

eip-agri

AGRICULTURE & INNOVATION

European Innovation Partnership for
Agricultural Productivity and Sustainability

Survey of Austrian Operational Groups
as of September 2023

Translated from german by Johanna Rohrhofer, Lena Müller-Kress, Karin Zwerger

Supported by the federal government, federal provinces and the European Union

 **Federal Ministry**
Republic of Austria
Agriculture, Forestry, Regions
and Water Management


LE 14-20
Entwicklung für den Ländlichen Raum

The European
Agricultural Fund for
Rural Development:
Europe investing in
rural areas



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EIP-AGRI in Austria

European innovation partnership for agricultural productivity and sustainability

Austria has taken a pioneering role in the implementation of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) in Europe. Five EIP-AGRI calls for projects under the Rural Development Programme 2014-2020 have been implemented by the Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML) since 2015. In the meantime, 39 Operational Groups have been formed in Austria to implement innovative EIP-AGRI projects for agriculture.

For the implementation of EIP-AGRI projects, it is essential that synergies are created through the exchange between partners from different areas, sectors, initiatives and projects. EIP-AGRI focuses on cooperation between farmers and scientists. By building bridges between practice and research, problems from the agricultural and forestry environment are to be solved in an innovative way and translated more quickly into new products, services and technologies.

The following project descriptions were written by the respective project coordinators and reflect the current status of the projects as of November 2022.

If you have any questions, please contact directly the project coordinators, the responsible person within the ministry or the innovation broker

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1st Call

The projects of the first EIP-AGRI call in Austria were approved in 2016 and address the following guiding themes:

- ➔ Animal Welfare / Animal Health / Animal Husbandry
- ➔ Biodiversity and Management
- ➔ Strategic farm and product development and current challenges in production
- ➔ Climate-relevant approaches to agriculture

Projects of the 1st Call

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PLANT HEALTH
AND PROTECTION



PROJECT AREA IN

Styria,
Burgenland,
Carinthia

2016-
2019
PROJECT PERIOD



ONLINE

www.zukunftsraumland.at/projekte/1475
stmk.lko.at/welp-projekt-
innobrotics-erfolgreich-
abgeschlossen+2400+3259839

Innovative measures for corn rootworm control

Operational Group *Innobrotics*

ABSTRACT

The damage caused by the corn rootworm has reached worrying high levels in Austria. The pest has caused major damage on many arable and livestock farms from storage and scarring. According to experts, a further spread of the pest is to be feared, which means a disastrous development for agricultural holdings. Moreover, the ban on neonicotinoids was imminent. In addition to the crop production problems, this posed particular challenges for the agricultural livestock farms. For this reason, innovative solutions had to be found as soon as possible in order to avoid further major value-added losses on domestic farms. The EIP-AGRI project Innobrotics ("inno" stands for innovation and "brotics" comes from the generic name of the corn rootworm *Diabrotica*) therefore sees itself as an initiative to solve the corn rootworm problem in Austria. Through close cooperation between research, consulting and agricultural practice, new methods of pest control as well as innovative approaches to the use of alternative control methods, arable crops and feedstuffs for conventional and organic farms were found and implemented within the framework of the project. Moreover, socio-economic studies were also carried out on the farms.

STARTING POSITION

Since the first appearance of the corn rootworm in Austria in 2002, there has been an exponential increase of the pest, starting in the southern provinces of Styria, Burgenland and Carinthia. The beetle caused damage not only at the root and cob of the corn plant, but also to various other crops through leaf feeding. Especially in vegetable production, the mere presence of the beetle was sometimes enough for wholesalers to refuse deliveries. The damage in the field of crop cultivation, however, was continued in the related sectors, with the livestock farming being the most severely affected. By the time the project of the Operational Group Innobrotics began, experience at national and international level had not been sufficient to effectively tackle the problem, as there was too little knowledge about effective corrective measures. There were a number of approaches to solve the problem, but they were not coordinated or not sufficiently coordinated, nor were they implemented all over the country. Furthermore, there was too little knowledge about the efficiency of combinations of measures and alternatives to chemical measures, which have been compatible with organic farming.

TARGETS AND TARGET GROUPS

The main objective of the EIP-AGRI project was to maintain the added value through a high share of self-produced basic forage in the livestock farming industry, as well as the best possible substitution of the main crop maize by alternative crops. The specific goals of the project were as follows:

- ➔ Screening and testing of alternative feedstuffs bases to maize for cattle, pigs and poultry, conservation methods, digestibility, feeding performance, et cetera
- ➔ Testing of forage alternatives in arable farming
- ➔ Research into sustainably effective, ecologically compatible larvae and beetle control measures
- ➔ Identification of possible barriers to implementation based on socio-economic studies
- ➔ Targeted dissemination of the results in the agricultural practice on conventional as well as organic farming

The main target groups of the EIP-AGRI project were and still are arable and livestock farms as well as agricultural consultants.

KEY MEASURES

Essential steps of the EIP-AGRI project were:

1. Project management, monitoring and coordination during the whole programme period
2. Planning, implementation, evaluation and description of the results of the crop cultivation experiments
3. Planning, implementing, evaluating and describing the results of the experiments in the field of animal production, comprising feeding experiments with cattle, pigs and poultry as well as forage conservation experiments
4. Socio-economic study on implementation barriers
5. Analysis of cooperative land-use systems
6. Targeted spreading of the results by print and online media, by lectures and by individual farm consultations

RESULTS AND EFFECTS

The following results can already be presented: As far as the control of the corn rootworm is concerned, there exists no cure-all, but the most efficient possibility of mitigating the pest is by means of applying a package of measures consisting of early cultivation, control of the adult beetle and the larvae, as well as tailored crop rotation management. The effect of a potential variety resistance could not be examined due to the short duration of the project. Millet enables an expansion of the feedstuffs supply and thus a significant reduction of the maize share, which could also be proven by numerous feeding experiments.

During the project period, individual projects results could already be passed on to more than 1,200 practitioners per year via lectures. The contact between farmers and consultants is also sustainable beyond the end of the project. All the knowledge acquired in the course of the project will be integrated in the consultation in the coming years.

A brochure with the most important results and recommendations for agricultural practice has been worked out and is being spread via various channels, such as the homepage of the Chamber of Agriculture, Zukunftsraum Land network (national rural network), the EIP-AGRI Service Point, Consulting and so on.

PROJECT MANAGEMENT

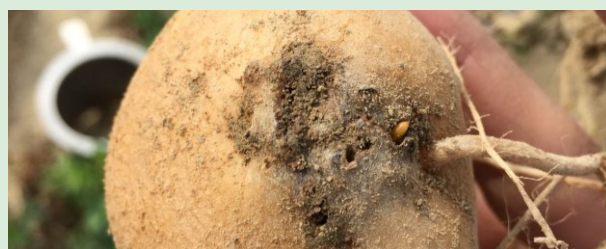
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- Loibner Maria and Gottfried
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- Institute of Animal Nutrition, Livestock Products and Nutrition Physiology - University of Natural Resources and Life Sciences, Vienna
- Institute for Sustainable Economic Development - University of Natural Resources and Life Sciences, Vienna
- Agricultural Research and Education Centre Raumberg-Gumpenstein
- Versuchsreferat Steiermark (experimental unit Styria)
- Chamber of Agriculture Burgenland

PARTNERS

- Chamber of Agriculture Carinthia



PLANT HEALTH
AND PROTECTION



PROJECT AREA IN:

Lower Austria,
Upper Austria,
Tyrol

2016-
2020
PROJECT PERIOD



ONLINE

www.zukunftsraumland.at/projekte/1478
www.global2000.at/arge-drahtwurm

Alternative wireworm control

Operational Group *Wireworm*

ABSTRACT

In Austria, wireworms are causing damage of several million Euros per year alone with potatoes. The control of wireworms is a major challenge for affected farms. In conventional potato production, for example, currently approved insecticides reach their limits of effectiveness when infestation pressure is high, and there is also a lack of effective control options in organic potato production.

With the aim of developing and testing effective and practical alternatives to the use of chemical-synthetic pesticides for wireworm control in potatoes, the Operational Group *Wireworm* was founded, bringing together relevant stakeholders from the fields of agriculture, research and environmental protection. To achieve the project goal, field studies were carried out in several production areas under common production conditions and in close cooperation with practitioners. The results reached are spread via seminars, information events and mailings especially to potato growing practitioners, and to further stakeholders in the field of agricultural production through publications and conference papers.

STARTING POSITION

Wireworms are larvae of click beetles living in the soil. They can cause enormous economic damage with potatoes and many other crops such as maize, carrots, onions and cereals. In potatoes, wireworms tunnel into the tubers, leaving typical feeding holes and thereby reduce the share of marketable tubers. The harvest losses caused in this way in Austria total on average 30,000 tonnes per year.

Wireworms are a major problem in both conventional and organic farming. Until now, this pest was mainly controlled by the use of insecticides. Pesticides that were frequently used against wireworms are no longer available. In Austria in the years 2006 to 2019, plant protection products against wireworms on potatoes were only available on the basis of temporary emergency use authorizations. Plant protection products currently approved in conventional production quickly reach their limits of efficiency when infestation pressure is high. As it is to be expected that wireworms will have a severe damaging effect also in the future, which will probably even be aggravated by climate change, there was an urgent need to work out alternative control measures.

TARGETS AND TARGET GROUPS

The main objective of the EIP-AGRI project was the development and testing of effective, practical alternatives to the use of chemical-synthetic plant protection products in wireworm control in potatoes, which is necessary to reduce economically significant wireworm damage. To achieve this objective, work was carried out on the following main topics:

- ➔ As a basic requirement for an effective control without insecticides, the distribution, temporal occurrence and spatial distribution of the agriculturally important wireworm varieties were surveyed
- ➔ Basic knowledge on the species-specific virulence of various strains of an insect-pathogenic fungus against wireworm species occurring in Austria, also as affected by environmental factors, was acquired
- ➔ The efficiency of alternative, direct control measures against wireworms under field conditions was assessed

The target group of the EIP-AGRI project were Austrian potato growers.

KEY MEASURES

Essential steps of the EIP-AGRI project were:

1. Characterisation of the distribution of wireworm species, which occur in Austria and are agriculturally important
2. Description of the seasonal activity and small-scale distribution of wireworms
3. Survey of the virulence of different insect-pathogenic fungi strains against wireworm species widespread in Austria
4. Laboratory tests on the efficiency of insect-pathogenic fungi applied to the soil and its influence on the distribution of wireworms
5. Implementation, evaluating and interpretation of field trials on the examination of the efficiency of alternative methods of wireworm control
6. Direct communication of the results to farmers, consultants and other stakeholders in the field of potato growing through seminars and other events

RESULTS AND EFFECTS

Wireworm species have different geographical distribution patterns, dry-warm, moist-cool environment and show considerable activity fluctuations on arable areas throughout the year. Laboratory tests with an insect-pathogenic fungus showed a virulence depending on the fungus strain and the wireworm species. In practical experiments, the most promising option to reduce the damage caused by wireworms is a combination of application of fungus-colonised barley grains and attraction by means of a mixture of attracting plants in the potato crop. For practical application, a consistently high quality of fungi preparations must be ensured and there has to be a sufficient soil humidity.

A steady reduction of wireworm populations can be achieved by a combination of long-term measures: Crop rotation, humus build-up, targeted soil tillage, promotion of natural antagonists and the use of environmentally compatible means such as insect-pathogenic fungi. To achieve this, the biology of the individual wireworm species must be examined even more extensively.

In the future, great importance will be attributed to forecast models, which can be important bases for decisions for example, for the right scheduling of targeted soil tillage measures, but also for other strategies to minimise wireworm damage.

PROJECT MANAGEMENT

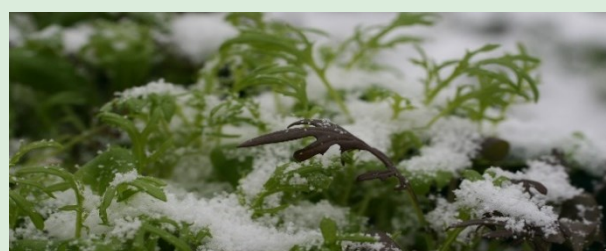
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COOPERATION BETWEEN

- 7 agricultural businesses
- Interest group potato growing
- Global 2000 Environmental Research Institute
- Austrian Agency for Health and Food Safety (AGES)
- Agroscope, research group ecology of harmful & beneficial organisms
- MELES Engineering Office for Biology
- University of Innsbruck, Institute of Ecology

PARTNERS

- Edmund Rauchberger
- Karl Paul
- Paul Votzi
- Johannes Mayer
- Eduard Paminger
- Romed Giner
- Producer group Bauernerdäpfel Verkaufs GmbH (Farmer potatoes' sales producer group)



MANAGEMENT
CONCEPTS

2016-
2019
PROJECT PERIOD



PROJECT AREA IN:

Lower Austria,
Upper Austria,
Salzburg, Styria



ONLINE

www.zukunftsraumland.at/projekte/1481
www.bio-austria.at
www.bio-austria.at/app/uploads/20190630_Abschlussbericht-Wintergemue%CC%88se-Praxis.pdf

Further Development of Organic Winter Vegetables

Operational Group *Further development of organic winter vegetables*

ABSTRACT

In winter, consumers must be prepared for a very limited range of types and varieties of regional vegetables. In order to be able to offer a diverse range, large quantities of fresh vegetables are produced in an energy-intensive way or transported over long distances in addition to classic stored vegetables. The project of the Operational Group Further development of organic winter vegetables shows that there is another way. Important insights gained from it are: Being able to harvest organic vegetables in winter means a great market opportunity for the farms. In the medium term, this could even replace imported vegetables in winter. Winter vegetables strengthen regional organic farming and bring about variety in the cuisine of conscious consumers. Numerous fresh vegetables are even more frost-resistant and winter-hardy than even experts would have considered possible before the beginning of the project. They can be harvested in unheated polytunnels even when it is storming and snowing outside. There is a wide range from salads, salad herbs, leafy vegetables, root vegetables to tuber vegetables.

STARTING POSITION

There existed a predecessor project to this EIP-AGRI project, over a period of one year, which brought first insights on growing and cultivation. However, due to the short duration, it was not possible to define reliable statements on the ideal crop rotations for the growing of winter vegetables. In order to establish this type of management also on the long term as an alternative to conventional production for several agricultural holdings, secured data on crop rotation were essential. Furthermore, it was obvious that the identification of the ideal times of growing requires a reshaping also with a view to the question when there is the highest demand for winter vegetables on the part of the consumers. The question should also focus on which types and varieties are permanently marketable under the given conditions. Moreover, the question whether the production of winter vegetables enables farms to use the respective growing areas also during the traditionally production-free time of the winter months, to achieve additional value-added, and to use the available working capacities in an optimal way, is decisive.

TARGETS AND TARGET GROUPS

The key objective was the comprehensive way of dealing with numerous questions concerning unheated growing of winter vegetables at scientific and practical levels:

- ➔ Identification of the ideal growing times of winter vegetable crops under various geographic and climatic conditions
- ➔ Identification of the ideal varieties and crops under various geographic and climatic conditions.
- ➔ Development of suitable packaging solutions for winter vegetables
- ➔ Sensory description for winter vegetable crops
- ➔ Key work economics as a basis for economic efficiency
- ➔ Economic and ecological analysis of winter vegetable production as a basis for a long-term establishment

The target groups were agricultural vegetable growing enterprises which are open for new management methods and searching for new sources of income, as well as environmentally and health-conscious consumers who want to enjoy in winter fresh organic and regional vegetables from unheated cultivation.

KEY MEASURES

Essential steps of the EIP-AGRI project were:

1. Planning, monitoring and evaluation of growing experiments on farms and in experimental stations
2. Economic and ecological analysis: Calculation of the contribution margins for individual crops and crop rotations, calculation of the ecological footprint of winter vegetable crops
3. Labour-economic analysis with winter vegetable crops, the result is manuals for practitioners: Part 1: Foundations of labour economics in vegetable growing; Part 2: Working methods with individual crops in the winter vegetables sector.
4. Sensory technology with winter vegetables. Establishment of means of communication for the description of winter vegetables: Sensory winter vegetables guide for consumers; Sensory winter vegetable guide for farms; Map for special winter salads and aroma wheel
5. Experiments on suitable packaging solutions for winter vegetables
6. Public relations and media work for various target groups: for example, a workshop 'Wintamine' to make restaurateurs familiar with winter vegetables; lectures and seminars for farmers; press talk on a winter vegetable farm; project conclusion 'Winter vegetables – seizing new opportunities in a sustainable way' with more than 100 participants and many other things.

RESULTS AND EFFECTS

Winter vegetables are vegetables from outdoor or protected cultivation, which are freshly harvested in the time between November and March. What is very important in this respect: The crops are not heated. In ring trials with bunch carrots, bunching onions, lettuce and radishes, various varieties and growing times were tested under different climatic conditions. An important conclusion is that there is no 'recipe' for winter vegetable growing, and that the growing times must be determined for every location individually. Winter vegetables bring about economic advantages for farms: Apart from more stable incomes, the expansion of the range of offers over the whole years serves as an instrument to promote customer loyalty. All participating farms continuously expanded the growing of winter vegetables in the course of the EIP-AGRI project, and have continued with it after the end of the project. For some of them, it has become an important source of income. Most recently, there has also been demand for winter vegetables from unheated cultivation in Austria from retailers, which offers an exciting perspective for many vegetable growing enterprises.

PROJECT MANAGEMENT

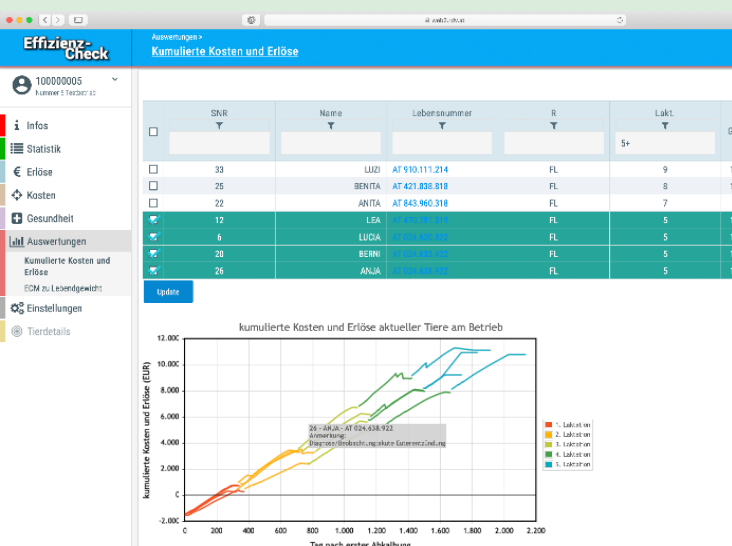
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COOPERATION BETWEEN

- 7 organic farms
- BIO AUSTRIA
- Federal College and Research Centre for Horticulture Schönbrunn
- Experimental Station for Special Crops Wies
- Horticultural school Langenlois
- Food Cluster Lower Austria

PARTNERS

- FiBL Vienna Research Institute for Organic Farming
- Eva Derndorfer, Vienna
- Renate Spraul, Germany
- Technologie & Innovation GmbH, OFI, Vienna




ANIMAL
WELFARE AND
HEALTH

2016-
2019
PROJECT PERIOD

PROJECT AREA IN:
 all over Austria

ONLINE
www.zukunftsraumland.at/projekte/1484
www.zukunftsraumland.at/download/23
0724-1594630709
www.rinderzucht.at/projekt/effizienz-check.html

Web application to optimise efficiency and animal health in dairy farming

Operational Group *Efficiency check*

ABSTRACT

Within the framework of the EIP-AGRI project of the Operational Group *Efficiency check*, a modern and practice-proof web application was developed to support dairy farmers in taking targeted measures to improve the economic and nutrient-related efficiency in milk production. By visualising the interrelationships between management measures, husbandry conditions, animal health and diseases as well as their economic effects, the aim is to increase farm managers' awareness of animal welfare and health.

The web application "Efficiency Check" comprises three central tasks:

1. Comparison of the economic efficiency of all dairy cows on the farm, taking into consideration the revenues from milk, meat and calves as well as costs for feeding, keeping, fertility, diseases and their consequences.
2. Analysis of own business and comparison with other businesses.
3. Highlighting potential for farm optimization, especially in the field of udder health, and creating new consulting opportunities by making the web application available to veterinarians and consultants as well.

The Operational Group consisted of the Federation of Austrian Cattle Breeders (Zentrale Arbeitsgemeinschaft Österreichischer Rinderzüchter ZAR), the Chamber of Agriculture of the Federal Province of Upper Austria (Landwirtschaftskammer Oberösterreich LK OÖ), the Animal Health Service of Styria (Tiergesundheitsdienst Steiermark TGD Steiermark), the LKV Austrian provincial control associations, ZuchtData EDV Dienstleistungen GmbH, agricultural holdings, veterinarians and staff of federal control associations.

STARTING POSITION

Every day, Austrian farmers are faced with the challenge of producing high-quality food in the complex interplay of nature, legal framework conditions and the current market situation, providing a species-appropriate environment for the animals on the farm and feeding their families. Under these preconditions, it is extremely important to know one's own strengths and weaknesses in order to be able to manage as efficiently as possible. In practice, a great amount of data for farm management is available for farmers. However, this data is not available in a collected form, but originates from various independent sources. Furthermore, there are hardly any opportunities available to them to analyze with simple means the economic efficiency of individual animals or the efficiency of their farm in comparison to other farms. Above all, however, there are hardly any possibilities to identify potentials of improvement on one's own farm. Thus, there existed the urgent need to develop a web application that would make it easier for a farm to assess the efficiency of a farm or individual animal without a great deal of additional recording effort.

TARGETS AND TARGET GROUPS

The objective was to develop a modern and practical web application that supports dairy farmers to take targeted measures to improve the economic and nutrient efficiency in milk production on farm and animal level. In the long term, the data collected will also help to achieve improvements in animal breeding, animal health, nutrient and production efficiency and reduce drug application. Specific goals were:

- ➔ Improvement of the economic efficiency of dairy production by means of the calculation of efficiency parameters, possibility of comparison with other farms and pointing out possible optimisation measures
- ➔ Use of the collected data for the breeding improvement of animal health and nutrient efficiency
- ➔ Reduction of the ammonia and greenhouse gas emissions by means of an increase in the efficiency in milk production
- ➔ Improving of animal health and thus reduction of the use of medications
- ➔ Helping farmers in daily practice with herd management and in taking selection decisions

The main target group of the web application are dairy farms and veterinarians, but also extension services and the teaching sector can use the web application and benefit from the results.

KEY MEASURES

The EIP-AGRI project focused on the participatory development of a requirement profile for a practice-proof web application, the programming and testing of the pilot application and the transfer of the web application into routine operation. The following concrete measures were taken:

1. Carrying out farm surveys and holding workshops with farmers
2. Preparation of a technical concept and of technical specifications for the web application
3. Conclusion and calculation of guide values under Austrian production conditions
4. Development of necessary calculation routines and practice-proof forms of presentation for comparison of farms and individual animals
5. Testing on pilot farms and obtaining feedback
6. Transfer of the pilot application to routine operation for all dairy farms under performance control

RESULTS AND EFFECTS

Within the framework of the EIP-AGRI project of the Operational Group *Efficiency check*, it was possible to develop an appealing and intuitive web application for farmers especially for analysing their own dairy cattle herd. However, the web application also enables the comparison with other farms and provides hints for optimisation potential on the farm.

In addition to the actual "final product" - the web application - valuable insights from and for practice were gained as well, and well-founded analyses of the relation between the conditions under which animals are kept, animal health and performance potential of dairy cows in Austria were carried out.

With the collection and the linkage of existing and newly generated knowledge, a tool was thus created which supports farmers in their daily work and, if possible, enables new insights about the farm without additional burden of recording. Moreover, a concept was developed to be able to make available detailed evaluations of the environmental impact of milk production in the future, using the LCA method (Life Cycle Assessment or life cycle methodology).

Since the beginning of 2020, the web application "Efficiency Check" has been available free of charge to all dairy farms under performance control - currently more than 19,000 farms - on the RDV portal.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

- 3 farms in OG plus 15 additional pilot farms
- 2 practising veterinarians in OG
- Federation of Austrian Cattle Breeders (Zentrale Arbeitsgemeinschaft Österreichischer Rinderzüchter ZAR)
- Association Styrian Animal Health Service
- LKV Austrian provincial control associations
- Chamber of Agriculture Upper Austria
- ZuchtData EDV-Dienstleistungen GmbH

PARTNERS

- University of Natural Resources and Life Sciences, Vienna
- LKV- Austrian provincial control associations - Lower Austria
- LfL Upper Austria
- LKV- Austrian provincial control associations - Styria

PROJECT MANAGEMENT

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- Association Styrian Animal Health Service
- LKV Austrian provincial control associations
- Chamber of Agriculture Upper Austria
- ZuchtData EDV-Dienstleistungen GmbH

PARTNERS

- University of Natural Resources and Life Sciences, Vienna
- LKV- Austrian provincial control associations - Lower Austria
- LfL Upper Austria
- LKV- Austrian provincial control associations - Styria



2016-
2018
PROJECT PERIOD



Sustainable grassland management by means of graduated grassland farming

Operational Group *Graduated grassland farming*

ABSTRACT

Quantitative and qualitative yields from grassland constitute the economic basis of a grassland farm. A precondition is a good crop formation, which can establish itself through adapted utilization and fertilization. The concept of graduated grassland farming according to Walter Dietl, where grassland areas within a farm are managed with different intensity, offers the possibility of concentrating fertilization on areas with high yields and thus developing and maintaining appropriate plant populations both in areas with high yields as well as in the more extensively managed areas. Within the scope of the EIP-AGRI project the Operational Group has been working on the topic of graduated grassland farming in terms of its practical implementation on farms in Upper Austria in the course of the past few years. Thirteen participating grassland farms in Upper Austria, both conventional and organic, applied this concept as model farms on their areas during the project period 2016-2018. The farms were supported by different professional institutions during the entire project period. The knowledge gained from the practical implementation could be used and processed as a basis for the creation for a guide on the implementation of the concept.

STARTING POSITION

In practical grassland farming, there is often a tendency to increase the frequency of use of grassland areas on the farm due to climatic developments. At the same time, the areas are mostly managed in a very uniform way. In practice, this frequently leads to an unbalanced relationship between utilization and fertilization of areas. A uniform management of all or major part of the grassland areas of a farm, related with high cutting frequency, can therefore often lead to problems in the nutrient supply (fertilization ceilings and/or not enough fertilizers). This challenge applies to conventional and organic farms equally. With the help of a differentiated management of one's own grassland areas, however, a deprivation-oriented supply on all areas can be ensured.

TARGETS AND TARGET GROUPS

The aim of the EIP-AGRI project was to test and establish the implementation of graduated grassland farming on model farms. Through the cooperation of the various project partners, the current situation on the farms was surveyed and suggestions for the conversion to graduated grassland farming were developed. At the end of the project, a manual as a guide for the practical implementation of graduated grassland farming for extension services and for interested farms was developed.

- ➔ Individual implementation of graduated grassland farming at farm level
- ➔ Establishment of adapted crop populations
- ➔ Adapted fertilization of extensive and intensive areas
- ➔ Preserving/increasing the biodiversity on farms

The target group were foremost farms in Austria.

KEY MEASURES

Key measures in the project were:

1. Analysis of the point of departure on the farms
2. Consultation and workshops with participating farms
3. Monitoring of the implementation of the concept at individual farm level
4. Preparation of a manual on the topic of 'Sustainable grassland management by means of graduated grassland farming' for farms

RESULTS AND EFFECTS

In the model region, it has been shown that the implementation of the concept of graduated grassland farming is mainly expressed in the differentiation of extensive two-cut meadows and intensive four-cut meadows. Due to economic reasons, areas far away from the farm or marginal strips are well suited for extensification, while areas close to the farm and more vigorous can be used more often and supplied with fertilizer. This leads to better manure management and more economic efficiency. The majority of the farms are convinced of the concept even after the end of the project and will continue to implement it. The differentiated management results in different mowing and fertilizer times, which reduces peak workloads and time pressure for the farmers. The forage quality and the yield on the meadows, which are now better supplied with nutrients, have increased, but the yield on the extensive areas is more dependent on rainfall than before. Moreover, different fodder qualities are produced: energy- and protein-rich fodder from the intensive meadows for the dairy cows and hay from the more extensive meadows for dry cows and calves. Through the assessment of nature conservation experts, some extensive meadows could also be designated as nature conservation areas, for which the farms receive a subsidy. However, the impact of the application of the concept on the herds and their yields as well as on biodiversity must be considered in the longer term and should be assessed in a few years.

In order to make the concept accessible to as many farmers as possible, a manual for practice use has been prepared. The manual on graduated grassland farming can be requested via the Biokompetenzzentrum Schlägl (biokompetenzzentrum@fibl.org) or downloaded directly via the online shop of the Research Institute of Organic Agriculture Austria FIBL (www.shop.fibl.org) as a PDF document.

PROJECT MANAGEMENT

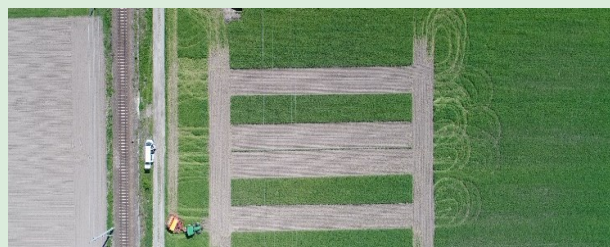
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COOPERATION BETWEEN

- Biokompetenzzentrum Schlägl
- Organic farms from Upper Austria

PARTNERS

- BirdLife Österreich
- Machinery Pool Upper Austria
- Chamber of Agriculture Upper Austria
- Agricultural Research and Education Centre HBLFA Raumberg-Gumpenstein




 SOIL MANAGEMENT
 AND EROSION
 PROTECTION

PROJECT AREA IN



Lower Austria

ONLINE

2016-
2019

PROJECT PERIOD


www.zukunftsraumland.at/projekte/1487
boku.ac.at/nas/ifoel/arbeitsgruppen/ag-bodenfruchtbarkeit-und-anbausysteme/projekte/eip-projekt-biobo

Yield development and humus development via reduced soil tillage and organic fertilisation measures

Operational Group *BIOBO*

ABSTRACT

Soil serves as a source and sink for climate-effective substances and plant nutrients; this is why changes particular in humus content have an influence on the climate and on the yield developments and erosion. The project of the Operational Group BIOBO therefore examined innovative, reduced soil tillage procedures adapted to the farm in connection with sustainable and environmentally friendly fertilization measures (greening, organic manure) as strategy for yield increase and promote of environmental benefits (humus increase, increase in the water storage capacity, increase in nutrient efficiency, avoidance of nutrient losses and erosion, diversity of species). For this purpose, farm-specific practical and precision experiments were carried out on various organic farms as well as on the practical research station Rutzendorf in Lower Austria.

STARTING POSITION

Organic arable farming focuses on preservation and/or development of a high soil fertility. The better the soil fertility is developed on a site, the better are stress tolerance and resilience to unfavourable weather conditions. A decisive measure for the promotion of soil fertility is, among other things, a gentle soil management, which is also associated with other benefits such as reduced erosion and increased biodiversity. In order to be able to use these advantages of reduced, saving soil tillage in organic farming without yield losses, it must be further developed and adapted to the respective site and soil conditions. New insights on reduced soil tillage was gained within the framework of the EIP-AGRI project of the Operational Group BIOBO by means of practical experiments, precision experiments and intensive exchange of experience in the group. They serve as a basis of information for organic farmers who have both experience concerning reduced soil tillage and interest in a conversion of their soil tillage.

TARGETS AND TARGET GROUPS

The objective of the Operational Group *BIOBO* was to develop and evaluate solutions for the implementation of reduced tillage in combination with green manuring measures and organic fertilization. The optimized growing system will contribute to erosion, climate and resource protection, promote soil quality and biodiversity and improve the adaptative capacity of the system with respect to climate change. The objectives can be summarized as follows:

- ➔ Development and control of innovative, reduced farm-specific soil tillage practices as well as fertilization measures (green manure and organic fertilization) in order to increase yields and incomes, while increasing the humus contents and soil fertility with the help of on-farm and on-station experiments
- ➔ Further development and stabilization of systems for soil loosening without reducing the benefits of reduced soil tillage (on-farm)
- ➔ Identification of the most appropriate greening system for the site and for soil tillage (on-farm)
- ➔ Survey of sound scientific data and demonstration of the results of the experiments on the comparison of soil-tillage intensities and fertilization systems within the framework of a long-term experiment (on-station)

The target group of the project were farms and consultants, who could be convinced of the functional and economic advantages of the innovative tillage methods and fertilization measures on the basis of the project results.

KEY MEASURES

Within the framework of the project, on-farm experiments were carried out on several organic farms. In each case, the experimental question was adapted to the respective farm and/or framework conditions. Moreover, experiments were also carried out on the practical research station Rutzendorf in Lower Austria, where the long-term effects of the conversion to organic farming have already been examined for more than ten years:

1. On-farm field trials on the effects of reduced soil tillage and organic (green) fertilization on selected soil properties and yield development.
2. Survey of sound scientific data (humus, nutrient and yield development, soil-water balance) and demonstration of the experimental results on the comparison of soil-tillage intensities and organic fertilization systems on a practical research station (on-station)

RESULTS AND EFFECTS

On-farm field trials: advantages of innovative strategies became partly visible for example a) very flat soil tillage with the modified skim plough as a gentle alternative to the cultivator with the same result as regards soil properties and yield performance, b) the direct seeding method has advantages regarding soil fertility and evaporation reduction and due to the lower utilisation of machinery, it is economically efficient. However, it still needs further improvement in particular regarding the time of seeding and the seeding technology; and c) the ridge till system from Turiel is an interesting soil tillage system for organic farming, however there is still need for research, in particular as regards humus and nutrient dynamics, air and gas exchange and their effects on soil fertility and crop yields.

Long-term trial: alfalfa crop rotation and organic fertilization resulted in appropriate yields, humus production and stabilization of the soil structure; reduced soil tillage: tendency towards improved soil structure, rapid redistribution of humus and nutrients to the topmost soil layer.

PROJECT MANAGEMENT

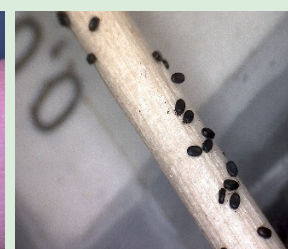
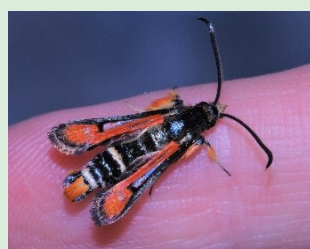
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Gabriele Gollner / University of Natural Resources and Life Sciences Vienna / Division of Organic Farming
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EMail: gabriele.gollner@boku.ac.at

COOPERATION BETWEEN

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- University of Natural Resources and Life Sciences Vienna -Division of Organic Farming
- Agricultural experimental station
- Research Institute for Organic Farming (FiBL) Austria
- 6 organic farms:
Alfred Grand, Karl Ringl, Helga Bernold, Josef Kühböck, Johann Kurzbauer, Hans Dornmayr

PARTNERS

- Chamber of Agriculture of Lower Austria
- wpa Beratende Ingenieure



2016-
2018
PROJECT PERIOD



Organic dock control with beneficial organisms

Operational Group *Organic dock control*

ABSTRACT

In grassland areas dock control is very important as the weed leads to a deterioration of forage in terms of quantity and quality. Therefore, an innovative and sustainable methodology for organic dock control in grassland should be identified and tested. This new methodology should aim at weakening large sorrel plants with an established root system by means of the root-eating clearwing caterpillars to such an extent that they either die by themselves or are displaced by a highly competitive turf/sward. Within the framework of the project, important insights on the breeding of the clearwing and on the inoculation of sorrel plants with clearwing caterpillars could be gained. However, it became also obvious that for the operation of a stable mass breeding and the development of an efficient, practice-proof inoculation method, which is independent from the weather conditions, fundamental knowledge about the biology of these animals, is still missing. Only when this fundamental knowledge is available will it be possible to take up the work on the development and the implementation of the use of clearwings in practice again.

STARTING POSITION

Heavy infestation of grassland with dock reduces yields and therefore results in considerable economic loss for farmers. However, due to the high regeneration and reproduction capacity the control of dock poses a particularly sincere challenge to farmers. Existing means of combating (for example chemical control) can often be used to a limited extent only and in most cases also entail risks. Organic control through natural enemies is therefore an alternative.

TARGETS AND TARGET GROUPS

- ➔ Testing of an innovative methodology for biological dock control with regard to its efficiency, practicality and feasibility by means of a pilot project.
- ➔ Knowledge transfer within the Operational Group as well as between the Operational Group and interested farmers outside the Operational Group.

The main target group was Austrian grassland farming.

KEY MEASURES

The Operational Group *Organic dock control* consists of practitioners, consultants, and researchers. They were supported by external partners (among others AGES, University of Vienna, Agricultural Research and Education Centre HBLFA Raumberg-Gumpenstein and the agricultural technical colleges Hohenlehen and Litzlhof). The implementation took place within the framework of the following sub-steps:

1. Collection of clearwing caterpillars from their natural environment as initial breeding population
2. Rearing and propagation of clearwing caterpillars
3. Application of the caterpillars that have been reared in first outdoor tests as well as
4. Analysis of the results gained from the testing of the method with a view to large-scale applicability of the method in grassland

RESULTS AND EFFECTS

1. On the basis of the experiences made and the project results, the Operational Group has come to the conclusion that the application of clearwings constitutes, at the present state of affairs, no efficient, practical option of clearwing control for Austrian grassland farming. According to literature, the best method of inoculating sorrel plants with the caterpillars of clearwings is the application by means of ice cream sticks applied in the project. However, under practical conditions this method has resulted only in a very weak infection quota.
2. The difficult task to bring the yellow-legged clearwing under artificial conditions to mating could be solved within the framework of this project.
3. Important insights into the development of mass breeding, for example on the recipe of a culture medium and on the conditions under which caterpillars should be kept could be worked out as a basis for further projects.
4. It has turned out that cool-wet weather conditions constitute for both varieties of clearwings (*Pyropteron chrysidiformis* – fiery and *P. triannuliforme* – yellow-legged clearwing) a great risk in the infestive stage. Moreover, the results indicate that the caterpillars of the clearwings can and must move a few centimetres deep into the soil in order to find an appropriate place to penetrate into the root. Both insights are of great importance for the development of a practical and efficient inoculation method.
5. In cooperation between the members of the Operational Group, the prototype of a capsule has been developed which is to enable an inoculation of sorrel plants with the eggs of clearwings, which is as independent from the weather and as practical as possible. This prototype can also serve as a basis for further projects on this topic.

The project year 2017 has shown very clearly that for the development and the implementation of an organic dock control by means of the clearwing fundamental insights on these animals will still have to be gained. These insights are necessary in order to be able to practice a stable mass breeding and to develop an efficient inoculation method, which is independent from the weather. The Operational Group has therefore come to the conclusion that the project should be terminated prematurely. First of all, research work to gain basic knowledge has to be carried out. Only then, the work on the development and the implementation of the use of clearwings in practice can be started again. As soon as an efficient inoculation method, which is independent from the weather conditions, is available, the actual potential of dock control of the clearwing for Austrian grassland farming, thus the ability to reduce dock populations, can be tested in practical experiments.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- MELES GmbH
- Ecker Werner - farmer
- Wieser Leopold - farmer
- Bio Ernte Styria
- Bio Austria Lower Austria
- Bio Austria Carinthia
- Austrian Agency for Health and Food Safety (AGES)
- University of Vienna, Department of Botany and Biodiversity Research, Division of Tropical Ecology and Animal Biodiversity

PARTNERS

- Agricultural Technical College Hohenlehen
- Agricultural Technical College Litzlhof
- Agricultural Research and Education Centre Raumberg-Gumpenstein
- 2 agricultural holdings:

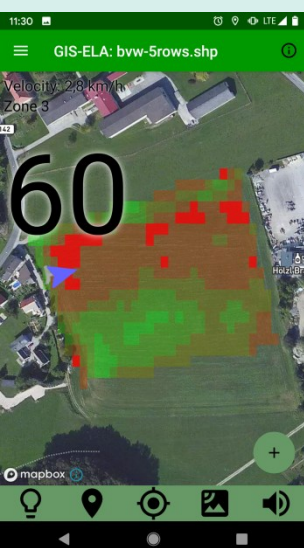
2nd Call

The projects of the second EIP-AGRI call in Austria were approved in 2017 and address the following guiding themes:

- ➔ Agriculture 4.0 – interlinking information/data with production-technical processes for the purpose of optimisation and/or efficiency increase – implementation of innovative procedures in practice
- ➔ Measures and technologies aiming at the reduction of emissions in agricultural practice
- ➔ Measures aiming at the increase of the welfare of farm animal
- ➔ Improving the risk management on farms
- ➔ Preservation and improvement of the genetic production basis of Austrian forests taking into consideration the aspects of the adaptation to climate change.

Projects of the 2nd Call

GIS-ELA	Page 22
Healthy fattening pigs	Page 24
Extended suckling period	Page 26
KLAUEN-Q-WOHL	Page 28
Catch crops	Page 30
SaLuT	Page 32



PROJECT AREA IN:

Lower Austria,
Upper Austria,
Burgenland,
Styria

ONLINE

2018-
2021
PROJECT PERIOD



www.zukunftsraumland.at/projekte/1940
<https://www.youtube.com/watch?v=1Ho4Pyp-OLQ>
<https://play.google.com/store/apps/details?id=at.josephinum.gisela&gl=AT&pli=1>
<https://noelko.at/projekt-geo-informations-systeme+2400++3365273+8060>

Geographic Information Systems for Site-Specific Management Aimed at Increasing Efficiency and Greening in Austrian Agriculture (GIS-ELA)

Operational Group *GIS-ELA*

ABSTRACT

While precision farming, data- and GNSS/GPS-supported precision agriculture, is gaining on importance worldwide, only 6% of farmers in Austria use these technologies. This means that the economic and ecological potential of precision farming remains largely untapped. The project of the Operational Group *GIS-ELA* evaluated the use of precision farming technologies for Austrian farm structures and supported their dissemination. For this purpose, methods for the creation and use of yield potential and application maps in agricultural practice were developed in close cooperation with pilot farms. The knowledge generated about site-specific farming practices, including concrete application tips, was documented in detail and published in print and online versions. Finally, knowledge transfer to a larger number of farmers took place within the framework of various events.

STARTING POSITION

For the small-scaled Austrian agriculture there are in practice some obstacles to the application and dissemination of precision farming. Besides the high acquisition costs for technical equipment, it is often necessary to use services for the creation of application maps when farms lack time and know how in the field of information and communication technologies. Furthermore, there was a lack of independent comparisons between the numerous processes and products of the technology and software providers on the market. Also, the ecological effect of precision farming has not yet been appreciated according to the current funding guidelines of the Austrian Agri-environmental Programme ÖPUL (Austrian Programme for the Promotion of Environmentally Sound, Extensive and Nature-Compatible Agriculture). Last but not least, the benefits of precision farming systems have often been doubted. The EIP-AGRI project started from this situation and, taking into account the small-scale and heterogeneous agriculture in Austria, wanted to develop adapted methods for precision farming and make them available to farmers. The aim was to raise awareness of the economic and ecological potential of precision farming systems. .

TARGETS AND TARGET GROUPS

The objectives of the EIP-AGRI project were:

- ➔ Dissemination and utilisation of yield potential and application maps in agricultural practice, with special consideration of the typical farm structures in Austria.
- ➔ Finally making available to the farmers free of charge the project results in the form of guides and multimedia manuals including free software.
- ➔ Furthermore, the results can be used for dissemination of knowledge about precision farming beyond the duration of the project (for example for training events).

The main target group were Austrian farmers with arable farming. The applicability on grassland farms was also considered.

KEY MEASURES

Key project steps were:

1. Examination of the available GIS software for their suitability with regard to the requirements for systems and imports of data from various sources
2. Generation of yield potential and application maps by means of various methods, with the focus on the automation of the generation of maps and the simple easy operability
3. Transfer of the maps on the working tools and development, and/or testing of the use of the maps and
4. Documentation, publication and dissemination of project results and experiences

RESULTS AND EFFECTS

The expected result of the Operational Group GIS-ELA was practical instructions for the implementation of site-specific management methods for agricultural farm structures. In the long term, the increased use of precision farming technologies should lead to a more efficient use of inputs, for example fertiliser, pesticides, fuel, while at the same time reducing environmental impact.

The project has shown that ecological benefits can be achieved through site-specific fertilisation. In some field trials, for example, it was possible to reduce fertiliser use by up to 15 kg/ha while maintaining the same yield, and in some sub-areas it was even possible to achieve higher quality.

Map generation on the basis of satellite images is feasible and practical with the software generated in the project. The smartphone application makes it possible to implement the map material independently of the available technology on the farms.

During the field tests on the pilot farms, the software was tested in practical use and a database for future fertiliser recommendations in the different climatic regions of Austria was developed.

PROJECT MANAGEMENT

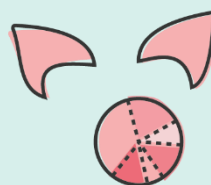
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COOPERATION BETWEEN

- 8 lagricultural holdings:
- Chamber of Agriculture Lower Austria

PARTNERS

- Josephinum Research



GEMA

Nutzung von Gesundheitsdaten zur Verbesserung von Atemwegserkrankungen und Parasitenbefall bei Mastschweinen



ANIMAL
WELFARE AND
HEALTH

2017-
2020

PROJECT PERIOD

PROJECT AREA IN:



Lower Austria,
Upper Austria,
Styria

ONLINE



www.zukunftsraumland.at/projekte/1943
www.voes-online.at/index.php/projekte/eip-projekt

Utilisation of health data for the improvement of respiratory diseases and parasite infestation with fattening pigs

Operational Group *Healthy fattening pigs*

ABSTRACT

The health of pigs is an important prerequisite for the economic success of pig fattening farms. However, farmers do not have a systematic evaluation and presentation of available health data, for example data from the carcass and examination SFU, at their disposal for use on farms for the farmers. The EIP-AGRI project of the Operational Group healthy fattening pigs therefore aimed at developing a health database for pig fattening farms, which will render it easier for farmers to identify risk factors and weak points of the farm with respect to health problems and to take respective improvement measures. In addition to that, a diagnosis catalogue with pictures and explanations of diseases and their significance was created, as well as tools (online questionnaire, app) were developed to identify possible weaknesses or risk factors on a farm-by-farm basis.

STARTING POSITION

In the course of the ante-mortem and post-mortem inspection at the slaughterhouse (carcass and post-mortem inspection data SFU), pig farmers only received the diagnosis on the health status of their own pigs. In order to be able to use this data for health management on the farm, it was first necessary to check whether the quality of the data was reliable for this purpose. Subsequently, the data were processed in more detail so that an evaluation of different batches over a longer period of time is possible. In addition, benchmarking with other farms was made available.

Thus, a comprehensive health database for pig farms was created with this EIP-AGRI project, which supports farmers in improving animal welfare and health on their farms.

TARGETS AND TARGET GROUPS

The objects of the project were:

- ➔ Development of a health database by means of interlinkage of available health data as well as preparation of a diagnosis catalogue as a tool for the interpretation of the health data.
- ➔ Development of tools in the form of a questionnaire for the fields of bio-safety, respiratory diseases and parasite infestation to identify risk factors and weak points of the farm with respect to health problems..
- ➔ Examination of the practicability and the effectiveness of the tools on the basis of farm visits.
- ➔ Development of a proposal for an alternative diagnosis scheme and/or listing of potential adaptations of the SFU metadata catalogue together with the Vienna University of Veterinary Medicine, including the transmission of the proposal to the Federal Ministry of Social Affairs, Health, Care and Consumer Protection.

The main target group of the project was agricultural farms with fattening pigs.

KEY MEASURES

The Operational Group was composed of active farmers, a practising veterinarian, the Association of Austrian Pig Farmers (VÖS), the Animal Health Service Upper Austria (OÖ TGD) and the Association of Agricultural Finishing Producers (VLV). The farmers of the operational group participated with their animals in the development and testing of the health database and the tools. Other cooperation partners were the University of Natural Resources and Applied Life Sciences Vienna (BOKU) and the University of Veterinary Medicine Vienna (VetMed Uni Wien).

Key stages in the project were:

1. Development stage: Programming of an interface and the possibility to evaluate the SFU data; working out tools and diagnosis catalogue.
2. Implementation stage: Evaluation of the current situation and the subsequent planning and implementation of measures on 28 pig fattening farms; further development of the tools and the health database.
3. Evaluation stage: evaluation and controlling the effectiveness of the tools; publication of the project results.

RESULTS AND EFFECTS

The aim was to improve animal health due to fewer respiratory diseases and parasite infestations in pig fattening farms and to take biosecurity measures. This may reduce pathogen entry and spread on the farm and contribute to a reduction in the use of medicines. After project completion, the following results were achieved:

1. An alternative reporting scheme was developed, which will be tested at slaughterhouses in a follow-up project by the University of Veterinary Medicine.
2. Evaluation options for SFU data that can be implemented after implementation of the alternative reporting scheme have been created.
3. A catalogue of findings for the interpretation of health data has been completed and is available online.
4. The GEMA Check App was programmed as a tool for self-evaluation of farmers in the areas of biosecurity, respiratory diseases and parasite infestation. Access to the app can be requested at office@schweine.at. The app also serves as a basis for further digitalization measures, such as the implementation of the risk analysis in the area of tail docking in the app.

PROJECT MANAGEMENT

Association of Austrian Pig Producer
Verband Österreichischer
Schweinebauern VÖS
Michael Klaffenböck
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COOPERATION BETWEEN

- 28 agricultural holdings:
- Chamber of Agriculture Lower Austria
- Association of Austrian Pig Producers (Verband Österreichischer Schweinebauern)
- Animal Health Service Upper Austria (Tiergesundheitsdienst Oberösterreich)
- Association of Intensive Livestock Farmers (Verband landwirtschaftlicher Veredlungsproduzenten)
- Veterinarian (Thomas Voglmayr)

PARTNERS

- University of Natural Resources and Life Sciences Vienna - Division of Livestock Sciences
- Vienna University of Veterinary Medicine - Unit of Veterinary Public Health and Epidemiology
- Vienna University of Veterinary Medicine - University Clinic for Swine



2017-
2020
PROJECT PERIOD



Participation project and transfer of knowledge on extended suckling periods on organic pig farms

Operational Group *Extended suckling period*

ABSTRACT

In organic pig farming, piglets are weaned from the sow at the earliest after the legally prescribed minimum suckling period of 40 days. At this time, however, the piglets are in a critical physiological phase. They are more susceptible to diseases and often get the so-called weaning diarrhoea, which has to be treated with antibiotics. The indisposition of the animals also manifests itself in performance losses, such as growth disorders, and is therefore economically relevant for farmers. The project of the Operational Group *Extended suckling period* aimed to show the positive effects and practicability of extending the suckling period to at least 49 days and to provide organic farmers with a guide. The concept of the extended suckling period showed a solution approach to reduce the problems around weaning of piglets and to improve the welfare and health of piglets.

STARTING POSITION

The fact that an extension of the suckling period has a positive effect on piglet health has already been scientifically investigated. This is shown in a significant superiority of the longer suckled piglets in terms of live weight development and treatment incidences.

However, there are several obstacles to actually implement it in agricultural practice: For farms with a fixed production rhythm, the extended suckling period requires an individual farm adaptation due to the longer period of utilization of the space. In addition, a longer suckling period must not have an effect on the fertility of the sows. Last but not least, an economic assessment of the extended suckling period as supporting information for farmers is missing. Within the framework of this project, the concept of an extended suckling period on fattening pig farms aiming at an improvement of the welfare and of the health of the animals and to reduce the farm risk due to the treatment of the animals. The experiences made and the effects reached in this context have been published in various forms and support farmers in switching to an extended suckling period.

TARGETS AND TARGET GROUPS

The objectives of the project were:

- ➔ Establishment of the concept of an extended suckling period as a reasonable option for organic pig farms and support of the farmers in the conversion process
- ➔ Improvement of the welfare and health of the animals and reduction of the farm risk due to the treatment of the animals
- ➔ Evaluation of the economic effects in the course of switching to an extended suckling period
- ➔ Meeting the expectation of the consumers of healthy animals on organic farms with a low level of animal treatments

The main target group were organic pig farms with interests in a successful piglet production. However, the results could also be interesting for conventional pig farms, if considering an extended nursing period to improve piglet health.

KEY MEASURES

Key project steps of the EIP-AGRI project were:

1. Farm visits and identification of the status quo
2. The preparation of farm folders on the implementation of an extended suckling period
3. The implementation of the extended suckling period on farms in practice and current data collection
4. Regular meetings of the Operational Group and permanent exchange of experiences
5. Evaluation, interpretation and discussion of the results
6. Publication of articles, preparation of a brochure and a short video for interested farmers

RESULTS AND EFFECTS

The project supports the establishment of the extended suckling period in Austrian organic pig farming. Regular meetings within the framework of the project promote the exchange between the participating farmers and members of the farm group and offer the opportunity to meet challenges together in a solution-oriented manner. Insights around successful piglet production were shared in the form of a brochure, and participating farmers reported on their experiences in a short video.

Positive effects were observed, which had a direct impact on the well-being and health of the piglets: Due to the extended conversion time from breast milk to solid feed, the piglets can already absorb solid feed very well at the time of weaning. This leads to a strong live weight gain, especially in the seventh and eighth week, and thus to increased vitality. 'This advantage is also noticeable in the fattening pen,' says an enthusiastic farmer. Neither do the sows' udders seem to be overstressed by an extended suckling period, nor are the sows more suckled than before. Provided that attention is paid to a balanced feed ration and feed is offered in sufficient quantity, they already gain body weight at this time (to be observed especially in group suckling). An increase in lactation heat as well as higher repeat breeding rates could be ruled out.

Healthy and productive animals can only be achieved through a combination of different measures (optimisation of hygiene and management measures, feeding and housing conditions). Piglets that are fit and vital during the suckling period also cope better with the often stressful weaning phase. And this can work on any farm! The detailed examination of the farm performance enabled a good comparison with other farms in the sector and made possibilities upwards and downwards visible. Many practical farms make use of the positive experiences with the extended suckling period and continue to practice it even after the end of the project.

PROJECT MANAGEMENT

Research Institute for Organic Farming (FiBL)

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COOPERATION BETWEEN

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- Rural Further Education Institute Lower Austria
- Organic Institute of the Research and Education Centre HBLFA Raumberg-Gumpenstein, external location Thalheim/Wels
- Division of Livestock Sciences, University of Natural Resources and Life Sciences (BOKU)
- Institute of Animal Welfare Science, Vienna University of Veterinary Medicine

PARTNERS

- Bio Austria



2017-
2021
PROJECT
PERIOD



Improvement of hoof health and animal welfare of dairy cows in Austria

Operational Group *KLAUEN-Q-WOHL*

ABSTRACT

Hoof and limb diseases with dairy cows are caused by deficiencies in husbandry, feeding and hygiene. They impair the well-being of the animals and bring economic disadvantages. The Operational Group *Klauen-Q-Wohl* aimed to raise awareness among farmers and hoof trimmers for improvement measures. An infrastructure for the standardized documentation and centralized electronic collection of hoof trimming and lameness data has been established. On the basis of these data, risk and influencing factors for the development of hoof diseases and lameness were derived, which are now available to the farmers for herd management, breeding and support them in taking improvement measures adapted to the individual animals and to the farm.

STARTING POSITION

Hoof and limb disorders rank among the most frequent causes of losses of dairy cows. Healthy hooves are essential for the well-being of the animals and of economic importance for the farm. At the beginning of the project, there was no systematic, centralised recording and evaluation for lameness and hoof diseases in Austria that also included other animal welfare parameters. This project established an Austria-wide infrastructure for the centralised, standardised collection and evaluation of data on hoof health, lameness and animal welfare.

TARGETS AND TARGET GROUPS

- ➔ Hoof trimmers: through their training and experience, they bring with them the relevant know-how and play a key role in the project. Programmes and interfaces were developed to motivate them to electronically records the hoof findings and transmit them to the cattle data network, to support them in doing so and to provide them with evaluations and analyses for on-the-spot consulting on the supported farms.
- ➔ Farmers: awareness raising and increase in knowledge in the fields of hoof health and animal welfare. Key figures and software tools were developed that show them strengths and weaknesses in the fields of hoof health and animal welfare on their farms and at the same time possible solutions, as well as the progress achieved after the measures have been taken. Breeding values for hoof health were developed in order to improve the health of cattle through breeding and thus sustainably and in the long term.
- ➔ Dairy cows: healthy footing, even higher welfare.
- ➔ Consumers: healthy, high-quality foodstuffs from dairy cows with healthy footing and a high degree of animal welfare.

KEY MEASURES

All measures were designed and implemented by the members of the 'ARGE Klauen-Q-Wohl' (farmers, hoof trimmers, provincial control associations all over Austria, Austrian Chamber of Agriculture, animal health services, experts in breeding and herd management, IT experts, Rinderzucht Austria, University of Natural Resources and Life Sciences Vienna, University of Veterinary Medicine Vienna).

1. Development of a programme to promote and push the electronic documentation of hoof trimming
2. Development and implementation of an electronic infrastructure for the central recording of hoof care data and lameness in the Cattle Data Network (RDV) (international standard: ICAR)
3. Data validation, statistical evaluations and analyses, development of key figures
4. Development of digital herd management evaluations for farmers and development of a mobile app on the documentation of hoof trimming
5. Comprehensive literature research and expert interviews on the weighting of risk factors
6. Identification of animal welfare indicators and risk factors on pilot enterprises and test farms in cooperation with the University of Natural Resources and Life Sciences Vienna
7. Elaboration of a technical concept on the digital recording of animal welfare indicators and risk factors
8. Evaluation of the surveys, reports to the test farms, development and test of the risk factor tool
9. Public relations tools, trainings, quality assurance, raising awareness and motivation of farmers and hoof trimming workers for measures in this field

RESULTS AND EFFECTS

The most important result is the improvement of animal welfare in milk production, which is also demanded by sensitised consumers. Increased level of welfare of dairy cows means less loss of performance, use of medicinal products and fever failures, and thus a higher productivity.

Data from hoof trimming are documented by the 40 participating hoof care professionals (as of September 2021, around 335,000 hoof diagnoses from 852 farms) and transmitted to the cattle data network. As part of the project, the *Klauenprofi-App* was developed, which enables member farms of the control association in Austria to quickly and easily document the hoof care and key animal welfare indicators of their cattle. The central recording of claw findings in the cattle data network in combination with other information makes it possible to provide evaluations to support herd management. These are available on a daily basis in the *Klauenprofi-App* or in the Herd Manager-Tool of the control association. With lists and diagrams, the evaluations provide farmers with a quick overview of the occurrence of findings and the development of claw health in the herd.

The tool supports the facilitation of daily management, but is also a tool for identifying potential for improvement and can also support farmers in discussions with experts (advisors, veterinarians). A tool that identifies risk factors for hoof diseases and improvement measures was developed in cooperation between science and practice. These risk factors are also clearly presented alongside other relevant information on hoof health in the hoof health brochure for practitioners.

The EIP-AGRI project of the Operational Group *Klauen-Q-Wohl* has also succeeded in laying the foundation for the development of a breeding value for hoof health. This is currently under development. This is very important for the sustainable improvement of animal welfare and claw health, as a breeding value for claw health makes it possible to select animals that are less susceptible to claw health problems. Together with improvements in herd management, this can improve animal health, but also profitability.

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COOPERATION BETWEEN

- Hoof trimmers from all over Austria
- Dairy farms (pilot farms)
- Scientific staff members of the Austrian provincial control associations (Landeskontrollverbände LKV) from all over Austria
- Rinderzucht Austria (RZA and breeding associations)
- Vienna University of Natural Resources and Life Sciences
- Vienna University of Veterinary Medicine
- ZuchtData EDV-Dienstleistungen GmbH

PARTNERS

- Rinderzucht Austria (RZA)
- Federation of Austrian Hoof Trimmers (Arbeitsgemeinschaft österreichischer Klauenpfleger AÖK)
- LKV Austrian provincial control associations
- Performance Control Agency Vorarlberg (Leistungskontrollstelle Vorarlberg)
- Austrian Provincial Control Association - Carinthia
- SEG Informationstechnik GmbH
- Animal Health Service Salzburg
- Austrian Chamber of Agriculture (Landwirtschaftskammer Österreich)

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 - LKV Austrian provincial control associations
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 - Austrian Provincial Control Association - Carinthia
 - SEG Informationstechnik GmbH
 - Animal Health Service Salzburg
 - Austrian Chamber of Agriculture (Landwirtschaftskammer Österreich)



SOIL MANAGEMENT
AND EROSION
CONTROL



PROJECT AREA IN:

Lower Austria,
Burgenland,
Upper Austria, Styria,
Carinthia, Vienna

ONLINE



2017-
2020
PROJECT PERIOD

www.zukunftsraumland.at/projekte/1945
www.bioforschung.at/projects/minnc-emissionsminderung-durch-begrueenungen/
<https://argebegrueenung.home.blog/>

Minimizing gaseous N and C emissions and N leaching by optimising catch crops in arable farming

Operational Group *Catch crops*

ABSTRACT

Catch crops reduce nitrogen leaching to deeper soil layers and gaseous nitrogen and carbon emissions. They are an important measure for groundwater protection. To achieve an optimized "catch crop function", many factors must be taken into account: starting from the sowing of the catch crop up to the release of nutrients from the died-off catch crop plants. The Operational Group *Catch crops* aimed with the EIP-AGRI project to test measures for an optimal catch crop management in practical trials and to assess their efficiency for the reduction of emissions. Based on the results, a management concept for cover crops was developed, which was published and communicated directly to farmers through events on site, at the field experiments.

STARTING POSITION

In several groundwater bodies, particularly in the Eastern part of Austria, high nitrate concentrations are found due to intensive agriculture. For example, in the Marchfeld the nitrate concentrations show a continuously increasing trend, with an average nitrate content of 55 mg/L NO₃ between 2011 and 2015, well above the permissible limit. Catch crops are an instrument for groundwater protection, because the green plants take up the residual nitrate from the soil in autumn and bind it in the plant biomass so that it is not leached into deeper soil layers during winter. Catch crops represent an important element in the ÖPUL programme (Austrian Programme for Environmentally Sound Agriculture), but at present it is also possible to establish a type of cover crop that is of little use as a catch crop for nitrogen. In this project, emission reduction measures were tested that make sense under the framework conditions of the ÖPUL programme. The aim was to investigate under which conditions cover crops optimally fulfil their catch crop function.

TARGETS AND TARGET GROUPS

- ➔ Reduction of nitrogen leaching into deeper soil layers as well as of gaseous nitrogen and carbon emissions.
- ➔ Optimizing the management of cover crops and undersowing under the conditions of the Austrian Agri-environmental Programme ÖPUL.
- ➔ Dissemination of results through field days, production of a cover crop brochure and a cover crop compass, development of a cover crop network.

The main target group of the EIP-AGRI project were arable farmers.

KEY MEASURES

Key project steps were:

1. Implementation of six practical experiments per year on the fields of the participating farmers over a period of three years, focusing on the most interesting question concerning cover crops on the respective site. Examined were different cover crop mixtures, seed rates, machinery, sowing times as well as winter management.
2. Examination of the nitrate content in the soil, the biomass and rooting manner of the cover crops; analyses of nitrogen and carbon contents of aboveground and underground cover crop biomass and its degradability, and of soil cover of the field trials. Additional root examinations.
3. The special feature of the "Cover Crop Field Days" was, that the participants learned about the analysis results of the same cover crop stands in the morning in the seminar, which they visited in the field in the afternoon. This allowed the participants to understand the results in a unique way.
4. Publication and dissemination of the results by means of a cover crop brochure, cover crops compass, recommendations for adapted cover crop mixtures, articles in journals, establishment of a cover crop network, recommendations for ÖPUL measures.

RESULTS AND EFFECTS

Key factors for the efficiency of cover crops to reduce N and C emissions were identified and communicated to farmers in numerous field days and articles in agricultural journals.

- ➔ Duration of soil cover: The longer a cover crop can grow and remain on the field, the more biomass it can form and the more protection against nitrate leaching and erosion will it bring. Soil cover by the residues of a cover crop reduces soil erosion during the period until the main crop covers the soil. Every day on which a field is greened counts!
- ➔ Species-rich cover crop mixtures are effective because they contain both dryness-loving and wetness-loving species and the cover crop is therefore successful in dry as well as in wet years. Mixtures for frost-killed cover crops should consist of at least five plant species from at least three plant families, mixtures for winter-hardy cover crops and undersowing of at least three plant species.
- ➔ Adjustment: The cover crop mixture (with and without leguminous plants) should be selected depending on the planned subsequent crop and the residual nitrate content in the soil. In case of sufficient residual nitrate (measurement with a simple nitrate test), growing large-seeded leguminous plants is not worthwhile, because they are suppressed by the abundantly growing non-leguminous plants.
- ➔ Time of sowing: On humid and cool sites, the sowing of cover crops should take place as soon as possible after the harvest in order to make use of the vegetation period. If the subsoil is dry, it is better to delay sowing until the soil has moistened sufficiently, so that a rapid germination and rooting is possible.
- ➔ In order to reduce soil erosion, the seedbed should be prepared not too finely, and the harvest residues should remain on the soil surface.
- ➔ Roots are essential! More roots means more protection against nitrate leaching. Mixtures with many different components are, due to their different root systems, more successful in keeping the nitrate in the upper soil layers. Roots in greater depths are particularly important for humus enrichment and soil structure improvement.
- ➔ The C/N ratio of different cover crop plant species varies within a wide range (7:1 to 140:1). By selecting an appropriate cover crop mixture taking into consideration the C/N ratio and the appropriate management, the nutrient release can be optimally adapted to the demand of the subsequent crop and nutrient losses can be reduced.

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COOPERATION BETWEEN

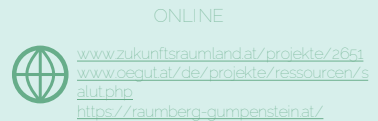
- 5 agricultural holdings:
- 1 agricultural service contracts
- 1 scientific institute
- Supported by numerous strategic partners, such as agricultural schools, agricultural extension services and NGOs, farmers, and three scientific institutes.

PARTNERS

- Bio Forschung Austria
- Karl Strohmayer
- Franz Traudtner
- Johannes Doppelbauer
- Heinz Köstenbauer
- Harald Schelander
- Maschinenring Hollabrunn-Horn



2020-
2023
PROJECT PERIOD



Clean air in animal production: Emission reduction and animal welfare in pig fattening

Operational Group *SaLUT*

ABSTRACT

Due to high emissions and associated neighbourhood conflicts, Austrian animal production faces the challenge of implementing environmentally sound and animal-friendly housing systems. Emission measurements in the first low-emission animal welfare house for fattening pigs in Austria were used to investigate the potential for savings in emissions and odour pollution.

On the one hand, the results are to point out possibilities for innovations and investments in animal production that will secure the competitiveness of Austrian animal production farms in the EU. On the other hand, they should invalidate the critical objections of neighbours so that official approval procedures for livestock buildings will involve fewer conflicts in the future.

STARTING POSITION

So far, many livestock farms, especially pig farms, cause large amounts of emissions. They account for one third of the agricultural sector's total greenhouse gas emissions and often lead to conflicts between livestock farms and residents in neighbouring settlement areas. The considerable odour emissions are also the main cause of often years-long official approval procedures with ultimately negative assessments. Measures to reduce emissions were therefore urgently needed and sought.

This EIP-AGRI project dealt with practical measures and technologies to reduce emissions and improve animal welfare in the first low-emission livestock house for fattening pigs in Austria and provided scientifically sound statements on emission reduction potentials. The results on the low-emission animal welfare barn are to contribute to ensuring the self-sufficiency of the pork industry in Austria at a higher level from the point of view of environmental and climate compatibility.

TARGETS AND TARGET GROUPS

The project aimed to reduce greenhouse-effective ammonium emissions (NH₃) in livestock farming. The focus was on the development and testing of the first low-emission animal welfare house for fattening pigs, which breaks completely new technological ground in the areas of animal husbandry and emissions. The combination of emission reduction and production optimization was worked out by using the latest technologies and evaluating them as a team. By reducing emissions, odour pollution was also reduced. At the same time, this new type of barn represents an innovation in terms of animal welfare, animal protection and animal husbandry in general.

The project set the following three priorities:

- ➔ Reduction of ammonium and dust emissions as well as of odour pollution in animal production and quantifiable statements on the emission reduction potentials.
- ➔ Reduction of existing and avoidance of future conflicts of interests with neighbours and animal welfare campaigners.
- ➔ Ensuring on a medium- and long-term basis the self-sufficiency of Austria in terms of pork.

The main target group of the project were Austrian farmers of pig fattening farms.

KEY MEASURES

The focus of the project focuses was on the scientific monitoring of planning, construction and operation of the first low-emission animal welfare stable for fattening pigs in Austria on the farm of the Neuhold family. For this new type of stable system there were so far no key figures on emission saving potentials available.

Key project steps were:

1. Ongoing measurements in the new fattening stable of the Neuhold family in order to identify the emission savings potential when using the state-of-the-art technologies
2. Active involvement of stakeholders, who have a critical view vis-à-vis conventional pig fattening in order to inform about this best-practice system.
3. Dissemination activities of the results, for example information material, technical contributions for networks, journals and meetings, public relations work, excursions and farm visits.

RESULTS AND EFFECTS

Within the EIP-AGRI project scientifically sound statements on the emissions savings potentials of best practice examples in the field of pig fattening were worked out. Furthermore, practice-proof possibilities of implementation of the National Emission Ceiling (NEC) Directive were presented to stakeholders for example within the framework of a network event, and the best practice measures are processed in the form of an information brochure, in order to raise awareness for low-emission animal welfare stables. Due to recommendations for respective promotion measures, the broad implementation of the technology shall be supported.

By means of an active involvement in the pig fattening sector, the developed production systems were optimized and positioned as a gentle alternative. The involvement of stakeholders and pig farms made it possible to present the developed production systems as an approach to solving existing or avoiding future conflicts of interest with animal welfare organizations and neighbours and to create investment incentives.

After all, the innovations that are necessary for the continued existence of domestic small-scale pig production and should create further incentives were thus demonstrated.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

- Builder
- Pig fattening farm
- Stable technology provider
- Scientific monitoring

PARTNERS

- Agricultural Research and Education Centre Raumberg-Gumpenstein
- Jaga's Steirerei
- Lorber & Partner GmbH
- Schauer Agrotronic

3rd Call

The projects of the third EIP-AGRI call in Austria were approved in 2018 and address the following guiding themes:

- Creation of new methods for resource-saving, emission-mitigating and efficient nutrient, plant protection and area management
- Tackling societal challenges in the context of agriculture
- Improving market opportunities along the agricultural value chain
- Strengthening the closed substance cycle economy
- Improving risk management in farms

Projects of the 3rd Call

Reine Lungau	Page 36
KEFStrat	Page 38
OptEro	Page 40
Agriculture Gutshof Heidensand	Page 42
Larval breeding	Page 44


2018-

2021

PROJECT PERIOD


Preservation of the competitiveness of mountain farms by means of innovation and transfer of knowledge for efficient production, closed substance cycle economy and marketing

Operational Group *Reine Lungau*

ABSTRACT

With the acceptance of a narrow regional delimitation of feed supply within the district of Tamsweg, the involved farms withdrew completely from the national feed market, which made a reorientation in resource and land management necessary. The starting point for the adjustment was the assessment of all nutrient flows on the farm in order to make changes in fertilization and use. For this purpose, the proven concept of staggered grassland management was introduced, which has since been applied on all participating farms. Accompanying measures to design the plant communities and integrate the locally important whinchat habitats were indispensable. In order to further develop the idea of regionality, the feed supply had to be ensured locally. Cereal seeds could only be propagated locally under the climatic conditions of the region. But this also applied to the seed mixtures for the reseeding of grassland. This seed could be obtained by threshing on site. Farmers were supported in their farm activities by the *FarmLife* farm management tool and received valuable information about changes in the farm structure. In particular, the marketing of old cows under the brand '*Reine Lungau Biosphärenrindfleisch*' opened up new production and sales channels for the dairy cows, which were fed exclusively with regional feed.

STARTING POSITION

Changes in feed procurement had a far-reaching impact on livestock production, opening a nutrient gap that affected both quality and quantity. Lower feed quantities led to a reduction in livestock numbers, which in turn reduced the amount of manure produced. At the same time, nutrient density decreased, and on many farms the proportion of staple feeds made up as much as 95% of the ration. Small-framed dairy cows with moderate performance coped better with this situation than more intensive dairy breeds. The project farms therefore had to change their breeding stock as quickly as possible and purchase suitable animals or develop them from their own herds.

All the measures taken so far have led to agriculture that is ideally adapted to the location and has a high ecological value. It was inseparably linked to the realization of ecological successes. This had already been achieved in the area of milk marketing, but still had to be extended to the sale of old cows. Both the control of nutrient flows and the assessment of comprehensive product quality in the sense of eco-efficient farming were ensured via the *FarmLife* farm management tool. Particularly important for the successful implementation of the EIP-AGRI project was the cooperation of regional actors, which led to a new sense of community in the region.

TARGETS AND TARGET GROUPS

In the EIP-AGRI project of the Operational Group *Reine Lungau* farms, processors, research, school and advisors cooperated and enabled the development of a modern management concept following the principle of "Get along with what you have". The objectives of the project were:

- ➔ Need for change in the individual farms in respect of resource-saving, emission-reduction and efficient land management: Use of *FarmLife* for the assessment of the plot-related nutrient balances, individual farm management plan.
- ➔ Safeguarding the biodiversity of flora and fauna: Ensuring the supply with regional grassland seeds through on-site threshing, regional propagation of arable seeds based on the local competence of the Lungau seed cultivation association, establishment of biodiversity areas with late harvesting dates (after 20th June) to foster the habitats of whinchats. Documentation of the habitats and recording of the cutting dates with external evaluation.
- ➔ Promotion of suitable strains: Evaluation rounds for Austrian provincial control associations (LKV) reporting, selection of mothers and choice of bull fathers according to the total ecological breeding value.
- ➔ Boosting the marketing competence for beef: Product development in the beef sector (durable goods) and pilot for marketing.
- ➔ Ensuring social acceptance and price hedging: Overall assessment of the production network within the framework of environmental accounting, visualization and communication paths to enterprises to be marketed and to consumers.

KEY MEASURES

1. Introduction of the successfully tested concept of graduated grassland farming
2. Increase the regional cereal cultivation for ruminant feed
3. Market exploration and prototypical introduction of the brand "*Reine Lungau Biosphären Rindfleisch*"
4. Measures to preserve biodiversity and species diversity, especially with regard to whinchat
5. Assistance of farmers by means of the farm management tool *FarmLife*

RESULTS AND EFFECTS

The farms participating in the EIP-AGRI project were able to expand their competences beyond the basic production in dairy farming and thus secure the innovative production method in the long term. With the success of the project, the local representative body of the farms, the *Tamsweg* District Chamber of Agriculture, supported the farming population in the region. The close networking between the farms and the regional tourism concept, especially through the close cooperation with the *Lungau Biosphere Park*, created a valuable application for synergies in rural areas. Overall, the appreciation of the region increased. This also had an impact on the overall development of the region. Another result path led to the *Tamsweg* Agricultural College. The *Reine Lungau* production process and the concept of eco-efficient agriculture are future training priorities in the region.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

- 57 farms organised in the association "Reine Lungau"
- District Chamber of Agriculture Tamsweg
- Agricultural Secondary School Tamsweg
- UNESCO Biosphere Reserve Salzburger Lungau
- Nature conservation department of the Province of Salzburg
- BirdLife
- WWF Österreich
- Cattle breeders association/ Producer group / Salzburg

PARTNERS

- Salzburg Milch
- Agricultural Research and Education Centre Raumberg – Gumpenstein
- METRO Österreich



2018-
2022
PROJECT PERIOD



Development of sustainable measures to combat spotted wing drosophila in the Austrian fruit-growing and viticultural sectors

Operational Group *KEFStrat*

ABSTRACT

Spotted wing drosophila is an invasive pest from Asia. The females of this fly species lay their eggs in ripening fruits and cause severe yield losses, mainly in berries, cherries, elderberry, grapes and 2022 also in apricots. Existing control strategies cannot always prevent yield losses. Infestations often occur only just before the harvest. In order to exclude residues in the crop the application of insecticides is not, or only to a very limited extent, possible at this time. The few currently registered insecticidal measures are not always sufficiently effective against the fly and can harm other insect species.

The EIP-AGRI project of the Operational Group KEFStrat therefore developed new approaches to control this pest that are environmentally and bee friendly. Substances that attract the flies were identified in the laboratory. They are to be used in attract-and-kill methods, in which insecticides are only applied to part of the crop or to baits. Sustainable measures to reduce egg laying and larval development have also been developed. The most effective strategies were tested in field trials. The results of the project formed the basis for an effective, environmentally sound control strategy for agricultural practice.

STARTING POSITION

Spotted wing drosophila (SWD, *Drosophila suzukii*) belongs to the family of fruit flies. It was introduced from Asia and was first detected in Austria in 2011. Animals caught in traps demonstrate that meanwhile the species has spread all over the federal territory. In Austria, the species damages especially soft fruits, such as raspberries, blackberries or blueberries, sweet cherries and sour cherries, plums, elderberry and also grapes (in particular red varieties or those with flesh pink berries, for example the varieties Blauer Portugieser, Roter Veltliner, St. Laurent, Rotburger (Zweigelt), and Frühroter Veltliner). Depending on the region and the crop, the crop failure caused by spotted wing drosophila amounts to up to 80 %. The currently available concepts to combat spotted wing drosophila cannot always prevent crop failure.

Frequently the infestation occurs only just before the harvest. In order to exclude residues in the crop the use of insecticides is not, or only to a very limited extent, possible at this time. The few presently permitted measures applying insecticides are not always sufficiently effective and can harm beneficial insects and, in the case of inappropriate application, even bees. The Operational Group KEFStrat aimed to develop strategies to reduce or prevent damage caused by spotted wing drosophila in the field or after harvest. The insights gained in the EIP-AGRI project were summarized in a brochure and disseminated to the sector.

TARGETS AND TARGET GROUPS

Key objectives were:

- ➔ Identification of substances that have an attractive effect on the flies and/or alter their behaviour under laboratory conditions. Following these substances were used to develop baits for this specific fly species, which are then used in the field as part of attract-and-kill procedures. In these procedures, the insecticide is only applied to the bait and the crop remains free of residues.
- ➔ Development and testing of repellents against oviposition and of sustainable strategies against the development of larvae in fruits. Development of strategies and tests on laboratory efficacy and application of the most appropriate method in the open air.
- ➔ Development of measures to reduce damage in storage through pre-harvest measures or post-harvest treatment.
- ➔ Survey of fly development at different locations, in different fruit crops and grape varieties, to determine which crops are endangered under what conditions.
- ➔ Improvement of farm profitability through less severe crop failures and the dissemination of the method and communication about its application.

The target group of the EIP-AGRI project were agricultural enterprises presently affected by spotted wing drosophila. They came from the soft fruit, stone fruit and viticulture sectors.

KEY MEASURES

Key steps of the project were:

1. Development and laboratory testing of attractants that are having an attracting effect on spotted wing drosophila in order to establish the most specific bait methods to combat this pest.
2. Laboratory tests to develop sustainable insecticides and repellents aimed at reducing or preventing oviposition of SWD and larval development.
3. Field trials with the developed baits, repellents and insecticides to test the effect of the measures in the open air.
4. Collecting data on infestation in different crops at different sites and with different climate conditions to allow more precise predictions, and thus better recommendations.
5. Development of measures to reduce fruit damage in storage.
6. Dissemination of the measures by publication of the results in scientific journals and lectures, to the advisors of the chambers and associations, and in a workshop.

RESULTS AND EFFECTS

A key result of the project was the development of control strategies for berries, cherries, elderberries and vines, based on residue free measures. After laboratory tests with almost 15 available agents and results from four years of field tests, treatments with different particle films (based on different rock flours) combined with wetting agents have turned out to be practical and affordable solutions for elderberries and vines. However, a combination of measures is required to successfully combat the spotted drosophila. In addition to the particle films mentioned, these include precise infestation monitoring and, in the case of expensive crops (for example raspberries), a recommendation to combat instars and pupae that fall to the ground (for example with nematodes) in order to interrupt infestation cycles. Another option are attract-and-kill methods, where attractive substances and LED traps could be used, but which still need to be investigated further. In addition, it was shown that the cool storage of fruits (raspberries, blueberries) together with the application of residue free gases that suffocate the flies lead to a very significant reduction in the number of spotted drosophila flies. The methods developed and the knowledge generated were disseminated via journals and lectures and summarized in a brochure for practical use. The results will be included in the advisory activities of the chambers and associations in order to allow direct integration into practice. The result brochure for practical use was distributed to numerous growers and students from viticultural and fruit-growing schools and made accessible on the Internet.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- Biohelp Biologischer Pflanzenschutz
- Chambers of Agriculture Burgenland, Lower Austria, Styria
- Austrian Wine-Growers' Association, Lower Austria, Wine Growers' Association, Landesobstbauverband Niederösterreich
- Österreichische Hagelversicherung

PARTNERS

- Austrian Institute of Technology GmbH (AIT)
- Federal Education and Research Centre and Federal Office for Viticulture and Pomology Klosterneuburg
- Food Cluster of Lower Austria - ecoplus Ltd.



2018-
2022
PROJECT PERIOD



Optimisation of erosion control in potato-growing

Operational Group *OptEro*

ABSTRACT

In potato cultivation, conventional farming methods contribute more to soil erosion than for other crops. In Austria, the *Waldviertel* and the *Weinviertel* regions are particularly affected. This not only results in crop failures, but also reduces the water retention capacity. As climate change progresses, this problem will become even more exacerbate. In order to improve the situation, a new, erosion-protecting cultivation technique for potatoes was developed in the EIP-AGRI project of the Operational Group *OptEro*, which can be applied under as many different conditions as possible and is thus scalable. For this field trials were carried out and evaluated in several variants. The focus was on feasibility, economic efficiency and effectiveness. Subsequently, the results were communicated through various channels and published in a manual in order to raise awareness among a large number of farmers, to get them interested in erosion control and to spread the use of the method.

STARTING POSITION

The cultivation of crops causes, among other things, soil erosion, which will continue to aggravate due to global warming. As a result, on the one hand, soil fertility is reduced and crop failures are imminent, and on the other hand, water storage capacity is reduced, which will have negative effects in view of the water shortage in the future. In Austria, soil erosion caused by potato cultivation is particularly problematic. This takes place primarily in the *Weinviertel* and *Waldviertel* regions and is already causing the first negative consequences there, such as increased flooding. Alternative cultivation methods already exist for other crops, but there were no satisfactory substitute for potato cultivation, which is why innovative techniques are needed, which were found through the EIP-AGRI project of the Operational Group *OptEro*.

OBJECTIVES AND TARGET GROUPS

Key objectives:

- ➔ Raise awareness of the issue of erosion control measures in potato cultivation among farmers and the non-agricultural population
- ➔ Testing of different methods, including mulch sowing, furrow planting, cultivation with transverse embankment technique and pulling of transverse furrows
- ➔ Development of concrete, broadly applicable guidelines and recommendations for farmers, which were communicated in a large scale
- ➔ Reducing soil erosion to achieve soil fertility and water retention

The main target group of the EIP-AGRI project were the farmers, who were motivated to use the newly developed cultivation techniques, as well as the agricultural schools, through which the results were disseminated. Furthermore, the broad, non-agricultural population should also be sensitized to the consequences of soil erosion.

KEY MEASURES

The following key measures were defined in the framework of the project:

1. Production of field trials in different predefined variants at various farmers and in an Agro Innovation trial facility, to test possible protective measures and their effect
2. Measurement of soil erosion by laser measurement technology and installation of erosion measurement plots, including recording of precipitation amount and intensity
3. Determination of economic factors such as crop yield, machinery and personnel costs
4. Determination of the site-specific soil properties and the change in erosion-determining properties (soil roughness) due to the application of the measures
5. From the second year of the project, demonstration trials on larger areas to test the practicality of the measures and to familiarize farmers and the general public with the measures, for example through project boards

RESULTS AND EFFECTS

Studies have shown that both bare cross dams (with a height of 15-20cm and a spacing of approximately 1m) and cross dams with stabilizing oat seed were able to minimize surface runoff and thus significantly reduce soil erosion. Compared to in-furrow oat seeding without cross dams, which already promised to reduce soil loss by more than 50%, cross dams can reduce soil runoff by 84%, and even by up to 95% in the case of vegetated cross dams. The mounding of the potatoes created small water retention areas where surface water collected and could be held back from further runoff. During heavy rainfall events, water runoff was at least drastically slowed down and the leaching of soil material was significantly reduced. However, the increased water retention not only reduced erosion, but also increased the soil water content by 0.5% (oat seed), 1.5 % (cross dams) or 3.5% (cross dams with oat seed), which can have a positive effect on yield, especially in dry years.

PROJECT MANAGEMENT

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- AgrolInnovation
- Chamber of Agriculture Lower Austria
- Verein Land schafft Wasser
- wpa Beratende Ingenieure GmbH

PARTNERS

- Institute for Land and Water Management Research
- Josephinum Research



2018-
2021
PROJECT PERIOD



Development of labour market oriented integration projects in the agricultural employment sector

Operational Group *Agriculture Gutshof Heidensand*

ABSTRACT

The labour market is presently characterized by a lack of skilled workers on the one side and an oversupply of low-skilled workers on the other. For the latter, finding a job is often problematic; while on the other hand, there are too few skilled agricultural workers on the labour market. The project of the Operational Group *Agriculture Gutshof Heidensand* addressed this problem and offered further training programs to low-skilled workers so that they can be integrated into regional food production. At *Gutshof Heidensand* in *Lustenau* which has about 23 hectares of arable land, a sustainable form of cooperation between agriculture and the social and education sectors was developed, implemented and tested. Socio-economic and sustainable structures were created which enabled a meaningful and useful division of labour between the farm and people who are disadvantaged in the labour market. The participants in the integration programs worked in the fields of several sharecroppers of the estate and in the processing of raw materials. The aim was to integrate people into the primary labour market in the long term.

STARTING POSITION

According to the Austrian Institute of Economic Research (WIFO), the share of long-term unemployed in relation to the total number of unemployed is 34.9% Austria-wide (as of 2017, WIFO). The problem of long-term unemployment is that the physical and psychological condition of those concerned is getting worse and worse. Self-esteem declines and, as a result, it becomes more difficult to regain a foothold on the labour market. Farmers in the Vorarlberg Rhine Valley, on the other hand, often face seasonal labour shortages. According to Florian Vinzenz, Vorarlberg Chamber of Agriculture, there is a seasonal need for 100 unskilled workers per season in Vorarlberg. The Ministry of Social Affairs provides for a quota of only 60 workers per season for Vorarlberg, which is exhausted every year. However, this does not cover the demand. The cooperation between farmers and social institutions could compensate for these peaks. For the farmers, the advantage is that these job assignments are also possible at short notice, and they do not need to provide accommodation and food, as is frequently the case for seasonal workers. The long-term unemployed get an opportunity to engage in meaningful work and to acquire new skills in the agricultural sector. The project was also intended to create the preconditions required to employ the long-term unemployed on a seasonally independent and continuous basis throughout the year. Moreover, the degree of self-sufficiency in vegetables in Vorarlberg is comparatively very low and currently stands at about 7%. Due to topography and tradition, Vorarlberg agriculture is dominated by dairy farming. The Vorarlberg Chamber of Agriculture has been trying for years to motivate more farmers to establish a further mainstay in the field of vegetable production. However, due to the lack of experience in the field and the increased labour requirements, many shy away from taking the step in this direction. The experience gained and reflected upon, in the EIP-AGRI project of the Operational Group *Agriculture Gutshof Heidensand* can be used to optimize and further develop the desired degree of self-sufficiency.

TARGETS AND TARGET GROUPS

Key objectives were:

- ➔ Designing forms of cooperation between the agricultural and integration sectors
- ➔ Diversification of the agricultural sector by expanding the original range of offers
- ➔ Development of methods, techniques and products for agricultural education and work projects
- ➔ Definition of suitable target groups for education and employment programs including adequate occupation
- ➔ Development of suitable education and employment programs and their medium- and long-term funding
- ➔ Profound examination of the relationship and the effects of work in nature on people
- ➔ Preparation of a guideline that enables other agricultural enterprises to learn from the model

KEY MEASURES

Key project steps were:

1. The intensity of cooperation and the exchange of services are increased
2. Care, learning and placement successes are analyzed and improved
3. Self-generated profit is determined and optimized
4. Education and employment programs are implemented and professionalized
5. Guideline with key results is finalized and will be published

RESULTS AND EFFECTS

Adequate structures and procedures of social farming were being developed and established in the long term at the *Gutshof Heidensand*. Evaluations of the interviews with project participants confirmed the following first results:

- ➔ The work at *Gutshof Heidensand* showed positive effects on the mental and physical health of long-term unemployed people.
- ➔ Simplified vegetable growing with focus on herbs and berries appeared to be appropriate in this case.
- ➔ Providing a daily structure with meaningful activity was central to the effective social agriculture practiced at the *Gutshof*.
- ➔ In order to create diverse possibilities, to ensure visibility and earn adequate income, additional activities outside the *Gutshof*, such as landscape maintenance or forest work were to be combined with farm activities.
- ➔ Networking and the exchange of ideas and experiences among the members of the Operational Group must be considered as essential parts of the project's success.
- ➔ A focus on public access, municipal cooperation through cultural events, pumpkin festivals or Christmas parties helped inform the public about the topic, make the measures known, and eliminate social barriers.

The funding of the EIP-AGRI project made it possible to involve qualified experts and to implement it in a practical and scientifically manner. The aim to open up the agricultural employment sector for work projects by means of cooperation and networking meant a great challenge. Through a technical work assistance service on site, the work structures, procedures and processes were further developed, tested and then modified accordingly. This created basic conditions that will make it possible in the future to manage employment and education projects from a business perspective and to develop synergies with other agricultural enterprises.

PROJECT MANAGEMENT

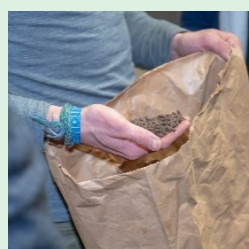
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PARTNERS

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- Fachhochschule Vorarlberg
- Green Care Österreich
- Chamber of Agriculture Vorarlberg



PRODUCTS
AND
PROCESSES

2018 -
2021

PROJECT PERIOD

PROJECT AREAS IN:



Upper Austria,
Styria, Vienna

ONLINE



www.zukunftsraumland.at/projekte/2289
www.global2000.at/insekten-als-futtermittel

Larval breeding for the production of feed for fish, poultry and pigs

Operational Group *Larval breeding*

ABSTRACT

Larvae were raised using residues and by-products from Austrian agriculture and their protein and fat were processed into compound feed for broilers, fish and pigs. The resulting feed was analyzed and tested in feeding trials on broilers and for its digestibility on pigs. As part of the EIP-AGRI project, larval protein and fat were fed specifically to farm animals that also eat insects (among other things) in the wild, so that the use of larvae corresponded to the natural food range. The larvae of the black soldier fly (*Hermetia illucens* L) were used, which are not selective about their food source and convert a large part of their food into biomass. The EIP-AGRI project concludes that the use of insect larvae as a protein source can contribute to reducing some of the ecological problems in livestock feeding. The digestibility trial in pigs shows that feeding insect larvae could not only be beneficial in terms of protein but should additionally be investigated as a source of easily digestible phosphorus.

STARTING POSITION

At present, soy from South America and fishmeal are the main feedstuffs used in European livestock farming, which makes the market highly dependent on world market prices and price fluctuations. Furthermore, the import increases greenhouse gas emissions and means a loss of biodiversity due to the overfishing of the world's oceans and the destruction of rainforests for soybean cultivation. At the same time, at the beginning of the project there was the assumption that high-quality protein for feeding purposes could be obtained in Austria itself through the upcycling of residues and by-products of the agricultural value chain via insects. Insect protein production was and is currently not very widespread in Europe, but changes in the legal framework and the establishment of a corresponding industry were already foreseeable during the project design phase and have already been partially implemented in the meantime (2022). In order to promote the supply of larval protein via production in Austria - the key words being circular economy and value creation, instead of via global players - the project of the Operational Group Larval breeding started in 2018 to set essential building blocks for this development. There was still a lack of practical knowledge on the effects of various substrates on the composition of the larvae, on the technical processing of larval protein and larval fat, on the material composition and usability of the residual substrate that remains after feeding the larvae, and on the actual digestibility of larval protein and larval fat in feeding. Serious consideration of the presumed environmental benefits of domestically produced larval protein was also deemed necessary.

TARGETS AND TARGET GROUPS

The main objectives were:

- ➔ To explore the suitability of various residues and by-products from Austrian agriculture or the agricultural value chain for use in larval rearing for the production of larval protein and fat
- ➔ technical processing of larvae (larvae protein and fat) into complete compound feeds
- ➔ testing the feeds in feeding trials on broilers and fish and in a digestibility trial on pigs
- ➔ further use of the residues from larval feeding (closing the loop)

The following objectives/target instruments were used to round off and measure the core objectives:

- ➔ Use of regional residues and by-products as far as possible.
- ➔ Preservation of larvae via ensiling, as a low-energy form of preservation
- ➔ Testing the ecological impact of larval protein from Austria
- ➔ Survey of the economic competitiveness of larval protein
- ➔ Increase the level of knowledge about insect larvae as a protein source in the relevant target groups

The main target group of the EIP-AGRI project were conventional and organic poultry farms. In addition, the topic and the know-how acquired were disseminated in the scientific community and, for the purpose of acceptance of larval feeding, in the general population.

KEY MEASURES

Key measures were:

1. Evaluation of residues and by-products as feed in larval rearing and larval feeding trials
2. Preservation of larvae and production of compound feeds, taking into account the effects of processing on composition and shelf life
3. Feeding trials with larval protein on broilers and digestibility trials in pigs
4. Ecological and economic analysis of larval protein
5. Dissemination of the results in professional circles as well as in the general population

RESULTS AND EFFECTS

The larval meal produced shows potential for use as feed in the livestock sector. The life cycle assessment resulted in an ecologically more advantageous protein source than soybean meal from South America. The ecological advantages depend on the production method and are therefore not the same for all larval proteins and larval fats produced. There is a need for improvement in some environmental categories. The composition of the larvae differs depending on the starting substrate used, the larval feed. The residual substrate left over from larval rearing can be used as organic fertilizer. Feeding larval protein and larval fat to broilers is possible to a limited extent in the case of protein, but up to the full extent in the case of fat (replacement of 15% of the soya extraction meal or 100% of the soya oil in the feed mixture). A promising feed mixture for fish with a replacement of 50% of the protein from fish meal by larval protein is ready for use and will be tested by the Federal Institute for Water Management. The digestibility trial in pigs provided essential information for the determination of a promising experimental feed mixture and showed very good digestibility values of phosphorus. An economically competitive use is currently only given for the pet food sector and will develop earlier for fish (replacement of fish meal) than for poultry and pigs (replacement of soybean meal). The production volume of larvae would first have to be expanded worldwide for large-scale use.

PROJECT MANAGEMENT

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- Ecofly GmbH
- Research Centre Raumberg-Gumpenstein
- Forster, farm business
- GLOBAL 2000 Umweltforschungsinstitut
- GLOBAL 2000 Umweltschutzorganisation
- Teichwirtschaft Hartl
- University of Natural Resources and Life Sciences –
Institute of Animal Nutrition, Livestock Products and
Nutrition Physiology (TTE)

PARTNERS

- BIO AUSTRIA
- Zentrale Arbeitsgemeinschaft der
Österreichischen Geflügelwirtschaft
(Association of Austrian poultry farmers)

4th Call


The projects of the fourth EIP-AGRI call in Austria were approved in 2019 and address the following guiding themes:

- ➔ Optimization of farm processes and facilities to reduce greenhouse gas, air pollutants and other emissions in agriculture
- ➔ Development and testing of methods to increase the productivity of farms through more efficient material or energetic resource use in agriculture
- ➔ Development and testing of methods to adapt to climate change in agriculture
- ➔ Development and testing of methods promoting biodiversity in agriculture
- ➔ Development and testing of alternative products in primary agricultural production
- ➔ Development and testing of approaches to improve animal husbandry (in respect of methods of animal husbandry, animal welfare, animal health, breeding methods)
- ➔ Development and testing of methods fostering the circular economy - use of residual substances, by-products and waste from the agricultural value chain
- ➔ Development and testing of methods and approaches to stabilize agricultural income due to price fluctuations under the practical framework conditions in Austria

Projects of the 4th Call


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PRODUCTS
AND
PROCESSES

PROJECT AREA IN:




Styria,
Lower Austria

2019-
2022

PROJECT PERIOD

ONLINE



www.zukunftsraumland.at/projekte/2429
www.stmklo.at

Low-emission fertilization through nutrient recovery

Operational Group *Ammosafe*

ABSTRACT

The increasing environmental protection requirements for farmers need new approaches to solutions that go beyond the previous level. One specific challenge is the reduction of ammonia emissions (National Emission Ceilings Directive – NEC Directive). In addition, unpleasant odours must be eliminated in order to improve the social compatibility of manure management. The EIP-AGRI project of the Operational Group *Ammosafe*, which is supported by innovative farmers, could be trendsetting in this context. The treatment plant developed removes the ammonium nitrogen from the slurry, so that after treatment it contains almost only organically bound nitrogen. This helps to reduce nitrogen and odour emissions during application and improve nutrient efficiency on farms. The removed nitrogen can be stored in a very concentrated form and applied at the time of highest demand. The expected reduction of nitrogen inputs to groundwater will be confirmed by field trials. In addition, the material changes over time and the odour load of the treated manure will continue to be measured and observed.

STARTING POSITION

Farms are facing ever greater challenges with constant changes and tightening of the framework conditions. In addition, it is necessary to improve the social compatibility of manure management by avoiding unpleasant odours. A special challenge in this context is the reduction of ammonia emissions in order to manage the specified limit values of the NEC Directive. With the measures used to date, it will be difficult to comply with the limit values. During the utilization cycle of farm manure, especially when manure is spread under less than ideal conditions, large amounts of nutrients can be lost to the air and groundwater through emissions. In order to reduce environmental pollution, stricter and stricter conditions are being imposed with regard to upper fertilizer limits and permitted application periods, as is already the case in groundwater protection areas, for example. This can lead to storage shortages on farms and an increase in work peaks. In addition, the latest developments on the fertilizer market make it urgently necessary to increase the effectiveness and efficiency of fertilizer application. The situation on the commodity market - especially the gas market - has significantly led to a shortage and a massive price increase for nitrogen fertilizers. The decline in the supply of nitrogen (mineral fertilizers) can be counteracted by optimizing internal nutrient cycles on farms.

TARGETS AND TARGET GROUPS

Basically, this innovative system was intended to improve environmental compatibility as well as farm manure logistics on the farms. The requirements in the areas of groundwater protection, air pollution control, soil protection and social compatibility must be met. The applicability should not only be limited to Austria, but also be international. The goals of the EIP-AGRI project were as follows:

- ➔ Provision of a practically realizable, cost-effective and mobile process for the treatment of farm manure
- ➔ Positive influence (in the sense of a reduction) of emissions to groundwater and air compared to untreated manure, which leads to a significant increase in environmental compatibility
- ➔ Improving the social image of agriculture by reducing odour pollution as a result of slurry processing
- ➔ Increasing nutrient efficiency on the farm and the associated conservation of natural resources
- ➔ Greater flexibility in the timing of slurry application - this makes it easier to avoid unfavourable weather conditions and to work in a way that is gentler on the soil
- ➔ Reduction of work peaks caused by too narrow time windows
- ➔ Existing storage capacities can thus be sufficient and do not need to be expanded
- ➔ Examination of the economic efficiency of the process

The target group of the EIP-AGRI project were livestock farms that were looking for solutions in farm manure logistics and also wanted to implement ways to improve nutrient efficiency on the farm.

KEY MEASURES

The main project steps included:

1. Project management, monitoring and coordination during the entire project duration
2. Planning, construction, provision and further development of a mobile pilot plant for the treatment of liquid manure by ammonia stripping
3. Collection of practically and scientifically proven results on the technical feasibility of the process
4. Carrying out a profitability analysis
5. Supervision of the trial plots and recording of crop production data to determine nutrient efficiency
6. Performance of an olfactory measurement series to record odour pollution
7. Supervision of the suction candle system incl. soil moisture sensors to determine the nitrate shift into the groundwater

RESULTS AND EFFECTS

Three manure treatment passes were carried out and ammonium-nitrogen removal rates of over 90% were achieved. The expected reduction in nitrogen input to groundwater was already evident. The final results will be available when all the necessary data from the project has been evaluated, processed and interpreted. This is currently still being worked on. In general, the significant reduction in odour due to the processed manure was confirmed. The entire results will be presented in the final report, a final conference and a brochure for practitioners.

PROJECT MANAGEMENT

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- Raumberg-Gumpenstein Research & Development
- Institute for Sustainable Economic Development - University of Natural Resources and Life Sciences (BOKU)
- Office of the Provincial Government of Styria, Department 15

PARTNERS

- Chamber of Agriculture Lower Austria



PROJECT AREA IN:

Burgenland, Carinthia,
Lower Austria, Upper
Austria, Styria, Vienna

2019 -
2022
PROJECT PERIOD



ONLINE

www.zukunftsraumland.at/projekte/2439
www.bioforschung.at

Closing cycles: Recovery by means of return, transfer or utilisation of organic by-products on the farm

Operational Group *Cycles*

ABSTRACT

In the EIP-AGRI project of the Operational Group *Cycles*, various innovative measures that can close material cycles on the farm and in the region and improve nutrient and humus efficiency through better use of recyclables from agriculture were tested in practical trials. Two different cut-and-carry variations were investigated, once as transfer mulch, once incorporated into the field; a clover-grass-manure and clover-grass-slurry cooperation and a cooperation in which clover-grass was utilized in a biogas plant. Different composting methods were tested on three farms, including an extremely extensive model on one farm. Using the example of the school farm of the agricultural technical college Grottenhof in Graz, the farmyard balance of a mixed farm with arable farming and dairy farming in a compost barn was investigated and calculated. Additional trials highlighted specific aspects, such as the effectiveness of cover crops to take up the nutrients of an autumn application of liquid manure and store them over the winter, dilution of liquid manure and manure storage with and without cover. All substrates used in the various processes, such as clover grass, hay, straw, wood chips, residues of cereals cleaning, and furthermore, were surveyed in terms of quantity, sampled and analyzed for their constituents. In addition to the quantity, nutrient and carbon balancing, an ecological evaluation in the form of CO₂ balances and an economic evaluation of the measures were carried out.

STARTING POSITION

Due to the abandonment of livestock farming in Eastern Austria and the currently increasing specialization of agricultural holdings, only a few farms have passably closed nutrient cycles. As a result, most farms are dependent on external inputs, whose rising prices are widening the cost gap. Closed nutrient and carbon cycles could counteract this, but they pose new challenges for farms. Problems arise, for example, with regard to the fairness of cooperations, the use of currently unused lucerne and grassland biomass, the conservation and use of unused residues, possible uses for biomass from nature conservation areas that cannot be used as fodder, and the use of fermentation residues, digestates and clays for a high humus efficiency. These questions are a burning issue to many farms. The relevance of closed cycles is also emphasized in the UN Sustainable Development Goals (2016), the Circular Economy Package of the EU (2015) and the Austrian Government Programme (2017).

TARGETS AND TARGET GROUPS

The main objective of the EIP-AGRI project was to close farm material cycles and improve nutrient and humus efficiency. Special attention was given to the development and testing of practical measures with the following focal points:

- ➔ Straw-manure cooperation between farms, for example between arable farms and livestock farms
- ➔ Biomass transfer within a farm
- ➔ Composting of unused residual materials and subsequent use
- ➔ Innovative methods in the use of fermentation residues, clays, and biomass of nature conservation areas

The target group of the project were the agricultural enterprises as well as agricultural advisors and students at agricultural technical schools, the next generation of farmers.

KEY MEASURES

At ten sites, innovative measures were evaluated by means of nutrient balances and in a total of seven pilot trials. In order to create nitrogen and carbon balances, the workflows of all measures were represented as 'processes' in a system diagram and supplemented with nutrient flows and gaseous emissions. All substrates used in the various processes, such as clover grass, hay, straw, wood chips, residues from cereals cleaning and additives such as vegetable charcoal, were sampled and analyzed for their constituents before they were composted, conserved, fed, exchanged, or transferred on the farms. The organic fertilizers produced or obtained in this way, such as compost, manure or slurry, were also analyzed for their constituents. The quantities of substrates and organic fertilizers were recorded, and thus nutrient inputs and outputs were compared. Nutrient outputs were identified in a loss source analysis. The RMA carried out an ecological evaluation in the form of CO₂ balances as well as an economic evaluation, and the farmers involved ensured evaluation regarding practicality. The results were summarized in a practical brochure.

RESULTS AND EFFECTS

In the EIP-AGRI project, site-adapted measures for closing the on-farm, inter-farm and regional nutrient and carbon cycles of farms that contribute to improving nutrient use were developed and tested. Concrete data were collected on the nutrient flows that occur in straw-manure cooperatives and the other innovative measures. From these data, important insights could be derived for similar cooperations. Compared to the use of synthetically produced nitrogen fertilizer, a net saving of 200 - 600 kg of greenhouse gases (CO₂e) per 100 kg of nitrogen applied could be achieved with all measures. With increasing transport distance, the share of emissions caused by transport in total emissions rises steeply. At a distance of 0.5 km, transport CO₂e emissions account for 3.4% of total emissions on average. At a distance of 4 km, the figure rises to 22 %, and at 10 km, transport accounts for 41 %, almost half of the emissions. In comparison with other commercial organic fertilizers certified for organic farming with prices of about 7 € per kg nitrogen, all examples with the exception of the 'liquid manure cooperation' and the 'clover grass composting with coal' achieved a net cost saving of about 130-400 € per 100 kg nitrogen through closed-loop management. In the long term, the results of the project will make it easier for many farms to close loops, save costs and maintain and increase natural soil fertility.

PROJECT MANAGEMENT

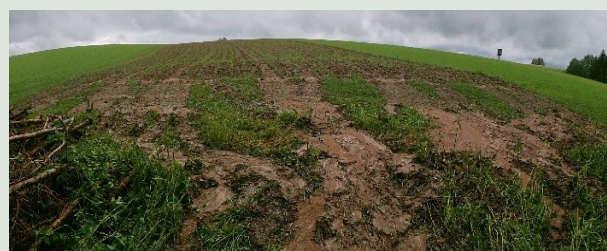
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COOPERATION BETWEEN

- 7 farms
- 3 agricultural advisors
- 2 scientific institutes
- 1 regional energy producer
- Supported by numerous strategic partners, such as agricultural secondary schools, agricultural advisory services and non-government organisations (NGOs), as well as other farmers and scientific institutes

PARTNERS

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- Bio Ernte Steiermark
- Ressourcen Management Agentur (RMA)
- Biogas Produktions GmbH & Co. KG
- Robert Schneider
- Estate management Michael Plattl-Fünfkirchen
- Andreas Kögl
- Veronika Messenböck
- Xaver Diermayr
- Kräuter Bergsmann
- Josef Jugovits




SOIL MANAGEMENT
AND
EROSION CONTROL

PROJECT AREA IN:
 Upper Austria

2019-
2022
PROJECT PERIOD

ONLINE
 www.zukunftsraumland.at/projekte/2430
www.biokompetenzzentrum.at

Erosion control and saving of resources in organic maize farming

Operational Group *Organic maize farming*

ABSTRACT

Farms are increasingly confronted with capricious weather conditions and the resulting soil erosion. These soil losses also affect farms that cultivate organic maize on slopes. The development is particularly problematic, as maize has gained importance as an important fodder alternative in recent years due to the increasing yield losses in grassland caused by drought and grub, among other things. The EIP-AGRI project showed how maize can be cultivated in a way that reduces erosion, protects against erosion and does not use herbicides, especially on slopes. Various cultivation measures were being tested, evaluated and further developed on the experimental plots. In the interest of resource conservation, alternatives to classic maize cultivation were also being demonstrated in the form of mixed cultivation. The improved cultivation and crop management measures increased farm productivity and protect the soil from erosion. The results of the project and practical tips were presented in a cultivation guide..

STARTING POSITION

Maize is grown almost worldwide due to its many advantages. In addition to being a valuable crop, it is also a high-quality feed source for cattle, pigs and poultry and, as a C4 crop, it delivers the highest energy yields with low water consumption per hectare. Furthermore, maize finds an ideal place in crop rotation and keeps its quality fairly constant throughout the year, even as silage maize. It can be ideally complemented with clover and grass silage. However, maize cultivation can have negative effects if cultivation is suboptimal and can damage the soil and the organisms living in it. This happens, for example, through unfavourable soil management and a lack of erosion control measures. Extreme weather events such as heavy rainfall, which have increased in recent years, also contribute to soil erosion. It was therefore essential to contribute to erosion control. Particular attention was paid to organic maize cultivation on slopes and aimed to protect against erosion especially there. Measures such as undersowing, erosion control strips or direct sowing contribute to resource conservation.

TARGETS AND TARGET GROUPS

The main goal of the EIP-AGRI project was to find alternative cultivation methods that are economically viable and at the same time actively protect the soil from erosion and conserve resources. Further goals were:

- ➔ Active erosion control and preservation of soil fertility in organic maize cultivation.
- ➔ Testing and further development of erosion-reducing cultivation methods and crop management measures, for example targeted soil cultivation, undersowing, mulch sowing.
- ➔ Trials of maize cultivation in mixtures as an alternative to classical cultivation in monoculture.
- ➔ Pooling the experience of practitioners and academia.

The target group were primarily farms that cultivate organic maize on slopes. However, the results of this project were relevant for all Austrian farmers who cultivate maize.

KEY MEASURES

Key measures in the project were:

1. Survey of the actual situation on the participating farms, for example basic data on areas and crop rotation, as well as machine use.
2. Establishment of different trial strips in the maize fields.
3. Measurement of soil erosion and monitoring of the experimental strips.
4. Preparation of a cultivation guide for farms outside the Operational Group.

RESULTS AND EFFECTS

The first positive conclusions can be drawn from the project of the Operational Group *Organic maize farming*: Measures during and before cultivation as well as during crop management are essential for soil conservation. Accordingly, it was found that, for example, incorporating and leaving a maize preceding crop has positive effects both on the crop and on soil erosion. The soil structure remains more stable and the risk of soil erosion is significantly reduced. The evaluations of the erosion measuring equipment used in the project have shown that a significantly higher soil erosion takes place with the plough than with minimum tillage equipment, such as the tiller. Initial analyses of the soil tests from the fields have also shown that the soil structure itself has a major impact on the soil's susceptibility to erosion and that efforts to make the soil 'climate-safe' are of great importance even before any additional measures. In the case of mixed cultivation as an alternative to classical maize cultivation, the maize-field bean mixture has proved particularly successful for the addressed region. The components must be optimally suited to each other in terms of ripening time and also to the site conditions. The protein component of the bean in the silage adds value to the feed. In addition, the flowering bean can make a positive contribution to biodiversity.

All the results obtained from the trial areas were summarized and illustrated in a cultivation guide at the end of the project. As a reference book in the form of a brochure or a 'new medium', it serves every farm. Optimal cultivation measures protect the soil from heavy rainfall and the associated erosion and consequently also the added value of the farms.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- 4 farms

PARTNERS

- Research Institute for Organic Farming (FiBL)
- ARGE KLIWA
- SoilSaveWeeding
- Bioschule Schlägl
- Boden.Wasser.Schutz.Beratung



MANAGEMENT
CONCEPTS



PROJECT AREA IN:

Lower Austria,
Upper Austria

2019-
2022
PROJECT PERIOD



ONLINE

www.zukunftsraumland.at/projekte/2420
www.fibrl.org/de/themen/projekt-datenbank/projektitem/project/1736.html
<https://agroforst-oesterreich.at/modellbetriebe/>

Knowledge transfer and implementation of agroforestry systems in Austria

Operational Group *Agroforestry Austria*

ABSTRACT

The progressive climatic changes in arable-dominated regions of Eastern Austria are prompting farms to try out new farming systems, including agroforestry utilization systems. These are a combination of tree rows and classic arable crops, with the trees serving as fruit or valuable timber. If implemented well, agroforestry systems show positive economic and ecological effects, for example on yield, biodiversity, carbon sequestration, soil conservation and water balance. To date, there were only isolated examples of implementation in Austria and neither a contact point for interested farms nor a network for the exchange of information and experience between practice and science. The project of the Operational Group *Agroforestry Austria* has implemented site- and farm-adapted agroforestry systems on six arable farms, and findings from this pioneering work are being made available to other farms and multipliers.

STARTING POSITION

Agricultural landscapes have been exposed to massive ecological changes in the course of climate change, for example droughts, heavy rainfall events, soil erosion and yield losses. Farms are increasingly forced to come to terms with modern cultivation systems adapted to the changed environmental conditions. Contemporary and site-adapted agroforestry systems are an innovative approach to the challenges of future agriculture because they can offer economic and ecological advantages for climate, soil, water balance, biodiversity and diversification. Despite these advantages, they are hardly implemented in Austria. While scientific findings and implementation experiences are available for other member states of the European Union, there were neither information points nor a specific network for agroforestry-interested farms in Austria to obtain targeted know-how. This deficit is even more serious in view of the fact that the establishment of agroforestry systems is a long-term form of management and must therefore be carefully considered. The EIP-AGRI project aimed to close this knowledge gap by implementing agroforestry systems on six demonstration farms, building a national network of practitioners and scientists, and producing advisory documents.

TARGETS AND TARGET GROUPS

The aims of the EIP-AGRI project were:

- ➔ Formation of a network on the topic of agroforestry
- ➔ Know-how transfer from Germany and Switzerland to Austria
- ➔ Identification of suitable agroforestry systems for different locations and farm orientations in Eastern Austria
- ➔ Concrete planning and implementation of agroforestry systems
- ➔ Documentation of the implementation steps
- ➔ Preparation of target group-specific information materials for farm managers and advisors
- ➔ Dissemination of the results of the project

The main target group were arable farms in Eastern Austria, but the project results were relevant for all Austrian regions where arable farming is practiced.

KEY MEASURES

Essential project steps were:

1. Implementation of agroforestry systems on six pioneer farms with the support of experienced advisors from Germany and Switzerland.
2. Accompanying studies: Survey of economic viability on at least three farms, modelling of climate impact, survey of stock development, clarification of the legal situation as a basis for discussion of future funding opportunities.
3. Dissemination of the results: Production of an information brochure for farm managers, advisory documents for interest groups, recommendations for action for the future of agroforestry in Austria, production of an agroforestry homepage, organization of a conference, contributions to national networks and international events.

RESULTS AND EFFECTS

In spring 2021, the implementation of agroforestry systems was completed on all six farms of the Operational Group *Agroforestry Austria*. The objectives and expectations of the farms regarding an agroforestry system were very different, therefore the resulting agroforestry systems show a wide range of possible designs. Classical alley-cropping systems (regular rows of trees on a farmland) were implemented on three farms: Walnuts on the field (currently strawberries and cereals), five different tree species - mainly nuts - on field, value wood from ten different tree species on rotational pasture. A field division with tree rows of two tree species was implemented by one farm, another farm planted old fruit varieties in addition to a multi-use hedge and another farm planted very species-rich tree rows on a slope in a design based on the so-called key-line system. A more detailed description can be found on the project homepage.

The results of the accompanying investigations (economic efficiency, CO2 binding potential, growth control of the trees in the agroforestry systems) and the elaboration of brochures, documents, recommendations for action are now being completed and will soon be available on www.agroforst-oesterreich.at. The final event as an agroforestry conference with lectures, discussion opportunities and exchange took place on 24th November 2022 in St. Pölten – Lower Austria.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- 4 farms in Lower Austria
- 2 farms in Upper Austria

PARTNERS


- Vienna University of Natural Resources and Life Sciences (Division of Organic Farming, and Institute of Viticulture and Pomology)
- Chamber of Agriculture Lower Austria
- Bio Austria
- Experimental unit of the Provincial Government of Styria






SOIL MANAGEMENT
AND
EROSION CONTROL

PROJECT AREA IN:



Lower Austria,
Upper Austria

ONLINE



www.zukunftsraumland.at/projekte/2427

2019-
2022

PROJECT PERIOD

Innovative erosion-reducing techniques of mechanical weed control after mulch sowing in row crops

Operational Group *SoilSaveWeeding*

ABSTRACT

Due to changing climatic conditions, for example heavy rainfall, more and more soils are at risk, especially on slopes. Mulch sowing is an effective strategy against soil erosion by water and wind and helps to maintain soil fertility. However, there have been no reliably functioning methods to implement effective mechanical weed control in mulch seed stands, so far. The EIP-AGRI project therefore tested methods and equipment for mechanical weed control in combination with mulch sowing in row crops. The results from the project are not only relevant for organic farms, but for all farms that want to pursue herbicide-free farming in the future and at the same time protect the soil from erosion.

STARTING POSITION

Erosion by water and wind poses the greatest threat to soil. Particularly on intensively used agricultural land, annual soil erosion can take on considerable proportions in unfavourable management practices, thus endangering the soil's fertility and productive capacity in the long term. Especially in organic farming, soil loss due to erosion always means an economically relevant loss of soil nutrients, since not all mineral fertilizers, for example, are permitted for organic farms. In addition, the demand for organic food has been increasing for some years, which is why the extent of organically farmed arable land is developing very dynamically.

Mechanical weed control is a central influencing factor for successful crop management in organic arable farming, but conventional farms are also increasingly interested in mechanical weed control as an alternative to herbicide use. For the combination of mulch sowing as erosion control and effective mechanical weed control, there have not yet been any reliably functioning methods that can cope with larger amounts of mulch.

TARGETS AND TARGET GROUPS

The overall objective of the EIP-AGRI project was to reduce the risk of soil erosion in row crops (using the example of grain maize), especially on slopes, and thus to maintain or improve soil quality. In particular, the following goals were to be achieved:

- ➔ Development and testing of suitable methods for mechanical weed control in mulch seed stands.
- ➔ Systematic optimization of the process chain from cultivation, through revegetation management, soil cultivation, mulch or direct sowing, to weed control under the premise of the longest possible retention time of mulch material on the soil surface.
- ➔ Testing new camera guidance systems and checking whether new technical possibilities for improved row recognition increase the impact power and ensure reliable guidance of the chipper.

The main target groups were practitioners of organic farming and herbicide-free conventional farming who want to prevent erosion efficiently in root crops, especially water and wind erosion. Other target groups were agricultural advisors, teachers and other multipliers.

RESULTS AND EFFECTS

In the EIP-AGRI project, freezing and winter-hardy greening mixtures were used as mulch suppliers. As expected, in the trials implemented to date, higher mulch coverage rates were usually achieved with winter-hardy greening mixtures (for example Pannonian vetch and green rye) than with freezing greening mixtures. In addition, in the spring before maize cultivation, undesirable weeds became established in the frozen green cover stands.

In the case of green cover, the focus in the project was primarily on shallow-cutting and low-mixing techniques that leave as much biomass as possible on the soil surface. Among other things, a flat-cutting ground cutter from *Cross Farm Solution*, an exact cultivator from *Treffler*, a *Kerner Stratos* and a *Kerner Corona* with a harrow roller as a trailing implement were used for the area-wide green cover. With this technique, it was possible to maintain between 20% and (in the case of tillage of a grass greening) 50% mulch coverage until the field emergence or three-leaf stage of maize. For comparison, a rotary cultivator was used on some sites for the conversion of grassland.

The equipment used in the project was made by *Schmotzer*, *Einböck*, *Samo*, *Dickson-Kerner*, *Treffler* and *Feldklasse*. Basically, all the equipment used is of a high technical standard. The chopstar twin from *Einböck*, for example, was very well suited for mulch sowing. During the first chopping pass in the three-leaf stage of maize, which is decisive for yield formation, a satisfactory chopping result could be achieved up to a mulch coverage rate of 20%. At the latest at mulch coverage levels of 30%, blockage symptoms begin to appear, leading to increased plant losses. Organic tillage generates a large part of the plant nutrients necessary for yield formation from the nutrient supply of the preceding crops or the green cover. This requires turnover-active soils. However, this high turnover activity is naturally also expressed in a rapid decomposition of mulch material close to the surface. Thus, in the project, the mulch coverage rates decreased very quickly and often only reached values below 10% in the six- to eight-leaf stage of maize. Not least for this reason, the project also experimented with strip-till systems with live mulch in the space between rows. The living roots of the vegetation in the space between the rows promise high erosion control potential. Among other things, a newly developed inter-row mulcher from the developers *Rohringer* and *Rossak*, a Variofield hoe from *Dickson-Kerner* adapted with knife rollers and cutting discs, and a pre-series device from *Feldklasse* with individual plant recognition were used here. The challenges in the live mulch system lie in successfully managing the competition between the live mulch and the crop during the youth development of the maize stand. This concerns in particular the soil water consumption by the live mulch and the successful weed control in the maize row. Here, the pre-series device from *Feldklasse* showed promising perspectives for the future. In addition, in live mulch systems under organic farming conditions, a delayed nitrogen release must be calculated due to the greatly reduced tillage intensity, which was relevant to yield in the trials carried out in the drylands.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

- 10 organic arable farms
- Chamber of Agriculture Lower Austria
- Bildungswerkstatt Mold
- Boden.Wasser.Schutz.Beratung-Oberösterreich

PARTNERS

- Higher Federal Education and Research Institute Francisco Josephinum
- Josephinum Research
- Federal Agency for Water Management, Institut für Kulturtechnik und Bodenwasserhaushalt Petzenkirchen




SOIL MANAGEMENT
AND EROSION
CONTROL

PROJEKT AREA IN:
 Lower Austria

2019-
2022
PROJECT PERIOD

ONLINE
 www.zukunftsraumland.at/projekte/2436
<https://boku.ac.at/nas/foel/arbeitsgrupp/en/ag-bodenfruchtbarkeit-und-anbausysteme/projekte/eip-projekt-kiwa>

Climate-resilience through water-saving organic arable farming

Operational Group *Water-saving organic arable farming*

ABSTRACT

As an economic sector, agriculture is massively affected by climate change; its effects are already clearly noticeable today. In order to be able to ensure a sustainable, future-oriented agriculture, appropriate adaptation strategies are required. These strategies should optimally increase the water absorption and water storage capacities of soils, reduce the evaporation of water and protect the soil against extreme conditions. For this purpose, there are procedures already, which have to be further developed, systematically analyzed and communicated to farms. The project focused on on-farm and on-stage trials as well as on the transfer of knowledge and results to agricultural practice so that these strategies can be applied area-wide on agricultural enterprises. Moreover, this project also provided insights into the labor and economic impacts for the individual farm.

STARTING POSITION

The past few years have already brought yield depressions in arable farming and crop production due to droughts and high temperatures. Climate scenarios show that a severe change in regional production conditions can be expected in the next decades. In dry regions and in case of bad soil water storage conditions above all summer crops, such as summer cereals, maize, potatoes, and soybeans, will be increasingly affected by water shortages and drought damage. For this reason, sustainable climate adaptation strategies are needed which ideally increase not only soil health but also the water storage capacity of the soil. Systematic, scientific studies of appropriate strategies, for example direct-seed and transferred mulch systems, are not yet sufficiently available, but they show promising potential. For this reason, further investigations and the targeted involvement of practitioners are needed to develop practical procedures that can be applied comprehensively.

TARGETS AND TARGET GROUPS

The EIP-AGRI project aims to contribute to the development of climate change adaptation strategies in (organic) farms. The main objective of the project was to develop and investigate innovative strategies to increase resilience to the impacts of climate change in arable farming. It is also important that the findings from the project are used to develop viable strategies for the farms and to communicate these not only to the project participants but also to other interested parties.

- ➔ Optimization and further development of the direct sowing of maize and soybeans and of transfer mulch systems in maize and potato crops.
- ➔ Insights into the effects of the systems such as direct-seed, transfer mulch on the soil-water balance, the amount of weed, soil protection, the nutrient balance and yield.
- ➔ Comparison of the effects on the soil-water balance of short-term measures (transfer mulch and direct-seed with mulch cover) and of long-term measures (humus build-up) in maize cultivation.

The target group of the project included farms and consultants that can, by means of the project results, be convinced of the functional and economic benefits of direct-seed and the transfer mulch system.

KEY MEASURES

Key measures in the project were:

1. On-farm field trials on the influence of direct-seed and transfer mulch systems on soil-water balance, nutrient dynamics and yield development.
2. Compiling of scientifically sound data (humus, nutrient and yield development, soil-water balance) and demonstration of the experimental results to compare tillage intensities and organic fertilization systems on a practice research station (on-station).

RESULTS AND EFFECTS

The previous results showed the difficulties and the high cultivation risk of organic direct seeding in soybeans and maize, especially in dry areas. In both investigation years, soybean and corn yields in the no-till stands were not satisfactory (only 20-50% of the grain yield of the standard variants). The following factors turned out to be decisive for a successful organic direct seeding: good development of the catch crop with corresponding biomass production, low wild and weed pressure, correct timing of rolling, sufficient rainfall after sowing the main crop and an optimized sowing technique. Further optimization to mitigate risks are needed, as well as a precise match to the respective climate, soils, and existing mechanization. Enormous research is still needed on the extent and frequency of use of no-till practices in an organic crop rotation.

The transfer mulch method provides optimal soil and evapotranspiration protection between corn rows or potato ridges. With the mechanical equipment available on the farms (shredder, loader wagon, compost spreader) a good area-wide mulch coverage was achieved. The precipitation in the summer months of both study years was above average, which meant that the positive effects of the transfer mulch process on potato and maize yields and the soil water balance only tended to be observed. The transfer mulch method is a practicable method, the cultivation risk is low if mechanical weed control is applied before. The method is useful as an erosion-reducing measure, for nutrient supply, and for soil and evaporation protection, especially for crops with high economic value per unit area. For organic farms without livestock, the use of forage legumes as a flexible source of nitrogen is an interesting alternative for nutrient supply in crop rotation.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- Vienna University of Natural Resources and Life Sciences (BOKU) / Division of Organic Farming
- BVW GmbH
- 7 organic farms:
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PARTNERS

- Biorama
- Landtechnik Stöckel
- Landtechnik Hammerschmied



2019-
2023
PROJECT
PERIOD



Measures against soil-borne diseases in garlic cultivation to safeguard cultivation in Austria

Operational Group *Garlic*

ABSTRACT

In recent years plant pathogenic fungi have been able to establish themselves more strongly in Austria due to the climate and cause considerable yield losses in the field, in the preparation and storage of plant products. Garlic is particularly affected by this problem. The rapid further development of regional garlic supply in recent years has been severely slowed down by fungal infestations. Since research on garlic is not yet standardized as it is for other crops, this issue poses a particular challenge. On the one hand, the exact identification of the pathogens is time-consuming, and on the other hand, adequate preventive or direct measures (for example, spray applications or dressing) are not available for either organic or integrated cultivation. The EIP-AGRI project aims to develop concrete methods for the identification, prevention and control of fungal infections. This should reduce yield losses and ensure high product quality of garlic from organic and integrated production.

STARTING POSITION

Various fungal diseases represent a major challenge for Austrian garlic production. In recent years, the problem has intensified due to changing weather conditions. Fungal infections cause considerable yield losses in all production steps: in the field, during preparation as well as in storage. Especially hidden fungal infections that only cause visible damage in storage or in trade are problematic. Therefore, the farms are under great pressure from the food retail, which demands high quality standards.

Austrian garlic demand is currently largely covered by imported goods, although there is a great demand for high-quality regional goods. Currently, Austrian garlic cultivation covers about 25% of domestic demand. Despite the quadrupling of Austrian garlic cultivation in the last ten years, the yield is increasingly reduced by fungal infections. Even when the pathogen is clearly identified, dealing with the infection is difficult. At present, knowledge about the dominant pathogens is not sufficient to establish efficient measures for quality maintenance based on this knowledge. The source of infection can be the planting material or the soil. The disease-promoting development conditions during the vegetation period and during harvest or storage are largely unclear. A better understanding of the development of harmful fungi represents an important contribution to future yield and quality assurance.

TARGETS AND TARGET GROUPS

The main objective of the project is to develop methods and easy-to-use instructions for reliably identifying fungal pathogens and effectively counteracting them. This includes in particular:

- ➔ Development of a well-founded diagnosis of fusariosis in garlic in the laboratory and elaboration of a scoring key.
- ➔ Review and analysis of all production steps, from cultivation and harvesting to drying and storage, for sources of infection as well as disease-promoting operational influencing factors at individual farm level.
- ➔ Development of measures to avoid or reduce contamination under Austrian climatic conditions with a focus on planting material and contamination via soil.

All current and future garlic farms are important target groups to whom the knowledge gained should be communicated as widely as possible.

KEY MEASURES

Essential project steps were:

1. Development of test systems for the examination of garlic and soil for colonisation by *Fusarium* in the laboratory.
2. Application of these test systems to investigate the fungal infestation of different garlic varieties and soil samples from different locations.
3. Identify potential causes, sources of infection and possibilities of spread throughout the production chain.
4. Investigation of the course of the disease in the field, including the identification of critical infection points.
5. Investigation of harvesting, drying and storage methods for their influence on the infection rate
6. Development of recommendations for action for farmers to prevent infestation
7. Dissemination of results through appropriate dissemination channels

RESULTS AND EFFECTS

It turned out that especially in the initial phase of cultivation, green rot (*Penicillium spec.*) is responsible for major failures during overwintering and in spring. The fungus is often spread over the entire seedling lot via infested seedlings when the garlic bulb is broken. The fungus penetrates the planting toe through injuries that occur when the garlic is cut up. As there is no approved way of treating infected plants, the only effective measure is to handle the planting material carefully and to take hygiene measures into account in all steps of planting material preparation and cultivation. As the most important pathogenic fungus in connection with garlic spoilage, a *Fusarium* species was discovered that was previously unknown in this crop in Austria.

The species responsible for dry rot, *Fusarium proliferatum*, was found on most samples. This mycotoxin-producing fungus, which is widespread on many crops, is heat-loving and thus also a concomitant of climate change. Although this fungus is present everywhere in the soil, infected seed potatoes were also found to be an important route of spread. Another project finding is that the weather at harvest, the ripeness and the drying are important factors for the intensity of infestation of the harvested crop. There are no possibilities for treatment with effective plant protection products, as there are neither sufficiently effective plant protection products, nor are any approved for use on garlic. Approaches for reducing infestation can be found in the choice of varieties, the quality of seedlings, the choice of a suitable location, as well as in gentle harvesting and drying techniques.

All important project results on pests and prevention strategies have been clearly summarised in the brochure 'Garlic Cultivation in Austria'. This brochure can also be seen as a guide for the cultivation of garlic in Austria, but should not hide the fact that the possibilities for plant protection are very limited.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

- 5 active farmers
- Lower Austrian Vegetable Growers Association
- Bio Austria Association
- Chamber of Agriculture of Lower Austria
- University of Natural Resources and Applied Life Sciences Vienna Department of Agricultural Sciences/Institute of Plant Protection

PARTNERS

- Austrian Agency for Food Safety (AGES)



2019-
2022
PROJECT PERIOD

ONLINE
www.zukunftsraumland.at/projekte/2409
www.global2000.at/forschungsprojekt-blattlaeuse-ackerbohnen
oeilk.at/nutzlingsbluestreifen-und-untersaaten-regulieren-blattlaeuse-in-leguminosen+2400+3656012

Tailored flower strips and undersowing control aphids in leguminous plants

Operational Group *Tailored flower strips*

ABSTRACT

The Pea necrotic yellow dwarf virus (PNYDV) transmitted by aphids, causes dwarfism and yield losses in Austrian legume crops. Since the use of biological and chemical plant protection products does not bring the desired success, more and more farms are reducing their cultivated areas, which jeopardizes their self-sufficiency in valuable protein sources. To counteract this development, the flowering strip project pursued a biodiversity-promoting approach and seeks to use the ecosystem service 'natural pest control'. The focus was on developing customised flowering mixtures and undersowings to create attractive habitats for aphid antagonists. In this way, aphid outbreaks and the transmission of PNYDV viruses are to be reduced in a natural way. The overarching objective was practicality, the methodology had to be economically viable and meet the technical requirements of the producers.

STARTING POSITION

Infection of legumes with the Pea necrotic yellow dwarf virus (PNYDV), which is transmitted by aphids, leads to dwarfing and low pod set especially at an early stage, and may even cause total loss. Control by organic pesticides is reaching its limits, and in conventional cultivation the effectiveness of chemical-synthetic agents is decreasing due to increasing resistance. The increased cultivation risk often causes farms to reduce the acreage under legumes, which are, however, valuable components of the crop rotation. Field beans in particular improve the soil structure with their deep roots, accumulate nitrogen and are also a valuable source of protein with a relatively high yield potential. Although it has been scientifically proven that adapted flower strips and undersown crops can have a positive effect on biodiversity and reduce aphid infestation, there are still many reservations among farmers and advisors, especially with regard to economic efficiency. The EIP-AGRI project was therefore very practice-oriented and was run specifically with agricultural benefits in mind.

TARGETS AND TARGET GROUPS

The main objective of the project was - besides improving agrobiodiversity - to demonstrate the potential added value of tailored flower strips and undersowings for safeguarding Austria's field bean production. Other objectives were:

- ➔ Identification of an effective and economically acceptable composition of the flower strips/undersowings,
- ➔ Reduction of the infestation with aphids and nanoviruses in crops,
- ➔ Avoidance and minimization of insecticide spraying for aphid control,
- ➔ Building know-how and increasing the acceptance of tailored flower strips among farmers.

The target group of the project comprised farms as well as advisors that, by means of the project results, were ideally to be convinced of the functional and economic benefits of flower strips and undersowings.

KEY MEASURES

Essential steps of the EIP-AGRI project were:

1. Development of tailored seed mixtures for flower strips and undersowings,
2. Establishment and management of tailored flower strips/undersowings by the farmers under the supervision of experts,
3. Planning, implementation, evaluation and description of crop inspections of tailored flower strips, undersowings and field beans; crop yield survey,
4. Survey of aphid and beneficial insect populations in field beans and tailored flower strips; evaluation and description of results,
5. Economic analysis,
6. Dissemination of project results in agricultural and specific expert groups.

RESULTS AND EFFECTS

The establishment and management of the flower strips and undersowings were successful. With regard to aphid antagonists, a tendency towards higher and more diverse populations was recorded in the flower strip and undersown variant. Likewise, the beneficials were able to contain the aphid populations over time. However, the effect did not occur in the critical phase of nanovirus infections or in the critical growth stage of field bean. Nevertheless, significantly fewer nanovirus infections were found in the flower strip and undersown variant.

In the undersown variant, the better area coverage and the higher plant species spectrum could have caused a 'masking' of the host plant or acted as a mechanical barrier and/or the undersowing could have changed the properties of the host plant and the microclimate.

Furthermore, defensive olfactory or repellent influences could have caused fewer aphids to fly into the stand. These factors could have caused a suppression of nanovirus infections at the beginning of plant development. Further studies are necessary to confirm these hypotheses. Likewise, the project was able to disprove the fear of attracting field bean pests through the flower strips and to demonstrate the high potential of flower strips in providing alternative living and feeding space in the cultivated landscape. From an economic point of view, the flower strip and undersowing variants performed worse than the no-tillage variant.

PROJECT MANAGEMENT

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COOPERATION BETWEEN


- 4 farms
- Chamber of Agriculture Upper Austria
- Research Institute for Organic Farming (FiBL)
- GLOBAL 2000 Umweltforschungsinstitut

PARTNERS

- Raumberg-Gumpenstein Research & Development
- Austrian Agency for Health and Food Safety (AGES)
- Deutsche Saatveredelung AG (DSV)




ANIMAL WELFARE
AND
HEALTH

PROJECT AREA IN:
 Lower Austria,
Upper Austria, Styria,
Salzburg, Carinthia, Tyrol,
Vorarlberg

2019-
2022
PROJECT PERIOD

ONLINE
 www.zukunftsraumland.at/projekte/2428
www.bergmilchvieh.at
https://oekd-bauen.at/dateien/EIP/Endbericht_2022.pdf

Further development of husbandry systems for future-oriented dairy farming in mountain areas

Operational Group *Mountain dairy cattle*

ABSTRACT

In the mountain areas of Austria's western provinces up to 40% of the dairy farms practice a husbandry system which combines pasturage, free-range farming, and temporary tethering. Recently, especially milk processing farms and the food retail are in increasingly exerting pressure on these farms to convert to loose housing stables. However, converting to loose housing poses major financial, spatial and management challenges for small dairy farms in confined mountainous areas. The project aimed at supporting these farms in two respects: on the one hand, innovative implemented solutions for stable reconstruction were well documented, processed, and made available as knowledge and experience. On the other hand, the project showed holdings where a reconstruction of the stable is not possible alternative strategies for farm development.

STARTING POSITION

Around 70% of the milk produced in Austria originates from small-scale dairy farms in mountain areas with an unfavourable starting position, such as a small number of cows, their location on a slope, or difficult climatic conditions. The vast majority of these farms practice a combined type of husbandry system. Due to new requirements and demands on the part of the food retail chains, milk processing enterprises and animal welfare associations (labelling, loose housing stables), but also legislation (EU organic regulation, national animal husbandry regulation), these farms are facing increased pressure to adapt their husbandry system. For example, deadlines have been fixed for the conversion to a loose housing barn, higher allowances for branded milk are only paid depending on the husbandry system and, in the case of combined type of husbandry, the duration of outdoor or pasture access per day is mandatory with immediate effect. These requirements threaten the existence of numerous mountain farms, as on the one hand it is not always possible to build a new loose housing system in the narrow mountain area for reasons of space. On the other hand, if there is enough space, there are no cheap, well established standard solutions for barn construction in the mountain area as there are, for example, for lowland areas, so that individual stables have to be planned and built individually for the respective holding. The EIP-AGRI project aimed at supporting the dairy farms concerned in a targeted way.

TARGETS AND TARGET GROUPS

The main objective of the project from the Operational Group *Mountain dairy cattle* was to collect, evaluate and uniformly document innovative animal husbandry systems, and business development strategies in mountain area. Further goals were:

- ➔ Plan representation of the structural measures.
- ➔ Evaluation of these construction measures in respect to animal welfare, emission risk and sustainability criteria.
- ➔ Economic assessment of construction/ modification measures based on current (re-) construction cost rates
- ➔ Survey and development of alternative farm development strategies.

The main target group included affected dairy farms in the mountain areas, which were then supported in implementing their farm solution and whose construction and farm development strategies were to serve as a decision-making aid for similarly affected farms and as a basis for advisory documents.

KEY MEASURES

Essential steps of the EIP-AGRI project were:

1. Systematic recording of 32 already implemented construction solutions by means of recording methods and documentation templates worked out.
2. Evaluation of construction solutions in terms of emission risk and animal welfare potential, sustainability and operational efficiency.
3. Monitoring and documentation of ten model farms with an alternative farm development strategy.
4. Preparation of a construction brochure and of a brochure on alternative types of business development options.
5. Creation of a homepage and various materials for multipliers for the purpose of spreading the results.

RESULTS AND EFFECTS

The EIP-AGRI project has shown many field-tested, innovative and individual future strategies for dairy farms and alternative forms of farming in the mountain area, taking into account the economic implications of the construction and conversion measures. Tips for improving animal welfare and reducing emissions, which consider social and environmental requirements, an important contribution was made to the preservation of the farms and the cultural landscape of the mountain area.

Two brochures describe the findings of the project in a total of 42 individual company portraits. The construction related brochure contains 32 innovative solutions for barn conversions, additions and new building in the mountain region of Austria (for example: design of combined farms, conversion towards playpen housing). These include different operational requirements and challenges, such as structural restrictions due to spatial restrictions or limited manpower capacity, and represent the construction process from planning to implementation. Detailed construction plans offer inspiration and concrete solutions for farms with a similar starting situation, whereby an analysis of the effects of the construction measure on animal welfare, nitrogen emission potential and business management completes each farm portrait. General findings, detailed considerations of concrete structural measures and a sustainability assessment for selected farms show potential for promising dairy cattle systems in mountain areas.

The second brochure provides ten farm portraits that have sought and implemented alternatives to dairy farming in mountain areas. Both the step-by-step conversion of the companies, a clear analysis of the before-and-after situation in terms of workload and company structure as well as experience reports offer interested persons ideas and inspiration for operational reorientation.

More detailed information on all specialist topics can be found at www.bergmilchvieh.at.

PROJECT MANAGEMENT

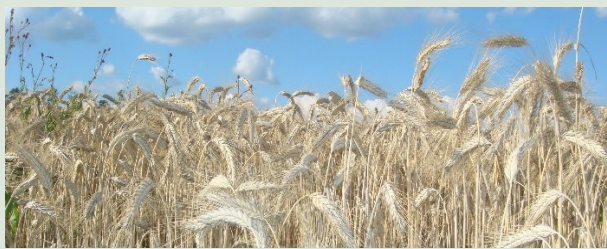
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COOPERATION BETWEEN

- 3 farms
- Austrian Chamber of Agriculture
- Chambers of Agriculture of the Provinces of Vorarlberg, Tyrol, Salz
- Bio Austria Bundesverband and Bio Austria Tyrol, Salzburg, Styria, Carinthia, Upper Austria, Lower Austria
- Austrian Council for Agricultural Engineering and Rural Development (Österreichisches Kuratorium für Landtechnik und Landentwicklung)
- Obersteirische Molkerei und Tirol Milch – Berglandmilch

PARTNERS

- Raumberg-Gumpenstein Research and Development
- Vienna University of Natural Resources and Life Sciences - Institute of Agricultural Engineering
- 42 pilot farms





FARM, DATA AND RISK
MANAGEMENT

PROJECT AREA IN:



all Austria

2019-
2022

PROJECT PERIOD

ONLINE



www.zukunftsraumland.at/projekte/2431
<https://idb.agrarforschung.at/>
<https://www.landnutzung.at/preise.html>

Presentation and simulation of revenues and costs depending on changes in prices and quantities

Operational Group *Income stabilisation*

ABSTRACT

Income in Austrian agriculture has been very volatile in recent years. Some farm types are familiar with such situations, for others this is new and leads to great planning uncertainty. Uncertainty about the expected costs of inputs or farm services and revenues from products sold contributes significantly to income risk. In this EIP-AGRI project, digital solutions are provided free of charge for Austrian farms to support them in their decision-making. In the process, various information and data were bundled and processed for further use and made available to the agricultural enterprises. For example, they receive information on forecasts from the agricultural sector or on the supply and demand situation for certain agricultural goods. In addition, information for individual farms can be derived more easily. The focus is on improving the planning and management of farms.

STARTING POSITION

Farm managers are confronted with volatile market situations. As a result, they are often exposed to strong annual income fluctuations. Information on and forecasts of price, supply and demand developments were often very difficult for individual farm managers to access. There were no consolidated sources of information for them. In addition, it was a challenge for many farms to apply such information and its consequences to their own economic situation. For these reasons, it was important to create intelligent, digital solutions that bundle different sources of information and enable the derivation of the effects on the individual farm.

TARGETS AND TARGET GROUPS

The overall objective of the Operational Group *Income stabilisation* was to improve the competitiveness of all types of agricultural and forestry holdings in Austria. To this end, various digital information offered current and forecast economic developments in the agricultural sector were collected and made available in a structured manner. This makes it easier for farmers to obtain information, for example, on the forecast future development of demand on their sales markets, the current and anticipated price developments of products and operating resources. This information is intended to serve farm managers as an additional basis for decision-making in farm management and to help them better assess the impact of possible developments on their own farms. The target group was all farm managers of all types of farms, both full-time and part-time.

KEY MEASURES

➔ Development of digital information services

1) Agricultural sector forecasts: Preparation and detailed presentation of the current, past and forecast supply, demand and price situation for selected agricultural and forestry goods, as well as inputs for short-, medium- and long-term observation periods. The aim was to provide interested parties with information on market developments quickly and in a structured form. Farmers can thus save time that they previously spent on consuming research on current and future market and price changes via many different information channels.



Link to the application 'Prices of agricultural and forestry goods and inputs': www.landnutzung.at/preise.html

2) Interactive Contribution Margin (IDB): The IDB application of the Federal Institute of Agricultural Economics and Mining provides a comprehensive collection of data, as well as a user interface for individual contribution margin calculations in the fields of arable farming, fodder production, animal husbandry and viticulture. The IDB application has been substantially further developed in the course of the EIP project and extended by the following additional functions:

- ➔ Basic settings
- ➔ Scenario comparisons (initial situation, target situation, best case, worst case)
- ➔ Creation of time series including short-term forecasts (+1 to 2 years)
- ➔ Crop rotation contribution margin
- ➔ Graphical and tabular presentation of results
- ➔ Ability to download sessions and upload for later editing



Link to the previous IDB application (IDB1, old version): idb.agrarforschung.at/
Link to the new IDB application (IDB2): in the transition phase: idb2.agrarforschung.at/
Link after the transition phase: idb.agrarforschung.at/

RESULTS AND EFFECTS

Data and information from various sources were made more usable for agricultural businesses. The project developed digital solutions that provide farmers with collected and structured research results, information on the demand and price situation, forecasts on the agricultural sector and on selected agricultural commodities. Users can simulate their own farm by making their own inputs and drawing conclusions. The solutions developed are available to Austrian farmers free of charge. This facilitated access to information and data at farm level should make it possible to make better farm decisions, better assess uncertainties in volatile markets and maintain competitiveness.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- Austrian Institute of Economic Research (WIFO)
- Beiselen Service GmbH
- Chamber of Agriculture Upper Austria

PARTNERS

- Other farms
- Federal Institute of Agricultural Economics, Rural and Mountain Research
- LBG Österreich GmbH Wirtschaftsprüfung & Steuerberatung
- Austrian Chamber of Agriculture
- Chamber of Agriculture Lower Austria



2019-
2022
PROJECT
PERIOD



Establishment of survey and regulation programmes on selected animal pests in sugar beet cultivation in Austria

Operational Group *Sugar beet cultivation*

ABSTRACT

Sugar beet is an important arable crop in Austria and a valuable component in many crop rotations. However, due to changed production conditions as a result of the increasingly limited possibilities for pest control, as well as increased pest occurrence due to the climate, this valuable crop rotation element is increasingly coming under pressure. The aim of the project is to develop measures for integrated plant protection in beet cultivation. On the one hand, a new warning system for beet pests is being developed, and on the other hand, the greening in front of sugar beet is being optimized with regard to the regulation of pest populations as well as the attractiveness for pollinators. This creates a concrete basis for decision-making, which reduces the risk of production losses and enables better responses to changing conditions. This contributes to securing domestic beet cultivation in the long term and making it fit for the future.

STARTING POSITION

The general conditions in Austrian beet cultivation, an important arable crop of social, regional and strategic interest, have changed significantly in recent years. On the one hand, changes in global supply and demand conditions are increasingly causing price risks and changing production requirements are bringing new challenges in cultivation. On the other hand, the changing climatic conditions have led to an increase in the incidence of previously little-noticed pests, such as the turnip weevil or the turnip earth flea and aphids in particular. These pose major problems for farms. Knowledge about these pests that is relevant for farmers, for example about population trends and distribution areas, is still incomplete. Also, there is currently no warning service for beet pests in Austria. Furthermore, pest control in beet cultivation is difficult, or rather increasingly difficult, as the use of insecticides is only possible to a limited extent. A possible starting point is the targeted selection of catch crops, which are often integrated into beet cultivation and have a great influence on insect populations, both for pests and beneficial insects or pollinators. However, practical knowledge about optimal varieties, mixtures and cultivation to minimize pest occurrence and at the same time provide optimal conditions for beneficial insects is often lacking.

TARGETS AND TARGET GROUPS

The main objective of the project is on the one hand to prepare knowledge and information for farmers in a targeted manner and on the other hand to develop management methods that minimize pest infestation in beet. This includes, among other things:

- ➔ Development of warning service system modules, www.warndienst.at, for selected beet pests, such as beet flea, black bean aphid, green peach aphid
- ➔ Studies on virus infestation of aphids
- ➔ Standardized recording of the occurrence and development of the turnip weevil and development of a monitoring and information system for beet farmers
- ➔ Optimization of greening mixtures in beet crop rotations with regard to their influence on beet-specific pest populations

The target group of the project is the entire Austrian beet sector, which currently consists of over 6,000 farms.

KEY MEASURES

Essential project steps are:

1. Development of ground flea and aphid detection systems, data transmission and quality assurance systems and their integration into existing warning service systems.
2. Investigation of the effect of seed treatment on the pest potential of beet pests
3. Development of a Rübenderbrüssler detection system and integration into existing warning service systems
4. Investigation of greening strategies for their influence on pest populations and biodiversity

RESULTS AND EFFECTS

Due to the high production costs, sugar beet cultivation has a high risk of lacking competitiveness. Therefore, highly efficient use of resources is essential in beet cultivation. Within the framework of this project, methods and recommendations for action are being developed that will enable Austrian beet farmers to effectively counteract beet pests that occur due to the climate, despite restrictions on the use of insecticides. These measures can make a decisive contribution to increasing production efficiency and yield security by reducing planting and yield losses.

One achievement of the EIP-AGRI project is that a beet warning module for earth flea and aphids has been created, which is also secured for the coming years. The beet weevil larvae monitoring already made it possible to better forecast the occurrence of the beet weevil during the project period and subsequently in the future. This fact provides planning security for beet growers as well as for companies in the beet processing sector. Beet cultivation in Austria could thus be secured even in difficult production periods. The Austrian economy also benefits from this, as jobs are secured by maintaining sugar beet production in Austria.

PROJECT MANAGEMENT

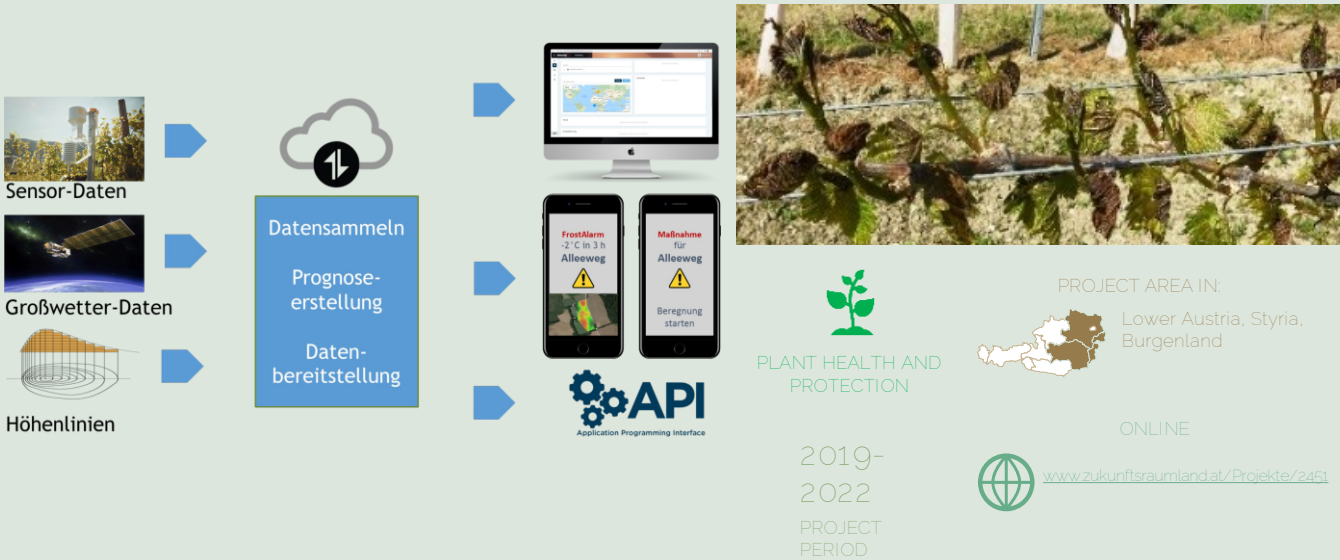
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COOPERATION BETWEEN

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- Austrian Chamber of Agriculture
- Austrian Agency for Health and Food Safety (AGES)
- AGRANA Research and Innovation Center (ARIC)

PARTNERS

- Provincial Chambers of Agriculture
- Die Rübenbauern (beet growers' association)
- AGRANA Sales & Marketing (ASM)



Strategy for reducing late frost damage in viticulture and orchards

Operational Group *FrostStrat*

ABSTRACT

The climate changes lead to an earlier phenology in vines and fruit crops. They sprout earlier and flower earlier. For this reason, the crops are particularly sensitive to cold spells and frost that can occur at any time in spring. Devastating frost damage and yield losses are the result, threatening the existence of wine and fruit growers. The frost protection measures currently used in viticulture and orchards were being examined in this project to determine their actual effect. They will be improved, and new measures developed. In addition, a digital tool has been developed in the project, in connection with sensors, which intelligently links data and information with each other and issues forecasts and recommendations for action for the agricultural businesses. This will enable wine and fruit farmers to better protect themselves from yield losses due to frost damage.

STARTING POSITION

Climate change is leading to increasingly mild winters and warm springs. This results in an earlier phenology of wine and fruit crops, namely earlier budding and earlier flowering. This makes the crops particularly sensitive to cold snaps and frost, which can occur at any time in spring. Devastating late frost damage or even complete yield losses are the result and threaten the economic existence of the farms. The strategies practiced so far to combat late frost damage in viticulture and orchards have not been sufficiently evaluated scientifically and in part had to be critically questioned with regard to their efficiency and effect. This lack of scientific knowledge led to frost protection measures not being used very systematically, for example at times when there is no actual threat from the weather or in a phenologically unproblematic phase. For these reasons, in addition to the evaluation and development of new frost protection measures, the systematic use of weather data, measured by a network of sensors, is also necessary in order to derive practical recommendations for action for wine and fruit growers.

TARGETS AND TARGET GROUPS

The EIP-AGRI project contributed to the development of practical strategies for adaptation to climate change. The main objective of the project was to develop a decision-making aid for wine and fruit farmers to avert impending frost damage. To this end, among other things

- ➔ Frost control methods used so far scientifically evaluated and tested for their effectiveness.
- ➔ New frost control methods developed, also scientifically evaluated and tested for their effectiveness, and
- ➔ developed an intelligent, digital tool which, based on sensor data on the current weather, offers farms forecasts including situation-specific recommendations for action to combat frost.

The target group of the project were wine and fruit growing farms that are at risk from late frost and advisors who support them. These target groups must be reached in order to be able to counteract frost damage systematically and efficiently.

KEY MEASURES

Essential project steps were:

1. Improvement of existing and development of new frost protection measures based on scientific findings.
2. Evaluation of frost sensitivity of fruit species and grape varieties according to phenological development stages.
3. Field observations in plants where late frost occurs.
4. Integration of over 400 small weather stations and sensors for the systematic collection of weather data.
5. Development of a forecast model for the small-regional late frost risk
6. Development of an intelligent, digital tool as a decision-making aid for fruit and wine growers with regard to the mitigation of frost damage.

RESULTS AND EFFECTS

In the EIP-AGRI project, an intelligent, digital tool has been developed that links data and information and provides concrete support for wine and fruit farmers. Sensor data, measured on site and large-scale weather data as well as findings from the evaluation of frost protection measures are linked. Damage in the form of crop losses or failures can thus be minimized. It is also expected that the use of resources, especially money and time, for the implementation of measures can be reduced, as control is implemented at the right time with the right methods.

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Klosterneuburg, Wine and Fruit Klosterneuburg RTD,
Joanneum Research, University of Natural Resources and
Applied Life Sciences and the Central Institute for
Meteorology and Geodynamics (ZAMG)

- ecoplus GmbH Food Cluster Lower Austria
- GEOsens GmbH
- Experimental Station Fruit Growing and Viticulture
Haidegg
- Austrian Winegrowers' Association and Federal Fruit
Growers' Association
- 4 regional wine committees and 10 other wine and fruit
growing companies

PARTNER

- Microtronics Engineering GmbH
- 6 agricultural wine and fruit farms
- Austrian Hail Insurance VVaG
- Austrian Chamber of Agriculture, Lower
Austria, Styria and Burgenland
- Lower Austrian Winegrowers' Association
- Tieto Austria GmbH

5th Call


The projects of the fifth EIP-AGRI call in Austria were approved in 2021/22:

Projects of the 5th Call

Strip cropping	page 73
Market gardening	page 75
PhosVer	page 77
Soil.Biodiversity	page 79
Alternative protein sources	page 81
Austrian organic greening seeds	page 83
NEU.rind	page 85
Pasture-innovations	page 87
Value added mountain farming	page 89




SOIL MANAGEMENT
AND EROSION
CONTROL

PROJECT AREA IN:
 Burgenland,
Lower Austria,
Upper Austria,
Styria

ONLINE

2022-
2025
PROJECT
PERIOD



www.zukunftsraumland.at/Projekte/3087

Agroecological and -economical evaluation of strip cropping systems and development of practical guidelines

Operational Group *Strip cropping*

ABSTRACT

Strip cropping combines the benefits of efficient farming with the environmental advantages of small-scale farming. It is defined as the production of three or more crops within the same field in adjacent strips. The important point is that the crops are laid out in common working widths, which means that the field can still be cultivated by machines. This form of land management increases the resilience and stability of the production system and provides a much more diverse and attractive habitat for a variety of insects and other animals. In the project, strip cultivation is implemented in *Hofkirchen* in *Traunkreis* (Upper Austria) and on five other demonstration farms in the arable regions of Upper Austria, Lower Austria, Burgenland and Carinthia. The following aspects are being investigated in the EIP-AGRI project: labour and farm management effects, occurrence of beneficial insects, soil health, plant health and yield..

STARTING POSITION

Monocultures are widespread because fields can be managed efficiently with this type of cultivation. But monotonous and large field plots lead to a loss of habitats which are attractive for many species. Pollinators and wild bee species in particular are very much threatened by the homogenization of the landscape. Field areas with monocultures are also more susceptible to soil erosion, diseases and pests.

Strip cropping systems could defy many of these challenges. The aim of the Operational Group *Strip cropping* is to create a system of strip cropping that meets the challenges of current regional and global problems such as the decline in biodiversity, the decline in soil fertility and the increase in weather extremes.

TARGETS AND TARGET GROUPS

The aim of the project is the agroecological and -economical evaluation of strip cropping systems and the development of practical guidelines.

- ➔ Evaluation of the innovation potential of strip cropping in terms of economic efficiency, stability and resilience of arable crops, quality of harvested crops and health of arable crops in strip cropping
- ➔ Investigation of the effects on the stability and resilience of arable crops, crop quality and the health of arable crops in strip cropping
- ➔ Investigation of the effects of strip cultivation on existing insect biodiversity on arable land, soil fertility and weed emergence
- ➔ Development of suitable and practicable management strategies for strip cropping
- ➔ Exchange between education, research and practice: During the project phase, the results are also discussed and evaluated with specialist colleagues from universities, educational institutions and practitioners

The target groups of the EIP-AGRI project are farmers and agricultural advisors.

KEY MEASURES

The project implements strip cropping on an arable area of 13.92 ha in *Hofkirchen* in *Traunkreis*. The strip cropping crop rotation will be compared with the same crops in a monoculture system. On five other demonstration farms in the arable farming regions of Lower Austria, Burgenland and Styria, strip cultivation is being implemented, adapted to their operational conditions:

- ➔ Establishment and implementation of strip cropping and monoculture comparison plots within the framework of a field trial on an area of 13.92 ha in *Hofkirchen Traunkreis*
- ➔ Detailed documentation and evaluation of agro-ecological and agro-economic parameters by carrying out standardized bonitures of arable crops (in cooperation with R-G R&D), examination of soil life, monitoring of beneficial insect diversity in strip cropping (University of Natural Resources and Applied Life Sciences) and a technological value test of the harvested crops..
- ➔ Recording of all operationally necessary labour time, machinery costs and management measures: Survey of the additional costs incurred by this method of cultivation.
- ➔ Data preparation and evaluation of the field surveys and laboratory results
- ➔ Direct comparison of strip cropping with crop rotation in the monoculture field
- ➔ Evaluating the concept of transfer mulch in strip cultivation
- ➔ Implementation of strip cropping on five more demonstration farms to expand experience and collect data regarding working time and management.
- ➔ Develop guidelines as a manual for strip cultivation in practice, which enable implementation on other farms.

RESULTS AND EFFECTS

The practical implementation is to enable the collection of experience in all areas of the arable practice of strip cropping. The Operational Group will carry out all steps from planning to implementation to harvesting and discuss all considerations and measures within the group. The first experiences could already be gathered during the establishment of the plots and will be passed on to the public during the project period.

PROJECT MANAGEMENT

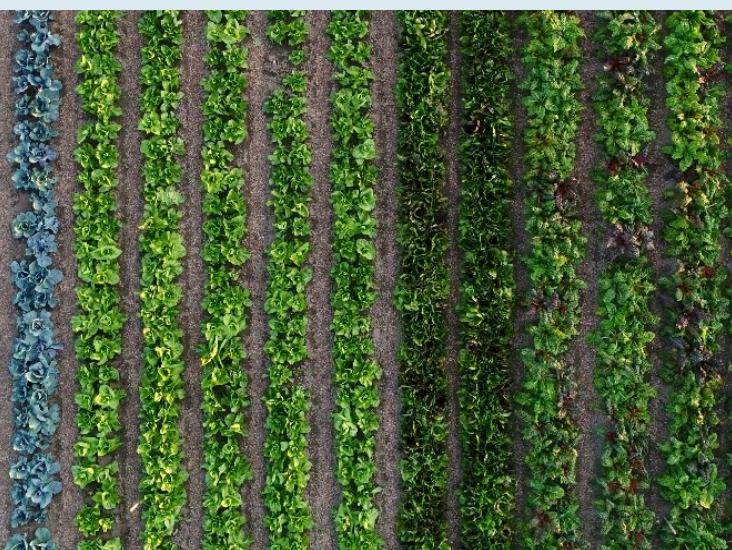
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COOPERATION BETWEEN

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- Weißhäuptl Gerhard
- Rudolf Hofmann
- Bio Austria - Association for the Promotion of Organic Agriculture

PARTNER

- University of Natural Resources and Applied Life Sciences Vienna, Ronnie Walcher
- Raumberg-Gumpenstein R & D, Daniel Lehner



2022-
2024
PROJECT
PERIOD



Market Gardening: Innovation to strengthen the supply of fresh vegetables in Austria

Operational Group *Market gardening*

ABSTRACT

Market gardening is a so-called bio-intensive method: maximizing yields and increasing resource efficiency while maintaining soil fertility. Cultivation is not done on arable land but in permanent beds.

This method places high demands on vegetable growing skills of farmers, crop management, as well as fertilizer, and soil management. The aim of the EIP-AGRI project is to identify those relevant success factors in the areas of vegetable production, business management, labour management, and soil management that have general validity, can be applied regardless of the location of the farm and are necessary for establishing the methods of market gardening.

In addition to existing vegetable farms, interested newcomers and end consumers have also been identified as target groups. The target group-oriented dissemination of the project results is an important component of the project.

STARTING POSITION

The self-sufficiency rate for vegetables in Austria is currently around 55%, and consumption is steadily increasing. The usual methods of vegetable production are characterized by high technical expenditure, and in some cases high CO₂-emissions. In organic farming there is also a high mechanical effort for weed control. A large part of the agricultural land in Austria is at risk of erosion, soil health is declining, and the problem of soil compaction is increasing. The farming methods applied in market gardening may offer possible solutions for the aforementioned challenges.

Market gardeners work according to the bio-intensive method. Most of the work is done by hand, and there is no need to purchase expensive equipment and machinery. For interested newcomers to agriculture, this is of great interest, together with the fact that there is no large land requirement. For farms already marketing directly, fresh, diverse vegetables can be an attractive addition to the existing range.

TARGETS AND TARGET GROUPS

The project of the Operational Group *Market gardening* strives to reach the following goals:

- ➔ Obtaining vegetable production data from market gardening practice
- ➔ Determination of key figures on productivity and area output over the course of the year
- ➔ Preparation of the economic prerequisites and success factors for market garden centers
- ➔ Preparation of the labour management prerequisites and success factors for market garden centers
- ➔ Identification of measures to maintain and regenerate soil fertility and to achieve the maximum possible natural yield potential
- ➔ Preparation of the results for the relevant target groups and dissemination

The target groups are vegetable farms or people interested in setting up such a farm, consumers and multipliers.

KEY MEASURES

The following measures are key to the success of the project:

- ➔ Planning and carrying out cultivation trials at market gardening experimental stations
- ➔ Documentation and evaluation of the data collected from market gardening practice farms
- ➔ Determination of the key figures and indicators to be calculated
- ➔ Calculation of key figures and indicators on the basis of the collected practice data
- ➔ Work management practice surveys on the participating farms and processing of the results
- ➔ Identification of improvements in the field of labour management
- ➔ Literature research on soil management measures in market gardening
- ➔ Selection of observation plots for soil investigations and the parameters to be investigated
- ➔ Recording of the actual soil condition by means of soil tests
- ➔ Observation of the selected parameters
- ➔ Preparation of results and reporting
- ➔ Design of target group-specific information material and public relations work

RESULTS AND EFFECTS

Key figures on productivity and area yield over the course of the year are to be gathered. This should be the basis for establishing efficient cultivation methods in line with the market and to draw up optimized crop rotation plans for year-round use of the cultivated areas.

Business management key figures and indicators as well as data on labour economics key figures and indicators serve as a basis for establishing measures for further development of the farms. Determination of relevant soil parameters as well as practice-relevant explanations of the soil tests and the communication of the optimization potential are vital measures to promote nutrient management and preservation soil functions.

Dissemination of the project results and the establishment of communication channels with the relevant target groups are also ongoing activities which ensure the long-term success of the project.

PROJECT MANAGEMENT

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COOPERATION BETWEEN


- 6 vegetable farms, BIO AUSTRIA and partners from research, industry and science

PARTNER

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- Johannes Pelleter e.U.
- Rukola Soft UG
- Renate Spraul – Work management in horticulture
- TB Unterfrauner GmbH
- University of Natural Resources and Applied Life Sciences – Department of Sustainable Agricultural Systems
- Experimental Station for Special Crops Wiesel




SOIL MANAGEMENT
AND EROSION
CONTROL

PROJECT AREAS IN:
 Lower Austria
Upper Austria

2022-
2025
PROJECT
PERIOD

ONLINE
 www.zukunftsraumland.at/projekte/3086
<https://boku.ac.at/nas/ifbel/arbeitsgruppen/ag-bodenfruchtbarkeit-und-anbausysteme/projekte/eip-projekt-phosver>

Improved assessment of nutrient supply for organic farms using the example of phosphorus

Operational Group *PhosVer*

ABSTRACT

Phosphorus (P) is an essential and at the same time limited plant nutrient, which is why it must be used efficiently. On organic market crop farms, phosphorus balances are usually negative, and the content of plant-available phosphorus (PCAL) is often suboptimal. However, a negative phosphorus field balance or a supply level A or B does not automatically mean an undersupply of the crops. The correct interpretation of phosphorus results and the selection of appropriate measures in practice is often difficult for farmers.

Using phosphorus as an example, on-farm and external opportunities to increase nutrient availability will be investigated, developed, and communicated to farmers. On-farm, plant species with high phosphorus mobilization capacity can increase phosphorus availability and phosphorus efficiency. P availability can be increased through the use of external resources which are approved in organic farming.

STARTING POSITION

Due to the increasing specialization of farms, also in organic farming, there is a growing number of market crop farms without (significant) animal husbandry. On these farms, the nutrients are exported with the harvested products or are lost through leaching or erosion, without the on-farm cycles being closed (apart from nitrogen). The phosphorus balances in farms without livestock or in livestock-poor farms are therefore mostly negative. The plant-available phosphorus contents determined with the CAL method were in the middle to upper range of the low content level B (26 - 46 mg P/kg) on organic farms in Upper Austria. A decreasing trend of phosphorus contents can be observed since 1991. Negative phosphorus field balances and low P supply levels in the soil are usually assessed negatively. Therefore, it is necessary to perform an evaluation of the plant available phosphorus in the P pools in the soil as well as the P mobilization potential.

TARGETS AND TARGET GROUPS

The project of the Operational Group *PhosVer* is divided into the following objectives:

1. Development of a practical tool that enables farmers to better assess the P supply of their fields by means of analytical data and on-farm data.
2. Results of different management strategies (P-mobilizing catch crops, external resources) for the mobilization of nutrients with the main focus on phosphorus are made available to farmers and provide a decision-making aid for future management.
3. Improved estimation of P fertilizer effectiveness of different organic fertilizers and P and K mobilization from stable pools based on the results of a long-term trial. These findings help practical farms to assess their nutrient strategies and the effects of longer-term organic management.

Target group: farmers, advisors, scientists.

KEY MEASURES

The main measures in the EIP-AGRI project are:

- ➔ Field trials on P mobilization through catch crops

The aim of the on-farm field trials are to apply management strategies for P mobilization (catch crops, external resources) and to examine their effects on the yields and nutrient supply of the main crops. The trial variants are determined together with the farmers in the project workshops, the detailed planning of the field trials is carried out in cooperation with the project coordinator.

- ➔ Long-term trial at the practical research farm Rutzendorf

The aim of the long-term trial is to continue selected investigations of the long-term monitoring at the practical research farm Rutzendorf. The effects of four organic fertilization systems on plant yields and nutrient dynamics of phosphorus and potassium will be examined. The results are to be used to better estimate the P fertilization effectiveness of organic fertilizers and the nutrient mobilization from soil stocks. The findings from the long-term trial will help practical farms to assess their nutrient strategies and the effects of longer-term organic management.

RESULTS AND EFFECTS

Improved assessment of P availability on organically managed arable land; contribution to a more efficient use of phosphorus through

- a) Estimation of P availability by evaluating P pools in the soil as well as the P mobilization potential of P-mobilizing catch crops and the use of external resources, approved in organic farming
- b) Estimation of the phosphorus fertilizer efficacy of organic fertilizers and P and K mobilization from stable pools from data of a long-term experiment.
- c) Identification of actual P deficiency situations with negative consequences for productivity on organic farms, prevention of P oversupply and reduction of the risk of P losses due to erosion and water eutrophication.

PROJECT MANAGEMENT

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- Organic farmer Herbert Zetner, Auersthal (Lower Austria)
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- Organic farmer Xaver Diermayr, Neuhofen (Upper Austria)
- Organic farmer Robert Musil, Weitersfelden (Upper Austria)
- Organic farmer Gerald Lamm, St. Marien (Upper Austria)
- Federal Experimental Farms GmbH
- TB Unterfrauner GmbH
- AKRA Karner Fertiliser Production GmbH



2022-
2024
PROJECT
PERIOD



ONLINE

www.zukunftsraumland.at/projekte/3153
www.boden-biodiv.at

Development of new cultivation methods to ensure microbial diversity in the soil and its functions for climate-friendly and resource-efficient arable farming

Operational Group *Soil Biodiversity*

ABSTRACT

The Operational Group *Soil Biodiversity* investigates the influences of arable farming measures on soil biodiversity. The aim is to develop recommendations for action from the investigated measures with a positive effect on biodiversity and soil fertility, which will enable farmers to integrate promising measures on the farm. Practical and exact field trials are combined with microbiological methods (including DNA sequencing to determine the diversity of soil microorganisms) and the recording of soil health indicators (nutrient-mobilizing soil enzymes, soil organic matter, soil structure). In order to also test the possibilities of digitization, vegetation measurements are carried out using drones. In addition to the investigation of subplots with different arable farming strategies on the farms of the Operational Group, already established long-term soil cultivation trials are sampled on two sites of agricultural technical colleges in Hollabrunn and Pyhra. One of each trial is in a dry area and the other one in a very moist area of lower Austria.

STARTING POSITION

In arable farming, there has been a market-related trend towards simplifying crop rotations that has been observable for a longer time period. Currently, few crop species dominate in arable land. For example, winter wheat, winter barley and grain maize occupy around 43% of arable land in Austria (Green Report 2020).

However, studies show that the use of diverse crops has great advantages: This achieves a high yield resilience against negative environmental influences (heat, drought, heavy rainfall). In addition, income stability on arable farms can also be improved through a variety of cultivation systems. Accordingly, innovative and practicable approaches to increasing plant diversity in site-adapted crop rotations would contribute to the stability of crop production.

A major reason for the large potential of biodiverse arable farming systems lies in the connection between plant diversity, microbial diversity in the soil and soil fertility. Diverse cropping systems increase the quantity (microbial biomass), number and diversity of soil (micro)organisms as well as important ecosystem services of the soil such as CO₂ sequestration and largely closed nutrient cycles through higher plant species numbers.

So far, however, there is still insufficient knowledge on the practical implementation of cultivation systems that can specifically promote soil biodiversity, as well as on the on-farm potentials in improving soil fertility through the implementation of biodiverse farming systems. Through the exchange of knowledge between innovative farmers and applied and basic research, this EIP-AGRI project aims to close knowledge gaps and better disseminate existing knowledge.

TARGETS AND TARGET GROUPS

The central goal of the EIP-AGRI project is to test and implement practical cultivation systems that promote biodiversity in the soil and its fertility.

The project is intended to be a guideline and provides instruments for the implementation of biodiverse, soil-improving cultivation systems that support farmers, advisors and authorities in optimizing environmental performance and potential in arable farming.

The target group consists mainly of practicing farmers, but also advisors, teachers and pupils of agricultural schools.

KEY MEASURES

The project combines practical and exact field experiments with modern methods of determining microbiology in soil via DNA sequencing and the recording of soil health indicators (nutrient-mobilizing soil enzymes, soil organic matter, soil structure). The effects of microbially induced soil health potentials on the vitality of crop populations as an essential goal of agriculture adapted to climate change are recorded with the help of remote sensing methods.

As part of the implementation, soil samples are taken several times a year on sub-areas of the six farms in the operational group. On these areas, the farmers carry out their usual crop rotation and integrate small sub-areas on the fields where the farming method differs from the rest of the area. However, on four of the farms, fields that have been cultivated in a soil regenerating way for many years are being tested and compared with newly leased fields, which have been cultivated conventionally. Here, differences in the various forms of cultivation are to be explored and it is being investigated whether the soil-building form of cultivation really does have a positive effect on soil biodiversity. At two sites of the agricultural colleges in *Hollabrunn* (dryland) and in *Pyhra* (wetland), different approaches to the greening of arable land are being investigated on the long-term tillage trials, such as black fallow, a customary less biodiverse intercrop mixture, a biodiverse intercrop mixture and a field grass strip. With the help of drones and special vegetation measuring devices, the test areas are flown over. This measures the influence of soil biodiversity-promoting measures on the vegetation of crops.

RESULTS AND EFFECTS

1. Practical solutions for the management of biodiverse arable farming systems, which can be adapted and adopted by interested farmers to their operational conditions.
2. Assessment of the potential of biodiverse cropping systems to promote natural soil fertility functions and their effect on yield and the environment.
3. In addition, the project is expected to make significant progress in the following areas:
4. Field methods for diagnosis and assessment of progress in soil health (structure, biology) by farmers and extension workers.
5. Raising awareness of the possibilities and feasibility of more sustainable crop systems by increasing biodiversity.
6. Improve the integration of modern research methods into farm innovation in arable farming practice through networking between science and farmers.
7. Define innovation needs in agricultural technology for improved management of biodiverse cropping systems.

PROJECT MANAGEMENT

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- Farmers from the Boden.Leben Association
- Chamber of Agriculture of Lower Austria
- Landimpulse Agroinnovations


PARTNER

- University of Natural Resources and Applied Life Sciences Vienna
- Austrian Institute of Technology
- Josephinum Research




PRODUCTS
AND
PROCESSES

2022 -
2025
PROJECT
PERIOD

PROJECT AREA IN:
 Upper Austria

ONLINE
 www.zukunftsraumland.at/projekte/3118
www.biokompetenzzentrum.at

Cultivation of alternative protein sources in harsh locations of Austria

Operational Group *Alternative protein sources*

ABSTRACT

The project aims to raise awareness and knowledge of regional protein supply in agriculture among farms, and in particular to address livestock farms. The aim is to cultivate grain legumes ecologically, sustainably and economically using varieties and cultivation methods suitable for the farm location. Different varieties and cultivation methods are tested, among other things with regard to weed pressure and maturity.

Subsequently, the various protein sources are used in livestock feeding on the farm and optimal rations are calculated. In addition, the possibility of using grain legumes in human nutrition will be investigated. Various analyses will show the composition of the ingredients of grain legumes and whether they meet food standards. This further sales opportunity should make the cultivation of legumes more attractive.

STARTING POSITION

Currently, protein crops are only cultivated in very small quantities in Austria, especially in the Mühlviertel region, and therefore often have to be bought in for livestock feed. However, the transport route increases the CO₂ balance of protein feed, which is why this option is becoming increasingly unattractive. In addition, yield losses due to drought and pest damage (white grubs) as well as the increasing impoverishment of biodiversity on intensively used meadows are a reality. The Alternative Protein Sources project aims to counteract this development.

By cultivating grain legumes suitable for the location, such as sweet lupine, field bean or pea, an alternative protein component to imported soya can be established. This has several effects: Grassland is relieved, CO₂ is saved, and the positive properties of grain legumes improve the soil. The *Mühlviertel* was selected as test region due to the still annual temperature of around 7 degrees Celsius. It is precisely here that varieties must be used in arable farming that can mature in the accompanying shorter vegetation period.

TARGETS AND TARGET GROUPS

The objectives of the EIP-AGRI project are structured as follows:

- ➔ The special focus is on enabling the farm to be self-sufficient in suitable grain legumes. The regional and thus more sustainable supply of the fodder brought in and the upgrading of the farm cycle go hand in hand with this.
- ➔ In addition, the potential of the tested grain legumes for use in the food sector is to be analyzed. The dual use for humans and animals would result in a new sales channel for farmers.
- ➔ A profitability analysis will determine how economical it is to cultivate the crops mentioned on the farm.
- ➔ The extension of the crop rotation causes a diversity of flowers, which increases the food security for insects and thus supports biodiversity.

The target group of the project is mainly livestock farms that need protein components for feeding.

KEY MEASURES

The project tests which varieties of grain legumes grow best, especially in the project region (*Mühlviertel* - Upper Austria). It is analyzed which grain legumes are particularly suitable for cultivation in the *Mühlviertel*. Different varieties of grain legumes are cultivated on five selected farms.

Furthermore, the optimal rations of the tested grain legumes will be calculated for subsequent use in livestock farming and then used in practice together with the farmers.

In addition, a profitability analyses will provide, if the cultivation of grain legumes on the own farm would be profitable.

An additional component of the project is to determine the potential of grain legumes in human nutrition. The dual use of protein crops for humans and animals would mean an additional sales opportunity for farms.

RESULTS AND EFFECTS

The project aims to raise awareness for a regional protein supply in agriculture. Crops and varieties that withstand the climate in the *Mühlviertel* and offer security of supply are to be tested and communicated. The dual-use aspect of grain legumes is to create a further sales opportunity for producers, which at the same time raises the attractiveness of cultivation.

PROJECT MANAGEMENT

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COOPERATION BETWEEN

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- 6 farms

PARTNER

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- University of Natural Resources and Applied Life Sciences Vienna
- Higher Technical Institute for Food Technology
- Soil water protection consulting



PRODUCTS
AND
PROCESSES

2022 -
2024
PROJECT
PERIOD



PROJECT AREA IN:

Vienna, Lower Austria,
Upper Austria, Styria,
Burgenland, Carinthia

ONLINE



www.zukunftsraumland.at/projekte/3165

Austrian Organic Cover Crop Seeds

Operational Group *Austrian organic greening seeds*

ABSTRACT

At present, it is difficult to obtain organic-quality seeds of all desired plant species for cover crops. For many species, it is necessary to resort to seeds from non-Austrian production. The aim of the EIP-AGRI project is to facilitate the propagation and availability of organic cover crop seeds in Austria.

In the project, practical field trials for seed propagation of frequently used cover crops as well as small plot trials for testing further innovative cover crop species and varieties are carried out. Through these propagation trials and the comparison of locations and production systems, the project aims to develop practical knowledge about the propagability of cover crop plant species in organic farming under Austrian conditions. At the same time, the propagation trials are subjected to economic evaluation. Data analysis will be carried out to identify and solve quality problems in cover crop seeds currently produced in Austria. Improvement measures for farmers will be derived from propagation trials, economic and data analysis.

STARTING POSITION

In the course of the implementation of the EIP project "Minimizing gaseous N and C emissions and N leaching by optimising catch crops in arable farming" (<https://www.zukunftsraumland.at/projekte/1945>) it became clear, that it is often difficult to obtain all components for cover crop mixtures in organic quality and that many components require resorting to seeds from non-Austrian production. If organic quality seed is not available, a national derogation currently allows the use of conventional seed without seed dressing in organic farming. However, there is growing pressure from the EU to restrict national derogations in organic farming. As of 2035 only organically produced seed will be allowed.

The COVID 19 pandemic and the war in Ukraine have highlighted the importance of security of supply. Resilience to crises will be a major future issue in agriculture and food security.

The spread of uncertified seeds is seen as a major cause and major driver of the spread of parasites, such as dodder (*Cuscuta*), and invasive weeds, such as ragweed or datura. Seed propagation, especially for little-tried plant species such as cover crop plants, and especially under organic farming conditions, can only succeed in the desired quality and purity with sufficient yield security if the required expertise is applied.

TARGETS AND TARGET GROUPS

In order to support a resilient, diversified Austrian organic agriculture, the Operational Group *Austrian organic greening seeds* wants to facilitate seed propagation and availability of organic cover crop seeds in Austria in the following ways:

- ➔ Gaining experience and knowledge for all Austrian farmers who practice or are interested in the professional propagation of cover crop seeds.
- ➔ Development of knowledge on the propagation of cover crops in organic farming in Austria.
- ➔ Examination of the physiological suitability of new innovative cover crop species and varieties with special characteristics for propagation under the conditions of organic farming in Austria.
- ➔ Cataloguing of quality issues in the cover crop seed currently produced in Austria and deriving measures to improve the situation.
- ➔ Assessment of the economic viability of propagating organic cover crop species in Austria.
- ➔ Raising awareness of the advantages and necessity of the quality standards of certified seed, and consequently of the risks and dangers of non-certified seed.
- ➔ Dissemination of knowledge gained through the project

Main target group of the project are organic farmers propagating seeds in Austria.

KEY MEASURES

- ➔ Propagation trials with cover crop plant species that have not yet been produced in Austria or have not been produced under organic farming conditions. Establishing and evaluation of practical field trials on the seed propagation of cover crops by the farmers participating in the project with experts supporting them on their farm sites. Economic calculation on the part of the seed producers.
- ➔ Small plot trials to test further innovative cover crop species and varieties in order to expand the range of cover crops for specific purposes.
- ➔ Analysis of the current situation: Data analysis of the cover crop seed produced in Austria with regard to quality and analysis of the reasons for the approval of special permits.

RESULTS AND EFFECTS

The expected result of the propagation trials is new knowledge about whether the selected cover crop plant species, which are frequently used in cover crop mixtures and whose propagability under Austrian conditions was judged promising by the OG, can be propagated in Austria under practical conditions. In detail, results are expected to improve knowledge on cultivation requirements, threshability, yield and quality of the harvested crop, as well as information on their cultivation under organic farming conditions. The implementation of trials at multiple locations will provide data as to which propagation area is most suitable for each of the cover crop species investigated.

The expected result of the screening trials is the identification of new plants suitable as cover crops, which will expand the range of cover crop plant species. The evaluations and analyses of the data material available to AGES will make it possible to derive targeted improvement measures.

PROJECT MANAGEMENT:

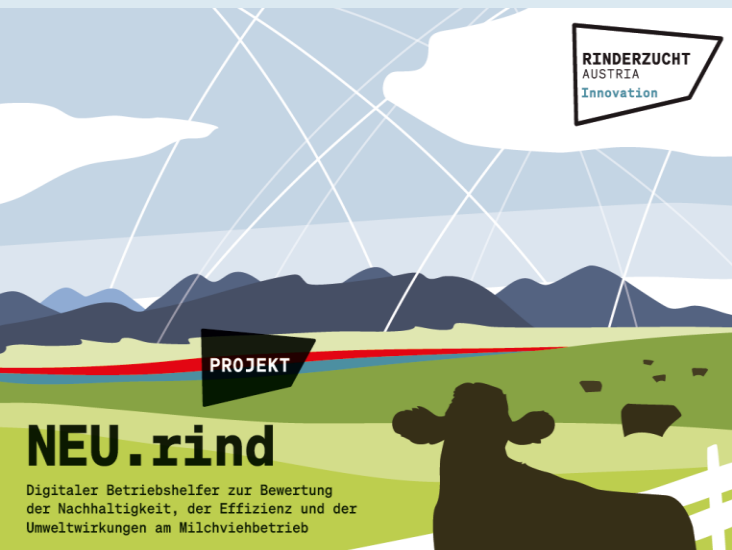
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COOPERATION BETWEEN

- 4 agricultural enterprises
- 4 seed propagation and seed breeding companies
- 1 association of plant breeders and seed companies
- 1 scientific institute
- 2 other scientific institutes as subcontractors

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- Andreas Patschka
- Friedrich Katz
- Franz Traudtner
- Saatbau Linz eGen
- Raiffeisen Ware Austria AG
- Saatzucht Gleisdorf GmbH
- Kärntner Saatbau eGen
- Saatgut Austria



NEU.rind

Nachhaltigkeit • Effizienz • Umweltwirkung



ANIMAL
WELFARE AND
HEALTH

2022-
2024
PROJECT
PERIOD

PROJECT AREA IN:



All Austria

ONLINE



www.zukunftsraumland.at/projekte/3121
www.rinderzucht.at/projekt/neu-rind.html

Digital farm helper to assess sustainability, efficiency and environmental impacts on the dairy farm

Operational Group *NEU.rind*

ABSTRACT

The EIP-AGRI project aims to develop a simple and practicable digital farm assistant for assessing sustainability, efficiency and environmental impacts. By providing various key figures and concrete recommendations for action, processes can be optimized at individual farm level and, for example, emissions and the demand for non-renewable resources can be reduced. The tool should be available to a large number of dairy farms and be usable with little effort, reliable and meaningful. This will create a broad database for Austrian milk production and highlight individual farm strengths and opportunities. The aim of the project is to improve sustainability in Austrian dairy and cattle farming.

STARTING POSITION

The climate crisis and its effects have become one of the greatest global challenges. Emissions are the subject of critical social debate – the cattle industry is both affected and partly responsible. Farmers expect understandable facts and figures on environmental impacts, resource efficiency and sustainability of dairy farming in Austria, as well as concrete support for improvements in their business.

Studies show that milk in Austria is produced with a smaller ecological footprint than in other regions of Europe and the world. The reasons for the advantages of Austrian production are the land-based production, the high proportion of forage, the GMO-free (genetically modified organisms) feeding and the high proportion of dual-purpose breeds. These features characterise the Austrian way of dairy and cattle farming.

Topics of the future in respect to dairy and cattle farming : sustainability, efficiency, environmental impacts – in german Nachhaltigkeit, Effizienz, Umweltwirkung → NEU.cattle

TARGETS AND TARGET GROUPS

In the NEU.rind project, a simple and practicable tool is being developed to evaluate life cycle assessments and eco-efficiency. Key figures such as greenhouse gas, ammonia or nitrate emissions, food conversion efficiency and preservation of natural diversity are analyzed and evaluated. These are calculated per kilogram of milk, per hectare of land used and per euro of contribution margin.

1. Development of a digital farm assistant for assessing sustainability, efficiency and environmental impacts on dairy farms.
2. User-friendly application with little effort for additional data collection by embedding the application in the Cattle Data Network (Rinderdatenverbund-RDV)
3. Meaningful and easy-to-understand key figures on important sustainability issues, efficiency and environmental effects
4. Development of farm-specific measures for improvements
5. Development of a system for farm comparisons to estimate improvement potentials (benchmarking)
6. Synergies with existing individual farm documentation and calculation obligations within the framework of the support system (for example Common Agricultural Policy (CAP))
7. Development of improved marketing profiles
8. Compilation of up-to-date facts and figures for representative farms in Austria
9. Development of a concept for the dissemination of the findings of the project

Target groups of the EIP-project are:

- ➔ Austrian farmers: A digital tool for assessing sustainability, efficiency and environmental impacts is provided. Benchmarking allows the estimation of improvement potentials and individual farm-specific recommendations for action. Through their implementation an improvement of the sustainability of the farm and thus of cattle farming in Austria is achieved.
- ➔ Dairy sector: The well-founded indicators on eco-efficiency developed in the project bring added value for the marketing and international positioning of the Austrian dairy sector..
- ➔ Society: Reduction of emissions and improvement of the environmental impacts and sustainability of farms by identifying farm-specific potential for improvement, providing advice based on this and implementing measures to improve the environmental impacts and sustainability while at the same time increasing competitiveness and profitability.

RESULTS AND EFFECTS

The EIP-AGRI project provides farmers throughout Austria with digital tools for assessing sustainability, efficiency and environmental impacts for farm-specific management. By using existing data, supplemented by parameters that are essential for environmental and sustainability assessment, meaningful key figures that are easy to understand can be generated for the individual farm. Due to the low data input effort and the trust in the *Cattle Data Network* (RDV), a broad participation in the project can be expected. The development of a system for farm comparisons (benchmarking) based on representative farms allows the estimation of improvement potentials in comparison to other farms. By identifying farm-specific potential recommendations and providing advice based on these, it should be possible to implement measures to improve environmental impact and sustainability while at the same time increasing competitiveness and economic efficiency. The proof of the implementation of various measures is also intended to strengthen the trust and appreciation of consumers in the Austrian cattle industry.

PROJECT MANAGEMENT

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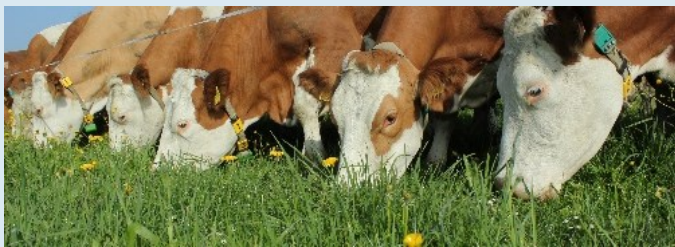
COOPERATION BETWEEN

- 6 austrian dairy farms
- Rinderzucht AUSTRIA
- Chamber of Agriculture Austria and Lower Austria
- LKV Austria, Austrian provincial control associations

PARTNER


- University of Natural Resources and Life Sciences Vienna
- Agricultural Research and Education Centre Raumberg-Gumpenstein
- ZuchtData EDV-Dienstleistungen GmbH


COOPERATION with BML Federal Environmental Agency, AMA, VOM, Austrian dairies (Berglandmilch eGen, NÖM AG, SalzburgMilch GmbH, Obersteirische Molkerei eGen, ARGE Heumilch Österreich, Pinzgau Milch Produktions GmbH, Kärntnermilch reg. Gen.m.b.H., Vorarlberg Milch eGen)




ANIMAL
WELFARE AND
HEALTH

2022-
2024
PROJECT
PERIOD

PROJECT AREA IN:
 Lower Austria,
Upper Austria,
Salzburg, Styria,
Tyrol

ONLINE
 www.zukunftsraumland.at/projekte/3138

New ways of pasture management under difficult conditions (Pasture Innovations)

Operational Group *Pasture-innovations*

ABSTRACT

For some years now, the interest in pasture farming has been steadily increasing. This is due to new legal requirements, market demands and social pressure, among other factors. Due to the new grazing requirements, many organic farms are forced to take areas into grazing that are only conditionally suitable for grazing. The project Pasture Innovations investigates on practical farms which plant stocks and grazing strategies are suitable for grazing small areas with a higher number of animals, hat pastures and steep areas, areas in dryland and for reducing parasite pressure on sheep and goat pastures. Furthermore, it will be determined which aspects (management, economic efficiency) are decisive for the grazing of calf-bearing dairy cows. The findings from the project are to support the farms in securing the yield capacity of the pasture herds and thus the profitability of their farms in the long term.

STARTING POSITION

Due to the trend towards more grazing and stricter legal requirements for organic farms, pastures close to farms will be grazed more intensively in the future. It can also be assumed that areas on marginal land such as hay meadows, steep slopes and arable land will be increasingly used for grazing. The effects of climate change with increased heat and dry periods make grassland management on ruminant farms even more difficult. Especially under difficult farm conditions, sustainable and innovative solutions are needed that build on current knowledge but also go beyond it. For example, there are currently no seed mixtures on the market for areas that are heavily grazed, for areas in dry regions or with antiparasitic plants. There is also no experience of how these can be established on the land and used through grazing. Farms with small ruminants also face major challenges in grazing. Sheep and goats show hypersensitivity to grazing parasites such as the red stomach worm. Recommendations are urgently needed on how to allow animals to graze without adverse health effects. Future-oriented pasture management also requires knowledge on the use of new techniques, such as modern fencing, water points and shade structures. Increasingly, dairy farms are implementing cow-based rearing of calves. This type of calf rearing, which is close to nature, is increasingly becoming the focus of the market. For this form of rearing, only a few advisory documents and scientific findings on housing are available. There is no accumulated experience on pasture rearing of calf-bearing dairy cows. In order to find a broader acceptance for this new approach to calf rearing, further knowledge on pasture management and economic benefits is needed. An exchange in a stable school and the collection of practical knowledge on best practice farms should generate new knowledge in addition to the findings from the scientifically accompanied practical trials and be available for practical farms and for consultation.

TARGETS AND TARGET GROUPS

- ➔ Bring new knowledge about pasture management under difficult conditions into practice.
- ➔ Maintain and build up the yield capacity of grazing herds in the long term.
- ➔ Promote the grazing of small ruminants and calf-bearing dairy cows.
- ➔ Facilitate pasture management with new technical solutions.
- ➔ Network farmers and advisors in order to learn from each other.

The main target groups of the EIP-AGRI project are farm managers, advisors, multipliers, also students at agricultural colleges..

KEY MEASURES

The main measures in the EIP-AGRI project are:

1. Testing of special seed mixtures with two establishment methods each on practical farms (on small, heavily grazed areas in the dry region and in a region with higher precipitation).
2. Establishment of a plot trial on a practical farm with simulated mob grazing in dryland and a practical trial on pasture management on arable land
3. Survey of the actual stock on five farms with pastures and steep slopes, development and implementation of site-adapted grazing concepts, evaluation of the development of the plant stock.
4. Survey and presentation of new technical solutions to facilitate pasture management
5. Initiation of a stable school with practical farms on the topic of "moving pasture"
6. Testing of special seed mixtures with antiparasitic plants on small ruminant pastures (sheep and goats), grazing system "top grazing"
7. Survey of practical knowledge on grazing on small ruminant farms
8. Online-Erhebung
9. Online survey of experiences with cow-based calf rearing (with and without pasture), identification of possible problem areas and exact examination of a problem area on a practical farm, including a survey of the economic efficiency of these forms of rearing.
10. Comparison of economic figures for cow-based calf rearing with pasture with conventional rearing systems
11. Production of technical brochures and a technical video (technology) on the individual measures and establishment of a separate project portal on the BIO AUSTRIA website.
12. Workshops on pilot farms, knowledge transfer to practitioners and multipliers.

RESULTS AND EFFECTS

Already in the first phase of the project, there was intensive cooperation between practical companies, advisory staff and research. The following results can be expected with the implementation of the individual project phases:

- ➔ Recommendations on how grazing can be implemented even under difficult conditions.
- ➔ The proportion of animals on pasture and the demand for milk and meat from grazing animals can be increased through new knowledge.
- ➔ New findings on the pasturing of calf-bearing dairy cows are pushing this animal-friendly form of calf rearing.
- ➔ New mixture components can maintain the yield capacity of the land in the long term and prevent damage to grassland.
- ➔ The intensive transfer of knowledge during excursions and conferences links practical farms and increases interest in pasture management.

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COOPERATION BETWEEN

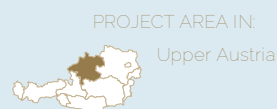
- farmers
- BIO AUSTRIA Federal Association and Provincial Associations
- Austrian Federal and Provincial Chambers of Agriculture
- Austrian Federal Association for Sheep and Goats
- Studia Schlierbach

PARTNER

- HBLFA Raumberg-Gumpenstein
- Raumberg-Gumpenstein-Research&Development Raumberg-Gumpenstein
- University of Natural Resources and Applied Life Sciences Vienna
- University of Veterinary Medicine Vienna
- Raiffeisen Ware Austria und Saatzbau Kärnten



2022 –
2024
PROJECT
PERIOD



Added value mountain farming - adding value to ecosystem services

Operational Group *Value added mountain farming*

ABSTRACT

The Upper Austria National Park *Kalkalpen* region with its 22 municipalities is characterized by an extensive and very close-to-nature form of mountain agriculture. The area-adapted production in the field of grassland farming with cattle husbandry, developed over centuries, promotes essential ecosystem services that represent an important basis of life for society inside and outside the region. However, these services are seldom compensated in a way that covers costs, and the continued existence of close-to-nature and small-scale mountain agriculture is not sustainably ensured.

In the EIP-AGRI project, scientifically and agriculturally committed people work together to highlight the ecosystem services of mountain agriculture in the region better than before with the help of an innovative approach and to exploit them profitably. For this purpose, the services are mapped, assessed and marketable business models are developed, above all in the form of strategic partnerships with the economy. This should contribute to the generation of alternative income for farms.

STARTING POSITION

In recent decades, there have been undesirable developments in mountain agriculture due to the general situation in the agricultural sector. These are:

- ➔ An increasing decline in the cultivation of grassland, especially on steep terrain.
- ➔ Decreasing income for farms from agricultural production and thus increasing dependence on public subsidies (CAP reform).
- ➔ An increasing workload on farms due to the need to establish additional sources of income or take disproportionate steps towards growth

This scenario threatens both mountain agriculture directly and the development of other economic sectors in the entire region (for example tourism). Therefore, the aim is to actively counteract these developments by sustainably strengthening mountain agriculture through innovative marketing models. The EIP-AGRI Projekt *Value added mountain farming* intends to make a positive contribution to the further development of the sector.

TARGETS AND TARGET GROUPS

- ➔ Better economic protection of sustainable, ecological mountain agriculture
- ➔ Survey and assessment of ecosystem services of mountain agriculture in the region
- ➔ Systematically explore needs assessments and opportunities to compensate for ecosystem services.
- ➔ Design of marketing options for ecosystem services, including the development, testing and evaluation of innovative business models for ecosystem services in mountain agriculture.
- ➔ Knowledge transfer - information and awareness raising on ecosystem services and ways to valorize them.

KEY MEASURES

The EIP-AGRI project is structured in following three phases

Phase I: 'Mapping': Development of a model for the qualitative description of ecosystem services, the sub-aspects, delimitations and interrelationships. Definition of a set of indicators and necessary measures to assess ecosystem services. A field study is carried out with about 30 farms to survey ecosystem services. The evaluation is based on farm and regional level.

Phase II: 'Assessing': Quantitative and qualitative surveys measure the service potential on the farms. For this purpose, the added values of farms in terms of environmental impacts and income are quantified through the provision of ecosystem services. Furthermore, agricultural economic calculations are made on the costs of provision and research is carried out on possible marketing opportunities and requirements in the economic sector with regard to future framework conditions.

Phase III: 'Marketing': Application of a multi-stage survey procedure with relevant stakeholders. On this basis, needs are identified and a catalogue of criteria for marketable new business models is developed. These are developed as prototypes for different branches of business and subjected to an acceptance analysis.

RESULTS AND EFFECTS

- ➔ Presentation of a scientifically sound analysis of the relevant ecosystem services in the environment of mountain agriculture in the national park region as well as a data-based assessment of the ecosystem services.
- ➔ Development of practicable indicators, tools and procedures for the operational recording of relevant ecosystem services.
- ➔ Performance potential of the farms and scaling the findings to the regional level.
- ➔ Provisioning costs for ecosystem services of mountain agriculture in regions such as the Upper Austria National Park *Kalkalpen* region.
- ➔ Theoretical groundwork on consumer/target group-suitable communication/mediation as a basis for promising marketing of the overall package of ecosystem services.
- ➔ Development of potentially marketable business models including a catalogue of criteria on the requirements of the target groups.
- ➔ Dissemination on a specially developed platform with marketing opportunities.
- ➔ Potential income increases for participating farmers.
- ➔ Further use/exploitation of the acquired knowledge, especially for teaching and further education with the scientific partners.
- ➔ Recommendations for action on the transferability of the approach or the results to similarly structured regions.

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COOPERATION BETWEEN

- Farmers from the region - Verein nahtur
- LK Upper Austria, District Chamber of Farmers Kirchdorf - Steyr
- STUDIA - Study Centre for International Analyses
- eb&p Umweltbüro GmbH Klagenfurt
- ÖKL - Austrian Board of Trustees for Agricultural Engineering and Rural Development
- HBLFA Raumberg - Gumpenstein Research&Development
- BIO Austria
- University of Natural Resources and Applied Life Sciences, Institute for Agricultural and Forestry Economics
- FH OÖ - F&E GmbH, Agricultural Management and Innovations

PARTNER

- Regional Forum Steyr - Kirchdorf
- LEADER Region Upper Austria National Park *Kalkalpen*
- WKO Upper Austrian Chamber of Commerce, district offices Steyr and Kirchdorf
- Ennstal Cultural Landscape Management Association
- Upper Austrian Provincial Government, Department of Nature Conservation
- AGRO Advertising GmbH
- Community of Steinbach an der Steyr

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EIP-AGRI projects can be clustered in different ways. Two clear classifications are presented below:

- 1) Classification according to the time of call
- 2) Classification according to the content focus

Classification according to time of Call:

Projects from the 1 st Call	4	Projects from the 4 th Call	46
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Wireworm	8	Cycles	50
Further development of organic winter vegetables	10	Organic maize farming	52
Efficiency check	12	Agroforestry Austria	54
Graduated grassland farming	14	SoilSaveWeeding	56
BIOBO	16	Water-saving organic arable farming	58
Organic dock control	18	Garlic	60
		Tailored flower strips	62
		Mountain dairy cattle	64
Projects from the 2 nd Call	20	Income stabilisation	66
GIS-ELA	22	Sugar beet cultivation	68
Healthy fattening pigs	24	FrostStrat	70
Extended suckling period	26		
KLAUEN-Q-WOHL	28	Projects of the 5 th Call	72
Catch crops	30	Strip cropping	73
SaLuT	32	Market gardening	75
		PhosVer	77
Projects from the 3 rd Call	34	Soil.Biodiversity	79
Reine Lungau	36	Alternative protein sources	81
KEFStrat	38	Austrian organic greening seeds	83
OptEro	40	NEU.rind	85
Agriculture Gutshof Heidensand	42	Pasture-innovations	87
Larval breeding	44	Value added mountain farming	89

Classification according to content focus:

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