BACKGROUND REPORT FOR AGROECOLOGICAL VOCATIONAL TRAINING

trAce

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Project leader: Ujj, Apolka

Partners:
Diversity Foundation - Hungary
GRAND FARM - Austria
Research Institute of Agricultural Economics, National Agricultural Research and Innovation Centre (NAIK-AKI) - Hungary
Jihočeská univerzita v Českých Budějovicích (USB) - Czech Republic
Agri-Cultura-Natura Transsylvanien (ACNT) - Romania
Grupo de Acção e Intervenção Ambiental (GAIA) – Portugal

Editors:
Ujj, Apolka
Bálint, Csaba

Authors:
Bálint, Csaba
Bernas, Jaroslav
Dezsény, Zoltán
Encarnação, Miguel
Farkas, Tibor
Goda, Pál
Grand, Alfred
Horstink, Lanka
Jancsovszka, Paulina
Klenkhart, Livia
Mogyorós, László
Moudrý jr., Jan
Moudrý sr., Jan
Mutua, Kennedy Ndue
Queiroga, Rita
Ramos Díaz, Fernanda
Rodics, Gergely
Strenchock, Logan
Szilágyi, Alfréd
Ujj, Apolka
Vásáry, Viktória

Proofreaders:
Horstink, Lanka
Kis, Máté
Strenchock, Logan

Cover page: Csibi, Júlia

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INTRODUCTION TO THE TRAECE AGROECOLOGICAL BASELINE REPORT

Aim of the agroecological situation analysis

The interpretation of sustainable development as a response mechanism to anthropogenic impacts on the biosphere is rather broad. International conventions, studies, and research define and interpret sustainability strategies and policy through varying approaches. Another reason for the broadness of the dimension of sustainability is that, in addition to the environmental and economic pillars, social sustainability has rightfully come to the forefront as a significant issue. It is commonly agreed in definitions that sustainable development is "*a strategy of preserving the world, which must include using natural resources that meet the needs of the present generation without diminishing opportunities of the next generation*" (Our Common Future, 1987). Over the last decade, the impacts of agriculture as a significant net contributor to climate change and anthropogenic impacts on the planet have been extensively documented, as has the potential for sustainable agriculture to be a viable strategy for climate change mitigation and adaptation.

Agroecology (AE) has emerged as a sustainable agriculture approach based on a dialogue of different knowledge systems between popular wisdom and science, which links a scientific discipline, agricultural practices and a social movement that together represent a framework and tools for agricultural transition. Increasingly, agroecological practices at the farm level and within the food chain are suggested as a strategy for the practical implementation of sustainable development in the agricultural sector.

Agroecology, while referred to as a farming philosophy, can be understood as a broad collection of good farming practices that acknowledges agriculture's impacts on ecosystems and society. Agroecology does not have a specific certification method – thus it is difficult to identify and differentiate farms that practice the principles of agroecology, and to what extent – but its baseline components are identifiable, such as the use of crop rotation, green manure crops, minimal soil tillage, short distribution chains, circular on-farm resource loops and reduced reliance on chemical inputs, etc.

In the context of the trAEce project (see below), our consortium has applied the following definition of agroecology as the most appropriate for our regional context based on a literature review, a geographic background analysis and the combined input of our diverse project team members:

Agroecology is developed from knowledge that is premised on a combination of heuristic practices and transdisciplinary science that is supported by participatory action-research. This knowledge is further informed by the ancient traditions of people living in natural ecosystems that contribute towards the sustainability of the food system. AE practices nurture soil ecosystems, nutrient recycling, the conservation of energy and the dynamic management of biodiversity, as well as foster a social movement to reshape the relations within the food system, promoting proximity and solidarity between consumers and producers. In AE systems, both consumers and producers challenge and transform power structures in society, leading to self-governing communities that endeavour to loosen corporate control over food systems to achieve people's food sovereignty.

The purpose of this agroecological situation analysis is to investigate the concept and practice of agroecology in five partner countries in Europe (Hungary, Czech Republic, Portugal, Austria, and Romania). We aim to identify applicable international and national policies as well as support campaigns initiated by numerous non-governmental initiatives and research institutes that impact the adoption of agroecological principles in farming practice in the above-mentioned European countries. We will consider whether farmers receive sufficient support in the form of training, information, and counselling to interpret and translate the sustainability objectives of international conventions and guidelines into their own farming practice. We also aim to highlight the shortcomings identified as barriers to the widespread adoption of agroecology, offering an opportunity to policymakers to act in support of the integration of agroecology in agricultural practice, in compliance with European Union (EU) and national environmental, economic, agricultural and rural development policies.

Relevance of the trAEce partnership

Experts from 6 institutions in 5 European countries (Hungary, Czech Republic, Portugal, Austria, and Romania) will work together and exchange experiences to promote a clear, practical approach to agroecology at the decision-making level and to provide training tools for farmers and instructors that can assist in integrating agroecological principles in common practices. Accordingly, the project partners have developed country-specific agroecology situation analyses, which identify relevant political discourses, regulations, actors, practices, networks, etc., while documenting a comprehensive view of the level of knowledge of farmers regarding AE-based activities. The report also provides a summary of the status quo of AE-related trainings and learning opportunities that are available at different levels. Based on the situation analysis, an AE vocational training programme designed for farmers will be elaborated and refined by the project team and will be accompanied by written and visual learning materials, which will incorporate the results of planned trial sessions. In order not to limit knowledge transfer to one-off training sessions and to spread knowledge of AE practices more effectively, the project team will develop a methodological guide for trainers and educators.

The trAEce partner consortium believes that EU directives can be translated into good practice at the farm level, if incentives and subsidies are not applied in a vacuum, but rather are accompanied by awareness-shaping training for farmers. We therefore consider that practice-oriented vocational trainings that teach well-established good practices are a highly effective method to increase farmers' knowledge of AE.

International initiatives, European Union policy and legislation regarding agroecology

The concept of agroecology and its role in agriculture, as well as its integration into everyday practice through the implementation of European Union support and individual national policies (national support system, project initiatives, local subsidies, etc.), vary from country to country. The lack of an international, regional, or nationally agreed definition for agroecology has resulted in the absence of a well-defined European policy and relevant regulations on agroecology. At the same time, member states are implementing compulsory EU environmental and sustainable agriculture directives in widely different ways. This trend can also be found at a global level. *For example,* for the period of 2014-2020, high-level political decision-makers agreed upon 17 Sustainable Development Goals (SDG), many of which are relevant to agroecology: e.g. SDG 2 (zero hunger), 3 (good health and well-being), 12 (responsible consumption and production) and 15 (life on land). However, the report that has been prepared in anticipation of the 2030 Agenda for Sustainable Development summarising progress towards the SDGs (i.e. the number of actions that have been undertaken by governments and other stakeholders) demonstrates that over the past four years progress has stalled, or is not happening fast enough with regard to addressing major problems (United Nations Economic and Social Council, 2019). As a result, the most vulnerable people and countries continue to suffer the most from climate pressures and it is generally accepted that the global response thus far has not been ambitious enough. All in all, according to the report, there is much more to be done, including within the European Union.

The other important determinant of environmental protection is the Lisbon Treaty, which entered into force in 2009. It consolidates environmental protection measures in all three foundational documents of primary EU law (including the Treaty on the European Union, the Treaty on the Functioning of the European Union, and the Charter of Fundamental Rights of the European Union). Article 37 of the latter is about the prioritisation of environmental protection and the improvement of the quality of the environment that must be integrated into the policies of the Union and guaranteed in accordance with the principles of sustainable development.

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Additionally, the **7th Environment Action Programme (EAP)** has been the baseline guide for Europe's environmental policy up to 2020. In order to provide more long-term direction, it sets out a vision: *"In 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued, and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society."* While the language of the action programme sets ambitious goals, action on the farm level as well as support for transition have not shifted fast enough to encourage rapid changing of agricultural systems. The programme identifies three key objectives: to protect, conserve and enhance the EU's natural capital; to turn the EU into a resource-efficient, green, and competitive low-carbon economy; and to safeguard the EU's citizens from environment-related pressures and risks to health and wellbeing.

At present, AE-related elements in policy operate under the sustainable farming practice mechanisms, which are regulated under the Common Agriculture Policy (CAP), the financial support system that has shaped farming over the past four decades in the EU (CFS, 2019). Among the objectives of CAP the elements in focus that are in correlation with agroecology principles are: viable food production; sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water; and balanced territorial development, with a focus on rural employment, growth and poverty in rural areas.

Within the CAP, protective measures are regulated and encouraged through voluntary payments to farmers. Currently, a system of cross-compliance is in place that makes the distribution of certain area-based payments to farmers conditional on a baseline environmental (and, where relevant, animal welfare) performance. The so-called cross-compliance rules and the mandatory greening component of direct payments under Pillar I of the CAP are often criticized for not achieving the desired effect (Mizik, 2019) and for having their effects' measurability very limited (Alons, 2017). In the agricultural policy for the period 2021-2027 the general, subsidy-independent (Statutory Management Requirements, SMR) and the CAP-linked (Good Agricultural and Environmental Condition, GAEC) requirements, and greening, often described as complicated

Photo: Eszter Dobos

and rigid, are expected to be replaced by a new, more flexible, expanded system called 'conditionality'. The proposed new system aims at simplification, while retaining the benefits and eliminating the disadvantages of cross-compliance and greening, with more room for maneuver for Member States and their regions in developing eligibility criteria (EC, 2019).

There is often a general criticism of the system of direct payments that subsidies are unevenly distributed between farm sizes, to the detriment of small farms. As a result of the 'degressivity' of subsidies on farms reaching certain economic size (and level of support) and the effect of "*capping*" maximizing support, a decrease in the amount of payments per hectare can be detected in parallel with the increase in the size of the area (EC, 2018). However, most Member States applied only the compulsory deduction, did not make use of the support ceiling (Matthews, 2018). This resulted in quite few resources being reallocated to rural development – and thus to innovations for sustainability – in the period 2014-2020. We consider it extremely important, the measures of the post-2020 agricultural policy to allow for substantial modulation in order to increase value, improve rural employment and the ecological sustainability and resource efficiency of farming, on both small and large farms.

Financial incentives include payments from Rural Development Programmes (RDPs) based on the assumed extra costs incurred or income foregone by farmers who deliver environmental benefits. The CAP reform also provides payments to maintain or enhance the environmental benefits from farming systems (See further on in the section on the agroecological situation analysis of partner countries). While direct payments for good on-farm practice are one method of incentivising a transition to more sustainable farming, it is necessary to take into account that the production stage of agriculture is only one phase of complex, globalised food systems, and a number of different types of supports for sustainable transition must be developed to envision wide-scale adoption of better practices.

In spite of existing regulations, an international panel of experts on sustainable food systems in their report entitled 'Towards a Common Food Policy for the European Union – the Policy Reform and Realignment that is Required to Build Sustainable Food Systems in Europe' has been critical of the governing policies, such as the previous iterations of the CAP, which today are shown to have unfavourable social and environmental impacts. In response, the report maps out a single, time-bound vision for reforming European food systems under the umbrella of a Common Food Policy: a policy setting a direction of transition for the entire food supply chain, bringing together various sectoral policies that affect food production, processing, distribution, and consumption, and refocusing all actions on the transition to sustainability not only in agriculture, but in entire food networks. The concept sees agroecology as one of the primary sources of innovation, as well as the main guarantee of long-term resilience, in addition to diversification and adding value along the food chain. It proposes at least a 50% share of Pillar II in the agricultural budget and the introduction of a so-called "*agro-ecology premium*", which would reward the use of additional agro-ecological practices beyond conditionality (DeSchutter *et al.*, 2019).

In summary, over the past decades, the European Union has put in place a broad range of environmental and sustainable laws, regulations, and policies. But despite the fact that EU-funded international and national projects have managed to collect and/or elaborate proven best practices for environmentally conscious farming, many challenges still persist and experience suggests that a reconsideration of the EU's green farming principles in the strategies for agriculture and sustainable development is urgently needed for the period after 2020. It is an encouraging development that three of the nine specific objectives of the Common Agricultural Policy 2021-2027 (Climate change action, Environmental care, Preserve landscape and biodiversity) specifically address environmental sustainability. Beyond the framework of sectoral policies, climate protection and sustainable growth will also be at the heart of the design of the multiannual financial framework for the new programming period. Similarly, we can look forward to the European Green Deal, which aims to make the continent climate-neutral by 2050.

National consultations with practitioners in trAEce partner countries

The national agroecological situation analysis carried out in 5 European countries provides general insight about existing measures and opportunities at the European Union and national levels regarding agroecology and about ideological motivations or financial support farmers can receive to incorporate agroecological principles into their farming practices. The goal of personal consultations with practitioners presented below was to assess their perspective on agroecology surrounding circumstances in their location. Questions explored farmers' general awareness of the concept of agroecology, which elements of agroecology are implemented in their practice, motivation for or discouragement towards adhering to the principles of agroecology, and more.

Accordingly, we conducted 68 interviews (17 Hungarian, 17 Portuguese, 13 Romanian, 9 Austrian, 12 Czech). By analysing summaries of interviews it was possible to highlight the strengths and weaknesses that characterize the various approaches to practice of farmers, while also keeping in mind the contextual aim of developing agroecology pedagogical training programs which would serve the needs of practitioners.

In selecting interviewees, it was a priority to engage with a diverse group which would provide a comprehensive picture of agriculturists' different conceptual approaches to farming, level of professional knowledge and willingness and openness towards new practices. Accordingly, the study focus was not specifically organic farmers, as in many countries organic farming is identified with agroecology, and the four basic principles of organic farming (principles of health, ecology, fairness and care) are already reflected in the practice of agroecology. It was of targeted interest to assess the opinion and farming context of conventional farmers, with hopes of better understanding attitudes toward agroecology in stakeholder groups not necessarily expected to be familiar with concepts or practice. The interview questionnaire was designed to include arable crop producers, vegetable growers, fruit growers, livestock farmers and farmers of mixed farms, while also focusing on surveying farms of different scales (with land size categories of less than 75 hectares; between 75 and 200 hectares, and land with more than 200 hectares).

Contrary to most of the partners, the Portuguese team adopted a different approach, due

Photo: Gergely Rodics

to its longstanding connection to the movement of food sovereignty. Their specific working process is detailed in their country report.

In general, while being guided by a set of baseline questions, the length and level of detail of interviews and transcriptions varied, as both were influenced by the personality, openness and agroecological awareness of the interviewee, and the style of interviewers. As the international team of the trAEce project is diverse, both in terms of the composition of nations and the professional orientation of colleagues contributing to the project, it was not a strategic priority to standardize the summaries of the interviews. Rather, information obtained during interviews was summarized by interviewers and systematically interpreted to develop a descriptive matrix which included a synopsis of the existing competencies of farmers along with suggestions for competencies which could be further developed through vocational training.

The technical information at the beginning of the summaries is as follows:

Type of stakeholder; Date of the interview; Length of the interview; Methods of the interview; Form of operation; Position of the respondent; Age group of the respondent; Highest qualification of the respondent.

The summaries do not fully follow the concrete order or format of interview questions, but rather structure the responses in summary as follows:

- Activity, sustainable farming practices, sustainability challenges of the farm
- Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice
- Agroecology attitude, knowledge and skill elements considered as important by the farmer
- Needs and ideas of the farmer for agroecology training

The interviews do not describe all practitioners' farming practices, skills, knowledge and attitude towards agroecology, but provide a representative picture. Personal consultations served as an opportunity to identify missing competencies which can be developed through training. The vocational training modules developed throughout the trAEce project will focus on both desired learning elements suggested by farmers themselves in addition to focus areas which were identified by the research team, and aim to provide support which helps farmers to move towards high quality, agroecology aware production in all respects.

The transcripts of the interviews, broken down by partner country, can be found in the following annexes:

- Annex 1. National Consultation with Farmers in Hungary: interview transcripts
- Annex 2. National Consultation with Farmers in Romania: interview transcripts
- Annex 3. National Consultation with Farmers in Austria: interview transcripts
- Annex 4. National Consultation with Farmers in the Czech Republic: interview transcripts
- Annex 5. National Consultation with Farmers and Key Actors in Portugal: interview transcripts

Needs assessment for the vocational agroecological training for farmers

The needs assessment for the vocational agroecological training for farmers presented for each of the partner countries of the trAEce consortium is intended to guide the design of agroecology-based vocational training modules that correspond to relevant and locally specific challenges and opportunities in the project's partner countries. The content of the needs assessment sections is linked to and supported by the country-wide review of the state of agroecology in each partner country (the agroecological situation analysis) as well as a series of interviews with practitioners (farmers) and key stakeholders in each country (the sections entitled interviews with practitioners and key stakeholders).

The main objective of the interviews conducted with a broad range of farmers, both in terms of scale and in farming practices, was to allow farmers to self-assess their current skills, knowledge and attitude regarding their agricultural practices, in addition to gauging their opinions and knowledge of basic agroecological concepts. A deliberate distinction was made between skills, knowledge and attitudes as key areas of focus in the interviews and guided the methodology for coding interview responses into categories. This would allow us to link the feedback from the interviews to the common typologies of learning outcomes in adult vocational training courses in partner countries.

For each focus area (skills, knowledge, and attitude) a summary of strengths and weaknesses was drawn up (both self-stated as well as inferred by the researchers during the interview analysis phase). Additionally, interviewees were asked to list those topics where they would like to improve for each focus area while researchers in each country compiled their own suggested topics for improvement during the analysis phase.

The interviews also allowed us to gather additional, valuable information about established sustainable and socially conscious farm management practices, with the aim of identifying and better understanding the specific training needs of the farmers in each of the partner countries. The summary of farmers' responses was interpreted and combined with comparative inferences made by the researching teams. Overall awareness of established pillars of agroecological farming was measured in order to better identify strengths and weaknesses, and the relevant farming practice areas for the future development of vocational training courses were confirmed. We believe our methodology was adequately assess the needs of farmers in relation to sustainable farming practices and will help accomplish the goal of increasing the knowledge and viability of agroecology in farming practices in the participating countries.

Photo: Gyula Ádám

SITUATION ANALYSES AND NEEDS ASSESSMENTS OF THE PARTNER COUNTRIES

1. Agroecological Situation Analysis of Hungary

Diverzitás Foundation
National Agricultural Research and Innovation Centre
2020

1.1. Agroecology in Hungary

1.1.1. Historical background of agroecology in Hungary

Agroecology was initially developed as a scientific term integrating ecology and agronomy, serving to describe the agriculturally important ecological features of a site (that mostly meant soil, water conditions, climatic factors, and some biotic factors (flora, fauna) (Moudrý *et al.*, 2018). Although the term's first mention appeared more than 100 years ago, its usage as a more wide-ranging concept taking a reactionary stance to the intensification of agriculture after World War II became more prevalent in Europe in the 1990s. The political aspects linked to the movement side of agroecology were not as well known or developed in Central and Eastern Europe until recent years, largely inspired by peasant and indigenous agriculture movements of Central and South America. The social and cultural aspects of the agroecology movement began to receive greater recognition in parallel with the Food Sovereignty movement during the late 1990s and into the early 2000s.

From its beginnings as a scientific term 'agroecological features,' agroecology has evolved into a comprehensive framework approach to sustainable agriculture, and presently as a concept it is understood to have multiple branches of focus (a scientific field of research, practice based agricultural method and a socio-political movement). From science to practice and then into movement, this has also been the evolutionary transition of the term in Hungary.

Ecological agriculture, as an officially recognized conscious agricultural movement, has a nearly four-decade history in Hungary. The roots of Hungary's ecologically conscious agriculture and gardening movement, not originally initiated under the banner of agroecology, but rather following the "*ecological-agriculture*" or "*organic*" motto and principles, sprouted in the early 1980s with a club of small scale gardeners, environmentalists and natural medicine advocates who shared common interests in chemical free agriculture and individual and family health issues (Torjussen *et al.*, 2004). In 1983 the Biokultúra-Klub was established as the first official organic agriculture organization in Central and Eastern Europe, adopting the moniker "*organic*" based on similar European movements. In 1987, the Biokultúra Klub was transformed into the Biokultura National Association, and gained greater credibility by being the first Central European organization recognized as an official member by the International Federation of Organic Agricultural Movements (IFOAM) (Torjussen *et al.*, 2004; Székács *et al.*, 2020). In 2005, the organization transformed into the Biokultura Alliance (Magyar Biokultúra Szövetség) and in its current form consists of regional branches that collaborate with organic producers, relevant associations, and advocates to facilitate political recognition for the merits of organic agriculture. The Hungarian Biodynamic Association (Biodinamikus Közhasznú Egyesület) was officially recognized by Demeter International, the world's largest certification organization for biodynamic agriculture, in 2000. In addition to the organic and biodynamic movements, in 2006, a group of permaculture enthusiasts formed the Hungarian Permaculture Alliance (Magyar Permakultúra Egyesület), which was registered as an official civil service association in 2016.

Between 2005 and 2015, several social farm initiatives were launched independently from each other with various focus target communities including: community farm development programs for Roma communities and unemployed people, farm pedagogy programs for school children, and social farms for disabled people with agricultural production, pro-

cessing, and eco-tourism activities. Many of the programs included ecological agriculture as an integrated portion of the social farming activities. In 2016, the Alliance of Social Farms was founded by 21 organizations, and since then, the number of participating members has increased steadily. The aim of the alliance is to foster the legal and institutional recognition of social farms in Hungary as a new agricultural model with social, health, employment and education functions (Čurná *et al.*, 2017).

1.1.2. Agroecology and ecological agriculture in practice

The amount of officially certified organic agriculture territory in a nation is by far from the only means of judging the progress of a greater agroecology movement but is a useful metric for gaining an idea about the feasibility of earning a livelihood from ecological agriculture in a country. The certified ecological agriculture movement has a nearly three-decade tradition in Hungary but remains a relatively small percentage of overall agricultural activity – while two-thirds of Hungarian land is agricultural, only 3–4 percent is certified organic (Meredith & Willer, 2016). (The organic share of total agricultural land in Europe is 3.1% whilst the organic area made up 7% of total EU agricultural land). The optimistic outlook for organic production in the early 2000s waned with stagnating adoption of such practices post-EU accession. Organic agriculture has grown slower in Hungary than in neighbouring countries. At the beginning of the 2010s, incentives for larger landholders to convert have reduced due to reliance on exporting – around 85 percent of Hungary's organic produce is exported, mostly feed crops for animal husbandry – and overall low prices for raw goods (Dezsény & Drexler, 2012).

The informal and formal ecological agriculture movements face many of the same challenges as the conventional sector. The most pressing issues include: marginalisation of Hungarian organics within the EU and international markets; a raw-commodity export-oriented tendency; market saturation with imports; low recognition of Hungarian products within the domestic market; difficulty in acquiring retail space in conventional shopping outlets; weak representation within the political sphere; insufficient communication between growers, organic advocates, support organisations and research institutes; weak policy initiatives and structural support systems, and disproportionate reliance on demand in urban locations to drive direct sales (Strenchock, 2012). Despite these challenges, in recent years, the foundation has been laid for the convergence of the historic ecological agriculturalist and more recent agroecology guided movements, which represent the basic elements of an agroecology network in Hungary. Actors include agriculturalists with decades of practical experience and a new wave of younger, college-educated, formerly urban professionals turned growers who are working together with other citizens and advocacy groups to establish new direct marketing chains in rural and peri-urban locations, supporting agroecological production.

1.2. Policy and institutional system of agriculture and environmental protection in Hungary

1.2.1. Governance

Since 2010, environmental issues in Hungary have largely been dealt with by the Ministry of Agriculture, after a reorganization and abolishment of the former Ministry of Environmental Protection. The Ministry of Agriculture's operating scope is vast, responsible for environmental policy and nature protection, rural development schemes, promotion of the operation of local community initiatives for sustainable development, and the establishment and operation of a national network for food chain surveillance legislation, including organic and integrated farming.

Under the Ministry of Agriculture's Organizational and Operational Rules, the Secretary of State for the Environment, Food Chain, Agriculture, Rural Development and Land Affairs is assisting the Minister for Agriculture. If agroecology is to gain traction as a calculated agricultural and environmental protection policy measure in the future, cooperation with and acknowledgement by the Ministry of Agriculture is essential for promoting new goals, targets and ground-level practices in the agricultural sector, in addition to develop-

ing support measures and incentives for agriculturists.

1.2.2. Law enforcement and regulating authorities

The institutional framework of agroecology incorporates ministries and reporting organizations – principally the Ministry of Agriculture –, its background institutes, authorities, the financing agencies, and administrative bodies.

Among background institutes, the National Food Chain Safety Office (NFCSO) is responsible for inspection, certification, and food safety measures across the food chain. The NFCSO is comprised of metropolitan, county, and district offices. These offices are the government's territorial administrative agencies with general powers. The 20 government offices constituting the largest units of territorial public administration operate in the county seats, while in the case of the capital and Pest County in Budapest. Government offices coordinate and facilitate the territorial implementation of governmental responsibilities in accordance with the relevant rules and the governments' decisions. In connection with the fulfilment of their responsibilities, government offices take part in the development of certain sector- and policy-specific documents as well as in the territorial implementation of decisions. The Food Chain Safety and Animal Health Directorate of the Government Office is under the professional guidance of the NFCSO. It carries out food safety, food quality control, feed control, food chain monitoring, animal health, and certain control tasks related to animal husbandry and winemaking. The General Department for Environmental and Nature Protection, that belongs to the Government Office of Pest County, operates the National Environmental Information System, which contains data on environmental pressures and conditions for the bodies responsible for environment, nature preservation, water protection, regulatory, and administrative functions.

The duties of a public authority are split between NFCSO and the county government offices. According to the Ministry of Rural Development regulation 34/2013, the competent authorities' tasks are shared between NFCSO and the Pest County government office and the district offices with competences either in food chain safety and animal health or in plant- and soil protection. The most important task of NFCSO is to recognize certification bodies. The Pest County government office is in charge of authorization. The district offices control compliance with eco-labelling and apply sanctions. (It is difficult for consumers to identify products with a similar term to the organic one on the market. In the interest of consumer protection and fair competition, term used to indicate organic products should be protected throughout the European Community therefore NFCSO controls and sanctions if necessary).

The Hungarian State Treasury, as the Hungarian Paying Agency, is responsible for the implementation and execution of numerous agricultural and rural development support schemes – including the agri-environment schemes (Box 1.1.). It was established as the Agriculture and Rural Development Office (ARDO) – the general successor of SAPARD Agency and Agricultural Intervention Centre – in 2003. According to the Government decree, 328/2016 (X.28.) on the closure of the Agriculture and Rural Development Office and on the modification of related government decrees the ARDO stopped operating in 2016 and the Hungarian State Treasury was appointed as its general successor in January 2017. Since 2016 the county offices of the ARDO have been integrated into the county government offices. These county government offices carry out the CAP related tasks delegated by the Paying Agency to them.

All entities that carry out farming activities have to comply with the various regulations of the authorities. The complex system is called 'cross-compliance', the main elements of which are the Statutory Management Requirements (SMR), that apply independently from any support, and the Good Agricultural and Environmental Conditions (GAEC), which apply only to farmers receiving support under the CAP. The 13 community regulations of the SMR and the GAEC rules can be divided into three cross-compliance areas: 'Environment, climate change and good agricultural status' (SMR 1-3: protection against nitrate pollution of agricultural origin, protection of wild birds, protection of natural habitats, and the compliance areas of GAEC); 'Public, animal and plant health' (SMR 4-10: animal identification and registra-

tion, food and feed safety, plant protection, agricultural hormone use) and 'Animal welfare' (SMR 11-13: protection of calves, protection of pigs, protection of animals kept for breeding). The Hungarian State Treasury determines the legal consequences (sanctions) of the violation of the requirements.

Box 1.1.: Subsidies of greening, agri-environmental and ecological activities

As part of the reform of the Common Agricultural Policy, the greening obligation for farmers benefiting from the Single Area Payment Scheme was introduced in 2015. The term refers to agricultural activities, i.e., practices that are beneficial for the climate and the environment. Its primary objective is to contribute increasingly to the preservation of the environment and the natural resources on which agriculture is based. Greening support can only be claimed for areas under the Single Area Payment Scheme (SAPS). The amount of support for greening is EUR 81, or about HUF 25,000 per hectare, which is a non-refundable annual payment. Greening is a combination of three different practices: 1. Crop diversification: a greater variety of crops makes soil and ecosystems more resilient; 2. Maintaining permanent grassland: grassland supports carbon sequestration and protects biodiversity (habitats); 2. Dedicate 5% of arable land to areas beneficial for biodiversity: Ecological Focus Areas (EFA), for example, trees, hedges or land left fallow that improves biodiversity and habitats. The rules on greening do not apply to farmers who opt for the small producer scheme. Organic farmers automatically receive greening support for their farm because of the nature of their work, which by definition has environmental benefits. Other exemptions may be applied depending on the individual situation of the farmer.

The main objectives of the agri-environment scheme (AES) are to support the sustainable development of rural areas, to preserve and improve the state of the environment, to reduce the environmental burden of agricultural origin, to provide environmental services and to strengthen agricultural practices based on the sustainable use of natural resources. In addition, it intends to promote the preservation of biodiversity in its natural living conditions (on the farm), the protection of nature, water, and soil through the development of production structures appropriate to the conditions of the area, the development of environmentally conscious farming and sustainable land use. Besides conversion to organic farming, other measures are: integrated production; reducing inputs of fertilisers and/or pesticides; crop rotation; enhancing habitats for wildlife; introducing buffer strips; managing livestock to provide the right grazing pressure on grassland species and avoiding the risk of soil erosion; conserving genetic resources in agriculture and local species and in animal breeds threatened by genetic erosion. Although the EU agreed to abolish the obligatory set-aside in 2008, in Hungary, this incentive still remains a requirement in some agri-environmental schemes in High Nature Value Areas (as establishment of sown set-aside fields).

The AES is part of the Rural Development Programme. Applications may be submitted on the basis of commitments for a period of 5 years. The area covered by the support shall be at least 1 hectare. Farmers who receive AES subsidy have to comply with the requirements of the cross-compliance, greening, Good Farming Practice and the general principles of integrated plant protection. In the case of agri-environment and climate measures, HUF 50.8 billion was paid on 641.8 thousand hectares in 2018 under 13.3 thousand subsidized contracts.

Within the framework of the Rural Development Programme, the other very important source of supporting ecological objectives is the call titled 'Conversion to organic farming, maintaining organic farming' ("*ÖKO*"), which is a voluntary payment system whereby participants undertake to carry out additional activities in their farming to achieve organic farming objectives. The purpose of the scheme is, on the one hand, to encourage the conversion of conventional areas to organic farming and, on the other hand, to maintain farming practices in organic areas. The supported farms are obliged to follow the regulations of the cross-compliance, greening, and ÖKO minimum requirements. The same commitment area, as measured by GPS coordinates, is eligible for either AES or ÖKO scheme only, so both supports cannot be used for the same area at the same time. In the case of organic farming conversion payments and payments for the application of organic farming practices and methods, in 2018 2.1 thousand beneficiaries received HUF 8.0 billion on 147.8 thousand hectares.

Among Ministries also the Ministry of Interior is notable as it is in charge of water issues. The Minister of Interior directs the General Directorate of Water Management and thus the National Water Authority.

A number of local government initiatives have already started up over the last few years, aimed at developing skills and knowledge appropriate for rural areas in basic agricultural areas. Through such programs, the Hungarian government has indicated an awareness of the central importance of the social context of agriculture and its resource-efficient nature that complies with the long-term strategic goal of sustainable natural resource management. Accordingly, the Ministry of Interior initiated the community employment programme ("*Közmunka program*") in 2011, to address entrenched rural unemployment. Organic farming can also be implemented as a subprogram of agricultural community employment programme, although it does not receive extra support compared to conventional agricultural activities implemented by municipalities. There is room for more committed integration of agroecological principles into future sustainable rural development programming initiated by the government.

1.2.3. Policy Level Impacts

Although advocacy for sustainable agriculture and voluntary practice by committed farmers in Hungary has a decades history, the adoption of agroecology as both a framework for influencing agricultural policy and practice and as a strategic term for bringing attention to the wider social impacts of agriculture has only become more common in the last five years. Agroecology, or "*agroökológia*" in Hungarian, as a concept and term is most widely recognized and publicized by research and advocacy groups, and a small percentage of agriculturists who are typically younger and highly educated. Much work is being done by civic actors and engaged agriculturalists to create the basis of an appropriate agroecology transition strategy and network, which is in consideration of specific local traditions, geographic and economic conditions, and the surrounding policy environment. From the official national policy perspective, sustainable agricultural goals, with a few sparing direct references to spreading organic agriculture, have been included at varying levels of specificity in numerous versions of Hungarian rural development policies, which beyond serving as ambitious texts have done little to actually encourage a shift from dominant national trends of conventional agriculture. Agroecology, as a specific approach, has largely been excluded from official agricultural policy documentation in Hungary. Due to persistent challenges created by the international and domestic food market structure, structural payments for organic conversion have not been enough to incentivize a wide scale adoption of certified organic agriculture in Hungary. In addition to this, direct single area payments and agri-environment schemes based on territory size are not compatible for providing support to smallholders who are more likely to be participating in local food networks.

1.2.4. Governance and decrees in relation to agroecology

Since the communist regime change in Hungary 1989, many treaties and conventions have been signed regarding environment conservation, biodiversity, agriculture, and human rights that to some extent, promote agroecological principles and sustainable practices. (See Annex 1.1. about the entire list.)

The most relevant treaties related to agroecology in which Hungary participates are:

The International Treaty on Plant Genetic Resources for Food and Agriculture or better known as the International Seed Treaty, entered into force on 29 June 2004. It aims at guaranteeing food security through the conservation, exchange and sustainable use of the world's plant genetic resources for food and agriculture as well as recognizing farmers' rights.

The Seed Treaty could be an important tool for farmers and the community to ensure the preservation of local varieties of plants that provide a more resilient ecosystem as well as ensuring a provision of healthy and culturally appropriate foods. However, according to the FAO country report's website, Hungary does not appear to take any action regarding projects or implementation.

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, better known as the Aarhus Convention, entered into force on 30 October 2001. This convention establishes several rights of the public (individuals and their associations) with regard to the environment such as: access to environmental information, public participation in environmental decision-making and access to justice. It is an instrument for supporting a culture of democracy and participation producing better environmental decisions and outcomes from a more informed and empowered society.

The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, signed in 2016. Hungary was the first EU country to pass legislation to support the agreement. Agroecology can play an important role in increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions through the implementation of sustainable, low-impact agricultural activities, efficient use of resources, and promoting local and responsible consumption therefore, decreasing the distance of transportation in the distribution of food and reducing waste. Although Hungary is to date still participating in the Paris Agreement, it has not taken substantive action on prioritizing sustainable agriculture as a climate adaptation strategy.

It is important for the actors of agroecology of Hungary to pay attention to the current and future treaties and agreements that influence the development of agriculture and food systems. Making reference to binding agreements that have relevance in the agriculture that are not currently strongly pursued in Hungary can provide legitimacy to calls for greater action. Currently, environmental and social challenges which demand the international community to commit to new agreements that should have a more realistic acknowledgement of the planet's biophysical limits, while prioritizing sustainable and regenerative practices where actors take ownership of the processes and benefits and where natural resources of future generations are not compromised.

1.3. Agroecology in scientific research, development and innovation

1.3.1. Research Institutions

A wider recognition of sustainable agriculture, ecological agriculture and the complex social impacts of agricultural systems became a topic of focus for Hungarian research institutions, civil service groups, and citizen advocacy groups in the last decade.

The National Agricultural Research and Innovation Centre (NARIC) is the Ministry of Agriculture's research and development institution for agricultural, food and environmental sciences. The Centre has a network of 12 research institutes and independent departments in the fields of agri-environmental science, food science, agroeconomics, crop production, vegetable, fruit and ornamental production, viticulture, animal breeding, animal feed, meat, working in the fields of forestry, agricultural biotechnology, and agricultural mechanization. Research by NARIC institutes aims to provide farmers with the most practical solutions, combining research with practice. Without being exhaustive, a few examples include: the Department of Field Crops Research, the most important activity of the Research Group on Sustainable Agronomic Models is the development of new technologies for integrated production; development of fertilization methods, soil fertility, and climatic effects; The main area of research in the Research Institute for Animal Breeding, Nutrition and Meat Science's Research Group for Ecology, Livestock housing and Gene Conservation is to quantify and study the possibilities of reducing the environmental burden caused by animal husbandry (primarily air pollution, ammonia, and greenhouse gas emissions), to explore the potential of environmentally friendly animal husbandry technologies in livestock farming and to investigate the effects of animal by-products, in particular litter and slurry manures, on soil, plants, and the entire production cycle. The Forest Research Institute examines the responses of forests to environmental impacts and their role in carbon cycles as they analyse the potential impacts of climate change. It develops natural-based forest management practices to reduce the proportion of clear-cut areas and to preserve the species and genetic diversity of forest ecosystems.

In 2014, agroforestry research began at the Forestry Research Institute. In the intermediate cultivation systems (at different locations in Hungary: Debrecen, Fertőd, Gödöllő, Karcag, Püspökladány) several factors are investigated in the rows of wide network plantations (cereals, various aromatic plants, stoop crops, legumes, berries). These studies focus in particular, on exploring the ecological, physiological, and economic relationships between the coexistence of wood production and agricultural crop production.

The Balaton Limnological Institute, the Danube Research Institute, the Institute of Evolutionary Sciences and the Institute of Ecology and Botany operate under the auspices of the Centre for Ecological Research, formerly managed by the Hungarian Academy of Sciences and currently under the auspices of the Eötvös Lóránd Research Network (Eötvös Lóránd Kutatási Hálózat, ELKH) of the Ministry of Innovation and Technology. Under the Act on Scientific Research, Development and Innovation, the activities of the Research Centre for Ecology include the study of terrestrial and aquatic communities; examining the sustainability of ecosystem services; research relating to existing international conventions on the protection of habitats, biodiversity, and water quality; impact analysis of land use, landscape management, water use, water management, and other interventions; examining the relationships between ecological processes at global, regional and local scales; basic and applied evolutionary research. The Centre for Agricultural Research is also integrated into the ELKH, and within the latter, the Institute for Veterinary Medical Research, the Institute for Soil Science and Agricultural Chemistry, the Plant Protection Institute, and the Agricultural Institute. The aim of the Agricultural Research Center is to carry out basic research, applied research, and development in the field of agricultural sciences and to contribute to the transfer of scientific and professional knowledge to society.

Ecological research is carried out within the Section of Biological Sciences of the Hungarian Academy of Sciences. The agricultural research activity is conducted according to the following disciplines: agricultural economics, agrarian engineering, forestry, horticulture, veterinary science, animal breeding, animal breeding, animal breeding, crop protection, plant biology, agricultural biotechnology, biometrics, biometrics and village sociology, soil science, agrochemistry, water management, and grassland management. The Section of Biological Sciences is part of the Scientific Committee on Ecology.

The Research Institute for Organic Agriculture in Hungary (Ökológiai Mezőgazdasági Kutatóintézet, ÖMKi), a branch of the Research Institute for Organic Agriculture in Europe (FiBL) was established in 2011 and since then has been a forerunner in opening forums for communication between ecological producers and industry stakeholders, engaging in field-level research which serves the needs of farmers in Hungary, organizing training programs for novice and experienced gardeners, and supporting academic research which focuses on the technical and scientific aspects of organic agriculture (Strenchock, 2012). In recent years ÖMKi has adopted the credo of agroecology in many of its publications, research and advocacy projects (OMKI, 2020). It has also organized a number of practical courses and conferences for farmers, which aim to disseminate the results of research conducted by the institute, with special attention to the results of their on-farm trials of organic agriculture methods in-situ in Hungary.

Agroforestry is also a rising topic in Hungary, besides the institutional initiatives (National Agricultural Research and Innovation Centre – Forest Research Institute) and academic interests, a network of practitioners was formed during the AFINET H2020 project, and they established the Hungarian Agroforestry Civil Association (Agroerdészeti Civil Társaság) in 2016. Additionally, in the focus field of fruit production, the Carpathian Traditional Fruit Growers Network (Kárpát-medencei Gyümölcsész Hálózat) aims to conserve old fruit varieties, and they have established and promoted techniques for ecological fruit production called Adaptable Fruit Growing (Alkalmazkodó gyümölcsészet).

1.3.2 Support Service Providers, Institutes and Societies

Pursuant to Act CXXVI of 2012, the Hungarian Chamber of Agriculture, Food and Rural Development is a public body of private and legal persons exercising agricultural activity and requires compulsory membership and payment of membership fees from all farmers. It performs the administrative tasks of the Chamber of Agriculture for the following purposes: development of the agri-food industry, rural development; establishing, maintaining or enhancing the security of business traffic and fair market behaviour; the pursuit of the common, collective interests of those engaged in agro-economic activities; developing strategies and programs for specific sectors of the agro-food sector.

As part of its public service duties, the Chamber of Agriculture operates a national network of advisors (state-funded advisory system); In addition to the areas of production and the applied technologies, the system of extension providers carries out advisory services on fields of expertise which are connected – inter alia – with the ecological functions and responsibilities of agriculture, such as environmental protection and nature conservation, within the framework of which, activity areas like ecological farming, water management, soil protection, alternative energy, etc. are covered. The main areas of specialisation also include plant protection, forestry, wildlife management, or the socio-economic aspects as land issues or rural development. Despite the wide specializations mentioned, the quality of the advisory services depends on the personality and knowledge of individual advisors rather than the whole organization. Furthermore, the work of village agronomists – who provide information to the farmers about grant opportunities (but in terms of technical issues farmers are directed to the registered advisors) – prepare crop estimation and status rating or assess agricultural damage events- is often limited to paperwork and administration issues (Ujj, Jancsovszka & Bálint, 2017).

Currently, the Hungarian Advisory system is also anchored on the European Innovation Partnership (EIP-AGRI), which was established in 2012 to rebuild broken relationships between research and practice and to bring innovation to the market. The newly developed network enables the establishment of close cooperation and partnerships between different actors within innovation and agriculture. The network will contribute to disseminating new and existing knowledge and developing it into innovation-based practices.

The Herman Ottó Institute is a non-profit limited liability company owned exclusively by the Ministry of Agriculture. The company provides services in the fields of professional tasks related to nature and environment protection, project coordination, application management and event management, eco-label system operation and certification tasks, agricultural training, and the Ministry of Agriculture publishing and distribution.

The National Centre for Biodiversity and Gene Conservation (Nemzeti Biodiverzitás- és Génmegőrzési Központ) is the official institute responsible for the plant genetic resources and the old Hungarian farm animal breeds of the country. The main focus of the organization is to promote the conservation of agrobiodiversity.

The Hungarian Ecological Society's (Magyar Ökológusok Tudományos Egyesülete) mission is to unite, assist and organize the basic applied research of Hungarian ecologists; providing a forum for the presentation of scientific results of ecological research, ensuring an efficient exchange of information and experience; promotion of ecological knowledge and research results; protection of nature.

The National Society of Conservationists – Friends of Earth Hungary (Magyar Természetvédők Szövetsége) was established in 1989 and their overall objective is to protect nature as a whole and promote sustainable development. They have 113 member associations with almost 33,000 members across Hungary. A large number of the member groups are small, local organisations whose main activities include environmental education, awareness-raising, participation in uncovering and solving local environmental problems, environmental advisory work and nature conservation tasks. Among the society's educational publications, there is a specific issue related to agroecology

(https://mtvsz.hu/kiadvanyok) that summarises the concept of agroecology for a wider audience (not only for scientists).

1.4. Civic organizations, projects, civic research and agroecology campaigns

As the concept of agroecology is becoming better known in Hungary, many research and educational projects, international collaborations, and scientific conferences have focused on the subject. Further promotion and support of agroecology has emerged from the civil sector as well, with a notable increase in activity during the last decade.

1.4.1. Timeline of notable recent events and campaigns

In 2012, a civic-oriented branch of the National Centre for Biodiversity and Gene Conservation was established by organic gardeners and botanists called Seedhouse (Magház) which became an official organisation for promoting seed saving and traditional, heirloom varieties. Since then, they have been working to organise seed exchange events across the country.

In 2015 Greenpeace Hungary launched in its campaign to support organic farming and to reduce the negative impact of conventional farming. The campaign was supported with published materials in Hungarian, along with organised events and trainings. Also, in 2015, the Hungarian Association of Conscious Consumers (Tudatos Vásárlók Egyesülete, TVE) launched a project to promote participatory quality guarantee systems for small scale farmers who do not have the financial means for traditional certification methods for organic agriculture. The organisation also continued promotion of Community Supported Agriculture in Hungary, while facilitating the Alliance of Community Based Smallholdings (Közösségi Kisgazdaságok Szövetsége, KÖKISZ).

The programming of the United Nations Food and Agriculture Organization (FAO), which has a regional office in Budapest, has also been impacted by the increase of recognition of agroecology globally. In 2016, the Regional Symposium on Agroecology for Sustainable Agriculture and Food Systems in Europe and Central Asia was held in Budapest. During this event, the Hungarian Minister for Agriculture confirmed that "*Agroecology is key in ensuring sustainable agriculture, protection of biodiversity, sustainable natural resource management, and supporting rural development*" (FAO, 2016).

Additionally, in 2016, Hungary was represented by a number of participating civic organisations – Hungarian Association of Conscious Consumers (Tudatos Vásárlók Egyesülete), Védegylet (Protect the Future Association), Hungarian Permaculture Association (MAPER), National Society of Conservationists, Kislépték Association – at the Nyéléni Pan-European Forum on Food Sovereignty, which had a specific focus on developing campaigns to spread knowledge and awareness of agroecology in practice in Europe Nyeleni Summary, 2016.

In 2017 National Permaculture Associations from Visegrad countries (Hungary, Czech Republic, Slovakia and Poland) and Ukraine united to create an informal alliance to promote permaculture and agroecology in agriculture and education through a series of Visegrad fund projects. They built up an international database of various projects (farms, communities, education centres), made a survey of permaculture education in adult training and during the last project, they focused on strengthening links with other movements (WOOF, GEN).

Védegylet (Protect the Future Association) has devoted a large majority of its work and programming since 2018 to developing a functioning agroecology network in Hungary. "*Agroecology Nights*" were a series of events co-organised by Védegylet and the Department of Environmental Sciences and Policy at Central European University in Budapest from November to March 2018. Guest speakers featured in these events were farmers, consumers' associations, researchers, academics, and civil society organizations active in alternative agricultural systems.

A group of mid-scale farmers formed an official association in 2019 called Soil Regenerative Agriculture Association (Talaj Megújító Mezőgazdaság, TMMG egyesület). Their main aim is to put into practice no-till farming meth-

ods in the Hungarian circumstances adapting technologies from the USA and other European examples. Most of the participants are arable land farmers interested in the technological feasibility of no-till farming. They organise field days, and they have an annual 3-day conference with the contribution of international experts.

In November 2019, in the framework of the International Environment Month, the first conference with a targeted focus on Agroecology in Hungary took place in Budapest. The conference was organised by the French Embassy in Hungary, French Institute in Hungary and their partners Védegylet, Hungarian Ministry of Agriculture, Hungarian Chamber of Agriculture, Dutch Embassy in Hungary, Ökopolisz and ESSRG (Environmental Social Science Research Group). This conference organizers and participants represent the first collective movement to bring together actors from different fields through the lens of agroecology: farmers, NGOs, researchers, and interested citizens. As agroecology is based on collaboration, the conference can be thought of as a significant milestone for the future work on dissemination and ongoing development of this field.

On the 25th of January, 2020, the Food Sovereignty Forum was organised by fifteen organisations encompassing workshops on 6th themes, agroecology was one topic (https://permakultura.hu/elelmiszer-onrendelkezes-forum-2020-01-25/). Many organisations were represented which are stakeholders in the agroecology movement. During the afternoon in the agroecology thematic section, participants went through an initial "*Agroecology in Hungary*" declaration, which aims to specify Hungarian circumstances of what agroecology means in viewpoint and practice for the Hungarian agroecology network.

1.4.2. Civic Research Partnerships

Civil service institutions and university research centres have also put the Hungarian agroecology movement on the map through participation in international research projects which focus on food sovereignty, agroecology, and sustainable food chains.

A number of recent relevant projects and actors include:

The Environmental Social Research Group (ESSRG) has been a lead partner in numerous projects focusing on in-situ biodiversity and food chain management including: the Dynaversity project, concentrating in building diversity in agri-food chains, the FitForFood2030 project, which targets European Union decision makers understanding of sustainable food and agricultural policy, and the TRUE project, which focuses on spreading knowledge of diversified legume production.

Védegylet and Kislépték, the National Association of Interest Representations for Small-scale Producers And Service Providers, are collaborating Hungarian partners in the BOND project, which aims to encourage collective action and networking of individuals, groups and entities of farmers and land managers with a view to creating strong, dynamic and effective organizations that impact agricultural policy design. In addition to participating in research projects, Kislépték strives to improve the legal and economic conditions for small-scale, local initiatives that can strengthen the local economy and promote environmentally low-impact methods of food production and processing, including handicraft production and its market access. The association promotes a community-based organic agricultural program to spread sustainable development models among small village communities, in order to have a positive impact on nutrition, economy and ecology by implementing community-supported agriculture.

The UNISECO ('Understanding and Improving the Sustainability of Agro-Ecological Farming Systems in the EU') Horizon 2020 project focuses on Soil Conservation Farming in Mid-scale conventional arable farms in its case study in Hungary.

From 2013-2016, Szent Istvan University (SZIU) participated in the SAGITER project, which aimed to "*valorise the process of acquisition and transmission of agroecological knowledge through an action study*" in partnering countries. A main focus on the project for the Hungarian team was to develop new methods for agroecology pedagogy and train-

ing for educators of future practitioners. Under the leadership of SZIU the ECO-Motive project international team has elaborated a vocational training in organic small-scale farming, with focus on social integration of disadvantaged people.

1.4.3. Social Farming Campaigns

In terms of social aspects of agroecology, it is still worth highlighting international projects that facilitate the public transition to the agroecology concept and articulate policy-making towards agroecology, while also exploring the societal benefits of agricultural activity which is inclusive of disadvantaged groups.

Social farming relates to a complex re-framing of agriculture and rural areas to provide socially and environmentally sustainable models, in comparison to what is resultant within the dominant agribusiness model. The Social Farming in Higher Education project-SoFarEDU, similarly to the Social farm mentor training – Revitalist project intends to take further the concept of social farming in Hungary by empowering rural communities and rural economies across Europe by increasing the quantity, and above all, the quality of social farms. SoFarEDU project team (with the participation of SZIU) elaborated a new social farm training curriculum in higher education in order to provide universities with tools to teach the necessary social farming skills. The Revitalist project is based on a social and therapeutic method of education (Practical Skills Therapeutic Education, PSTE) elaborated a vocational training curriculum for social farm mentors by creating and collecting a pool of background materials and by establishing a network of professionals, and this way responding to several European regional and local policy needs. The lead partner of Revitalist is the Hungarian Quality Compost Association (Magyar Minőségi Komposzt Társaság), but the consortium has more Hungarian partners: Diverzitás Foundation, Municipality of Tiszasas and WOOF Hungary (Word Wide Opportunities on Organic Farms).

1.5. Field of education

Regarding higher education, although specific 'Agroecology' titled programs, courses or trainings have not yet been developed, both BSc and MSc curricula cover several topics related to agroecology such as organic agriculture, soil and resource conservation, environmental management, agrobiodiversity, integrated pest and weed management, landscape management and nature conservation, agro- and soil ecology, natural resource management, agricultural, landscape evaluation and management, environmental sociology, sustainable agriculture and practices etc. In reliance on the database of Védegylet, these topics are included in the curricula of the following academic programs (by university degree) and trainings:

Academic programs (by university degree):

BSc and MSc level:

- Horticultural Engineer: Szent István University, Faculty of Horticulture, Buda Campus; University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management, Pannon University, Georgikon Faculty
- Agricultural Engineer: Szent István University, Faculty of Agricultural and Environmental Sciences (BSc and MSc 5-year program; University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management; Pannon University, Georgikon Faculty; Széchenyi University, Faculty of Agricultural and Food Sciences (BSc, MSc, 5-year program)
- Plant Production Engineer: Szent István University, Faculty of Agricultural and Environmental Sciences
- Agricultural and Rural Development Engineer: Szent István University, Faculty of Agricultural and Economic Sciences, Szarvas (from 01/02/2020 it continues to function as an institute)

MSc level:

- Environmental Agricultural Engineer: Szent István University, Faculty of Agricultural and Environmental Sciences (until 2017 BSc program); University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management (until 2017 BSc program), Pannon University, Georgikon Faculty; Széchenyi University, Faculty of Agricultural and Food Sciences
- Organic Farming Agricultural Engineer: Szent István University, Faculty of Agricul-

tural and Environmental Sciences and Faculty of Horticulture
- Plant Doctor: Szent István University, Faculty of Agricultural and Environmental Sciences, Pannon University, Georgikon Faculty
- Agricultural Water Management Engineer: Széchenyi University, Faculty of Agricultural and Food Sciences
- Agricultural and Rural Development Engineer: Pannon University, Faculty Georgikon; Széchenyi University, Faculty of Agricultural and Food Sciences
- Human Ecology: Eötvös Loránd University, Faculty of Social Sciences

BSc level:
- Agricultural Engineer: Szent István University, Faculty of Agricultural and Environmental Sciences and Faculty of Agricultural and Economic Sciences, Szarvas (from 01/02/2020 it continues to function as an institute).

Postgraduate trainings:
- Agroforestry Engineer: University of Sopron, Faculty of Forestry
- Grazing based animal husbandry engineer: Szent István University, Faculty of Agricultural and Environmental Sciences
- Plant Protection Engineer: Pannon University, Georgikon Faculty
- Soil Engineer: Szent István University, Faculty of Agricultural and Environmental Sciences
- Biological Soil Fertility Management: Szent István University, Faculty of Horticulture. (See Annex 1.2.)

Several organisations (12, among others Diverzitás Alapítvány) provide agroecology linked trainings (non-formal adult education) in e.g. shopping community, community-supported agriculture (CSA), organic gardening**,** participatory guarantee systems (PGS), permaculture design, biointensive vegetable production, soil management, mentoring of social farming. There are currently 3 pedagogy programs, namely Tanya (homestead) pedagogy program, School garden program and Farm-based education. Besides these already mentioned, an Agricultural producer professional training is also offered. (See Annex 1.3.)

Therefore, the same conclusion can be drawn in terms of traineeships in Hungary – a specific 'Agroecology' training is still missing but some trainings on agroecology related topics are available.

1.6. In Summary

With the increase in interest in agroecology as both a research topic for institutions and as an advocacy campaign item for environmental civic groups occurring in Hungary in the last decade, it can be considered an opportunistic time for increasing knowledge of agroecology in practice. One must take into account that a functioning agroecology network does not yet exist, and it is difficult to quantify the number of practitioners who possess knowledge of on-farm agroecological practices, because of the novelty of the term and also the scattered nature, scale and orientation of practitioners (some certified organic farmers, some non-certified, permaculture advocates, hobby gardeners of different scales, large farms with agroecological aspects but not full adoption, etc.) A corresponding increase in knowledge of agroecology in practice must accompany the existing interest as a research topic and advocacy slogan if more farmers are to adopt best practices for agricultural land management. An additional potentially influencing, but currently distant factor is the adoption of agroecology inspired standards and corresponding support measures being incorporated into national and European agricultural policy. Hoping the policy environment shifts in this direction, it is currently imperative to increase knowledge of agroecology at the ground, or field level, and to examine methods for which knowledge of best practices is spread from farmer to farmer.

A summary listing of the existing national support organizations, research centres, government institutes, civic service organizations and academic institutes which are currently performing research on agriculture's impacts on the natural environment appears extensive in one collection. What is left to be considered in such a listing is how new developments (uncovered by scientific research and themes pushed into public view by civic research and advocacy) create positive incentives at the farm level for the adoption of agroecological practices which have tangible benefits for agriculturalists. Also,

agricultural ministry representatives and policymakers must acknowledge the severity of agriculture's environmental impact and develop a policy that is not driven by its potential for financial gain alone. Without clear policy mechanisms to create incentives for shifts in practice, and without recognition within the market for farmers making more environmentally responsible choices, the shift away from conventional farming at a wider scale is unlikely. An equally important factor to consider beyond the availability of financial support for good practice is increasing access to educational resources for agriculturists of different scales, production types, working in different geographical regions.

Currently, most Hungarian farmers lack access to educational opportunities providing knowledge of agroecology related topics and practices. It is difficult to develop a framework for assessing baseline skills for agroecology in practice because the farmer community is very diverse, and to date, there has not been a comprehensive study which has provided an evaluation of farmers' agroecology skills using primary (e.g. through questionnaires) or secondary data sources. Most farmers do not consider the long-term environmental consequences of production and the complicated relation between the elements of production and impacts on ecosystems. They rather follow decision making processes according to short term economic advantage, a mindset which is encouraged by high pressure and high competition domestic and international food markets. Certified organic agriculture within the country remains a small amount of overall agricultural production (4%), and available financial incentives for organic conversion have not had a wide impact. It is also necessary to keep in mind the problematic nature of per-hectare payments for land management, as they are most beneficial to large landholders, as opposed to smaller-scale farmers who may be carrying out best practice agroecological measures on plots of a few hectares. The transfer of agroecology-related knowledge or skills remains slow, as there are only a few self-organised groups of farmers who are active in mutual knowledge sharing events related to agroecology, and there is deficiency of qualified, professional farm advisors who have adequate knowledge and expertise to transfer to farmers interested in agroecological practices. All these challenges must be addressed imperatively.

Keeping these challenges and opportunities in mind, one can look forward to the next decade with hints of optimism coming from the recent upswing in activity in the Hungarian conscious agricultural movement. Focusing specifically on spreading knowledge of agroecology in Hungary, and agroecology in practice, key points of focus for future progress include:

- Increasing awareness, understanding, and acknowledgement of agroecology in national agricultural policy and land management strategies
- Increasing the quality of farm advisory networks and adjusting their methods for interacting with practitioners based on their targeted preferences and needs
- Influencing national and international agricultural policy to develop support mechanisms which incentivize best ecological practices at operations of different scales, and shifting away from landholding size-based subsidy payments
- Reducing the gap between research and practice; providing support for agroecological research which assesses and responds to the needs of farmers and the most urgent ecological and social issues related to agriculture using multi and interdisciplinary approaches and participatory design strategies which link farmers and various stakeholders (civil society, rural dwellers, experts, businesses).
- Developing educational outreach programs which follow peer-to-peer exchange learning processes between farmers
- Beyond farm technical advisory, providing support to ancillary networks which assist farmers who are practicing agroecology and ecologically conscious production, including institutions and programs which offer business development and communication training, specialized training for on-farm activities, and strategies for interacting with customer groups and extended stakeholders
- Providing support to civil service organizations and research institutes attempting to increase awareness of agroecology in society
- Maintaining the integrity of agroecology as a discipline, research field, and movement, and ensuring that the increasing usage of the term does not lead to its misuse

Annexes

Annex 1.1.: Conventions with the membership of Hungary in terms of nature and environment

Convention	International approval	Hungarian accession
Convention on Long-Range Transboundary Air Pollution	International approval: November 13, 1979 Geneva (Switzerland) In force: March 16, 1983	Signed: 1986 Accession: 1986 In force: 1999
Vienna Convention for the Protection of the Ozone Layer	International approval: March 22, 1985. Vienna (Austria) In force: September 22, 1988	Signed: – Accession: May 14, 1988 In force: September 22, 1988
United Nations Framework Convention on Climate Change	International approval: May 9, 1992. New York (USA) In force: March 21, 1994	Signed: June 3, 1992 Accession: February 24, 1994 In force: May 25, 1994
Convention on the Protection and Use of Transboundary Water-courses and International Lakes	International approval: March 17, 1992. Helsinki (Finland) In force: October 6, 1996	Signed: March 17, 1992 Accession: September 2, 1994 In force: October 6, 1996
Danube River Protection Convention	International approval: June 29, 1994. Sofia (Bulgaria) In force: October 22, 1998	Signed: June 29, 1994 Accession: October 4, 1995 In force: October 22, 1998
Convention on the Law of the Non-navigational Uses of International Watercourses	International approval: May 21, 1997 New York (USA) In force: –	Signed: July 20, 1999 Accession: January 26, 2000 In force: –
United Nations Convention to Combat Desertification	International approval: June 17, 1994. Paris (France) In force: December 26, 1996	Signed: – Accession: July 13, 1999 In force: October 14, 1999
European Landscape Convention	International approval: October 20, 2000. Firenze (Italy) In force: January 3, 2004	Signed: September 28, 2005 Accession: – In force: February 1, 2008
Framework Convention on the Protection and Sustainable Development of the Carpathians	International approval: May 22, 2003. Kiev (Ukraine) In force: January 4, 2006	Signed: May 22, 2003 Accession: – In force: –
Paris Agreement under the United Nations Framework Convention on Climate Change	International approval: December 12, 2015. Paris (France) In force: 2020	Signed: December 12, 2015 Accession: October 5, 2016 In force: November 4, 2016
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat	International approval: February 2, 1971. Ramsar (Iran) In force: December 21, 1975	Signed: 1979 Accession: April 11, 1979 In force: August 11, 1979
Convention Concerning the Protection of the World Cultural and Natural Heritage	International approval: November 16, 1972. Paris (France) In force: December 17, 1975	Signed: – Accession: July 15, 1985 In force: October 15, 1985
Convention on the Conserva-tion of Migratory Species of Wild Animals	International approval: June 23, 1979. Bonn (Germany) In force: November 1, 1983	Signed: – Accession: July 12, 1983 In force: November 1, 1983
Convention on the Conservation of European Wildlife and Natural Habitats	International approval: Septem-ber 19, 1979. Bern (Switzerland) In force: June 1, 1982	Signed: – Accession: November 16, 1989 In force: March 1, 1990
Convention on Biological Diversity	International approval: June 5, 1992, Rio de Janeiro (Brazil) In force: December 29, 1993	Signed: June 13, 1992 Accession: February 24, 1994 In force: May 25, 1994
Convention on International Trade in Endangered Species of Wild Fauna and Flora	International approval: March 3, 1973. Washington (USA) In force: July 1, 1975	Signed: - Accession: May 29, 1985 In force: August 27, 1985
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	International approval: March 22, 1989. Basel (Switzerland) In force: May 5, 1992	Signed: March 22, 1989 Accession: May 21, 1990 In force: May 5, 1992
Convention on Environmental Impact Assessment in a Transboundary Context	International approval: February 25, 1991. Espoo (Finland) In force: September 10, 1997	Signed: February 26, 1991 Accession: July 11, 1997 In force: October 9, 1997

Convention	International approval	Hungarian accession
Energy Charter Treaty	International approval: December 17, 1994. Lisbon (Portugal) In force: April 8, 1998	Signed: February 27, 1995 Accession: April 8, 1998 In force: July 7, 1998
Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	International approval: June 25, 1988. Aarhus (Denmark) In force: October 30, 2001	Signed: December 18, 1998 Accession: July 3, 2001 In force: October 30, 2001
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	International approval: September 11, 1998. Rotterdam (Netherlands) In force: February 24, 2004	Signed: September 10, 1999 Accession: October 31, 2000 In force: February 24, 2004
Stockholm Convention on Persistent Organic Pollutants	International approval: May 22, 2001. Stockholm (Sweden). In force: May 17, 2004	Signed: May 23, 2001 Accession: – In force: –

Source: Own editing based on Bihariné & Kanczler (2019)

Annex 1.2.: Academic programs related to Agroecology

Academic program	Institution	Level	Specific topic
Horticultural Engineer	Szent István University, Faculty of Horticulture, Buda Campus	BSc, MSc	Organic agriculture, environmental management, integrated pest management
	University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management		
	Pannon University, Georgikon Faculty		
Agricultural Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences*	BSc, MSc	Organic farming agriculture, soil and resource conservation, environmental management, biodiversity
	University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management		Environmental management, integrated pest management, soil ecology
	Pannon University, Georgikon Faculty		
	Széchenyi University, Faculty of Agricultural and Food Sciences*		
Plant Production Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences	BSc (until 2017), MSc	Natural grassland management, adaptive soil management, organic plant production
Agricultural and Rural Development Engineer	Szent István University, Faculty of Agricultural and Economic Sciences Szarvas (from 01/02/2020 it continues to function as an institute)	BSc, MSc	Ecological aspects in land use and rural development, water management, rural sociology, local economy development, integrated rural development

Academic program	Institution	Level	Specific topic
Environmental Agricultural Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences (until 2017 BSc program)	MSc	Transdisciplinary aspects in agriculture and environmental management, ecological aspects in land use and rural development: environmental resource management, landscape evaluation and management, water management, grassland management, agricultural ecology, environmental sociology, sustainable agriculture, and practices
	University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management (until 2017 BSc program)		
	Pannon University, Georgikon Faculty		Agro and soil ecology, natural resource management, agricultural, landscape evaluation and management, environmental sociology, sustainable agriculture and practices, agricultural and landscape policies
	Széchenyi University, Faculty of Agricultural and Food Sciences		
Organic Farming Agricultural Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences and Faculty of Horticulture	MSc	Ecological land use, organic agriculture practices, renewable natural resources, design of organic farming systems, agroecology
Plant Doctor	Szent István University, Faculty of Agricultural and Environmental Sciences	MSc	Biological and integrated pest management
	Pannon University, Georgikon Faculty		
Agricultural Water Management Engineer	Széchenyi University, Faculty of Agricultural and Food Sciences	MSc	Water rights, habitat management, water management, natural resource management
Agricultural and Rural Development Engineer	Pannon University, Georgikon Faculty	MSc	Ecological aspects in land use and rural development, water management, rural sociology
	Széchenyi University, Faculty of Agricultural and Food Sciences		
Human Ecology	Eötvös Loránd University, Faculty of Science	MSc	Human ecology, rural development, socio-ecological systems, environmental governance, resource governance
Agricultural Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences and Faculty of Agricultural and Economic Sciences Szarvas (from 01/02/2020 it continues to function as an institute)	MSc	Organic agriculture, soil and resource conservation, environmental management, agrobiodiversity, integrated pest and weed management, landscape management and nature conservation
Environmental Sciences, Policy and Management (MESPOM) (in English)	Central European University, Department of Environmental Sciences and Policy	Erasmus Mundus Joint MSc	Socio-ecological systems, agroecology, farming systems, biodiversity, conservation, environmental governance, resource governance
Agroforestry Engineer	University of Sopron, Faculty of Forestry	Post-graduate training	Agroforestry, landscape management, ecosystem management
Grazing based animal husbandry engineer	Szent István University, Faculty of Agricultural and Environmental Sciences	Post-graduate training	Animal husbandry, grazing, landscape management, pasture

Academic program	Institution	Level	Specific topic
Plant Protection Engineer	Pannon University, Georgikon Faculty	Post-graduate training	Biological and integrated pest management
Soil Engineer	Szent István University, Faculty of Agricultural and Environmental Sciences	Post-graduate training	Soil conservation, soil management, soil biology
Biological Soil Fertility Management	Szent István University, Faculty of Horticulture	Post-graduate training	Biological soil management, nutrient management, soil conservation, soil biology

*5-year program.
Source: Own editing based on database compiled by Védegylet (2020)

Annex 1.3.: Trainings related to agroecology

Traineeship	Institution/Organization	Type of traineeship	Special topic
Shopping community	Nyíregyházi Kosár Közösség	training (non-formal adult education)	shopping community, local food system, community development
Community Supported Agriculture	Tudatos Vásárlók Egyesülete	training (non-formal adult education)	CSA, local food systems, circular economy, community development, organic farming, farming
School of Rural Knowledge	Két Torony Nagyszékelyi Faluegylet	training (non-formal adult education)	permaculture, self-sufficiency, rural life, organic farming, farming, crafts, traditional products
Organic gardening in practice	Oázis Kertészet	training (non-formal adult education)	organic gardening, self-sufficiency farming, composting, crop rotation, companion planting, biological plant protection
Garden Workshop	Diverzitás Alapítvány	training (non-formal adult education)	organic gardening, self-sufficiency farming, composting, crop rotation, companion planting, biological plant protection, biodynamic farming
Barefoot gardener school	Három Kaptár Biokert	training (non-formal adult education)	organic farming/agriculture, vegetable production, self sufficiency
Participatory Guarantee Systems	Tudatos Vásárlók Egyesülete	training (non-formal adult education)	PGS, local food systems, circular economy, community development
Permaculture Design Certificate	Életfa Permakultúra	training (non-formal adult education)	permaculture, ecological systems, farming systems, habitat management
Profitable biointensive vegetable production	Cserhát Biokert	training (non-formal adult education)	organic gardening, vegetables, no-dig farming, biointensive, market gardening
Soil humus management	Agrofutura	training (non-formal adult education)	soil conservation, soil management, soil biology, composting, biochar
Soil management, cover crops	Demeter Biosystems	training (non-formal adult education)	no-till, cover crops, crop rotation
Social farming mentor training	Diverzitás Alapítvány	training (non-formal adult education)	mentors training, social farming

Traineeship	Institution/Organization	Type of train-eeship	Special topic
Permaculture Design Course	Magyar Permakultúra Egyesület	training (non-formal adult education)	permaculture, system design, ecological design, eco-architecture, agricultural production, ecology
Permaculture for small communities	Magyar Permakultúra Egyesület	training (non-formal adult education)	4 days introduction to permaculture, and permaculture design, target group is small eco-communities
Agricultural Producer	National program	professional training	agricultural production, farming system management
Farm-based education	Farm Alapú Nevelésért Egyesület	pedagogy program	farm based learning, Waldorf pedagogy, biodynamic
School garden pro-gram	Iskolakertekért Alapítvány	pedagogy program	school gardens, awareness-raising, community gardening
"*Homestead (tanya) pedagogy*" program	National program	pedagogy program	tanya (homestead), education, farm-based learning

Source: Own editing based on database compiled by Védegylet (2020)

2. Needs Assessment of the Vocational Agroecological Training for Farmers in Hungary

Diverzitás Foundation
National Agricultural Research and Innovation Centre
2020

2.1. Attitude

2.1.1. Strengths

Based on common experience, and on the findings of interviews made with Hungarian farmers, it is clear that farmers nowadays are open to educating themselves, developing their skill sets, and learning from their mistakes and successes. Agriculturalists expressed clear ideas about types of training which would be of interest to them as farm managers and beneficial for the financial viability of their operations. Farmers are willing to make time for developing skills within their capacities, considering the demands of the production season. Interviewees expressed interest in specific practice-based training, directly related to the activities of their farms/companies. Farmers prefer short, in person training sessions that include on site demonstrations and field visits, and such activities must respect seasonal time requirements.

Knowledge-transfer currently occurs most frequently with the help of professional advisory services and consultants. Farmers tend to recognize and respect the knowledge of advisors, and their usefulness in transferring best practices, and they are willing to pay for dependable, high quality instruction. It must also be mentioned that in the opinion of farmers, in spite of the positive outlook, limitations of advisory services in Hungary include their capacity to offer assistance at necessary frequency, and a limited ability to provide knowledge of agri-environmental, organic farming, or sustainable farming practices.

It is considered an important strength that farmers are starting to focus more attention on meeting sustainability requirements, preserving their land and other natural resources. Farmers feel attached to the land they cultivate and are aware that it is crucial to leave an adequate soil quality to future generations. This sentiment was especially relevant for farm managers who are also owners of the land they cultivate. For many farmers, agriculture is accepted to be a lifestyle and they acknowledge the importance of serving as role models for the next generations of farmers. Committed farmers can make farming more popular and accepted among society. Encouraging young farmers by setting positive examples is especially important taking into account the increasing average age of farm managers.

Besides environmental considerations, social awareness and local communities are increasingly a part of farmers' considerations, and they have shown an interest in maintaining contact with like-minded farmers. It was also a common trait to share a willingness for their agriculture activity to have a positive impact in the rural location where the farms were located, and farmers indicated a willingness to cooperate more with local farmers in their region, although it was mentioned the difficulty in building relationships without effective support networks.

2.1.2. Weaknesses

Agroecology as an approach to farming is still a relatively new concept in Hungary and agroecological initiatives which exist are fragmented. Most farm management decisions are dominantly influenced by their potential economic impacts, i.e. a significant proportion of farms rely on subsidies and tax benefits to remain viable, and much less along ethical, environmental, or social considerations. Farmers – especially in the case of large farms – know that agroecology entails an alternative set of principles for organizing food production systems based on maximizing the positive interrelations between people, farming and nature, but they are not necessarily willing to trade off competitive intensive farming for alterna-

tive approaches following agroecological principles. As a more concrete statement, it can be added that there is a lack of commitment to minimizing the usage of chemical fertilizers and pesticides for feared efficiency or production losses. There is a tendency to attempt to correct technological deficiencies through the additional application of chemicals.

For a high proportion of farmers, the links between the farm's location and the observed benefits of strategic rural development is not recognized, and they do not typically pursue programs which help develop potential social benefits of agriculture. Sometimes they do recognize themselves as important actors. The willingness for cooperation, networking, and joining social organizations and movements is still on a low level. Despite an awareness of advisory services and some positive regards, many farmers do not feel connected or directly served by local extension services offered within the region. Furthermore, elderly farmers are largely sceptical about new techniques and innovations.

2.1.3. Desired improvements by the farmers

Based on the responses of the interviewed farmers, a number of key focus areas emerged where interviewees recognized the importance of developing their competencies, both at the individual and group level. Although most of the desired competencies appear among the knowledge and skill elements, some findings are clearly focused on improving attitudes. The strengths and weaknesses themselves contain many factors that point to directions for improvement, but what was observed during interviews also included well-identified, specific sub-areas of self-development.

From the perspective of farmers having a more advanced, complex understanding of their responsibilities, it is a clear intention to find a balance between competitive, profit-oriented activities and an environmentally sustainable farming operation. An element of improving attitudes towards agroecological practices includes increasing knowledge of the on-farm benefits of practices while also bringing attention to the not always clearly perceptible negative impacts of conventional farming practices. This area of improvement can be considered as an 'optimizing trade-off' between economically viable and sustainable farming. This is also supported by the idea of increasing the need for stabilizing the farming activity, however, not merely on the basis of economic efficiency considerations, but also by diversification, application of systematic agro-ecological approach and the possibility of enhancing social outreach, in terms of employment and community development.

The importance of establishing functioning partnerships was also highlighted by more interview respondents, not only for mutually taking part in knowledge and information transfer, but also for sharing risks, thus becoming more willing to try new approaches.

2.1.4. Proposed improvements

In addition to the competencies recognized and formulated as needs by farmers, the synthesis of the results of the situation analyses and the experience gained during the interviews outline additional attitude-related competence elements that confirm the assumptions developed during preliminary work on the theoretical design elements of a future agroecological curriculum for practicing farmers.

It is a common experience that an agroecological program has to arouse the farmer's interest for the above-mentioned aspects of agriculture, and to enhance and perpetuate their striving for continuous improvement not only in farming technologies, but also in the environmentally and socially beneficial operation of their activities. This will lead to a continuous need for extending their approach towards the ecological, social, and ethical considerations and values of farming in a holistic way.

In terms of the utilization of knowledge and information, it is crucial to encourage farmers to take advantage of extension services that promote the conservation of soil condition and fertility, the reasonable use of inputs, and overall efficient resource-management. For strengthening the mutual benefits of those, the different agro-ecological achievements must be built upon each other, which requires a high-level of openness and commitment to agroecological principles.

2.2. Knowledge

2.2.1. Strengths

From the interviews conducted a number of different knowledge-based strengths were identified. Hungarian Farmers expressed an awareness of current technological support tools for learning and communicating available such as the internet, and the use of social media for communication as well as for finding training opportunities.

Farmers are generally aware of such concepts as sustainability in agriculture, and alternative farming methods, and understand the impacts of climate change and the potential importance of applying practices promoted in agroecology. Other important knowledge identified is related to various production techniques, especially in large scale farmers managers. At different farm scales, certified organic practices are acknowledged, as well as Hungarian standards for organic crop rotation and plant protection measures at micro gardening and arable crop levels. Interviewed farmers mentioned that the knowledge and awareness of low and minimal tilling farming is growing but needs to improve.

Regarding formal education, farmers who attend BSc and/or MSc programs acquire basic knowledge about concepts such as ecology and sustainability. They also learn the basics of agricultural production. There are some programs that offer agroecology-related training where the practical courses are more attractive to farmers. Currently, there is a visible increase in the level of qualification of farmers/managers.

In the 'master farmer' ('Aranykalászos Gazda') vocational training, non-agricultural knowledge (e.g. entrepreneurship, management, sales) is included.

2.2.2. Weaknesses

There are certain topics which are either less or more understood depending on the size of the farm operation, such as the level of knowledge related to sales, marketing and management which was a strength of large farms but in the case of small scale farms they often lack the necessary staff with knowledge of economics and business management, and diversified marketing techniques.

Interviews indicated that the age of a farmer operator correlated with their willingness or lack of willingness to adopt new practices on their farm, with older farmers (above age 60) being more reluctant to adopt new practices. It is important to consider this in the future when developing communication strategies which present agroecology learning opportunities, as older farmers may be less interested in participating in agroecological trainings, or the communication strategy for advertising trainings must take into the specific considerations for reaching older farmers with deep commitments to set farming methods developed over decades.

In Hungary, the trainings for farmers and most programs generally do not feature specific coursework on organic farming methods, agroecology, or alternative practices in detail. Some farmers search for opportunities to learn online using videos with examples that are far from their context and circumstances, which can lead to problems or failure in practice when applied. Interviews indicated that farmers could become frustrated and sceptical towards alternative practices if they unsuccessfully tried to adopt new practices on their own farms.

There is a limited number of formal or supplementary education or training programs focusing on agroecology principles in practice. The knowledge farmers possess about agroecological concepts is mostly through their own self-study and not necessarily connected to their higher education academic pursuits. Knowledge of agroecology as a holistic concept is something that can be more developed, especially with regard to the social themes embedded in agroecology. Agriculturists did not express a comprehensive knowledge of deeper on-farm agroecological practices such as: increasing biodiversity, reducing water consumption, creating organic compost and nutrient inputs on site, and additional benefits of perennial crops, heirloom varieties, blending crop production and animal husbandry and including disadvantaged stakeholders in farming operations, for example.

2.2.3. Desired improvements by the farmers

Farmers expressed various needs and made many suggestions regarding which topics they should improve their own knowledge of.

Most farmers indicated that they would be supported with additional knowledge of farm management, including marketing strategies which are specific and applicable for their case, for example different ways of establishing and maintaining short supply chains. Farmers also showed an interest in learning more about communication with customer bases, and in strategic networking with other farmers in their region. Moreover, a better understanding of the administrative and legislative context which is relevant to them is also needed so that they can cope with the bureaucratic requirements they must face (e.g. small scale farmers and applications, background paperwork and registration, financial support opportunities). Knowledge of the agricultural subsidy system is also essential, even though some of the alternative, small-scale farms do not pursue subsidies, the viability of the majority, especially larger operations, often depends on their success in maximising income from subsidies. In addition to area-based payments there are various support programs and subsidies that could be relevant for farms of all scales if their knowledge of policy and support programs and capacity to complete applications increases.

Farmers also showed interest in environmental topics, particularly in soil related knowledge. Interviews indicated a desire to increase knowledge of soil biology, specifically the relationships between soil life and plant nutrition, as they mentioned, soil nutrient management and plant protection methods were largely trial and error practices over time which were not necessarily supported with an expert understanding of techniques which were most appropriate for their operational scale and systematic capacity (based on human, machine and financial resources). Farmers showed an interest in learning more about proven techniques for no and minimal till farming operations. Farmers were also explicitly interested in learning about how to create their own high-quality compost and organic supplementary soil applications.

Moreover, farmers repeatedly expressed the value of gaining practice-oriented information through best practice examples to increase in-depth professional knowledge. Farmers indicated an interest in best applicable practices that are environmentally friendly but still do not compromise their effectiveness or come at high economic cost.

Finally, farmers expressed the potential benefit of learning more about effective communication, team management, network building and creating functioning partnerships with those in their proximate region when asked about their desires for management training programs. They also seek more opportunities for professional qualifications in agriculture, and deeper specialization for their chosen activity (mostly within the framework of short-term trainings). There is a need from their side for an extensive knowledge to be able to create and maintain a holistic approach to develop sustainable farming.

2.2.4. Proposed improvements

The first and most important knowledge gap regarding the implementation of agroecology practices on farms concerns the conceptual, theoretical level: farmers do not have the adequate biological and ecological background knowledge at the farm or local landscape level. Also, knowledge of sustainability in theory as well as in practice is indispensable so that it appears as an ever-present consideration in their thinking, which interviews indicated was a weaker point. Strengthening knowledge of agroecology as a holistic concept and better understanding of elements of agroecology is recommended. All of these should help farmers to deepen their system thinking and understanding of different methods for holistic farm system analysis.

Secondly, farmers need to increase their knowledge of agricultural business management and strategy development. They should have information on the types and nature of farmer support programs available in Hungary and in the EU. Knowledge building and sharing are crucial from the point of view of agroecology. Strategic network building and community supported farming are relevant topics which farmers should be more acquainted

with. Problem and conflict management is also a useful knowledge which is often a gap leading to low social capital of farmers. They would also benefit directly from training on value addition through diversification.

Farmers often lack high-level agricultural knowledge and practical experience in the following fields: building on farm diversity at different scales, also in relation to the introduction of lesser known varieties of crops, green manures, perennials, intercropping and building biodiversity corridors in parcels of different scale. Diversifying plant species and the incorporation of animal husbandry and poultry to farms of different scales are recommended. They also require relevant information on the mechanics of compost production and soil nutrient enhancement in farms of different scale and on-site conditions to reduce reliance on purchasing soil supplements. In mechanized farms, no and low till practices seem to be experimental at the moment, and at small scale farms a more detailed introduction to soil nutrient content management and weed/pest reduction through minimal tilling practices is recommended. Lastly, water conservation practices and preparing agriculture for resilience in water scarce conditions are also relevant topics for them.

Finally, knowledge of the social aspects of agroecology needs improvement: social farming opportunities, and the societal benefits of open farms are relevant topics for farmers.

2.3. Skills

2.3.1. Strengths

Many farmers regularly monitor soil quality. Farmers examine the physical condition of their soils with observation and with the help of spade or farmer stick. They are able to perform the evaluation of their soil structure. In addition to on-site examination most farmers regularly send soil samples for laboratory tests.

It was mentioned that having direct family members involved in the farming operation is a positive as it helps build a team with well-rounded skills who can attend to the different facets of production, marketing, business management and reporting.

Farmers' entrepreneurial skills have improved and remain responsive to market fluctuations, as it remains a key skill for navigating opportunities for sales of products. From a communication standpoint, most farm leaders are aware of the relevance of being present and connected to the co-workers.

Farmers tend to recognize and accept the utility of professional advisory services, although it is not always easy to find or interact with advisors who have a developed knowledge of agroecological or agri-environmental production practices.

Farmers (especially young and middle-aged ones) use social media, and other internet tools (e.g. YouTube videos, online marketing etc.) as a source of information and knowledge and for communication on a daily basis. The ability to consult new publications in languages besides Hungarian (English and German especially) helped farmers stay informed of trends for best practices and new techniques. Farmers' knowledge bases were supplemented as they were able to acquire new skills mainly through accessing foreign agricultural networks, newsletters, research, and online courses.

Farmers with foreign language skills are able to learn about agroecological practices that are compatible with the scale and realities of their farming operation.

Farmers develop skills with time and must evolve with the changes of climate and the circumstances.

2.3.2. Weaknesses

A deficiency in practical problem-solving skills, on site assessment of cultivation conditions results in a trend for farmers to attempt to solve production problems with increasing fertilization or chemical application as opposed to addressing the root causes of problems at the soil level.

Farmers seem to be confident in their skills of crop rotation and soil nutrient building, but this confidence is largely based on a number of years of experimentation and not necessarily supported by a mastery knowledge of farm ecosystem health.

A general weakness uncovered is the lack of interpersonal skills, mainly communication skills – farmers often do not know how to, or have the time or established infrastructure for communicating effectively with their customers (e.g. through social media or other in person opportunities) in a fashion that creates interest in products and adds value, and cannot interact regularly with other farmers without additional support networks or incentives. In addition, best practice communication skills (and skills development and improvement in general) are missing from the training courses' curricula.

Some (specifically elderly) farmers are not aware of the value of skills that are not always directly related to production-based knowledge.

Farmers often have difficulty understanding the policy environment including European, national, and regional agricultural support systems and this results in the loss of opportunities for applying for adequate support grants. This skills gap can be attributed to the lack of the average farmer's ability to master the numerous technical, business, and managerial tasks required to address a farm's multifunctional operation. While farmers may be able to manage certain aspects of production or sales, the understanding of farming as a complex system is not always well understood. In many cases this could be the reasoning for why many farmers are not voluntarily willing to pursue ecological sustainability without compromising economic viability.

In many cases only basic or introductory knowledge of sales and marketing skills are observed even in large farms.

It was observed that due to a lack of advanced business management and planning skills farmers have difficulty in establishing strategic investment or development plans to improve in their business. Even in cases in which they realize what is necessary to change, their intentions are slowly transformed into action.

2.3.3. Desired improvements by the farmers

Adaptability is an essential skill from multiple facets of farm operations for practitioners. Farmers must be able to bridge the gap between knowing and doing and to transform knowledge into action, to manage complexity and changes in natural and/or economic environment (e.g. to know how to make flexible decision according to seasonal changes in climactic and market conditions, and financial opportunities; how to increase profit while complying with environmental rules).

Since one of the key conditions of successful farming is cooperation and the ability to work in functioning teams (to communicate and to treat people in an appropriate way), the development of interpersonal skills is also indispensable. Farmers need to improve their communication and team management skills – they are eager e.g. to learn more about communication with customer bases, and also in strategic networking with other farmers in their region, in addition to farm team management.

Being organised and able to manage time well means that farmers can more effectively handle complex tasks, therefore general time management and organisation skills are important to further develop as well.

Considering that technical skills are essential (both for on farm management and business purposes), their improvement is required. Farmers have to be technology literate and need to be able to relatively quickly understand and properly apply new technologies in practice – and respondents specifically express interest in developing their skills in micro and larger scale processing and adding value to their products, in addition to farm management and planning support software .

2.3.4. Proposed improvements

It is suggested to improve farmers' analytical skills as these are closely related to problem solving and decision making. The skills in question refer to the ability to collect information, analyse data and identify patterns. Farmers need to gather up-to-date information (e.g. on agricultural support programs) with the aim of adjusting to the changing legal background, to see conditions and trends outside their own farm, to understand and be aware of their surroundings, landscape and nature, market, community; and to perceive sustain-

ability indicators in context and recognize the potential of their farm both geographically and economically.

Critical and system thinking skills also need to be further developed in order to enable farmers to apply a holistic approach in their work. In addition, it is recommended to improve adaptability which enables farmers to link theory to practice, to adapt production along agroecological principles to market needs, to reconcile the market and sustainable farming or to prepare farming for resilience against water scarcity and additional impacts of climate change.

Improving the list of skills mentioned above is not sufficient on its own without building strong interpersonal skills which are a key factor within farming communities. Some key qualities and behaviours suggested to be developed in this category are the following: communication skills, negotiation, teamwork/ collaboration, networking and building relationships, leadership, empathy, positivity, flexibility in thinking, awareness, sensitivity toward others' preferences, socializing skills, lifelong learning skills.

2.4. Summary

The aim of the interview process with a broad range of agriculturists, both in scale and in farming practice, was to allow farmers to conduct a self-assessment of their current skills, knowledge and attitude in relation to their own agricultural practice in addition to gauging opinions and knowledge of basic agroecology concepts. For each topical area (skills, knowledge, and attitude) a summary of strengths and weaknesses (both self-proclamations and the inferences made after interviews were completed by researchers), in addition to a listing of desired focus areas of improvement (from interviewees) and suggested areas of improvement (compiled after the interviews) relating to each topical area was created.

The interview process was also focused to supplement the farmers' self-assessment with additional analysis of responses to a series of general questions about established sustainable and socially conscious farm management practices, with the aim of identifying and understanding better the specific training needs of Hungarian farmers. The summary of farmer responses was interpreted and combined with comparative inferences made by a researching team. Overall awareness of established pillars of agroecological farming was measured in order to better identify strengths and weaknesses, and relevant focus areas for the future development of vocational training courses. This process can directly assess the needs of farmers and help accomplish the goal of increasing knowledge and viability of agroecology in practice in Hungary.

A summary table of the strengths, weaknesses, desired improvement areas and areas of improvement proposed by the research team is found in Table 2.1. The conclusions of this exercise will influence the further planning procedures for agroecology based vocational training courses developed in the trAEce project.

Table 2.1.: Summary of the need's assessment in Hungary

	ATTITUDE	KNOWLEDGE	SKILLS
STRENGTHS	Farmers are more open to educate themselves, to learn from their mistakes, and to develop their abilities, and they also have definite ideas about what training they would spend their time on Farmers tend to accept the utility of professional advisory services and are more willing to pay for it Farmers tend to recognize the importance of sustainability and preserving their land and other resources Social considerations and local communities are increasingly part of farmers' thinking, and they start to keep in touch with like-minded farmers For many of them, farming is a lifestyle, and new generations of farmers can make it more popular and more accepted among the society	Generally increasing level of qualification among the farmer society, especially the large-scale farm owners/managers gain high level knowledge Farmers, at different depths, but have agroecological knowledge, even if they have not realized it as such Knowledge of possible alternative practices, e.g. ecological farming, minimum tillage, organic plant protection etc. is increasing Agricultural higher education clarifies the basic terms and concepts related to the ecological aspects of farming Non-agricultural knowledge (e.g. entrepreneurship, sales) is also included in the 'master farmer' (aranykalászos gazda) trainings	Farmers tend to use more capacities to acquire new skills from international agricultural networks Many farmers regularly monitor the soil quality, by using own evaluation methods and laboratory services When various members of the family are involved in the farm/business, they have different skills that are useful Most farm leaders are aware of being present and connected to the co-workers Especially the younger farmers, but also many of the middle-aged ones use computers, internet and social media on a daily basis
WEAKNESSES	The agro-ecological approach is less widespread in Hungary than in other European countries; Agro-ecological initiatives are fragmented Most of the decisions are dominantly made on economic basis, and much less along ethical considerations Lack of commitment to the reasonable use of fertilizers and pesticides A significant proportion of farms base their viability on subsidies and tax benefits For a high proportion of farmers, the link between the farm and the regional development is not recognized, and they do not pursue local social benefits of agriculture A lot of farmers do not feel connected or served by local extension services offered within the region The willingness for co-operation, networking and joining social organizations and movements is still on a low level Elderly farmers are mostly sceptical about innovations	Agriculturists do not possess a comprehensive knowledge of deeper on farm commitments for the elements of agroecology Farmers' background knowledge of alternative practices is often superficial Farmers often do not get a refined knowledge of adding value or differentiated marketing Even large-scale farmers have no satisfactory knowledge in the field of sales and marketing Young generations of farmers sometimes underestimate the knowledge and experience of older farmers The quality of agricultural education – especially the most common 'master farmer' courses – is mostly mediocre. Specific agroecological programs, courses or trainings are still missing	Farmers often do not know how to handle the complexity (i.e. the viability and sustainability) of farming, and the support system Farmers are not always looking for in-depth and long-term optimum, but for short term maximum Most farmers have limited communication skills Some (specifically elderly farmers) do not take the importance of soft skills seriously, while being confident in their own skills Vocational training centres do not provide courses that actually improve skills

	ATTITUDE	KNOWLEDGE	SKILLS
DESIRED IMPROVEMENT	Optimizing trade-offs between competitiveness (intensive farming) and sustainable agricultural performance Understanding the 'essence' of rural development Scaling-up the farm activity Creating functioning partnerships with those in their proximate region Willingness to take risks	Soil biology, the relationships between soil life and plant nutrition Qualification in agriculture, deeper specialization for the chosen activity Agroecological practices, the potential to improve their agricultural practices, therefore, their income and the value of their land No and minimal till farming operations Creating their own high-quality compost and organic supplementary soil applications Farm management-knowledge Better understanding of administrative, legislative context, agricultural subsidy system	Application of most up-to-date technologies Managing complexity and change Flexible decision making Communication Strategic networking Organisational skills
PROPOSED IMPROVEMENT	Striving for continuous improvement Holistic approach towards the ecological, social and ethical considerations and values of farming Openness to new farming approaches and techniques Better utilization of extension services Building the agro-ecological achievements on each other, for strengthening their benefits mutually	Interrelations of the landscape, the ecosystem and the farm Sustainability as an ever-present consideration in theory as well as in practice Low and no till practices Value addition through diversification Social farming opportunities Knowledge sharing Methods to system analysis Problem and conflict management	Skill of self-evaluation Adaptation of production along agroecological principles to market needs Co-operation, community involvement and social participation techniques Lifelong learning skills Stress management Action competence Empathy Flexibility Engagement

Source: own compilation based on the situation analysis and farmer consultations

3. Agroecological Situation Analysis of Romania

Agri-Cultura-Natura-Transylvaniae Association
2020

3.1. Agroecology in Romania

This study aims to provide insight into the history of agroecology and its current situation in Romania. As agroecology represents a rather holistic approach – it includes certain fields of agriculture, education, nature conservation, social movements – this study does not cover these fields in many details. Our aim rather to provide a screening-like overview about the topic.

We also have to emphasise at this point that the term agroecology is not very well known in Romania, and it is often used imprecisely. Even those working in the domain of agriculture, education or nature conservation are often unaware of the meaning and they deduce it from the two words it is contained of. Therefore, it is often mixed up with organic farming, or people think it must be some nature conservation organization. Sometimes, this inaccurate interpretation is amplified by the names of organizations. For instance, both the Romano-Italiana AgriEcològica Association and the Agroecologia Association deal with organic agriculture only but not with the broader meaning of agroecology.

3.1.1. Historical overview

The concept of agroecology was first introduced by scientists in Romania. It appeared for the first time in 1977 in the books, publications and educational materials published by the Institute of Agriculture of the University of Cluj, then in the Agricultural University of Timiș and Bucharest. Its practical relevance has increased by the establishment of the so called agroecological districts between 1984 and 2000 (Moudry *et al.*, 2018).

Before the industrialization, traditional farming was essentially agroecology (agroecology was the only practice during the time of traditional agriculture). An interesting historical characteristic of Romania is, that elements of traditional farming survived until the 21st century. This can be explained by the fact, that after the regime change – from 1990 onwards – mass land privatization occurred causing small-scale family farming to be re-established. This led to a unique situation in Romania. The average farm size here is the smallest among all European countries: 3.65 ha compared to the 16.56 ha of the EU average. The population of the country makes up only 4% of the EU total population, however the total number of the agricultural units is 29% and the share of the people working in agriculture is 20% (Knowles, 2011). Moreover 94.6% of holdings are considered to be small farms (the EU average is 67.6%) (Eurostat, 2019).

Violent socialist collectivization together with industrialization of farming, which began in the 1950's, resulted in the rapid decline of environmentally sound, traditional peasant farming. After the political change in 1989 a vast land privatization took place. The land went to the descendants of the original owners in the first place. Because normally an owner had more than one child and even more grandchildren, a very scattered small-scale family farmland structure was re-established.

These "*new*" farmers began to operate in a fairly environment-friendly way, mainly due to the lack of own capital: the farmers simply did not have money for chemicals and machinery. Using animals for land cultivation was introduced in a large scale as a popular land management technique. This method still exists in some remote regions of the country; however, it is disappearing.

This semi-subsistent form of farming is environmentally beneficial, but it is unsustainable from an economical point of view. As an effect of globalization, profit generation has become an inevitable aim for farming, thus average farm size is increasing, and modern technology is being introduced. Despite this ongoing process in many parts of the country the aver-

age farm size is still relatively small (3-5 ha). Although mechanization and usage of agrochemicals is increasing, the environmentally favourable mosaic land structure – especially in the mountains – is still prevalent and characteristic to the area.

The older generation with the knowledge and expertise of traditional farming methods are unfortunately in decline. Typically, if the farmer passes away their farmland will be leased or purchased by well-capitalized locals. However, a more worrying process, especially on fruitful lowland areas, is that foreign investors buy huge territories of the country for investment. One of the leading associations of agroecology, EcoRuralis, has published a number of studies related to the problem of land grabbing in Romania (EcoRuralis). This trend goes against many of the aims and principles of agroecology

This reappearance of small-scale farming from 1990, coincided with presence of the more modern agroecological small farms and organizations growing in number throughout Romania. They introduced new methods and new ideas about environmentally sound farming practices. Some of the pioneers of this farming movement gained knowledge by working on Western-European farms which often were also organic farms. Others were Romanian citizens inspired by the Western practices, or some were foreigners who moved to rural Romania from mostly Western-European countries. These non-Romanians typically moved from urban areas and were often highly educated. Besides teaching farming techniques, they strove to highlight the social aspects of agroecology too. By giving lectures and offering training, they began to introduce the many aspects of agroecology. This included using different forms of direct marketing and promoting advocacy for the small farmers. They embodied the meaning of agroecology; being committed to environmental protection, the belief of sustainability of local communities while also making a fair living from farming. However, this ideology did not turn into a mass movement in Romania.

Ultimately it was the financial considerations that caused groups of farmers to move from conventional farming techniques to organic. This process can be governed by a variety of influences, for example a successful company (e.g. the Dorna diary) might organise a group of producers to supply organic farm products for their large-scale production line. Or it could be a dedicated local organizer (e.g. The Gyimes Organic Farmers' Association) providing overall support for the farmers to help with the conversion to organic farming. In these cases, the farmers are less committed to organic production, instead they are mostly motivated by

Box 3.1.: Commemoration

One big character of this movement was Willy Schuster (†53). He was one of the most enthusiastic advocate of organic and peasant farming in Romania. Sadly, he passed away on the 27th of May 2020 – just during the time we were working on this study. Therefore, we wanted to dedicate a short paragraph to his memory. He came from a Saxon-Hungarian marriage, he had a Romanian wife and had an extraordinary warm and loving manner to people, nature and God. He was an interpreter on a number of study visits on organic farms in the Switzerland during the 1990-s. On these trips he learned a lot about organic farming and ultimately, he decided to move back from Germany to his homeland, Saxon Transylvania. He started his own farm in Moșna (Maešn in Saxon) in 1999. He initiated the first organic shop in Transylvania in Sibiu (Hermannstadt) and set up a direct sales network and rural tourism business on his own farm. He was also instrumental in campaigning against two very controversial projects causing significant environmental and social conflicts in Romania. These were: 1) the opening of Rosia Montana goldmine using cyanide technology, and 2) the American shelf gas extractions in his own village where the company used landscape level explosive technology without warning and consulting local landowners – the small farmers. He was co-president of the agroecology NGO EcoRuralis and was always an opinion leader and a heroic actor in what we would call today an "*agroecological movement*" in Romania.

the subsidies and the premium price (and possibly a more secure market opportunity) they benefit from.

Because of their fragmentation and low capitalization, effective advocacy and representation of small farms is missing in Romania. However, as they represent a significant part of Romania's population and territory, politicians endeavour from time to time to make favourable decisions for them. The reasons for the cessation of eco-efficient small farms are: low economic efficiency, decreasing available labour force to work on farms, the young generation not engaging in farming, lack of own capital and by the large scale land acquisition of rich investors.

3.1.2. Hotspots of agroecology: the semi-dry grasslands of Transylvania

One positive consequence of the fragmented land structure is that a harmonic collaboration between man and nature was maintained, which has practically disappeared from the developed world. There is significant traditional knowledge preserved on nature-friendly farming methods particularly in less competitive, remote mountain areas. The main reason is that farmers cultivate their land as part of nature thus they are forced into a strong cooperation with it (Babai, Molnár, Molnár, 2014).

At this point we have to highlight the extremely high biodiversity of semi-dry grasslands in Romania, and the centuries old land management techniques maintaining them. In numbers: 33% of Romania's territory is grassland, comprising 3,300,000 ha meadow, 1,531,400 ha pasture, which are the most species-rich habitats of Europe (Knowles, 2011). The possibilities for agroecology are also reflected in the fact that more than 20% of the country's territory is high nature value area. Moreover 25% of the territory is under Natura 2000 protection (although this is the obligatory minimum for EU member states) however as most of biodiversity is to be found on farmland (grasslands and forests), the country has become one of Europe's natural hotspots.

Most of this land which is regarded as a natural treasure, came into being and is maintained by farming itself. According to comparative studies (besides the extreme species richness of the high mountain meadows too) the low-lying areas of and close to the Carpathian Mountains are holding the European records of plant species richness. Among these areas the most valuable one is a meadow close to Cluj-Napoca (Roleče *et al.*, 2014), while in the Ciuc Mountains the 81 plant species counted in a 4x4 botanical quadrate is considered to be the third highest value in Europe (Babai, Molnár, Molnár, 2014, pp. 35). Moreover a number of botanical quadrates from Central and Eastern European Countries are world-record holders (Wilson *et al.*, 2012). As the survival of these meadows is in jeopardy (abandonment or becoming sheep pastures) it should become one of the most vital aims of agroecology to keep and maintain these areas.

We are convinced, Romania still holds a great opportunity to combine modern agro-ecological principles with traditional ecological knowledge and traditional farming methods. As the academician, Zsolt Molnár claims: "*When talking about conservation management in these areas, this (local) knowledge must not be ignored*" (Hegyi kaszálók, 2016).

3.2. Institutional background

3.2.1. Ministries

The most important policy areas related to agroecology are agriculture, environment and education. In the following we will introduce those high-level state institutions which represent, and influence policies related to agroecology.

Ministry of Agriculture and Rural Development

This is the state institution, most closely linked to agroecology, the related subordinate institutions are the followings:

- *Agency of Payments and Intervention for Agriculture – APIA:* The European agricultural subsidy payments are realized via this institute, such as the agri-environmental scheme and funding for certified organic agriculture.
- *Agency for the Financing of Rural Investments – AFIR* as its name suggests, supports investments in rural areas.

- *Agency for the Mountain Areas – AZM:* Its aim is to research and finance the mountain areas of Romania. It supports mountain farming, the processing and marketing of mountain produce.
- *National Agency for Land Improvement – ANIF:* It controls the compliance of land use practices to environmental standards.
- *The State Institute for Variety Testing and Registration – ISTIS:* It verifies, registers and protects the purity of cultivated plant varieties, including older varieties, thus helping the reproductive materials important for agroecology.
- *County Directorates for Agriculture – DAJ:* They are the decentralised agricultural units of the ministry on county level. They organize trainings related to agriculture, including organic farming.

Agricultural subsidies

The Ministry of Agriculture and Rural Development runs the agricultural payment schemes through APIA as introduced above. As this is the most important incentive to introduce agroecological practices; in the following – without providing deeper details – we are going to introduce some elements of it. It has been proven by studies, that without these subsidies, nature-friendly farming practices would have nearly been disappeared from Romania by now. To the Single Area Payment Scheme additional subsidies can be required in the following cases:

- Late mowing of high natural value grasslands – 142 EUR/ha/year
- Manual or light mechanized management of high nature value grasslands – 21-100 EUR/ha/year
- Dedicated methods for the cultivation of certain bird and butterfly habitats – 80-410 EUR/ha/year
- Certified organic farming or organic conversion period – 39-620 EUR/ha/year
- Sustainable land use (greening) of arable land for the winter months – 128 EUR/ha/year

For example, in the case of a high natural value grassland, which is under the process of obtaining the organic farming certification, the fund that can be requested may exceed the amount of 450 Euro/hectare.

Ministry for Environment, Waters and Forests

The Ministry is responsible (among many other tasks) for the administration of the nature reserves. The county level subsidiaries dealing with the European network of Natura 2000 areas is the National Agency for Protected Areas (ANANP). A significant part of species and habitats of European importance thrive on agricultural land which makes this link between farming and biodiversity significant.

National Ministry of Education

It is link to agroecology lies primarily in agricultural education in secondary schools and in higher education, extracurricular agricultural trainings, and adult education.

At this point it is worth mentioning, that the idea of agroecology is related to one of the most influential Romanian politicians, Dacian Ciolos. Obtaining a qualification in agriculture and having run a number of projects related to agroecology, he first became the Romanian Minister for Agriculture, then he was EU Commissioner for Agriculture between 2010 and 2014, and the President of Romania between 2015 and 2017.

3.2.2. International conventions, UNO

In the following we are going to list those international conventions, which Romania is a party of, and which have some links to agroecology.

The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse-gas-emission mitigation, adaptation to global warming, and the related financial matters since 2020. It was signed by Romania in 2016.

FAO's International Treaty on Plant Genetic Resources for Food and Agriculture was signed by Romania on the 4th of June, 2004.

The Convention on Biological Diversity was signed by the parties in Rio de Janeiro, which was ratified by Romania in 1994. Romania is also part of the later Protocols entered into force since then. In 1996 the parties estab-

lished a work program dealing with agricultural biodiversity (Decision III/11). The program was drawn up on the 5th meeting of Conference of Parties, in 2000. At the request of the Conference of Parties, the Secretary of the FAO has assessed the ongoing activities and instruments related to agricultural biological diversity, summarizing it in this study.

The European Landscape Convention was signed by the parties in Florence, in 2000. Romania has ratified it in 2002 and it is in force since 2004. The parties undertake to integrate landscape values into their regional and local development plans, in their cultural, environmental, agricultural, social, and economic policies.

The Carpathian Convention was signed by seven states, Romania, Hungary, Czech Republic, Ukraine, Slovak Republic, Poland and Serbia, in 2003. The aim of the signing parties is to preserve the natural treasures of The Carpathians and to foster sustainable farming. As the ecological values of the region are in agricultural and forest areas, a significant part of the planned measures will affect agriculture and ecology.

The Aarhus Convention was signed by Romania on the 25th of June, 1998, then it was codified in 2000. The convention provides access to information, fosters public participation in decision-making of environmental matters.

In this list we would like to also mention that the FAO (Food and Agriculture Organization of the United Nations) – which Romania is also a member of – is related on several points to the topic of agroecology. From those points we would like to highlight the online "*Agroecology Knowledge Hub*" It is a huge database about agroecology, containing studies, legislation materials and networking possibilities.

In FAO's "*Family Farming Knowledge Platform*" among many other subjects Agroecology, Mountain farming, Pastoralism and Community-Supported Agriculture are relevant topics for Romanian agroecology.

"*Villages with Fortified Churches in Transylvania*" are on the World Heritage List of UNESCO (United Nations Educational, Scientific and Cultural Organization). In the protected value's description of the six Saxon and one Hungarian village, the particular cultural landscape, the land use system of the original population (the Saxons fled from Romania after 1990, Hungarians are still in place) and the family farms are also highlighted.

3.2.3. Professional advisory

In Romania, the system of agricultural professional consultancy is relatively underdeveloped. State level consultancy is provided by the County Directorates for Agriculture. These bodies are rather unstable, continuous changes of governments cause uncertainty and smaller or bigger organisational reforms happen repeatedly. In the present situation, consultancy is done in the form of information forums and trainings. Personalized, farm specific consultancy is not available.

Research institutions should and sometimes do provide consultancy. They typically support the bigger agricultural operators. For the small farms, which should be a priority for agroecology in Romania, research institutes are considered to be an inaccessible ivory tower. On the contrary larger farms can afford spending on consultancy or even more likely they employ specialists as their own staff members.

There is a small number of market-oriented advisory services. These can be smaller independent businesses but more often they are run by large companies (e.g. producers of agricultural machinery, chemicals or seed) who may have their own agenda.

For organic farming consultancy the County Directorates for Agriculture play a role, as well as different associations and companies. This activity is authorized by the Ministry of Labour and the National Authority of Professional Qualification (Autoritatea Națională Pentru Calificări).

The European financial assistance scheme "*Farm Advisory System*", has not been launched in Romania. Although this could be a source for market oriented or mixed (partly institutional) custom tailored advisory, there is little chance for its introduction in the nearer future.

3.2.4. Research institutes

In the following, we enlist the agricultural research institutes that could be important from an agro-ecological point of view. According to our knowledge, there are only few specific research projects on agro-ecology.

Romanian Institute of Permaculture
Institutul de Permacultură din România

A network promoting the practice of permaculture in Romania, it deals with research, education, professional consultation and with the implementation of projects, which have a positive effect on the environment and society.

Research and Development Institute for Plant Protection
Institutul de Cercetare-Dezvoltare pentru Protecția Plantelor

It carries out research on and assessment of substances used for plant protection, provides consultation services, edits publications, and organizes conferences. Their activity also includes organic plant protection and other sustainable methods.

National Agricultural Research and Development Institute, Fundulea
Institutul Național de Cercetare și dezvoltare Agricolă

Its activity includes the breeding, selection and sales of cultivated seeds and propagation materials, development of cultivation technologies, sharing research outcomes with the farmers. One of their ongoing projects aims at the breeding and promotion of a sunflower breed, which can be used in organic farming.

Research and Development Institute for Grasslands, Brasov
Institutul de Cercetare-Dezvoltare pentru Pajiști

It carries out scientific research and development projects related to grasslands. It takes part in the designing of development strategies. It investigates the native species composition of grasslands, contributing to the efficient use of grasslands taking into account new agricultural challenges.

Research institutes of fruit cultivation (Conștanța, Băneasa, Mărăcineni, Pitești, Bistrița and Iași)

There is a rather wide network of such institutions in the country in the towns listed above. They are engaged in the improvement of fruit varieties and the production of propagation materials.

There are further state institutions on species breeding other than fruits:

- Institute for Improvement of Vegetables and Flowers – Institutul de legumicultură și Floricultură, Vidra
- Research and Development Station of Vegetable Cultivation, Bacău – Stațiunea de Cercetare-Dezvoltare pentru legumicultură, Bacău
- Research and Development Station of Vegetable Cultivation, Buzău – Stațiunea de Cercetare-Dezvoltare pentru legumicultură, Buzău
- Agricultural Research and Development Station of Secuieni – Stațiunea de Cercetare-Dezvoltare Agricolă, Secuieni.
- Agricultural Research and Development Station of Turda – Stațiunea de Cercetare-Dezvoltare Agricolă, Turda

National Research and Development Institute for Food Bioresources – IBA
Institutul Național de Cercetare-Dezvoltare pentru Bioresurse Alimentare

It aims to improve the general quality of life by continuous expansion of food chains (both on producers and consumers side), by research, training, and disclosure of information.

3.2.5. The education system

It may be surprising having read the above analysis, but agroecology in fact appears in a lot of education programs in the Romanian higher education. Every university of agriculture provides training programs which is connected to the domain of agroecology: being called as "*agroecology*", "*ecological agriculture*", "*organic agriculture*", etc. These programs could be part of a bachelor or a master's program. Besides them, similar but less specific programs appear on several other universities. In some cases, it is not taught

Table 3.1.: Agroecology in the Romanian higher education system

Title of the training	Level	Taught topics
University of Agronomic Sciences and Veterinary Medicine of Bucharest		
Agronomy	BSc	Biological crop protection Organic agriculture Environmental protection and sustainable agriculture
Horticulture	BSc	Biological crop protection
Environmental, agricultural engineer	BSc	Protection of aquatic and terrestrial ecosystems
Sustainable agriculture	MSc	
Expert on the protection of agroecosystems and plant health	MSc	
Management of biodiversity conservation	MSc	
Organic Horticulture	MSc	
University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca		
Agronomy	BSc	Agroecology Biodiversity conservation
Development of mountain areas	BSc	Agroecology
Organic agriculture	MSc	A wide spectrum of subjects
Manager of natural resources and mountain agro-tourism	MSc	Ecological production systems Landscapes and biodiversity
Agriculture, climate change and food safety	MSc	Agroecology Organic agriculture
OVIDIUS University of Conștanța		
Organic agriculture	MSc	A wide spectrum of subjects
Ion Ionescu de la Brad University of Agricultural Sciences and Veterinary Medicine of Iași		
Technologies in organic agriculture	MSc	A wide spectrum of subjects
Organic Horticulture	MSc	A wide spectrum of subjects
Banat University of Agricultural Sciences and Veterinary Medicine of Timișoara		
Agronomy	BSc	Organic agriculture Agricultural biodiversity
Organic agriculture	MSc	A wide spectrum of subjects
Sustainable technologies of arable crops	MSc	Sustainable fodder production Sustainable production of spices and herbs Alternative agricultural systems
Sustainable use of agricultural lands	MSc	
University of Craiova		
Environmental protection in agriculture	MSc	
Transylvania University of Brașov		
Eco-Biotechnologies in Agriculture and Food production	MSc	Environmental protection in agriculture and in food processing
University of Oradea		
Agronomy	BSc	Eco-agriculture (ecoagricultura)
Horticulture	BSc	Eco-agriculture (ecoagricultura)
Sapientia Hungarian University of Transylvania		
Agricultural Engineering – (Sfântu Gheorghe)	BSc	
Landscape architecture (Târgu-Mureș)	BSc	
Plant Pathology	MSc	Biological crop protection
Szent István University through the Pro Agricultura Hargitae Universitas Foundation		
Organic farmer	adult education	A wide spectrum of subjects

Source: own editing based on the data of higher education institutions

within the frame of an individual program, but we find courses referring to the field of agroecology even in the general agronomy or horticulture curriculums.

As far as secondary school education is concerned, ecological agricultural technicians are trained in vocational high schools. Such institutes are the Vocational Agricultural High School Group of Bistrița or the Agricultural High School of Murgeni and many others.

The Szent István University (Hungary) has a vocational training course on organic farming. This is a year-long adult education program provided by the Romanian foundation of the

university in Miercurea-Ciuc. The training is run in Hungarian aiming at the one-and-a-half-million Hungarian speaking community living in Romania.

In Table 3.1 we summarize those higher education programs, which include agroecology to some extent.

3.3. Organic farming

Organic farming is the most known field of agroecology, and in Romania it is a domain, which is regulated and controlled by the state. Therefore, we have dedicated a separate chapter for the current situation. We used statistical data from the Ministry of Agriculture and Rural Development. Unfortunately, the availability of information by year is incomprehensive so we always used the most recent data available.

Organic farm certification started in 2010, with the launch of the first certifying body in Romania. The plot numbers and the overall size of the certified area went through significant fluctuations in the last 10 years. The increase of this number can be explained by the enthusiasm caused by the available extra EU support for organic farming and the outlook for a higher price for organic products. However, when marketing opportunities failed, and farmers learned (later) about the prescriptions they have to comply with in order to receive the EU funding; the above numbers went down.

In some places a massive conversion was initiated by a company, an NGO or a local authority. However typically in the following years an attrition of participation began. It was typically the small farms which gave up organic farming. Between 2013 and 2018 the number of certified farm holdings approximately halved, while their total land size did not change significantly. (See Figure 3.1.) This proves, that throughout Romania, the organic farms are generally growing in size.

In 2017, 57% of the organic farms were under 5 ha, and only 3% of them worked on an area larger than 100 ha (4 of them having a size between 2500-5000 ha). In 2018, 40% of the organic products were sold on the internal market, whereas 60% was exported, mostly into EU member states. The largest market outlet is Italy, where 31% of the total organic products is delivered to, followed by Germany with 13.5%. Figure 3.2 illustrates the share of different crops in the total production.

Related to animal livestock farming we have data only for the period between 2012-2016. According to this data, the number of certified livestock has significantly reduced. (See Figure 3.3.) This data series however

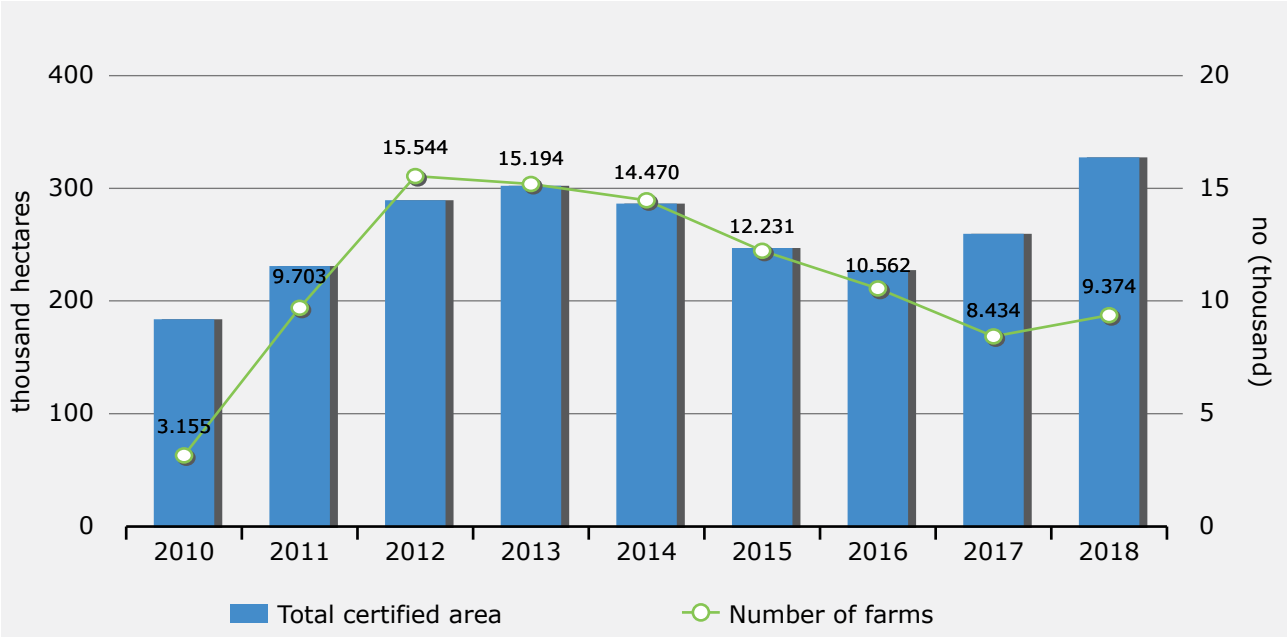

Figure 3.1.: The number of organic farms and the size of certified territories

Source: Ministry of Agriculture and Rural Development

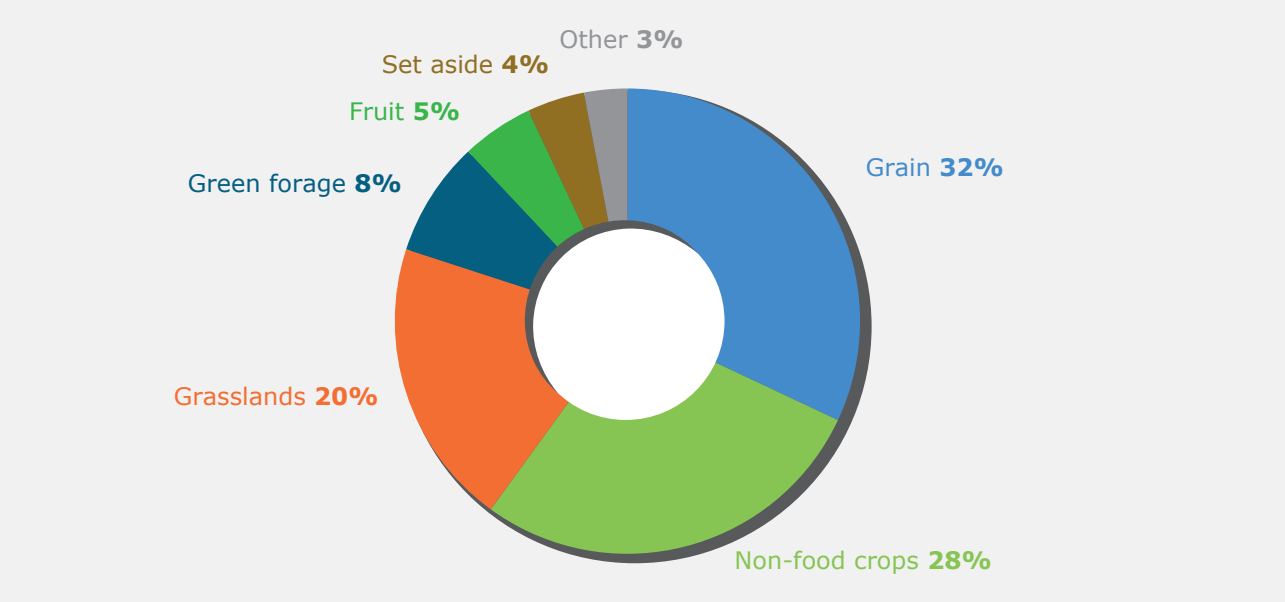

Figure 3.2.: Cultivated crops in certified organic systems in Romania, 2018

Source: Ministry of Agriculture and Rural Development

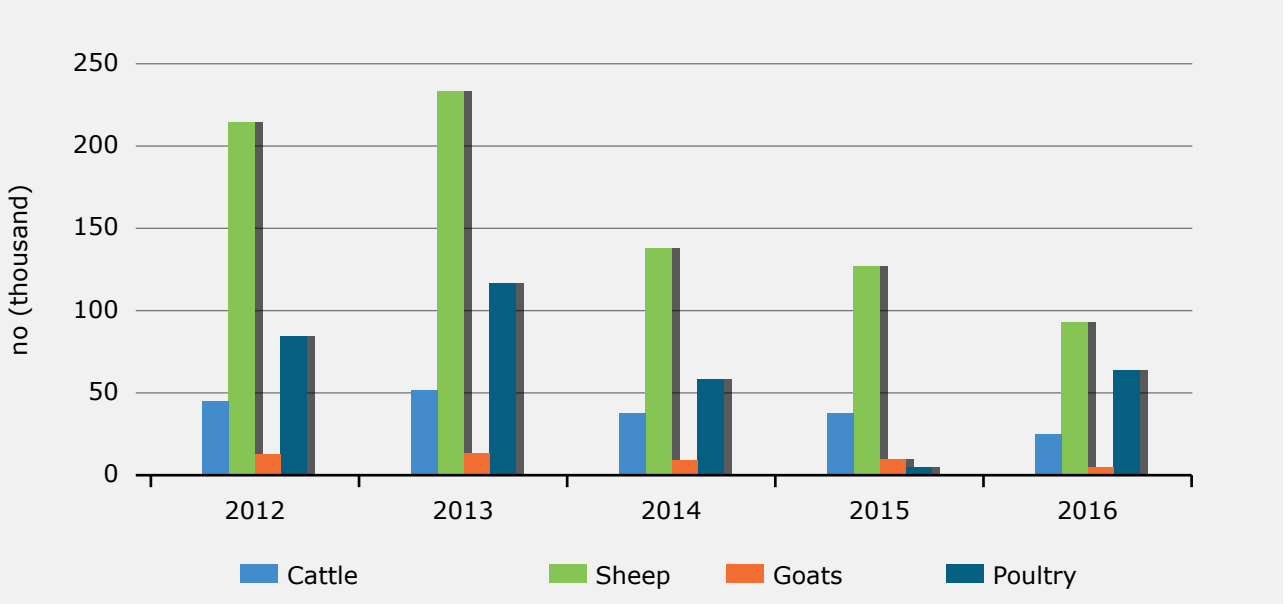

Figure 3.3.: The evolution of the number of certified livestock (pieces) between 2012-2016

Source: Ministry of Agriculture and Rural Development

may be misleading, because – according to 3.1 – there was a trend turning point in 2017-2018.

The domains of financial support for organic farming and the control of compliance with the statutory requirements fall under the Ministry of Agriculture and Rural Development. The authorization of organic certifying bodies is carried out by the Romanian Accreditation Association (RENAR). At present there are 13 such authorized companies operating in the country.

Many of these companies were formed with some form of support from foreign countries, quite a few of them were established as a subsidiary of certifying bodies set up in other countries. The first certifying body in Romania was Ecoinspect Ltd., launched in 2000 with the help of Biokontroll Hungária Nonprofit Ltd. from Hungary. Under such mixed circum-

stances certifying bodies must have a RENAR authorization on the one hand and an approval of their parent companies (if applicable) on the other hand.

Researches related to organic farming are performed by the National Agricultural Research and Development Institute and by several research institutions from other countries. These ones are presented in the chapter 6.4.

3.4. Non-governmental organizations, NGO networks

In this chapter we review some NGOs, which exercise their activity in the domain of agroecology. First, we present in more detail a few organizations which provide outstanding performance in this field. Then in the form of a table we enumerate 35 other organizations, which recently (or nowadays) have exercised their activity in this field. We would like to emphasize that we did not list each and every organization which might have some activity in the field of agroecology.

EcoRuralis – The NGO was set up in 2009 with headquarter in Cluj Napoca, its members include small organic farmers and consumers being in relation with them. Their aim is the fostering of traditional farming in Romania, in particular in a spirit of agroecology and self-sufficiency in food. Their work entails the production and exchange of traditional seeds, the documentation and analysis of land grabbing in Romania, the prevention of the GMO plants from getting state approval and the production of GMOs on Natura 2000 areas. They provide agroecological trainings, they organize a network and do advocacy of small farmers and promote the WWOOF movement in Romania.

ALPA – Access to Land for Agroecology (Romanian: Acces la Pământ pentru Agroecologie) – The main aim of the organization is to secure land for new small farmers, who commit themselves to the principles of agroecology. It was founded as a result of the Land Rights Working group of Eco Ruralis, their work is fostered by the European Access to Land Network and the Austrian Ashoka management development program.

ASAT – Association for the Support of Traditional Agriculture – is an initiative, which – according to the principles of agroecology – builds direct relationships between small farmers and consumers. The operation is done mainly on a voluntary basis. Their policy is based on the European Charter of Community Supported Agriculture, and the organization is member of the Romanian "*Agroecology*" network. At present they are operating in six urban areas: Arad, București, Cluj-Napoca, Sibiu, Odorheiu Secuiesc and Timișoara.

WWOOF Romania – WWOOF is an international network for organic farming, giving opportunity to work on organic farms as a volunteer, thus gaining experience about rural life and agricultural work. In exchange for help, the farmers provide food and accommodation

Table 3.2.: Certifying bodies in Romania (February 2020)

	Country	Certifying body	Authorizing organization
1	RO	S.C. ECOINSPECT Ltd.	RENAR
2	RO	S.C ECOCERT Ltd.	RENAR
3	RO	CERTROM Ltd.	RENAR
4	RO	S.C. ECOROISCERT Ltd.	RENAR
5	RO	MIȘCAREA ROMÂNĂ PENTRU CALITATE	RENAR
6	RO	BIOCERT TRADIȚIONAL Ltd.	RENAR
7	RO	SC SRAC CERT Ltd.	RENAR
8	DE	AGRECO R.F. GÖDERZ GMBH GERMANIA-SUC. ROMÂNIA	AGRECO R.F GÖDEZ GMBH
9	DE	CERES ORGANIC CERT Ltd.	DAKKS
10	IT	BIOS S.R.L ITALIA -SUCURSALA ROMÂNIA	ACCREDIA
11	IT	BIOAGRICERT ITALIA SRL – SUCURSALA ROMÂNIA	ACCREDIA
12	AT	AUSTRIA BIO GARANTIE GMBH ENZERSFELD SUC. BUCUREȘTI	AUSTRIA BIO GARANTIE GmbH
13	AT	SC TÜV AUSTRIA ROMÂNIA Ltd.	RENAR

Source: Ministry of Agriculture and Rural Development

for the volunteers. Its operation in Romania is carried out by Eco Ruralis mentioned above.

With the extreme popularity of using social media there is an increasing number of voluntary cooperation and networks following (consciously or unconsciously) agroecological principles. They are often producer-consumer groups who also educate each other with sharing useful information including own experiences.

The following list includes non-governmental organizations that were not mentioned above and are registered in the field of organic farming and agroecology in Romania. It is impossible to present all such NGO-s, but it is important mentioning, that the operation of civil initiatives is rather unstable in Romania. Therefore, even in the below list there are organisations, which were launched earlier and although they had not been closed down entirely, but their operation might have decreased or even stopped.

Table 3.3.: Agro-ecological organizations in Romania

	English denomination	Romanian denomination
1.	National Federation of Organic Agriculture	Federaţia Naţională de Agricultură Ecologică
2.	Professional Organization "Agroecology"	Organizaţia profesională „Agroecologia"
3.	Association of Bio-farmers in Romania, "BIOTERRA"	Asociaţia bioagricultorilor din România „BIOTERRA"
4.	Romanian Association for Sustainable Agriculture	Asociaţia Română pentru Agricultură Durabilă
5.	Association of Operators in Organic Farming BIO ROMANIA	Asociatia operatorilor din agricultura ecologica BIO ROMANIA
6.	Association of Bio-aviculturists of Romania – BIOAVIROM	Asociaţia Bioavicultorilor din România – BIOAVIROM
7.	Society for Organic Agriculture	Societatea pentru o Agricultură Ecologică
8.	Association for Environmental Protection and Organic Agriculture "TER"	Asociaţia de Protecţia mediului şi agricultură ecologică „TER''
9.	"Mother Earth" Foundation	Fundaţia „Mama Terra"
10.	National Association of Agricultural Consultants	Asociaţia Naţională a Consultanţilor din Agricultură
11.	Academic Foundation for Rural Progress "TERRA NOSTRA"	Fundaţia Academică pentru Progres Rural „TERRA NOSTRA"
12.	The Ecological Society of Maramureș	Societatea ecologistă din Maramureş
13.	The Ecological Collaboration Group of Bukovina	Grupul Ecologic de Colaborare Bucovina
14.	"Avram Iancu" Company	Societatea „Avram Iancu"
15.	Foundation "Operation of Romanian Villages"	Fundaţia Operaţiunea satelor Româneşti
16.	The Transylvania Ecological Club	Clubul Ecologic Transilvania
17.	Rurala Romania Foundation	Fundaţia Rurala România
18.	Bioclub Cluj	Bioclub Cluj
19.	Biodynamic Gardeners Group	Grupul Grădinarilor Biodinamici
20.	Romanian Association of Applied Bioagriculture	Asociaţia Romana de Bioagricultura Aplicată
21.	Galati Ecological Consulting Center	Centrul de Consultanţă Ecologică Galaţi
22.	The Association for the Protection of the Environment and Nature	Asociaţia pentru Protecţia Mediului si a Naturii
23.	Foundation "Divers Eco"	Fundaţia „Divers Eco"
24.	Foundation "Noema Consulting"	Fundaţia „Noema Consulting"
25.	Albina Association	Asociaţia Albina
26.	Association for Environmental Protection and Resource Conservation	Asociaţia pentru Protecţia Mediului şi Prezervarea Resurselor
27.	The Association "Terra Verde"	Asociaţia „Terra Verde"
29.	Roman-Italian Agri-Ecological Association	Asociatia Romano-Italiana AgriEcològica
30.	Romanian Association of Applied Bioagriculture – Ecological family farm	Asociatia Romana De Bioagricultura Aplicativa – Ferma Ecologica Familiala
31.	EcoLogic Association	Asociatia EcoLogic
32.	Association of Organic Farmers in Moldova, "BIOMOLD"	Asociatia bioagricultorilor din Moldova „BIOMOLD"
33	Pogány-havas Regional Association	Asociatia Microregionala Pogány-havas
34	Agri-Cultura-Natura Transylvaniae Association	Associatia Agri-Cultura-Natura Transylvaniae Egyesület
35	ADEPT Foundation	Fundatia ADEPT

Source: own editing based on the Ministry of Agriculture and Rural Development, and the websites of the organizations

4. Needs Assessment of the Vocational Agroecological Training for Farmers in Romania

Agri-Cultura-Natura-Transylvaniae Association
2020

4.1. Introduction

The needs assessment was done during the COVID-19 pandemic shutdown therefore it was practically impossible for us to see farmers in person. This led to a situation where we had to do most of our interviews (with a few exceptions) via phone. We had to ask farmers a favour to sit down and talk to us honestly for about 90 minutes. Therefore, we had to do the interviews with farmers we already knew. Thus, the sample we created is smaller and less representative than planned.

Because of the rather small sample we decided to approach mostly farmers who have some openness to agroecology from scratch. We made this decision based on the experiences of our first few interview-trials when the result showed that farmers uninterested in agroecological issues do not give useful inputs into our needs assessment. However, we can formulate some training proposals for this group of farmers too.

We interviewed 13 farmers altogether from different profiles, but they are all small-scale family farmers. They live in the area of the Csík basin (Depresiunea Ciucului) and the Gyimes (Valea Ghimesului) in the Eastern Carpathians, central Romania. Most of them combine self-sufficiency with production to the market and all of them come from a farming family – which is typical in this region. These farmers inherited a very deep knowledge on locally useful agroecological practices (aka traditional ecological knowledge).

Nevertheless, based on our professional experience we can say that the below findings can be extended to many of Romania's hilly areas where small scale farming is still widely spread. One important difference with other areas might be farm size. In more open hilly landscapes land ownership is more concentrated however it is rare to find farms cultivating more than a few hundred ha-s.

4.2. Attitude

We can distinguish between two important forms of attitudes towards agroecology among family farm owners.

1. The environmentally conscious farmers

Most of our farmers socialized at home where farming family members (parents and grandparents) taught the young generation how to work in highly biodiverse landscapes and how to use natural resources sustainably. It was an essential attitude since small farms in Romania could not afford chemical inputs and machinery until very recently. This traditional attitude is still around but it lost its importance lately.

the other category belonging to this attitude group is the conscious agroecologists. They are partly better educated people, sometimes are or were town dwellers. these people have an inner motivation to do farming and at the same time to contribute to conserving nature.

2. The environmentally ignorant farmers

This group of farmers socialized in industrialized socialist farming with little sensitiveness about the importance of natural assets in farming. The younger generation however learned about modern farming in Western Europe being an employee (a "*servant*" with local vocabulary). They learned about efficiency, mechanization, profitability. This group does not really care about nature friendly farming.

And we have to add that poverty plays an ambivalent role in this respect. Small farmers either cannot afford machines and chemicals – this keeps them on the agroecological side despite their wishes to modernise. With just a little more income, farmers try to follow modern trends. But they are unable to afford environmentally efficient machinery, chemicals and they miss the knowledge on how to use these

technologies in an environmentally sound way (i.e. how much pesticide to use in what concentration under what weather conditions).

As a general remark it is important to mention that farming in these areas is rarely profitable therefore it is a general desire of farmers to improve their farms' profitability.

4.2.1. Strengths

- There is an inherited attitude to follow agroecological principles in farming.
- Many farmers have a dual attitude: producing food for family demands (self-sufficiency) besides running the farm as a market-oriented business.
- The beauty of the landscape and the obvious presence of highly biodiverse agroecosystems makes many farmers sensitive towards agroecological values. One of our interviewees – a pioneer and opinion leader of organic farming in the area – said: "*the farmers' community (esp. the young adults) are open minded and receptive towards agroecological principles*".
- There is an increasing number of farmers who choose to become agroecologically conscious. This includes not only valuing nature but also being socially responsible.
- Helping each other and not considering fellow farmers a competitor is still the general attitude of family farming.
- A good number of farmers expressed serious interest and willingness to learn.
- Some EU agricultural subsidies motivate farmers to follow environmentally sound farming approaches
- There is a new regional movement the so called "*small gardeners*". They are often town dwellers with higher education who sell or share vegetables produced in their backyards or allotments. It also is a vivid network of people sharing tips about production and marketing information fulfilling even more the definition of agroecology.

4.2.2. Weaknesses

- Most farmers do not even consider new ways of boosting the farm's incomes. Economic diversification is not part of the general attitude.
- Poverty can lead to ignorance of environmental values.
- Socialist industrial farming taught the older generation to ignore agroecological values.
- Similarly, the work experiences on Western European farms turned many young and middle-aged farmers to follow the capitalist attitude of profit-oriented thinking – ignoring nature.
- Pessimism: many farmers do not see a bright future for farming in Transylvania and even less for environmentally conscious farming.
- Many farmers follow environmentally sound farming methods only as long as EU subsidies require it.

4.2.3. Desired improvements by the farmers

Many farmers really wish to farm in environmentally sound way often because of sentimental reasons. One motivation is the nice memories from childhood farming and what they learned from the older generation. Another reason is that they would like to keep this natural beauty for their children – or just maintain biodiversity for its intrinsic value.

Improving the farm's profitability is a general desire among farmers.

Modern and environmentally sound farming approach is a frequent aim.

4.2.4. Proposed improvements

Teach farmers about the importance of their work

People can be more motivated if they understand their situation better and they are empowered by positive messages which underpin their confidence about the importance of what they do. Although farmers always emphasise that trainings should be practical, they actually starve for positive feedback about they work. Trainings should provide such positive messages custom tailored to farmers. Trainings should not only teach about farming practices, but the many values nature represent and the role of farming in maintaining it.

Opportunities to network and socialize with similar minded farmers

We propose to organise events of even to set up and run farmers' clubs where farmers could meet and talk to each other on a regular basis. This would not only help farmers exchanging useful information and experience but also to revitalise and strengthen the attitude for cooperation.

This could be an outcome of this project too hence the training courses will provide opportunities to build stronger network of farmers interested in agroecology. One of our respondents also emphasized: "*The training should not stop at a certain point because introducing new methods and technologies provoke a lot of questions and generate important experiences to share in a later stage*."

4.3. Knowledge

There are some pioneers who already use different elements of agroecological production. Not only the organic but less rigorous voluntary systems.

The number of farmers converting into organic is increasing significantly in the last few years. The motivation is overwhelmingly the extra subsidy and the premium prices they could get for their produce. However, there are also those who are committed to healthy food and nature friendly farming.

4.3.1. Strengths

Traditional ecological and farming knowledge

Our farmers still learn from their ancestors about the ecological system of their natural/farming environment. This knowledge includes microrelief, microclimate, wild plant species and their role in indicating local ecological conditions such as water or nutrient richness etc. Our farmers can not only "*read*" landscapes and ecosystems, but they also know the ways how to utilise them sustainably. This traditional ecological knowledge and the farming techniques connected to them are of very high value for agroecology.

Organic farming

Some 150 farmers in the process of conversion is a good basis for teaching a group of farmers about agroecology.

Pastoralism and haymaking

The majority of farmers in the area have a mixed farm. It means that besides arable land they manage vast grasslands. These are biodiversity hotspots even on global level. It means that our farmers have knowledge how to manage rich biodiversity. However new mechanized methods are taking over which need thoroughness to avoid biodiversity loss by intensification. Also, many hay meadows turn into pastures or forests which results in biodiversity degradation. Therefore, finding new ways to valorise this asset (mountain hay) is an urgent necessity.

4.3.2. Weaknesses

The lack of exact knowledge how to best use modern technologies for the environment. Farmers often do not know about modern however environmentally sound farming techniques. Under the term technique we mean new, environmentally sound technologies as well as the environmentally sound application of new or conventional agrotechnology. One example is overdosing or mixing pesticides "*to be sure it will work*".

4.3.3. Desired improvements by the farmers

Many farmers expressed interest in learning about the basics of agroecology including soil, water, air and biodiversity. Greatest emphasis should be given on soil.

Development of grassland-based products such as new milk products. Cheese trainings could be organized.

Learn about farm buildings. This topic includes designs, workflow, animal welfare and materials.

There is some limited but apparent interest to learn about permaculture.

4.3.4. Proposed improvements

Development of new grassland products. For example, hay seed mix, branded hay milk and hay milk products or high-quality hay pellets as a fodder.

Introduction of new arable species and varieties into the crop rotation for economic diversification and climate change adaptation.

4.4. Skills

To separate skills from knowledge is sometimes difficult. Our farmers did not give very detailed answers to differentiate between the two.

However, it is obvious that traditional knowledge often includes skills not only knowledge.

4.4.1. Strengths

Traditional farming skills. We do not want to repeat here the above details about traditional knowledge but obviously this often includes skills too. One example is the skill to identify different biotopes in the landscape or the sustainable long-term management of biodiverse grasslands.

There is an increasing number of farmers who already developed skills in certain agroecological methods.

4.4.2. Weaknesses

Many farmers lack the skills to use modern technologies in a way which is best for the natural environment.

Most farmers lack long term planning and management skills.

4.4.3. Desired improvements by the farmers

Practical trainings on modern environmentally sound techniques.

Marketing techniques and food processing.

Organic farming including the certification process and organic farming techniques.

Biogas usage on the farm.

4.4.4. Proposed improvements

Grassland management with modern technologies.

Strategic planning and farm management.

Organic and agroecological weed and pest control.

4.5. Summary

Table 4.1.: Summary of the need's assessment in Romania

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	• traditionally nature friendly attitude • sensitivity to the natural values • combining self-sufficiency and producing to the market • increasing social responsibility • willingness to learn • EU subsidies good for the environment • small gardens become popular	• traditional ecological and farming knowledge • organic farming • pastoralism and haymaking	• traditional farming skills • modern technology's penetration
Weaknesses	• lacking economic diversification: not being ready to try new farm income strategies • ignorance on the negative effects of farming on nature • pessimism	• lack of best use of modern technologies for the environment	• skills to use modern technologies for the environment
Desired improve-ments	• make farming modern and environmentally sound • improving the farm's profitability	• basics of agroecology: water, air and biodiversity and special emphasis on soil, • grassland-based products such as new milk products • farm buildings • permaculture	• modern environmentally sound farming techniques. • economic diversification • marketing techniques • food processing • Organic farming – certification and techniques
Proposed improve-ments	• farmers empowerment actions • organize networking events	• development of new grassland products new arable species and varieties into the crop rotation	• grassland management with modern technologies • agroecological weed and pest control • Strategic planning and farm management

Source: own compilation based on the situation analysis and farmer consultations

5. AGROECOLOGICAL SITUATION ANALYSIS OF AUSTRIA

GRAND FARM
Model Farm for Research and Demonstration
2020

5.1. Introduction and Definition

Historically, the term "*agroecology*" means the application of ecological concepts and principles on the design and management of sustainable agricultural systems (Altieri, 1995; Gliessman, 2007). In the recent decade, Agroecology has gained increasing attention evolving from the application of agroecological methods and principles towards a variety of perceptions, which vary according to academic content, research methods, practical applications, and policies (Gallardo-López *et al.*, 2018).

Within the trAEce consortium, we agreed on the following perception: Agroecology is considered jointly as **a science** with a transdisciplinary, participatory and action research approach to research the farms ecological relationships as well as the sustainability of the whole food system; **a practice** that nurtures soil ecosystems, nutrients' recycling, the conservation of energy at all scales and the dynamic management of biodiversity; and a **social movement** reshaping the relations within the food system, promoting proximity and solidarity between consumers and producers, both challenge and transform power structures in society and thereby fostering food sovereignty leading to self-governing communities loosening corporate control of food.

5.2. Structure and Governance of the Agricultural Sector in Austria

Agroecological measures can be considered partially implemented due to several reasons in Austria: Landscape is mountainous, farms are rather small and therefore have to be more diversified compared to other EU member states and tourism is one of the major industries. Thus, caring for the landscape is important. Environmental legislation is quite strict. Austrian farm holdings are therefore restricted in their application of fertilizers and pesticides which limits intensification. Small scale, diversified, family-owned farming has remained desirable even if competition leads to a pressure to grow. Organic farming is the main driver for agroecological practices in Austria, even if not the only one. The implementation of organic farming resulted in nearly 25% of organic cultivated area in 2019, which is the highest score within the EU and the recent target, set by the European Commission, to be achieved in average across the EU until the year 2030 (European Commission, 2020).

5.2.1. History overview and country specifics

In 2016 Austria had 161,200 farm holdings. 58,700 (36%) located in the mountains. 90% of the farms are family farms and the average size of the agricultural production land is 19.7 hectares.

Most of the historical development of the agroecological approach is strongly related to organic farming. As early as 1925, the first biodynamic farms were established in Austria. The first organisations for organic farming were founded in 1959, which resulted in the organization Bio Austria in 2005 uniting 13,500 Austrian organic farms in 2019. These farmers do not only cultivate according to the EU regulation on organic farming (Nr 834/2007), but have to follow far stricter rules, which strengthens the implementation of AE methods.

When Austria joined the EU in January 1995 the first, the Austrian farming community was concerned not to be able to compete with member states in scale and, therefore efficiency in production. A new marketing strategy for Austrian food production was found according to which Austria identifies itself as the "*delicatessen shop of Europe*". Organic, diversified, small scale family farms received higher support in Austria compared to other EU member states (Demokratiewerkstatt, 2014).

5.2.2. CAP in AT

The European common agricultural policy was implemented in Austria with a strong focus on pillar 2. Indeed, Austria continues to be one of the Member States that receives a significant share of its CAP support via the so-called 2nd pillar of the CAP (European Commission, 2019):

General measure (implementation in Austria in 2018 in brackets):
- Environmentally sound and biodiversity-promoting management (1,092,505 ha)
- Organic farming (484,050 ha)
- Limitation of yield-increasing inputs (274,994 ha)
- Nature conservation (79,165 ha)

Arable land:
- Greening of arable land – intermediate crops (265,759 ha)
- Greening of arable land – "*Evergreen*" system (193,842 ha)
- Direct seeding and seeding on mulch (incl. strip till) (128,966 ha)
- Preventative groundwater protection (regional) (324,438 ha)
- Preventative surface water protection on arable land (regional) (1,138 ha)
- Management of arable areas particularly threatened by leaching (regional) (1,351 ha)
- Renouncement of fungicides and growth regulators in cereals (70,748 ha)
- Cultivation of rare agricultural crops (12,567 ha)

Grassland:
- Renouncement of silage (117,021 ha)
- Mountain grazing and herding (312,207 ha)
- Cultivation of mowed mountain grassland (14,526 ha)
- Natura 2000-Agriculture (81 ha)

Others:
- Erosion protection for fruit, vineyards and hops (42,604 ha)
- Pesticide renouncement in vineyards and hops (22,741 ha)
- Use of beneficial organisms in greenhouses (220 ha)
- Surface-near spreading of liquid farm manure and biogas manure (97,860 m^3)
- Animal welfare – grazing of livestock (36,029 animal units)
- Animal welfare – stable (2,852 animal units)
- Maintenance of endangered livestock breeds (40,763 animals)

5.2.3. AE measures and skills common in AT

Agroecological measures come from different motivations in Austria. On one side, the Austrian CAP is initiating the implementation of certain AE methods on large-scale all-over Austria (see 2.2 CAP in AT). On the other side, pioneers establish Agroecology on a higher level, although only on a comparable small scale. These farms are often characterized by diversified income strategies, their strength in public relations and/ or formal and informal teaching assignments. AE skills most often used in Austria are environmentally sound and biodiversity-promoting management, crop rotation, cover crop implementation, organic farming, mountain grazing, and nature conservation.

5.2.4. Trends

According to the definition of AE (see 1. Introduction and Definition), there are efforts to implement such practices in Austria. Nevertheless, these efforts are not strong enough to make a turnaround in the loss of biodiversity, in mitigating climate change, nor in preventing pollution or to restore the environment (Bundesanstalt für Agrarwirtschaft und Bergbauernfragen, 2019).

Therefore, many actors urge for the implementation of a stronger new CAP, and pioneers become active along the sector. Already in 2017, the environmental umbrella organisation (Umweltdachverband), BirdLife Austria and the Nature Conservation Association jointly expressed their support for EU-wide effective biodiversity protection in the CAP 2020+ for (Umweltdachverband, 2017). The future CAP should be ecologically sound, for which a fixed share of financial resources must be provided, according to the motto "*Public money for public goods*" (Umweltdachverband, 2017). In 2019, two associations were founded: VEREIN BODENLEBEN (association "*soil life*"), which is dedicated to introducing soil protection measures to the farming community and ARGE AGROFORST (working group "*Agroforestry*"), which promotes agroforestry in Austria.

Another trend emerging is the rise of career changers and young people, buying or renting rather small pieces of land to start businesses. They often have in common to cultivate the land in tune with nature in both-traditional and innovative ways. In 2013 an association and network for farm succession in Austria was founded, which later launched the initiative PERSPEKTIVE LANDWIRTSCHAFT (Outlook Agriculture) out of the high demand for a platform and the resonance of farmers/ people either looking for land or honourable successors.

Within the EU, support for Agroecological methods will be covered by the recently published EUROPEAN GREEN DEAL and the FARM TO FORK STRATEGY as well as the establishment of MISSION BOARDS like MB on Soil health and food in the near future. These efforts aim to urge member states to strengthen their programs towards ecological sound faming systems. It can be assumed that further agroecological trends in Austria will rely on decisions made in the curse of the CAP reform, although new programs are not expected to be implemented before 2022.

5.3. Key actors

Due to the history of agriculture in Austria, many actors who can be seen as the backbone of agroecological thinking, are found within the Organic Network. However, it must be mentioned here that "*organic*" does not always represent agroecology by definition, but there will definitely be practices based on the same ideas.

5.3.1. NGOs, politically oriented organisations and citizens' movement

In the last decades, several NGOs and Organisations emerged that do not agree with current policymaking in agriculture and carry the idea of food sovereignty. Uniting into one platform "*Wir.haben.es.satt-Plattform"* (we.are.fed.up-platform of rural, environmental, economic and developmental organizations) those organisations stand up for a worldwide socially just and agro-ecological agricultural and food system. Root of their discontent is the fact that 80 percent of the subsidies go to the biggest 20 percent of farms and thereby displacing small farms from the market (Chemnitz and Rehmer, 2019). The Platform stresses, that subsidies are swallowed up by the low prices and that only large farms and processors benefit from subsidies. Thus, this platform takes a stand against the growth- and agro-industrial oriented agricultural model and therefore demand an agricultural policy based on food sovereignty, human rights and the protection of and fair access to natural resources (Plattform "*Wir haben es satt!*", 2019).

Carriers of the platform are: ÖBV-Via Campesina Austria, IG-Milch, FIAN Österreich, Südwind, Attac, Welthaus Diözese Graz-Seckau, GLOBAL 2000, Greenpeace, Grüne Bauern und Bäuerinnen.

Another carrier of the idea of food sovereignty is the citizens´ platform Nyéléni Austria that hold forums twice a year from which frequently projects and alliance emerge. Church organizations as KOO und DKA (kath. Partner von CIDSE) und Brot für die Welt (evang.) are also be found amongst several publications for agroecology and food sovereignty.

5.3.2. Educational facilities

Agroecological thinking and related educational facilities are spread amongst several colleges, divisions, associations and institutions but is hardly ever the sole focus of attention or is often not even addressed as Agroecology per se.

5.3.2.1. Vocational schools for Agriculture and Forestry

Bioschule Schlägl: The school for exclusively organic agriculture was founded in 2002 and offers an innovative block system that is adapted to the seasons and promotes holistic thinking and acting.

Fachschule Grottenhof: A Technical school for agriculture and forestry where all aspects of organic farming can be found on the training and experimental farm, which has been organically farmed for over 30 years.

HBLFA Raumberg Gumpenstein: At three organically managed sites, the Bio-Institute deals with questions concerning organic grassland and livestock farming, animal health, arable farming and legal issues in organic farm-

ing. Another focus is on the conservation of rare breeds of farm animals in Austria.

5.3.2.2. AE at University of Natural Resources and Life Sciences, Vienna

Master programmes Organic Agricultural Systems and Agroecology (AgrEco-Organic) and **Organic Agricultural Systems and Agroecology** (EUR-Organic).

Division of Organic Farming (IFÖL), three working groups: The Soil Fertility and Cropping Systems WG, The Knowledge Systems and Innovation WG, The Transdisciplinary Systems Research.

Relawi-working group: Newly established students´ working group on Regenerative Agriculture. Aim: Think tank to connect and learn from each other about economically, ecologically and socially sustainable agro-ecosystems, which revive the desire to work and live in harmony with nature in the countryside.

5.3.2.3. Other research and advisory services

Ländliches Fortbildungsinstitut LFI, Rural training institute: LFI is one of the largest educational institutions in rural areas and offers a comprehensive and area-wide range of training and further education opportunities. Besides traditional and proven professional training, LFI offers courses in the field of health and environmental protection and personal development. In addition, LFI notices high demand in the field of business management, IT, income combination, direct marketing and farm holidays and offers respective courses. Classes related to Agroecology are represented under the category "*environment and organic agriculture*" (see below: 5. Existing training trainings). With support of the federal state, provinces, and the European Union.

Bioforschung Austria: Austria´s first research institute for organic farming. With the focus on the improvement of organic farming with the help of interdisciplinary research, the implementation of the results in practice, together with farmers, farm women and consultants and consumers information about the advantages of organic farming.

FiBL Austria, Research Institute for Organic Agriculture: FiBL is a charitable association. On behalf of various government agencies and private organizations, the following focal points are worked on: promoting biodiversity in agriculture, sustainable food systems, sustainability assessment of food production, and many more. Networking between practice, consulting, and research as well as sound organic knowledge for consumers are among the main goals and fields of activity of FiBL Austria.

5.3.2.4. Other (Associations and Organisations)

Bio AUSTRIA: Austrias biggest organic farmers' association that represents organic farmers' interest. Bio Austria is politically active and provides advisory services and learning opportunities along the organic sector.

Bioverband Erde und Saat: A rather small organic famers association of about 500 members. The guidelines are as such, that soil should be protected by increasing the build-up of humus and promotion of soil fertility. The biodiversity on the land and farms should be preserved, not only in the animal sector but also, for example, through our own cereal farm breeds. In order to achieve these goals, continuous advice and information for members about Earth & Seeds is available. Further educational opportunities include the members' newspaper, excursions and training and informative events.

Demeter: Is a biodynamic association and the only organic one that has established a worldwide network of independently certifying organizations. Besides a basic class as a requirement for certification, further education and events are provided.

Permakultur Austria, Association and Academy: The association Permakultur Austria is a non-profit organization that is committed to the dissemination of information about permaculture, the sustainable design method developed by Bill Mollison and David Holmgren. In addition to the certificate course, the association also organizes lectures, excursions to- and workshops about related projects.

SOL – People for Solidarity, Ecology and Lifestyle: The Association that counts about 2000 members has been advocating a sustainable, enjoyable lifestyle and the corresponding change in the political framework since 1979. Knowledge transfer, political work and networking are amongst SOLs fields of activity.

Arche Noah Society for the Conservation of Crop Diversity and its Development: ARCHE NOAH responds to the loss of agro-biodiversity with a positive vision and numerous activities, projects, and political work.

Verein Bodenleben: The young association has set itself the goal of gathering knowledge about soil-improving and erosion-reducing cultivation methods and to put this knowledge into practice. Aim: Practice-oriented research work, awareness raising and knowledge transfer.

Netzwerk Existenzgründung in der Landwirtschaft Perspective Agriculture is an initiative of an association and network for extra-familial farm succession in Austria. Their field of activity includes research, public relations, awareness raising, international networking and representation of the interests of farm seekers and farm donors. According to them, business start-ups in agriculture are to be conveyed as a necessary component for the preservation of agricultural enterprises and their diversity – and thus of a living rural area.

5.4. Existing trainings and other resources related to AE for farmers and educators

LFI Courses, Permaculture certificate course, see below: Agroecology and partnerships

Bodenpraktiker Zertifikatslehrgang – Soil practitioner certificate: By LFI together with Bio Forschung Austria and Bio Austria

Seminar series – Biodynamic & organic farming

An extra occupational course that provides a comprehensive insight into theory and practice of biodynamic and organic farming. Organizers are: Teaching and research association for biodynamic fields of life in cooperation with the Institute of Organic Agriculture of the BOKU Vienna, DEMETER, BIO AUSTRIA and the respect-BIODYN.

5.5. Agroecology and partnerships

Most trainings provided by LFI are in cooperation with experts and other institutions. A selection:

- Permaculture as a planning tool for agriculture (Bio Austria)
- Bionet-Workshop: Practical experience with mulch and direct sowing in organic farming
- Promoting beneficial insects
- Biodiversity in arable farming
- Identifying weeds and using them as indicator plants

Biokompetenzzentrum Schlägl: The Bio Competence Centre Schlägl was founded in 2011 by the graduate association of the Bioschule Schlägl together with the Research Institute of Organic Agriculture (FiBL Austria). It is funded by the province of Upper Austria, aiming to develop sustainable solutions together with organic farms and actors in organic farming. The Centre carries out corresponding experiments and makes the results available to the region.

Permaculture certificate course of Permakultur Austria in cooperation with: BOKU University Institute for Soil Research, Hochschule für Agrar- und Umweltpädagogik, TU Wien, Institut für Kunst und Gestaltung.

5.6. Outlook

The pressure of farmers to maximize their yields is high. With the rapid development of the market and the increasing price pressure, the concern about maintaining and increasing soil fertility has also been supplanted on many organic farms. Trainings that address the careful cultivation of the soil on the other hand are attracting interest again, but a lot more needs to be done to alter the loss of carbon in the soil as well as biodiversity and to mitigate climate change. Researchers, practitioners, politicians, consumers, educators and advisors-everybody's strengths and knowhow are needed to achieve a turnaround towards regenerative Agriculture.

6. NEEDS ASSESSMENT OF THE VOCATIONAL AGROECOLOGICAL TRAINING FOR FARMERS IN AUSTRIA

GRAND FARM
Model Farm for Research and Demonstration
2020

6.1. Attitude

Based on the findings of interviews made with Austrian farmers, following attitudes could be identified.

6.1.1. Strengths

Identification of interviewed farmers with their jobs is high, as well as their appreciation for it. Even though many face economic difficulties, they persist and keep on working hard. They know about the importance of their work for the well-being of the society as a whole. In general, farmers intrinsically aim for sustainable ways to do their work but often do not have enough time/money/will/and/or strength to effect a change. However, some farmers, self-organise and arrange meetings to learn from each other's experiments, exchange experiences and strive for improvement and more sustainability in their farming practices.

6.1.2. Weaknesses

Aside from such motivated farmer groups, many farmers are resistant to learning entirely new methods. Some reasons for this are the potentially large economic risks and a fear of going out of business exasperated by a low willingness to change. Farmers tend to be rather sceptical about new ideas for doing something and often hesitate because of economic uncertainties. Far too little farmers are capable of working in a truly self-determined way. Instead of deciding on their own (based on experience and observation), many of them rely on the recommendations of agricultural advisors or vendors of agricultural products. This situation causes many problems and leads to a huge loss in decision-making ability and subsequently to an increasing dependency on different authorities.

6.1.3. Desired improvements by the farmers

First and foremost, economic stability and security are the fundamental prerequisites for any successful farming activities. This must be secured in order to empower farmers to develop new and more sustainable ways of farming. Subsequently, well-compiled and – most importantly – independent information would help farmers make decisions on their own. Farmers need to be more aware and open-minded in order to realise the effects their work has on the environment. The realisation that farmers need to work in accordance with natural principles and limits is the key to genuine sustainability in farming. As to production and marketing, more creativity would help farmers to better adapt to changes in demand or competitor's activities.

6.1.4. Proposed improvements

Financial stability and independence of farmers must be the overall goal of any EU funding programme. Only in this way will farmers be capable of trying new methods and investing in new techniques. After ensuring their economic security, it is then necessary to empower them to think for themselves and make their own decisions based on independent information and observation. Natural principles and limits should be the boundary conditions. In all actions of any EU programme the aim must be to understand the real needs and challenges of farmers. For that to happen, real practitioners are needed in the development process of such programmes. Farmers should be highly involved in any decision-making process in order to ensure true alignment with the real challenges in the everyday business of farming.

6.2. Knowledge

6.2.1. Strengths

Farmers generally have a good understanding of natural processes and know a lot about seasonal rhythms and weather dynamics. Most farmers are also well experienced in terms of crop or animal management. Some of them make an effort to be well informed about new machines and tractors. When it comes to agro-ecological measures, the knowledge of farmers varies a lot between those who already work ecologically or organically and those who do not care much yet. Some ambitious groups of farmers self-organise to meet at each other's farms and discuss new experiments or techniques they have been trying. Unfortunately, such groups are more the exception than the rule.

6.2.2. Weaknesses

Far too many farmers have insufficient know-how regarding biodiversity and soil health. In both of these fundamentally important subjects many farmers would benefit with being better informed/trained. We also observed a lack of knowledge regarding business administration, accounting, and legislation. Farmers sometimes make very large investments based on the recommendations from agricultural advisors or vendors of agricultural products. Especially when it comes to large tractors, buying decisions often are not based on rational calculations and subsequently exercise high economic pressure on a farmer's budget.

6.2.3. Desired improvements by the farmers

Profound knowledge about soil and biodiversity should be the basis for every farmer's practices – as important as the know-how of the crops they are producing or the animals they are keeping. Product development and marketing are other important factors in a successful farming strategy and should be considered more often. Generally speaking, better education could lead to increasing self-determination of farmers and should therefore be the main focus in agricultural politics.

6.2.4. Proposed improvements

Comprehensive education regarding soil health, biodiversity and business administration must begin in secondary schools and should be taken more seriously. Increasing self-determination and decision-making ability based on experience and observation should be the central goals of any educational programme. Both of those attributes could be useful arguments in motivating farmers to attend trainings – because farmers generally tend to favour autonomy and independence.

6.3. Skills

6.3.1. Strengths

Most farmers are very skilled in the management of crops and animals. For reasons of experience they are generally very good at all the little manual operations that make their work fast and efficient. Aside from diverse manual work, driving large vehicles is another part of their daily routine. They have often perfected the handling of those heavy machines and are used to repairing most equipment themselves. Farmers are often genuine handymen and have the burden of managing many different tasks on the farm: they are not just producers, but also builders, mechanics, product managers, staff managers, marketers, salesmen, family fathers/mothers, …

6.3.2. Weaknesses

Mindfulness, empathy and care have ceased to be common "*skills*", the absence of which may be leading to environmentally harmful actions. The ability to conduct basic soil tests is also not very prevalent. A final weakness is the lack of ability to perform the necessary calculations in order to make economic decisions.

6.3.3. Desired improvements by the farmers

Basic skills in calculation and accounting would help a lot to make better decisions in everyday practice. The ability to think economically and to manage the farm as a successful business should be fostered by future training programmes.

6.3.4. Proposed improvements

Increasing the awareness about the responsibility of farmers regarding soil health and biodiversity should be a central goal. More attention must be paid to mindfulness and responsibility of care. Basic soil tests should also be promoted much more. Training in economical thinking and business accounting combined with simple spreadsheets for everyday use are necessary to help improve the profitability of farms.

6.4. Summary

Farmers' attitude, knowledge and skills regarding agroecological measures strongly vary between those who are already practising ecological farming to a certain extent and those who are not yet working with ecological methods.

Table 6.1.: Summary of the need's assessment in Austria

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	• In general, farmers intrinsically tend to aim at sustainable ways to do their work. • Some farmers self-organise and meet to learn from each other's experiments.	• Farmers often have a good understanding of natural processes and know a lot about seasonal rhythms and weather dynamics. • Most farmers are also well experienced in terms of crop or animal management. • Some of them keep up to date with new machines and tractors.	• Most farmers are very skilled in the management of crops and animals. • From experience they are very good at all the manual operations that make their work fast and efficient. • Farmers are often true handymen and used to managing many different tasks on the farm – they are not just producers, but also builders, mechanics, product managers, staff managers, marketers, salesmen, family fathers/mothers, …
Weaknesses	• Many farmers tend to resist totally new methods because of potentially large economic risks, fear of going out of business as well as a low willingness to change. • Far too little farmers are capable of working and making decisions in a self-determined way.	• Far too many farmers have insufficient know-how regarding biodiversity and soil health. • There is also lack of knowledge regarding business administration, accounting, and legislation.	• The emotional aspect of farming somehow got lost with the last generation of farmers. Good farmers should not only know a lot about natural processes but should also care and feel genuine joy about abundant biodiversity. • Mindfulness, empathy, and responsibility of care have been lost as common "skills", the absence of which is leading to environmentally harmful actions. • The ability to conduct basic soil tests is also not very prevalent.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Desired improvements	• Economic stability and security are the fundamental prerequisites for any successful farming activity. This must be secured in order to empower farmers to develop new and more sustainable ways of farming. • Farmers should be more aware and open-minded in order to realise the effects their work has on the environment. • The recognition that farmers need to work in accordance with natural principles and limits is key to true sustainability in farming.	• Profound knowledge about soil and biodiversity should be the basis of every farmer's practice – just as the know-how of the crops they are producing or the animals they are keeping. • Furthermore, product development and marketing are other important factors in a successful farming strategy and should be considered more often. • Generally speaking, better education could lead to increasing self-determination of farmers and should therefore be the main focus in agricultural politics.	• Basic skills in calculations would help a lot to make better decisions in everyday practice. • The ability to think economically and to manage the farm like a successful business should be fostered by future training programmes.
Proposed improvements	• Financial stability and independence of farmers must be the overall goal of any EU funding programme. • After ensuring their economic security, it is necessary to empower them to think for themselves and make their own decisions based on independent information and observation. • Natural principles and limits should be the boundary conditions. • In all actions of any EU programme the aim must be to understand the real needs and challenges of farmers. To achieve that, real practitioners are needed in the development process of such programmes. Farmers should be highly involved in any decision-making process in order to ensure true alignment with the real challenges in the everyday farming business.	• Comprehensive education regarding soil health, biodiversity and business administration must happen beginning in secondary schools and should be taken more seriously. • Increasing self-determination and decision-making ability based on experience and observation should be the central goals of any educational program.	• Increasing awareness about the responsibility of farmers regarding soil health and biodiversity should be another central goal. • Mindfulness and responsibility of care must be paid more attention to. Basic soil tests should also be promoted much more. • Training in economical thinking and business accounting combined with simple spreadsheets for everyday use are absolutely necessary to help improve the profitability of farms.

Source: own compilation based on the situation analysis and farmer consultations

7. Agroecological Situation Analysis of the Czech Republic

University of South Bohemia in České Budějovice
2020

7.1. Overview of Agroecology in the Czech Republic

7.1.1. Status of agroecology in the Czech Republic

Agroecology, as perceived in the Czech Republic, lies on the boundaries of other, considered more scientific disciplines, while its name derives from two key disciplines, ecology, and agronomy. The primary focus of ecology are natural systems, while the central point of agronomy lies in the research and application of scientific findings important for agricultural practice (Šarapatka *et al.*, 2010). Agroecology focuses on research in the area of the use and functioning of field ecosystems as well as generally utilised agricultural ecosystems. It deals with the relationships between plants, animals, microorganisms and agricultural land, and with the relationships of these organisms within the landscape (Křen, 1997). It evaluates the influence of agrotechnics on ecosystems of farmed land. The main aim is to optimise methods of farming on a farm and in the landscape (Lacko-Bartošová *et al.*, 2005).

7.1.2. Historical overview: how agroecology has changed in the past decades (for V4 countries after 1990)

Agriculture in the Czech Republic has gone through several fundamental changes over the past decades. Shortly after the Second World War, nationalisation took place and subsequently large agricultural entities came into existence in the scope of collectivization. All this had a very unfavourable influence on the structure of the agricultural landscape (creation of large land units, removal of landscape elements), almost wiped out the tradition of family farming on small areas, severed farmers' bond to the land, and changed the social status of the farmer as well as the perception of agriculture by society. Czechoslovak agriculture at the end of the 1980s in was, in comparison to western European countries, characterised by high employment, intensive and non-ecologically friendly production, extensive grants enabling the development of specialisation and the concentration of production into cooperative or national businesses, while also raising the standard of living of rural populations (Hampl *et al.*, 1996). After 1989, fundamental changes were made in the area of property relations and business structure. National and cooperative businesses were mainly transformed into trading companies or other legal forms and they mostly farmed on land rented from original owners. Czech agriculture can be distinguished in the EU context by a large average area of the agricultural holdings. In businesses with areas above 100 ha, 86.4% of the land is being farmed and in businesses above 500 ha the proportion is 67.6% (MA, 2017). Restructuring of agricultural production relied on extensification mainly in sub-mountain areas that are productively less favourable. In the 1990s a downswing of gross agricultural production to the order of 23.5% took place, mostly affecting cattle production, which fell by nearly 40%, while the usage of industrial fertilisers dropped to one third, crop yields dropped and agriculture as a whole ceased to be profitable (Doucha, Sokol, 1999). The number of workers in agriculture dropped by about 50%, resulting in a gradual decline of agriculture in the absence of relevant support.

A fundamental shift in the development of organic agriculture (OA) as well as agroecology itself happened in 1990 when the first funds were released for the support of the development of organic farming businesses. Unions uniting organic farmers came into existence (PRO-BIO, Libera and others). Grants were provided until 1992 and were probably the main reason for the increase in OF farmed area to 15,000 hectares. The decision of the Ministry of Agriculture of the Czech Republic to cancel grants caused the stagnation of OA-farmed areas between the years 1993

and 1996, although at the same time it had a positive influence on the qualitative development of organic agriculture. Many businesses that were farming organically only because of the grant support terminated their activity. In 1998, financial support for organic farmers in the Czech Republic was renewed again. Additionally, international aid had a great impact on the promotion and support of organic agriculture, through the systematic support by a worldwide movement of organic farmers, as well as financial and educational support, the publishing of books and the establishment of information systems for organic agriculture, among others. Today, organic agriculture in the Czech Republic occupies 12% of total agricultural land available and it has become a stabilised and state-supported agricultural system contributing to the development of agroecology.

7.1.3. European regulation framework integrated in the national context

The principles stipulated in European Parliament (EP) Regulations and by the EU Council – No 1306/2013 on the financing, management and monitoring of the common agricultural policy (CAP); No 1307/2013 of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and EP Regulation No 1305/2013 on support for rural development by EAFRD – have been transposed into the national legislative framework of the Czech Republic, among these the most important are:

- Partnership Agreement for the programming period 2014 – 2020 (Czech Republic).
- Policy statement by the government of the Czech Republic on the 27/6/2018 regulation, stating priorities of the Czech agriculture.
- The Act No 252/1997 Coll., on agriculture.
- Strategy of the department of the Ministry of Agriculture of the Czech Republic setting a roadmap for 2030 (hereinafter "*Strategy of the department of MA*"), authorised by the government on 2/5/2016.
- Regulation of the Ministry of Agriculture No 214610/2012-MZE-17013 from 12/2/2013 on the accreditation of consultants and their record in the Registry of consultants that are accredited by the Ministry of Agriculture.
- National action plan for the reduction of the use of pesticides in the Czech Republic.
- Czech Republic action plan for the development of organic agriculture between the years 2016 and 2020.
- The Act No 289/1995 Coll., on forests and amendments to some acts as amended.
- National Forestry programme II, including the report "*Conclusions and recommendations of the coordinating council for NFP II*".
- Regulation of the Ministry of Agriculture No 11169/2009-10000 from 25/8/2009 on further specialised education in the department of the Ministry of Agriculture.
- Educational concept of the Ministry of Agriculture for the period 2015 to 2020.

7.1.4. National coordination and governance of agroecology – Institutional background

Upon the Czech Republic's entering the EU, a new conception of agricultural counselling has been created on the grounds of Council Regulation (EC) No 1782/2003 in relation to the support granting in the scope of CAP. This conception is focussed on the enforcement of legal requirements when farming on agricultural land and in forests, particularly as it pertains to water protection, NATURA 2000, and to animal welfare, organic methods of farming and farming optimisation. The current structure of the information transfer is expressed by the AKIS diagram (Agricultural knowledge and innovation system), which follows below. (See Figure 10.1.)

7.1.5. The role of research and advisory services in agroecology trainings

The Institute of Agricultural Economics and Information (IAEI) plays a crucial role in the accreditation of consultants, managing the consultants' register as well as the transfer of knowledge and education of consultants. One of the priorities of the current programming period (PRV) 2014-2020 is supporting the passing on of knowledge and innovation in agriculture. Recommendations for further development include:

- Continue with the support of activities of the Czech Technology Platform for Organic Agriculture, which was founded in 2009 for the purpose of coordination in the area of

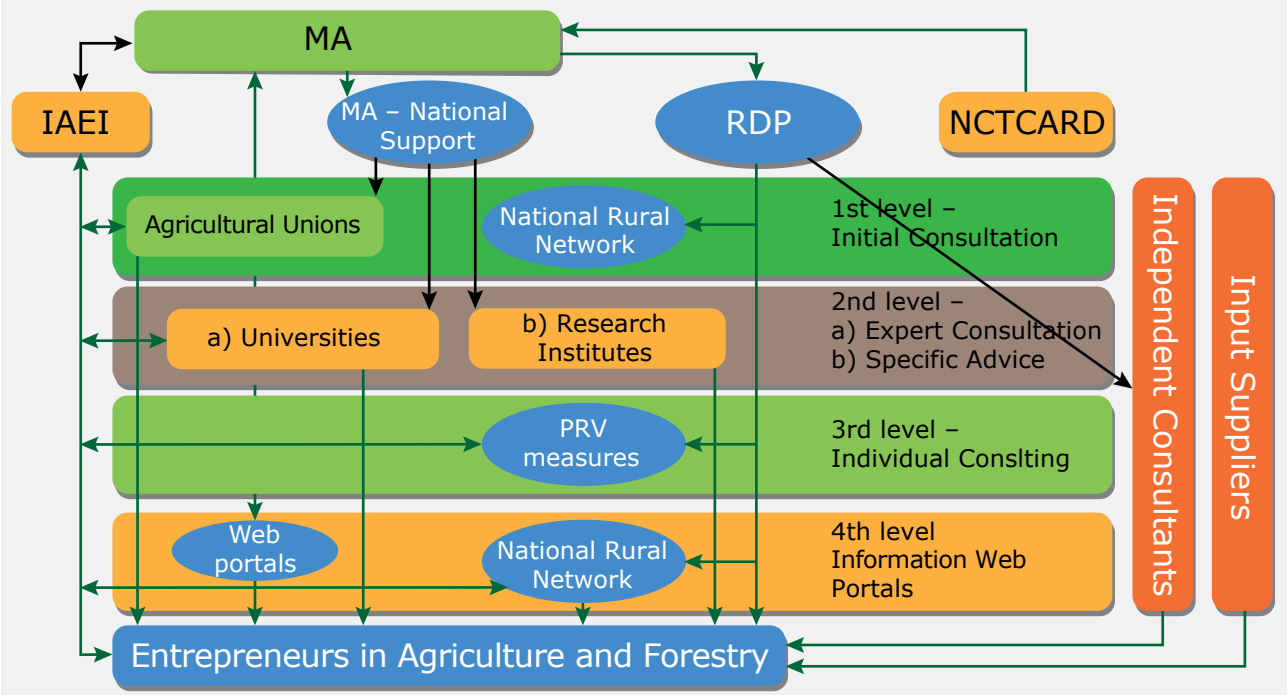

Figure 7.1.: AKIS (Agricultural knowledge and innovation system) in the Czech Republic (version update: Pulkrábek, Pazderu, 2014)

Legend: green = flow of knowledge/information; black = flow of supports; NCTCARD – National Counselling and Training Council for Agriculture and Rural Development (umbrella function); IAEI = Institute of Agricultural Economics and Information; MA = The Ministry of Agriculture of the Czech Republic; RDP = Rural Development Programme.

research and knowledge systems for the subsequent translation of results into practice. CTPOA is a member of the European platform TP Organic, as well as a member of IFOAM EU Group.

- Integrate research in the OA area within the main topics under the scope of the Ministry of Agriculture's (MA) departmental research, to support/ensure expert advice in OA, to educate the corresponding number of consultants with OA specialisation.
- Support the establishment and long-term functioning of model farms for specialised training and counselling for purposes of agricultural practice, school education as well as research (conducting experiments in practice).
- Provide regular education of expert audiences on OA topics (awareness raising).
- Implement the Czech Republic's action plan for the development of organic agriculture between the years 2016 and 2020 (MA, 2016a).

In the Registry of consultants accredited by the MA in 2017 there were 176 consultants in agriculture and 41 in forestry. In 2020, 24 consultants were available for the sub-area of "*Organic agriculture*", 52 consultants in the sub-area of "*Soil care*" and 16 consultants in the sub-area of "*Agriculture and conservation of nature and countryside*". Advisory, management and supporting services for agriculture that aim to ensure the long-term sustainability of businesses with respect to the environment and reduce climate change impacts, represented 80% of eligible expenditures, with a maximum of 1,500 EUR for one advisory service per business per year. In the provision 'Support of operational groups and EIP projects', 85% of eligible expenditures is reserved for incurred eligible expenditures for the cooperation between operational groups.

All in all, it can be said that education is the preferred form of knowledge transfer within the scope of national support schemes and PRV, while individual counselling is not supported. Education is thematically wider in scope, it is provided by professional organisations and is closer to potential than individual counselling (even though there is still space for increasing effectiveness, for example with public interest topics, or coverage of new topics). Cooperation

of research and practice in the transfer and creation of innovations is insufficient, even if according to the RDP evaluator the number of investment projects create the idea that transfer of innovations is indeed taking place.

7.1.6. Main actors, practices, learning events, resources, and networks under the topics of agroecology

In the European context, Czech agriculture displays a relatively advanced educational structure (ČSÚ 2011-2017), however, capacity for cooperation is negatively influenced by a rather low level of confidence on the part of Czech society (European Commission 2005). State capacities to support the transfer of knowledge are substantial.

In the Czech Republic, it is possible to acquire a secondary education with a certificate in the study programme Ecology and Environment at 20 secondary schools (MA, 2018).

Cooperation between students of agriculture at secondary schools and colleges of higher education has started to develop (in Tábor, Písek, Benešov, Karlovy Vary – Dalovice, Klatovy and Březnice with universities specialised in organic agriculture and landscape management).

7.1.7. Four universities offer agroecology as a study programme:

Education in sustainable agriculture in the Czech Republic was initiated in 1992 at the Faculty of Agriculture of the University of South Bohemia in České Budějovice. In 2001, a new bachelor study programme in Agroecology and a follow-up master's degree programme in Agroecology with a specialisation in Landscape management and Organic Agriculture were accredited. In 2018, a doctoral study programme in Agroecology was launched in a full-time as well as a part-time study form. The subject of Agroecology has also been implemented in other study programmes, for example an MSc. module in Multifunctional Agriculture and a Bc. module in Sustainable Systems of Farming in the Agricultural Landscape. In addition, the Faculty of Science at the University of South Bohemia offers a study programme in Ecology and Environmental Protection.

the Institute of Applied and Landscape Ecology of the Mendel University in Brno at launched a bachelor study programme in Agroecology with the following specialisations: Agroecology, Landscape Adjustments and Soil Protection and Water in Agro-ecosystems, as well as a follow-up study programme in Agroecology. In the doctoral study programme 'Ecology and Environmental Protection', it is possible to study the following specialisations: Applied and Landscape Ecology, Applied Bioclimatology and Applied zoology.

The Czech University of Life Sciences in Prague has subjects that are related to the topics of agroecology at the master degree level, it offers a study programme in Organic Agriculture and Protection and Use of Natural Resources and a programme in Evaluation and Soil Protection.

The Palacký University in Olomouc offers a master study programme in Ecology and Environmental Protection at their Faculty of Science.

7.1.8. Agroecology and training

In 2016, 62.89% of leadership workers and 31.84% of physical natural persons declared they were pursuing further education in agriculture. approximately 40% were studying topics directly related to agro-environmental topics. The willingness to further their education, especially in the case of natural persons, creates an opportunity for balancing the differences between them and legal persons (i.e. organisations).

A large number of AKIS participants take part in the transfer of knowledge by means of consultations and seminars, most of these are universities, some are secondary schools, as well as institutes engaged in research, other departmental organisations, consultants and unions including the Agricultural Chamber and its regional advisory and information centres. Education supported by PRV enabled the training of a total of 14,750 participants in the years 2017/2018, 44.7% of them completed the training course on the topic of "*Protection and Improvement of Ecosystems Dependent on Agriculture*". In the case of individual short-term consultations, 14,580 consultations in 2016 and 12,914 consultations in 2017 were

provided by departmental organisations and universities.

7.2. SWOT analysis

Strengths:
- Existing advisory system and its conception.
- Complex consultancy ranging from advisory and technological consultancy to consultancy for the control on cross-compliance.
- Accreditation system of agricultural, forestry and plant health consultants amended by Regulation and aimed at broad expert matters (3 areas/9 sub-areas of accreditation).
- System of consultants' training in place.
- Control system of advisory work in place.
- Activities of the National Council for consultancy and education for agriculture and rural development.

Weaknesses:
- Unstable financial conditions for consultancy from national sources.
- Lack of accredited consultants in the system for some areas.
- Underestimation of the importance of consultancy.
- Insufficiently developed transfer of knowledge and results of research into practice and its fragmentation.
- Inflexibility of the feedback within existing systems of knowledge transfer.
- Discrepancy between the offer of consultancy and the demand by entrepreneurs.
- Non-systematic and fragmented consultancy in forestry.

Opportunities:
- Possibility of funding from European structural and investment funds and other support sources.
- Interest of the professional public in using advisory services.
- Interest of consultants in accreditation.
- Generally well-functioning commercial system of knowledge transfer.
- Concentration of agricultural actors from the of agro-complex (all actors involved in agricultural sector, such as farms, agricultural processors, traders, consultants, etc.) in Non-Governmental Organization (NGO).
- NGO interest in increasing their role within the advisory system.

Threats:
- Stopping/interrupting of programmes of support for knowledge transfer (1st and 2nd stage).
- Insufficient willingness and motivation, and also lack of ability of the expert public to adopt knowledge, experience and the newest findings from research (MA, 2016b).

7.3. Agroecological skills

The financial support of farmers is bound to the meeting of a number of measures aimed at environmental protection through non-invasive means of landscape farming (CC- GAEC+ SMR, AEKO, greening, NATURA 2000, PRV, and others). It is quite difficult for farmers to understand the significance of long-term observation of the rules of individual measures and sub-measures and to integrate the stipulated conditions of farming into the operation of the whole business. Besides detailed information about the rules for grants, of which transfer is currently well-covered, the farmers should also know why they should or should not do some things, how it will affect the objects of their care (protected species, natural biotopes, the condition and quality of the soil and water), and how it will affect the logistics and economy of the farm. Nature protection often meets the reluctance of farmers to engage into more demanding and targeted objectives (care diversification of permanent grasslands, support of biodiversity on arable land, creation of and care for landscape features, etc.). In some cases, farmers cannot assess their capabilities and they are exposed to sanctions due to their choice of unsuitable combinations of commitments. Such obstacles can largely be overcome through education and complex advisory help, by convincing farmers about the importance of tools, raising their knowledge of the impact on their operations, convincing them to change their opinion, or helping them overcome typical barriers, etc. The barriers to the effectiveness of CAP tools cannot be overcome only with large educational initiatives but requires personal interaction with the farmer. Regular advisory support and experience with targeted education proved successful (integrated production, seminars for farmers farming on Protected Landscape Areas (PLA)), also thanks to the transfer of experience from abroad (Great Britain, Austria), where targeted envi-

ronmental consultancy significantly increases the effect of agro-environmental grants on the environment and farmers take responsibility for the outcomes of their farming.

Increasing skills within agroecology by means of training in partner countries occurs more on an individual or a project base. For example, representatives of the Faculty of Agriculture of the University of South Bohemia in České Budějovice are founding members of Agroecology Europe. Guarantors of the modules of the Agroecology programme actively participate in international cooperation within the ENOAT association (European Network of Organic Agriculture University Teachers). The association supports professional development of university professors (16 universities in Europe) in the area of education for sustainable development of agriculture. Through regular workshops, they exchange experience on methods and teaching forms, organise international summer schools, educational projects, student and professor exchanges, common publications, study materials, etc.

7.4. Agroecology and partnerships – Providers of knowledge transfer (education/consultancy)

Non-Governmental Organization provides general information about support programmes and the necessity of observing the conditions of correct production practice, mostly in connection to the fulfilment of the C-C requirements and programmes provided within European grants, directing those inquiring to other professional consultations or individual advisory services (via phone, electronically, websites, personally).

Expert departments from the MA provide advisory services in the area of plant and animal production, organic farming, water management, fishing, forestry management, game management, and food processing (via phone, electronically, websites, personally). Research organisations (public and private research organisations, public universities) provide consultancy via phone, electronically, personally and on websites.

Organisations that are subordinate to the MA – such as the Institute of Agricultural Economics and Information (hereinafter "*IAEI*"), the Forest Management Institute (hereinafter "*FMI*"), the Central Institute for Supervising and Testing in Agriculture (hereinafter "*ÚKZÚZ*"), the Czech Breeding Inspectorate (hereinafter "*CBI*"), the Czech Agriculture and Food Inspection Authority (hereinafter "*CAFIA*"), the State Veterinary Administration (hereinafter "*SVA*"), the State Land Office (hereinafter "*SLO*"), the Institute for State Control of Veterinary Biologicals and Medicines (hereinafter "*ÚSKVBL*") – offer information support mostly in the areas of specialisation of the given institute (via phone, electronically, personally, web support).

The State Agricultural Intervention Fund (hereinafter "*SZIF*"), including its regional departments, is also a contact place for providing consultations on support programmes as well as the agenda of National rural networks on the regional level, etc. (via phone, electronically, personally, web support).

The National rural network (hereinafter "*CSV*") provides information on rural development matters for the Rural development programme in the Czech Republic for the period between 2014 and 2020 (hereinafter "*PRV 2014–2020*"), which is an important role from the viewpoint of the initiating and introducing of innovations. Tools and activities for the fulfilment of the CSV objectives – an internet portal, communication activities according to the communication plan, the sharing of best practices, the support for the creation of the networks (organisation of expert seminars, workshops or excursions) as well as the transfer of innovations communication activities regarding PRV 2014-2020 as well as publicising the policies for rural development (MA, 2014).

Overall it can be stated that the predominant forms of knowledge transfer are web portals, brochures, telephone consultations, field days and seminars, while personal consultancy, which would be targeted to the specific conditions of a given business, is spread to a lesser extent. Support of decision making, problem solving, support of local initiatives and conflict solving that require the individual involvement of an expert/consultant and a longer period of cooperation with the client, are not yet well-developed by the current AKIS. One of the reasons is the low number of independent consult-

ants, that which indicates low capacity in this area. Although education has a large number of beneficiaries, it also requires an increase in quality and improved leadership to be more effective. Coverage of topics needed for the successful implementation of CAP is insufficient in education, as well as in consultancy. Insufficient transfer of knowledge is shown to have a negative impact on competitiveness, especially in the environmental and social sectors, which therefore will not develop in accordance with knowledge progress in these sectors. Neither can we expect sufficient changes in farmers' attitudes, for example towards topics of public interest (e.g. animal welfare, environment, social sector). At the same time, we conclude based on our situation analysis that the potential offered by the new CAP has not been fully explored and that farmers' needs are not being fulfilled in all areas (IAEI, 2018).

8. Needs Assessment of the Vocational Agroecological Training for Farmers in the Czech Republic

University of South Bohemia in České Budějovice
2020

8.1. Attitude

8.1.1. Strengths

Most farmers' respondents work in the regime of the family farms. They consider the character of family farms to be an advantage. In most cases, there is a strong link to the region, the landscape, the farmland and the livestock. Family farm allows for greater self-sufficiency in decision-making, and farmers perceive it as freedom. but also, responsibility. Most respondents profile themselves in their management so that they improve in a certain area of management and feel comfortable in it. In addition, farmers farming in organic farming consider organic approaches to be a strength not only in terms of profit, but also in terms of environmental benefits. Most of the respondents are young farmers who, in addition to their agricultural education, also have many years of experience. From the point of view of arable land management, the strong point of many farmers is the high share of organic fertilizers.

8.1.2. Weaknesses

There is a small share of cooperation between farmers. Most respondents are strongly tied to grant support (the National and also the European). The economic situation is pushing farmers to prioritize quantity over quality. Thus, farmers deal more with the intensity of management for the purpose of profit and environmental aspects are thus in second place. The economic policy of the state is oriented towards market crops. This is especially the case in conventional management. The weak point is thus often the narrow crop rotation and lack of diversification. Despite efforts to achieve self-sufficiency in feed production, it is often very difficult – depending on the method of farming. The weakness is also the absence of processing capacity and the need to distribute farm products through dealers. The profit is then lower. Farmers subordinate most of their time to the farm. It is a great commitment for them. An important aspect of the weaknesses is the management of leased land. Sometimes it is a big expense and it brings a competitive struggle.

8.1.3. Desired improvements by the farmers

Farmers would welcome a looser bureaucracy from the Czech and European side. It is difficult for them to operate within the farm operation and at the same time to find out information about the possibilities of drawing subsidy titles or to solve legislative requirements. Thus, the main requirements of farmers concerned bureaucratic aspects. It is very difficult to create own processing capacity, even if they have enough money for investment. Trade is problematic because many farmers sell through dealers and this reduces overall profits.

8.1.4. Proposed improvements

Farmers often face difficulties in obtaining investment support. The structure of agricultural enterprises in the Czech Republic is strongly unbalanced and there is strong competition. Competition concerns in particular property rights to land and real estate and also in the context of trade in primary production. Small family farms are not competitive and would welcome more support from the state in particular. There should be greater support for agriculture leading to rural development and the associated retention of people in rural areas. The farmers believe that agriculture could make a greater contribution to maintaining rural settlements, an additional income for society and also to maintaining rural traditions, lifestyle and the general sustainability of the landscape and the countryside.

8.2. Knowledge

8.2.1. Strengths

The farmers surveyed rely mainly on their own abilities and knowledge. Most of the farmers surveyed have an education in the field of agriculture. Thus, practical experience is supplemented by information obtained during the study. Young farmers have a good education, which they try to put into practice, and they also have enthusiasms and energy for it. In terms of knowledge, they are doing well. Regardless of age, all respondents rated their knowledge mostly as average. They felt strongest in terms of environmental aspects and farm management. Farmers working under organic farming system, as well as those farming in the conventional regime, were aware of agroecological principles. It depends on the nature of the farm. They do not consider the availability of information to be a problem.

8.2.2. Weaknesses

In the field of society and economic aspects, they considered their knowledge to be rather average. Only one respondent confirmed the experience in the field of social farming and the community cooperation. Most of the farmers understand the importance of the social aspects of agriculture but have no experience with it and consider it extra work. Farmers often do not exactly understand the difference between agroecology and organic farming. According to their experience, these areas are not different. Awareness of the environmental aspects of agriculture is then a strongly individual matter.

8.2.3. Desired improvements by the farmers

In the field of marketing, farmers generally have less knowledge. For a more successful operation of the company, attention should be focused on this area. Farmers also consider it important to create good processing conditions on the farm for greater self-sufficiency. In the field of environmental aspects, farmers would welcome greater awareness and care of the functional properties of the soil. General information is good, but knowledge is lacking, for example, in relation to climatic areas and soil types. The area of plant nutrition and animal nutrition is equally important. Greater attention should be paid to these areas.

8.2.4. Proposed improvements

Greater emphasis should be placed on linking theory and practice. Most of the farmers consider this to be insufficient. The motivation for possible seminars is then a demonstration of good practice. They often do not receive information that they could use in practice. Alternatively, the information is presented in too complex profile. Among farmers, there is a clear link between the subsidy title and the purpose of its use (or the farmer can obtain the title, but clearly does not understand its purpose). Communication between officials and the farmers should be improved. Then, there are conflicts because the bureaucracy.

8.3. Skills

8.3.1. Strengths

Strongly individual aspect. Farmers consider their skills in working with agricultural machinery to be good. They provide only a minimum of technical tasks through services. They work with seasonal workers – they involve young people in practice. They can be flexible in seasonal work. Can work well with soil and crop rotation. Livestock farmers focus on quality fertilizer management. Most farmers try to produce their own feed. Modern technologies are welcome regardless of the focus of the farm. Young farmers are adopting modern technologies quickly and see them as a benefit. The strong point is also the higher biodiversity of livestock and cultivated crops.

8.3.2. Weaknesses

Farmers generally consider the management of the farm to be a weak point, which is closely connected with the ability to obtain financial support, e.g. in the form of a national or European subsidy. Long-term work planning is also considered problematic. This is complicated by the unstable economic situation and difficult economic forecasts. Some farmers see a problem in proper plant nutrition. It is a complex and intricate topic. The weakness also becomes the connection of two jobs, which is common among young farmers. Respondents consider

knowledge of social aspects to be average to low. Communication with other farmers often also becomes a weakness.

8.3.3. Desired improvements by the farmers

Knowledge of how to obtain financial support is a common problem for farmers. Improving the transfer of information in the field of business economics would help. Farmers consider investment to be an important aspect. It is often difficult to find the right direction of investment.

8.3.4. Proposed improvements

Respondents are individually aware of the importance of species diversity in the landscape. However, for economic reasons, their business is focused on a narrower spectrum of production. All respondents are familiar with the term agroecology. However, they often do not understand the difference between organic farming and agroecology. For future courses, it would be appropriate to introduce agroecology and its approach as a tool for improving management.

8.4. Summary

As already mentioned, the farmers' attitude, knowledge and skills regarding to agroecological measures strongly vary between the farmers who already are under organic farming system and the others working under conventional farming system. Also, education and age of the farmers are important aspects.

Table 8.1.: Summary of the need's assessment in the Czech Republic

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	• A generally positive approach to protecting and promoting biodiversity around the farm • Positive approach to support the biodiversity of crops and biodiversity of livestock • There is a high perception of agriculture as a tool for rural development • The trend is to pass the farm from generation to generation	• Most of the farmers have a good knowledge of current environmental problems (drought, climate change, etc.) • Most farmers know about agroecology and perceive it as important • Organic farmers consider their farming method to be adequate in relation to agroecological principles • Generally good knowledge of arable farming and generally good knowledge of livestock farming • Some of the farmers are well informed about new technologies in agriculture	• In general, farmers are able to build a farm as a manager, take care of animal husbandry, plant production and get information that can help them improve the current situation of the farm. • Some farmers have additional activities such as hunting. They consider hunting to be an activity that is in relation to the care of wildlife and the landscape and is in relation to agroecological principles • Some farmers provide marginally agritourism

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Weaknesses	• Some farmers stand the environmental aspects behind economic aspects • For some farmers, it is risky to switch to organic farming due to finances and market orientation • It is very difficult for farmers to renew the farm (facilities, mechanization, techniques, etc.) and its connection to the countryside due to historical consequences	• Farmers do not see a difference between organic farming and its approach and between agroecology • In general, farmers have little knowledge of the social aspects of agriculture • Another weakness is the understanding of the link between agroecology and potential economic benefits	• Effectiveness of using the offered subsidy titles • Nutrient management in soil – usually only on the basis of estimates • Investment activities – often problematic and risky
Desired improvements	• As part of farming, farmers should take greater responsibility for the activities they carry out. This is especially problematic for leased land • Greater efforts should be made to motivate farmers to switch to more environmentally friendly farming methods or to switch to organic farming – an incentive to be more courageous	• Good knowledge of soil and biodiversity should be the basis of every farmer • Making processing options available (processing of primary production). This would lead to greater stability of the farm and would bring opportunities for more efficient implementation in the market	• Be able to manage a higher range of crops and livestock and be able to implement and sell the products on the market • Be able to use the benefits of environmentally friendly approaches in practice
Proposed improvements	• The promotion of environmentally friendly farming systems should be a priority • Some farmers surveyed consider ecology to be expensive and difficult to access, but they understand its importance. • Support for not only the programs providing support or protection of the environment, but also the support of advice related to economic benefits would be welcome.	• More attention should be paid to linking theory and practice. All farmers consider this to be insufficient • The motivation for possible seminars is then a demonstration of good practice. Farmers often do not receive information that they can use in practice. • Farmers then lack a clear link between the subsidy title and the purpose of its use (or the farmer can obtain the title, but often does not clearly understand its purpose). • Communication between officials and farmers should be improved. There are conflicts over the bureaucracy.	• Respondents are individually aware of the importance of species diversity in the landscape. However, for economic reasons, their business is focused on a narrower spectrum of production. • All respondents are familiar with the term of agroecology. However, they often do not understand the difference between organic farming and agroecology. For future courses, it would be appropriate to introduce agroecology and its approach as a tool for improving the management.

Source: own compilation based on the situation analysis and farmer consultations

9. Agroecological Situation Analysis of Portugal

GAIA
Grupo de Acção e Intervenção Ambiental
2020

9.1. Introduction

The use and application of the concept of Agroecology is still marginal in Portugal, whether as an academic research area, a set of agricultural practices within the farming community, or as a social movement for the defence of peasant rights-asserting food sovereignty and demanding the transformation of the agro-industrial system.

The methodology used for this situational analysis consisted of a search in online search engines for keywords that represent the different approaches to ecological Agriculture. This resulted in a non-exhaustive general inventory of the history and current state of ecological farming practices in Portugal. Using websites and the pooled knowledge of civic experts, we also surveyed actors, projects and other initiatives working in the broadest sense within the philosophy and movement of Food, intervening, educating about or studying food systems through transdisciplinary and/or participatory approaches.

Although many agricultural practices by traditional farmers of peasant origin can be considered agroecological, for our study, only actors, farms and initiatives that were known to (partially or fully) embrace ecological agricultural practices, or expressed their interest in converting to agroecological practices, were considered, in order to respond to the primary objective of the trAEce project: to create a vocational training in agroecology for existing farmers. Therefore, we chose as our point of departure the farmers and other key actors who are already dedicating themselves to applying and/or promoting agroecological or closely related practices. By understanding their practices and the factors that facilitate and/or hinder the flourishing of their activities, we believe we will be in a better position to offer a beneficial course to farmers, perhaps even entire communities, who wish to convert to agroecological practices.

Two of agroecology's key purposes are to attribute value to the traditional knowledge of rural communities and to support their political project to resist neo-liberal domination over food systems (Guzman & Woodgate, 2013; Holt-Giménez & Altieri, 2013). While in Latin America these facets of agroecology are part and parcel of the day-to-day reality of farmers and peasants, in Europe these ideas have not been linearly transposed. This is why our analysis of agroecology in Portugal will necessarily be reductive, as it tends to favour the current neo-rural reality over the situation of Portugal's peasants, who are harder to find within the limitations of a baseline study based on internet search. Nevertheless, where possible, we aim to depict and contrast the different realities and farmer typologies that we have encountered.

We consider here as agroecological systems of production those that are designed from the beginning according to principles of cooperation and association between human beings and ecosystems in order to nourish vital functions. Production units are recognized as a living organism in which the soil, plants, animals, and humans are interdependent.

In addition to Organic Farming, we chose other forms of agricultural production for which we recognize ecological bases, such as Biodynamics, Regenerative Agriculture, Syntrophic Agriculture / Agroforestry in Succession, Holistic Management, Market Garden and Permaculture. Because they are based on the same regenerative principle, we verified the accumulation of the use of several of these knowledge systems / certifications / agricultural practices by the same project / farm. For example, we could find farms that are organic and biodynamic certified, using Permaculture or Syntrophic agriculture practices and presenting Agroecology as a key word.

Given that Organic Agriculture is a certification supported by the state, consulting the agri-

cultural censuses, it is possible to situate the moment of its beginning in Portugal, as well as to monitor the development of its used agricultural area and the number of farmers who joined the practice.

Biodynamic Farming and Permaculture are other systems that are somehow institutionalized, either because of their affiliation, as Biodynamics is part of the Anthroposophical system that has been present in Portugal since the seventies, or Permaculture, which has followed a certain path in Portugal since the 1990s.

Regenerative Agriculture, Succession Agroforestry / Syntrophic Agriculture seem to be used interchangeably (Reflorestar Portugal, 2019), and are currently recent and still residual, as well as Holistic Management and Market Garden practice.

9.2. Historic overview of agroecology in Portugal

To trace back the origins of agroecology, we started by looking for the roots of ecological agricultural practices in Portugal and how these have developed to this day.

In addition to Organic Farming, there are other forms of ecological agricultural production, such as Biodynamic Farming, Agroforestry in Succession, Syntrophic Agriculture, Regenerative Agriculture or Permaculture. Since organic farmers need to obtain certification, it is possible to identify the moment the production in organic mode started in Portugal, as well as to follow the evolution of how much agricultural land it is occupying and the number of farmers that have adhered to the practice, through the agricultural censuses. The first official records date back to 1994 after the then-called European Economic Community legislated Organic Farming through a series of specific regulations (Cabo, Matos, Fernandes & Ribeiro, 2016).

Organic farming in Portugal has seen a similar evolution as in other European countries, although in a slower rhythm. It is still a subsector at an early stage of development that has low expression within the national agricultural economy (Cabo *et al.*, 2016).

The main difficulties for the development of this sub-sector identified by Cabo et al (2016), are the low penetration of these products in the markets, difficulties in the acquisition of approved production factors, lack of specialized marketing channels and the high prices that do not correspond to the producer prices, making organic farming inaccessible to the majority of the population. Seeking to respond to these constraints, the Government approved in 2017 the National Organic Farming Strategy – ENAB – (Presidency of the Council of Ministers, 2017), which presents five strategic objectives for a 10-year horizon for production, commercial profitability, consumer demand, training and business innovation.

Until the 1990s, the main producers in Organic Farming (OF) were foreigners that settled in the territory, whose main objectives were either self-provision or to export to their countries of origin (Gonçalves, 2005, as cited in Cabo *et al.*, 2016).

Since then, the main driving force of OF has been European funding available through the agri-environment measures policy, which supports those farmers with practices that protect the environment, rural landscape, natural resources, soils and genetic diversity. These measures have been very helpful for the development of: extensive cultures, the planting of trees, the production of nut and edible seeds, as well as the increase in extensive pastures (Interbio, 2011, as cited in Cabo et al, 2016). Another important driver has been the consumer's demand for (bio) intensive cultures, such as vegetables and fruits.

In 1994, 234 registered farmers were occupying 7,183 ha of the land with organic farming. Between 1994 and 1997, the area of land grew slightly to 12,193 ha. The next two years, 1998 and 1999, experienced an increase in the area to 47,974 ha. Between 2000 and 2006, the area grew to 214,232 hectares, the largest growth observed to date and only in 2002 did the number of producers exceed the thousand, showing how slow the adherence to this mode of production is. At the end of 2006, there were already 1550 registered producers. From 2007 to 2013 there was an increase and successive decreases due to the change in the funding regime and the data collection meth-

odology. From 2007 to 2009 there was also a decrease in the number of producers due to the changes and until 2017 there was a strong adhesion, thus doubling the number to a total of 4,267 producers. In 2017 farming land reached the value of 252,812 hectares, with a new European support regime until 2020. Its cultural occupation is mainly intended to feed livestock, with 72% dedicated to pastures and forages. Only 26% is intended to produce food for consumption or processing. In total, the area cultivated in organic farming occupies 7% of the used agricultural area of the Continental Portugal (DGADR, 2019).

The first national organic farming association in Portugal, AGROBIO, was founded in 1985, offering specialised training and consultancy services. Unfortunately, after thirty years of existence, the association is still not collecting and publishing statistical data on the organic market, despite the considerable growth in demand and land use (Ferreira, 2016).

In 2014, biodynamic agriculture, although a practice at least as old as organic farming in Portugal, was formalised by the founding of a biodynamic farming association, ABIOP (Associação Biodinâmica Portugal), which offers courses and supports the process of certification of farms by the international biodynamic certifying body, Demeter.

The practice and teaching of another form of ecological agriculture, Permaculture, was started in Portugal by an English organic farmer and permaculturist who had been certified by the British Permaculture Institute and started organising courses in Portugal in the mid-1990s (Marques, 2010).

Regenerative Agriculture, Succession Agroforestry / Syntrophic Agriculture seem to be used interchangeably (Reflorestar Portugal, 2019), and are currently recent and still residual, as well as Holistic Management and Market Garden practice.

9.3. Governance of the agricultural sector

In Portugal there is no specific institutional framework for agroecology. But there are a number of relevant regulations supporting small farmers, short food supply chains and the demand for Organic Farming.

In 2014, the government of Portugal created The National Strategy for the Implementation of Fruit and Horticulture Products in Schools (RFHE) following the EC recommendation in Regulation (EC) No. 288/2009 (REDSAN-CPLP, 2016). Following the review of the strategy for the period of 2017-2023, pre-school and primary school canteens can now buy their products from regional origin, within the season, and with the quality certified by an organic label, using a specific budget from the government (DPP, 2017).

In 2018, the Statute of Family Farming was approved by the Council of Ministers, recognising the specificity of family farming in its various dimensions and attributing special rights in the access to funds as well as regulatory debureaucratization for the agricultural economic activity[1].

EU funding can be considered structural in areas that bear an affinity to agroecology, even though agroecology itself is not officially recognised. Funding does not just apply to farmers and projects when they comply with agri-environment measures, as described previously, but also supports all vocational education (Ribeiro *et al.*, 2017, p. 11) that includes training modules related to sustainable modes of production, such as Organic Farming.

The definition of agri-environment measures in Portugal has been rather broad, meaning that practices that are not strictly agroecological, even those lying in between conventional and organic forms of production, such as integrated production and integrated protection, may be funded. As an example, the use of glyphosate, a known carcinogenic, and even that of Genetically Modified Organisms is not prohibited under the current interpretation of agri-environment measures, although it is prohibited for organic farmers, thus creating unfair competition between them and so-called 'integrated producers'[2] (STOP GMO Platform, 2020).

[1] https://dre.pt/application/file/a/115933763 – Decreto-Lei n.º 64/2018 from 07/08/2018 Law that establishes the Statute of Family Farming.

[2] All regulations that apply to organic farming Portugal: https://www.dgadr.gov.pt/sustentavel/modo-de-producao-biologico.

Nevertheless, the government has very recently endowed the 2020 State Budget with 29 million euros[3] for the conversion of conventional farming into organic farming, using instruments of European funding (Marcela, 2020).

In Portugal, as we will see below, different government agencies are responsible for the specific policy areas regarding agriculture, forestry, food security and safety, environment, natural resources, and rural development.

DGADR, the General-Directorate of Agriculture and Regional Development is the institute responsible for implementing EU regulations, for the definition and implementation of national regulation regarding Organic Farming, for the regulation of Certifying Bodies, and represents Portugal in the EU in all that concerns OF. It is also the state agency responsible for the implementation of the Action Plan of the National Organic Farming Strategy. In cooperation with the agencies governing matters of vocational education and training, it is responsible for creating all content related to Organic Farming, Sustainable Agriculture, Forest Management and Short Food Supply Chains (DGADR, 2019).

DGAV, the General-Directorate of Food and Veterinary is the institute responsible for food safety in Portugal, and in this capacity, it defines to which extent chemical products may be used in OF (DGADR, 2019).

ASAE, the Authority for Food and Economic Safety, assesses and communicates the risks in the food chain by visiting the different entities in the chain and observing its compliance with the law, which includes all rules regarding organic labelling and certification. It also deals with complaints regarding the commercialisation of organic products (DGADR, 2019).

ICNF, the Institute for Nature and Forest Conservation, is the entity that holds authority over forest and nature conservation as well as the preservation of biodiversity. It is responsible for proposing, implementing, and monitoring the execution of nature conservation policies. It designates the areas where OF can and cannot be practiced (DGADR, 2019).

ANQEP, the National Agency for Qualifications and Professional Education, is responsible for the Catalogue of National Professional Qualifications and for updating and introducing new qualifications or short training units, the latter being the modules that form each professional qualification. It holds the Farming Sectoral Council where the most important stakeholders from the sector are represented, who will need to be consulted in order to introduce changes to the National Catalogue[4].

9.4. The social movement of agroecology: food sovereignty and short food supply chain farming

In Latin America, and increasingly in other areas in the Global South, agroecology is a widely used concept by the peasant, fisherman, and indigenous movements, to claim their right to land and to the conditions that can help them maintain a subsistence lifestyle that is interdependent with the ecosystems in which they live (Anderson, Pimbert & Kiss, 2015). In Europe, even though in the past centuries' peasants have been an important part of the cry for social reform, the reality of farmers has changed markedly in the past three to four decades. In Northern Europe, farming has been strongly industrialised and professionalised, with the South, Portugal included, still displaying a wide peasant base, although aged and mostly unable to live off farming alone. Agroecology as a practice and philosophy of a "*Way of Life*" (Anderson *et al.*, 2015), in particular in the South of Europe, has therefore largely been taken up by back-to-the-landers/neo-rurals or younger generations of landholders (Santos, 2016). The following are examples of farms and farmers' groups, civic groups and other initiatives that have embraced the idea of agroecology.

In Portugal, the National Confederation of (small-scale) Farmers, CNA, a member of the global peasant movement La Via Campesina, has taken up the flags of food sovereignty, family farming, and agroecology as a leverage for change in the hyper-industrial mode of agricultural production.

Many agroecological farms and projects receive wwoofers and other volunteers as

[3] https://www.dinheirovivo.pt/economia/29-milhoes-para-agricultura-biologica/

[4] https://www.dgadr.gov.pt/formacao

well as organise community actions on their farms, using these events to promote knowledge exchange among the participants. It is possible to find different formats, ranging from classic study visits with a guiding lecture to the use of peer-to-peer circles (see Annex 1).

Within civil society, different initiatives exist to promote ecological practices in farming and forestry. The association Reforest Portugal[5] organises a National Meeting on Forests every two years. During its second edition in 2019, the event gathered 200 people. This association has also been organising regular weekend trainings, practices and reforestation actions with a focus on Succession Agroforestry, Agroecology and Regenerative Agriculture, with trainers from Portugal and Brazil.

Several municipalities, such as Ourém, Montemor-O-Novo, Fundão, and Torres Vedras are promoting short food supply chains between local producers and public collective restaurants such as canteens. Others are joining together within bioregions[6], which is a growing phenomenon in Portugal, some recent initiatives being that of North-Portugal with Galícia and that of Tâmega e Sousa, which are joining pioneers such as Idanha-A-Nova and São Pedro do Sul.

One particularly relevant multi-stakeholder initiative is that of the Mértola municipality, which mobilises stakeholders to establish a Regional Food Network[7], buying from local agroecological farmers to provide for public canteens.

The same municipality also champions another budding initiative that aims to provide land from abandoned properties, as well as training in ecological farming practices to potential farmers, with the condition that they plant without recourse to synthetic chemicals and sell to the local market. But their most ambitious project, involving significant European investment, is the Mértola Biological Station for Valuing and Transferring Technology in Biodiversity, Agroecology, and Hunting[8], which is forthcoming to be launched in the next few years and will receive scientists from all over the world, integrating research with practice.

In particular during the last ten to fifteen years, there has been increasing interest in the preservation of local/farm seeds in Portugal. Associations such as Colher para Semear, GAIA, the Cooperative Minga as well as informal groups like Círculo de Sementes (Seed Circles) have been promoting the age-old practice of seed saving, and are organising seed festivals, seed exchanges, seed libraries as well as local seed networks, in order to recover and maintain local and traditional varieties. The association Colher para Semear[9], founded in 2006, has done extremely valuable work in preserving, in situ, over 2,500 local vegetable and fruit varieties, of which it publishes a catalogue every year. They also inventory, one region at a time, the local and peasant varieties that have survived the commercialisation of standardised seeds.

In terms of advocacy, a number of networks and platforms exist that lobby for more ecological forms of farming and food production. As an example, the association ACTUAR[10] is responsible for the ReAlimentar Network, bringing together fifteen organisations that put political pressure on the state and government to safeguard food sovereignty, family farming and agroecology. Together with FAO and the municipality of Idanha-a-Nova the network has organised the International Forum of Relevant Territories for Sustainable Food Systems or 'FISAS', a congress that ended with a statement affirming agroecology as the strategy for Portugal's food future[11].

REGENERAR, the Portuguese Solidarity Agroecology Network, is another recent initiative that brings together farms with regenerative farming practices to organise themselves together with consumers in a CSA (Community Supported Agriculture), called AMAP in Portugal. This network currently includes seven farms throughout the Portuguese mainland[12].

[5] https://reflorestar-portugal.com
[6] https://www.ibiblio.org/london/links/start-392001/msg00549.html
[7] http://vozdocampo.pt/2019/01/09/mertola-procura-implementar-uma-rede-alimentar-local
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9.4.1. Agroecology in the scientific community: participatory action-research and transdisciplinarity

The existence of agroecology as a concept, research discipline, and practice in Portugal is very recent and only a few research centres recognise it. While Organic Farming is spreading, other alternative approaches have not been given much space, considering that the predominant vision in agriculture still relies on agro-industrial modes of production (Santos, 2016).

Changing the dominant view in agriculture to consider ecological alternatives requires changing curricula and integrating environmental and social sciences, which are usually separated from the agrarian sciences, as well as changing people's mindsets when they often show lack of knowledge of these areas (Santos, 2016). Some researchers questioned by Santos point out how organic farming itself is seen from a productivity point of view, rather than sustainability, a finding that is echoed by other authors (Migliorini & Wezel, 2017) when analysing the discourses on Agroecology and Organic Farming.

Since the concept of Agroecology was first launched in the 1980s, traditional knowledge of working the land has been central to it, because from that stem regenerative practices have allowed peasant life to sustain itself over the centuries. But in order to be recognised by the scientific community, Agroecology not only requires a transdisciplinary approach to guarantee the acceptance of other knowledge systems besides itself, but it also needs to use participatory research practices as its preferred method of data collection (Méndez, Bacon & Cohen, 2015).

In Portugal, we find three research centres within the agrarian sciences, rural development and ecology studies, that mention transdisciplinarity, action research as well as public participation in their descriptions: Grupo Dynamo, from the ICAAM Institute of Évora University; CETRAD, the Centre of Transdisciplinary Studies for Development, from UTAD, the University of Trás-os-Montes e Alto Douro; and CE3C, the Centre for Ecology, Evolution and Climate Change from the Faculty of Sciences of the University of Lisbon. The research group Dynamo is partner in the project 'ECO-MONTADO XXI' – Agroecology applied to the Montado Design[13], an EU funded project run by Herdade do Freixo do Meio that focuses on studying and training the design of the Key-line Technique to harvest rainwater. The CE3C centre, for their part, is designing an Agroecological Caravan scheduled for 2020 with the intent of disseminating the concept of agroecology and participatively creating proposals for public policies for agroecology. The project will send its caravan to visit different localities and examples of agroecological farms, covering different territories in Portugal (Simões, 2019, p. 17).

In the field of social sciences, the project 'JUSTFOOD' – From Alternative Food Networks to Environmental Justice[14]is worth mentioning, currently ongoing and run by the University of Coimbra's Centre for Social Studies.

9.4.2. Formal and informal education: teachers, trainers, and peer learning

The offer of training and education in agroecological farming practices is very limited in Portugal. But our impression improves when we consider all forms of education, ranging from university level to informal adult education organised by civil society groups, and finally the peer-to-peer exchange of agroecological knowledge organised by farms, combining community workdays with the horizontal sharing of knowledge. The latter approach is the basis of popular education practices in Latin America, called the Campesino-a-Campesino methodology, which helped to spread agroecological practices and empowered peasants to become more self-reliant, over the last 30 years (Rosset, Sosa, Jaime & Avila, 2011).

Agroecology appears as a unit in the curriculum of a Rural Development course at the Open University, in a course on Agronomic Engineering at the UTAD, and a course on Sustainable Management of Rural Spaces, from the University of Algarve. For related practices, in particular for Organic Farming, there is a choice between

[13] http://www.ecomontadoxxi.uevora.pt/ Montado is an agroforestry system found in Portugal that combines low density trees with farming or pastoral activities.
[14] https://ces.uc.pt/pt/investigacao/projetos-de-investigacao/projetos-financiados/justfood

higher vocational courses, undergraduate, and master's courses on Organic Farming in the University of Madeira (since 2015) and in the Polytechnic Institute of Coimbra (since 2011), Santarém (since 2017), Viseu, and Ponte de Lima. The Polytechnic Institute of Portalegre also offers a course on Sustainable Farming, while the only institute using the term Agroecology is the Polytechnic Institute of Bragança (since 2011) (DGADR, 2019). Judging by their curriculum, this course is mostly focussed on the agrarian sciences and mainly at the level of production and productivity (Santos, 2016).

The National Catalogue of Qualifications[15], where all Professional Education and Training (VET) courses are registered, offers approximately 2,500 hours in courses from level 2 to level 4 in Agriculture and Animal Production, with the possibility of specialising in Organic Farming with modules totalling 300 hours. Training centres choose the modules according to the type of expertise they wish to provide. AGROBIO, the oldest Organic Farmers' Association and other private certified training centres construct their own courses, with varying duration, depending on the modules they choose. Vocational schools and training centres that make up the public VET network in Portugal are only authorised to offer this training when local labour market needs justify it, since they are funded by the EU, which sets this as a condition for financing. There are currently no vocational schools or training centres with an agroecological training or related ecological practices. There are private companies and people providing consulting in organic farming whose services farmers can hire.

In addition to formal education, there are a plethora of informal training courses on Agroecology and related agricultural practices, such as Permaculture and Syntrophic Agriculture, which lasts from a few days to several weeks, mainly offered by farms or initiatives active in promoting these farming alternatives, such as Reflorestar (Reforest) Portugal, Cooperativa Integral Minga, Herdade do Freixo do Meio, Aldeia do Vale, the Soajo Agroecological Project, the Vale da Lama Permaculture Institute, ABIP-Associação Biodinâmica Portugal, the Terra Sintrópica Association, to name but a few.

As mentioned previously, many agroecological or agroecology-related farms and projects offer on-site learning opportunities by accepting volunteers and receiving groups on their farms using different knowledge exchange formats such as typical, lecture-based study visits, but also peer-to-peer conversation circles or other horizontal self-learning formats. Two examples among many of these horizontal learning farms are Finca Equilibrium[16], of which the founders regularly share their water harvesting experience, and Monte Mimo[17], where the founders' experience in Agroforestry, Regenerative Agriculture and Community Supported Agriculture is systematically shared.

The only international agreement that Portugal is involved in, with regards to agroecological education, is a non-binding declaration from the CONSAN-CPLP, the council for food safety and security of the community of the Portuguese-speaking countries, where the Portuguese government is represented. In 2015, the CONSAN-CPLP approved the recommendation for each country member to include agroecology in non-university level education and in public policies. In particular, it urged the development of a Competency Centre on Sustainable and Family Agriculture in one of the countries. This Competency Centre would also promote agroecological systems in the Portuguese-speaking member countries, through the techno-socio-cultural exchange among farmers, technicians and trainers. So far, there has not been any impact on agricultural policies in Portugal (REDSAN-CPLP, 2016).

[15] http://www.catalogo.anqep.gov.pt/

[16] https://www.facebook.com/TransformaVerde/

[17] https://montemimo.wordpress.com

10. Needs Assessment of the Vocational Agroecological Training for Farmers in Portugal

GAIA
Grupo de Acção e Intervenção Ambiental
2020

Preamble

To establish the present needs assessment, the Portuguese project team visited and/or interviewed via videoconference over 30 farmers and other key actors from different regions, planting different crops and using different farming techniques. The criterium that links all interviewees is that they all practice and/or promote some form of agroecological practice. The database was built through snowballing[18], starting with agroecological or similar initiatives that were identified during the desk research for the agroecological situation analysis.

Because of the way the database was constructed (favouring farming projects with an online presence) and further limitations caused by the COVID-19 pandemic, which pre-empted us from continuing to visit farming regions and conduct face-to-face interviews, we did not manage to identify nor interview more than two traditional smallholders. This fact limits this assessment to those farmers who use imported and formalised agroecological knowledge systems, such as permaculture, syntrophic agriculture, regenerative farming, market gardening or holistic management, which they have adapted to their local contexts.[19]

About one quarter of the interviewees are 'key actors' in agroecology or related fields. Key actors and farmers were characterised as follows:

1. Key actors: 1.1 association/ cooperative/ consumer group or collective that consider themselves following agroecological or related principles; 1.2. promoters of agroecology/ecological farming; 1.3 trainers, consultants or schools for ecological farming; 1.4 state agency or institute/ local administration active in promoting ecological farming; 1.5 academia researching and/ or promoting agroecology
2. Farmers: 2.1. agroecological farmer; 2.2. organic farmer; 2.3. other ecological form of farming; 2.4. traditional farmer

Additionally, interviewees were classified according to region (using the widely accepted Portuguese agricultural region classification), the size of their farm, their crops (horticulture, cereals and or legumes (i.e. arable crops), traditional Portuguese crops such as wine and olive oil, cattle rearing, (aromatic or medicinal) herbs, mixed systems and on-farm processing), their age group and gender. We preferred farmers for whom farming was the main source of income, even though it is common among Portuguese farmers to obtain income from different sources. Finally, we tried to diversify between projects that are more recent and those that are more established.

The interviews were conducted using a semi-structured format, with different guidelines for key actors than for farmers. Farmers were asked to explain their farming practices in detail, with an emphasis on their treatment of their soil, water and biodiversity, which provided us with a wealth of technical information useful for the vocational course. There was also an opportunity to discuss their particular pedo-climatic conditions and the impact of climate change in their region, as well as any benefits observed from their ecological practices. Additionally, they answered questions about their economic structure, employees and training background, and provided us with their view of farming and agroecology and of what a vocational agroecological course should look like. Key actors were asked to describe their efforts

[18] This is a common technique used in the social sciences to identify respondents, which starts with the better-known projects indicated by people knowledgeable in the field and then asks each interviewee to recommend others.

[19] In order to complete the needs assessments and include traditional farmers' needs in agroecology, the project team could contact CNA – the National (small) Farmers Confederation, Colher para Semear – the Portuguese association for the preservation of traditional seeds and PROVE – a short food supply chain box programme, and local rural development initiatives associated with the NGO ANIMAR.

to promote / teach / lobby for agroecological practices and asked about their views on farming and agroecology as well as on our vocational course.

10.1. Attitude

10.1.1. Strengths

The farmers whom we interviewed are keen to mitigate climate change through their farming practices, mainly by planting trees, regenerating landscapes and by minimising the use of fossil fuels. They believe these practices will increase the farm's resilience to climate change. They are very concerned with the world they will leave to younger generations and wish to share both ancestral and modern knowledge with other people.

Those openly promoting agroecology are willing to make concessions in favour of regenerating the surrounding territory in terms of soil quality, water, vegetation as well as revitalising the local economy and culture. They place (healthy) food and farming firmly at the centre of any solutions to revitalise ecosystems as well as communities and are keenly aware that they will need to diversify in order to achieve a higher level of self-sufficiency. Food and farming in their view are the glue that holds together culture, life, people and causes.

Most farmers we spoke to are very open to new experiences, but recognise the risk of implementing these, since bad results would damage their business. Some accept the risk of installing experimental agroforestry systems and aim to become experimental hubs.

Collaboration is very important for these farmers. They collaborate with universities, municipalities, activists, and organisations from civil society. Farmers gather through associations, networks and informal groups. They benefit from networks since these helps to exchange knowledge, information and products. Similarly, they benefit from associations since these can guarantee access to better market prices. Finally, peer-to-peer knowledge exchange between the members of networks is very important for these farmers.

The respondents sell most of their produce locally or nationally and are focussed on producing food, as opposed to commodities. A minority also exports. Some of the farmers have food processing units, to produce value-added products.

These farmers choose to pick olives and grapes in the traditional way, and by doing so provide jobs to people, as well as enhance the community spirit.

10.1.2. Weaknesses

The interviewed farmers warn that they rarely have time to attend a course. We found very few collective farming experiences, even though these types of initiatives could free up time for these farmers. Some even abstain from cooperating with their neighbours because of pervasive conservatism in farming practices.

The farmers are very dependent on subsidies from European funding, whether these be incentives for young farmers or agri-environment schemes to support the regeneration of land.

There is a clear divide between farmers who wish/need to consolidate a living wage with the desire to minimise their impact or even regenerate agro-ecosystems and those that merely produce food for their subsistence and for whom the key aim is to regenerate the biotope. The latter most often obtain their income from other sources and/or from selling courses on regeneration and related (sometimes also self-improvement) practices. An additional weakness of what we may call the 'life-style' regenerative farmers is that they prefer to simply set an example and rarely start or join movements to enact more permanent and wider-spread change.

10.1.3. Desired improvements by the farmers and key actors

According to our respondents, consumers and producers should be brought into closer contact, for mutual support and understanding and to help cement the short food supply chains that can help recognise and reward small-scale ecological farming.

Both the farmers and key actors agree that the farmer and his/her role need to be fully recognised and duly compensated. Some suggested incentivising foreign migrant workers to farm their own land using best practices (for example through land grants).

The key actors whom we interviewed would like to see the farmers learn to cooperate better together, for the benefit of the whole community. Farmers, they believe, need to understand that for change to come the whole chain has to be fair and healthy: local, organic or 'in transition organic' food, fair pay for all, fair price for the consumer, and transparent information about the whole process available at all stages. Consumers, in their view, should be better educated about the social and environmental impacts of food consumption and incentivised to join short food supply chain schemes. Awareness-raising among farmers and consumers is therefore a key pedagogic activity.

Many respondents feel that the process of developing a course in agroecological practices should involve municipalities, farmers associations, cooperatives as well as professional/vocational schools.

10.1.4. Proposed improvements

The farmer's view of farming needs to become more systemic, in order that he/she see and understand the interconnectedness between farming, biodiversity, soil health, climate change mitigation, local development, poverty reduction, food security, the needs of future generations as well as the relations between their locality and the territory, the region, country, continent, etc.

The principle of regeneration of landscapes should guide farm management in order to make it economically viable while supporting the land in fostering life. Food should be considered a common good and a celebration of human cultures as opposed to a commodity. Farmers and consumers need to create relationships of trust, since farmers are the potential suppliers of healthy, culturally appropriate goods that should be exchanged at a fair price for both parties.

Farmers need social tools to make their social network more efficient since the dynamics of networking take up time and require that all involved value networking, cooperation and horizontal exchange with their neighbours and customers as well as with local and national actors in order to allow for the sharing of resources, knowledge, materials and services.

The status of the job or vocation of becoming a farmer needs to be improved, farmers are the guardians of healthy food as well as healthy agro-ecosystems and should therefore be properly rewarded for their work. We need to empower the farmer as a respected professional and support him/her in achieving economic viability at the same time.

10.2. Knowledge

10.2.1. Strengths

In general, the farmers whom we interviewed proved to be very knowledgeable in their understanding of the water cycle, erosion processes and the importance of diversification. They know that resilience and economic stability are achieved by diversifying crops, varieties, breeds of animals as well as sources of income.

Most of the interviewed farmers can cite the components of agroecology. They are fully aware of the environmental impacts of conventional agriculture. They are also knowledgeable about: the concept of agroforestry, biological pest, disease and weed control; how to manage irrigated and non-irrigated tilths; seed saving and traditional varieties; soil regeneration and water-retention techniques, such as the key line design; and ecological methods of fertilisation (cover cropping, mulching, use of manure, etc.). The cattle raisers we contacted are very knowledgeable about the different breeds, and about which of the breeds fare better in their specific pedo-climatic context.

Even the more conventional organic farmers (i.e. with a limited number of crops and larger areas in monoculture), with the exception of those who farm organically 'on the side' (i.e. come from industrialised agriculture) were keenly aware of the basic principles that they should respect on the farm: protect and regen-

erate the soil, use minimally invasive practices, avoid tilling, rotate crops and allow land to lay fallow.

Since there are no public extension services in Portugal, farmers tend to learn by themselves using the internet and/or contacting with other farmers to get information (an improvised and unplanned form of the Campesino a Campesino method[20]). These practices empower farmers and recognise them as responsible for their own learning, guided by the need to solve concrete problems.

10.2.2. Weaknesses

Definitions of agroecology varied a lot among the respondents, and generally tended to ignore its social component. Some of the farmers had never heard of the term agroecology. Those key-actors who are also active farmers in the so-called more 'conventional' branch of organic farming (i.e. more focussed on environmental as well as economic benefits, not necessarily on social or regenerative aspects) have heard of the concept but have not embraced it and seem unsure of its advantages vis-a-vis organic farming.

Some of the respondents shared with us that currently very few farmers will dare to venture into organic polyculture, or orchard-based farming, due to the difficulty in controlling pests when producing apples or pears, which requires technical knowledge that most farmers lack and have difficulty accessing.

Some farmers confess to having difficulty obtaining information about agroforestry systems adapted to their own context since most of the experiments and materials available online are developed under different pedoclimatic conditions. Respondents believe that knowledge about agroforestry is still not very consolidated in Portugal because there are not a lot of experiments on a commercial scale and all are relatively new.

Among the animal breeders we spoke to there is still not a lot of information about holistic management and grazing practices with multiple species, again, mainly because of the lack of experimentation and demonstration in Portugal. Traditional knowledge about animal traction techniques is on the brink of disappearing, since currently almost all farmers use machinery to work the soil.

Knowledge about forest species and how to use these in farming is very poor. There is a clear and undesirable disconnect between forest/ agroecosystem regeneration and farming, even though in other countries some of these combined farming/regeneration experiments are over 30 years old.

Respondents have little knowledge of short food supply chain marketing strategies and the respective legal framework.

The peer-to-peer method of learning is a strength as well as a weakness of the farmers we interviewed. It is very reliant on informal networks and may therefore not reach everyone it should/could reach. In particular, it may discriminate against peasants with less formal schooling.

There is to date no organised community that gathers agroecology practitioners and promotes the cross-sharing of knowledge and skills: some of these practitioners possess important skills but do not generally share them or have time to promote them, others are well-versed in theories of agroecological food and farming but do not have the opportunity to share them nor the skills or resources to put them into practice. This way, a lot of good knowledge is dispersed and wasted and winds up not getting to where it is most needed.

10.2.3. Desired improvements by the farmers and key actors

The farmers shared with us that they would like to learn more about: biodynamic farming; systems thinking; holistic management; syntrophic farming; companion planting for olive groves and vineyards; machinery and tools for large-scale agroecological practices; techniques for water retention and circulation in the landscape; conservation tillage practices; efficient hand tools; biological control of pests, diseases and weeds; cover cropping;

[20] The Campesino a Campesino or Peasant to Peasant movement started in the early 1970s in Guatemala with the aim of peasants teaching each other agroecological farming techniques. https://www.sourcewatch.org/index.php/Movimiento_Campesino_a_Campesino

pasture cropping; legal framework of small scale farming; basics of permaculture; agroecology; regenerative agriculture, soil ecology; soil dynamics; soil microbiology; symbiotic relationships in the soil and nutrient cycling in the soil; properties of different foods and how these relate to production; knowledge of the geology, geography and landscape of the territory; recovery of best traditional practices; how to create a circular production system avoiding exogenous inputs; ways to make agroecological practices economically viable.

Most agree that it is key to ensure that the farmer understands how his/her farm part is of a larger, living ecosystem. They would also like to see more systematised knowledge on agroecology and associated practices made available to practitioners as well as the general public. Finally, they recommend an on-going debate on the issues to ensure the correct identification of problems and opportunities, while simultaneously staring the work on regeneration.

The respondents recognise that more research into agroecological techniques is needed. The key actors we contacted recommend that farmers are taught practices that are appropriate for semi-arid climates. It is also important to stimulate their creativity in continuously improving practices to regenerate desertified areas.

The key actors also insisted that farmers should learn how to defend fairer prices for their products, whether through aggregation/common representation, education of the public or by streamlining their costs as well as their distribution. If farmers learn how to reduce their input-cost, they can improve their profit margin without raising prices.

Finally, most key actors as well as some farmers recommended that farmers learn about the European and Portuguese legislative frameworks for food and farming, from a critical point of view, identifying the legislative obstacles to ecological farming but also the opportunities to combat a generally unfair system that has been put in place in the past eight years in Portugal.

10.2.4. Proposed improvements

Traditional ecology-based knowledge and practices need to be rescued from obscurity and put to work to satisfy the global need to decrease fossil fuel consumption, whether from the use of machinery or indirectly from using fertilisers and pesticides. At the same time, farmers need to keep up with the new knowledge produced by scientists and agroecological farmers. Farmers should also be aware of efficient hand tools and machinery that have been adapted to agroecological practices.

A strong experimental knowledge base should be built to demonstrate not only on-field agroecological practices, but also alternative short supply chain marketing strategies. This way farmers can see that these practices actually work and won't be afraid nor feel judged when exchanging their old practices for new ones. Farmers should be informed about the possibilities of achieving zero external inputs, zero exploitation (an issue that did not come up much in our conversations with our respondents), short food supply chains, self-sufficiency and local interdependence.

At the same time, an agroecology course should recognise farmers as knowledge producers, through their observation, practice and experimentation on their land, as well as stimulate the dialogue between the diversity of equal-value practices, whether from a technical or a traditional source.

Farmers need to understand the European and Portuguese legislative framework for food and farming, the latest political strategies and the differences between EU policies, countries with best practices and Portuguese policies and practices. Ideally, they should understand the basics of the 21st century political economy of food and farming (giving them a brief history of food and farming over the past 100 years, including for their specific country). Farmers need to be agents of a narrative change from the idea of water and synthetic chemical input-supported, large-scale, ever-replicating agriculture that is supposed to provide wealth and jobs to a story of woe, of eroding/dying soil and threats to people's health as well as a rise in precariousness of farmers and rural workers, including the increase in the use of slave-like labour.

10.3. Skills

10.3.1. Strengths

The farmers whom we interviewed are skilled in assessing soil fertility by looking at the condition of crops and indicator plants. The vegetable producers were all skilled in biointensive techniques. In general, they combine fruit trees with horticulture beds, and sometimes even with pasture animals. This practice is setting a new trend, or rather, a comeback, since garden-orchard systems for household consumption have been applied in the region at least since the Islamic age.

The arable crop farmers we spoke to are starting to produce wheat again and sell it directly to customers, recovering traditional practices.

Some of the farmers use their animals to control the weeds in olive groves and vineyards, and to process crop leftovers. Some animal breeders used the technique of multi-species grazing. Mixed farms we spoke to were able to make their own compost and will use crop rotations to offset the need to import fertility from outside the farm.

All the farmers were preserving ancestral knowledge about practices – in farming as well as seed saving – and also about gastronomical and rural traditions. Family farmers benefit from knowledge transmitted by older members of the family, including traditional varieties of seeds.

Fossil fuel consumption is variable: holistic management farmers do not spend as much diesel as conventional organic cattle raisers; and some market gardeners achieve high vegetable productivity with close to zero on-farm fossil fuel use.

Some of the farmers are skilled in accessing available short food supply chains. They try to market their products through different distribution channels and most recognise the need to add value to their products. Some of the farmers are experimenting successfully with the AMAP (CSA) model. One farmer is organised in a cooperative applying sociocracy tools to make collective decisions. The farmers show they have networking skills by buying from complementary produce from their neighbours (i.e. a vegetable producer who does not produce fruits buying these from a fruit producer in the same bioregion, to add fruits to the vegetable box he/she offers customers).

Some of the farmers provide training and consulting services to external parties as an income supplement. Others send out their employees to get specific off-farm training. Most of the interviewed farmers are skilled internet users and use it to find information about practices. The most profitable farmers have the best management and marketing skills.

The peer-to-peer method of learning is the one most developed in Portugal (through volunteering, on-site events, *woofing* and community support days on farms). Since the most recent ecological forms of farming and forestry are being practiced and taught by people with higher education, there is a great potential for continued learning, experimentation and improving.

Most interviewed farmers chose to apply for organic certification, but some consider it limiting, besides being costly. In general, the farmers tend to adapt their crops to the agroecosystem, by doing so they reduce the amount of chemicals needed.

10.3.2. Weaknesses

In general, the holistic cattle raisers we met are not able to feed their animals solely through pasture and end up importing nutritional supplements from conventional suppliers. These nutritional supplements often come from a genetically modified source (maize or soy). Other more conventional cattle raisers tend to underuse their permanent pastures and spend a lot of fossil fuel to prepare seed beds.

The market gardeners we spoke to tend to import plants, seeds, fertiliser as well as compost from outside the farm, to increase time efficiency. Seeds are obtained mainly from foreign companies. This fact underlines the systemic weakness of non-organised farmers in Portugal. If farmers would join forces, one farmer could produce for the needs of another farmer, effectively reducing transportation costs and strengthening the bioregion.

Some organic vegetable farms are not very efficient and that reflects on the high cost of the products sold, compared to conventional products.

Very few chicken farming alternatives were found, and the chicken tractor is still not used by or even familiar to the majority of farmers.

From our respondents we observe that it is especially hard to be an organic vegetable producer in the interior of Portugal due to limited access to a market that values ecologically produced food.

The cattle raisers in our sample are helping to preserve the local breeds but have to cross them with more productive ones because there is no market for the traditional breed's meat.

The farmers do not rely much on soil and plant analysis.

We found that most of the vegetable farmers are not yet integrating animals in their operations.

10.3.3. Desired improvements by the farmers and key actors

The farmers we spoke to would like to increase their skills of: bee management; following the lunar calendar; preservation of food originating from polyculture; holistic management; pruning; grafting; tree nurseries; natural fertilisation programmes; marketing and management; interpretation of soil analysis; vermicomposting; use extracts of microorganisms; erosion control; soil management; management of marginal areas; general agricultural techniques; farm efficiency; and Mediterranean companion planting.

The key actors on the other hand recommended farmers be taught: the basics of soil biology; how to diversify crops; use of cover crops (green fertilisers/permanent fertilisers); how to diminish/abolish dependence on inputs from agroindustry; how to practice no till (except on the line in the case of permanent crops) and returning all organic matter from the farm back to the soil – no burning!; use of traditional varieties and which are appropriate for which purpose/soil and climate type, since we are losing diversity fast even in organic farming, because of the obligation to buy certified/registered seeds; water retention practices and efficient water use; the impact of phyto-pharmaceuticals and the context in which these are sold (i.e. a captive business).

10.3.4. Proposed improvements

We suggest that farmers need to know how to:

1. Observe the water cycle and the soil ecology on their own land.
2. Identify the closed and open patterns of the cycles / networks / flows of water, wind, light, matter (soil, plants, animals, objects, human activities) of their own land.
3. Identify the traditional sustainable farming and food practices of the elders in their own communities.
4. Design their own land's agroforest / holistic grazing / market garden, choosing adequate techniques from the agroecological farming models / practices presented.
5. Design their own fair-trade business model, integrated in the regional and national food system.
6. Communicate with potential partners that could have a key role in the farmer's business model.
7. Connect with the regional / national / international communities of practice of agroecological farming models and practices as well as with its knowledge resources.

10.4. Summary

Table 10.1.: Summary of the need's assessment in Portugal

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	• Recognition of farming as a key sector for climate change mitigation • Willingness to be sustainable, regenerate the land. • Almost all of them are studying or implementing agroforestry systems. • Understanding of food as a common good rather than a commodity. • Openness to new experiences. • Some farmers are still saving ancient seeds and using common lands. • Most want to be part of the local food system contributing by offering jobs to the local community. • Cooperation within sector associations and networks, at local and national levels. • Eagerness to learn and teach.	• Farmers are knowledgeable about natural processes of water and soil. • They are knowledgeable about the different components of organic plant production. • They know diversification is the key to biological and economical resilience, whether through crops, animal breeds or sources of income. • Understand the basic principles to follow on the farm: protect and regenerate the soil, use minimally invasive practices, avoid tilling, rotate crops and allow land to lay fallow. • Knowledge about agroforestry and the main agroecological farming practices: balancing the biology in the farm, soil regeneration, water retention and water management, ecological fertilisation, traditional plant / animal varieties /breeds and seed saving. • Family farmers benefit from knowledge passed on by older members of the family. • Farmers are leading their own learning process by using information resources such as the internet and other farmers as sources of knowledge.	• Assessing soil fertility. • Biointensive techniques. • Reduced fossil fuel consumption through alternative agroecological techniques. • Mixed farms control weeds through livestock and produce their own compost. • Some farmers are organised in a collective using sociocracy in decision making. • Selling produce through short food supply chains using models like Community Supported Agriculture (AMAP). • Some farmers diversify their economic activity by offering training and consulting services, others have small processing units or offer ecotourism. • The most profitable farmers have good management and marketing skills. • Most are able to learn by themselves and to continue to develop their knowledge in specific agroecological practices.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Weaknesses	• No collective farming initiatives were found, aside from the use of volunteering or community support days. • Farmers are very dependent on subsidies. • Lack of an entrepreneurial attitude, whether collective or individual. • Lack of networking with movements of advocacy and lobbying for sustainable farming.	• The definition of agroecology varies a lot among farmers, and they tend to forget the social component. • Internet dependency for access to new concepts and information that is often not adapted to the regional soils and climate. • Lack of knowledge of pest control in organic fruit production. • Knowledge of agroforestry and holistic grazing is not very consolidated due to lack of experiments in the national territory. • Traditional knowledge of animal traction is on the brink of extinction. • Farmers lack knowledge of the legal framework and marketing strategies in short food supply chains. • Peer-to-peer knowledge sharing on agroecology practices is out of reach for most traditional small-holder farmers. • There is no community of practice of agroecology where members can share their knowledge and skills.	• Holistic cattle raisers import part of the feed from conventional suppliers (often GMO-based feed). • Market gardeners are very dependent on outside inputs. • Low efficiency, which reflects on the high cost of the end products. • Difficulty in marketing organic products when far removed from a population centre. • Farmers do not rely much on soil and plant analysis. • Agroecological practices have generally not integrated animals in the system.
Desired improvements	• Recognition of the valuable role of the farmer in regional and national development. • Consumer education about environmental, social and economic impacts of food as well as on how they can participate in short food supply chains. • Systematised knowledge on agroecology made accessible to key actors as well as the general public. • Cooperation between farmers and consumers towards mutual support among farmers and farmers-consumers.	• Farmers would like to know more about the different types of agroecological farming systems and practices (syntrophic, holistic management, biodynamic, permaculture, etc). • How to create a circular production system, avoiding exogenous inputs. • Learn techniques adapted to Mediterranean climatic conditions, in particular semi-arid and desertified areas. • Soil protection and regeneration. • Farm efficiency.	• Farmers would like to improve their skills in general alternative organic techniques (bee management, food preservation, organic fertilisation, etc.). • They would like to be able to farm ecologically and still be economically viable. • How to farm with low or zero external input requirements. • Train marketing skills. • Farmers would like to choose the topics they can enrol in, if possible, depending on the type and needs of their farms.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Desired improvements	• Include municipalities, farmers associations and cooperatives and professional/ vocational schools in the process of creating an agroecological course. • Incentivise foreign migrant workers to work their own land using agroecological practices (through land grants). • How to improve self-sufficiency simultaneously with local interdependence.	• Information about the legal framework of food and farming, in particular for short food supply chains. • Recognise farmers as knowledge producers and create a dialogue between technical and traditional knowledge. Build on the knowledge that the farmers already possess.	• The course would ideally be intensive and lectured on a farm (or different farms to provide contact with different cases and respective practices), it should be mostly practical and provide didactic material. • If possible, courses should be regional to avoid travel for the farmer, although visiting different regions can be a plus. An alternative suggestion was to teach the theory online and have participants meet in person every 15 days (never longer than 3 days). Still another suggestion was to administer the course over the course of a full farm year, to understand the cycles. Finally, there was a suggestion to offer the course in the most challenging territories (arid, over-farmed, invaded by super-intensive farming practices,...) such as Mértola, Serpa, particularly in areas where one can still find small-holders (whose practices have become very conventional). • Regional differences in varieties, breeds and soil conditions are not an obstacle to learning, basic practices are the same. • The training should be FREE. • Well-known experts in specific practices could be brought in to motivate participants. In any case, trainers should be farmers themselves, to gain the respect of participants.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Proposed improvements	• Promote a systemic view of farming in order that the farmer understand the interconnectedness of the different biological, social, cultural and political elements of the agroecosystem. • Use the principle of landscape regeneration as a guide to decision-making on the farm, while keeping in mind the economic viability of the farms. • Recognition of food as a common good and a shared value between farmers, consumers and communities. • Incentivise networking, cooperation and a local community approach with horizontal exchange, between farmers, neighbours and consumers. • Recognition of farmers as guardians of traditional farming knowledge, of healthy food and healthy agroecosystems.	• Didactic materials on agroecology should be in Portuguese and information about pedo-climatic conditions of the different regions in Portugal made available. • Traditional and modern ecology-based practices and short food supply chain marketing techniques should be taught to reduce fossil fuel use, regenerate soils and create economically viable farming businesses. • A strong experimental knowledge base should be built and shared with farmers, to make the transition easier. • Farmers need to know the European and Portuguese legislative frameworks, understanding their impact on risks and opportunities in agroecological practices. • Recognise regional gastronomic and cultural traditions and the role of farmers in sustaining these. • Teach a brief history of food and farming in the past 100 years in order to unpack old narratives of large-scale industrial, chemical and water-supported farming as well as its ecological, social and cultural impacts. • Recognise the role of networks and how to cooperate and build knowledge together.	• Describe the water cycle and the ecology of each farmer's land. • Train networking skills (communication and win-win negotiation) with partners of the local food system and others that are relevant to the farmer's business model. • Identify the closed and open patterns of cycles/ networks/ flows of water, light, wind and matter. • Help value the traditional sustainable farming practices of neighbours and elders. • Help farmers design and apply their own sustainable farming and business models, integrated in the local and national food system. • Increase communication skills with partners that could play a key role in the farmer's business model.

Source: own compilation based on the situation analysis and farmer consultations

ANNEXES

Annex 1. National Consultation with Farmers in Hungary: interview transcripts

Diverzitás Foundation
National Agricultural Research and Innovation Centre
2020

11.1. Interview 1

Type of stakeholder: Arable crop producer private farm
Date of the interview: April 2020
Length of the interview: 90 minutes
Methods of the interview: phone call
Form of operation: sole proprietorship
Position of the respondent: full time worker, owner's son
Age group of the respondent: 35-54
Highest qualification of the respondent: Master's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

The family farm, in which a father and his 2 sons work, currently has 405 ha, of which 371 ha is arable land, 19 ha is forest and 15 ha is grassland. They produce pumpkins for their own use, they have apples, peaches, and plums for fresh consumption and palinka production. In addition to the 3 full-time family members, they have 3 permanent workers. After a few years, they were able to offer full employment to these 3 people who are their constant help, with a lot of work during summer and less work during winter. The interviewee grew up in agriculture, in practice, and has an MSc in Agriculture. He considers agriculture not only as an opportunity to earn money but as a lifestyle. The main arable crops are cereals (barley, wheat in ~ 160-200 ha), sunflower (~100 ha), rapeseed (~60-80 ha), corn (~20-40 ha) and alfalfa (~5-10 ha). They do not work with a fixed crop rotation, so it turned out that vetch was also sown for seed last year. Their method of farming is basically conventional, but the interviewee has been thinking strongly about moving towards organic farming, because they cannot compete with large farmers and their soil conditions are not outstanding. Their lands are very different, with an average of 20-30 gold crown* including salt affected soils of Hortobágy. They also have lands with secondary salinization (human induced salinization), which the interviewee attributes to their unappropriated tillage method. The diversity of their areas often causes difficulties in terms of work organization: while one area is dusty, the other area cannot be approached by machine, as it is too wet.

They do not have income from any other program than land area-based support. Greening is considered important not only as a mandatory support element, but as a way of green-fallowing that helps in improving the condition of their poor quality soils (E.g. currently there is phacelia on 5 ha as a main crop) Unfortunately, there is a lot of professional discussion between father and son in this regard, because the older generation does not always accept what younger generation have been introduced to during university education, such as minimum-tillage, growing alternative crops, etc. The aim of the interviewee is to exclude their high-salinity areas from cultivation. They use trihoderma (hyperparasitic fungus) as a biological control agent in order to substitute fungicide and stimulate soil life. For sunflowers, the return period is only 3 years in their case (instead of the recommended 5-6 years) because it maintains a good market selling price. However, with short return time and presence of rapeseed in the crop rotation (which is also one of the most profitable crops for them) they have many plant protection problems,

which to date have been solved with pesticides. Withdrawal of some pesticides also affected them sensitively (e.g. neonicotinoid), although the interviewee knows the rate of pollination is improved by up to 20% if there are bees installed in sunflower fields. Extended soil sampling is performed every 5 years, the results of which also show that the manganese content of the soil is extremely high. This also supports the fact that it is worthwhile to deal with the analysis of microelements. There was an example that a huge dose of N fertilizer (200 kg of active ingredient) did not result in a surplus of wheat. So, it is not the solution to increase the fertilizer dose, the interviewee learned. A soil EC meter (conductivity measuring probe) is used to measure the salinity of the soil.

They plan to irrigate their fields. An application has already been submitted for a 40-ha irrigation console. Applying autumn irrigation to rapeseed would result in higher and more secure result yield. Irrigation would also contribute to pre-emergence weed control so that no further weed control is required later. Irrigation water quality can be an issue due to its high salinity. Plant protection is mainly based on insecticides (e.g. against grain fly, grain bugs) but they also use light and pheromone traps (against rapeseed beetle, corn borer, cotton-owl butterfly). They apply arvalin LR with a targeted shotgun (bait release device) against common vole.

They have to face the effects of climate change every day. Even the classic sowing time of plants described in scientific literature can no longer be maintained. Currently, after frosts that may last until April, there are often periods of drought, as was the case in 2020. The top layer of soil is dry. They start maize sowing earlier than it is recommended in books. In the case of maize, therefore, a variety with a good cold test value is chosen. (The suitability of maize for sowing in cold soil is indicated by the cold test value.) Sunflower is rather sown later, taking into account its heat demand. Rapid rooting results faster and more even germination, that is important to reduce the damage of soil-dwelling pests.

*gold crown: Unit of measurement expressing quality differences between lands. In the past landowners paid the tax on the basis of the golden crown value system. It is still used today as a relative value of land. In Hungary, the value expressed in the average gold crown of 1 hectare is 19. Lands with a value between 0 and 17 gold crowns are considered to be of lower quality, lands between 17 and 25 are considered good, and lands with more than 25 gold crowns are considered excellent.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The interviewee believes that agriculture is going through great changes and the farmer needs a wide range of professional knowledge. One of the most important areas is the supply of nutrients in light of his soil properties. In their case, this knowledge is even more indispensable as the characteristics of their lands are very diverse with different needs. (Requiring different crops, different tillage methods and nutrient management.) He believes that due to farmers' passion for machinery, there are many exhibitions and fairs focusing on agricultural machinery, although this sector does not develop so dynamically excluding precision farming. The importance of soil biology is underestimated by many, although this subject could be better focused. In the areas of finance, fundraising, economic diversification, procurement, and logistics, as well as sales and marketing, the farmer is well prepared and has no difficulties. He employs an advisor to get acquainted with EU, national and local regulations and to submit project proposals and applications for subsidies. Within the village, unfortunately, there is no cooperation with neighbouring farmers, and even the best relationship falls into the 'neutral' category. The farmer recognizes and highlights the importance of the social role of agriculture. He teaches Roma minority about backyard gardening during winter in the nearby village. His aim is to motivate them to use their uncultivated gardens. He doubts the stability of local sales on farms because, in his experience, farmers may lose their regular customers because of big supermarkets' occasional promotions.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
The farmer is familiar with the term of agroecology. He regularly reads paper and internet-based journals, articles, and watches YouTube videos about farming practices. During the winter, he attends company-organized professional events and discusses his issues with experts. He makes use of his professional network, which is based on his many years of experience in the agricultural profession and the friendships he has developed during his agricultural studies. The division of work within the family is well divided, responsible persons for certain work are always assigned. Since it is a family, regular communication and planning is not an issue. There are long-term plans that are considered together after the idea is raised (e.g. purchase of machinery, crop storage investment, infrastructure development, introduction of a new crop into the crop rotation.)
Needs and ideas of the farmer for agroecology training:
He would like to participate in training programs focusing on practice. All forms of training can be interesting for him (especially during winter). Education on his own farm would be even better as he would learn a lot about his own fields.

11.2. Interview 2

Type of stakeholder: Arable crop producer private farm
Date of the interview: February 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: limited liability company
Position of the respondent: CEO Chief Executive Officer
Age group of the respondent: 25-34
Highest qualification of the respondent: MSc Agricultural Economics Stuttgart, Germany, BSC University of Debrecen, Hungary

Activity, sustainable farming practices, sustainability challenges of the farm:

The farm is a 290-hectare farm which is comprised of 265 hectares of arable crops, a 23-hectare fruit orchard and a small kitchen vegetable garden. The farm has been in operation for 20 years, with the land owned by the family. The interviewee's father started purchasing plots in the area 20 years ago and gradually built up the total amount to the current 290 hectares. The land was previously owned by a number of farmers and portions also by the local cooperative. All the arable crops are officially certified organic since 2015. The main products coming from the arable land areas include grains for feed, grains for milling and human consumption, and seed production. Specific crops in the rotation include sunflower, winter wheat, oats, rye, crimson clover seeds, phacelia, alfalfa seeds, and peas. The also produce potatoes for sales domestically, and a small amount of sweet corn as a recent experiment. They replant some of their crimson clover seeds for use on the farm. They aim for grain production to be sold to mills but if the quality is not determined to be high enough, then the yield is sold as feed. The fruit orchard is not certified organic, and all the fruits are used for palinka production. Fruits include plum, sour cherry and apricot. Some of the difficulties they encounter are the quality and price standards set within the European market. They have to sell most of their grains abroad because of the lack of a developed organic milling industry in Hungary. The foreign market makes determinations of quality and price based on conditions year to year.

The company employs 5 permanent workers all year, and during the fruit harvesting season, an additional 5 workers for help with harvesting from the end of June to September.

A focus on a sustainable crop rotation has helped them build up soil quality and avoid problems with diseases and bacteria in soils. They have collaborated with OMKI throughout the years to track and evaluate soil quality with a soil scanner tool. The tool has helped map soil organic matter, moisture and soil quality over the years. They have also aimed to adapt modern minimum to no till methods over the last few years. They have had to purchase machinery and equipment which is compatible with the no till practices at large scale. Because of their organic certification status, they are eligible to receive OKO payments per hectare of organic agriculture, along with AKG support for the orchard area.

In addition to collaboration with ÖMKi to track soil health, they also use external services (lab testing) to sample soils along with the usage of a penetrometer. The soil analysis provides nutrient management data, nutrient content, mineral content, and physical conditions. The conduct soil tests at least every five years but aim for every three years.

They have two different major crop rotations based on the differing soil quality on their plot. The better-quality soils have an 8-year rotation of 2 alfalfa varieties, winter wheat, sunflower, crimson clover, and maize, followed by winter wheat and sunflower again. On lower quality land they follow a three-year rotation of crimson clover, winter wheat and spelt, while including phacelia

and linseed based on market demand. They intercrop peas and spelt; sowing peas first followed by spelt. They are harvested together and separated after harvesting.

The farm uses organic fertilizing methods (green manure, stable manure, slurry and compost. The farm manager took an interest in minimal tilling and attends regular events in Hungary on minimal till arable crop farming and supplements his knowledge with additional information he gets from abroad through publications and videos in German and English. During his schooling in Germany they also started to introduce minimal tilling practices in coursework. They cannot produce all of the manure they need on the farm or from local sources, so they need to buy in manure or use concentrated chicken manure pellets for fertilization. They leave all stubble residue on the farm after harvesting.

They experience some problems with pests but attribute over satisfactory conditions to their crop rotation. They have tried some methods of physical disturbance at specific times during the season to avoid whitening of winter wheat from pests. They use novodor against specific pests (on potatoes and winter wheat).

They have started to take into account the impacts of climate change on their farming operation. Weather has become more radical with high rain periods followed by extended dry periods. To lower the risks associated with changing weather patterns they choose more resilient varieties in their crop rotation.

The decision to convert to organic farming was inspired by the farm managers University studies and after experiences with conventional farming that they could not reach high yields with chemicals. They also had hopes for higher market prices for organic products and have pursued the market opportunities for higher organic crop prices.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farm manager thinks cooperation between farmers is essential for survival and cooperates regularly with neighbouring farms in sharing machines and advice on production. They also participate in events and forums for organic producers organized by ÖMKi, and together with local bakers who are interested in Hungarian grown grains for baking purposes. He finds farmers to be supportive in an informal manner in network building and has seen limited results in the last five years in bringing together farmers informally. Most of the meetings were international meetings with Austria and Danish farmers, so knowledge of English/German was essential for participation. They are not a member of a specific official organization for ecological/socially conscious farming.

The farm manager considers knowledge of crop rotation and density, pest management and nutrient and soil management, crop varieties, tilling and ploughing reduction and marketing support essential for efficient and environmentally conscious agricultural production. The farmer considers his knowledge of soil conservation and biodiversity management as average to high, and water conservation and air pollution reduction to be limited.

For farm management, he considers on farm economics and budgeting an essential management tool, which he learned a lot about in University. He considers people and team management a key part of the operation and makes sure to meet personally with his staff each Monday, as well as meeting face to face throughout the week. Good communication is a key tool for a functioning farm operation. He finds it important in the managerial role to be progressive, helpful and a good listener when managing his team. They try to speak together as a team about larger decisions which will impact the farm.

The farm manager has a high knowledge of farm financing and fundraising, economic diversification, and EU, national and local regulations. He has an average knowledge of procurement and logistics, sales & marketing, and communication.

As far as the social benefits of the farm, the manager currently understands that the farm does not play a significant role in the region it is located in, and they are working on a strategy to play a greater role in their region. They would like to develop the local marketing of goods and are planning to build an onsite, traditional French grain mill so that they can market more grains and flours in Hungary. They would also like to develop more opportunities for onsite visits in the near future. The farmer considers high knowledge of agriculture as an income generating activity and the role of agriculture in protecting the natural environment as high, the role of agriculture in supporting rural populations, social farming opportunities, agritourism, and preserving rural traditions as average, and the overall role of agriculture in the supply of food, raw materials and energy as limited.

In five years, the farm hopes to develop systems for making more processed products on site (flour and potatoes for sale in shops in bags) and to develop a permanent customer base in the Hungarian market. In the long term they hope to establish a more defined local market, create better quality output, have a few umbrella brands of products along with open and social farming programs which would help pass on knowledge of organic arable crop production.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer is familiar with agroecology as a term and practice, and was first introduced to it in University, and more recently through the programming of ÖMKi. He is interested in developing his knowledge of the topic, especially with relation to more advance no tilling or minimal tilling for arable crops. On his own farm, chemical avoidance or reduction, soil nutrient management and building healthy soils, and crop rotation knowledge he considers to be the strengths of his current management practices.

The farmer gains new knowledge of organic production management from his own research online, from the teachings of professionals, some information from NAK newsletters, and training opportunities from various farm management newsletters online.

Needs and ideas of the farmer for agroecology training:

The farmer would be interested in future training opportunities which focused on:

- soil conditions and soil health
- biodiversity enhancement on arable lands
- advanced no tilling methods and intercropping
- on site composting and nutrient management
- biodiversity sectors in an arable landscape
- organic fruit production

The farming would be willing to attend multiple day training sessions in the winter period when there is less of a work burden. He would also be happy to host training opportunities on his own farm. November to February would be the main timeframe when it would be realistic for him to attend multiple day training sessions.

11.3. Interview 3

Type of stakeholder: Arable crop producer private farm
Date of the interview: February 2020
Length of the interview: 45 minutes
Methods of the interview: via telephone
Form of operation: private farm
Position of the respondent: owner
Age group of the respondent: 55-64
Highest qualification of the respondent: Agricultural Engineer MSc

Activity, sustainable farming practices, sustainability challenges of the farm:
The interviewee has been running his private farm for 20 years (previously he had worked at agricultural cooperative). The farmland (50 hectares in total) is partly his own property (inherited and purchased), partly rented. The farmer reckons the land not only as a production input, he feels attached to it. He considers farming as a lifestyle.
The farm profile is arable crop production (wheat, sunflower, colza and maize) and the entire produce is sold on the market.
Since the farmer's family is not involved in farming, he employs casual labour. Unfortunately, the farm succession is not solved (there is nobody to hand it over).
He considers it is crucial to leave an adequate soil quality to future generations. In his experience, the soil quality on the farm has been slightly improved comparing with its initial state. He does not benefit from agri-environmental payments.
The farm is located in an N-sensitive area where regular soil monitoring is required (which is made by an external organisation).
The interviewee uses crop rotation (not including legumes) but he does not do second crop planting. The farmer uses reduced/no tillage in some parcels and recycles crop residues (turns all straw). However, no irrigation and no organic fertilization are utilized.
With regards to the plant protection, it is solved with only conventional pesticides (no biological plant protection). The farmer cannot estimate the impact of climate change on his farm, saying that there also were periods of drought further back.
Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
The respondent considers his knowledge of agri-environment, management and social function of agriculture average.
Usually he makes farm activity plans for 3-4 years, but this does not apply to variety use – if a new one comes up, he tries it. His future production related decisions are based on needs assessment (market opportunities and environmental conditions).
The farmer sees himself as part of a community and he is able to work in a team. He maintains a friendly relationship with the neighbouring farmers considering them as partners, sharing knowledge and experience with them. Nevertheless, he is not a member of any social organization or movement. The interviewee's sources of information on new technologies and trainings

include the Internet (websites) and professional meetings (product presentations organized by service providers).

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer considers necessary a practice-oriented, high-level, in-depth professional knowledge in agricultural production and sustainable farming. In his opinion, that would enable responding appropriately to changing economic and natural environment and to prevent or reduce the resulting negative effects. Knowledge of viable, profitable farm management is also required to facilitate adaptation and also to identify and exploit opportunities.

Needs and ideas of the farmer for agroecology training:

The respondent has already come across the concept of agro-ecology, however he would refuse to attend training on this subject with reference to his age. In his view, such training could take the form of a short course over several weeks (1 day/week), on non-consecutive days, at an external location. According to him, the course content should be closely related to the practice and it is advisable to include knowledge of agricultural business and management.

11.4. Interview 4

Type of stakeholder: Arable crop producer enterprise
Date of the interview: February 2020
Length of the interview: 120 minutes
Methods of the interview: personal interview
Form of operation: limited liability company
Position of the respondent: executive director
Age group of the respondent: 35-54
Highest qualification of the respondent: Aranykalász* farmer course certification

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee owns 700 ha of land which is comprised of arable crops such as wheat, maize, sunflower and 20 ha of energy willow. The extension of crop rotation is continuous, a mixture of 6 species was sown as a winter-kill cover crop on 180 ha. They have no problem selling their crops in the market. The company employs 7 people: Executive Director, Production Director, Administrative Manager, 4 physical workers (one of them is the farm manager). They participate in the agri-environmental program; therefore, they are eligible to receive AKG support. They do not plough their lands in order to preserve the biological activity of the soil. The interviewee believes that in terms of soil looseness their lands do not require ploughing, loosening can be solved by other tillage methods. Horse bean as a winter-kill cover crop has been sown on 3 ha together with a local type of rye. The rye was sown for seed production and its stem will be sold as straw. Red clover and maize mixture are planned for the future as an intercropping system (in order to cover the soil surface).

The soil condition is checked regularly. In addition to the regular use of spade and farmer stick (to check soil penetration resistance and soil structure), plants are sampled for plant fluid analysis and sent to a Dutch laboratory. Learning from the 25-parameter evaluation, the lack of micro-elements can be detected and then treated. This so-called PlantSap analysis is used primarily for nutrient management purposes.

For soil protection purposes, in addition to minimum tillage and the use of green manure, direct sowing method is applied for some crop species (wide spaced crops), as they do not have in this moment adequate machinery which is able to sow grains in a direct drilling way. The stable cultivation is performed before sowing cover crop.

A plant protection specialist is employed, plant protection products are used, biological plant protection is not yet typical. Pelleted organic manure is also applied for nutrient replenishment. Common voles are present in wheat fields (for years) but the damage is not significant. T-trees are placed for birds of prey. They try to avoid the use of poisons.

Their areas belong to a drought zone, so the amount of precipitation is the limiting factor.

They exchange experiences not only with nearby farmers, but with so-called Soil Renewal Farmers. Farmers with 50-1200 ha lands made up this association (approx. 45 members). They meet twice a year. During these meetings invited external speakers give lectures on topics of interest (E.g. Nutrient management in a non-traditional way, irrigation in a non-traditional way)

The interviewee cooperates with other farmers too, but the number of these cooperation is limited and focused on 'quality relationships'.

* Aranykalász farmer course: Minimum compulsory education for land purchase and inheritance and for young farmer program application in Hungary.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

In the areas of finance, fundraising, economic diversification, procurement, and logistics, as well as sales and marketing, the farmer is well prepared and has no difficulties. He evaluates his knowledge level as "poor" concerning EU, national and local regulations but he does not consider this aspect of farming predominant. He underlines the importance of the social aspect of agriculture, but he evaluates his own knowledge in this area to be average.

Day-to-day tasks are distributed in person, with each employee. Among the management models, he believes in and follows the Pareto model (20-80 principle), which also applies to work: 20% of work will bring 80% of material return.

He is informed about the work processes and their completion in person, by phone or via SMS. Who he discusses professional issues with depends on the type and nature of the decisions he has to make, but in general he is curious about everyone's opinion. He feels himself part of a community, although he basically believes in individual farming, but he is happy to work with his current team. The atmosphere and the attitude of the employees fundamentally determines the success of everyday work.

In general, the company has half-year plans but are constantly being updated. The end-of-year / beginning of the year plan is for 1 year. Investment plans – by their nature – have longer term.

The interviewee has a 10-year long-term arable crop production plan. Decisions will be made according to actual trends and his own set of values, which also applies to what crop the company will produce.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The interviewee is familiar with the concept of agroecology and he is interested in the topic. He has a high level of professional knowledge of soil, while his knowledge is rather limited in the case of biodiversity although in his farming practice, he is very much in favour of stimulating the biological life of the soil.

He is informed about learning opportunities and technological innovations through the media, the internet and through his personal professional network. He considers professional visits and experiences especially important. (He has just come home from the USA, which was very inspiring for him in terms of farming in general, and soil tillage methods.) The relationship of the Soil Renewal Farmers also contributes to the fruitful discussion and experience-exchange of professional issues.

Needs and ideas of the farmer for agroecology training:

He would be happy to take part in agroecology-related training, depending on its subject. He believes that theoretical knowledge can be acquired via the internet, whilst in Hungary the practical courses are the real shortcoming, therefore he prefers practice-oriented trainings. Regarding the duration and time schedule of the training, the respondent is flexible. If the training really arouses his interest, he is able to participate, this is not a problem in his workplace.

11.5. Interview 5

Type of stakeholder: Arable crop producer enterprise
Date of the interview: February 2020
Length of the interview: 80 minutes
Methods of the interview: personal interview
Form of operation: agricultural cooperative (new type)
Position of the respondent: president
Age group of the respondent: 55-64
Highest qualification of the respondent: Agricultural Engineer MSc

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee has been working in the cooperative since its establishment in 1993. The cooperative's profile is arable crop production (wheat, sunflower, corn, and rape). As a large agricultural enterprise, the land – 930 ha – is rented (from 800 to 1000 owners). 14 permanent and 2 temporary workers are employed in the cooperative.

The quality of the land improved slightly as evidenced by the increased percentage of humus. External soil monitoring (an optional external service) is carried out every 5 years, while the nutrient management plan must be prepared annually. They utilize bacterial fertilizers (e.g. Phylazonit) but do not use any soil disinfectant. Their farming includes practices resulting in improvement of long-term soil fertility and ensuring the preservation of surrounding ecosystems such as stubble stripping, deep soil loosening, mulching, crop rotation (without legumes due to their unfavourable market position). They do not apply direct drilling, irrigation, or tillage without ploughing (machines for the latter are currently missing but such an investment is possible in the future). All stubble residues enriched with bacterial fertilizers are recycled – the straw is not sold. In addition, they are committed to the reasonable use of fertilizers and pesticides, thereby contributing to environmental protection. Since the farm is located in a nitrate-sensitive area they are obliged to comply with the requirements of good agricultural practice. 'Technological deficiencies should not be fixed with chemicals' – the interviewee underlined. Biological pest control is not really applicable on hundreds of hectares, but in some place's pheromone traps are used. In the beginning, the agri-environmental scheme was tested on 50 ha, but the farm is no longer involved in that. As protection against climate change, which is mainly perceived as an absence of rain, they grow drought tolerant varieties and bring forth sowing date.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent believes he has a high level expertise in agri-environment, economic diversification, procurement, marketing, communication, regulation and also in the social role of agriculture (e.g. a former unemployed is hired but according the cooperative's president it is difficult to employ people with disabilities on a large farm). He evaluates his knowledge of finance as an average.

The interviewee gets information about management, subsidies/regulation and trainings from the Internet. Regarding technology changes, his sources of information in addition to websites are also specialist books, product presentations and professional meetings.

Planning depends on activity: nutrient management plan – 1 year; variety use plan – 1-2 years; investment plan – 4-5 years. The interviewee's opinion regarding the production decision is that it should be based on profitability.

The respondent does not follow a specific leadership model, he relies completely on his experience. He allocates tasks individually according to the skills of employees. The completion of the tasks is monitored by him, but he underlines that he trusts the staff and their relationship is friendly. The team cooperates with other farmers (e.g. they lend machinery to each other). Decisions are made collectively while taking into account the opinion of an expert in the given field.

He feels part of a community. The cooperative has supported the municipality e.g. in the construction of a nursery school, in the organization of 'lecsó' festival, in the renovation of the church.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The interviewee considers essential the system thinking and in-depth professional knowledge of technologies, economic aspects, and steps of sustainable farming. Furthermore, planning, design/modelling, economic/financial skills (e. g. thinking logically and critically, data analysis, problem-solving, financial reporting etc.) are also required. In his opinion if somebody could model the process then he/she would be willing to carry out a sustainable farming activity.

On the one hand a permanent leader's task is to solve the day-to-day problems and on the other hand to develop a strategy. He emphasized that the key to a successful leadership is the friendly and confidential personal relationship with the employees.

Needs and ideas of the farmer for agroecology training:

The interviewee has already heard about the concept of agroecology and it is possible for him to attend an agroecology training. Although the training could be organized in both forms (in case of external location it would be advisable to hold it on 1 day/week), he would prefer a training on his farm. The training should be practice-oriented covering not only the basics of agroecology but also management planning, economic and financial knowledge.

11.6. Interview 6

Type of stakeholder: Horticulture private farm
Date of the interview: February 2020
Length of the interview: 1 hour
Methods of the interview: phone call
Form of operation: Individual entrepreneur
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: university degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

The farmer inherited the greenhouse and the land he cultivates, which he has been farming for 5 years. He produces for the requirements of his family and to sell the surplus products. In his opinion, it is difficult to meet quality requirements. The size of his agricultural establishment is approximately 2500m^2, in which mainly mushrooms, annual flowers, spices, peppers and tomatoes are grown. The income from the farming activity serves as income supplement. He feels connected to his production area and the condition of the area has been maintained since he started farming. Farming is considered by the farmer as a job. Family members are involved in sales for a few hours per week, but non-family labour is not employed. When the time comes, he does not have anybody in mind to transfer the farm to.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

An aspect of his farming is that the production area should remain well-cultivable and fertile for future generations. He does not receive agri-environmental support. It is not organic farming. The soil condition is not checked regularly, but if it is needed external services are used. There is no crop rotation in the greenhouse. Irrigation is, however, applied. Crop residues are not utilized. Insects appear regularly. The farmer tries to use environmentally friendly technologies, and biological plant protection is applied. As far as perceived impacts of climate change, the fast-changing weather and strong winds were mentioned. As for preservation of the environment to the extent that is consistent with the farmers' principles, attitudes, and expectations he thinks more could be done. Sometimes the farmer shares his experiences with other farmers, and he is a member in the Chamber of Agriculture.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer admits to possessing an average knowledge regarding topics of soil, water, air and biodiversity. (Note: He is absolutely against artificial growing mediums.) As for management, he considers the knowledge of sales very important or rather the most important. He has average knowledge in the different fields of management. He rates his knowledge with a high score regarding the role of agriculture in the supply of food, raw materials and energy, in keeping the rural population, income generation and supplement and in eradicating poverty, but in areas such as the role of agriculture in the social employment of disadvantaged people, therapy etc., in tourism, recreation and education, in preserving rural traditions, in protecting the natural environment and landscapes and the role of cooperation in agriculture the level of his knowledge seems for him to be average. He thinks the main task of the farmer is to have a holistic view of operations. He is in charge of both production and sales. Decisions are taken together with the family members. He plans the activities for each half year cycle, and he tries to follow the needs of the consumers.

Needs and ideas of the farmer for agroecology training:
He has not heard about the concept of agroecology, but he is interested and would take part in theoretical and/or practical training on the different topics of agroecology once per month.

11.7. Interview 7

Type of stakeholder: Horticulture private farm
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: limited liability company
Position of the respondent: Farm Founder and Manager
Age group of the respondent: 25-34
Highest qualification of the respondent: Agricultural Engineering BSc

Activity, sustainable farming practices, sustainability challenges of the farm:

The farmer interviewed has been working full time as a garden manager at three different locations since completing his degree in agricultural engineering in 2016. He started off in Nógrád county, managing a community owned farm and developing a market gardening model. In the 2017/2018 seasons he was operating a market garden on a rented piece of land in Veresegyház. In December 2018 he acquired a property in Bér, Nógrád County, and began developing the site into a permanent organic market gardening operation which is 0.5 hectares in total area while cultivating 0.3 hectares (900 m^2 of polytunnel). The location of the farm was selected because the manager was familiar with the area from prior work experience and required proximity to Budapest for sales opportunities. The garden team is comprised of the manager and his partner, 1 employee during the season and part time help from locals in the village. The area is quite small, it was the garden plot with a residence, which was uncultivated for decades. They are surrounded by a forested area. The farm manager owns and lives on the plot with his partner, who also works on the farm. In the farm's first two years it has been oriented to market its goods to local restaurants near Gödöllő and Budapest, but the farm manager intends to transform to a more CSA oriented model with 60 subscription shares in the next year, or even launching by autumn because of the difficulty in marketing organic products to restaurants (and of unpredictability of the hospitality sector, specifically citing this year's corona virus impacts on restaurants/hotels).

The aim of the garden is to intensively cultivate a small area on focus production on high value micro roots and greens, salads, lettuce, radishes, and baby root vegetables. The farm finds a difficulty in marketing products in the village it is located and surrounding villages because many locals produce some vegetables of their own or consider the price of organic produce too expensive. The farm is organically certified by Ökogarancia. They aim to avoid leaving cultivation beds empty and use a locally produced mix of cover crops which work well for vegetable production. They are following a crop rotation plan which is compliant with certified organic practices. The soil was sandy in its original condition, so they have had to build up organic material through composting. They are using a combination of bought compost, concentrated pellets, and their own compost, but in the future, they hope to be self-sufficient in their own compost production. They currently compost crop residues and leave the roots of crops in the soil to break down on their own. Maintaining healthy soil is a priority of the farm. They have had their soil tested regularly in labs and have tracked significant improvement in nutrient content after 2 years of cultivation. They have created a small pond on the farm for its biodiversity benefits. For pests, they use a few biological products (novodor, polyversum for fungi) against wire worms, but mostly fend of pests through crop rotation and physical barriers (protective netting). For weeds they use hand tools and regular cultivation of beds, but they credit the absence of weeds to their no till cultivation practices.

They are largely working with physical labour instead of machines and practicing minimal to no tillage cultivation practices. All the produce is marketed in Hungary, with most of the sales occur-

ring in Gödöllő and Budapest. They are not receiving any type of agri-environmental support and would likely not qualify or benefit much from land-based payments because of their small scale. They acknowledge lack of reliability in precipitation as an already noticeable impact of climate change even on their small farm. One of the reasons that they selected this location was because of its tendency to be a few degrees cooler and wetter throughout the season, which they hope will be a benefit in years to come. He acknowledges that his own contribution to preserving the environment on a macro level is small, because of their scale, but on the micro level he finds it important to improve the quality of the mini ecosystem which he is managing so that it will be in a better condition for whomever comes after him. The manager also prioritizes teaching and passing on knowledge to the next generation of growers, and host regular teaching and exchange events on the farm.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farmer felt that he has a close connection to farmers in his region, and a network of farmers which are following similar market gardening practices. He does not participate typically in any formal networks but is an active member in an informal network of market gardeners in Hungary which is managed through an online Facebook group where information and tips are shared. He organizes teaching events regularly on his own farm, but they are mostly attended by hobby gardeners who are looking to learn more information which can help them in their own backyard production. He keeps track of international movements and participates in market gardening online educational courses which are conducted in English, mostly by influential market gardeners from North America and Western Europe.

The farm manager's family has experience in business management and entrepreneurship, so he feels one of his strengths is business management, something which may not be the main skills of other agriculturalists. He believes the most fundamental skill for market garden managers is systems thinking and process management, thinking of a garden as an efficient production system, and thinks from this knowledge base comes the management of a financially successful garden. He would rate his knowledge of soil management and water conservation on the farm as high, and of air quality and pollution reduction, along with on farm biodiversity as average. From the farm management side of things, due to his business background and University education, his has ranked his knowledge of financing, economic diversification, procurement and logistics, and sales, marketing, and communication as high. Since he does not receive any agri-environmental support, his knowledge of EU funding support schemes is average, and he assess his overall knowledge of EU, national and local regulations as average.

For the social aspects of agriculture, he considers that he has an average knowledge of various issues but living and working in a village he is aware of the potential impacts on rural livelihoods of supporting small scale agriculturalists. He has an interest in building a community of small-scale farmers, which can help in sharing techniques and support to make this type of lifestyle sustainable. He also finds it important to build local food communities through short supply chains, and the importance of farmer to farmer networks for teaching and sharing experience.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

From his own study (it was specifically mentioned that his University program was not strong in teaching agroecology or organic production practices, especially at small scale) he feels he has a strong general knowledge and awareness of agroecology. Agroecology has been a personal interest of his which he has researched on his own and finds it good fortune that he is able to read texts in multiple languages besides Hungarian. Locally, he has followed the teachings of a local advocate for no till agriculture. He would be interested in more detailed learning opportunities focusing on agroecology, and he finds specifically important increasing knowledge of no or low-

till farming. He considers soil conservation and regeneration one of the most important aspects of agroecology, and in the market gardening sector, knowledge of unheated polytunnel all season production something important to increase knowledge of in the future.

Needs and ideas of the farmer for agroecology training:

Although the farm manager considered his knowledge of agroecology adequate, he outlined a number of topics which he would like to study more including:

- increasing on farm biodiversity at a small scale
- no till and low till agricultural practices in a market gardening setup
- unheated polytunnel all season production
- on farm compost production from different base materials
- general soil conservation practices
- social aspects of agroecology and building local and regional networks
- Hungarian support networks for agroecology
- CSA marketing development
- Social farming programs

He specifically mentioned the weakness in the traditional University educational system domestically and internationally, and that agroecology and small-scale market gardening in not currently a topic of focus in most University programs. Most of what he learned on these topics was from personal study online. He would be willing to host training programs on his farm and mentioned that the most convenient timing for him and those of similar work schedules would be in late autumn or throughout the winter months. He mentioned that attending a multi-day training would only be possible if he were to host it at his own farm, or in the winter months.

11.8. Interview 8

Type of stakeholder: Horticulture private farm
Date of the interview: February 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: licensed traditional small-scale producer/private farm
Position of the respondent: producer
Age group of the respondent: 35-54
Highest qualification of the respondent: high school

Activity, sustainable farming practices, sustainability challenges of the farm:

The farmer has 1.2 ha land in the Pilis mountains close to the Danube. He has open fields and also plastic tunnel production. The farm does not have the organic certification but complies with the regulations, he does not use any pesticides nor mineral fertiliser. He farms his own land, where he produces fresh vegetables for his family and for selling on the market directly to customers. He has one temporary worker and his sister to help with the production and marketing. He also keeps goats and poultry but just a small flock, rather for the manure and for clearing the land. Each part of the production site is manured every 3 years. There was no proper soil test before, he makes his own observations (colour etc.). The land is irrigated, and he experiments with different mulching methods (manure, straw, black plastic foil). He also uses biological pest control to protect the plants and compost the plant residues and put it back in the soil. He has a pond where he collects rainwater from the slope, and has fish in the pond, he uses the pond for irrigation which is therefore rich in nutrients. He placed out birdhouses on the trees around the site to help them nesting, which in turns help to control pests. Marketing is one of the main challenges for him, to find the right customers who are willing to pay the extra costs of the production. He tried to form a CSA system but had negative experience with that. Climate change, and the random weather events have had huge impacts on farming, he sees this as the other main challenge for him and for the other producers.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

He mostly evaluated his knowledge of agri-environmental themes as average except for water where rather high. He considers his knowledge of procurement, logistics, diversification, sales, marketing, and communication as relatively good, average while limited in finances and EU, national and regional/local regulations.

He had various opinions about the social aspects of agriculture:

He thinks that the food system is catastrophic as it is now. He stressed the importance of young generations in maintaining rural populations. Farming is a passion for him not only an income generating activity. He is sceptical about the possible role of agriculture in eradicating poverty while sees a lot of opportunities in supporting disadvantaged groups via agriculture. He thinks that preservation of rural traditions, and the role of agriculture in tourism, recreation and education became a fashion nowadays. He believes cooperation should be a crucial element in agriculture. Alternative agriculture is seen by him as an important element for safeguarding the natural environment and landscape values by forming protective, buffering zones against conventional, intensive agriculture.

He mostly gets information from other growers, also internet sources. He participates in the Network of Small-Scale Community Growers (KÖKISZ). He is also part of a Christian community.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The interviewee thinks that a basic knowledge is indispensable for doing agriculture, but above that the most important is the own experience of the farmer. This is why he is experimenting always with something on his farm. As for the management of the farm, he stressed the importance of intuition and observation skill which are very important in all activities, also when engaging with customers. He thinks that the grower must know his/her customers and has to be able to think with their head. He is committed to promoting organic farming methods and feels as having a pioneer role in that together with other small scale, community growers. He has some help, but mostly does the main work on his own. He has someone to help with the heavy physical work and his sister helps with additional work along with marketing. He manages everything, even though he thinks that the weather is often the key factor in how he plans the activities and not his own self-minded factors. He likes teamwork although he sees its difficulties. He plans the activities for 3-4 years normally. He writes a diary where he documents his experiences and he plans the next season based on these observations.

Needs and ideas of the farmer for agroecology training:

The interviewee has never heard about the term 'agroecology' before. Even though the term and the ideas behind appeal for him but managing a farm with such a complexity requires his continuous presence therefore a training of 4-5 days is difficult for him. He thinks the best learning method is via field visits where practical, working solutions are demonstrated. The winter season is better even though there are less things to see than in the growing season.

11.9. Interview 9

Type of stakeholder: Horticulture private farm
Date of the interview: February 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: licensed traditional small-scale producer/private farm
Position of the respondent: producer, full time job
Age group of the respondent: 35-54
Highest qualification of the respondent: horticultural engineer BSc.

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee has 25-hectare fruit plantations, with 10 different species (apple, apricot, and many more). He was born into a farming family and cultivates the plantations together with his parents. All land belongs to the family; therefore, he has an emotional connection to it, he does not look at it as just a means of production. Succession of the farm is not yet a question, he would like to show farming for his kids, but he does not want to force them, it has to be their decision. They have no paid permanent employees, only temporary workers for pruning and harvesting. He has a passion for farming, it is not only his profession, but his hobby and lifestyle. The farm is not certified organic nor part of the agri-environmental scheme although he is planning to apply for the latter. He stopped using glyphosate to control weeds, he applies mechanical weed control (machines). Against rodents he started measures to help attract predatory birds, he experiments with leaving higher grass between the rows, and he also placed out T shaped pillars and deliberately left dead trees on the land. No soil testing was completed so far, but he is planning to do it. Most of their plot is eroded and sloping hillsides, so erosion is a problem he must take into consideration. Fruit trees are good to control erosion, the plantations are 25 years old on average, the land was arable beforehand. They select cultivars for replantation based on their fruiting capability (quality, quantity), but resistance to diseases is also a key factor. They only apply manure before planting new trees, apart from that he uses mineral fertilisers. They also apply soil life stimulators and hyper parasite fungi when planting new trees. As for plant protection, their main focus is on conditioning the fruit trees with foliar fertilisers, and stress treating. They use sexpheromon traps against pests. Climate change has a considerable impact on his farming, he looks at it as a very influential factor in the present and future. E.g.: they are planning to stop growing apples and plant grapes and apricot instead, also they have to install irrigation. The natural environment is very important for him, conservation of the environment and decreasing negative effects of farming are among his goals.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The interviewee evaluated his knowledge of soil and water as average while high for air and biodiversity in the agri-environmental themes. He considers his knowledge of procurement, logistics, finances and EU, national and regional/local regulations and communication as average while limited in sales, marketing and high in diversification.

He had various opinions about the social aspects of agriculture: he evaluated his knowledge as average regarding the role of agriculture in keeping rural population, high in food supply and eradicating poverty and as an income generating activity. He was less knowledgeable in the other social aspects: limited in supporting disadvantaged groups, preserving rural traditions, and regarding the role in tourism, recreation, education also in cooperation.

He mostly gets information from professional events, like field visits, cultivar demonstrations and plant protection conferences. Above that he uses internet sources mostly to gather information on machinery and fruit cultivars. Apart from that he consults professional literature, books, and articles. They do not have much time for deeper cooperation with others or to participate in projects, but they always visit a lot of professional events where they have the opportunity to exchange experiences with other growers.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer thinks that his profession requires most knowledge and skills regarding machinery, plant protection and soil. A viable business is based on the adequate knowledge about the market, what can be sold on which price etc.

Working in a family also requires good communication skills. They have their own way with his father to come to a group understanding regarding common decisions. They come together more times discussing the question and look for a compromise. After all, if they cannot find a compromise then they look at the issue as an experiment and see how it plays out finally.

Needs and ideas of the farmer for agroecology training:

The interviewee has heard about the term 'agroecology' during his university studies. He perceives it as the contrary of large scale, intensive agriculture.

He thinks that he has adequate basic knowledge about farming and environmental issues thanks to his studies and own experience. He would prefer face to face learning instead of online tools. Timing of a training depends on the target group, he thinks that most farmers in his sector have no time at all during the summer season, maybe smaller growers may. He is mostly interested in very specific novelties in fruit growing, like new plant protection products, new methods, cultivars or other specific knowledge. So, he would not likely participate in a more general course about environmentally friendly farming. He said that regarding the social aspects, trainings should be very informative and well planned so that he gets interested enough to participate. But maybe he lacks the sensitiveness to these themes, he thinks that maybe women farmers are more open to them.

11.10. Interview 10

Type of stakeholder: Horticulture private farm
Date of the interview: February and April 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview and telephone
Form of operation: licensed traditional small-scale producer/private farm
Position of the respondent: producer, full time job
Age group of the respondent: 35-54
Highest qualification of the respondent: higher

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee has 6 hectares of own land, which is partly arable and partly (1.5 ha) horticulture. The land belongs to his family for around 100 years now, so he has a special connection to it. He grew up in farming and this is his lifestyle, it is much more than profession. His wife helps him in the work and occasionally his children, and there is an elderly local woman who helps him from time to time, but he does most of the work. He tries to keep himself up to date with the new technologies, solutions, plant protection products, but has a settled way of cultivation. He applies manure to the horticultural land every year, and he rotates the crops. He tries to reduce pesticide use and is open to biological pest control, he uses sex pheromone traps, and microbiological soil amendments. Climate change has impacted his farming, the droughts are quite severe, he must irrigate nowadays, and pests are changing as well, as new pests appear.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The interviewee evaluated his knowledge of soil and water as average while limited for air and biodiversity in the agri-environmental themes.

He considers his knowledge of procurement, logistics, diversification and EU, national and regional/local regulations as average while limited in finances, sales, marketing, and online communication while high in personal communication.

He was knowledgeable about the social aspects of agriculture on average, he is not informed about the very details, but has a lot of first-hand experience. He is sceptical about these aspects, he said it is often politically driven and there are no serious efforts behind. Cooperation is rare and mostly partners have their financial interest in it.

He mostly gets information from professional literature: brochures, books, leaflets. Above that he uses internet sources as well to gather information, but it is problematic, as it is hard to find quality information. He has loose connections to local farmers; they try to help each other on family or friendship basis. He has also in cooperation with one of the neighbouring organic farmers, but his farm itself is not certified organic.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer thinks that his profession requires most knowledge and skills regarding soil cultivation, plant protection and new pesticides. A viable business is based on the adequate knowledge about finances like e.g.: loans. He does not have any partners in his farming and does not really have experiences in teams working apart from family.

Needs and ideas of the farmer for agroecology training:
The farmer is not familiar with the concept of agroecology, even though many ideas appeal to him. He is interested in deepening his knowledge, but has no time for more general things, or for very scientific information. Experience is more valuable to him, what and how should be done. It is hard for him to leave his operation for consecutive days. The best option is when a company organises a one-day/afternoon event with 2-3 experts holding shorter presentations on novelties. Wintertime is best for more theoretical themes while he would only go for a 1-day training in summer if it is very practical and held on a good example farm.

11.11. Interview 11

Type of stakeholder: Horticulture private farm
Date of the interview: February 2020
Length of the interview: 1.5 hours
Methods of the interview: online call
Form of operation: family farm
Position of the respondent: Owner/administrator
Age group of the respondent: 25-34
Highest qualification of the respondent: Bachelor's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:
The owner acquired the farm 3 years ago, the land used to be a big orchard but with time it was divided and sold by pieces. Because it is 30 min away from Budapest, it is an interesting area for investment, and it is transforming into more of a residential area than agricultural. This family farm is a 5-hectare space with some riding horses, sheep, goats and 4 donkeys. The main activity of the farm is the orchard and its sub products. The income comes from the services the farm and the orchard provide such as activities of apple picking for people and groups, apple juice, direct sales of apples, and the renting of the area for social events.
He thinks that climate change is affecting the farm attracting more pests to the trees and it needs to be controlled with the application of more pesticides.
Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
All the activities of the farm are done by contractors hired according to season. There is a contractor for each activity: Erosion management, pruning, or fertilizer application. The everyday activities are done by the younger brother who has not completed formal agricultural studies but knows how to operate machinery and tools.
They do not conduct soil testing.
This farmer thinks that he has very high knowledge and the surrounding farmers are smaller scale and not formally educated; therefore, he does not see the need to cooperate with them or create networking.
This farm is just an investment for him, and he will run it as long as it is profitable. Because of its proximity to Budapest he expects to develop another business in it, either eventually removing the trees for building development on the space or to sell it. Farming is only a job, not a lifestyle.
He does not rely on other farmers for information.
Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
This respondent has a very basic idea about agroecology. He thinks that it is important to take care of the environment, but he is not using any sustainable practice at the farm. They grow grass between the rows of grapes and then incorporate/compost it in the soil.
He thinks that is important that the farmer neighbours see his business so they can get inspiration to start their own businesses. With the picking apples program, they have they create awareness in the population about local foods, specially kids can be more aware about food and nature.

Needs and ideas of the farmer for agroecology training:
The farmer gets information useful for the farm from Expos, especially for networking; Hungarian authorities' official sites and because he is young, he has access to technology. If there is any training it would be better in his opinion if it is online with materials to be available for when the farmer is available. He will only attend a training program if it is very relevant and flexible with time.

11.12. Interview 12

Type of stakeholder: Horticulture enterprise
Date of the interview: February 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: limited liability company
Position of the respondent: CEO (Chief Executive Officer)
Age group of the respondent: 25-34
Highest qualification of the respondent: Agribusiness and Rural Development Engineer MSc

Activity, sustainable farming practices, sustainability challenges of the farm:

The company has been the property of its five owners since 1991. The interviewed CEO applied for the position through a job advertisement and has been managing the farm since 2017.

The farm does tomato production on 3 hectares of plastic greenhouses. The polytunnels are heated by thermal water. They water the plants by drip irrigation, and the production is additionally enhanced by CO_2 fertilization. The farm applies biological macro applications ('useful insects') against harmful insects, and bumblebees for helping pollination. Biotechnical tools like pheromone traps and lamps are also installed for plant protection. The plant residues are used on the company's arable crop fields as green manure, while the used production quilts are sold.

The risk of climate change can be observed through the undesired temperature changes of production tools. The mildly cold winters allow more pests and insects to survive. The usage of inorganic fertilizers could be reduced or eliminated by increasing CO_2 fertilization, which is planned for the near future.

The company participates in a horizontal co-operation as being one of the three members of a Producer and Sales Organization.

There are 40 people employed on the farm on average, 30 of which are permanent workers. This makes the company one of the biggest employers in the surroundings of the settlement. The CEO's work is assisted by a farm manager and his deputy. People with physical disabilities (e.g. hearing impairment) are employed part time, currently 4 persons, supported by the Hungarian state. Annually, the company brings tomatoes and flowers to the village days and primary school sport events for donation and offers financial support for the local kindergarten ball.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The interviewee attributed a high-level of knowledge to procurement, logistics, sales, marketing, and communication, and high awareness of the role of agriculture as income generating activity, in eradicating poverty, and in the protection of the natural environment. She evaluated her knowledge as average-level in the fields of agri-environment; from a management aspect, finances and EU, national and regional/local regulations; and from socio-economic point of view the role of agriculture in the food supply, in supporting rural populations, in preserving rural traditions, and in tourism, recreation and education. According to the respondent, her knowledge is rather limited in relation to economic diversification.

The respondent gets information about new technologies from producer and sales organizations, from extension service providers, specialized websites and brochures. She informs herself about management and legislative novelties by subscribing to taxing publications and online law

archives. The interviewee follows opportunities for trainings and programmes via e-mail newsletters and websites.

Although the functions in the company are clear, the CEO has a direct connection to the workers, which can be considered as quite close due to the low fluctuation of colleagues. Daily contact with the company owners is required. The management decisions are made on an annual basis: the CEO makes the proposal, but the final decision is entitled to the owners. Sometimes, e.g. before holidays, the community gathers and celebrates together. Overall, the relationship with the community is good, but rather limited due to work-related issues.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent emphasized that carrying out a sustainable farming activity requires a qualified professional in agriculture. The task of a farm leader is management, leadership and treating people in an appropriate way. As an entrepreneur, financial management, legal issues, procurement, logistics, sales, marketing, knowledge of employment and community involvement are required skills. In the opinion of the interviewee, the existence of proper aptitude, organising skills and good timing is indispensable.

Needs and ideas of the farmer for agroecology training:

The interviewee has never heard about the term 'agroecology' before, but after the interview, the topic aroused her interest. As her working time is flexible, she would gladly participate in agroecology training, even on weekends, either on a weekly basis, or in intensive blocks. 1-2 days in a week would be the most preferable, but she would have no problem with spending 3-5 days in a row. She even would be happy to be educated on the farm. The training itself must be interactive, and more focused on the practical side of agroecology. In addition to the agri-environmental aspects of agroecology, the management competencies and community development, social participation issues should be also included in the training curriculum.

11.13. Interview 13

Type of stakeholder: Winery
Date of the interview: February 2020
Length of the interview: 1.5 hours
Methods of the interview: phone call
Position of the respondent: Owner/administrator
Age group of the respondent: 25-34
Highest qualification of the respondent:

Activity, sustainable farming practices, sustainability challenges of the farm:

The farm's main product is wine on a 4-hectare farm. It is a well-established business. The farm plot was purchased. It had 28 previous owners who applied conventional practices until the current owner acquired it 16 years ago and turned it into a certified organic farm with more diversity. Now there are cherry, olive, apricot trees, many pollinators, 3000 bird nests, and in general more biological diversity. Farming is a full-time enterprise and a lifestyle. The family is partially involved in the work, sisters and their kids visit, and he expects to pass the farm on to the younger family members when he retires.

Climate change has a big impact in the farm now, including extreme summer weather and aggressive rain. Winter is milder, and low temperatures help to control some bad/invasive insects but now it is difficult. The time when the grapes are ready for harvesting has changed which influences the quality of the wine. They have a 300-year-old cellar that now for the first time needs A/C because of the fluctuation of the temperature and hot summers.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

This farm does not receive any support through programs from the government. The farmer mentions to have high knowledge regarding agri-environment issues such as soil, water, and biodiversity as well as in the management area, specifically on sales, marketing, and communication. However, the knowledge about procurement and logistics is average.

The farmer gathers information mostly from internet and social networks. Regarding the planning at the farm, the activities are almost always the same, he just checks when and how will things happen exactly. There are people assigned to specific areas of work and they know what to do and they report to him.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

As the agricultural practices, they turn back to the soil all the residues from the farming like pruning, harvesting, and wine processing. They make their own compost. They use organic sprays with sulphur and copper base to not affect the pollinators.

Follow organic certification guidelines.

They do not share equipment with other farmers because of their organic condition but they do have a good relationship with neighbour farmers, they talk to each other, share knowledge, discuss varieties, challenges. They help the closer neighbours which are small farmers mostly elder (70 years old and above).

They participate in a bigger community of wine producers under the Terra Hungarica marketing brand, but do not belong to a formal association.

The farmer believes the social aspect of farming is important because he rates as high the knowledge about the role of farming in providing food, keeping alive rural communities, eradicating poverty, social employment, preserving rural traditions and maintaining biodiversity.

Even though he was practicing many principles of agroecology, is the first time the farmer has heard of the terminology formally.

Needs and ideas of the farmer for agroecology training:

The farmer mentioned different topics that he will be interested in obtaining training such as gas exchange in plants (photosynthesis, evaporation), nitrogen sequestration, air pollution in farming, environment, microbiology of the soil.

Economic topics are also needed like finance and fundraising, economic diversification, agriculture as an income generating activity, tourism, recreation and education, The role of cooperation in agriculture, among others.

Policy and law is a topic that not many farmers are aware of, therefore, it is important to receive training about EU market regulations and competitors, national and local regulations, what are the strategies for agriculture and were the wine making, and the organic farms are in the plans.

The farmer is interested in agroecology and is willing to attend agroecological training in a non-continuous way and any online material is also appreciated.

11.14. Interview 14

Type of stakeholder: Winery
Date of the interview: February 2020
Length of the interview: 1.5 hours
Methods of the interview: personal interview
Position of the respondent: Owner's son/worker
Age group of the respondent: below 25 years
Highest qualification of the respondent: Agricultural engineer student

Activity, sustainable farming practices, sustainability challenges of the farm:
The farm is run by the family full time, the father who is horticulture engineer (35-54 y/o) oversees the administrative tasks and the winery business, the mother is a plant protection engineer and coordinates field work. The sons help with labour, marketing and sales. The 7-hectare farm has been in the family for 25 years. The father of the current owner acquired the land after the communist time as a payment for his work as a farmer. Originally the land was not cultivated, it was full of weeds, the family did not have tools to start, it took 3 years to restore the soil and they planted the grapes. The first year they also produced poppy seeds because of the high demand and good price. Since then they have produced only wine and respond to high standards of production.
The residues of the farm are composted back into the soil.
The effects of climate change are a big challenge, with unpredictable weather, and earlier harvests leading to lower quality and less sugar content in the grapes. They need to experiment new ways to work and that can be risky. Less rain is making them consider an irrigation system which will require investment. They are also monitoring the potential of new bacteria and fungi.
During the year the family work is enough but in high season they hire 5 extra people to harvest the grapes by hand.
Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
The farm obtained subsidies by the government to acquire tractors and other machinery needed.
The grape production is conventional but the wine making applies sustainable practices without any certification.
They use external labs 4 times per year to do soil testing to add fertilizers. The soil preparation consists of minimum tillage 6 or 7 times before harvesting and mulching.
They rely completely on rain, with no additional irrigation system.
They must deal with deer, birds, rodents, and insects that affect the production. To get the deer away they make a mixture of pig fat. They play loud music on the speakers to keep birds away and insecticides for insects.
Pest control is done by visual inspection of the plants and they decide what to spray. There is no biological pest control.

According to management skills they have high knowledge in Finance, fundraising, EU, national and local regulations and Communication and an average knowledge in Economic diversification and Procurement, logistics.

The information they obtain is from the Chambers mostly, subsidies information from the tax office/official sites and exhibitions of the providers of supplies.

The role of the manager is to keep the synergy between the farm and the winery, keep the resources up to date and ready, keep track of the farm and improve.

The planning is day by day according to needs, the whole season is basically the same each year, and activities could vary overall by 2 weeks mostly.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

For this farmer, the farm is a lifestyle for the whole family.

They have an informal relationship with other farmers and neighbours, they talk about prices, challenges among other topics. Formal association (of wineries) does not work. They belong to the Agricultural Chamber, Plan Engineering Chamber and NAK (he did not know the English name of it).

In the social aspect, the farmer considers average and limited the knowledge about the role of agriculture, they know it has a role of income generation, but they do not include the social aspect of agriculture and farming.

They do not know the term agroecology. They are interested in the topic and are willing to attend personal trainings not online, host lectures and visits but everything depends on the farming season.

Needs and ideas of the farmer for agroecology training:

The farmer expressed the need of training in innovative ways to process their products with the new characteristics that the raw products are developing. Sales and marketing training will be also useful in this farm.

11.15. Interview 15

Type of stakeholder: Animal keeping private farm
Date of the interview: February 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: individual farm
Position of the respondent: farm leader
Age group of the respondent: 25-34
Highest qualification of the respondent: Regional economics MSc

Activity, sustainable farming practices, sustainability challenges of the farm:
The interviewed farmer's family has been actively farming for almost 40 years, he has been involved in farm work since he was 10 years old. The farmer uses 165 hectares of pasture area for keeping 120 ewes (mother sheep) and 12 cattle cows. The land used to be a military base, but since 2015, within the framework of a state program for utilizing abandoned areas the interviewee has been renting it from the Kiskunság National Park Directorate. The animals are primarily kept for being sold as live animals for meat production purposes. He selects the species based on their meat production potential (growth rate, feed utilization, tenacity etc). The by-product of the sheep-keeping is wool which is regularly sheared and marketed. The feeding regimen is nearly 100% grazing, supplemented by silo corn bought from a close cannery, and alfalfa hay in the winter. They use no supplements or additives in the feeding and no antibiotics in the medication of the animals. The aforementioned herds are kept together with the animals of the farmer's father, outdoors in the summer and in a barn (owned by the family) in the cold season. The staff working the land on the interviewee's farm are also employed on his father's farm. Manure accumulating in the barn during the wintertime is later applied to crop growing areas.
Taking the continuous inspection by the national park and the food-chain authority into consideration, every compulsory regulation is strictly followed by the farmer.
The threat of climate change is perceptible due to the drying-up and desertification of the land, and a lack of cold and snowy winter.
For the interviewee, farming is a tradition, a hobby and an income supplement at the same time. He is planning to take over his father's farm (an area of 1200 hectares, 200 ha of which is arable land, the rest is pasture).
The interviewed farmer does not take part in any particular cooperation, but the local community of the farmers is like a good neighbourhood: there is no competition between them, the information flow is continuous, they share their experience and learn from each other. The interviewee's farm also offers meat products and preparations for local events.
In the near future he intends to increase the produced value by processing cheese and cottage cheese and building touristic facilities.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The interviewed farmer does not take part in any particular co-operation, but the local community of the farmers is like a good neighbourhood: there is no competition between them, the information flow is continuous, they share their experience and learn from each other. The interviewee's farm also offers meat raw material and preparation for local events.

In the near future he intends to increase the produced value by processing cheese and cottage cheese and building touristic facilities.

The interviewee assesses his knowledge as advanced in the fields of natural resources (soil, water, biodiversity etc.), and considers his knowledge to be average in terms of management (finance, logistics, marketing etc.), while, according to him, his knowledge is above average related to social and rural development aspects.

He gets the most important information on farming and technologies from advisors, village consultants, and state institutions (e.g. State Treasury, Food Chain Safety Office, Chamber of Agriculture, National Park etc.) He makes decisions in strong collaboration with his father. The longest time frame they plan their activities for is the seven years EU programming period in which the agricultural policy measures are defined. Sometimes administrative and market pressure is also a motive behind their decisions.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In the interviewee's opinion it is of essential importance to have an agricultural qualification, but it is not enough: continuous self-improvement and the use of advisory services is needed as well, especially in relation to the crop species and animals which the farm deals with. Nowadays it is also inevitable to have knowledge of diversification and value addition (tourism, for instance). It is very important to delve into management issues, because success is dependent on good management (although being taught in the agricultural vocational training, and information is also provided by the advisors and consultants). In the interviewee's opinion, it would be favourable for people to know more about the rationale behind rural development, and the role of the agri-food sector in supporting rural livelihoods. From a skills point of view, the crucial characteristics of a farm leader is continuous development, good leadership, stress handling, communication, and a well-built network of connections. Co-operation is needed even when someone is not a team-player.

Needs and ideas of the farmer for agroecology training:

During his studies, the interviewee was introduced to some elements of agroecology, but had never heard about the comprehensive concept before. It is important to gain knowledge all the time, but it would be an incentive somehow to benefit from agroecology training. He would not really feel like sitting in an in-person lecture, but rather that YouTube or an online lesson would be ideal for people in his age group. If it would be provenly advantageous, he would even participate in a 3-5 days training at an external location, although animal keepers have work to do every day, so it is difficult to crowd out several days in the schedule. According to him, receiving training on his own farm would already be expert advisory service. Instead, he would prefer that best practices from existing farms be presented.

11.16. Interview 16

Type of stakeholder: Animal keeping private farm
Date of the interview: February 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: licensed traditional small-scale producer/private farm
Position of the respondent: producer
Age group of the respondent: 25-34
Highest qualification of the respondent: high school

Activity, sustainable farming practices, sustainability challenges of the farm:

The farmer has a flock of 330 egg-laying birds. He started the operation last year. He started farming at another site 5 years ago, cultivating sweet potato. But he ceased that and started rearing poultry for meat, and last year he started with egg production. He rents the site where he has his flock now, he built up a half-open plastic tunnel. He uses a deep litter system, but now has put into usage a fencing system for letting out the birds in more of a free range system, but because of the actual regulation due to the bird-flu he cannot let them outside. He carries out farming on his own, his family is not involved in the working, sometimes some of his friends help him out with bigger works but not within the daily routine. He keeps the Lowman Classic Brown egg-laying hybrid race, he chose that based on internet sources and advice from organic, free-range poultry keepers. He sells the eggs partly to another egg producer and directly to consumers personally and via farmers market. The challenges in his case mostly concern with marketing of the eggs, and to be viable economically, also find sources to invest in development.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

He mostly evaluated his knowledge of agri-environmental themes as average except for water management, as rather limited. He considers his knowledge of procurement, logistics, finances and diversification as average while limited in sales, marketing, and communication and EU, national and regional/local regulations. He had various opinions about the social aspects of agriculture: he evaluated his knowledge as average regarding the role of agriculture in food supply, also average and high in keeping rural population, and as an income generating activity because that is what he is doing in his everyday life, and farming. Ha was less knowledgeable in the other social aspects: limited in eradicating poverty and supporting disadvantaged groups and average concerning preservation of rural traditions, and the role in tourism, recreation and education.

He mostly gets information from internet sources; he prefers to focus on one specific topic and then read extended texts on the subject. He uses professional literature guides, books in the most important fields, like e.g. animal nutrition. He also likes online videos, but rather for practicalities, like DIY (do-it-yourself) solutions. He also consults a few farmers who do similar activities.

He has limited knowledge and experiences in cooperation with other farmers. He does not participate in any initiatives linked to his profession. He has some relation to local people and local farmers but not very close-knit relationships. He has other ways of connecting to community life elsewhere.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The interviewee thinks that knowledge about animal nutrition and feeding (e.g. GMO soy) is the most crucial in laying hen keeping. As for the field of management, planning with financial

resources, and work planning are the most important skills according to the interviewee. He does not have any partners in his farming operation and does not really have experiences in team working.

Needs and ideas of the farmer for agroecology training:

The interviewee has once heard about the term 'agroecology' before, but it did not catch his attention particularly. Keeping animals requires daily presence, and as he does not have any hired employees, he would not be able to stay away from the farm for consecutive days. He prefers online resources, but the most adequate way for him would be visiting other farms or receiving an advisor on his farm site. For him the most interesting would be to learn about innovative practices that are adaptable to what he is doing.

11.17. Interview 17

Type of stakeholder: Mixed farm enterprise
Date of the interview: March 2020
Length of the interview: 1.5 hours
Methods of the interview: phone call
Form of operation: private company (group of companies)
Position of the respondent: managing director
Age group of the respondent: 35-54
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

The company has 6,000 hectares of arable land and 1,500 hectares of pasture, 2,000 head of dairy cattle, 1,200 head of sows (altogether app. 20,000 pigs) and 120,000 broiler chicken. Furthermore, it has fruit orchards (100 ha) and deals with seed production on one fifth of its area. Two thirds of the fruits are processed on the farm and sold as directly pressed juices. The seeds are partly produced for their own use. The company is self-sufficient in producing forage. Moreover 20-30% of the forage crops are sold. The company used to be a state farm in County Hajdú-Bihar, that was transformed into a public limited company (Rt in Hungarian) in 1993 and later into a private company (Zrt in Hungarian). 80% is owned by private persons and 20% is owned by the state. The number of permanent employees is 250 per annum, but seasonal workers (mainly from the local Roma community) are hired as well. The orchards occasionally employ about 200 workers during specific portions of the season.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

It is important for the company that the production area remains well-cultivable and fertile for future generations. Great quantities of livestock manure and fertilizers are used. Soil loosening and irrigation is done carefully. As a result, the quality of soil is mainly remaining the same. The company has been benefitting from the agri-environmental scheme since the introduction of this support measure. (At the beginning almost 100% of the area was covered by the scheme, but today it amounts to one third of the cultivated land.) There is no certified organic farming in the land managed by the company. The management thought about it, but they do not have a firm concept. The soil condition is regularly checked, every 5 years as it is obligatory, but also beyond that. Experts' reports on soil condition are utilized, for example, to plan fertilizer applications. For sampling and laboratory analysis, external services are used. Crop rotation is self-evident, secondary crops are mainly used to produce fermented feeds for their own livestock. Crop residues serve mostly as bedding material. All the straw (different grains) and 20-30% of the corn cob is harvested, the larger portion of the latter is used as organic fertilizer. (Disking 2 times, stem-crushing and ploughing occurs.) There is a wide spectrum of pests the company needs to deal with. The greatest economic damage is done by corn beetle. Chemical products are used against them. (Main pests: Orchard – codling moth; legumes – palliates species, grains – Oulema species.) As a result of the use of organic fertilizers weeds cause severe problems. Physical and chemical weed control is used, but glyphosates are banned. Biological pest control is used only for forecasting purposes (swarming is monitored). As regards the livestock the same species have been used for years (e.g. for the purpose of disease prevention). (Swine – KA-HYB boars; dairy cattle – Holstein-Friesian cattle; species of boiler hybrid chicken preferred by the slaughterhouses.) Pigs and chicken are fed by fodder and mixed feed mostly produced by the company itself. The exception is the soybean meal, 15-20% of which is imported extruded soybean meal. Purchased premix is used, but antibiotics and hormones are not fed to the animals. Young heifers spend some time on pastures, but the company has mainly intensive housing for the livestock. Straw is used for bedding, and then the livestock manure is used as organic

fertilizer on the land owned by the company. (They do not have biogas plants, as those are considered risky.) With regard to animal health and welfare, the company follows regulations. When building new capacities or premises the roofing of the housing is designed to follow the patterns of the landscape (especially Natura 2000 areas). Otherwise regulatory requirements (e.g. height) are met. It would be nice to build the housing of wood, but it is too costly and besides that the company has already modernized the buildings. As far as severe perceivable impacts of climate change, the interviewee cites the prevalence of the corn beetle and a lack of enough precipitation as major issues. So, more adequate cultivation practices need to be used, and the irrigation infrastructure needs to be further developed. (Irrigation is possible as the Eastern main canal is in the vicinity. 1,200 hectares are already irrigated, and the company intends to irrigate even more. Its experience in irrigation has been deepened over 30 years.) It is typical for the company to exchange experiences, to think together, to expand each other's knowledge as they participate in the events organized by the Hungarian Chamber of Agriculture and they organize events themselves. The company has its own conference centre to host 5-10 professional events per year with a capacity of 100-150 people.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

For the company sustainability is an important aspect. Their aim is to be self-sufficient when it comes to the production of forage.

Their knowledge is rated high in the following areas: Soil: soil condition (structure, cultivability, air, water management, nutrient uptake, biological activity) and conservation; Water: preservation and protection of surface- and groundwater resources and rainwater utilization; Air: gas exchange in plants (photosynthesis, evaporation), nitrogen sequestration, air pollution in farming but limited in the area of Biodiversity: diversity and protection of the biosphere, plant and animal specimens, populations and communities. As for biodiversity, in their opinion it is almost impossible to contribute to it as monocultures should be maintained to remain efficient and competitive.

Their knowledge is rated high in the following areas: Finance, fundraising; Economic diversification; Procurement, logistics EU, national and local regulations, and Communication. The exception is the area of sales and marketing. (In Hungary there is a lot to learn e.g. regarding contractual discipline.)

Important issues in relation to the social aspects of agriculture: provide more information on food production for children; improve traceability and designation of origin; become more independent from fossil-based energy, use less fertilizers, become less dependent from gasoil. Their knowledge is rated high in the following areas: the role of agriculture in the supply of food, raw materials and energy; agriculture as an income generating and supplementing activity; the role of agriculture in preserving rural traditions and the role of cooperation in agriculture. It is rated average in the following areas: the role of agriculture in keeping the rural population and the role of agriculture in protecting the natural environment and landscapes. And they think to have limited knowledge regarding the role of agriculture: in eradicating poverty; in the social employment of disadvantaged people, therapy etc. and in tourism, recreation, and education.

They get information mainly from internet sources and at national fairs and exhibitions and conferences, furthermore from the newsletters of the Hungarian Chamber of Agriculture. A problem lies with the huge quantity of information and the difficulties in weighing them.

The role of the farm manager is diverse, i.e. to provide employment, maintain rural jobs, ensure income security, hire new workers instead of those retiring or leaving the country or avoid debt. There are different management models. In the company it used to be rather centralized, but it has already loosened somewhat. The managers communicate online a lot, but the workers get

the necessary instructions as first thing in the morning each day. Decisions are made sometimes jointly, but in several cases, the final decision is made by the CEO. The company corporate governance system is used to support decision making.

As for feeling part of the community, the situation is unique as the settlement where the company is located has actually co-developed with the company over the decades. And even nowadays the company plays an important role in the life of the settlement. They have some initiatives for youth, retired people or for the conservationists etc.

Needs and ideas of the farmer for agroecology training:

The interviewee has heard of the concept of agroecology. He is not that interested in the topic. He and his colleagues would participate in trainings only if it is not general, but very specific (related to the activities of their company/ e.g. on permaculture and if it is practice oriented). The training should be short and include field visits. Before the event it would be useful to share some videos on the farm to be visited, on technologies to get acquainted with.

Annex 2. National Consultation with Farmers in Romania: interview transcripts

Agri-Cultura-Natura Transylvaniae Association
2020

12.1. Interview 1

Type of stakeholder: Mixed private farm
ate of the interview: April 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: higher education

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent is working as a milk producer farmer, owning 37 hectares of land and 32 Romanian red-spotted cattle. He has been working full-time since 2008 as corporate entity; however, he works on a farm since his childhood. The farmer, his wife and sons are working full-time on the farm; they have no employees. Sometimes he hires wage workers. A little part of his lands was inherited, the rest he purchased. Land means more to him than just an asset for the farm. At present, besides the necessary potatoes and vegetables for the family, he produces only roughage. He likes natural grasslands the most and considers them both beautiful and valuable. He produced tare, oat and maize earlier, but because of the many damages caused by wild animals he had to give up on producing these crops. Bears and wild boars caused the biggest problems. He does not use any chemicals and chemical fertilizer for plant protection. He sells milk, some of it is bought directly by consumers, and most of it is sold for acquirers, moreover, he is satisfied with the sales. Due to the fact that he has registered, valuable livestock, he is able to sell the stirks for a good price. The acquirer is also satisfied with the quality of the milk. He improved the soil quality by cleaning, using organic fertilizer, and chalk powder. Because he has a relatively large number of cattle kept in stable, a significant amount of manure accumulates. Feeding is fairly varied; the animals get hay, haylage, marc from brewery, a mixture of maize and wheat and a few concentrates.

He is cooperating with the other farmers, and even the animals were bought together with them. They exchange their experiences; they arrange common grazing and the purchase of input materials.

Climate change is a real phenomenon; in his opinion, the winters are becoming milder, and the precipitation level is much lower.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The capacity of the soil to be cultivated is very important to him. He would employ an expert to be his farm manager.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

He considers building trust between other farmers to be very important.

Needs and ideas of the farmer for agroecology training:

He would be very interested in creating a small biogas facility, where he could ferment liquid manure and generate electricity. He would also like to make cheese, he had also participated in training, but he does not want to deal with the marketing part. He would be interested in a shared cheese maturing service.

Vocational trainings should not take longer than a few weeks, because it becomes boring after a few months.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Self-sufficient family farming	Pasturage Traditional knowledge	Good relations with other farmers
Weaknesses	Intensive milk production, uses concentrates	little theoretical knowledge	Marketing
Desired improvements			Producing biogas
Proposed improvements		New species in crop production	Producing biogas Marketing

12.2. Interview 2

Type of stakeholder: Mixed private farm
Date of the interview: March 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: technical college

Activity, sustainable farming practices, sustainability challenges of the farm:
The respondent began to work in agriculture in 2015, when he moved from the city to his grandparents' village. He graduated high school in agricultural studies. At present, he is working part-time as a farmer, engaged in crop production in particular. He also keeps animals: 20 goats and sheep altogether. He is very attached emotionally to this profession. His family members also take part in the work; the children love agriculture and livestock farming as well. Besides producing fodder for animals, food production is getting more and more important, both for the family and for sale. Some of the land was inherited, but the bigger part was purchased. From the total territory of cultivated land of 20 hectares, one half is used as arable, the other half of it is grassland. Maintaining the soil's quality is most important; therefore, he does not give up on raising animals, which produces the organic fertilizer. He applies a crop rotation system that includes leguminous plants as well. As double cropping, he plants radish and phacelia, which are not harvested, but used as mulch. The fertilizer is composted, which enriches the soil of the root crops. At this moment, he is converting into organic agriculture, from this year on, he abandons chemical fertilizers and other chemicals, although he hardly used them before. His products are of higher quality compared to the ones demanded by the acquirers; therefore, he sells his products unconventionally, directly to the consumers. He applies a free-range system with a paddock; nevertheless, the cattle are kept on the farm also during summer. All the fodder is produced by himself; the animals get hay and grain. The straw of the grains is used as bedding for the cattle, and in the end, he spreads it together with the farmyard manure on the lands. His lands were in a pretty devastated condition at the time of purchase, but due to the applied technology, their quality has noticeably improved. Such technologies are for example, no-till cultivation, using organic fertilizer, compost, and mycorrhiza.
Climate change is not significant; there were atypical years every once in a while.
Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:
The respondent considers that his knowledge about agri-environment (soil, water, air, biodiversity) and management is limited, and he would prefer to train himself. Regarding the questions related to management, economic diversification and marketing are considered to be important by him. He thinks that among the social effects of the agriculture, tourism, to maintain traditions, environmental and landscape protection would be very interesting to him.
He collects professional information from websites, but he also experiments many things. At this time, he makes a direct-sowing machine, which will enable to spread the compost simultaneously with sowing.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

For the respondent, environmental-friendly agricultural methods are very significant, considering soil revitalizing to be the most important from all of them.

Related to this, he also initiated to get the organic certification for the lands.

Needs and ideas of the farmer for agroecology training:

The farmer is open to undertake agroecological training; a few days (3-5) a year would suit him.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Commitment social sensibility self-sufficient	Using agroecological technologies like no-till, composting, organic fertilizers	
Weaknesses			
Desired improvements		Soil, water, air and biodiversity	Permaculture
Proposed improvements	Certified organic farming	Soil, water, air and biodiversity	Marketing management

12.3. Interview 3

Type of stakeholder: Mixed private farm
Date of the interview: April 2020
Length of the interview: 78 minutes
Methods of the interview: personal interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 55-64
Highest qualification of the respondent:

Activity, sustainable farming practices, sustainability challenges of the farm:
The respondent is working as a farmer, owning 30 hectares of land and 42 Austrian cattle. The owner, his wife, and sons are working full-time on the farm, and they have no employees. Farming was always a secondary job for him, but in 2008 – together with five other farmer – they started to farm full-time when they bought 10 Austrian heifers. On the lands – half of which are own property, the other half is leased – he produces fodder in particular. Milk as their primary product is produced for the market; however, they also sell stirks as breeding animals. They also have cows dedicated to raise bulls. Milk sales are done in two ways: he is operating a self-service milk dispenser in the village, and he sells the rest to acquirers. He also makes matured cheese occasionally, both for sale and for his own consumption. The milk is top quality. Arable production is increasingly declining because of the damages caused by game in particular. They grow potatoes, vegetables, and fruits only for their own consumption. He makes a lot of effort to clear up stones from the arable land. He bought and regenerated a lot of deteriorated lands. He uses chalk powder for soil improvement. He regularly (every two-three years) adds liquid manure to the land, because according to the results of the lab tests, the lands have poor productive capacity. Besides natural turf, he is also growing alfalfa and sown grass; he applies the crop rotation system, alternating oat, tare, and potato. The bedding straw for the stirks is also produced on the farm. He also applied double-cropping, sowing vetches after the early-mowed rye. He does not apply for any agri-environmental payment, because he does not dare to take the risk of the multi-annual commitments. The whole livestock is registered from the beginnings. The animals roam free; the stirks spend the summer on alpine pastures. The chosen breed, Austrian Fleckvieh proved to meet the farmer's expectations. Feeding is fairly varied, the animals get hay, haylage, marc from brewery, energy fodder and a few concentrates.
He does not perceive any impact of climate change on farming.
He is cooperating with other farmers; they exchange their experiences; they arrange common grazing and the obtaining of input materials.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
According to him, a good farmer has diversified knowledge; he considers it important to have knowledge about the animals' physiological, reproduction and feeding characteristics. Regarding cultivation, the nutritional value and plant reproduction are not compatible, in his opinion. Good fodder has to be mown at early-flowering, however, from the aspect of environment protection, mowing would be optimal later in the summer.
In his opinion, economic diversification is not feasible for a farmer. He offers baling services for other farmers of the village, but it is hard to synchronize, as all of them would like to produce hay in the same period of time.

Needs and ideas of the farmer for agroecology training:

He would like to improve his cheese-making skills.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Good marketing self-sufficient Agricultural services for other farmers	Using crop-rotation Pasturage	
Weaknesses	Intensive milk production, uses of concentrates	Little theoretical knowledge	
Desired improvements			Agritourism Milk processing
Proposed improvements		Soil	Milk processing

12.4. Interview 4

Type of stakeholder: Mixed private farm
Date of the interview: April 2020
Length of the interview: 83 minutes
Methods of the interview: personal interview
Form of operation: Authorised private individual
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: after secondary level vocational training school

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent is working as a certified ecological farmer, owning 53 hectares land and 47 dairy cattle. He is working full-time, his wife and sons part-time and he also has a permanent employee. It is important to highlight that the farmer is very dedicated to organic agriculture; he was the first farmer applying organic farming methods in the region. His ancestors also worked as farmers. On his (mainly leased) fields he produces fodder for his animals in particular. Bread wheat, spelt, rye is also produced, most of which is sold. Most of the cereals are sold as seed; however, he has a small stone mill. Thus, he also sells flour. Additionally, his vegetable and fruit garden's yield are almost enough for all of their needs. Regarding farm cultivation, he chooses the sequence of crops carefully. He sows alfalfa, mixed feed containing pulse crops and grain crops as well. He also plans to sow mangold and green manure. He takes into consideration the cultivated plant's impact on the soil structure and in the case of seed mixtures, the vigour of the components too. He also applies double cropping, after the winter cereal, he sows a mix of white clover and perennial ryegrass. After harvesting, the mix will be used as a meadow for two years. The quality of roughage is very important to him, because as an organic farmer, he does not use feed supplements (marc from brewery, sugar beet slices, nutrient concentrates, etc.). With the recently bought sowing machine, he can sow directly into the stubble; thus, he would like to begin producing crops without ploughing. For getting a higher quality roughage, he would like to introduce drying hay at home. He uses different techniques for a healthy soil condition and for preserving the productive capacity with great success: using organic fertiliser, bedding, irrigation, zero tillage, using green manure. The livestock contains dairy cattle having two breeds: Swiss Simmental and Tyrolean Grey. The respondent uses the method of insemination for having pedigree livestock and for forming the bloodline. He produces high-quality organic milk. He can sell it for a premium price to a small milk factory in the village. He also plans to process the milk into cheese and butter. The building for the cheese workshop is already there, and he is just about to buy the equipment. He does not slaughter the animals; he sells them to slaughterhouses or to farms to grow them further. The animals spend most of the year on pastures, but they can range free even during winter. The stable has a paddock, which is preferred by the animals as well.

His confession: farming is more than a lifestyle; it is an art.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent considers that his knowledge about agri-environment (soil, water, air, biodiversity) and management is limited, and he would like to learn about these topics.

He considers marketing as a key topic. Under local circumstances, the farmers' unions and direct marketing are two efficient tools to increase incomes. He is a founding member of a local agricultural cooperative, where the members are farmers of similar profile. He takes part in another

initiative which aims to improve the genetic stock of the village livestock with the support of the common's management organisation.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

In his opinion, every aspect of agroecology is very important.

Needs and ideas of the farmer for agroecology training:

He proposes a training which contains two main sections the first being a prerequisite of the second, for one year. He thinks that the farmers' community (esp. the young adults) are open-minded and receptive towards agroecological principles. Training courses could be two-three days long, involving theoretical and practical modules. The training should not stop at a certain point because introducing new methods, and technologies provoke a lot of questions and generate important experiences to share in a later stage.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Certified organic farming for a long time socially sensitive self-sufficient	Uses many agroecological methods Pasturage	Good marketing Agricultural cooperatives
Weaknesses			
Desired improvements	Permaculture	Soil, water, air, and biodiversity	Milk-processing
Proposed improvements	Permaculture		Milk-processing

12.5. Interview 5

Type of stakeholder: Mixed private farm
Date of the interview: April 2020
Length of the interview: 70 minutes
Methods of the interview: personal interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: higher education

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent studied Forestry and Environment Protection at a technical school; he works full-time as a farmer. His activity covers milk production and the production of the necessary fodder for the milking cows. He is an individual farmer for 11 years however, he was raised in a farming family, thus being very familiar with farming since his childhood. His family members do the same job. At present, he has 28 cattle together with the young ones, and he does not want to have more. He intends to increase productivity by improving the genetics of the herd. Sales is a unique feature of his farm: he delivers fresh milk to 170 households. Besides the expected top quality, one main particularity of this form of selling is the production of the same amount of milk throughout the year. To be able to realize this, he has lambing approx. equally in each month. In the beginning, he delivered milk to 30 families only, but this number has been increased continuously. He needs to work and spend more, but this leads to more income. From the unsold milk, he makes different kinds of cheeses for the family.

The milking cows are kept in tied stalls, and the young ones range free. During the summer, they are out, and only the milking is done in the stable. Regarding the breeds, he prefers multipurpose ones. Except for the energy fodder, he is able to produce all kinds of fodder, and he produces hay and haylage. The animals also get brewery yeast flakes, but no other by-products or concentrates.

The cultivated farmland is 25 hectares altogether, sown with alfalfa or kept as natural grasslands.

As he does not use any chemical fertilizer, nor pesticides, he also initiated to get the organic agriculture certification for the lands. Due to the use of farmyard manure, he can mow two or three times a year. At the time of taking over the lands were deteriorated, but he cut the bushes out and improved the lands. As a result of this work, he makes a rich hay yield, and he can sell some of the surplus.

The production is mechanized, he also provides hay baling and wrapping services to other farmers as well.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The respondent does not consider agri-environmental and social-related knowledge to be important, but management is important to him, however he does not have time and energy to improve his knowledge.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

He is not interested in agroecology. He believes that the farmers from the region will be able to deal with such knowledge only when they do not have to struggle for their everyday survival. The farmers do not manage their own incomes well; they are unorganized and do not have long term visions. He is also pessimist regarding the trainability of the farmers; he considers them to be conservative-minded.

Needs and ideas of the farmer for agroecology training:

When questions are raised, he is looking for answers on information events for farmers and online platforms, but also from fellow farmers. He does not want to participate in trainings.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Good marketing Self-sufficient	Traditional knowledge Pasturage	Professional technologies
Weaknesses	Pessimism	Little theoretical knowledge	
Desired improvements			Management
Proposed improvements	Certified organic farming	New species in crop production	Finance Strategy Producing of biogas

12.6. Interview 6

Type of stakeholder: Arable crop private farm
Date of the interview: April 2020
Length of the interview: 120 minutes
Methods of the interview: telephone interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 55-64
Highest qualification of the respondent: technical college (secondary school) plus a 6-month training on arable farming provided by the County Agriculture Agency

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee farms and has always been farming as a secondary activity besides being employed on a working place. He cultivates 25 ha of land of which 20% was inheritance the rest he bought or rents. He grows wheat, barley, triticale, potatoes, lucerne and semi natural grass to make hay. He has a personal connectedness to farming. The production covers the family needs and about 70% is for sale. He does not have problems with producing the required quality however his buyers are mainly long-term relations from other parts of Romania plus some farmers from the area.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

He has a very open attitude towards new ideas which can improve his farming activities. He does not distinguish between the different topics listed in the interview questions.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

He is very much open for agroecology even if he did not hear about it before. he does not have a disciplined categorization of the different topics.

Needs and ideas of the farmer for agroecology training:

He would be open for any topic to learn. Also, ready to provide space for trainings either on his own farm or in the village Commons' buildings and lands.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Very open minded Self-sufficient Local opinion leader	Traditional knowledge Pasturage	Professional technologies
Weaknesses	Little differentiation between related topics	Little theoretical knowledge	
Desired improvements	Learning about any practical aspect of farming		Management
Proposed improvements	Deepening the knowledge by using enthusiasm and leading capabilities		Strategic thinking

12.7. Interview 7

Type of stakeholder: Mixed private farm
Date of the interview: March 2020
Length of the interview: 60 minutes
Methods of the interview: personal interview
Form of operation: Authorized private individual
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: technical college

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent is a farmer for 17 years, and he has been working like an authorized private individual for 15 years. His farming is a half-time practice but is an important financial income for the family. He was born in a farmer family, and he feels emotionally attached to his farm, he thinks that without this emotional involvement, he could not do this job. The members of his family are also involved in farming activities. He produces arable crops and keeps cattle of the Simmenthal and Aberdeen Angus stocks. On the land he cultivates feed plants as well as 1.5 hectares of potato yearly for sale. He plants the crops applying the crop rotation systems, where the potato is the first culture, fertilized with farmyard manure, the following culture being the wheat, barley, which is followed by leguminous plants like alfalfa or tare. The total cultivated area is 14 hectares, which includes arable and meadows, however communal pastures are also used by farmers in the summertime. The respondent leases more than half of the area; the remaining part of the land is his own property. The farmland condition is improved remarkably since he started the agricultural work due to the use of the farmyard manure. The potato is protected with chemicals against the pests – such as the Colorado beetle. The respondent does not employ day laborers, because the farm is equipped with tractor and machines, and most of the work can be done with the help of the family members. He only needs occasional help for potato harvesting. He and his friends often help each other. The animal stock contains 26 cattle; the farmer sells milk and live animals to merchants. He can easily meet his own and the market's expectations regarding the quality of the product. With the exception of the milking cows, which are kept in tied stalls two months before lambing, all animals range free, and they spend the whole summer on the pastures. All fodder is produced by the farm; the animals eat 70% hay, 20% silage, and 10% grain. There are no concentrates, premixes, nutritional supplements, or additives used on this farm. The straw of the grain is used as bedding for the cattle. In the end, he spreads the manure on the lands.

The respondent feels the effects of climate change, he said that the spring is coming earlier, and the summer months are drier, and therefore the spring sowings must be finished earlier, otherwise, the plants do not get enough rain.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The respondent considers that his knowledge about agri-environment (soil, water, air, biodiversity) and management is limited, but he does not intend to acquire any more knowledge on these topics. As interesting topics concerning civil societies, he mentions the role of agriculture in tourism, recreation and education, and the role of agriculture in protecting the natural environment and landscapes. He collects professional information from colleagues, from the web, from seed suppliers, and on informational meetings organized by the local authority.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent considered to be important to ensure sustainable farming practices and to protect the surrounding ecosystems. The term "agroecology" was unknown for him, but he became interested in it. He does not apply for any agri-environmental management support, but it is very important to him to be nature-friendly. In his opinion, for the organization of agricultural progress, one needs to be flexible and well informed.

Needs and ideas of the farmer for agroecology training:

The respondent considered it conceivable to participate in an agroecological training, although he could only have one day off a week, since he has to stay at home to feed the animals. He does not prefer to receive training on his own farm, but he would be open to the possibility of organizing trainings on his farm. He thinks that the best solutions would be one-day trainings, organized monthly or every two months.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	commitment social sensibility self-sufficient	much practical knowledge Pasturage	mechanized farm
Weaknesses		little theoretical knowledge	
Desired improvements	Role of agriculture in protecting the natural environment and landscapes		Agritourism
Proposed improvements		Soil New species in crop production	Processing of milk and meat

12.8. Interview 8

Type of stakeholder: Cattle breeding farm
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: Family farm
Position of the respondent: Owner
Age group of the respondent: 25-34
Highest qualification of the respondent: High school

Activity, sustainable farming practices, sustainability challenges of the farm:
He has been running the family farm since 2017; until then, his parents have worked on it. The area he uses is owned by the parents; he uses it under a leasing agreement. He is emotionally attached to the land, as part of them are family heritage, and the other part is bought by his parents, 58 ha in total. He produces hay on grasslands or put the cattle out to pasture. He produces milk for sale and for processing, selling it in the form of cheese. In addition, he breeds calves up to 300 kg for sale, as they are easy to sell. The farmer owns 30 cows and five bulls. He can easily meet the expectations of the market with the products, but the high-quality products are not well-paid on the market. The members of the family also help in farming, especially his father, who always takes the lion's (bear's) share from the summer haymaking. The respondent is a full-time farmer and is fully committed to this activity. He considers this profession as a job and a lifestyle at the same time.
He regularly employs non-family labour force to take care of the animals and occasional labour force to harvest the crop.
He cannot entrust the managing of the family farm to anyone else, not even for a short period of time. He keeps red-spotted cattle with respect for tradition, but he also takes the advice of experts about further growth. Most of the fodder consists of hay and aftermath; forage is very little. He does not use growth promoters or forage supplements at all.
His idea is to keep his animals outdoors and in free-range, as much as possible. He keeps them on pasture in summer, in winter, they are in stable, but he lets them roam freely every day. After composting the stable manure and the organic waste, he scatters it on the cultivated lands. Regarding new livestock buildings, building in traditional style is very important to him, the materials used should be natural, such as wood and stone. The most important aspect to him is the animals' well-being and to establish an easily operating building, that later can be extended.
Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:
His farm is being positively affected by climate change because the animals consume less feed during the shortened winter period. He firmly believes that the best way to protect the environment is to use as little material from external sources as possible. The farmer sees his colleagues as partners, and they help each other whenever they can. They discuss the problems that arise and try to find a solution together.
He gets part of the information related to farming, regulations, training and learning opportunities, new technologies from the press and literature, and most of it from Internet websites dealing with the topic. In his opinion, the main task of the farm leader is to formulate achievable goals and to cooperate with others in order to achieve them.

In farming management, in order to run a long-term sustainable farm, an important aspect is to have diversified but thorough knowledge. He considers his knowledge to be average in preparing a long-term plan for the farm, on the basics of tendering and finance. He would also like to attend training in these domains. Resting on more pillars is very important; however, he has limited knowledge related to this. He would like to attend training, too.

His knowledge about sales and marketing is average, but he does not intend to apply for training in this domain. He considers the role of agriculture in tourism, recreation, and education important, and considers his knowledge to be limited in this area.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

He considers traditional farming to be the best method in terms of agricultural production and sustainable resources. According to him, he has advanced knowledge about soil conditions, average knowledge about water and air, and limited knowledge on biodiversity, plant, and animal diversity.

He thinks, diversified but thorough knowledge about farm management is necessary, in order to be able to build a long-term sustainable agriculture. He has limited knowledge for preparing a long-term plan for the farm and on the basics of finances and tendering. He would also like to attend trainings on these topics.

His farm is a member of the Gyimesvölgyi Organic Farmers Association.

Needs and ideas of the farmer for agroecology training:

The interviewee has never heard of the term agroecology so far but is interested in the topic and would like to participate in training, preferably in the winter. Taking part in training organized three-seven times at external places would not mean a problem to him, he could also offer his farm as the place of another training.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Certified organic products Dynamism	Pasturage	Sustainable farming
Weaknesses		Insufficient agroecological knowledge	Marketing Product sale
Desired improvements	Having interest in everything, that could improve the farm	Biodiversity	Milk processing Organic meat selling
Proposed improvements	Expanding his knowledge on agroecology	Production of new products	Processing of milk and meat

12.9. Interview 9

Type of stakeholder: vegetable production
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: phone interview
Form of operation: Family farm
Position of the respondent: Owner
Age group of the respondent: 35-54
Highest qualification of the respondent: High school

Activity, sustainable farming practices, sustainability challenges of the farm:

The leader of the farm has been working full time for 22 years. He produces vegetables to sell at the fair (75% of them are tomatoes), and he is able to meet the customers' expectations; thus, he sells all of his products. The cultivated, 1000 m^2 area is rented, but the greenhouse, where the products are growing, is his own property. He is emotionally attached to the lands he cultivates; land is not only a tool for profit. At the time he took it on rent, the area was in neglected condition. Now, regarding the productivity, it is in very good condition.

His family members are actively involved in farming. They see farming as a lifestyle, and they do not employ any non-family labour force. In case of necessity, a family member could continue with farming. In his view, the quality of the land must be preserved at a high level, so that they can be used by future generations, too. He does not use agri-environment support for its management. He does not make use of any agri-environmental farming aid.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

He considers his knowledge of the condition of the soil, water, and air to be average, and would be happy to take part in training in this field. He considers his knowledge on the topic of biodiversity to be limited and would like to expand this knowledge. He considers his knowledge on the basics of grant schemes and finances to be average. He has limited knowledge about sales, marketing, and economic diversification. He finds the role of agriculture important in respect of the protection of the natural environment and landscapes, promoting our traditions, but he would not participate in training.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

In the farming practice he uses environmentally friendly, sustainable methods. He produces everything by using organic methods, but he does not have any organic agriculture certification. He checks the condition of the soil regularly, but only with the simple method of observation. From the farming practices he applies mulching, organic fertilization, and drip irrigation. He composts and recycles plant residues. Weeds, insects, and rodents also appear in the vegetable garden, but they do not cause serious damage, because he uses organic production technology to protect the crop, such as pheromone traps, or also enables the colonization of pest eating birds.

In his view, climate change is having a detrimental effect on his farming, because windstorms, persistent rainfalls and dry seasons are more and more frequent. He thinks he can contribute to protect the environment with traditional agricultural methods. They work in partnership with other vegetable producers, discussing problems and trying to find a solution together. He is not a member of any farmers' organization.

Needs and ideas of the farmer for agroecology training:

He has already heard of the concept of agroecology, but he does not know where. Explaining what the topic is about has made him curious, and when an opportunity presents itself, he might expand his knowledge. He could imagine training in the winter, 1-3 times a week would be the most suitable. Primarily, he would like to gain practical knowledge, organized at external locations. On his own farm, he does not think training could be organized. He collects the necessary information related to farming and production from television and websites. The interviewee's main task is to organize and to achieve the production – he thinks. They plan and achieve the goals together with his family members.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Convinced about chemical-free self-sufficiency	Mulching Colonization of pest-eating birds	Very sellable vegetables
Weaknesses		Little theoretical knowledge	Lack of crop rotation Marketing
Desired improvements	Vegetable production using organic methods	Sustainable farming	
Proposed improvements	Techniques of organic farming	Production of new vegetables	Processing of vegetable

12.10. Interview 10

Type of stakeholder: animal husbandry
Date of the interview: April 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: Family farm
Position of the respondent: Owner
Age group of the respondent: 25-34
Highest qualification of the respondent: High school

Activity, sustainable farming practices, sustainability challenges of the farm:

The cattle farm has been operating continuously since 2007; his parents are also farmers. The respondent farmer works on 43 ha leased lands, keeping 12 cows and 6 calves. He produces hay too. The mixed-purpose cattle serve as the primary source of milk, dairy products, and meat. He is personally attached to the farmlands and the activity itself; he considers it as a living tradition to pass on. The lands were of good quality at the time of the purchase, so they were easy to maintain. He works on the farm with his family members, together with his parents. In summer, occasional labour is employed for the forage harvest. Agriculture for them is more than work; they see it as a lifestyle. Keeping the grasslands chemical-free and in good quality is a very important aspect for him.

The farm needs support for obtaining the organic certification and for being able to maintain the agri-environmental and organic production. He keeps the Hungarian red-spotted mixed-use breed for emotional reasons and from respect for tradition, but the breed's productiveness is also an important factor, of course. Feeding is done by grazing in summer and with hay in winter, but he also buys a little amount of energy fodder.

The cattle spend six months on pastures, during the winter they are kept in the stables, assuring that a few hours per day they are outside. By scything, he destroys the unwanted weeds and the non-native plants on the grasslands. He scatters the organic manure produced in agricultural holdings on the grasslands. When planning a new farm building, the most important aspect is its simple operation and the well-being of the animals.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The respondent rated his knowledge on soil condition and quality as average, and he has limited knowledge about questions related to the subject of water, air, and biodiversity.

He considers his knowledge to be limited about the basics of tendering, economic diversification, sales, marketing, and the EU, domestic and regional regulations.

The respondent considers good professional knowledge to be the most important for managing a sustainable economic activity.

According to him, agriculture has an important role in maintaining the rural population, in poverty eradication, public employment, as well as in therapy, tourism, recreation, and education, however, his knowledge is very limited in this area.

He collects information related to production, regulations, training opportunities, and new technologies from websites developed for professionals, but sometimes also from newspapers and other agriculturist colleagues.

An undesirable effect of climate change on the economy is that it is becoming increasingly difficult to harvest good quality hay. He cooperates with other farmers in the problems posed; in his opinion, many common problems can be solved together. The farm's future activities are planned in advance, they decide on the amount and the types of products based on the information shared among the colleagues.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent attaches great importance to good professional knowledge and to environment-friendly farming practices. Relevant competence, organisational skills, and supporting the community are also very important features.

Needs and ideas of the farmer for agroecology training:

He had never heard of the concept of agroecology before, but explaining the topic to him, he found it interesting. If the training were organised during the winter, he would be happy to participate 1-2 times a week, even for up to several months. He would be very happy to take part in training organized on his own farm. He considers it possible to take part for a few days in training organised at an external location – if it is agreed in advance. The training should be practice-orientated and should offer concrete suggestions to the participants.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Certified organic farming and self-sufficiency	Pasturage Traditional agroecological knowledge	Good cooperation with other farmers
Weaknesses	Pessimism	The existing theoretical knowledge is not put into practice	Marketing management
Desired improvements	Improving the profitability		Milk processing
Proposed improvements	The sale of organic products	Land and biodiversity	Financing strategy

12.11. Interview 11

Type of stakeholder: animal husbandry
Date of the interview: April 2020
Length of the interview:90 minutes
Methods of the interview: personal interview
Form of operation: family farm
Position of the respondent: owner
Age group of the respondent: 55-64
Highest qualification of the respondent: high school

Activity, sustainable farming practices, sustainability challenges of the farm:
The total area of 37 hectares grasslands that he cultivates is his own property. Most of it was bought, and a small part was inherited; he is also emotionally attached to his farm. He thinks it is a great achievement that he could buy these lands for his family.
He keeps 22 cattle, produces milk for sale, selling it for acquirers, furthermore in the summer-time, he makes cheese also for sale. His family members help him in farming, his wife works part-time, but he gets help from his adult sons too.
Agriculture means a job to him, but he considers it also to be a lifestyle. Occasionally he employs labour force for hay harvesting. In his opinion, his adult sons will take over the farm. He uses a local breed called the "red-spotted cow", and recently purchased registered steers to improve its stock. The forage mainly consists of locally produced mountain hay, but he also buys energy fodder. He buys whey from the local dairy, which the cows very much like, and it improves the milk production as well.
The cows spend around six months on the pastures; for the rest of the year, they are kept in stable, letting them out once a day. The manure that is produced on the farm is scattered on the meadows in the spring. He does not apply any special method for animal welfare; he considers free ranging to be a good solution. When building he follows traditional methods, he uses mainly wood and stone, and concrete only for the foundations.
Construction work is done by him, but when necessary, he also employs master builders. He considers it important that the animals are comfortable in the stable. He would like to visit other farms in other countries to gain experience, but he has not got any time for that.
Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:
Producing good quality hay has become very difficult because of the climate change; he can see the tendency that too much rain falls in a short period of time. He does not really see how he could contribute to environmental protection. He discusses common problems with the colleagues from the area, but their relationship is considered rather neutral by him.
According to him, having professional knowledge is important; his knowledge of the soil condition, water, and air is limited, but he would not like to train himself on these topics. Based on his own judgment, he has average knowledge about biodiversity.

He does not make a long-term plan for his economy; he does not deal much with the topic of sales and marketing and considers his knowledge to be average. He considers his knowledge to be limited regarding the basics of grant schemes, EU and domestic regulations, and the diversification of activities.

In his view, agriculture has a major role to play in maintaining the rural population, in promoting our traditions and preserving natural values. In this respect, he considers his knowledge to be limited, and there is no intention for training.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

Persistent work is the most important thing in agricultural work, according to him. Good professional knowledge and to resolve tasks quickly are important traits for the farmer.

Needs and ideas of the farmer for agroecology training:

He had never heard about the term agroecology until now, and after explaining the topic to him, he neither became interested in it, nor would he apply for training in this domain.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Self-sufficient	Pasturage Good practical knowledge	Mechanised farm
Weaknesses	Pessimism	Low level of theoretical knowledge	Management Marketing
Desired improvements	Modern nature-friendly farming	Knowledge about organic farming	
Proposed improvements	Switching to organic farming	Constructing agricultural buildings, Local breeds, Organic farming	Selling local products

12.12. Interview 12

Type of stakeholder: Cattle breeding farm
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: personal interview
Form of operation: Family farm
Position of the respondent: Owner
Age group of the respondent: 35-54
Highest qualification of the respondent: High school

Activity, sustainable farming practices, sustainability challenges of the farm:
The family farm has been operating continuously since 1995, and the respondent's parents were farmers. The lands he cultivates are 30 hectares in total, all own property, part of them were inherited, and some of them were bought.
The main products made on the farm are mixed-use cattle (8), milk and meat, and hay (hay also for sale).
A part of the produced milk is sold in the form of processed dairy products. Other parts of the products are produced for self-consumption of the family.
He is emotionally attached to the land and farming; he considers it as a heritage to pass on to his children. At the time of the takeover, the lands were in good quality, and it was preserved throughout the years.
He runs the farm together with his family members; his wife, besides doing the housework, takes part in the farming as well, and his son and daughter are working part-time. He also employs occasional labour at the time of harvest. For the family, farming is a lifestyle. The farm will be maintained by his adult son in the future.
Preserving the cropped area's good quality is a very important aspect to him.
He monitors the condition of the soil based on his experience and uses solid organic fertilizer. Crop residues are used as bedding in the stable, which is then composted and thus scattered as manure on the meadows. Unwanted weeds are removed by mowing.
The undesirable effect of climate change from the point of view of agriculture is that it is becoming increasingly difficult to harvest good quality hay. In case of persistent rain, the dried and harvested hay is not of good quality, so in recent times, he has been forced to silage it.
From agri-environmental and bio-production maintenance aspect, the farmer applies for aid for having a certified organic farm.
In his farming practice, he considers the farming method learned from his parents to be the guiding principle, as it is the most beneficial for the croplands and the natural environment.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The interviewee thinks he has a high level of knowledge about soil condition and quality, and average knowledge about the topics related to water, air, and biodiversity. He has limited knowledge in the area of grant schemes, economic diversification, sales, marketing, EU, national and regional regulation.

He cooperates with other farmers; they discuss the problems and try to find good solutions for them. The long-term activity of the farm is planned two years in advance. Decisions about what and how much to produce are based on the market and the information from other farmers.

He is a member of the Gyimesvölgyi Bio Association, and organic farmers' association, one of the most important professional organizations in the area.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

In order to be able to operate a sustainable agriculture, the respondent attaches great importance to obtain agricultural qualification, to gain experience, and to have good organizational skills.

It is the responsibility of the farm manager to set long-term and short-term goals and to attain them.

He does not consider himself well-informed to be able to judge the role of agriculture in maintaining the rural population, poverty eradication, public employment and therapy, tourism, recreation, education.

He obtains information on production, subsidies, regulations, training opportunities, and new technologies from special websites and, less frequently, from the press or other colleagues.

Needs and ideas of the farmer for agroecology training:

He had never heard of the concept of agroecology before but explaining the topic to him he found it interesting.

If the training were organized during the winter, he would be happy to participate 1-2 times a week even for up to a month. He would be happy to participate in training organized on his own farm and he would also offer it as a place for training. He considers it possible to take part for a few days in training organized at an external location if it is settled in advance. The training should be practice oriented.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Self-sufficient Certified organic farmer	Traditional knowledge	Cooperation with other farmers
Weaknesses	The intention of introducing alien agricultural technologies	Low theoretical knowledge	Marketing
Desired improvements		Getting acquainted with biodiversity	Milk processing
Proposed improvements	Getting acquainted with the methods of organic farming	Getting acquainted with new dairy products	Milk processing

12.13. Interview 13

Type of stakeholder: Animal husbandry
Date of the interview: April 2020
Length of the interview: 90 minutes
Methods of the interview: phone interview
Form of operation: family farm
Position of the respondent: owner
Age group of the respondent: 35-54
Highest qualification of the respondent: high school

Activity, sustainable farming practices, sustainability challenges of the farm:

The family farm cultivates mountain grasslands. The lands are rented from private individuals, 17 ha in total, and this activity means a lot to them, as it provides a living for the family. He produces milk for sale, which is then bought by the dairy industry, and he also raises bulls for sale for the meat industry. He owns 14 cows and 5 calves. He thinks he can meet the market expectations regarding quality because he produces high-quality organic products. In his work, he is assisted by his wife and school-age sons. The family helps him, especially in the summer, during hay production.

He employs the non-family labour force for casual work occasionally, but it is difficult to find good workers. He hopes his sons appreciate the agricultural work that he does and hopes they will take over the job from him later. The cattle he breeds are selected on the basis of personal experience, but he also pays professional attention to breeding. The fodder mostly consists of mountain hay, produced by himself, but he also buys a little forage, too.

His animals spend about 180 days a year on pastures; on the other days, they are in a stable, from where he releases them to the paddock every day. He spreads the manure onto the meadow areas in the form of liquid manure. He plans to build a barn in the near future, which will be built in the traditional form using wood, stone, and concrete.

The new part will be attached to the existing buildings. The most important aspects of the building are the simple operation and to create the best possible place for the animals.

Self-perceived attitude, knowledge, and skills of the farmer, and their presence and application in everyday practice:

The respondent regards his knowledge of soil sciences, water, air, and biodiversity to be limited, and as far as possible, he would learn about these topics in order to fill the gaps.

In his opinion running the farm requires significant professional knowledge. At present, the farm operates without any long-term plans, and the respondent considers his knowledge on the basics of grants, sales, marketing, EU, and national regulations to be limited.

As far as social and traditional aspects of farming are concerned, the respondent feels that he does not have adequate knowledge of these subjects.

In his view, the climate has recently changed a lot. It often happens that the air is very cold at night, even in summer, and persistent rainy periods or long-lasting dry periods characterize the weather. This makes the production of the fodder very difficult. It is difficult to obtain information about production, subsidies, and regulations. He acquires information from the agricultural headings of written and electronic press.

Agroecology attitude, knowledge and skill elements considered as important by the farmer:

In his farming practice, regarding production, he tries to use as little external source material as possible. To solve various common problems, he cooperates closely with other farmers from the region.

He considers his fellow farmers as partners, and he does not feel that anyone would consider him to be a competitor. The family farm is registered, and it is a controlled organic farm, a member of the Gyimesvölgyi Organic Farmers Association.

Needs and ideas of the farmer for agroecology training:

The interviewee's opinion is that the trainings should be organized in the winter. After prior consultation, he could take part for up to 4-5 days in a training organized at an external location, and 2-3 times a week somewhere in the nearby.

From such training, he expects a practical approach that he could use in his agricultural activity.

	Agroecology attitude	Agroecology knowledge	Agroecology skills
Strengths	Certified organic farming	Pasturage Traditional knowledge	Mechanized farm
Weaknesses		Low level of theoretical knowledge	Management Marketing
Desired improvements	Getting acquainted with modern organic methods		Milk processing
Proposed improvements	Organic mountain product Marketing	Getting acquainted with the production of new dairy products	Milk processing

Annex 3. National Consultation with Farmers in Austria: interview transcripts

GRAND FARM
Model Farm for Research and Demonstration
2020

13.1. Interview 1

Type of stakeholder: farmer and agricultural advisor
Date of the interview: March 2020
Length of the interview: 45 minutes
Methods of the interview: skype call
Form of operation: private farmer, income-supplement
Position of the respondent: advisor & owner of his own farm
Age group of the respondent: 35-54
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

In 2008 he inherited the farm from his grandfather and started to revitalise the area. He operates the organic farm part-time parallel to his job as agricultural advisor and keeps a small flock of sheep of an ancient breed, about 20 bee colonies and around 15 chickens. All animals can be outdoors all year round. All feed for the sheep is produced exclusively on the farm, organic chicken fodder is purchased. Slaughtering is done by a local operation, packaging and selling is done on the farm. The farm is organised so as to be manageable by the owner without any additional help.

The respondent is well-connected to other organic farmers in his region, helps to organise organic festivals and manages the interchange of organic forage and other agricultural operating resources. He indicates that organic farmers tend to connect and learn from each other more than conventional farmers.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

Profound knowledge about biodiversity, natural cycles and water management is very important for his everyday practice as a farmer. Additionally, procurement and logistics are necessary for a well-working farm. Farmers are often accomplished handymen (for planning, practice, management, marketing etc.) and orient themselves according to natural rhythms. For the interviewee, management means to find the right time for every task. Customer wishes are important impulses for new product variations – as long as they can be managed without hiring any additional worker. Investments are only done if necessary, for quality-improvement and always without bank loans.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In his opinion, production know-how on the basis of natural science, professional working practice, marketing, knowledge about legal parameters and product development are important for any farmer.

Needs and ideas of the farmer for agroecology training:

Organic farming covers most parts of ecological farming, "agroecological training" is therefore not really necessary in his opinion. There are enough guidelines in organic farming that help to improve farming practice. Written guidelines, professional journals, newsletters and meetings with local organic farmers are very helpful.

13.2. Interview 2

Type of stakeholder: agricultural advisor for fruit production
Date of the interview: March 2020
Length of the interview: 30 minutes
Methods of the interview: phone call
Form of operation: private farmer, income-supplement
Position of the respondent: advisor & owner of a small farm
Age group of the respondent: 55-64
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent has been working as an agricultural advisor for over 30 years now – both for organic and conventional fruit farmers. From his day-to-day practice he is extremely knowledgeable about the characteristics of fruit farmers and their needs and challenges. From experience he can assess the difficulties in promoting new agroecological methods to long-established farmers. He knows about the importance of trust when you want to incentivise someone to do something new – changes like that only happen on a personal level.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

Empathy and a true understanding of farmers' needs and challenges are probably the most important characteristics for an agricultural advisor. Thirst for knowledge and curiosity for new ideas and practices are also very important for each farmer's/advisor's progress in terms of skills and know-how.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In his opinion, profound knowledge about crop management and business administration are key to success in fruit production. A neutral assessment of new methods and higher flexibility would help farmers to be more open to positive change.

Needs and ideas of the farmer for agroecology training:

In his opinion, it is all about trust when it comes to change. You can never incentivise someone without knowing their values. Therefore, real change in the day-to-day practice of farmers can only happen through personal relationships. Here, best-practice examples of local farmers are key to success. Without the former, it is doubtful that training programmes will reach the practitioners. It is key to be able to present successful(!) examples of trustworthy farmers that want to share their experiences. These model farmers have to reach other farmers on a personal level and talk to them about the real challenges on the farm – theoretical professionals/advisors/trainers can never reach a farmer the way another farmer can.

The biggest problem of most EU programmes is that they communicate in the wrong way, because they do not really know the needs and challenges of farmers. The central challenge on farms today is in fact its economic survival. And in many cases its very existence may be at risk. Every change is risky and costs money. And in every transition period you have to assume that mistakes are going to be made due to lack of experience with new techniques and the lack of efficiency at the beginning. In addition, there are formalities, paperwork, approvals. All tremendous challenges for already-struggling farmers. Most EU-funded projects do not see/

understand those challenges. And that is why such programmes do not have a positive image but in fact act as a deterrent for farmers.

A well-working training programme has to convey a vision to farmers that helps them to fulfil a basic need such as:

- earning more money (fundamental requirement !!!)
- gaining reputation and positive image
- inner desire for more ecology in their work

Additionally, it is important to be aware of the very slow progress in transitions on the practitioner's level. Programmes therefore have to be carried out for at least 5-10 years in order to get recognised and truly affect the daily work of farmers.

13.3. Interview 3

Type of stakeholder: plum production and beekeeping, project and PR manager
Date of the interview: March 2020
Length of the interview: 120 minutes
Methods of the interview: phone call
Form of operation: private farmer, income-supplement
Position of the respondent: Owner and former manager of the farm
Age group of the respondent: >65
Highest qualification of the respondent: secondary vocational school

Activity, sustainable farming practices, sustainability challenges of the farm:

At the age of 28 he quit his job as an electrical engineer and attended a special course at an agricultural school to get the basic training needed to start farming. At the course he met his future wife, whose parents own the farm on which they work and live today. For 10 years he has worked on the farm for his parents-in-law and for the 20 years after that he was himself the manager of the farm. Additionally, he has worked as an entrepreneur, project manager and PR advisor. Now, his son is heading the operation. Under his leadership the farm started to specialise in organic plum production which is a very small niche in Austria. They found ways to produce large amounts of plums with a very high fruit quality in a way that is more effective than most other farmers' strategies. Everything is sold at a satisfying price to a regional fruit dealer. The demand is very high, but they decided not to expand their business any further. In addition, they produce organic honey for sale. At busy harvest times all the family members help on the farm, non-family workforce is not needed.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

In order to develop a really good production method for organic plums, it was necessary to bite down and stay persistent. Creativity, support from the whole family and the will to experiment further were also important success factors for him. He visited a lot of other European plum farms, tested over 40 varieties, and always searched for the most efficient methods for all activities on the farm – in order not to work more than necessary and save time.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In his opinion, deep professional knowledge about crop management is the basis of his work. To think flexibly and broad was also important to find different strategies to do things. An essential part of his success comes from creative PR activities – according to the (Austrian?) saying "do well and talk about it". Generally, he has always avoided working more than necessary.

Needs and ideas of the farmer for agroecology training:

In his opinion, the only way to promote agroecological practices is by showing its economic advantages. In the first place, this is the only thing that counts for a farmer. True ecological idealism may develop over time but is not necessary at the beginning.

When you want to set up a new training programme, start by doing a comprehensive desk research to find all the programmes in Europe that deal with similar topics. It is not a good idea to reinvent the wheel again and again – because there are so many things that already exist and work very well. Those ideas should be the basis of a new programme that combines the very

best strategies and refines them. Model projects should be contacted as well as thanked for their helpful preliminary work.

Every project needs a clear USP (unique selling proposition) that makes it outstanding and recognisable. And every single stakeholder must be addressed by pointing out specific benefits for them. It is crucial to think carefully of everyone who might have something to do with the project – directly or indirectly. The worst that can happen is to forget important interested parties, officials, or politicians in the decision-making process. Long-established training institutions in different countries should also be part of any new training programme – they already have the resources, experience and networks for organising and promoting these types of programmes.

Finally, from the interviewee's point of view, it is also about telling a good story. PR management should therefore be carefully considered.

13.4. Interview 4

Type of stakeholder: arable farming and suckler cow husbandry
Date of the interview: March 2020
Length of the interview: 45 minutes
Methods of the interview: phone call
Form of operation: private farmer, full-time
Position of the respondent: co-Owner and husband of the operation manager
Age group of the respondent: 55-64
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

The interviewee is the CEO of the local organic farming association and advisor for the chamber of agriculture. The family farm has been certified organic since 1986 and his wife manages the farm since 1996. They practice arable farming on 23 hectares and raise calves using the suckler cow husbandry model. Furthermore, they have their own mill and clean grains for other farmers. They sell directly through their own organic farm shop but also to canteen kitchens and other farmers. They tend to collaborate with other local organic farmers in terms of sales and access to machines.

The farm is run full-time by the wife and son, while one additional local worker is employed two days a week. A big share of the crops grown on the field are legumes, which are mainly used as feed for the cow herd. Rather than leaving the ground fallow over the winter, they always have something planned to grow in their crop rotation system. Cow manure is utilised for their own composting.

The effects of climate change vary a lot from one year to the other. In general, drought and heat in summer are getting worse. Therefore, it is crucial to build and maintain healthy soil that is able to store and provide enough water.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

In his opinion, knowledge about soil and the natural cycles are the basis for daily work on the farm. Without it, farmers are not able to maintain a well-running system. Organisational structure and business administration are also very important. But none of this would be useful if the family cannot work well together. Therefore, a good working climate within the family tops the list.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The interviewee claims that, again, it is all about soil. Every farmer should know the essential basics of soil health, nutrition cycles and functional principles. Those elements should therefore be part of any training. Collaboration and collective learning are also helpful to improve the day-to-day farming practice.

Needs and ideas of the farmer for agroecology training:

The interviewee suggests that regional working groups in the development of new (agroecological) skills, mutual learning and empowerment work really well. It is a fact that farmers learn most from other farmers. They need to see the practical results of new techniques and they need to talk to other practitioners as opposed to theoreticians. The working groups should be led by someone who is able to moderate and organise the process. The most powerful way to promote new ecological methods is to visit other farms that are already successfully practising those techniques. Those farmers are the most valuable resource for teaching new ways of farming. Excursions can be combined with external advisors? who bring in special inputs and other visions.

Certificate courses such as the "soil practitioner" also work very well. These are held spread across 10-12 days throughout the year combining external teachers/advisors with farm visits. The attendees of these courses can then become future referrers in order to motivate new beginners.

13.5. Interview 5

Type of stakeholder: Vegetable production and beekeeping
Date of the interview: April 2020
Length of the interview: 45 minutes
Methods of the interview: phone call
Form of operation: private farmer, full-time
Position of the respondent: Owner
Age group of the respondent: 25-34
Highest qualification of the respondent: secondary grammar school

Activity, sustainable farming practices, sustainability challenges of the farm:

Both the owner and his wife, who run the farm together, are lateral entrants. After finishing school and working in several operations in the horticulture sector, they bought their own small farm in 2013 and started producing organic vegetables and seedlings. He attended a comprehensive beekeeping course, but horticulture they learned mainly through practice. Today they keep around 25 bee colonies and grow vegetables manually on about 2000 m^2 of beds and high tunnels. The two of them run the farm full-time and mostly without additional workers. Only in Spring do they need help from other family members for pricking and potting thousands of seedlings. They grow a lot of different crops and varieties, try to experiment a lot with different methods and techniques and aim to run a closed cycle on their farm by using their own chicken manure and high-quality compost from another farmer nearby. In terms of soil cultivation, they have never ploughed, but still use a rototiller on an irregular basis. Tarps are used as mulch for bed preparation.

In general, they have observed a significant shift in the common seasonal rhythm, which is currently anticipated by about two weeks which changes the traditional work schedule both in beekeeping and in the garden. In their view, the biggest challenge in vegetable growing is going to be water scarcity and irrigation.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

In the male owner's view, curiosity and love of experimentation are important drivers for his work and motivate him to try new techniques and practices. He is learning a lot from colleagues and other farmers but is also searching the internet for information. Especially in the starting phase of his farm he watched a lot of YouTube videos about market gardening to get the necessary knowledge and understanding to start his own project. This medium appears to him to be a very important source of information for young people who want to start farming.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The concept of organic farming is the basis for these farmers' work ever since they started farming. It is important for them to always try new methods and techniques in order to find the most suitable and sustainable way for them. The guiding principle is always to work with and not against nature. Self-organised further education and networking with other farmers is an important part of their learning.

Needs and ideas of the farmer for agroecology training:
They feel it is very important not to press any training programme on farmers. They should never feel themselves forced to do anything but rather possess the inner motivation to take part. It is therefore key to the success of any programme to link it to existing needs and wants of farmers. Modular info on 1-2 days would be suitable. Very important: favour wintertime or early in the year (December, January, February).

13.6. Interview 6

Type of stakeholder: Dairy Business
Date of the interview: April 2020
Length of the interview: 30 minutes
Methods of the interview: phone call
Form of operation: company
Position of the respondent: CEO & Co-Owner
Age group of the respondent: 34-54
Highest qualification of the respondent: Master's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

In 1997, just before Austria entered the EU, the respondent's father and two other farmers decided to set up their own business together in order to become more self-sufficient and more independent from political decisions and the changing demands of dairy factories. As neighbours, the three farmers started to cooperate in terms of the processing (mostly into yoghurt) and marketing of their milk. All of them work according to the guidelines of organic farming and only sell directly to end customers, restaurants, and shops. In terms of the farming itself, they all work independently with their own methods and experience. In total, the company has 130 milk cows and they aim to maintain that size, even though they could easily grow much bigger because of rising demand. At the moment they are able to cope with the workload themselves without needing any additional workers. The three farmers consider that a favourable situation for them.

Climate change already affects their work in many ways. The natural change of seasons is shifting, extreme weather conditions occur more often (long drought vs. heavy rains), grass harvests tend to be smaller than years before because of drought. Therefore, new crop varieties for organic farming would be important.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

They believe that self-determination of farmers is important and far too few farmers are capable of working that way. Instead of deciding on their own (based on experience and observation), many of them mostly rely on the recommendations of agricultural advisors or vendors of agricultural products. This situation causes many problems and leads to a huge loss in decision-making ability and subsequently to an increasing dependency on various authorities.

The way out of this dilemma, in their opinion, is through education and training.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Due to the early official conversion of the farm to certified organic dairy farming, all of the three farmers are familiar with the principles of ecological farming. They produce all of their green fodder themselves, try to reduce concentrated feed, partly work without silage and naturally enable year-round access to outdoor grazing. Nevertheless, the term "Agro-Ecology" seems to be difficult to grasp for them.

The respondent says it is important to be informed and open-minded in order to make important decisions on your own. Also, obviously, all activities must be profitable for the farm. Otherwise other farmers would never start thinking about implementing new ideas.

Needs and ideas of the farmer for agroecology training:

In the interviewee's opinion, education and training are key to self-determined decisions. But sadly, it is often very difficult to motivate farmers to attend educational programmes without this being obligatory. On the other hand, compulsory programmes tend to work badly due to the lack of self-motivation.

Effective arguments for a voluntary participation could be
- the increase of self-sufficiency as well as
- proven profitability

Without economic efficiency, no programme will be attractive for farmers. Therefore, that should be the main focus in the set-up of educational programmes. When presented with reliable proof of profitability, farmers are more likely to start identifying themselves with agro-ecological principles.

13.7. Interview 7

Type of stakeholder: Vegetable production
Date of the interview: April 2020
Length of the interview: 60 minutes
Methods of the interview: phone call
Form of operation: private farmer, full-time
Position of the respondent: Owner
Age group of the respondent: 34-54
Highest qualification of the respondent: master's degree in law and certification as Market Gardener

Activity, sustainable farming practices, sustainability challenges of the farm:

The couple bought the farm 9 years ago after various agricultural experiences and a Market Gardening university programme in the USA. Both of them originally studied at Universities in Austria and the USA and are lateral entrants into farming. When they bought the land, it had been completely devastated after having been farmed as a maize monoculture for decades. They revived the farm and built a beautifully diverse place that has 1.7 ha in Market Garden style, another 1.3 ha in field production, 1.5 ha of grassland with sheep and some forest. Today it is a full-time family farm and one of the first of its kind that is operated as a CSA (community supported agriculture) in Austria. The main activity of the farm is the organic vegetable production, but they also produce organic flowers, organic field crops and seedlings. They educate 4 to 5 trainees every year and offer a broad workshop programme on the farm. Situated in the very south of Austria, they often face very high temperatures and drought and expect further increase in extreme weather periods over the next few years. The normal natural rhythms and seasonal characteristics have changed dramatically and require wide-ranging adaptation.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

Mindfulness and discipline play a very important role on the farm and in the couple's opinion should both be heeded much more in all areas of agriculture. In particular, a mindful overall approach to farming seems to them to be crucial for long-term sustainability. In some areas they tend to be quite radical, e.g. when it comes to their strict non-hybrid-seed-commitment and their goal to save old regional varieties on their farm. Generally, they combine proven knowledge and practical skills in their daily work. They add to this that there are those thousand little tricks that lead to workflow efficiency.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The understanding of the natural cycles on a farm is the basis for agro-ecological farming. The basic knowledge about soil function and soil health is crucial for these farmers. For vegetable growing it is additionally important to know about botany and the principles of seed propagation. That is why they also take part in regional propagation programmes of old seed varieties, to preserve and enhance them.

Needs and ideas of the farmer for agroecology training:

The exchange of ideas and experiences between farmers is very important for them. They think collaboration is a key element in successful learning within the farming community. Training programmes should therefore be designed to include visits to various farms and get in-depth information about specific topics there. Such programmes should be available during the winter months when most farmers have more time. These on-site farm visits could be supplemented with online webinars, where attendees are able to watch educational videos at a time of their convenience.

In their opinion, when it comes to motivating conventional farmers that were not interested in such programmes in the past, it is all about money. As long as they are not convinced about the profitability of agro-ecological practices, they will never be interested in any training programme for that purpose. It is the key challenge to prove the profitability of the system when you want to motivate others to try it themselves.

Furthermore, it is crucial to also convince the main opinion leaders in the (regional) community. As long as they are not in favour of a new idea, only very few farmers will try it on their own. Many of them mostly react to the general opinion of those influencers.

13.8. Interview 8

Type of stakeholder: farmer and agricultural advisor
Date of the interview: May 2020
Length of the interview: 45min
Methods of the interview: phone call
Form of operation: private farmer, income-supplement
Position of the respondent: advisor & owner of his own farm
Age group of the respondent: 35-54
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

After his studies of sustainable agriculture, the respondent also completed a college and started working for the local organic farming association. In 1999, he inherited the family-owned farm from his father and started converting the farm to certified organic agriculture. Inspired by many practical examples from his work as an agricultural advisor, he started experimenting on his farm. For many years he has kept a suckler cow herd besides practising arable farming, but nowadays he only produces field forage, hay, and silage for sale to other organic farmers. Most of the time he is able to manage the work on the farm himself but for some days a year he needs additional workers. Although he is using some agroecological measures, ploughing is still an important part of his soil cultivation – because it is easier to manage for him in terms of timing. Generally, it can be quite a challenge to organise the farm work besides his full-time job as advisor.

He finds that farmers today cannot rely on standard solutions anymore. Drought periods are lasting longer, heavy rains occur more often and in spring early warming conflicts with late frosts. In terms of soil cultivation farmers therefore need to think more carefully what to do and when in order to save water – especially in spring when they are about so sow. Protection from erosion is another increasingly important factor in agriculture today – particularly between the months of April and October when heavy rains occur most often. To cope with all those challenges, farmers today must spread their risks and should never stake everything on one card. This means that monocultures are a very risky strategy in times of climate change. It is a matter of security to at least sow large areas of one culture in sets to reduce the risk of total failures. Most importantly, crop rotation should be far more diversified as well as supplemented with a selection of special crops that achieve a better price on the market than the common standard crops such as corn, grain, or soybeans.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

Over the years he has seen many practical examples on different farms, gained broad experience through further education and experimented a lot on his own farm. Additionally, the, albeit irregular, meetings of several organic farmers are helpful to exchange knowledge and experiences. All this contributed to his developing an open-minded approach to farming.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In his opinion, it would be very helpful for farmers to develop more impartiality and some curiosity for new or even crazy ideas. The willingness to experiment a bit and to connect with others to exchange experiences would lead to a better learning curve and quicker success. Flexibility, risk spreading and the ability to improve oneself further are also very important aspects of successful farming today.

Needs and ideas of the farmer for agroecology training:

He believes that the only way to teach farmers is to let other farmers talk about their experiences and show them how these work in the field. Lectures alone never work well without any practical examples – especially when such programmes are compulsory. Everything works much better outside in the field, in part because many farmers really like tools and technical solutions. Live demonstrations therefore work quite well. Such events should probably not last more than one day – especially for new beginners it could be a deterrent to attend multi-day programmes. Maybe at the start it should just be one day with the option to proceed with further training programmes.

13.9. Interview 9

Type of stakeholder: farmer
Date of the interview: May 2020
Length of the interview: 90 min
Methods of the interview: phone call
Form of operation: private farmer, full-time
Position of the respondent: son of farm owner
Age group of the respondent: 25-34
Highest qualification of the respondent: university degree

Activity, sustainable farming practices, sustainability challenges of the farm:

After a comprehensive agricultural education and having attended college, the respondent started working full-time on the family farm, one of the very first certified organic farms in Austria (since 1969). Despite the relatively small scale of the farm – 26 ha, 15 milk cows, 15 laying hens and a few hectares of arable farmland – the respondent and two other family members are employed full-time on the farm. In addition, four local women help once a week. All of that is only possible because of the strong focus on farmer-to-consumer direct marketing. Most of their products are sold in their own organic farm shop – especially homemade bread, dairy products, grain, and eggs, but also products from other local organic farmers.

In terms of access to machines they also cooperate with nearby farmers. The respondent himself is well-connected to other farmers, especially within the organic farming community, being the current head of Austria's organic farmer youth (association?).

All animals on the farm are allowed to be outside all year round, the amount of concentrated feed for the cows is reduced to a minimum, animal health is well monitored – with a focus on the ideal dung texture.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

According to the interviewee, the most important factor in his daily work on the farm is a deep understanding and appreciation of biodiversity on the farm. Profound knowledge is crucial, but it is also a lot about intuition– and about genuine joy when you observe abundant biodiversity. This emotional aspect of farming, he believes, sadly got lost within the last generation of farmers.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

In the interviewee's opinion, without emotions/connection to the land it is not possible to work in a genuinely environmentally friendly manner. That is something that cannot be studied but must be passed on by our ancestors or trained over a period of years. Environmental concern must be an honest concern. Unfortunately, genuine environmental concern is not widespread in conventional agriculture.

Additionally, a good understanding about business administration and calculations is very important for a successful farm. It is a big problem that too many farmers do not budget anything – they buy huge tractors without knowing if and when they could bring a return. The respondent thinks it might be a problem of ego. Digitalisation seems to play a bigger role in the coming years but could be a huge disadvantage for farmers because it is likely to distract even more from a genuine understanding of nature.

Additionally, know-how of marketing is a big success factor for farms. In particular, small farms tend to profit a lot from direct marketing through farm shops or similar circuits – due to larger profit margins and a better connection to their own produce.

Needs and ideas of the farmer for agroecology training:

The respondent believes that the most important success factor for any training programme is the prompt implementation of what is learned. The respondent claims that you need to apply new ideas within approximately one week in order to make good use of them. Training content therefore must be selected for practicability and it should be a planned part of any programme to give farmers time to test new methods on their own farm between the introductory programme and the remaining training sessions. Within this period, they would be able to experiment on their farm and bring any questions to the next sessions. At the end of a training programme it is a good idea to set up a final project and/or paper in order to train the application of the new information each of the participants' farm. In this phase it is essential to get help from experts and practitioners.

Online webinars are also a nice instrument for convenient education at home without the need to drive anywhere far. These can be part of any programme but should never replace practical training on the field.

Annex 4. National Consultation with Farmers in the Czech Republic: interview transcripts

University of South Bohemia
2020

14.1. Interview 1

Type of stakeholder: Mixed enterprises
Date of the interview: February 2020
Length of the interview: 150 minutes
Methods of the interview: personal meeting
Form of operation: joint-stock company
Position of the respondent: Chairman of the company board
Age group of the respondent: 35-54
Highest qualification of the respondent: Master's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent has been working in the cooperative farm for 20 years. The cooperative farm was established 50 years ago, in 2018 it was transformed into a joint-stock company. The respondent became the Chairman of the board of the joint-stock company in the year of its establishment (2018). In the field of agriculture, the company is engaged in plant and animal production, sales, and processing of primary products. It operates a biogas plant to produce electricity and heat. The company uses an area of 2960 ha of agricultural land, it owns 850 dairy cows, 360 bull (for beef production), 870 young heifers and calves, and a total of 1636 LUs. Most cattle feed is grown by the company itself. Only feed supplements, soy and rapeseed meal are bought. The company sells milk and meat (live animals only). Crop production is focused on the cultivation of winter rape (over 300 ha), cereals and fodder crops (1500 ha). The company also sells food and feed grains and electricity. Furthermore, the company performs activities of machinery repairing in its own workshops.

From the point of view of ownership relations, one part of the property belongs to the company since de beginning, another small part was later purchased and most of it is leased.

The company employs 89 permanent employees and occasionally people from the local community, including several people with disabilities.

The condition of the soil is essentially the same in terms of quality as before. Heavy, clayey soils predominate. Although there are several ponds in the area and the preconditions for sufficient moisture in the soil (high groundwater level), there has been a growing problem with soil moisture in the last five years due to the lack of precipitation. The company operates conventionally, it complies with GAEC (good agricultural and environmental condition) and receives support in agri-environmental climate measures. Agrochemical testing of soils is performed by the Melich III method accredited by the National Reference Laboratory. Regarding of soils analysis, the company prepares an annual fertilization plan, which is adjusted according to the N content shown in the soil analysis, possibly plant analysis for fertilizing plants during vegetation. The basic fertilizers are barn straw manure, digestate from biogas plant, intercrops (bundle, white mustard) and mineral industrial fertilizers. Agricultural management includes practices leading to the improvement of long-term soil fertility and ensuring the protection of surrounding ecosystems, especially surface waters. The basic method of tillage is plowing due to the soil

type and susceptibility to compaction by heavy machinery. Tractors and some other machines are equipped with flotation tires. They do not use no-till sowing or irrigation. Cereal straw is used in stables for animals or crushed and plowed. Crop rotations are relatively varied (winter wheat, winter barley, rape, maize, rye, oat), they also use clover and intercrops, mainly for feed purposes. They don´t use biological plant protection, pesticide application is carried out very carefully due to the large number of ponds (water protection) and due to the fact that ponds are important nesting grounds for birds (wild geese, ducks, swans, gulls, herons, storks).

Animal production is specialized on cattle breeding. The company produced high quality pig breeding material. Unfortunately, due to tough foreign competition and a large reduction in the number of pigs in the Czech Republic, they had to eliminate pig breeding 3 years ago. The Czech Red-spotted breed is selected in cattle breeding and Holstein cattle for milk production.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent believes that he has a high level of expertise in the field of agri-environment, especially about condition of the soil and its protection. He worked as a cooperative agronomist. In his opinion, he has knowledge of other natural resources and their protection on average level. Respondent evaluates his knowledge in the field of sales and purchasing, logistics, marketing, and communication as high. Knowledge of other topics in the field of economic diversification, public procurement, finance is average, as well as knowledge of EU legislation and national and local regulations., He values his knowledge of the social role of agriculture as average (although the company employs people with disabilities). Respondent highly appreciates the role of agriculture in providing food and energy, maintaining rural employment, eradicating world poverty, but also protecting the environment and caring for the countryside. He has a limited understanding of the role of agriculture in tourism, recreation, and education, as well as the preservation of rural traditions.

The respondent obtains information on management, subsidies / regulations, and training from the internet. For technological changes, his sources of information, in addition to websites, are also professional books, product presentations and professional meetings.

The respondent does not adhere to a specific leadership model, he relies entirely on new knowledge (he cooperates with the university and the Institute of the Academy of Sciences of the Czech Republic) and his experience gained in practice.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent believes that the company he represents and manages can contribute to environmental protection to the extent that it is in line with his own principles, attitudes, and expectations. The framework for sustainable farming management are some European directives, resp. their national version: GAEC (good agricultural and environmental condition), MMR (Ministry for Regional Development) and the CC document (Cross Compliance). He believes that the regulations for nature protection in the Czech Republic (EU) are relatively strict and even bureaucratic. Economic pressure on companies decrease the sustainability of farming and environmental protection. The respondent considers systemic thinking and thorough expertise in technologies, economic aspects and steps of sustainable agriculture to be essential. Especially in connection with climate change (particularly the effects of drought on the production of fodder crops), the need for a flexible response to natural and market fluctuations comes to the fore. The company is not a member of any organization dealing with environmental, social, ethical issues.

Needs and ideas of the farmer for agroecology training:
Respondent has very limited knowledge of the agroecology concept. He heard about it, but he does not care much. He is not interested in agroecology courses. Respondent prefers seminars related to new farming trends and in dependence on their concrete terms he would prefer to participate in longer training programs (one week). The respondent is not interested in hosting trainings/seminars on his farm.

14.2. Interview 2

Type of stakeholder: Animal keeping private farms
Date of the interview: March 2020
Length of the interview: 120 minutes
Methods of the interview: Personal meeting
Form of operation: Private farm
Position of the respondent: Manager
Age group of the respondent: 35-54
Highest qualification of the respondent: Agricultural High School

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent has been running a private farm for 27 years. His previous work was as a zootechnician in an agricultural cooperative. Agricultural land (a total of 25 hectares) is partly his own property (inherited and purchased) and partly leased from members of his extended family. The farmer considers agriculture as a lifestyle even though he runs it as a side activity. The respondent farms with his wife. Both spouses contribute 50% to the farm economy. They feel satisfied and have a positive attitude towards this kind of work (husband has been physically and mentally ill for a long time). Family members help them in a limited extent. Some of the work with agricultural machinery are done by their neighbours, to whom they rent a part of the arable land. Previously, The Farm worked with the clients from NGO (Non-Governmental organization), focused on drug addicts. They have 3 kids, 2 small children (7-13 years old), the youngest child (son) and the oldest child (daughter) have different ideas, characters, and interests. Their third child (11-year-old daughter) has the closest relationship to agriculture, but she would not be able to farm on her own. So, she will see in the future. The farm is registered in the Ministry of Agriculture as organic. It is controlled by BIOKONT (one of the Czech control organisations for organic farming). The farm is focused only on the animal production (sheep and horse breeding). Due to customer's interest, they were forced 3 times to change the breed of their sheep. They only sell live animals. They also produce sausages, but only for their own use. Bulk fodder (hay) has origin in their own production. But now, they are forced to buy it due to drought and deteriorating quality of pastures. All feed (99%) is produced on the farm, only mineral supplements are bought. Both allopathic medicines (deworming problems) and antibiotics are used only in accordance with the veterinary prescription and the laws regulations for organic farming. Animal housing and other welfare regulations according to the laws are complied without any problems. The animals are on the pasture for 10 months. The farmers presuppose to switch grazing (free pasture) to paddock grazing and grass modification due to the infestation of the parasite (there are problems with securing a regional mixture for sowing). Fertilization of pasture, delivery from the stable after the expulsion of sheep to pasture and spreading on the pasture are provided by own means. Buildings (part of the original farm inherited from the grandparents) are in poor conditions. Partial purchase and reconstruction (within the extended family) are carried out continuously. They do not plan a new construction but all the above factors (architectural style; materials used; method of construction; animal welfare) would be equally accepted. A farmer is not able to estimate the effects of climate change on his farm.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farmer graduated from secondary agricultural school and has many years of experience. His wife is a graduate of Charles University in the field of biology. She has a close relationship to environmental activities both theoretically and practically. Knowledge of the soil and other natural resources and their protection is high. They consider their knowledge in the field of economics to be average, (due to the unprofitability of doing business in organic farming which is depending on subsidies). It is difficult to decide on the development of management. They have limited knowledge and partial experience with economic diversification. More varied activities are hindered by family conditions and the health status of the owner. They had tried and operated some ancillary activities for several years, but there were many troubles (for example: musts – low price, high labour intensity, small volume of production, annual fluctuations ...; or meat products – regulations and personal problems with customers). Experience in purchasing and logistics is average and experience in terms of sales and marketing is limited (see above). In their opinion, EU, national and local rules are changing rapidly. These rules are often seemingly unnecessary, excessive, restrictive. Communication within the family-business is good, communication with the neighbours is average. They consider their knowledge in relation to the social aspects of agriculture to be average to limited, although they have a high social sense. Due to the husband's illness, they reduced their social activities mainly to the extended family.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondents are convinced that they can contribute to the protection of the environment. Their own principles, attitudes and expectations support an environmentally friendly approach. They consider the role of agriculture in the protection of the natural environment and the landscape to be crucial. They are actively involved in organic farming, so they promote the outflow of clean water from their land. In the forest, they plant local suitable species of trees. They use local seeds and seedlings (but there is a problem to acquire them) and a varied composition of herbs. The farm has a problem with poor animal health, especially cattle. The causes are in an old stable and free grazing. In response to animal health and drought in recent years, they have reduced the number of cattle on the farm. The farm cooperates with neighbouring farmers. There is cooperation in agricultural services (sowing, tillage, etc.) and land rental. The respondents are not members of any social organization. They consider their knowledge in the field of social services to be average. They gained most of their experience by working with the drug treatment community.

In their view, the role of agriculture in tourism, recreation and education is limited. And they have the same opinion about the role of agriculture in preserving rural traditions. In their opinion, agriculture should provide mainly a production function (i.e. the production of basic raw materials).

However, they have their own experience with all mentioned fields of study. Previously, they participated in local events (for example: horse riding days, three-king carols, etc.). At the moment, they are more concerned with the upbringing of children. At a time when both were unemployed in the early 1990s, they focused on using their parents' house, which is located near the town of Telč, to accommodate guests and set up a souvenir shop for tourists. The guest house is their main source of income today. They were brought to farm because of the family situation. They had the best relationship of all family members to work in agriculture.

Needs and ideas of the farmer for agroecology training:
Respondents know the term of agroecology, but do not understand its difference from organic farming system. They are interested in the field of agroecology and would be willing to participate in theoretical or practical training on various topics of agroecology. They consider a seminar with examples of good practice to be a suitable form. They cannot take part in long-term trainings due to the health of the husband, childcare and animal care. They are not convinced about the implementation of training on their farm. They generally attend few trainings; they do not receive offers. Information on topics: production, management, grants, regulations, are obtained from the Association of Sheep and Goat Breeders (they are the members). They use the State Agricultural Intervention Fund – as an active aid to the complications and the reports. They have many administrative responsibilities (e.g. many records for control organizations, they need 32 types of records). Decisions in the farm are always taken together. The planning of activities is ongoing throughout the year. For the above-mentioned reasons, they also see the future of farm management more pessimistically.

14.3. Interview 3

Type of stakeholder: Animal keeping private farms
Date of the interview: February 2020
Length of the interview: 90 minutes
Methods of the interview: Personal meeting
Form of operation: Private farm
Position of the respondent: Manager
Age group of the respondent: 25-34
Highest qualification of the respondent: University – Faculty of Agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

The farmer works at the farm full time. He has been interested in agriculture since he was a child, he started his business in 2016, after graduating from the university. A part of the farm and some buildings are under rent. He farms together with his father in one agricultural subject (common farm status) – there are 2 tax entities on the farm. When he started farming in 2016, the condition of the farm was very good, thanks to his parents, who thoroughly renovated everything after the return (so-called restitution) of the devastated farm. His parents are active in agriculture (now on their part of the farm), the wife of the respondent helps, but the children are still small for work at the farm. He does not employ other workers. He is optimistic about the future and hopes that a member of the family will continue running the farm. The farm is in the organic farming system. It produces cattle without marketable milk production (Aberdeen Angus breed), meat calves and purebred animals for further use of breeding, as well as horses and sheep. The farm keeps poultry, rabbits, donkeys and pigs. The farmer chooses animals according to their health condition, breeding value, exterior, performance. The farm produces and uses its own feed. Nutritional supplements or some additives are used to a small extent only for horses. Allopathics or antibiotics, are used only medically with a prescription from a veterinarian. The farm does not use any other agricultural by-products for feeding. The manure is applied to the arable land of the farm. Sheep spend all year round on the pastures, horses half a day, cows 10 months, heifers all year round and bulls are outside during the grazing season. Stabled cattle have the possibility of outdoor paddocks. Forage is produced on the farm; the farmer buys only grain. The farm offers grass silage and hay for sale. As a part of animal production, the farmer sells live animals, including lamb to a lesser extent. No construction or renovation of buildings is currently planned on the farm. When building new capacities, the price and appearance compromise is crucial for the farmer. He takes welfare of animals for granted.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farmer has a university education (Faculty of Agriculture – field of Zootechnics and one year of study at the Faculty of Veterinary and Pharmaceutical Sciences). He has been interested in animals since childhood. The family has a close relationship with parkour riding, horse breeding and with environmental activities. He considers his knowledge regarding the state of the soil and other natural resources and their protection to be average as well as the knowledge of economics. They have limited knowledge and partial experience with economic diversification. He gained excellent experience from his parents in the field of animal husbandry, sales, and marketing. In his view, EU rules, national and local regulations are often excessive and restrictive. Communication within the family and the company is good and with the neighbours is average. The farmer considers knowledge in relation to the social aspects of agriculture to be average to limited, although he has a high social awareness.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
The farmer considers agriculture as a job, a profession, and a lifestyle. He feels co-responsible for the economy and the place left to him by his ancestors. He is proud to be able to continue farming on his family farm. It seeks to contribute to the protection of the environment to the extent that it is in line with its own principles, attitudes, and expectations. Farmer tries to help the surrounding farmers and actively cooperate. The respondent is a member of the Association of Private Agriculture, the Association of Beef Cattle Breeders, the Association of Aberdeen Angus breeders, the Association of Sheep and Goat Breeders. He considers his knowledge about natural resources to be average. He also considers economic and social knowledge to be important for the viable and profitable management of agriculture. Sometimes he likes to work in a team, sometimes he prefers to work alone.
Needs and ideas of the farmer for agroecology training:
The farmer is familiar with the concept of agroecology from his university studies and he is interested in the topic. He is also interested in participating in one-day seminars (twice a year will be enough for him, and not on his farm). He considers the role of the farm manager to be decisive. Information on topics – production, management, grants, and regulations, he gains by studying literature on the Internet, and from seminars of associations of which he is a member. He is particularly interested in new technologies. Long-term farm decisions should be made together with all the family members. Activity planning (capacity utilization, feed provision, investment, etc.) should be prioritized. He also wants to try to be a good manager and produce what he can do, mostly beef.

14.4. Interview 4

Type of stakeholder: Mixed private farms
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: Personal meeting
Form of operation: Private farm
Position of the respondent: Manager
Age group of the respondent: 35-54
Highest qualification of the respondent: Agricultural High School

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent operates his farming as a secondary activity. His main job is technical worker at the Department of Agroecosystems, Faculty of Agriculture, University of South Bohemia. The farmer manages an area of 85 ha. He farms on land which is partly purchased and partly leased. His wife is involved in agriculture as well, she owns some parts of land, resp. property (this land is in the conventional regime). The rest of land is managed by a respondent in ecological regime. He is registered with the control organization KEZ. They have the status of a joint economy with 2 tax subjects. He does not employ other workers outside the family members. The farm draws agri-environmental support for its management. The farmer cooperates with University of South Bohemia and UKZUZ (Central institute for supervising and testing in agriculture) in carrying out varietal experiments of cereals for organic farming. He considers the habitat conditions of his farm to be favourable. The soil is fertile. He thinks that its quality is improving by ecological procedures, he performs laboratory testing in the state regime. In crop production, the farm is focused on growing spelt wheat, oat, barley, and potatoes. Crop rotation of the farm include intercropping. The farmer uses undersowing and mixtures (winter peas, spelt wheat and oats with undersowing). Plant nutrition of the ecological part of farm is provided by ploughing of the straw and organic fertilizers (green manure, manure). The most common harmful factors are perennial weeds (Cirsium arvense, Elytrigia repens). The greatest damage of land is caused by wild boars. In animal production, the farm is focused on sheep breeding (about 67 ewes producing lambs). From spring to autumn, the animals are constantly grazing. There are located light shelters for them. The farm produces enough of its own quality feed. They do not use nutritional supplements, additives, or agricultural by-products to feed. Antibiotics and allopathics are not used beyond the guidelines. The farmer sells market crops and live animals. He does not process the production for the market. He tries to invest and restore the property from grant titles. For a new building, he would prefer 70% animal welfare for the new building, the rest for appearance and economy. He expects his son to take over the farm in the future.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent considers local knowledge to be important for the agricultural production and the sustainable resource management. He considers his knowledge of soil, soil processes, soil water and plants to be high, as well as his knowledge of biodiversity. His knowledge of nutrient cycles, photosynthesis processes and other knowledge related to physiology, growth and development of plants is average. He highly appreciates the role of agriculture in the supply of food and raw materials, including energy, and the role of agriculture in maintaining of the rural production and social activities. He believes that agriculture could make a greater contribution to maintaining rural settlements, providing additional income for society. It has the potential to maintaining rural traditions and lifestyle as well as the general sustainability of the landscape and the countryside. Regarding the evaluation of knowledge which are important for the sustainable management of the company, he believes that he has a high knowledge of financial

management, purchasing and logistics, as along with good communication skills. Knowledge of EU and local regulations is average. He also evaluates his knowledge of economic diversification in a similar way. His business shows that he diversifies production, economic and operational processes quite well. He has general knowledge in the field of social aspects. The knowledge regarding social behaviour and employment of disabled people, the role of agriculture in tourism, recreation, and education are assessed as average. He generally considers the role of the farm manager to be especially important. He considers the need for follow-up of all activities to be important as well. The decision-making process is important for all participants. All of them should be involved, especially during the planning of investments. The respondent plans in the horizon of 3-5 years depending on the field.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent is willing and able to contribute to the protection of the environment to the extent that is in line with his own principles, attitudes, and expectations. He prefers diversity and variety as the basis for system stability. He considers agriculture to be a profession. He approaches to the solution of problems pragmatically; he appropriately uses the knowledge and experience gained in the basic profession at the Faculty of Agriculture of the University of South Bohemia. Currently, he does not c observe any significant impact of climate change on his agricultural economy. He encounters environmental issues daily. He participates in seminars organized by the control organization of organic farming. The respondent helps other farmers in distance individual counselling guaranteed by the faculty and supported by the Ministry of Agriculture.

Needs and ideas of the farmer for agroecology training:

The farmer is familiar with the concept of agroecology. He works in the Department of Agroecosystems. He is interested in this field of study and would be willing to participate in a theoretical or practical short-term trainings on various topics of agroecology taught by people with experience. They consider the seminar with a practical demonstration to be a suitable form for him. They prefer 1 one-day training per year. He cannot take part in longer-term training because he does not have much free time. He does not think that the training on his own farm is required.

14.5. Interview 5

Type of stakeholder: Animal keeping private farms
Date of the interview: April 2020
Length of the interview: 60 minutes
Methods of the interview: Phone call
Form of operation: Private farm
Position of the respondent: Manager
Age group of the respondent: 25-34
Highest qualification of the respondent: Agricultural High School

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent has been working in agriculture since 2005. He is a manager of the farm and it is his secondary activity. He farms together with two of his brothers who work on the farm after their regular job (firefighters). They have bought this farm, but their family has been farming on about 20 hectares in the neighbouring cadastre for many generations. They started building the whole farm in 2005. At that time, there were more subsidies and better realization prices of cattle. Now, the situation has become difficult. They try to sell meat directly from the farm. There are 2 more permanent employees on the farm.

The farm is managed according to the principles of organic farming and is registered with the Ministry of Agriculture and controlled by one of the control organisation (KEZ). It is focused on beef cattle (breeding cattle and animals for slaughter) and horse breeding. They breed Limousine and Aubrac cattle in purebred form. Currently, the herd consists of about 200 animals, of which about 80 mothers (about 60 cows are fertilized by insemination, the rest of them are fertilized naturally). Their breeding is one of the best in the country. They join breeders' competitions (for example: Vojta the breeding bull won the prestigious Golden Cob award last year). During the grazing season, they have all-day entrance to the pasture. They sell live animals, but they plan to implement their own slaughterhouse. They make their own feed, buy only mineral supplements enriched with selenium. They use molasses as agricultural by-product for feeding. 99% of feed for cows and heifers come from their own production. Every breeding bull receives about 1.5 kg of concentrate per day. They use antibiotics only with a prescription from a veterinarian. Stables for animals are favourable from the point of view of welfare. During the season, the animals have all-day access to pasture. They have 160 hectares of fenced pastures. The condition of the K-85 cowshed was adapted to the conditions of cattle. All buildings have red roofs and are made by wood. They thus meet the requirements for balanced demands in terms of animal health and welfare, economy, and aesthetics. A smaller part of the area is set aside to produce their own grain feed (they grow triticale, wheat, oats, and rye with clover undersowing) and straw for bedding. The manure is ploughed. The slurry is put into the soil with a hose applicator. The arable land is then modified by disking.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

Agriculture is a family tradition and the respondent hopes to continue. Although all 3 brothers are professional firefighters, they take agriculture as a profession and lifestyle. To the question: "What knowledge do you consider important in agricultural production and sustainable resource management"? the answer is: "There are many of them. I am focused on animal production. I work as a veterinary technician and I am educated in animal breeding. But I still have to learn how to care about meadows and I also need a foreign language for our animal shops. One brother is focused on mechanization and crop production, the second is in charge of finance and helps me with the animals. The respondent considers the knowledge in the field of protection

of natural resources and their sustainable use to be average for all the brothers. In terms of viable and profitable agricultural management regarding ethical and sustainable management and resources, he states that in all these areas, it is important to have a sense of communication with people. The owners are only members of The Czech Beef Breeders Association (ČSCHMS), but with a remarkably high ability to actively participate and present the breeding (see above).

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmers are convinced that they can contribute to the protection of the environment to the extent that is in line with their own principles, attitudes, and expectations. Information about production; management; grants and regulations are obtained from a paid consultant. In their opinion, the role of the farm manager is difficult. The manager's wife works at the Institute of Soil Biology of the Academy of Sciences of the Czech Republic and brings a good relationship with the environment to the wider family and beyond. The farmers strive for sustainable farming by the crop rotation, using organic fertilizers, and roofing the dunghill. In addition to those described above, they take care of the forests and try to work with children. Decisions on larger purchases and the direction of the farm should be taken together. The planning depends on the type of events. They have the feed for a year and try to maintain a six-month reserve. Investments are planned for several years ahead, but when it is possible to buy land, the investment will shift. They still want to devote themselves to the production of breeding animals, but at the same time they want to build their own slaughterhouse and start selling meat.

Needs and ideas of the farmer for agroecology training:

The respondent is interested in attending seminars, courses and other forms of the education. He would also take part in a 3-5-day training at an external training place. He would have to commute, but it is interesting for him. He is interested in completing and organizing training on his own farm according to the season.

14.6. Interview 6

Type of stakeholder: Mixed enterprise
Date of the interview: March 2020
Length of the interview: 120 minutes
Methods of the interview: Personal meeting
Form of operation: joint-stock company
Position of the respondent: Agronomist
Age group of the respondent: 35-54
Highest qualification of the respondent: University – Faculty of Agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

Bemagro (joint-stock company) was established in 1994 from several former state farms. Today it farms on 1930 hectares. The company's assets are partly owned, partly purchased, or leased. Most of the area is occupied by meadows and pastures, arable land makes up almost a quarter of the area-470 hectares. Bemagro has more than 50 permanent employees. The company has been registered as organic for more than 20 years and has been a certified biodynamic farm for almost 10 years. Crop production provides enough quality feed for their own animals – haylage, hay and grain. Rye, wheat, spelled, oats and buckwheat are mainly grown for sale. The company also grows vegetables. In its assortment, it has a smaller amount of more demanding types of vegetables grown from seedlings, larger areas are occupied by potatoes and root vegetables, especially carrots, beets, parsnips, and parsley. The crops can be stored in good condition until spring, thus extending the time it can supply customers. Mineral fertilizers and pesticides are not used, decent yields are achieved by proper agrotechnical measures using a suitable crop rotation. An important goal is the long-term improvement of soil quality. The control of soil is performed by the company itself.

In animal husbandry, the most important part is dairy farming. The original Holstein breed is gradually transforming into the Czech breed of cattle by crossing, which is more suitable for organic farming. In summer, over 300 cows graze in the wide neighbourhood of the farm, in winter they use the nearest pastures as a paddock. The time staying on pasture depends on the weather, dairy cows about 8 hours, meat breeds 24 hours a day.

The animals are mostly fed by grass, haylage and hay. Soy or lupine is usually bought. Calves are kept in groups and fed by milk. Animals are not dehorned. Medicines are not given for preventive reasons, antibiotics only on the prescription of a veterinarian. Heifers of the Czech breed are bred in the company and there is also a farm for beef cattle with about 60 pieces.

The company operates its own dairy production. The dairy was launched in the spring of 2016. All basic types of products are created using traditional methods: pasteurized milk, natural and flavoured yoghurt, cottage cheese, sour drinks, and various types of cheese. The cheeses mature in an underground cellar. All products except cheeses are packed in returnable backed-up glasses and bottles, which is quite labour-intensive and logistically demanding. The company receives subsidies for organic farming, it is a member of the association of organic farmers PROBIO.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent considers her expertise to be average in the field of natural resources and their protection and high in the field of biodiversity. Her knowledge in the field of management is average, in the field of finance and economic diversification it is limited. She places great emphasis

on that ethical behaviour, believes, and skills are much more important than knowledge in many areas. In relation to the social aspects of agriculture, she considers his knowledge to be average.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent places the highest emphasis on the role of agriculture in the protection of the natural environment and landscape. This is also related to the idea of the company's founder with the support of his employees. The respondent has a positive attitude towards cooperation, but she also likes to work alone. In addition to agronomic work, her tasks included presentations in the media, communication with control bodies, planning, arranging excursions and internships for students and other interested parties.

In addition to organic production, Bemagro takes care of the landscape. It is often a matter of repairing the damage that was done in the second half of the last century – for example, the boundaries are being restored, which, in addition to their key anti-erosion function on sloping land, also increase biodiversity. Other measures "for nature" include the construction of bio-corridors, alleys, windbreaks, ponds, protection of wetlands and, of course, the very way of managing agricultural land – starting with the method of fertilization and ending with the system of mowing meadows and pastures.

Needs and ideas of the farmer for agroecology training:

Due to the sale of the company, the respondent is leaving the field agriculture. The company will continue to operate ecologically, but the biodynamic activity should not be continued. The new owner will decide on the next direction of the farm. Therefore, the respondent is no longer interested in agroecology/farming trainings.

14.7. Interview 7

Type of stakeholder: Mixed private farms
Date of the interview: March 2020
Length of the interview: 150 minutes
Methods of the interview: Phone call
Form of operation: Private farm
Position of the respondent: Manager
Age group of the respondent: 35-54
Highest qualification of the respondent: Agricultural High School

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent has been involved in agriculture since his childhood. Traditional family farm run by his parents (both cooperate fully) farming in Křenovice u Dubného. In the restitutions period, the farm was returned completely devastated. The restoration took more than 30 years. He does not employ other people; the successor should be a son. The respondent is a member of the Association of Private Farming. He keeps in contact with other farmers.

The farm is focused on conventional farming. The farmer manages an area of 212 ha, of which 113 ha are meadows and pastures, and 90 ha is arable land. From the whole farm, one part is inherited, other purchased and the other leased. The farm is mainly focused on breeding beef cattle of the Simental breed. Farmer has 95 pieces of meat cows. The basic herd consists of 30 cows and one breeding bull. Another part of animal production consists of pig breeding (currently 69 pieces). The basis is 10 sows and one breeding boar. In lower quantities, he deals with the breeding of sheep (currently 10 pieces). He uses modern methods of reproduction, uses antibiotics exceptionally, uses his own feed and buys nutritional supplements. The stay of animals outside maximizes and harmonizes living conditions. He built a slaughterhouse and sells packages of processed meat. Meadows and pastures form a feed base for farmed cattle, on arable land it grows mainly cereals. He uses manure, grows intercrops but no legumes.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The respondent states that he farms for profit, but he considers farming as a lifestyle. He sees the effects of climate change as huge, now the main problem for him is drought. He believes that he can help reduce the impact of climate change. The farmer relies on his experience. He considers his knowledge in the agronomic field and in economics to be average. He answered "on average" to all other questions concerning the role of agriculture and social aspects. He acquires skills about regulations and other possibilities of farm development from the Association of Private Farming. He has been cooperating with the ARPIDA center for the rehabilitation of people with disabilities for a long time. Children from the local kindergarten visit the farm every year in the spring to get acquainted with life on the farm, agricultural machinery and animals. The company is also visited by students of the Faculty of Agriculture of the University of South Bohemia, including foreign students. The farm also sponsors the children's competition team of the Křenovice Volunteer Fire Brigade.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Although he farms conventionally, he has a sensitive attitude towards nature, land management and animals. He commonly uses the Internet and follows the model of a family farm. In 2019 he received the title of "The best private farmer of the year", which is awarded by the Ministry of Agriculture and Associations of Private Farming of the Czech Republic. All meadows and pastures

are involved in agri-environmental nature protection programs with specific conditions. He does not grow crops in wide rows such as potatoes or corn because he wants to reduce the risk of soil erosion and thus devastation of the soil profile. Clover mixtures serve as quality feed for cattle (haylage) and contribute to soil fertilization. There are many factors that play a role in maintaining of soil quality (for example: the use of modern agricultural machinery and suitable technologies from soil preparation, sowing, crop treatment to harvest). He does not use high-volume trailers and heavy equipment. He tries to take care of the soil through proper management. He is therefore fully aware that the soil is a non-renewable natural resource.

In 2015, they joined the program for the protection of the northern lapwing (Vanellus vanellus), which occurs in some of our fields. By sowing of suitable crops and following specific agrotechnical procedures, they would like to help increase the occurrence of this bird species, which used to be abundant in our country.

Needs and ideas of the farmer for agroecology training:

He is interested in gentle farming methods and the field of agroecology. He would like to participate in theoretical and practical training in this topic on a weekly basis (according to the season). He does not prefer the internship on his farm.

14.8. Interview 8

Type of stakeholder: Horticulture private farm
Date of the interview: February 2020
Length of the interview: 90 minutes
Methods of the interview: Phone call
Form of operation: Private farm
Position of the respondent: Manager, owner
Age group of the respondent: 35-54
Highest qualification of the respondent: Elementary school

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent works in agriculture. He manages 7.5 hectares of leased agricultural land. At the time of launch, the company was in good condition. He feels connected with his farm. This work is a joy for him, and he takes it as a lifestyle. He occasionally employs some family members; other workers are not employed there. He does not know if he will have a successor (he fears that the lease of the land may not be permanent). The farmer receives an agri-environmental support.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

He considers his knowledge of agriculture to be average, he is not always able to meet the required quality of production. He has a limited orientation in regulations and economic diversification. He feels on average in the field of finance and communication, and on a high level of knowledge in purchasing and logistics. The farmer cooperates with other farmers. He is a member of the Fruit Growers' Union, but in terms of communication and exchange of experience he is independent, more closed. He sees the social function of the countryside as high in terms of preventing poverty, but less so in terms of maintaining of the rural life. He also sees the limited possibilities of the agriculture in the support of tourism. In his opinion, his knowledge on other tasks of agriculture is only average.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer obtains information from the farmer's portal (portal of the Ministry of Agriculture). He does not know or care about the concept of agroecology. He receives an agri-environmental support. He uses post-harvest residues for birds. He uses traditional methods and pheromone traps to protect trees.

Needs and ideas of the farmer for agroecology training:

He is not interested in acquiring knowledge in the field of agroecology, although he does not know this concept. Nevertheless, he would be willing to participate in interactive seminars or trainings for 2-3 days.

14.9. Interview 9

Type of stakeholder: Horticulture private farm
Date of the interview: April 2020
Length of the interview: 60 minutes
Methods of the interview: Phone call
Form of operation: Private farm
Position of the respondent: Manager, owner
Age group of the respondent: 25-34
Highest qualification of the respondent: Elementary school

Activity, sustainable farming practices, sustainability challenges of the farm:

The respondent works in agriculture. He manages 28 hectares of his own (purchased, leased) agricultural land. He has been farming since 2008. There are orchards on the farm. He produces mainly apples (15 ha) and a smaller amount of cherries and plums. The farm produces musts from the fruit. At the time of launch, the company was in good condition. The soil is fertile, and the farm uses AZP analyses (agrochemical testing of soils). The leftovers from the orchards are used as feed or are composted. He farms conventionally, but he sensitively uses sprays and combines them with pheromone traps. He feels connected with his farm. This work is a joy for him, and he takes it as a lifestyle. He occasionally employs some family members; other workers are not employed there. He does not know if he will have a successor (he fears that the lease of the land may not be permanent). The farmer receives an agri-environmental support.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

He considers agriculture to be demanding in terms of the need for knowledge. He considers his knowledge of agriculture to be average and in terms of biodiversity he thinks he has limited knowledge. He has average knowledge in regulations, economic diversification, finance and communication. The farmer cooperates with other farmers to a limited extent. He is a member of the Fruit Growers' Union, but he is independent and does not exchange experiences very often. He sees the social function of the countryside as high in terms of preventing poverty, but less so in terms of maintaining of the rural life. He also sees the limited possibilities of agriculture in the support of tourism. In his opinion, his knowledge on other tasks of agriculture are only average.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer obtains information from the farmer's portal (portal of the Ministry of Agriculture). He does not know or care about the concept of agroecology. He receives an agri-environmental support.

Needs and ideas of the farmer for agroecology training:

He is not interested in acquiring knowledge in the field of agroecology, although he does not know this concept. Nevertheless, he would be willing to participate in interactive seminars or trainings 3-4 times a year in the form of an active exchange of experiences.

14.10. Interview 10

Type of stakeholder: Mixed private farms
Date of the interview: April 2020
Length of the interview: 80 minutes
Methods of the interview: phone call
Form of operation: family farm
Position of the respondent: full time worker, owner's son
Age group of the respondent: 25-34
Highest qualification of the respondent: Master's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

A young farmer who farms with his older brother and father. It is a family farm with a long tradition and would like to continue the trend (from father to son). The farm is focused on a wide range of production. The farm has cattle (fattening bulls and dairy cows), 10-15 pigs (per year), about 30 sheep under organic farming system, poultry (laying hens and broilers). Arable land is used to produce feeds and commodities that are intended for sale (cereals, rape seed). The farm does not have its own processing unit for beef, but they have large storage spaces (especially for cereals). The respondent has been engaged in agriculture for more than 15 years. Farm produces a large amount of manure; manure is applied to the arable land. They buy only micro-elements and the necessary vitamins and milk powder for calves. Only mutton and pork (10-20 pieces) are partially processed on the farm. Bulls are sold live (usually to German customers, due to price), lambs are slaughtered and processed. However, the positioning on the market is not ideal – their products are underestimated, and it does not meet the expectations – mainly due to logistics. Due to non-intensive farming system, he considers his products to be of high quality – the farmer knows what he is selling. Local interest is great, but the farm would not be financially self-sufficient only on this interest. The farm is divided into 3 – two conventional characters (280 ha in total, 200 arable and 80 meadows, owns 60 ha, the rest for rent) and a small part (perennial grassland) is under organic farming regime. They have complications with payment of rent (cca 150 Euro per ha per year). The crop rotation is applied as follows: barley (spring and winter), winter wheat, and in spring rape seed, silage maize, oat, rye for silage + some minor plants (e.g. legumes). They employ seasonal workers on the farm, but not as part of social services. This is not a widely known area.

The animals have green fodder in the season (5-10% according to crop rotation) and the dairy cows spend 50-60% of the time on the pastures. Bulls for fattening are permanently in stables. The respondent only partially deals with the stabling conditions. It depends on the circumstances and building materials, everything depends on finances. Functionality, low cost, and practicality are preferred on the farm. They use minimum tillage in field work, mulching, straw covering, organic fertilization (green manure, cattle and poultry manure and compost). They are focused on proper waste management on the farm. They consider this to be very important in relation to the environment. All the waste is transported to the municipal waste incinerator – municipal waste, bale nets, tarpaulins, plastic bags, and other materials. It is financially demanding, and it must be always packaged (for suitable transport). They try to avoid chemical crop protection, but it is usually necessary – especially when growing rape seed. The farm cooperates with neighbouring farms (e.g. services connected with sowing of maize), cooperation in mowing cereals and meadows, exchange of experience (how to gain subsidies). However, there is strong competition in terms of arable land. The respondent obtains information from the Association of Private Farming of which he is a member.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

For the farmer, the most important area of knowledge is plant nutrition, plant protection, diseases, pests, and technology. The respondent considers his knowledge of agro-environment, management, and society as average. He is most oriented in the field of animal keeping and feeding and plant protection. He has education in agroecology, but his farm is focused on more intensive way of farming. They plan their daily activities together with their father and older brother, and the father's opinion is decisive. They jointly plan the crop rotation and feed rations for animals. The respondent is responsible for the sheep farming under organic farming system.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent knows the field of agroecology well. It is a field that he studied at the university. But he believes that he does not apply the principles of agroecology at the farm. He prefers profit. He is interested in plant nutrition, plant protection, processing and marketing of meat products. This is also the area he is interested in potential trainings. He could attend the trainings at any time. However, this is difficult during the season. He would also be willing to provide space for trainings on his farm. They could provide many examples of working with the soil using minimal technologies as well as traditional plowing, manure application, manure storage, animal husbandry and plant protection. He considers his father to be the manager of the farm and his role is essential for the proper functioning. The relationship with the region is important for the adequate operation of the farm and they aim for the highest possible self-sufficiency. He tries to draw information about the possibilities of improving soil quality and the quality of animal husbandry. He is also looking for information on ways to support biodiversity. The aim is to support small-scale production and the family character of the farm.

Needs and ideas of the farmer for agroecology training:

The farmer would like to build a beef processing unit, this would lead to higher self-sufficiency and higher efficiency in the market. It is important to ensure a sufficient amount of farmland. As part of any possible trainings, it would use those that focus on animal husbandry, meat processing and subsidies. Environmental aspects are not a priority for him.

14.11. Interview 11

Type of stakeholder: Animal keeping private farm
Date of the interview: March 2020
Length of the interview: 80 minutes
Methods of the interview: phone call
Form of operation: private farm
Position of the respondent: full time worker, owner's daughter
Age group of the respondent: 25-34
Highest qualification of the respondent: Master's degree in Agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

Respondent is working at the farm since her childhood. The farm is focused on milk and meat production under organic farming system. Part of the farmland is in private hands and part is under rent. The farm has modern cow-house, facilities, machinery, and all buildings are in good condition. All the family works in agriculture and they have long-term experience and practice. They keep high productive breeds of milking cows (Holstein Friesian and traditional Czech breed), and Aberdeen angus breed for meat, they produce their own feed that comes from pastures and arable land. They have good and large storage facilities. The farm uses a 5-year crop rotation. They grow Lucerne, clover grass mixture, winter wheat, spring barley and triticale. On smaller areas, they experimentally grow marginal cereals (e.g. spelt wheat). From feed, the farmer buys only granules for calves and organic mineral supplements, feed salt, feed limestone, organic mineral mixture. They have their own meat processing plant and produce packages of meat for sale. They are satisfied with the sales of the products and the quality is high. They have a very positive attitude towards agriculture and the surrounding landscape. They take agriculture as a lifestyle.

Only family members and two permanent employees work on the farm, they employ other workers during the harvest season. There is no cooperation with the community. Access to the animals is in relation to the welfare principles. Cattle raised for meat production are on pasture all year long, dairy cows have access to pasture also throughout the year. The farm uses a highly sophisticated milking system (robotic one) and stables with automatic air-condition system. The manure produced is used mainly on arable land, slurry on meadows. They focus mainly on animal welfare and the quality of the materials they used (natural materials). Practicality is essential for farm management.

They use close cooperation with neighbouring farmers and pass on information and experience to each other. They are a member of several organizations related to organic farming. They are also members of the Private Agriculture Association.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farm operates a guest house with a restaurant and agro-tourism activities. However, this is an additional activity, especially during the high season. For the farmer, the most important area of knowledge are principles of organic farming. The respondent considers his knowledge of agri-environment, management and society average. But they believe that their principles of organic farming are working well and sustainable. She is most oriented in the field of animal keeping, financial support and agro-tourism. She has education in agroecology and has long-term experience in agriculture. They plan their daily activities together with their father and husband. They plan the sowing, manure management, market plan and feed rations. The respondent is responsible for the subsidy programs and economic aspects of the farm.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
She has a high knowledge of agroecology due to her studies in the field of landscape care and agroecology. She considers education to be very important. She is constantly trying to educate herself. The field of education focuses on agri-environmental programs. She tries to coordinate and ensure the correct sequence of work on the farm. All by mutual agreement with other members of the family. They consider communication and reliability to be important. They do not work with the community but only within a close circle of the family. The organization of work and the planning of sowing procedures are based on the current market situation and financial predictions. The subsidy support also plays an important role in business in relation to nature protection. Thanks to the financial support (subsidies), they are able to fulfil the principles of nature protection and its support. This concerns the modernization of the farm background and the possibility of including green strips, wastelands, and clover-grass mixtures, etc.
The respondent is not interested in multi-day training courses. She prefers one-day excursions with examples of good practice. She would not be interested in multi-day courses abroad. She is not interested in a possible course on her farm.
Needs and ideas of the farmer for agroecology training:
Examples of good practice

14.12. Interview 12

Type of stakeholder: Arable crop producer private farm
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: phone call
Form of operation: private farm
Position of the respondent: owner
Age group of the respondent: 25-34
Highest qualification of the respondent: Master's degree in agriculture

Activity, sustainable farming practices, sustainability challenges of the farm:

This 32 ha. farm is run by a young farmer. 30% of the land is owned, the rest is leased. He bought the farmland himself. He started independently farming since 2009. Before that, he did business together with his father. He has more than 15 years of experience in agriculture. The farm is focused on crop production. He works for the purpose of profiting from the sale of all commodities. On the farm, crop products are not processed or used as feed. All production is for market.

The situation on the market does not correspond to the farmer's ideas – he has no storage capacity – he must go through the dealer, therefore, the profit is not so high. He has a strong relationship with the area in which he farms and his farmland, and he takes agriculture as a hobby but also as a great responsibility. He considers it a family heirloom and would one day like to hand over the farm to his children. In agriculture, the whole family works full time (parents and sister). The farmer has another job in relation to agriculture (soil quality evaluation).

The condition of the arable land and adjoining landscape is improving. There are more small farms, high diversity and positive results of good hunting management. He sees big benefits for the farmland when is owned by farmers who work on it. He has no employees; he relies on his own work. He works in the Less Favoured Area and believes that the local soil fertility is not sustainable in the long run without added value (e.g. organic matter) and the soil would lose fertility quickly.

The farmer does not use any types of agri-environmental support/subsidy because it does not have permanent grassland. To support the soil fertility and the surrounding landscape, he uses green strips, underseed, green manure and crushed straw. The target is to retain water in the soil. He does not use irrigation. He is not farming in organic farming system, but there is an area that is (3 ha) without intervention (green land). This area is primarily for wild animals. He regularly checks the condition of the land and he prepares a plan for monitoring soil potential. He is working with the experience gained from his university studies and his second job.

Because he has no animal production and no manure, he includes legumes and other intermediate crops (mustard, clover, radish, bundle, buckwheat, etc.) into the crop rotation. He uses green manure and establishes small plots for wild animals. He tries to increase the amount of organic matter in the soil and prevent wind erosion in the winter season letting intercrops freeze.

Pest control and weed control: The farmer monitors the level of harmfulness and does not use chemical protection for preventive purposes, only in a targeted manner and only according to the occurrence of pathogenic agents. He does weed control with the help of herbicides and uses ploughing as a mechanical measure. He does not use biological protection. He monitors the effects of climate change in relation to water and soil.

Self-perceived attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

For the farmer, the most important area of knowledge is plant nutrition, agrotechnical terms (correct dates of sowing and harvesting), plant protection, diseases, pests, technology, market orientation, and choose the right approach accordingly. The respondent considers his knowledge of agri-environment and management high. He is most oriented in the field of soil, water, biodiversity, and climate change. It has to do with his education and interest. In the field of economics, especially in finance, logistics, sales, marketing and EU, national and local regulations, and communication he considers his knowledge are average. Within the field of society, his knowledge is rather average. He has high knowledge in the field of agriculture as an income generating and supplementing activity, the role of agriculture in eradicating poverty, the role of agriculture in protecting the natural environment and landscapes and the role of cooperation in agriculture.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The respondent knows the field of agroecology well. It is a field that he studied at the university. He is still being educated today thanks to his job and thanks to hunting. He is partially interested in the field of agroecology. He is not fully interested in it because he is not applying it directly.

He is interested in possible educational courses and he attends them regularly. The most sought-after examples are good practice and advice in the field of finance. He would be willing to participate in multi-day trainings also abroad. Outside the harvest season he can take the course at any time. He would be willing to carry out training on his own farm. For example, demonstrations of wildlife management and biodiversity management. He plans to enter the field of farming in a regional competition focused on hunting.

The farmer obtains the most information from the Farmer's portal. Daily information on trainings, grants, news from the Ministry of Agriculture.

He considers education to be the basis. Information about the possibility of drawing financial support is important to him (he understands it as a tool for increasing competitiveness). It is important for him to cooperate with other farmers (e.g. when ousting wildlife from meadows before mowing).

The farmer does not make long-term plans for his fields, but uses a program to record oil consumption, seeds, or work. Furthermore, he plans only crop rotation (5 years), use of varieties, nutrient management, investments, etc. all based on market demand and future financial results. In the future, he would like to buy a field sprayer, culture the facilities, improve the visual appearance of the farm, build a stable and a shelter for the machines.

Needs and ideas of the farmer for agroecology training:

Examples of good practice and finance – financial benefits arising from an agroecological approach.

Annex 5. National Consultation with Farmers and Key Actors in Portugal: interview transcripts

GAIA
Grupo de Acção e Intervenção Ambiental
2020

15.1. Interview 1

Type of stakeholder: 2.2 Organic farmer
Date of the interview: March 2020
Length of the interview: 60 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Owner of the farm
Gender of respondent: M
Region where the respondent operates: Algarve
Size of the farm: 17 ha
Main crops: Wine, sweet potato, processed products (Peanut butter, toasted peanuts)
Start of project: 2000
Age group of the respondent: 35 to 54
Highest qualification of the respondent: Vocational secondary schooling in agriculture.

Activity and sustainability challenges of the farm:

The farm is certified organic, stretched over 17 ha in Aljezur, on Portugal's south west coast, and has been producing for 20 years. The owner receives subsidies and employs one-person full time while others are hired seasonally to help with specific tasks.

The farm mainly produces wine, peanut butter, toasted peanut and sweet potato.

The processed products are produced in a small factory owned by the farmer.

Income comes from selling to organic supermarkets, restaurants, grocery stores as well as directly to customers.

The past 20 years the farmer has witnessed the growth of agro-industry in the region, so he worries that he might not be able to continue farming if these intensive practices end up surrounding him.

He is keen to continue producing traditional crops/varieties and to teach the younger generations how to work with them, before this knowledge is forgotten.

When he started, his fields were full of brambles and bushes, and he observes that the land has been improving in fertility and productivity.

He feels that climate change has upset the weather patterns, it rains less, and it is warmer than it should be, with differences between the seasons becoming less and less observable. This in turn affects the winter crops.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
The farmer's biggest fields (4 ha) are approximately 2 km from the ocean, on a very sandy soil, and this is where he plants the arable crops in summer (sweet potato and peanuts). To ensure the fertility of the land he leaves it fallow in the winter, or plants leguminous crops, such as peas or broad beans. To control summer perennial weeds, he sometimes leaves the land fallow in the summer as well.
He has 10 sheep that graze the fallow land and the vineyards. Their manure is used to fertilise the summer crops. The vineyard occupies about 1 ha and was only irrigated in the first years. In between the lines he lets the natural vegetation grow. Vine diseases are controlled using standard organic control, but he also applies Horsetail (Equisetum spp.) tea, as a preventive treatment against fungi.
Additionally, the farmer uses another 1.5 ha for horticulture for self-consumption, with a diversity of vegetables, such as cabbages, onion, garlic, tomatoes, etc, using traditional varieties that he has been preserving. Finally, he owns a mixed forest consisting of cork oaks (Quercus suber) and Stone pine (Pinus pinea), also near the ocean.
His water comes from the Santa Clara hydro-agricultural dam, and he uses traditional flooding methods to water the summer crops.
The farmer operates in a niche market of quality products and he considers he can satisfy his market's expectations.
In his opinion, in Portugal, family farming has been undervalued if not destroyed completely. But he believes this type of farming is vital to feed the world and to retain people in the inland territories. People cannot depend exclusively on tourism, otherwise the system can collapse, the core activity should be agriculture.
He feels a connection to his land and to the ancestors who farmed that land.
Operational decisions are taken together with his collaborators, but the strategic ones he takes himself.
The only training, he provides his employees with is of the peer-to-peer kind.
In the summer he organises pedagogical and touristic visits to his farm, he was also involved in organising a local 'forgotten food' festival.
He collaborates with an informal network with other farmers in the region as well as touristic entities.
Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
Agroecology means respecting the territories/landscape and ancestral knowledge. Organic farming is that what has always been done, and ancestral agriculture is permaculture. Agroecology he relates to courses such as Geography and Biology, that are taught at school, to help understand the functioning of the ecosystem.
He mainly learns and gets information about practices through his informal network.

Needs and ideas of the farmer for agroecology training:

He thinks that the **consumer needs to be educated, more than the farmer**. He would like to learn more about biodynamic farming and lunar calendars, also about food preservation methods and processing techniques. He says the course should be given in farms and not in classrooms.

15.2. Interview 2

Type of stakeholder: 2.4 Traditional farmer
Date of the interview: March 2020
Length of the interview: 90 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Owner
Gender of respondent: M
Region where the respondent operates: Alentejo
Size of the farm: 451 ha
Main crops: sheep and cows for meat
Start of project: Farm handed down several generations, new management about 10 years ago
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree (not concluded)

Activity and sustainability challenges of the farm:

This family farm belongs to a couple and is located in Castro Verde, southern Portugal, within a bird reserve, which is very restrictive and means that they can only produce cereals and livestock. Because of the sanctuary, it is forbidden to build infrastructures, plant trees, or diversify the crops outside Zone 1 (i.e. house, stable and shed area), to preserve the steppe agroecosystem. Within Zone 1 the female half of the couple has developed four areas for vegetable production for self-consumption, and they are practically self-sufficient in food.

The couple are the only people working and managing the farm. Subsidies are crucial, representing about 60% of the farm's income. They have no specific type of certification, and they claim to practice family farming, but intuitively they have been applying agroecological practices. Since they are not burdened by rules for OF, they are free to adapt their practices, which is important considering the hardships they face. This means not all practices are 100% sustainable, but they strive for the best solutions within their legal and financial restrictions.

The farm stretches over 451 ha and the main income comes from selling lambs and veal calves for export through an association that collects the animals from a great many farmers and is thus able to access better prices, the same goes for the wool from the sheep.

Since they started farming, they have managed to increase biodiversity, pasture productivity and resilience, as well as soil organic matter, they were also able to stop runoff and erosion.

Climate change affects them enormously. In the past decades annual rainfall has decreased significantly. Because of the lack of rain and the devastated soils, investing in inputs to produce cereal crops could be an economic disaster. Therefore, they instead invest the money directly in importing feed, from more fertile areas.

As climate change gets worse, they will get even less rainfall, and because of the restrictions they cannot plant trees to restore the landscape. Agriculture could be used to stop the desertification but if policies do not change the whole region could become a desert.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
They rotate their 400 sheep and 60 cows, in a holistic management system, comprised mostly of permanent pastures, but they also sow some fields with mixes of cereals and legumes. When the animals are ready to give birth, they are put inside the corral to avoid predation, and are fed hay, straw and nutritional supplements made from cereals.
The rotational grazing system works as long as there is rain, but they complain about the cost of the fences. The manure from the animals is used to fertilise the pastures.
Animals drink from ponds, that have been dug throughout the fields.
The soils are very compacted Leptosols, whatever little rain they get often turns into torrential downpours causing a lot of loss of soil from runoff. To counter this, eight years ago they started building swales on contour, spaced 24 m apart, using a tractor plough, starting with the 100-ha area surrounding Zone 1. As a consequence, they no longer have runoff and the pasture is more productive.
Within Zone 1 they planted small agroforestry systems, where, thanks to the shade provided by eucalyptus, vegetables and aromatic herbs are grown for self-consumption. Temperatures can reach 45 degrees Celsius in summer, therefore, without the eucalyptus, vegetable production would not be possible. They use mulching to further protect the soil and retain humidity. At the same time these trees provide shelter for birds.
They feel people have become disconnected from the land and from where food comes from.
Decision-making concerning animal management is reserved for the male owner and follows the logic of economic feasibility, whereas decisions concerning the vegetable gardens are taken by the female owner. They do not provide any type of training and rarely attend a training, since because of the animal care, which is a 365-days-a-year responsibility, they do not even have time to go to funerals.
They do not collaborate a lot with neighbours or with civic organisations in their area because attitudes tend to be very conservative.
They are part of a number of farmers associations to help sell their produce, and to get access to subsidies.
Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
The man was not really familiar with the concept of agroecology, but he thinks that it is about using farming to maintain the ecosystems. He was familiar and has experimented with the concept and ideas of permaculture.
They find their information on the internet, books, and through specific references mentioned below.

Needs and ideas of the farmer for agroecology training:
He suggests that the course should talk about the works of Bill Mollison, Geoff Lawton, Fukuoka and Yeoman; He would like to learn about holistic management in an arid environment. The course should be given in farms not in classrooms.

15.3. Interview 3

Type of stakeholder: 2.1 Agroecological farmer
Date of the interview: March 2020
Length of the interview: 60 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Rentee farmer
Gender of respondent: M
Region where the respondent operates: Alentejo
Size of the farm: 3 ha
Main crops: horticulture, in near future fruticulture as well
Start of project: 2008
Age group of the respondent: 35 to 54
Highest qualification of the respondent: Vocational secondary school

Activity and sustainability challenges of the farm:

The farm is located in Mértola, south-eastern Portugal and has a total of 3 ha. The farmer started working the land in 2008 as a bio-intensive vegetable and aromatic herb production farm. Nowadays it is an experimental Mediterranean agroforestry system and it is producing vegetables for the local market, local restaurants and municipal canteens. They are also starting a nursery for forgotten plant varieties with the aim to produce enough seed so that bigger farmers can plant these in their fields.

The farm is rented, has been certified organic and is subsidy-free. The farmer is the only one being paid, and they work with volunteers.

Archaeological findings have shown that the soil they are working on was transported in ancient times by people, from near the river up to the farm.

The impact of climate change in the region is plain to see, temperatures can reach up to 45º C in the summer. It rains about 250 mm per year, sometimes in only two single torrential rain events, which is what the worst predictions said would only happen in 2050. Because of the drought they have had to rethink the system, and therefore converted from bio-intensive to agroforestry. This new system is working better for them and while their neighbours' water their plants twice a day in the summer, they water twice a week, without losing productivity.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The most productive area of the farm is comprised of 1 ha of agroforestry. The system was inspired by traditional garden-orchard systems and syntrophic farming systems.

The garden is laid out with lines of perennial plants at every 4-5 metres and in between the lines annual vegetables are planted.

In the perennial lines they plant a big variety of fruit and support trees as well as bushes.

The plants are spaced about 15 cm apart, so that they can choose, in the future, what stays and what is chopped down. The species are peach, almond, grape vines, apple, quince, apricot, pomegranate, strawberry tree, loquat and prickly pear. However, the system has only recently been installed and the plants are not yet bearing fruit.

Support plants are rapid growing trees that serve the purpose of providing shade, physical support to vines and organic matter which they then chop down and introduce into the system. All the plants are well adapted to dry conditions and come from traditional varieties. In the lines of annual plants, they plant a big variety of vegetables.

They apply the principles of rotation between heavy feeders and light feeders, as well as companion planting. Beds are initially prepared using the rototiller and maintained using the broad fork.

They do not operate under the concept of weeds, claiming that, if a plant is constantly cut, it can be a source of organic matter. Their only pests are aphids and mites, they mainly let nature deal with them, but sometimes apply neem oil.

Seedlings are obtained from a local municipal tree nursery, that gets its plant material from local varieties.

Fertility is maintained by planting legumes and adding animal manures. The irrigation system is through drip irrigation.

All the lines are covered with mulch, with about 20-30 cm of organic material. They believe this is the key to water conservation in the soil.

The remaining 2 ha are comprised of native trees, shrubs, and aromatic herbs. They intend to use this area to restore it to natural vegetation, using the key line technique.

Apart from farming the farmer collaborates with the local food network, which lobbies, plans and collaborates to achieve regional food sovereignty and is very dynamic (see the joint summary of Interviews 1, 15, 17). They only provide peer-to-peer trainings on the farm, yet volunteers come from all over the world to learn, experiment and contribute to the processes happening in the region.

For lack of time the farmer does not have a lot of opportunities to collaborate with other farms or attend trainings. Operational decisions are made by him, but strategic decisions are discussed with all the people involved. He considers that the monoculture model does not provide as much jobs as small-scale farming, is harmful for the environment, and could worsen the impacts of climate change. His farm is one of very few experimental models of Mediterranean agroforests. A model that, should it work, could be replicated through the territory.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Agroecology means thinking and planning the farm in a sustainable way so that people can have an income but at the same time they do not exploit the earth, it also means farming in harmony with nature. The farmer mainly gets his information from the internet and finds inspiration in bio-intensive farming, syntrophic agriculture and permaculture, particularly the work of Ernst Götsch.

Needs and ideas of the farmer for agroecology training:

He would like to participate in a course but claims that he has no time. He suggests the topics of soil microbiology and ecology and educating the consumer.

15.4. Interview 4

Type of stakeholder: 2.2 Organic farmer
Date of the interview: March 2020
Length of the interview: 105 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Owner
Gender of respondent: F
Region where the respondent operates: Alentejo
Size of the farm: 288 ha
Main crops: Olive trees, cows for meat, cereals
Start of project: 2001
Age group of the respondent: 55 to 64
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm (handed down several generations) started production in its current form in 2001, is located in Ferreira do Alentejo, southern Portugal, and covers 288 ha.

It is a mixed farm, comprised of a non-irrigated olive grove, cereal fields, and sown pastures for cows. They employ 4 people full-time and one person part-time, but during olive picking season, their team expands to 15 workers.

The farm is certified organic and about 60-65% of the farm's income comes from subsidies. The olive oil and meat that they produce are brought to market through direct sales to customers, as well as local markets. The owner experimented with the CSA model but so far without success.

Since she started farming, she has noticed an increase in the fertility of the soil, and an increase in the number of wild birds, probably because they find refuge in her fields. Recently super-intensive olive groves have started to surround her farm, meaning she is now forced to grow living hedges, at her own cost, to protect their house and organic olive grove from the chemicals used by the neighbours.

In terms of climate change she has noticed that there is less rain and that the temperatures are higher. This in turn has reduced her olive productivity in the past years since the olive grove is not irrigated. Frost during the winter used to be common, now there is almost no frost. She also notices different types of plants appearing and the swallows that used to come in March, now arrive at the end of January.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farm consists of 22 ha of non-irrigated olive grove, which reaches a productivity of 1000 kg (1 tonne)/ha. Weed control is done by tractor. Pest management is done using insect traps with vinegar, and BT applications. Fertility is maintained by leaving the prunings on the field, maintaining a permanent wild clover cover crop, and periodically applying manure. Every two years she passes the chisel plough in between the lines to decompact the soil and promote water infiltration. She does not use livestock to control weeds because of the cost of fences or of a shepherd. Olive picking is done in the traditional method but using carbon fibre poles and plastic tarps.

She has approximately 100 ha of dry farming arable land where she sows pastures for her 50 cows to graze in the summer. In the winter, the cows graze on about 75 ha of Mediterranean shrubland and are supplemented with hay. Cows drink water from a well.

When the calves are big enough, they are transported to a corral near their house to be fattened. Their diet is based on hay, straw and cereals germinated by them, in trays. To make the hay, pastures, cereal seeds and green manures, she sows a special seed mix, with seed that she has been preserving for 20 years and that is comprised of a mix of cereals (wheat, barley and oats) and leguminous plants (vetch and peavine). She does not apply any kind of fertiliser to the pastures and has no need to make crop rotations because the seed mix is already a form of companion planting. They recently started experimenting with stockpiling pastures in the field for winter grazing, and noticed an increase in fertility, but it is dangerous because of wildfires. More recently she started planting wheat and is experimenting with two varieties, she pretends to integrate the wheat in a rotation with the seed mix.

All soil work is done by tractor and she considers her fossil fuel consumption to be high.

The farmer argues that agriculture has a vital but invisible role in society. Society is addicted to low prices, and prices should be fairer. Farmers specialised in monocultures are solely focussed on profit. If a food crisis hits, these farmers will go hungry, because despite having lots of land, they do not produce food for themselves or others. She feels that there should be an entity to settle agrarian disputes, because of the conflicts generated by the encroachment of super-intensive olive groves.

Decisions are divided according to skills between her and her husband. She gives peer-to-peer training to employees because formal trainings are geographically far away. They collaborate with other farmers through a formal network and also through associations.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

For the owner agroecology means the integration of ecological processes in farming, it also means leaving the planet and the soil in a better condition than you have found it.

She finds needed information through the internet, agriculture courses and farmers meetings. She feels badly informed about the legal framework, investment opportunities and available machinery.

Needs and ideas of the farmer for agroecology training:

She suggests that the course should have information on agroecological practices in general but adapted to Portugal and not imported (she says this because a lot of the information on the internet comes from different countries and different climates).

More specifically she would like to see companion planting for olive groves, vineyards and orchards, water retention strategies, appropriate machinery, design of adapted hand tools and information about short food supply chains.

She also suggests the course should encompass ‘agro-espionage’ meetings, in which farmers would go to other farms and discuss the practices used there. Good didactic materials, for example in illustrated form, should be available for the public.

The course should have a maximum duration of 2-3 days because of farmers’ limited time. The location should be on farms.

15.5. Interview 5

Type of stakeholder: 2.2 Organic farmer
Date of the interview: March 2020
Length of the interview: 70 minutes
Methods of the interview: In person
Form of operation: Farming enterprise
Position of the respondent: Production manager
Gender of respondent: F
Region where the respondent operates: Alentejo
Size of the farm: 1000 ha
Main crops: Wine and olive trees, carob
Start of project: 1980's, OF as from 2009
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm has been operating for more than 40 years, but only switched to certified organic farming in 2009.

It is located in Castro Verde, southern Portugal, covers about 1000 ha, employs 10 people permanently and an additional 35 in the different fruit picking seasons. The subsidies represent about 22% of the farm's income.

The farm integrates an olive grove, vineyards, carob plantations, sheep, pastures and bees. It is known for its five lakes that are used to water the plantations and serve as drinking water for the animals. Their main products are wine, olive oil, lamb and honey, which they sell to the internal market as well as export (65%), they prefer quality markets over quantity markets.

Their objective is not simply to produce but also to reforest the farm because the area is very arid. Since the start, they have planted more than 300,000 trees, and have been noticing remarkable increases in organic matter in the soil as well as a reduction in erosion.

Climate change significantly affects the area and they have noticed a decrease in production, due to lack of rain. However, their soil conservation techniques and lakes provide them with resilience to climate change.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farm consists of 30 ha of vineyards, 80 ha of olive groves, 270 ha of carob plantations, beehives, and 1,100 sheep that graze on 400 ha of agro-silvo-pastoral system, and another 200 ha of permanent pastures.

The pasture area consists of 400 ha set up as an agro-silvo-pastoral system, called 'Montado', which is a model of companion planting with Quercus ilex, Quercus suber, Pinus pinea trees and permanent pastures. The farm has an additional 200 ha of permanent pastures with no trees associated.

Within the Montado they sow about 120 ha of cereals and legumes (oats, vetch, and yellow lupin) to make hay, in a dry farming system. Organic fertilisers are used to replenish the nutrients in the sown pastures.

They are currently implementing a 10-year program to reduce the area of fences in an attempt to implement a more efficient rotational grazing system, making the animals rotate faster.

When the sheep are about to give birth, they are transported to a corral near the farm (Zone 1), to avoid predation. They are fed with hay and given vitamin supplements.

The sheep also ensure weed control by grazing on the different plantations in different periods.

At the farm, they make their own compost with manure from sheep.

The vineyards are planted following a key line design and are the only plantations that are irrigated. They plant a mix of over 35 species of Mediterranean-adapted cover crops, in between the lines of the vineyard, which they then incorporate or leave on the surface of the soil. Recently they have been experimenting with mycorrhizal and trichoderma fungi in the vineyard and reported an increase in plant growth and reduction in wood diseases. Every year they conduct a microbial testing of the soil to assess its protein content. Fertility is maintained by cover-crop planting, compost application, Fert irrigation, and foliar micronutrient application. They are planning to apply a new foliar bacterium that fixes nitrogen and supplies it to the plants.

Picking of the different fruits is all done manually.

The manager believes that agriculture is not valued enough in society.

Cereal growing in the Alentejo region has caused soil degradation, erosion, desertification, and aquifer contamination. Therefore, she claims that since super-intensive olive groves are a permanent crop, they are still better for the soil than cereals.

As climate change gets worse, the land is getting less productive and there is no water, so the farmers have no motivation to keep farming. The greatest challenge we are facing is how to create soil so that agriculture can be viable and productive.

Operational decisions are made by her, but the strategic ones are discussed with the owners of the farm. Employees are sent to off-farm trainings.

They collaborate with municipalities and universities, organising technical visits and internships, they also collaborate with farmers associations for knowledge exchange and access to better prices.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

She believes more in the concept of conservation agriculture, which for her is the increase in agrobiodiversity and ecosystem biodiversity and also water conservation. She also claims that being 100% ecological is not always the best solution, for example organic farmers are allowed to use toxic copper to treat diseases or deep soil tillage. She finds her information mainly on the internet, from books or relevant institutes.

Needs and ideas of the farmer for agroecology training:

She would like to see the following topics: Soil microbiology, symbiotic relations between soil organisms and symbiotic relations between plants. In terms of location, the course should be given in each of the different regions, and people should be able to choose the subjects and topics they want to attend.

15.6. Interview 6

Type of stakeholder: 2.2. Organic farmer
Date of the interview: March 2020
Length of the interview: 95 minutes
Methods of the interview: In person
Form of operation: Farming, processing and tourism enterprise
Position of the respondent: Owner
Gender of respondent: F
Region where the respondent operates: Algarve
Size of the farm: 34 ha
Main crops: Figs (processed), salt, tourism
Start of project: 2008/2009
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is located in Castro Marim, south-eastern Portugal, and has been in operation since 2008. It is certified organic, covers 34 ha and employs 10 people permanently.

Subsidies represent 10% of the total income. The farm obtains its revenue from: dried fig production for export (she organises the export of figs for her farm and several others), tourism, traditional salt production, and an on-farm shop.

About 2/3 of the farm's income comes from tourism and sales of salt. The region borders the ocean and has a big influx of tourists every year. Therefore, they take advantage of that and promote touristic activities on the farm.

They possess a small factory where the fruits that do not have enough quality for export are processed. They then sell the different processed products directly in their farm shop.

Water is obtained from a hydro-agricultural dam, which is currently at critically low levels due to lack of rain, over-consumption by the local population and the irrigation of orange, mango and avocado monocultures.

The farm was originally an organic milk producing farm, but ever since a new generation took over, it is more productive and has more diverse sources of income.

Climate change affects the farm mainly through lack of rainfall. In the past there was no need to water the trees in the summer, now, if they do not water them, the trees die. Nowadays if they dig a well, they get salt water, due to aquifer depletion. One of their missions is to plant at least 1,000 trees per year, therefore around Zone 1 we can find a wide variety of medicinal plants and shrubs.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The farms have 5 ha of fig trees, 6 ha of orange trees, 2-3 ha of stone pine trees, 6 ha of almond trees, 2 ha of olive trees and 9 ha of carob trees. However, the only economically viable fruit is fig, all the other fruits are for self-consumption. Fruits are picked by hand. Figs are picked, dried, and sold for export. The owner only demands from the fig trees what they can give her, while simultaneously regenerating the soil. The lower productivity, compared to conventional

fig plantations, is compensated by access to a higher-value market, and additionally by adding value through processing.

To maintain fertility, the farmer plants green manures (yellow lupin, clovers and long radish) in between the lines of trees and cuts them with the tractor. Weeds in the line are not controlled unless they interfere with the picking. They also avoid tilling the soil, and for a long-time used chickens for weed control.

They want to convert the carob field, which is a very unfertile and degraded part of the farm, into a syntrophic agroforest farming experiment. The objective is to regenerate the field by planting native fruit trees, shrubs, and support plants, increasing biodiversity, organic matter in the soil and the resilience of the system. She chose the carob field to carry out this experiment, because the concept of syntrophic farming is still new and there are not many experiments. She wants to wait and see results before experimenting with more valuable crops.

Her view of farming today is that avocado producers in the region are uprooting the olive groves, carob groves, fig trees and are burning all the biomass. Traditional farming ended, she says, when fertilisers were invented, and the farmer lost his/her connection to nature because he/she no longer had to integrate animals in the farm, this led to specialisation and all the problems that came with it. In her opinion it should be mandatory for horticulture farms to integrate animals. Nonetheless there are logistical problems associated with this option, since there are almost no slaughterhouses in Portugal, and it is currently forbidden to slaughter animals on the farm.

Strategic decisions are taken by her, but she gives freedom to her employees in terms of operational decisions. She provides peer-to-peer training to volunteers and employees, who are sent to other ecological farms to learn certain skills such as pruning, while sometimes they host trainings in permaculture at the farm.

They collaborate with farmers associations, salt producers' associations, an energy cooperative, and other civil society associations that campaign for local food.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Agroecology is the opposite of agronomy, because agronomy sees a field and thinks about how to adapt the field to the most profitable crop, while agroecology looks at the field and tries to understand what crop will adapt better to it.

They get their information from the internet, books and from farmers associations.

Needs and ideas of the farmer for agroecology training:

She suggests the topics of economic planning and the legal framework for farms. Trainings should be given on farms and a system of mentoring could be implemented, through which recently installed farmers could ask more experienced people for advice.

15.7. Interview 7

Type of stakeholder: 2.1 Agroecological farmer
Date of the interview: April 2020
Length of the interview: 70 minutes
Methods of the interview: Video call
Form of operation: Private farm
Position of the respondent: Owner
Gender of respondent: M
Region where the respondent operates: Ribatejo e Oeste
Size of the farm: 3 ha
Main crops: horticulture, supplemented with olive trees, aromatic herbs, honey
Start of project: 2011
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is certified organic, is located in Torres Novas, central Portugal and has been in operation since 2011. It covers 3 ha and started as a financed honey-producing project, nowadays it is following the model called market garden.

They work the farm full-time without additional employees and receive no subsidies. However, they do consulting jobs on the side, which allows them to make investments in the farm.

Income comes mainly from selling vegetables and olive oil, at the weekly market and through a vegetable box system. Whatever they do not produce, in particular fruits, they buy from other organically certified producers in the region to complete the box. Economic viability of a small-scale organic farm is dependent on a niche market of consumers, who are generally concentrated in big cities. Starting such a farm in the interior, away from a big population centre poses a big challenge. After 5 years of selling to the local market, they still struggle to have regular clients.

Selling through a box system allows them to plan production to match customer demand. By doing so, they create no food waste unlike when they go to markets and do not sell everything.

Since the start they have managed to increase organic matter in the soil and stop most of the erosion by keeping the soil covered.

Climate change affects their farming. They notice a reduction in water to the point that their autumn crops are being jeopardised. Older residents in the area have told them that streams that used to flow all year round are now dry in the summer and wells that used to be abundant, dry out. Plants flower earlier and bees do not have enough food in the summer.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The garden covers a total of 7,000 m^2 and is laid out in an agroforestry system. It has arboreal beds spaced 4-7.5 metres apart, with in the middle 70 cm-wide permanent vegetable beds, separated by paths that are 45 cm wide.

In the arboreal beds they have about 160 olive trees, permanent aromatic plants – for ecological infrastructure purposes – and other recently planted fruit trees.

Annual vegetable beds are prepared using the broad fork and the rototiller.

Crops that stay longer in the soil are companion planted with crops that are harvested quickly and they also rotate the beds between heavy feeders and light feeders. They use the market garden system, consisting in only planting high market value crops and rotating them quickly. By doing so they optimise the space and get the most out of every square metre.

They buy their seedlings from an organically certified nursery.

Fertility is maintained by incorporating high quality compost and organic fertiliser, imported from outside the farm. They have a dehydrator to dry excess vegetables, such as tomato.

They get their water from a well and irrigate through a drip and sprinkler irrigation system. Water is a very limiting factor and the lack of it prevents them from expanding the garden beds.

Pests and diseases are not remedied, their control is done preventively using the rotation system. If they suffer a bigger attack, they simply take out the crop and plant a new one.

They believe that food production is one of the main causes of climate change and ecosystem degradation, and that there is a need to reorganise production. Ecological farming is a way to truly help solve the environmental problems. The male owner notices that in cases of crisis, such as the corona virus, short food supply chain farming is the obvious solution to feed people. Conventional producers cannot sell their produce through the traditional distribution channels and short supply chain agriculture could be the answer.

Decisions concerning marketing and sale of products are taken by his wife, and decisions concerning the garden are taken by him. Strategic decisions are taken by both.

He considers that they do not participate actively in social movements, but they have an informal network of farmers from whom they buy the products that are not produced by them. They also promote open days on the farm, where customers can visit and see where their produce comes from.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The farmer sees agroecology as agriculture that gets its inspiration from ecosystem dynamics. The couple get their information through the internet, books, and peer-to-peer knowledge exchange. On their farm they promote market gardening courses and invite alternative agriculture experts to lecture trainings.

Needs and ideas of the farmer for agroecology training:

The farmer thinks that beyond techniques, what should be taught is a holistic mind set, soil ecology and its dynamics.

15.8. Interview 8

Type of stakeholder: 2.1 Agroecological farmer
Date of the interview: April 2020
Length of the interview: 120 minutes
Methods of the interview: Video call
Form of operation: Farming enterprise / cooperative
Position of the respondent: Production coordinator
Gender of respondent: M
Region where the respondent operates: Alentejo
Size of the farm: 586 ha
Main crops: Mixed
Start of project: This family farm predates the end of the dictatorship; it was subsequently taken away from the owners and given back in the 1980's. In its current form it exists since the 1990s (one of the pioneers of OF in Portugal).
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is certified organic and in the process of getting its biodynamic certification. It is located in Montemor-o-Novo, southern Portugal and has been in operation in its current form since 1990.

It has a total area of 586 ha and employs 30 people. Subsidies represent about 30% of the farm's income. Income comes from selling the products produced in the farm through different channels: an on-farm shop, a shop in a big city, an online shop, and through a 170-member CSA (AMAP in Portuguese) system. What they do not manage to sell is distributed amongst the employees, and whatever is left after that is given to the animals. In 2018 the farming enterprise was partially converted to a non-profit cooperative.

The farm has a strong experimental vocation, allowing people to develop autonomous experimental projects on the farm.

The farm mainly produces vegetables (tomato in large quantities); locally adapted arable crops such as chickpea, lupine bean and broad bean; animal meat; fruits; nuts (including acorns, for which they are well-known); and processed products. They have several small factories inside the farm, with which they add value to the raw materials.

Climate change affects their farm, mainly through extreme climatic events such as torrential rain, strong winds and heat peaks. They also notice the weather is more unpredictable. In the years since they started their current project, they managed to reforest degraded areas and as a consequence increase biodiversity and soil condition.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The system implemented on the farm is based on the traditional 'Montado' agro-silvo-pastoral system. Their Montado is divided into three parts. One part of about 300 ha is traditionally managed, with animals grazing more intensively and arable crop plantations; another part consists of Mediterranean forest, which is left alone for conservation purposes and therefore maintains considerable biodiversity; and finally, a part of degraded land, of about 100 ha, they are intending to regenerate through an agroforestry system.

From the Montado they also pick acorns and transform them into flour for bread and cakes.

Around Zone 1 of the farm, they have orchards and agroforestry experiments. In one of them they managed to convert a traditional olive grove into an agroforest that now produces olives, oranges, grapes and vegetables. They have another experiment, covering approximately 13 ha, where they combined olive trees, fig trees and grapevines. In between the lines of trees, they plant a biodiverse meadow, which they then cut when it is flowering, and use the straw to provide soil cover for the tree lines.

In terms of animals, they have 177 cows, 300 sheep, 300 pigs, 30 horses, 20 donkeys, 20 goats and, seasonally, 500 turkeys. They are all Portuguese and sometimes endangered breeds.

The traditional part of the Montado is divided into paddocks, where they implement rotational grazing of the animals. They not only rotate the animals through the fields, but since different animals eat different parts of a plant, they also combine different species of animals in the same field, to increase pasture efficiency.

They additionally plant different arable crops on a larger scale, among them: lupine beans, broad beans, chickpeas, sorghum, pumpkin, tomato and pepper. In the past years they have increased their leguminous plant production, both for human and animal consumption.

Vegetable production for the CSA is carried out following the market-gardening model.

They make their own compost and vermicompost combining the excess biomass and manure from the animals. This makes them self-sufficient in terms of fertility. They have a plantation of rosemary covering 0.2 ha. Water for the animals and irrigation comes from two big ponds and a well.

The production manager increasingly sees agriculture as a philosophy, allowing him to combine different fields of study in a holistic approach to life.

In his view, conventional food production is very dependent on subsidies and this creates a fictitious economy. Adapting the system to more sustainable food production could bring resilience for the upcoming desertification. Change is a very difficult process, but we cannot continue to do the exact same things that lead us to the point we are today.

At the farm, sector coordinators make the operational decisions, but strategic decisions are made using the sociocratic model. It consists in gathering all affected people in circles and discussing proposals. They then approve or block these proposals.

On the farm they give peer-to-peer trainings to the staff, and a lot of alternative agriculture experts pass through the farm and facilitate trainings.

They are part of many associations, groups, and networks of farmers as well as non-farmers.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The manager was not very familiar with the concept of agroecology, but he considers it to be regenerative agriculture that respects natural succession, also encompassing agroforestry. The farm's mission is to understand the role of the human being in catalysing and creating life. He asks, how can we survive on this planet with dignity and at the same time leaving it in better state than we found it?

Needs and ideas of the farmer for agroecology training:

The manager considers basic knowledge of biology to be very important for agroecology, because it is the basis of ecosystem functionality. Other important topics are the water cycle, agricultural techniques and alternative economical points of view.

15.9. Interview 9

Type of stakeholder: 2.1 Agroecological farmer
Date of the interview: April 2020
Length of the interview: 110 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Rentee farmer
Gender of respondent: M+F
Region where the respondent operates: Ribatejo e Oeste
Size of the farm: 3.5 ha
Main crops: Horticulture
Start of project: 2017
Age group of the respondent: 25 to 34
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is certified organic, located in Caldas da Rainha, central-west Portugal, and has been in operation since 2017.

It has a total area of 3.5 ha although only about 0.3 ha are utilised, self-employs 2 people (the couple running the farm) and receives no subsidies.

Income comes from selling vegetables in the local town market, but with the constraints put in place due to Covid-19, they started selling through a box system, which they deliver once a week to their (20 or so) clients. The vegetables are produced using the market gardening system. Their philosophy is to produce on a human scale, using as little fossil fuels or any impact whatsoever as possible.

Their farm is 8 km from the sea, very close to a swampy natural reserve, which makes the place very cold and humid in the winter months. They get heavy frosts in winter. In their field they have an autonomous agroforestry experiment run by an agronomy student. They have been fortunate enough to not having experienced any lack of rain, on the contrary, their garden had to be designed to adapt to excess water. They do notice more extreme climatic events like intense rain and winds.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

When asked about agroforestry, they said that since the farm is rented, they did not want to invest money in plants that will only have an economic return many years from now, so their production is focussed on annual vegetables with high market value.

The farm is planned for 64 permanent beds, organized in 8 blocks, each containing 8 beds, which are 75 cm wide and 25 metres long, separated by 45 cm wide paths. They now have 6 blocks ready and are almost completing the 7th. Work is slower, because they only wanted to use the tractor in the beginning and are now doing everything by hand and with manual tools.

By standardising the beds, they know exactly how many plants of each kind can fit in it. The rotation consists of separating the crops into heavy feeders (Brassicaceae, Solanaceae, Alliaceae and Cucurbitaceae) and light feeders (root and leaf crops). Half the garden blocks are occupied with light feeders and the other half with heavy feeders. A heavy feeder block follows a light feeder one, and each block only repeats families of plants every 4 years.

Seeds and plants are not produced by them. Instead they buy them from an organically certified nursery and seed companies. Saving seeds would require keeping the mature plants in the beds for a long time. And this is not compatible with the high rotation system they have installed.

To prepare the soil they first take out the previous crop, then pass the broad fork, then they incorporate the pelletised manure with a special tool, and finally they apply a pulverised manure mulching. They do not mulch with plant matter, instead use the manure and also plant the plants quite close so that they provide their own cover. This way they avoid extra costs and work, and also minimise the invasion of mice.

Fertility is maintained by incorporating sheep, horse and chicken manure, imported from outside the farm. In the beginning they added limestone to the sandy soil. They practice companion planting by combining plants that stay a long time in the soil with others that are harvested quickly.

To control pests, they use an insect net, that serves the double purpose of protecting the vegetables and heating the air in the winter. Weeds are controlled using a wire weeder when they are still small. After finishing a crop, if the beds are very infested, they put a plastic tarp over them, for a period of 4-6 weeks.

In the summer they water the plants using drip irrigation, using water from a pond located in the farm. They make it a point to never use plastic tarps to grow the plants, which many farmers do (by making holes in the tarp and planting the seedlings there).

They calculate that to ensure economic viability, each bed should yield 300 euros per year. They feel that they can fulfil the market's expectations and would sell more if productivity was increased. Currently only one of them is able to work full-time, when they are able to both works full-time, they feel they have room to increase productivity and income significantly.

Their journey in farming started from a desire to be self-sufficient and control where their food comes from. Having an ecological garden contributes to a more sustainable future, and they stress the need of society having more people producing food on a smaller scale. By selling organic food they feel they are creating the basis for their customer's health. Decisions are taken collectively. In the summer they organise school visits to the farm. To make their offer more attractive and complete to their clients, they buy products such as fruits and mushrooms from farmers around them. No training is provided on their farm.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

The couple understands agroecology to be management of the agroecosystem in the most regenerative and sustainable way possible.

They get their information from books, internet, experience and peer-to-peer exchanges. They have also significantly learned by doing and experimenting and even make their own tools.

Needs and ideas of the farmer for agroecology training:

They suggest the following topics for the course: marketing of products, holistic thinking, how to be economically viable without resorting to chemicals, ecological and social footprint of products, pest control, pest life cycle and how to control pests naturally.

15.10. Interview 10

Type of stakeholder: 2.1 Agroecological farmer
Date of the interview: March 2020
Length of the interview: 120 minutes
Methods of the interview: In person
Form of operation: Private farm
Position of the respondent: Son of owner /manager + his partner
Gender of respondent: M + F
Region where the respondent operates: Alentejo
Size of the farm: 3.4 ha
Main crops: horticulture, processed foods, small-scale mixed system
Start of project: 2009
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is located in Alvalade do Sado, southern Portugal and has been in operation since 2009. The couple operating the form do not have any formal certifications, but they are experimenting with a participatory model of certification, developed by them. The son of the owner learned the basics of horticulture from his father, but now follows a very different path.

The farm is worked by two people and occasional volunteers (WWoofers) and covers a total area of 3.4 ha.

Income comes from selling vegetables through a CSA (AMAP in Portugal) system, selling processed products, as well as (more recently) lambs from their 5 sheep. In addition, they manage to produce most of the food that they eat on the farm. They receive no subsidies. Income is not sufficient yet to guarantee two minimum wages, but this year they intend to scale up the CSA system. For now, only 50% of their income comes from the farm.

They are experimenting with market gardening, rotational grazing, agroforestry, and animal traction.

One of their main objectives is to regenerate the field, and over the years they have transformed what was initially very degraded, treeless, arable land into an oasis of biodiversity, with trees and water. They have managed to increase organic matter by over 1% in 10 years.

Climate change affects their farm through lack of rain and high temperatures. In 2018, temperatures reached 45 °C for 4 days and the tomatoes wound up being cooked while still attached to the plants.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

They cultivate approximately 7,000 sqm of their field using the market gardener model, to provide for self-consumption and for the CSA. The garden is laid out in permanent raised beds separated by paths. At every 5 metres there is a bed with fruit trees and permanent aromatic plants.

Their CSA system is currently feeding 12 families, with an average of 4 kg of vegetables per week, meaning an approximate total of 2.4 tonnes of food comes out of the system each year, not counting with their own consumption, the olive trees or arable crops. They want to increase the amount of families they supply this year to 25.

Plants are obtained from an organically certified nursery, but they save a relevant portion of the seeds they use. They used to save most seeds before the CSA system, but the market gardener model is too demanding to be able to also prepare their own seedlings. They buy seeds when they need larger quantities from an Andalusian organic seed company. They also exchange seeds on seed festivals, but the quantities are never enough for a bio-intensive farming system. They do not have an organised rotation system, it is in the planning, but so far rotation is done more or less intuitively.

Erosion is controlled by designing the garden and the pastures on the contour lines and by using soil cover.

They control weeds by hand or by temporarily covering beds after the crop has been harvested. They also use splintered wood from their budding agroforest to cover the soil. They control most pests by hand as well (squashing slugs, caterpillars and aphids) and some they just leave, hoping they will stick to one or two plants, sort of 'sharing the wealth'. The presence of pests means the soil and plants need nutrients, so they try to pay attention to that.

Water comes from a dam of which the water is diverted through pipes to the farmlands, and they store it in three ponds located on the farm. The vegetable garden is watered by drip irrigation.

They are experimenting with the rotational grazing of 5 sheep, and two hinnies. The latter are also used for animal traction. Their manure is composted and applied in the garden. Besides that, they also use green manure (broad bean, lupine bean). Composting is too demanding, but they have discovered the benefits of leachates and compost teas.

In the pastures they also plant arable crops such as potatoes, broad beans and a traditional American indigenous combination of companion plants called milpa (maize, pumpkin and beans). However, they need to sow a fast-growing variety of maize, because it needs to flower before the neighbours' hybrid maize flowers, otherwise the variety will get genetically contaminated.

Finally, they have areas/pockets of biodiversity, where they experiment with different support plants and native trees.

Strategic decisions are taken collectively but one of them is more responsible for the garden and the other responsible for the animals and agroforestry experiments.

They felt the need to produce their own food and achieve autonomy that way.

In their view there is an increasing tendency to invest in monocultures, and farmers do everything with their tractor, without needing to touch/work with the soil. Monocultures oblige farmers to contract debt at the beginning of the season and forces them to apply chemical fertilisers and pesticides so that they do not risk losing the crop.

They feel that agriculture should serve the purpose of producing healthy food and providing self-sufficiency. Instead, farmers focus on making money, so that they can then go to the supermarket and buy food.

They collaborate with consumers, neighbours, farmers, associations, activists, municipalities, and consider collaborations crucial to promoting regenerative agriculture that gives farmers a fair compensation and consumers nutritious food.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Agroecology in their view is the harmony between nature and agriculture. How to grow nutritious food, while increasing biodiversity and fertility. It is also guaranteeing fair social interactions between humans. They are keen on being very transparent with their CSA members, showing them how much they spend in time and money and how much they think is fair for them to earn. Farming is a shared responsibility. They find it incredible how farmers are often paid to not produce.

They find their information through the internet, books, courses, peer-to-peer exchange, sometimes by consulting with experts, and through farmers meetings.

Needs and ideas of the farmer for agroecology training:

They would like to learn about how to close the cycles, types of companion planting and rotations, animal traction, pruning, grafting, nursery techniques, how to germinate trees, how to design a system of natural fertilisation, how to read soil analysis, agroecological marketing and management.

The training should be in the different regions, so that it is not too far for the students, the theoretical part should be online, and then have in-person days where students could pose their questions and discuss what they learned. The course should preferably be free of charge, on a farm, and with in-person meetings every 15 days.

15.11. Interview 11

Type of stakeholder: 2.4 Traditional (family) farmer
Date of the interview: May 2020
Length of the interview: 90 minutes
Methods of the interview: Video call
Form of operation: Private farm
Position of the respondent: Owner
Gender of respondent: M
Region where the respondent operates: Trás-os-Montes
Size of the farm: 10 ha
Main crops: Portuguese traditional cow breed
Start of project: 2015
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm has no specific type of certification, is located in Serra do Alvão, north-eastern Portugal and has been in operation since 2015.

The main activity consists in the raising of a local breed of cow called Maronesa.

The farm provides work for the owner, the owner's father and a paid intern. The owners do not have a wage but live off whatever superavit they manage. In total, the farm covers an area of 10 ha, but their cows graze on 2,900 ha of common lands, called 'baldio' in Portuguese. Subsidies represent about 65% of the farm's income.

Maronesa cows are very well adapted to tough conditions and have traditionally been used to pull agricultural tools. Its high-quality meat is sold at a higher price, locally as well as to restaurants in bigger cities.

In the region there is an active pack of wolves, but this breed of cows has the ability of defend itself against these predators. This allows for the local population to take pride in their wolves, rather than fear that they will compete with them for resources. It also means no shepherd is needed to guard the cows, saving time and money.

Climate change has raised temperatures in the region, and this creates a double effect: on the one hand increasing pasture productivity, and on the other hand increasing the risk of large fires.

Marginal, so-called unproductive, lands or 'baldios' – which in the North of Portugal are often under community management – are important because, since they have no agricultural value, biodiversity and nature can survive in them. It is an opportunity for rewilding.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

The 33 cows from the farm graze autonomously, on the mountainous common lands, from May to October, eating only the natural vegetation available. Then, from November to April, the cows are kept inside and eat hay. Calves are sold for their meat at 7-8 months and kept confined, supplemented with cereals imported from conventional suppliers (meaning their feed may contain GMO's).

The mountains are replete with natural springs from which cows drink.

Permanent meadows grow on the fields close to rivers, areas that are called 'lameiros', these meadows are mown at the end of summer to make hay.

The 'lameiro' fields have a special type of irrigation, called "rega de lima", which consists of irrigating the meadow, in the winter, to keep the temperatures above freezing level. This increases the productivity and pasture availability in the tougher months.

Together with scientists, the farmers from the region are currently in a project to assess exactly how much carbon this type of grazing fixes in the soil, and the effect it has on biodiversity.

Due to recurring forest fires, the common lands are extremely deforested. Therefore, they are trying to bring the forest back, by isolating areas of about 0.5 ha and protecting these from grazing. These areas will serve as pockets of biodiversity, where a seed bank can be created and from which the forest can spread to the adjacent fields.

As the cows graze, they reduce the amount of vegetable material susceptible to burning, thus providing a valuable ecosystem service.

To make the animal beds, they collect different plant materials from the woods. These animal beds are then composted and serve to fertilise the maize and rye fields.

The farm is self-sufficient in vegetables and flour for bread.

In the owner's opinion, farmers, and particularly cattle raisers, are stigmatised by society. As a consequence of this stigma, young people do not want to stay in the territory and continue this activity. Traditional cattle herders are also stigmatised and in danger of disappearing, so he stresses the need to reinvent the profession. He suggests that biologists and photographers could develop their work in the mountains while herding cattle.

The farm cooperates with an association that promotes mutual support and exchange of technical knowledge between Maronesa cow breeders.

They also cooperate with the association that manages the common lands, universities, cooperatives and other civil society associations. Cooperation in the young owner's opinion is essential for the survival of this profession and for the survival of the cow breed. He provides peer-to-peer training to the intern that is working with them.

Decisions are not easy to make since there is a clash between his father's more conservative ideas, and his newer, more agroecosystem-focussed ideas.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:

Agroecology for this farmer means producing food without destroying the resources we depend on. It also means being able to give up on profits in the name of a positive impact on nature. However, it should not give up on human comforts, otherwise it only appeals to a small percentage of the population and cannot be scalable. Agroecology means leaving the planet in a better state than we found it.

Needs and ideas of the farmer for agroecology training:

The training should involve knowledge on how to manage marginal areas and how to create an economically viable farm. In his region people emigrate a lot, so the course should be able to teach how people can farm ecologically but at the same time make enough money to live a good life in the more distant territories. He feels that the course should be given in a practical context instead of just theoretical.

15.12. Interview 12

Type of stakeholder: 2.2 Organic Farmer
Date of the interview: May 2020
Length of the interview: 155 minutes
Methods of the interview: Video call
Form of operation: Farming enterprise
Position of the respondent: Rentee farmer /owner enterprise
Gender of respondent: M
Region where the respondent operates: Ribatejo e Oeste
Size of the farm: 0.2 ha
Main crops: high-value horticulture
Start of project: 2017
Age group of the respondent: 35 to 54
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:
The farm is certified organic, is located in Sintra, southern Portugal, and has been in operation since 2017.
The farm employs two people, has a total area of 2000 sqm and receives no subsidies.
Income comes from selling high market value vegetables to local grocery stores, organic supermarkets and restaurants, in densely populated areas. They have also experimented with a box system, but it does not work for them because in their opinion trust-based agreements do not work very well in Portugal. The demand ended up being too irregular.
Despite having a small area, they make around 50,000 euros per year using the Market gardener system. Surprisingly they are able to get a two month vacation every year, from December to February.
Their philosophy is to make things as efficient as possible, saving as much time as possible, and being as productive as possible, as well as get a premium price for their products.
When the farmer started, he did not have land or money, so he had to gain experience to get where he is at today. His whole operation is portable and he can pick up the tools, leave and go set up in another place if necessary. Despite the bio-intensive, compost dependent model, since he started the fertility of the land has increased.
The region where they are farming is a microclimate, and they get an above-average amount of precipitation.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:
The garden is laid out in 15-metre-long beds that are 75 cm wide and separated by 45 cm wide paths.
To ensure fertility they apply basalt rock dust in the beginning of the season, a big amount of vegetable compost imported from outside the farm, chicken manure for nitrogen, and foliar algae applications, for micronutrients.
Fifty per cent of their income comes from selling salad mixes, but they also sell chives, kale, carrots, radish, rocket and chard, as well as dill. They discovered the market of ethnic gastronomy and sell specific vegetables to immigrant communities (such as dill).
They do not mulch with straw because it takes too long to apply it, and to move it every time they have to plant a new crop. Instead they use black plastic mulching, ensuring water retention and weed prevention.
Planning is the most important part of the system, and they predict and plan the garden and the succession of crops in the beginning of the season.
Their main pest is the Altica beetle, and they control it by putting insect nets over the affected crops.
Salads are picked with the quick greens harvester and they buy their seeds and plants from outside.
A pond will be built on the farm to attract and promote the reproduction of insect eating amphibians.
Water comes from a well and the irrigation system is a hybrid between sprinkler and drip irrigation.
Whilst they are on vacation, they leave a cover-crop protecting the beds.
He feels he can satisfy the market's expectations and could increase the sales if he wanted. However, people should adopt the principle of producing better, not bigger, and should be careful when thinking about scaling up production, because it could lead to bankruptcy.
Agriculture should be regenerative, but he claims the only way to regenerate on a big scale is through animals and holistic management. The mass planting of trees is not the solution because it is too resource intensive. It is very hard to regenerate the arboreal layer without regenerating the herbaceous one. Regenerative projects in their opinion should have a minimum of 500 ha, because it is the only way to have a significant impact on offsetting climate change. These projects should be complemented by bio-intensive horticultural projects to feed the maximum of people with the least possible space and effort. He wants to set the example that it is possible to live of farming and living the good life at the same time.
Decisions are taken together by the two founders and they follow the philosophy of first checking what the market needs and then producing to match the demand.

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
In the farmer's opinion agroecology can be measured by the amount of carbon fixed in the soil per year, and the company's profit. Portugal is lagging behind in terms of innovation in agroecology. He claims that by applying the holistic management approach to grazing, pastures produce much more grass. Farmers can save the money they would otherwise use to buy feed, to offset the investment in fences.
He gets his information mainly through the internet and books, like the works of Elliot Coleman, Jean Martin Fortier, Allan Savory, Richard Perkins, Fukuoka, Curtis Stone and Joel Salatin.
Needs and ideas of the farmer for agroecology training:
He suggests bringing famous regenerative agriculture experts to Portugal. This way we can learn from the people who have created these concepts and really practice them.
The course should be focussed on increasing the efficiency of the farm.

15.13. Interview 13

Type of stakeholder: 2.2 Organic Farmer / 2.1 Agroecological farmer
Date of the interview: May 2020
Length of the interview: 120 minutes
Methods of the interview: Video call
Form of operation: Farming enterprise / Family farm
Position of the respondent: Co-owner/ Production Manager
Gender of respondent: M
Region where the respondent operates: Alentejo
Size of the farm: 700 ha
Main crops: cattle (cows, pigs)
Start of project: (in current form) 2014
Age group of the respondent: 55 to 64
Highest qualification of the respondent: University/college degree

Activity and sustainability challenges of the farm:

The farm is certified organic, located in Elvas, southern Portugal, and has been following the holistic planned grazing system since 2014.

The farm employs three people, covers a total area of 700 ha and subsidies represent about 50% of the farm's income.

Income comes from selling grass-fed beef to organic supermarkets, local butchers, and a big retailer, they also sell olive oil and Iberian pigs.

Very little diesel is used in his farm because he does not produce nutritional supplements, choosing to feed his cattle entirely with grass, and supplementing them with purchased organic cereals. They practice holistic planned grazing, following the work of Allan Savory, and are part of the Iberian hub of holistic management.

Climate change impacts the manager's farm through drier springs, drier autumns and less frost. This in turn provides them with more pastures in the winter but also a shorter spring. He claims, however, that we are suffering more from anthropogenic soil deterioration than from climate change.

He started as a conventional meat producer, and since applying holistic planned grazing noticed having more feed available, more tree renovation and more available phosphorus. This type of grazing he sees as the only way to regenerate the degraded soils of our arid environment. He used to sow biodiverse meadows but observed no significant increase in organic matter in the soil.

Sustainable farming practices; attitude, knowledge and skills of the farmer, and their presence and application in everyday practice:

They have 360 cows and 100 pigs, and their main focus is finding a way of producing beef using only extensive permanent pastures. The cows are a hybrid between the local Mertolenga breed and the Aberdeen Angus breed.

The pastures consist in spontaneous perennial grasses (Phalaris spp and Dactylis glomerata), annual grasses (Avena spp, Lolium spp, Bromus spp), and legumes (Trifolium subterraneum and Medicago spp.).

They have about 18 ha of olive trees that are grazed only by calves, for the protection of the trees. In the farm there is a part that is 'Montado', where pigs eat the acorns while cows graze the grass. This type of grazing is based on the observation of wild herds on the untouched grasslands of the world, where animals flock in huge herds, graze the grass quickly, and then move on, due to predator pressure, not returning to the same field for months.

Holistic grazing attempts to recreate the natural conditions by flocking the animals together on small areas with electrical fences, moving them frequently, and not returning them to the same spot for at least 60 days. Cows graze on the same spot for a maximum of 4 days. This creates soil cover and an even distribution of manure.

A fatal error committed by new farmers is thinking that they already have the biological capital in their soil to feed the cow exclusively from the pastures.

Electrical fences save a lot of money in feed because every division made in the field increases pasture productivity. His field is divided into 55 paddocks of 10-15 ha, and when he wants to create a bigger impact on the land, he reduces the area of paddocks using portable electrical fences.

Under the present conditions, he's not yet able to fatten the cattle entirely with grass. He also practices stockpiling of grass instead of producing hay. Cows then eat the dry grass directly from the field.

He has experimented with the key line plough on 70 ha and notices a big increase in fertility particularly in the most degraded and compacted areas.

In his view, conventional farming and grazing have tremendous impact on nature. If we managed to increase soil carbon and -biology, climate change would be solved. Farmers should learn how to farm with less inputs. Easy access to subsidies stimulates dependency on external inputs rather than a search for more ecological solutions. He suggests society should pay people just to manage herds as an ecosystem service rather than as an economic activity, making meat a by-product of ecosystem restoration. The meat industry wants farmers to produce enormous animals, and this is not compatible with the locally adapted breeds, which in turn are the right choice for sustainable cattle rearing.

He collaborates and shares information regarding holistic management with other farmers, through the internet. He is part of the Iberian hub of holistic management. They are also collaborating with a university to measure the amount of carbon stored in the ground by this practice, and with a municipality in northern Spain, to recreate the ancient practice of transhumance. Collaborations with neighbours are not common due to the differences in practices (his neighbours are conventional cattle breeders).

Agro-ecology attitude, knowledge and skill elements considered as important by the farmer:
Agroecology in the farmer's view means achieving a productive and biodiverse landscape, while producing healthy and chemical free food.
Agroecology is the only way to get out of the vicious cycle of monoculture.
It should not, however, attempt to provide recipes, but rather teach how to think holistically. He argues that agricultural tools can, if managed poorly, cause great damage, but if applied in the right way, provide valuable ecosystem services.
Needs and ideas of the farmer for agroecology training:
He would like to see the following topics lectured: introduction to holistic management, syntrophic farming, how to farm without tilling the soil or applying chemicals, cover cropping, pasture cropping, vermicomposting, micro-organism extracts, water, and soil management.
The course should be very practical, it could be online and provide different modules to different audiences.

15.14. Interviews 14, 15, 16

Type of stakeholder: combination of 1.4 state agency or institute/ local administration active in promoting ecological farming; 1.1 association/ cooperative/ consumer group or collective that consider themselves following agroecological or related principles; and 1.3 trainers, consultants or schools for ecological farming as well as the support of 2.3. other ecological form of farming
Date of the interview: February 2020 and March 2020
Length of the interview: approx. 60' minutes each
Methods of the interview: In person
Form of operation: Community initiative 'Food Network of Mértola'
Region where the organisation/initiative operates: Alentejo
Position of the respondent: city councillor, founders of an association, director of a professional school
Start of project: ~2018
Age group of the respondent (approximate): 35 to 54; 55 to 64.
Gender of respondent: F + F + F + M
Highest qualification of the respondent (if it came up): university/college degree

How is the organisation/initiative promoting and/or supporting agroecological farming or similar practices?

This network of different actors from the same community has over the past years developed a diagnosis of the socio-ecological issues their region (very remote, dry and eroded) is facing and through knowledge-gathering, experiments and debates have come up with the idea of a 'Food Network' to regenerate as well as revitalise their region, while building up their resilience and self-sufficiency (currently at less than 5%). They lobbied to have agroecology added to the objectives of the 'organic research station' to be installed in Mértola in the next one/two years. They are experimenting with two demonstration agroecological vegetable gardens, where they are recovering traditional 'al andaluz' varieties such as barbelinha and black/yellow wheat. The municipality, besides backing the research station, runs a monthly 'people's dinner' where traditional, local food is served and food and farming issues are discussed, and is setting up a land grant system, attributing land through competitions to people committed to not using synthetic chemicals, guaranteeing a basic income. The territory's professional school is planning to become a 'farm to fork' school and is interested in incorporating our vocational course (they already have courses on farming, fishery, hunting and wild foods, as well as natural heritage-focussed tourism, and are sensitive to gender issues, with one course exclusively for women). Other projects are the plan to supply all five public canteens with local food from the vegetable gardens being set up, for which cooks will be trained as well as people attracted to start horticulture projects for local supply. These canteens will be examples of 'community-certified' kitchens. Currently the primary schools already each have a syntrophic farming vegetable garden where each student has a portion of land and when possible products from the gardens are used in the public canteens. A so-called 'integral' cooperative (involving all aspects of a solidary economy) is also in the planning. The network is keen on partnering with surrounding territories, suffering from similar drought and erosion as well as lack of people, and is represented in national as well as international networks, including that of bioregions.

What is the respondent's view on food & farming and in particular on agroecology?

The people from the network whom we interviewed consistently use the term agroecology, which they understand to be a practice and a source of solutions but also firmly rooted in agro-ecosystems, markets and social relations. They are strong defenders of the concept and willing to make concessions to favour the regeneration of their territory in terms of soil, water, vegetation as well as revitalising the local economy and culture. They are open to experiments to find the right balance between ecological, cultural, social and economic needs. In this balance, food and

farming in their view are key. They are highly critical of how the state of Portugal and successive governments have (mis)handled agricultural development, favouring practices that are not adequate for the current soil and climatic conditions – and often deteriorate the conditions even more, such as excessive watering, burning organic material instead of giving it back to the soil, treating the soil as a mere support and not a living organism – and ignoring the small, ecological farmer. They are aware of their problems and also of how to correctly identify and place them in context. They have chosen not to let themselves get paralysed by the catastrophe-in-making all around them but to react and act.

They believe there is a dearth in systematised knowledge on agroecology and the associated practices.

Where does the organisation/initiative obtain its information/train its skills or its members'/ clients' skills?

The network consists of a variety of actors, each with different but complementary skills, and in turn the network exchanges information regularly both with residents in the territory as well as similar networks, regional, national and international. Information and skills are mostly informally exchanged as well as experientially gained (strong emphasis on doing and learning). The region has received courses on permaculture and syntrophic farming, which resulted in kicking off their ecological vegetable gardens (planned to grow to ten gardens in the next three years). Despite the informality, the network has a clear 5 and 10-year strategy towards which it is working and are running several projects in parallel. A key strategy in the network's learning process is to cooperate wherever possible and to move one step at a time.

What are the needs and ideas the respondent proposes for agroecology training?

The network is not only concerned about regenerating the landscape, they also wish to revitalise the local economy and culture and are concerned about how to give farmers a worthy life and people access to fair prices for healthy food. Farmers need to learn how to improve their income by reducing inputs, not by raising prices. The following topics are considered key: Practices appropriate for semi-arid climates, collect models of solutions for desertified areas and apply those to Portuguese reality; Legislation for food and farming (which currently favours bad practices); knowledge of the territory and its challenges; soil biology; introduction to plants and plant companionship; biodiversity resource management; properties of different foods and how these relate to production; recovering traditional knowledge and good practices from before the use of exogenous (chemical) inputs. They recommend that the course cover at least a whole farm year, to follow and understand the cycles. They would like to see the course impart a holistic view to the farmer so that he/she understands how his/her farm is part of a larger and live ecosystem. Finally, they propose the course promote cooperation among farmers, and between farmers and the rest of the community.

15.15. Interview 17

Type of stakeholder: 1.3 trainers and consultants for ecological farming; also (for subsistence and demonstration purposes): 2.1 agroecological farmers
Date of the interview: April 2020
Length of the interview: 105 minutes
Methods of the interview: Video call
Form of operation: Private project/farm
Region where the organisation/initiative operates: Northern Portugal
Position of the respondent: Owner/Manager
Region where the organisation/initiative operates: Entre Douro e Minho
Size of the demonstration farm: 0.3 ha
Start of project: 2010
Age group of the respondent: 35 to 54
Gender of respondent: M
Highest qualification of the respondent: University/college degree

How is the organisation/initiative promoting and/or supporting agroecological farming or similar practices?

The project is run by a couple, they were one of the first people in Portugal to provide training in permaculture. They live in a mountainous region that still has common land (called 'baldios' in Portugal, 'montes vecinales' in Galícia). There is an association that manages these lands, and the couple makes an effort to go to the meetings and participate in the decision-making of the association. In these common lands they are helping to plant experimental agroforestry systems.

They collaborate with a nearby project, which keeps a germplasm (seed) bank preserving hundreds of traditional varieties. This diversity is essential for the future adaptation to climate change in Portugal.

Their main income comes from consulting for projects that want to install agroforestry systems. Their experimental agroforests are laid out with fruit trees spaced 5 metres apart, and in between the lines of fruit trees they usually plant a line of support plants.

Support plants used are of the following genera: Sambucus, Salix, Populus, Crataegus, Fraxinus, Cytisus and Alnus. These are pruned every year to provide organic matter to the system. They also cut the meadow in between the lines 3-4 times per year with the same objective.

The main objective of these systems is not horticulture, because it is very labour intensive, instead they want to focus on planting diverse orchards, while regenerating the land and still providing an income.

Their longer-term aim is to experiment with agroecological techniques and prove that it is possible to go back to living on the land through regenerative agriculture.

They would like to transform their farm into an agroecology centre to conduct experiments and organise meetings and trainings.

What is the respondent's view on food & farming and in particular on agroecology?

They believe society does not have enough people producing food. Portugal has a lot of productive potential, considering the size of abandoned land (2 million ha), and our ancestral knowledge has not yet completely disappeared.

Food should be produced on a smaller scale as well as collectively, at the same time it must be regenerative, and the consumer must be a lot more involved in the process of farming. Consumers should know where their food comes from and the impacts its production and distribution have on the planet.

In their view, regenerative farming should be subsidised. There are too few composting enterprises, making farmers dependent on imported compost. There are a lot of people that would become farmers if the right conditions were provided. But unfortunately, we no longer have the legacy of the past, very few farms were left functional for the young generations. Therefore, every time someone want to become a farmer they have to start from scratch. Even if this person would be willing to obtain financing to invest in an organic/ecological farm, the available funds do not favour efficiency: in order to be eligible for funding, it is forbidden to buy equipment second hand, to share and cooperate or even recycle. Most money will therefore go to expensive and little-used equipment such as a tractor.

Agroecology, in their view, is the involvement of humans in ecological processes. It represents the social and economic aspects of ecosystems. With the tools and technologies that currently exist, we could create resilient and productive systems, that would provide wealth for all human beings.

Where does the organisation/initiative obtain its information/train its skills or its members'/clients' skills?

They get their information through the internet, articles, peer-to-peer exchanges, and over the years they have attended several courses with experts in alternative agriculture.

What are the needs and ideas the respondent proposes for agroecology training?

The training should encompass the following topics: basic principles of permaculture, agroecology, holistic management, regenerative agriculture, basic knowledge of biology and nature's patterns and cycles, water retention and circulation in the landscape. It should also explain students what happens in one farming year and teach production methods like market gardening.

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