

# Shaping the agriculture of the future

Research. Develop. Advise.



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Innovations such as the MulchTec Planter were on display at the 2019 “Öko-Feldtage” (organic field days) in Kassel. The event, organised by FiBL Germany, attracted some 11,000 visitors. FiBL is involved in similar format events in other countries: the “Biofeldtage” (organic field days) in Austria with roughly 8,000 participants, the “Bio-Ackerbautag” (organic arable farming day) in Switzerland with 2,000 and the “Bio-Viehtag” (organic livestock day) with around 1,000 visitors.

# Organic agriculture in 2030 – casting an eye to the future

What do we need to do now in research and extension to ensure that in 2030 organic farming continues to help ensure food security worldwide and fully meets the requirements of sustainable agriculture? The Research Institute of Organic Agriculture FiBL addresses this question and tackles this challenge. Not only do we develop relevant visions but together with practitioners we also turn visions into reality through research, innovation and advisory services. FiBL therefore sees itself as an engine of innovation for sustainable food systems and agroecology and is internationally sought-after as a partner in this field.

As part of its “Farm to Fork” strategy, the EU aims at 25 per cent of agricultural land having transitioned to organic management by 2030. This is an important target, and a highly ambitious one: currently the organic share of total agricultural land is 8.1 per cent in the EU and 16.5 per cent in Switzerland. FiBL very much welcomes this objective and is highly committed to doing its part to achieve it. Increasing demand through sales promotion measures and the procurement of sustainable food for communal catering in public institutions may prove particularly effective

in this respect. It is important that agricultural and food policies also set the right course. Organic Action Plans have proven useful in this regard: In recent years FiBL has been strongly involved in projects aimed at promoting organic agriculture by means of action plans. By co-developing and assisting such projects, by evaluating their impact and by conducting organic research at the highest international level, FiBL has been making an important contribution, not only to achieving the EU's 25 per cent target, but also to sustainable agriculture worldwide.

This activity report reflects the breadth of FiBL's work: from project examples in the areas of soil, crop plants and livestock, to topics in food processing, sustainability assessments of food systems, policy and technical advice, to the pillars of education, knowledge transfer and agroecology. We present our work, which already addresses the challenges of organic agriculture in 2030, in an informative yet enjoyable format. We hope that all our readers will enjoy discovering new and perhaps surprising aspects of FiBL's work. We would like to take this opportunity to thank all our sponsors and patrons. Without them many of FiBL's projects would not be possible.



**Directors of FiBL Switzerland**  
From left to right: Marc Schärer, Knut Schmidtke, Lucius Tamm

*M. Schärer Knut Schmidtke Lucius Tamm*

## Six FiBLs, one idea

The FiBL Research Institutes of Organic Agriculture are non-governmental civil society institutions or non-profit enterprises operating as foundations or associations in a number of European countries. While each of the institutes is legally autonomous, they see themselves as part of the FiBL Group, working closely together in partnership.

The FiBL Group is united by the objective to continuously advance organic agriculture along the entire value chain of the food system through research, knowledge transfer and advisory services, practice-oriented projects and public relations work. Together with practitioner partners, other research and advisory institutions, public bodies and non-governmental organisations in Europe and on other continents, FiBL works on projects aimed at safeguarding both global food security and the natural resource base on which life depends by means of organic agriculture and sustainable food systems. The six FiBLs are committed to responsibility for people, animals and the environment, and to transparency and participation both internally and externally. For FiBL, respect for colleagues, cooperation partners and people in general as well as democratic decision-making are fundamental prerequisites of successful and globally recognised work.

The FiBL Group currently includes FiBL Switzerland (established in 1973), FiBL Germany (2001), FiBL Austria (2004), ÖMKi (Hungarian Research Institute of Organic Agriculture, 2011) and FiBL France (2017) as well as FiBL Europe (2017) which is jointly supported by the five national institutes.



**Director of FiBL Germany**  
Robert Hermanowski

*Robert Hermanowski*



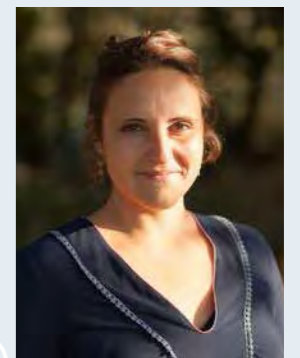
**Director of FiBL Europe**  
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**Director of FiBL Austria**  
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*Andreas Kranzler*



**Director of FiBL France**  
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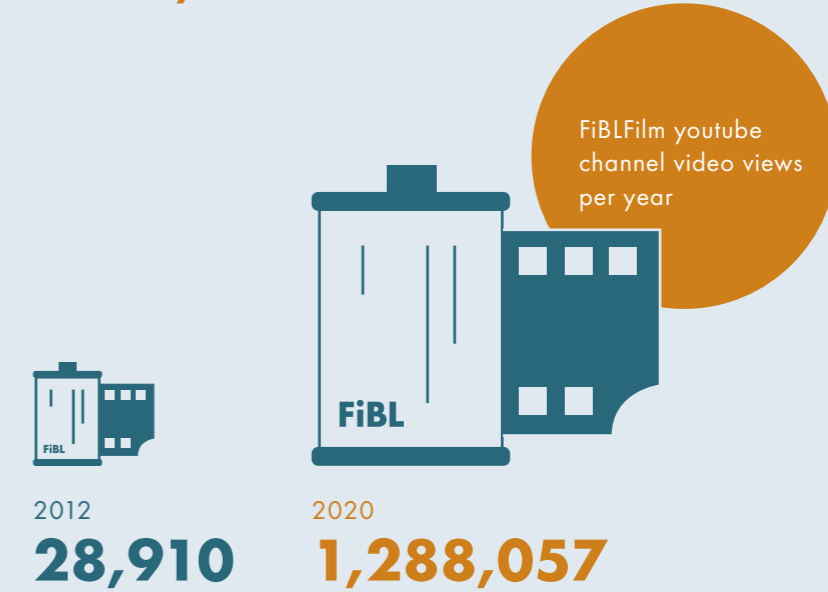
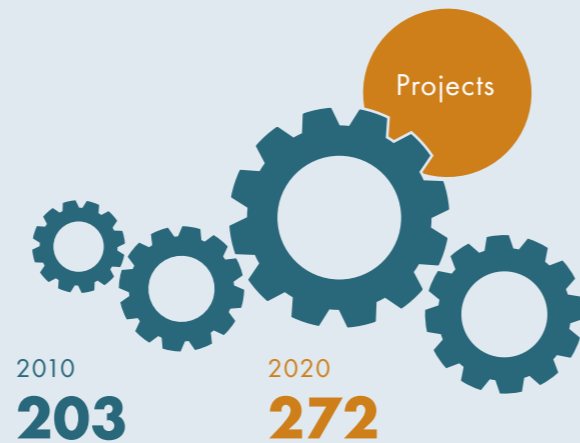
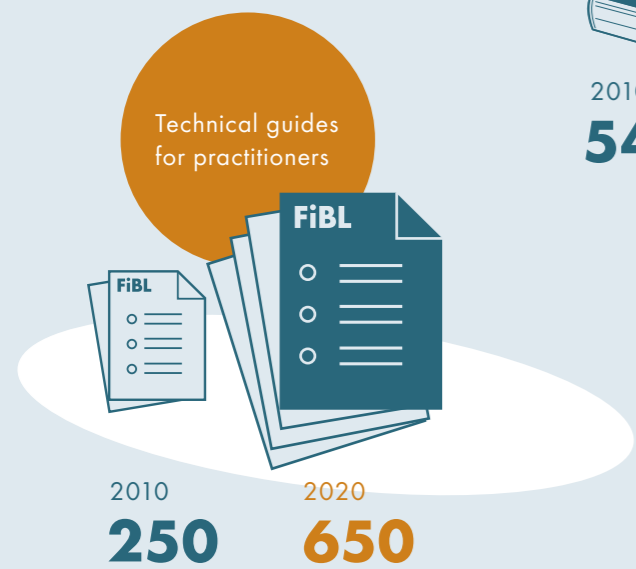
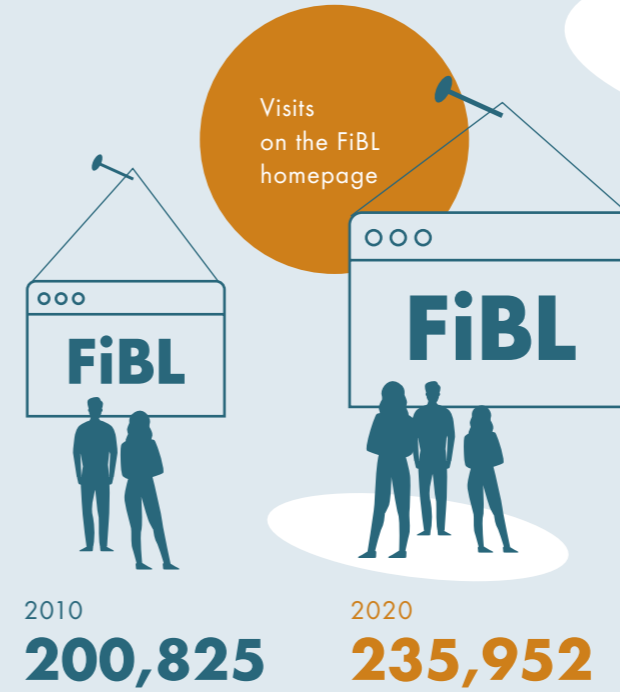
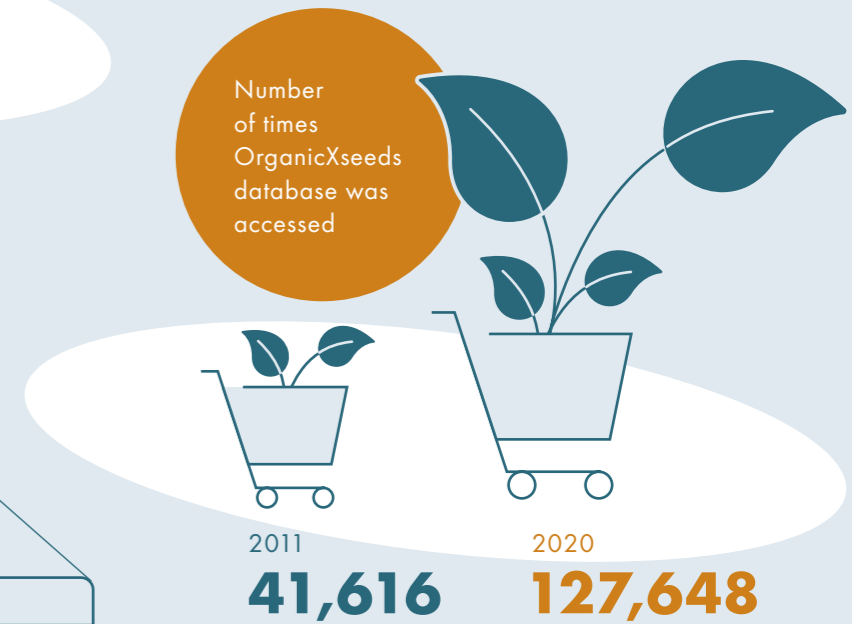
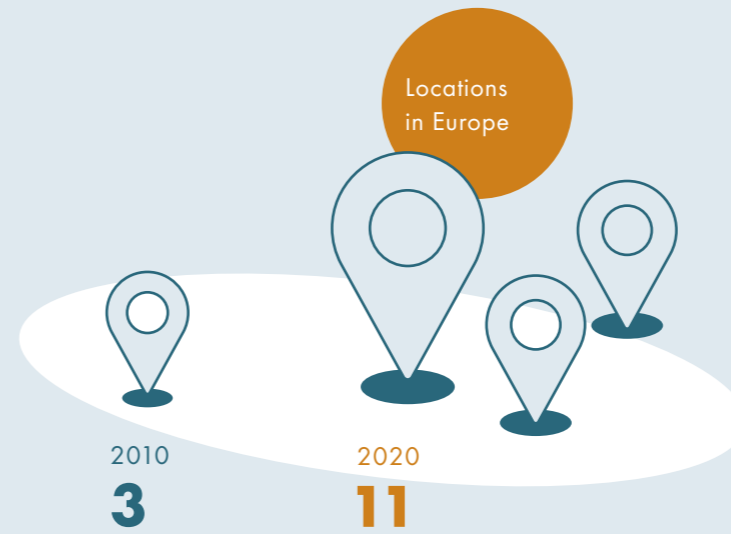
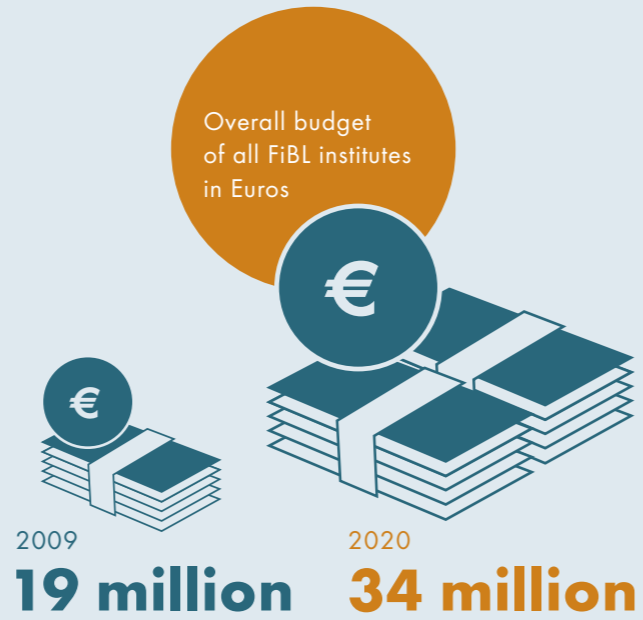
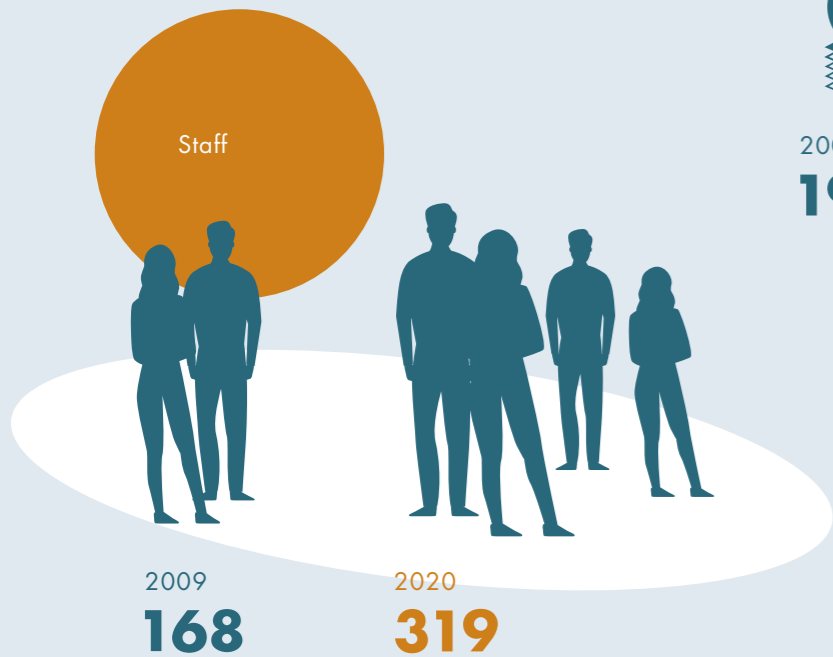
*Florence Arsonneau*



**Director of ÖMKi Hungary**  
Dóra Drexler

*Dóra Drexler*

# FiBL in figures



# Highlights – a timeline



## 2020

- 1 December**  
**Fertiliser from the sea / EU**  
The new Sea2Land project is concerned with the recycling of nutrients from the sea for use as fertiliser.
- 2 December**  
**Action plan for more organics in the Free State of Saxony / DE**  
Working together with an agricultural marketing agency, the aim is to strengthen regional added value and organic agriculture.
- 3 December**  
**Success for FiBL's sister institute in Hungary / ÖMKi**  
In 2019 and 2020, ÖMKi is involved in seven new international research projects in receipt of EU funding.
- 4 November**  
**Paving the way for agroecology in Europe / EU**  
The aim of the ALL-Ready project is to prepare a framework for a future European network of Living Labs and research infrastructure under the name of AgroEcoLLNet, which is to

- enable the transition to agroecology across Europe.
- 5 October**  
**ABIM goes virtual / CH**  
The Annual Biocontrol Industry Meeting ABIM in Basel is the biggest international event in the field of organic plant protection products. In 2020 it is held purely as a virtual congress for the first time, and successfully so. FiBL organises the event together with the International Biocontrol Manufacturers Association IBMA.
- 6 October**  
**Strategy for FiBL Germany to the year 2025 / DE**  
Ten strategic guidelines are defined for FiBL Germany up to the year 2025. These include the establishment of a new Sustainable Farming Systems division and the strengthening of research.
- 7 September**  
**Opening ceremony at the R & D livestock housing complex / CH**  
Following a four-year period of

- planning and construction, an opening ceremony is held for the new farm buildings dedicated to high-tech agricultural research.
- September**  
**FiBL at the Tech & Bio fair / FR**  
FiBL presents research on parasite control in cattle, goat and sheep pastures at the Tech & Bio fair Elevage.
- 8 September**  
**SustainSAHEL commences EU / CH / FR**  
The project aims to improve climate change resilience and the intensification potential of smallholder farming systems through scalable innovations in crop, shrub and livestock integration (CSL systems).
- 9 August**  
**DemoNetErBo extended to 2021 / DE**  
The pea/bean demonstration network known as DemoNetErBo has achieved so much that it is extended once again, now for a sixth year. FiBL is tasked with knowledge transfer and public relations.

- 10 July**  
**Dairy calves allowed to suckle CH**  
Until now, dairy farms were under obligation to supply the "entire milking". Thanks to a change in legislation, the way has now been cleared for milk sales from single or multiple suckler calf rearing enterprises. FiBL has been studying this animal-friendly but demanding form of husbandry for many years and offers qualified advice.
- 11 July**  
**Launch of Fokus Tierwohl network DE**  
Together with partners, FiBL launches the nationwide "Fokus Tierwohl" (focus on animal welfare) network. It supports livestock farmers in Germany in further improving animal welfare and environmental protection as well as quality in production.
- 12 July**  
**Bio2030 project commences / AT**  
FiBL will analyse the current situation of organic agriculture and organic food production in Austria and formulate

- targeted measures to contribute to a balanced advancement of organic agriculture by 2030.
- 13 July**  
**Factsheet: Climate impact of organic soil management / CH**  
The factsheet shows what organic agriculture can bring to the table when it comes to helping the farming sector adapt to climate change.
- 14 May**  
**Business benchmarking for farm shops / DE**  
Using the KennDi online tool and the associated handbook, farm shops can compare their business data to those of other operators. FiBL Germany is significantly involved in the development.
- 15 March**  
**Corona crisis management plan EU / CH / DE / AT / FR / ÖMKi**  
Just like all businesses around the globe, FiBL is affected by Covid-19. The great solidarity and flexibility shown by all employees brings about creative solutions so that FiBL is able to

- successfully continue the work on its projects.
- 16 February**  
**Bionet vegetable growers' conference / AT**  
Market gardens produce a great variety of vegetables on a small land base and are attracting a great deal of interest. This is also evidenced by the 150 visitors who attend the "Bionet Gemüsetagung 2020" (Bionet vegetable growers' conference 2020). The event, organised by FiBL Austria, is devoted entirely to market gardening and provides important impetus for networking and knowledge exchange between interested stakeholders from research, extension and practice.
- 17 January**  
**Relaunch of the FiBL website EU / CH / DE / AT / FR / ÖMKi**  
The redesigned FiBL website enters 2020 with a fresh look and a more clearly laid out structure.



# 2019

**18 December**  
**Research award for comparison of cropping systems in Bolivia, India and Kenya / CH**

FiBL's SysCom long-term trials demonstrate the benefits of organic agriculture for smallholders in the tropics. The Swiss Forum for International Agricultural Research SFIAR honours the SysCom team with its research award.

**19 December**  
**Education for a future-proof farming and food sector / CH**

Outstanding specialists are needed to tackle the future challenges faced by the agri-food sector. Their education is the joint concern of the Zurich University of Applied Sciences ZHAW and FiBL in the Agrofood Systems specialisation as part of the Environment and Natural Resources MSC programme.

**20 November**  
**Support for advisors / EU**

The i2connect project commences. It aims to build the capabilities of advisors, thus enabling them to support and facilitate interactive innovation processes in response to the multiple challenges faced by the

European agriculture and forestry sectors.

**21 November**  
**New animal welfare unit / DE**

A new work priority is established at FiBL Germany, with the goal of improving animal welfare and animal health in livestock housing.

**22 November**  
**Food Systems Caravan in West Africa / CH**

A "caravan" organised by FiBL travels through Mali, Burkina Faso, Ghana, Benin and Nigeria for 60 days. The team discusses improvements in food security and agroecology with smallholder families, advisors and representatives from the policy arena and the research and business communities.

**23 October**  
**Commencement of agroforestry project in Austria / AT**

For farm holdings, agroforestry systems offer opportunities that are interesting from both the economic and ecological point of view. In an EIP-AGRI project, FiBL Austria promotes the establishment of an agroforestry network, supervises

six pilot farms, and processes the expertise gained with this forward-looking management method with a view to advising other interested farms.

**24 September**  
**Budapest: Conference on crop diversification / ÖMKi**

The first European Conference on Crop Diversification is organised successfully in Budapest and attracts more than 200 participants from 25 countries.

**25 September**  
**FiBL at the Tech & Bio fair / FR**

FiBL France has a stand at the Tech & Bio fair. The fair is visited by 20,000 people, 60 per cent of whom are farmers.

**26 September**  
**Support for organic breeding / EU**

The Engagement.Biobreeding initiative seeks to enable the organic sector to make targeted investments in breeding by setting up partnership-based engagement along the entire value chain.

**27 August**  
**Cotton exhibition / CH**

The Bio & Fair cotton exhibition from seed to T-shirt organised by FiBL is



on display at the Botanic Garden of the University of Zurich.

**28 July**  
**Major event: Organic Field Days / DE**

The second nationwide Bio-Feldtage (Organic Field Days) at the Hessian state-owned Frankenhausen estate are once again a great success, attracting 350 exhibitors and more than 11,000 visitors.

**29 July**  
**More on-farm research in Hungary / ÖMKi**

The project "Further development of the national on-farm participatory research network for a sustainable and competitive agricultural sector in Hungary" commences.

**30 May**  
**New FiBL journal / DE**

Publication of the first issue of BioTOPP. The journal of organic agriculture is independent of sector associations and has a practical focus. It is published by the German Agricultural Society (DLG) and FiBL Germany.

**31 May**  
**World Congress on Agroforestry / FR**

FiBL participates in the Fourth World Congress on Agroforestry in Montpellier. FiBL France presents its project on sheep in vineyards.

**32 May**  
**New greenhouse opened / CH**

The 600 sqm greenhouse, equipped with state-of-the-art air-conditioning technology, will be used in future to advance organic plant breeding efforts. Natural substances and plant extracts for organic plant protection will also be trialled here.

**33 April**  
**Organic certified feed with vitamin B2 developed / DE**

The GM-free organic poultry feed EcoVit R with a high riboflavin content enters the marketplace. The production process was developed jointly by FiBL Germany and project partners.

**34 March**  
**Development of value chains in rural areas / DE**

A new work priority at FiBL Germany is concerned with the strategic and

practice-oriented development of value chains; the aim is to strengthen rural structures and regionalise economic cycles.

**35 March**  
**Smallholders organised in groups have an advantage / CH**

A FiBL study shows that smallholders who are organised in groups reduce their cost of certification, enjoy better market access and increase the quality of their products through knowledge exchange.

**36 February**  
**NutriNet network launched / DE**

In the NutriNet competence and practice research network for the further development of nutrient management in organic agriculture, FiBL Germany is in charge of knowledge transfer and public relations.

## Promoting domestic production over imported foods

Aargau is the first canton in German-speaking Switzerland to promote organic farming by means of an action plan. The plan stimulates entrepreneurial initiative and supports small and medium-sized enterprises in their continuous improvement of performance and competitiveness – coordinated by FiBL.

The development of organic action plans throughout Europe has been triggered by the growing markets for organic food. The intended beneficiaries are local farmers, processors and traders.

The objectives the Organic Action Plan for Aargau aims to achieve by 2021 include an increase in the agricultural area under organic management in the

canton to 14 per cent (from 9 per cent in 2016) and a greater level of processing of organic products directly on farms, in the catering sector and in other small and medium-sized enterprises. The overall turnover in organic products is to be increased by 10 per cent. In this context it is important to communicate well the dual environmental benefit of “regional organic”.

### New old niche crop: Waldstaudenroggen – a relict rye cultivar

The “Waldstaudenroggen” sub-project has been particularly successful. A regional processor was found – the innovative Fredy’s bakery in Baden – who now sells bread rolls made with the relict rye into the retail trade. Similarly, the Neuhof bakery in Schlieren now produces a sourdough bread using only Waldstaudenroggen. Moreover, farmer Daniel Böhler gets his rye polished and sells it directly from the farm as “risotto”, which is well received by the catering trade, farm shops and processors. More farmers and processors are being sought.

In the canton of Aargau, the action plan has set numerous other projects in motion. Similarly, in the canton of Bern the “all aboard the organic train” call has been heard. When the target of a 2000 ha increase in the area under organic management by 2020 was exceeded, the “Bern Organic Offensive 2025” commenced with a focus on the development of outlet markets.

Robert Obrist, FiBL Switzerland

### Organic Action Plan for Aargau

Website: [www.interregeurope.eu/smeorganics](http://www.interregeurope.eu/smeorganics)

Contact: [robert.obrist@fibl.org](mailto:robert.obrist@fibl.org)

Funding: Swiss State Secretariat for Economic Affairs SECO

Partners: Liebegg Agricultural Centre (Landwirtschaftliches Zentrum Liebegg LZL), Canton of Aargau



Farmer Daniel Böhler with Waldstaudenroggen rye. This relict grain grows to a height of more than two metres.

Burgenland’s aim:

50% organic  
by 2027



Susanne Kummer, Richard Petrasek and other staff at FiBL Austria have provided start-up assistance for Burgenland’s move towards all-organic farming.

## The state of Burgenland goes organic

Burgenland is 160 kilometres long and at its narrowest point five kilometres wide, so it is not especially big. However, on the organic front Austria’s most easterly state has big plans: in 2018 the Burgenland state assembly approved nothing less than a comprehensive transition to organic farming – supported by FiBL.

Besides the ambitious target of increasing the proportion of land under organic production to 50 per cent by 2027, Burgenland also intends to put in place measures relating to the institutional environment and the food value chain. FiBL Austria was commissioned to support this process by producing a feasibility study and providing scientific assistance with implementation.

The project was completed in May 2020. It concluded that farming 50 per cent of the land organically in Burgenland is entirely achievable, provided that the growth rates of recent years continue. However, maintaining the economic appeal of organic farming for the future requires a raft of ongoing actions in organic market development, as well as in training and extension services.

### Promoting produce, raising public awareness

On the basis of surveys and evaluations carried out as part of the project, FiBL Austria defined targets and development paths towards an organic Burgenland. Particular emphasis was placed on the following future fields of action: expanding the product range with the aid of extension services; product development; public relations work and information for consumers; implementing a greening strategy for the whole of agriculture; strengthening the regional organic value chain; developing organic processing;

improving cooperation and networking all along the value chain; and raising public awareness.

### All-round positive impacts

In addition, the study assessed the impacts that the expansion of organic production from 33.8 per cent of agricultural land in 2018 to 50 per cent in 2027 would have. The results are encouraging, with improvements expected in all the areas examined: a 5.8 per cent fall in greenhouse gas emissions, 5.5 per cent less nitrates entering groundwater, significant potential for reducing pesticide use on an additional 28,200 hectares of organic land, as well as a 5.2 per cent increase in profit margins.

In 2019 Burgenland had already introduced a grant for converting to organic production, which to date (September 2020) has been claimed by 119 farming businesses. The proportion of organic produce in community catering in regional government institutions has increased markedly, and state schools and day nurseries are to follow. The move towards an organic Burgenland has begun.

Elisabeth Klingbacher, FiBL Austria

### Burgenland goes organic

Contact: [susanne.kummer@fibl.org](mailto:susanne.kummer@fibl.org)

Funding: Office of the Burgenland state government

Partner: Bio Austria Burgenland

## PhD student unveils soil secrets

Soils generate our food, cleanse our drinking water and degrade organic toxins. The degree to which soils can provide these services is strongly dependent on their quality. For her doctoral thesis, Giulia Bongiorno uses next-generation sequencing and spectroscopy methods to demonstrate how soil quality can be measured and how it is impacted by agriculture.

Soil quality is normally assessed based on characteristics such as nutrient content, humus content and aggregate structure. "However, one crucial bit of information had so far been missing and that is the quantity and activity of microorganisms such as fungi, algae, bacteria and worms. These are indispensable for many functions of a healthy soil," says Giulia Bongiorno, a former FiBL PhD student who currently works as a research scientist at Wageningen University in the Netherlands. Using soil samples from all over Europe, she was able to show in her doctoral thesis how different agricultural practices impact the activity and diversity of the microscopically small helpers that reside in the soil.

Moreover, using the latest statistical methods she determined the significance of different types of carbon. This is important because a particular type of carbon, i.e. labile soil carbon, positively influences the quantity of soil micro-organisms. These, in turn, strengthen numerous soil functions such as disease resistance, aggregate structure, mineralisation and nutrient recycling.

### Reduced tillage fosters labile soil carbon and, in turn, soil life

Giulia Bongiorno's research data show that reduced tillage positively impacts the proportion of this important labile carbon. Moreover, microorganisms were



Using a spectrophotometer, Giulia Bongiorno determined the proportion of different types of soil carbon.

37 per cent more active, more diverse and showed a greater ability to suppress plant diseases. "However, we are not yet able to answer the question as to the ideal level of microorganisms and worms. We do not have the requisite data and reference values to do that," says Giulia Bongiorno. "When we get there we can offer the new tests to farmers with a view to improving soils."

Franziska Hämmerli, FiBL Switzerland

### Measuring and assessing soil quality

Contact: paul.maeder@fibl.org

Project: Interactive Soil Quality Assessment iSQAPER

Funding: EU, Swiss State Secretariat for Education, Research and Innovation SERI

Partners: 25 universities in Europe and China



"It is just not enough to determine the usual chemical parameters in order to assess soil quality. We must include parameters indicative of soil organisms," says FiBL PhD student Giulia Bongiorno.







Reduced soil cultivation goes to a depth of no more than ten centimetres.

## Less is more. Testing reduced tillage under organic conditions

The turn of the millennium brought a change in the agricultural mindset: reduced tillage. Reduced soil cultivation is less hard on soils – and on weeds. Farmers and FiBL have taken on this challenge. They have been testing and developing reduced soil cultivation for the past 20 years.

Ploughing has a long tradition. But while the early ploughs were drawn by humans or animals and could not delve deep into the soil, industrialisation gave rise to heavy machinery with deep working depths. The resulting consequences include furrow compaction, deterioration in soil structure, soil surface erosion and humus decomposition.

The change in mindset first came in the US on foot of massive wind erosion. It gave rise to the direct seeding movement or “no-till”. Is it a solution for everyone? Not really, given that direct seeding calls for herbicides for weed control – a taboo for organic farmers. They did however want to integrate this more careful form of soil cultivation into organic management. At the start of the new millennium, Swiss organic farmers approached FiBL with ideas for how to reduce

their traditional management to very shallow cultivation using modern machinery, and to do so without resorting to herbicides. FiBL took the issue on board and started a long-term trial in Frick, Switzerland, in the autumn of 2002 together with practitioners and advisors. Given that the soil in Frick with its high proportion (40-50 per cent) of clay is not representative of all of Switzerland, FiBL launched a second long-term trial in 2010 on the loess soil of the Schlattthof farm in Aesch in the canton of Basel-Landschaft.

### Long-term trials deliver sought-after data

At this stage a significant archive of samples and data has been compiled. The long-term trials thus provide a platform hugely valuable to FiBL for project partnerships and are a basis for detailed investigations. Both trials were integrated into several major national and European-level projects, giving rise to 28 scientific publications by 2020. A summary of the results from the trial in Frick was published in early 2020 in the renowned scientific journal “Scientific Reports”. Investments into long-term trials are clearly worthwhile. And there is much more to come, given that such trials become ever more interesting the longer they run. Many questions have yet to be answered – on soil physics, humus quality or biodiversity, for instance. The trials have already shed a great deal of light on the impacts of reduced soil cultivation in organic agriculture. They have shown, for example, that crop yields in reduced tilled soils can be expected to be slightly lower than those from ploughed ones. Forage crops however

Left to right: Farmer Dani Böhler, FiBL research scientists Paul Mäder, Maike Krauss, Jeremias Niggli, trial engineer Frédéric Perrochet and advisor Hansueli Dierauer assess the outcome of soil cultivation with a chisel plough. Numerous farmers, researchers and advisors have studied and advanced reduced tillage systems over the years.

**A result of the reduced tillage movement and FiBL's commitment:**

25% reduced tillage in Swiss organic agriculture

yield approximately the same. Under reduced tillage, yields fluctuate more strongly overall. Reduced tillage works best, the better the weather in springtime with its associated soil warming and nitrogen mineralisation. However, a problem that has yet to be solved is the increase in weeds, especially in rhizomatous weeds.

#### Reduced tillage benefits for soils and climate

Reduced tillage is highly beneficial to soil life, giving rise to a greater abundance of earthworms and microorganisms such as mycorrhizal fungi. Another major advantage is the accumulation of humus in the topsoil. Humus is also vital to the cohesion of the soil and aids in erosion control. The more clayey the soil, the greater its potential to store soil organic matter. Reduced soil cultivation scores higher when it comes to soil protection and, in parts, climate protection: the clayey soil of the Frick trial sequestered an additional 700 kg of carbon per hectare compared to its ploughed counterpart.

#### New techniques trialled together with farmers

Tillage systems were not only compared in the long-term trials but also on 15 further agricultural holdings. New machinery as well as techniques, such as ley termination with non-inversion tillage, direct seeding without any soil cultivation as well as a variety of green manures, have been tested in numerous field trials. By sharing their experiences and attending field visits and machinery presentations organised by FiBL, the farmers involved in the network engaged in a continu-



#### Conclusions from trials on reduced tillage

Reduced tillage cultivation

- improves soil life and humus formation compared to ploughing
- delivers climate change mitigation potential
- results on average in a slight reduction in yields and increases weed pressure compared to ploughing
- requires investment in new machinery and adaptation of the crop rotation
- can be well implemented on organic farms with simpler crop rotations and good soil conditions as well as in rather dry regions

ous process of learning from each other and improving their practice. Videos and information leaflets documented and systematised these experiences for practical use. The following conclusions can be drawn from the field trials to date: A strict reduced tillage regime is easier to implement on farms with simpler crop rotations and good soil conditions than on farms producing more specialised crops or those dealing with heavy or stony soils. Farms in drier regions benefit more from reduced tillage. A successful regime generally requires investment in a shallow cultivator, a rotavator or shallow plough and adaptation of the crop rotation. A close eye must be kept on rhizomatous weeds at all times.

#### Funding through direct payments achieved

There has also been a political success: Together with the reduced tillage movement, FiBL advocated for a special "conservation tillage" module as part of the federal-level amendment of the Swiss Ordinance on Direct Payments in Agriculture in 2014. This provision is still in force today and as a result organic farmers have been benefiting from direct payments for reduced tillage to a maximum working depth of ten centimetres as well as from an additional payment for refraining from herbicide use. Thanks to this financial aid and thanks to model farms and newly developed machinery, reduced tillage has now been adopted by some 25 per cent of organic holdings – a great success.

Maike Krauss, Paul Mäder and Hansueli Dierauer, FiBL Switzerland

#### Projects on reduced tillage

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Projects: NUE-Crops, KLINE-AG, BKBA, Tilman-Org, FertilCrop and iSQAPER

Funding: EU, Swiss Federal Office for Agriculture FOAG, Software AG Stiftung, Stiftung zur Pflege von Mensch, Mitwelt und Erde, Edith Maryon Foundation, Coop Sustainability Fund, Bio Suisse, Fondation Sur-la-Croix



For ten years FiBL scientist Henryk Luka trialled the flowering strips in cabbage fields together with farmers like organic vegetable grower Christian Rathgeb (left).

## Flowers in the cabbage patch are good for beneficials

**In order to support beneficial insects and control pests FiBL developed the idea of integrating flowers into cabbage production. Ten years of research demonstrate that this combination is not just pretty but harbours great potential.**

FiBL scientist Henryk Luka wanted to do something to promote beneficial insects. He developed the idea of planting flowers within and around vegetable producers' fields. "This provides more vital space for insects, including many beneficial insects that help control pest species," says Henryk Luka. These habitats support a wide spectrum of insects such as wild bees, hover flies and carabid beetles.

Ten years and several master's and doctoral theses later the results obtained by the FiBL team show the following: The establishment of flowering strips for beneficials allows for the use of broad-spectrum bio-insecticides such as Spinosad to be halved and replaced by substances that have little to no effect on beneficials. The number of beneficial insects in the cabbage crop increased by 45 per cent while the number of pest larvae declined by one third. An even greater decline of pest larvae, by two thirds, occurred

when not only flowering strips were established but, in addition, cornflowers were planted into the rows of cabbage and no Spinosad was applied at all. The latter technique even resulted in an 18 per cent weight increase in the heads of cabbage.

The trialled and tested seed mix has been made commercially available under the name of "Nützlinge Kohlanbau" (beneficials for cabbage production). The flowering strips are recognised as ecological focus areas and eligible for direct payments.

Franziska Hämmerli, FiBL Switzerland

#### Beneficials instead of pesticides

Contact: [henryk.luka@fibl.org](mailto:henryk.luka@fibl.org)

Funding: Coop Sustainability Fund, Swiss Federal Office for Agriculture FOAG, Federal Office for the Environment FOEN, Bristol-Stiftung, Ernst Göhner Stiftung, Parrotia Foundation, Schöni Swissfresh AG, Bank Vontobel Charitable Foundation, Stiftung Dreiklang, Temperatio Foundation, Werner Steiger Foundation  
Partners: Swiss Federal Institute of Technology (ETH) Zürich; Universities of Basel, Innsbruck and Lancaster

Impact of the flower seed mix developed by FiBL:  
+ 45 % beneficial insects



The organic sauerkraut from cabbages grown in fields augmented with flowering strips has been available at the retailer Coop in Switzerland since 2018.



FiBL interns were actively involved in the evaluation of on-farm trials. From left to right: Alyssa Fischer, Leslie Mann and Charlotte Savoyat.

## Bread grains for low-fertility soils

Modern high-performance cultivars need fertile soils and have high nitrogen requirements in particular. FiBL, Agroscope and Agridea tested little-used cereal crops under less intensive conditions and investigated how a high level of quality can be ensured all the way from crop production to milling and to the bakeries.

The production of organic bread wheat is almost exclusively reliant on modern wheat cultivars, as they deliver the protein contents demanded in the marketplace. This requires careful management of the crop plants' nitrogen supply. In their joint four-year CerQual project, FiBL, Agroscope and Agridea investigated the possibilities of producing organic quality bread grains in low-fertility situations. In a network comprised of a dozen farms in Romandy, the project trialled the cultivation of little-used and relict cereal varieties that also thrive under less intensive conditions: einkorn wheat, emmer wheat, spelt, rye, bread triticale and various further types of wheat. The analysis included soil quality parameters as well as factors determining agronomic, baking and nutritional quality.

### Baking quality and nutritional physiology

Baking quality varies greatly from one cultivar to another; nutritional characteristics are determined by protein content, dietary fibre, vitamins and minerals, and plant micronutrients. Cereal grains also contain fermentable components called FODMAPs that are poorly absorbed in the small intestine and can trigger food intolerances. A logical approach to process-

ing therefore aims at preserving the cereal grains' original quality while achieving a conversion of the least digestible components.

### Integrated production chains for integral quality

But how do the little-used grain cultivars get from farms to mills to bakeries and ultimately to consumers? We also addressed this question as part of the project, studied the marketplace, considered sociological aspects and conducted interviews with farmers and artisanal bakers to elucidate their positive and negative experiences.

It is clear that high-quality production necessitates the coordination of all steps involved. This includes a choice of species and cultivars adapted to the conditions on site, gentle milling, especially on natural millstones, and long proofing using natural sourdough. Today, this approach is mainly employed by farmers and bakers working in cooperative partnerships. And while this is certainly a niche trade, it is up-and-coming. The little-used and relict grain cultivars make it possible to offer a wider range of artisanal specialty breads. Raphaël Charles, FiBL Switzerland

### CerQual – Quality cereals

Website: [www.bioaktuell.ch](http://www.bioaktuell.ch) > Pflanzenbau > Ackerbau > Getreide > Anbautechnik > CerQual  
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 Funding: Swiss Federal Office for Agriculture FOAG  
 Partners: Agroscope, Agridea

## Fresh bread from an old grain

Schlägler rye is one of the oldest cultivars listed in Austria's federal register of crop plant cultivars (Zuchtbuch für Kulturpflanzen). It has been bred and maintained in the Upper Austrian Schlägl convent since 1908. After having been somewhat forgotten in recent decades, the cultivar is now coming back to life at its place of origin – with start-up aid provided by FiBL.

The return to old, robust cultivars has brought Schlägler organic rye back into the limelight. As a rare agricultural crop cultivar, this rye from the Schlägl region is one of the endangered Austrian cultivars of regional importance, the cultivation of which is financially supported. This rye cultivar's special characteristics include yield security, winter hardiness and low demands in terms of soils and nutrient supply. Due to its good baking qualities it can be baked into crispy bread with a nutty note that keeps fresh for a long time.

### It should be easy to grow and easy to bake with

The preservation of this cultivar's cultural heritage is one of the concerns of the Schlägl centre of excellence for organic farming (Biokompetenzzentrum Schlägl), which was founded in 2011 by the Schlägl organic agricultural college (Bioschule Schlägl) and FiBL Austria. Together with organic farms, the centre carries out practice-oriented research for the Mühlviertel organic region (Bioregion Mühlviertel) and works on improving this rye cultivar in the monastic breeding garden of the Schlägl convent by means of individual



Satisfied with the rye plants' development: Johannes Schürz of the Schlägl centre of excellence for organic farming (Biokompetenzzentrum Schlägl).

plant selection and progeny testing. Winter hardiness, tillering, disease susceptibility, weed suppression, growth height, number of ears and thousand kernel weight are among the traits assessed, and its starch content and gelatinisation properties are also analysed to determine its baking qualities. Seed selection is carried out by the Schlägl centre of excellence for organic farming, while subsequent steps to bulk up the seed are outsourced to contract farmers and the Saatbau Linz seed producer cooperative which also handles seed certification.

The intention is to continue to foster the Schlägler organic rye by means of a cooperative effort by producers, gastronomy, traders and processors. In doing so, attention will be paid to a regional value chain that is as closed-loop as possible.

The strategy seems to pan out: Rye from the organic region Mühlviertel is not only popular as bread flour with local bakeries, but has also become a valued grain in the production of whiskey and beer. Moreover, Ströck, one of Austria's most important bakery chains, became aware of Schlägler rye and is now selling traditional organic rye bread (Bio-Ur-Roggenbrot).

Elisabeth Klingbacher, FiBL Austria

### Maintenance breeding of Schlägler organic rye

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 Funding: Seed licences, Stift Schlägl  
 Partners: Stift Schlägl, Biosaat Gahleitner, Saatbau Linz



A manual seeder helps Johannes Schürz to establish micro-plots for breeding the old rye cultivar.



Interactive maps show FiBL research trial networks on commercial farms in the areas of livestock production (pictured), arable farming and specialty crops.

## On-farm research – a FiBL success story

The real test of new research findings, farm inputs and other innovations is whether or not they also work in the farmers' fields or livestock enterprises. It is for this reason that FiBL Switzerland conducts some 200 trials on commercial farms each year.

Practical trials on commercial farms have a long tradition at FiBL Switzerland. For more than forty years, FiBL researchers have been working on solutions for organic agriculture together with farmers who are innovative and open to experimentation in their various different enterprises.

### Example: Potato varieties put to the test

FiBL's potato variety trials give insights into this on-farm research. Classic cultivars such as Erika and Charlotte are susceptible to late blight (*Phytophthora infestans*). If no chemically-synthesised plant protection products are used, this fungal disease can cause significant damage in such cultivars, up to complete yield loss. This is why the organic sector needs disease-resistant cultivars. The potato variety project brings the most promising new European varieties to Switzerland for trials. If a cultivar performs well in small plot trials conducted by Agroscope, the Swiss centre of excellence for agricultural research, it is grown in practical trials on six organic farms for two seasons each. In 2020, for example, four trial varieties were compared in two three-metre-wide strips each

along the entire length of the field on Christoph Hauert and Eva Ulm's Gerbehof in Bibern, Solothurn. FiBL provided comprehensive assistance for the varieties' cultivation, obtained the farmers' feedback and recorded parameters such as disease susceptibility and yields.

The Vitabella cultivar came out on top in earlier variety trials and has already made its way into the shops. The results obtained in the summer of 2020 have shown that Montana is also a robust and high-yielding cultivar. La Vie stood out with its beautiful tubers and excellent taste, but proved to be insufficiently robust. In the 2021 growing season, the farmers will trial further promising varieties on their land to find further winners.

Tobias Gelencsér, FiBL Switzerland

### Potato variety trials

Contact: [tobias.gelencser@fibl.org](mailto:tobias.gelencser@fibl.org)

Funding: Bio Suisse, Coop Sustainability Fund

Partners: Agroscope, Fenaco, Rathgeb, Terraviva

### Maps of the trial networks

[www.bioaktuell.ch](http://www.bioaktuell.ch) > Tierhaltung

[www.bioaktuell.ch](http://www.bioaktuell.ch) > Pflanzenbau > Ackerbau

[www.bioaktuell.ch](http://www.bioaktuell.ch) > Pflanzenbau > Obstbau

Potato variety field trial: Farmer Christoph Hauert (left) and FiBL advisor Tobias Gelencsér.

## Bees: The wild ones are even busier

Did you know? When it comes to the efficient pollination of crops and wild plants, wild bees clearly outrank honey bees. The decline of wild bees therefore threatens both wild plant biodiversity and agricultural yields. FiBL researchers are investigating how we can effectively support wild bees.

“For a long time, we thought honeybees were sufficient for pollination in agriculture,” says Aliette Bosem, biodiversity expert at FiBL. “However, recent research has shown that, in the background, wild bees provide indispensable services for agriculture. That’s because they are far more efficient pollinators than honeybees.” Wild bees fly at temperatures as low as seven degrees Celsius, while honey bees need ten to twelve degrees. “Our more than 600 wild bee species are also irreplaceable for biodiversity,” adds FiBL agroecologist Lukas Pfiffner. “Some wildflowers can only be pollinated by specialised wild bee species due to their flower anatomy.”

Unfortunately, many wild bee species in Central Europe are at risk due to pesticide use, among other factors, and there is also a lack of flowers and nesting sites. The decline in wild bee populations has already led to yield losses in some places. Special support and protection measures are needed to halt this decline. “This is where our projects come in,” says Aliette Bosem. “The results demonstrate that agriculture can promote its important helpers, the wild bees.”



Not an easy job for the FiBL entomologists: identifying individual specimen of our more than 600 wild bee species.

+35% wild bees  
occur in pesticide-free  
conventional or organic  
fields

### Ideal scenario: Minus pesticides, plus biodiversity

A FiBL study carried out in 2020 on agricultural holdings shows that cereal plots under conventional but pesticide-free management or under organic management host up to 35 per cent more wild bees than those under purely conventional management. The flora accompanying the crop, also termed arable weeds, is key in this regard: If no herbicides are applied, weeds flower more, wild bees find more food and their populations increase.

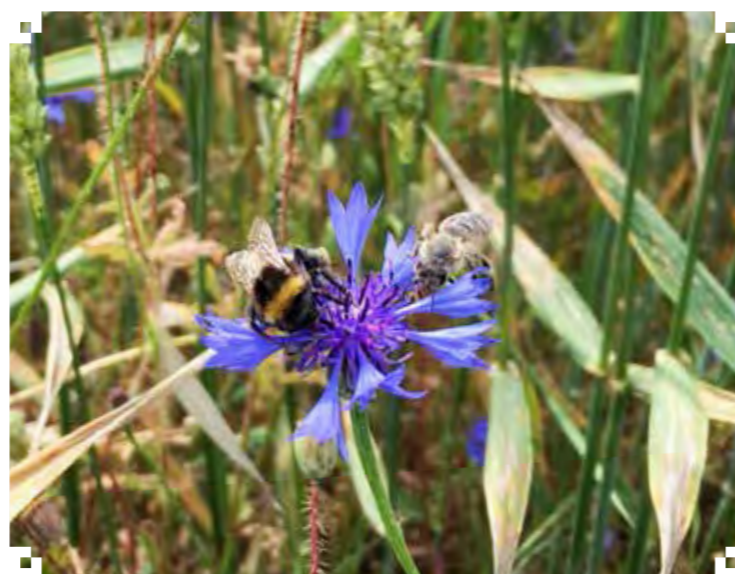
“However, the positive effect of pesticide-free cultivation methods only comes to pass if there are near-natural habitats in the immediate vicinity, such as species-rich grassland, forest edges or perennial flowering strips,” Lukas Pfiffner notes. “In addition to food, bees also need suitable nesting sites for overwintering.”

Franziska Hämmerli, FiBL Switzerland

### Support for wild bees in agriculture

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Funding: Swiss Federal Office for Agriculture FOAG, project execution as part of cantonal resource project Partner: Agrofutura



A species-rich weed flora in cereal crops is crucial for the survival of wild bees which feed on their nectar and pollen.



Which apple cultivars are resistant? FiBL researcher Thomas Oberhänsli (left) and farmer Hans Brunner assess the health of the trees in Brunner’s orchard, consisting of 400 standard trees in Steinmaur, canton of Zurich.

## What remedies for leaf blotch?

The new fungal disease *Marssonina* leaf blotch is spreading to apple trees in orchards and gardens. Thanks to a research project conducted by FiBL and the Lake Constance Centre of Excellence for Fruit Production, it is now known how and when the disease spreads and which plant protection measures promise success at what point in time.

The new *Marssonina* leaf blotch disease has been posing a problem for Europe’s apple producers since 2010. The first spots appear on leaves from June onward and then spread until the leaf has turned yellow throughout and drops off. Trees can lose a considerable amount of foliage in this way, negatively affecting their yields. Until recently, little was known about the disease and how to combat it. FiBL therefore carried out a research project to investigate the fungal pathogen’s biology and ways and means of protecting apple trees from this disease.

### Pathogen shows little mutation to date

One bit of good news - at least for the time being - comes from studies on the pathogen *Diplocarpon coronariae* (formerly *Diplocarpon mali*): “Genetically the population is rather homogenous throughout Europe, as is typical for a newly introduced organism,” says Thomas Oberhänsli, molecular biologist at FiBL’s Crop Protection – Phytopathology group.

“At the moment, the prospects are still good at combating the fungus by using robust apple cultivars.” But it is only a matter of time before the fungus changes genetically and overcomes existing resistances. Certain modern cultivars such as Ladina, Discovery and Galant or the cider varieties Blauacher, Bohnapfel and Tobiässler are still somewhat resistant to *Marssonina*. It is difficult to control the fungus. While in the case of apple scab mulching or the removal of fallen leaves from the orchard in the autumn reduces infestation

in the following year, this does not appear to be the case for *Marssonina* leaf blotch. However, the trials have shown that the frequency of treatment has a clear impact.

### Bentonite and lime sulphur – the more frequently the better

According to our findings, phytosanitary measures must be taken from May to the end of summer to ensure a satisfactory level of protection. In severely affected orchards with susceptible cultivars, treatments with both preventive agents such as the bentonite product MycoSin and curative agents such as lime sulphur are required. The simulation model RIMpro *Marssonina* is very helpful in determining the correct times for targeted applications. Studies involving spore traps have shown that the model can very precisely predict periods of infection.

Hans-Jakob Schärer, FiBL Switzerland

### Biology and control of *Marssonina*

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Funding: Interreg Programme Alpenrhein-Bodensee-Hochrhein

Partner: Lake Constance Centre of Excellence for Fruit Production (Kompetenzzentrum Obstbau-Bodensee KOB), Ravensburg-Bavendorf



# Halting lavender decline

A cicada is the vector of stolbur disease in lavender fields and is endangering this highly important crop in southern France. With a view to controlling the cicada, FiBL France has trialled moderate irrigation and has searched for predators.

For several decades now, growers of lavender, a widespread crop in south-eastern France, have to deal with the lavender decline disease, which kills off the plants. The pathogen, stolbur phytoplasma, is transmitted by the glass wing cicada *Hyalesthes obsoletus*. In cooperation with the France Lavande cooperative and with support from the Givaudan Foundation, FiBL France has been working on controlling the cicada since 2016.

## Cicadas like it dry. Could irrigation help?

Given that the glass wing cicada *Hyalesthes obsoletus* prefers hot and dry conditions, we investigated the impact of moderate irrigation on their development. Tackling two stages of the insect's life-cycle, we worked with staggered irrigation periods. The trials in 2017, 2018 and 2019 showed a significant difference between the number of cicadas in irrigated plots compared to those in non-irrigated control plots. The investigations demonstrated that the moisture interfered with the species' larval development. This may be due to the fact that humid conditions give rise to greater abundance of parasitic fungi. Further trials are necessary to test this hypothesis.

## The potential of functional biodiversity

An inventory of the abundance and diversity of certain categories of insects and spiders was undertaken in order to identify potential predators of the cicada. Pitfall traps were installed for a period of one year in eight lavender plots, four of which were under organic management. These traps yielded 18,650 individuals (carabid beetles, rove beetles and spiders). The number of insects trapped in the organic plots exceeded that of the non-organic plots by 24 per cent, with the organic plots also showing greater species diversity. Molecular analyses (qPCR) of insect and spider samples were undertaken in order to ascertain whether their stomachs contained cicada DNA. This was the case for 26 out of 323 spiders analysed; traces of *H. obsoletus* were also found, to a lesser degree, in the stomachs of some of the carabid beetle species.

These results indicate that functional biodiversity may have potential to control the cicadas. Moreover, the project has triggered progress in the development of a new molecular detection method: LAMP\* was shown to be a swift and cost-effective method for the detec-



Purple and violet hues and aromatic scents: lavender fields are emblematic of southern France.



Fewer cicadas hatched under conditions of moderate irrigation. Yellow plate traps in covered lavender plots.

tion of stolbur phytoplasma in lavender plants. Field use of this instrument by farmers, advisors and plant propagators appears feasible in the medium-term. Amélie Lèbre, FiBL France

\* Loop-mediated isothermal amplification, a method for genetic amplification.

## Sustainable control of phytoplasma-mediated lavender decline

Contact: [amelie.lebre@fibl.org](mailto:amelie.lebre@fibl.org)  
Funding: Givaudan Foundation  
Partner: France Lavande producer cooperative



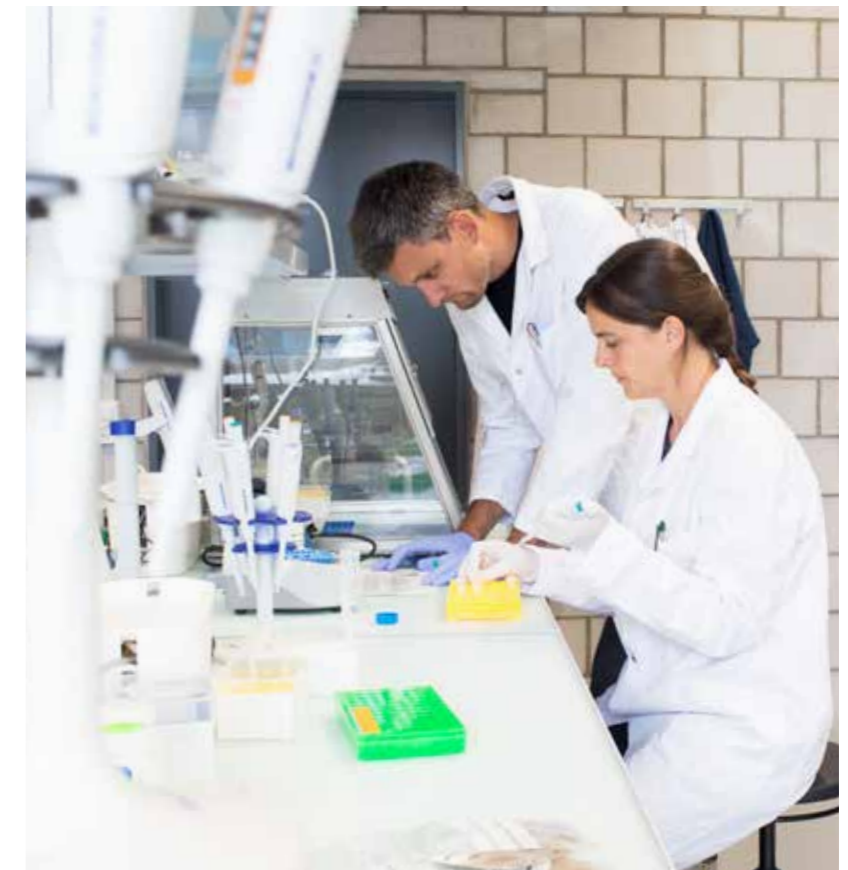
Measuring biodiversity: FiBL intern Morgane Guilbaud collects insects.



In their search for robust pea cultivars, the FiBL plant breeding group investigates microbes that colonise plant roots. To this end, Lukas Wille of FiBL (left) and Sebastian Kussmann of the cereal breeding association Getreidezüchtung Peter Kunz take samples as part of a field trial in Hausen am Albis.



Samples of intensively colonised pea roots are bagged for laboratory analysis.



Which microbial species live in diseased pea roots and which ones can be found in healthy roots? Lukas Wille and Seraina Vonzun in the FiBL laboratory.

## Wanted: Robust bundles of protein

**Legumes are full of protein. Their production has become a trend and the area under legumes is growing. However, fungal diseases are a problem in organic systems. This has prompted FiBL researchers to employ innovative methods in their search for robust cultivars.**

Legumes such as peas or lupins supply valuable proteins for humans and animals as well as nitrogen for the soil, and they are also good bee forage plants. They are essential in particular for organic agriculture, as organic farmers do not use any synthetic nitrogen fertilisers. Unfortunately, various fungal diseases make legume cultivation difficult and necessitate up to ten-year breaks between such crops.

In order to find more resistant cultivars, the FiBL plant breeding group works together with national and international partners to improve peas and lupins. Since 1998, FiBL has been pursuing the objective of promoting organic plant breeding as well as the independent seed market.

### Pea lines that can resist harmful fungi

Root diseases are a major issue in pea cultivation. They usually appear when peas are repeatedly

grown in the same field. In order to be able to test a large number of different pea lines for disease resistance, FiBL researcher Lukas Wille developed a resistance screening as part of his doctoral thesis completed in 2020. This made it possible to screen 300 pea lines to identify robust lines that show clear resistance to fungal attack; the others show strong disease symptoms on diseased soils and grow much more slowly.

Organic plant breeders are now to benefit from these promising results. In close cooperation with the bio-dynamic cereal breeding association "Getreidezüchtung Peter Kunz", the cultivar screening procedure is now being adapted for breeding work.

### Beneficial microbes as crop aids

Lukas Wille's PhD also showed that different microbes colonise the roots of susceptible and resistant pea cultivars respectively: for example, resistant cultivars are more strongly colonised by beneficial mycorrhizal fungi.

In a follow-up project, Lukas Wille is currently investigating additional connections between a pea cultivar's resistance traits, pathogens and the soil microbial community.

### Renaissance of the white lupine

The currently vast levels of soybean imports to Europe for feed and food are highly problematic from an ecological point of view. The white lupine with its high protein content and low nutrient requirements would be a suitable local alternative. However, lupine cultivation is severely restricted by anthracnose leaf blight. It is caused by the seed-borne fungus *Colletotrichum lupini*. Even low levels of seed infestation can cause complete yield loss under Swiss climatic conditions. For the successful cultivation of white lupins it is therefore important to understand the pathogen and to find resistant breeding material. FiBL researcher Christine Arncken has been breeding white lupins with improved anthracnose resistance since 2014. Her team also includes Joris Alkemade, who as part of his doctoral thesis developed a screening system that is performed in a controlled environment (climate chamber) and allows for the identification of resistant lupins at an early-stage of the plants' development. The cultivar Frieda as well as Ethiopian landraces proved to be particularly resistant to anthracnose infestation. These findings were confirmed in field trials. Moreover, Joris Alkemade was able to show that anthracnose is mainly caused

by one particular aggressive fungal strain and that this strain occurs worldwide. Joris Alkemade is currently searching for molecular markers that indicate which of the cultivars are particularly resistant. These markers could then be used for diagnostic purposes in organic plant breeding to identify robust cultivars more quickly.

Monika Messmer and Lukas Wille, FiBL Switzerland

### Projects on lupins and peas

Videos: [www.youtube.com](http://www.youtube.com) > FiBLFilm > Search > Lupine  
 Projects: resPEAct, AGRIBIOME, LIVESEED, Breeding research on anthracnose tolerance  
 Contact: [pierre.hohmann@fibl.org](mailto:pierre.hohmann@fibl.org)  
 Funding: Stiftung Mercator Schweiz, WFSC ETH Zürich, Swiss Federal Office for Agriculture FOAG, European Commission: Horizon 2020, Bio Suisse  
 Partners: Molecular Plant Breeding ETH Zürich, Getreidezüchtung Peter Kunz gzkp, organic farms Böhler and Stefani, University of Hohenheim, University of Kassel, Feldsaaten Freudenberger, Sativa Rheinau AG, Semillas Baer Chile, CREA Italy, LBI Netherlands, UBIOS France, AREI Latvia

# Excellent health with little concentrate: New bulls for dairy breeding

Healthy cows and as high a milk yield as possible: These are the main criteria in dairy breeding. However, the level of antibiotics used and the amount of concentrate feeds needed to achieve these goals have as yet rarely been taken into account. But from the spring of 2021 onwards, bulls will be available that were selected on the basis of new criteria suited to organic breeding – thanks to a project conducted by FiBL, Bio Suisse and Swissgenetics.

How does a cow get in calf? Ninety per cent of organic dairy cows become pregnant with the help of artificial insemination (AI). To this end, the inseminator brings sperm doses (“straws”) to the farm in a nitrogen-cooled flask. From this flask, the farmer chooses from more than a hundred bulls of different breeds, the standard range offered by Swissgenetics. From 2021, this range will include the first straws from bulls selected on the basis of organic criteria.

## It all began with dissatisfied farmers

The criteria normally used by Swissgenetics to select breeding bulls – that their female offspring will produce a lot of milk and perform well in terms of a number of conformation and health traits – are not optimally adapted to the needs of organic farming. Organic holdings need smaller, longer-living cows with low concentrate requirements. Thus, in 2016, sixteen farmers took the initiative to add to the supply of breeding bulls for AI for organic farms in cooperation with Swissgenetics. Three years later, the organic AI bulls project was launched.

## Strict criteria for the bulls’ dams

Longevity and excellent health with adequate milk yield – these are the most important criteria that a future organic breeding bull’s dam must meet. The criteria were jointly defined by farmers and breeding organisations. But high husbandry standards must also be met: the bull’s dam must live on an organic farm, forage for at least half her feed out on pasture in the summer, must not be fed more than 300 kg of concentrate feed per year and should only have required antibiotics in an emergency, at most once in her life.

“Given that the requirements are even more strict than the already strict Bio Suisse standards, many cows do not qualify as bulls’ dams,” says Anet Spengler, project manager and FiBL cattle expert. “But it’s important that we are strict about it, that’s exactly the point. It’s the only way that allows us to establish breeding lines that reach top performance without high levels of concentrate feeding.” Roughly 400 suitable dams were identified and some of their offspring, which also have to meet strict criteria, have already been raised as potential breeding bulls: five Swiss Fleckvieh, four Brown Swiss and two Simmental bull calves; only Original Swiss Browns are still missing.

## Scientists seeking roughage specialists

In the project run by FiBL and Bio-Suisse, the young bulls are assessed on the basis of additional breeding criteria to which no attention has ever been paid before: When the bull is out on pasture, is he busy foraging or is he easily distracted? And most importantly, is he a good converter of roughage? To this end, once



Caro, a Swiss Fleckvieh bull, perfectly meets the new organic breeding criteria. Also in the photo (from left to right): Project staff Janine Braun, project manager Anet Spengler and farmer Hans Braun, one of the project’s co-initiators.

a month during the rearing phase the manure of each bull is washed and rinsed out. If there is little fibre left over, this is a sign that he is particularly good at converting grass. This criterion is essential for farms in Switzerland, as Bio Suisse will limit the proportion of concentrate feed for ruminants to five per cent from 2022. For comparison: up to fifty per cent concentrates are permitted under EU organic standards.

## 500 semen doses from each bull

So far, the two Swiss Fleckvieh bulls Kingboy and Caro as well as the Brown Swiss bull Jansrud\* meet the strict criteria. All three have been taken on by Swissgenetics for semen production. If things progress as planned, each bull there will “mount” about fifteen times within a few months. 200 to 300 semen doses can be obtained from one ejaculate; they are then deep-frozen. The goal for the coming years is to sell 500 semen doses from each bull each year to farmers. Breeders from neighbouring countries have already expressed interest. “We hope that farmers will take up the offer,” says Anet Spengler. “This would boost the prospect that the project is extended and that the selection of organic animals can be widened

and maintained.” Anet Spengler is passionate about the project. While the organic standards recommend that natural service should be used as far as possible, there are risks and effort involved in keeping a bull – which is why ninety per cent of Swiss organic dairy farms prefer AI. The project is therefore of great significance to the organic movement.

Franziska Hämmerli, FiBL Switzerland

\* Numbers 120.1389.4893.6, 120.1486.0583.6 and 120.1528.3857.2 in the Tierverkehrsdatenbank livestock database

## Organic AI bulls

[www.bio-kb-stiere.ch](http://www.bio-kb-stiere.ch)

Contact: [anet.spengler@fibl.org](mailto:anet.spengler@fibl.org)

Funding: Bio Suisse, Edith Maryon Foundation, Stiftung Dreiklang, livestock breeding fund of the Zukunftsstiftung Landwirtschaft, own contributions by Swissgenetics, Braunvieh Schweiz and Swissherdbook Partners: Bio Suisse, Swissgenetics, Braunvieh Schweiz, Swissherdbook, IG neue Schweizer Kuh, Plantahof



If the washed, rinsed and pressed dung contains as little fibre as can be seen in the photo on the right, then the bull excels at roughage feed conversion. With inferior converters of roughage there can be two or three times as much fibre residue.



## Breeding: Robust and efficient animals

### Resilient goats and sheep

Good pasture management helps to reduce dewormer use in goats and sheep, as FiBL projects have already demonstrated. In order to further reduce dewormers, the EU project Smarter aims at finding goats and sheep for breeding that are less prone to gastrointestinal worm burden. To this end, genome analysis is carried out on 1300 dairy goats of the two breeds Chamois Coloured Goat and Saanen. In 1200 Lacaune dairy sheep, faecal samples are taken to identify those animals that excrete the lowest number of worm eggs, i.e. are the most resistant. At the same time, the goats and sheep should perform well in terms of milk yield and milk constituents.

#### Smarter

Contact: [steffen.werne@fibl.org](mailto:steffen.werne@fibl.org)

Funding: EU Horizon 2020

Partner: Qualitas AG



Chamois Coloured Goats are to become more resistant to gastrointestinal worms.



Resistance to worms is also to be improved in Lacaune dairy sheep - the photo shows two rams.

### Wanted: Swiss organic pig

Pig breeders in Switzerland have as yet not been able to choose breeds that are ideally suited to organic or Demeter husbandry conditions. To remedy this situation, efforts are now underway to breed an undemanding, robust and healthy domestic pig that is adapted to free-range conditions. The breeding criteria include fattening performance, meat quality, potential to utilise by-products of processing (such as whey, pomace, milling by-products), resilience and good reproductive performance in a natural husbandry system that meets the animals' intrinsic needs.

#### Our domestic pig

[www.unserhausschwein.ch](http://www.unserhausschwein.ch)

Contact: [anna.jenni@fibl.org](mailto:anna.jenni@fibl.org)

Funding: Demeter, Bio Suisse, Fondation Sur La Croix, Edith Maryon Foundation



This is what the new domestic pig breed could look like - well suited to free-ranging and also good at utilising food industry by-products.

## Feeding: Secondary compounds of prime importance

In animal feeding, secondary plant compounds such as tannins, alkaloids and essential oils have for a long time only been considered so-called anti-nutritive compounds, i.e. substances that inhibit feed intake or digestion or are even toxic. At FiBL they enjoy a better reputation: We can see phytotherapeutic agents, regulators of digestion, and important flavour components for the animals.

Species-rich Alpine meadows are for cows what modern shopping centres are for people: a fragrant supermarket including a tobacco section and a chemist. Cows find an equally large diversity of scents, tastes, and toxic as well as useful active substances in such grasslands. Farmers have long been familiar with many of the effects of herbs, fruit, roots and tree barks, and they use these to treat themselves as well as their animals. For a number of years now, FiBL veterinarian Michael Walkenhorst and his students of pharmacology have been collecting and categorising this type of traditional knowledge as part of their "ethno-veterinarian" research and have been publishing their findings in scientific journals. Traditional knowledge is to be preserved for posterity and shall serve veterinary medicine as a knowledge base on medicinal plants.

### Long-term study shows: Active substances contained in herbs improve health

At FiBL, we are also investigating the veterinary potential of the active plant compounds in experimental trials. In 2020 we were able to publish an important long-term study on the health effects of herb-rich supplementary feeds for dairy cows. Above all, the study showed a clear positive effect on udder health: Cases of increased cell counts fell by more than 20 per cent. In a further study, herbal extracts proved to be suitable for stabilising dairy cows in critical metabolic situations.

Another important aspect are anti-parasitic effects. Tannins, which are contained for example in the fodder legume sainfoin, can inhibit gastrointestinal parasites in sheep and goats, among other effects. FiBL researchers Veronika Maurer, Felix Heckenborn and Steffen Werne have been working on this topic for many years now. Over the last two years, this research has been extended to include heather species as part of the RELACS EU project. Under the leadership of Hannah Ayrle, we are also experimenting with herbs such as coriander, garlic and peppermint for poultry in order to test their health-promoting effects.

Eating herbs helps:  
20% improvement in dairy cow udder health





FiBL's Head of Department of Livestock Sciences Florian Leiber and his team investigate how herbs improve the health of cows and increase feed digestibility.

### Variety of tastes also essential for animal welfare

It doesn't always take scientists to find out what helps and what could do damage: In many cases the animals know by themselves. Especially in the case of sheep and cattle, it has been shown many times that they are able to control their metabolism by specifically consuming plants rich in active substances - or by avoiding them - and thus keep bacterial fermentation under control in their rumen and other compartments of their stomachs. These findings have led

to the conclusion that this is based on a pronounced ability to differentiate tastes and scents, i.e. that cows are basically gourmets and also that they have deeply rooted needs in this regard. We are dealing with this topic of relevance to animal welfare in several of our research projects on diversity in feeding regimes. In 2020, we set up a "pasture laboratory" at FiBL, where in the future, in cooperation with the Gut Rheinau farm estate, selective grazing by cows on species-rich pastures will be investigated in order to derive feeding recommendations.

### More sustainable animal husbandry with herbs?

The secondary plant compounds also have positive effects in terms of sustainability. In certain cases they can, for example, improve the protein metabolism of dairy cows and thus reduce emissions. Alexandra Kapp's dissertation, which was jointly supervised by FiBL and the Swiss Federal Institute of Technology ETH Zurich, was able to show this effect for the salad burnet in particular. This herb, a member of the Rosacea family, reduced nitrogen losses via the cows' urine by up to 30 per cent. We will therefore continue to include this plant in our research and investigate its suitability for cultivation, among other aspects. Research must also always be prepared to acknowledge if a hypothesis has been shown to be false. For example, we were unable to prove a positive effect of sainfoin on the protein metabolism of either goats or dairy cows. We also do not keep such results to ourselves, but publish them.

Secondary plant compounds continue to be an extremely important topic at FiBL's Department of Animal Sciences. They are a link that extends from botanical biodiversity to animal health and welfare and to sustainability; they are therefore an excellent example of the One Health principle: health must be viewed holistically.

Florian Leiber, FiBL Switzerland

### Herbal supplements good for cows

On dairy farms in Germany and Switzerland, herbal supplementary feeds are tested for their effects on metabolic, fertility and other health parameters. Contact: michael.walkenhorst@fibl.org Funding: SaluVet GmbH, Bad Waldsee

### Herbal pellets for improved protein digestion

Development of herbal concentrates for dairy cows designed to bind excess protein in the rumen. The aims are a more efficient uptake of feed proteins and a reduction in ammonia formation. Contact: florian.leiber@fibl.org Funding: Swiss National Science Foundation Partner: ETH Zurich, University of Hohenheim

### Farm inputs for animal welfare

Testing healthier preparations for the control of gastrointestinal parasites in sheep and goats Contact: veronika.maurer@fibl.org Funding: EU, Horizon 2020, RELACS project Partners: 14 project partners in 8 European countries



# Sheep in the vineyard – Is copper a threat?

Grazing sheep in vineyards is beneficial to both viticulturists and sheep farmers. However, the question arises as to whether copper residues pose a risk to the sheep. FiBL France has investigated this issue.

Many organic viticulturists and orchardists are keen to save the work involved in mulching their plots. At the same time, sheep farmers are often looking for additional grassland resources. While farmers in the Département Drôme in south-eastern France practice this combination of viticulture and sheep grazing during the winter, they are worried about potential impacts of copper on the sheep which is used as a fungicide in viticulture.

When sheep consume feed that is rich in copper this element is predominantly stored in the animals' liver where it can accumulate over long periods without giving rise to any visible symptoms; this is called chronic copper poisoning (CCP). If liver copper level is high, a slight stress can cause its sudden release in the blood stream, leading to swift death.

The "Sheep in the vineyard" project addresses the following questions: What is the level of risk of copper poisoning in sheep grazing in organic viticulture plots? What is the primary source of copper as a potential risk to sheep: spray drift or the uptake of copper accumulated in the soil?

## On-farm study in two viticulture plots

FiBL France conducted a trial in two viticulture plots in order to answer these questions. As part of this trial a range of soil and plant samples from the vineyard plots, and blood samples from a small flock of hoggets which had grazed the plots were analysed.

The results indicate that the level of risk is rather low but that caution is advised nonetheless. While the hoggets displayed only weak signs of CCP, the pasture plants were indeed contaminated with copper at a level that could constitute a serious risk of poisoning after two months of grazing. It was also shown that the majority of the copper contained in the plants came from the treatments applied in the current season rather than having been taken up from the soil. However, these results may differ where conditions are different (sheep breed, soil conditions).

## Grazing possible, caution advised

Based on the project's results it is reasonable to encourage viticulturists and sheep farmers to engage in the practice of grazing sheep in vineyards. They must however be alerted to the risk of CCP. The sheep should be allowed to graze the vineyards as late as possible in the winter season, after the rains have leached out some of the copper and grass growth has reduced its concentration. New research projects will address, in particular, the grazing of vineyards and orchards during spring and summer, i.e. during the times when both benefits and risks are at their peak.

Martin Trouillard, FiBL France

## Sheep in the vineyard

Contact: martin.trouillard@fibl.org

Funding: Agence de l'Eau

Partners: Fédération Départementale Ovine de la Drôme, Syndicat de la Clairette de Die, Communauté de Communes du Val de Drôme



Sheep grazing in the vineyard eliminate the need to mulch (Suze, Département Drôme).



Martin Trouillard samples pasture plants in the vineyard to determine their copper content.

# New: Animal Welfare Unit at FiBL Germany

More and more consumers are attaching great importance to animal welfare. FiBL Germany added a new work priority in 2019 with a view of bringing more animal welfare to livestock management. This focuses on the animals' health and welfare as well as on their ability to express their natural behaviour.

Ethologically sound animal husbandry is one of the core tenets of organic farming. In addition to sufficient space and range access this includes appropriate husbandry and breeding, correct feeding and preventative measures designed to maintain animal health. The team around unit manager Christian Lambertz works on a range of projects aimed at improving livestock keeping and management on organic holdings. In the focus on animal welfare network (Netzwerk Fokus Tierwohl) network, for example, FiBL staff cooperate with the German Agricultural Society (Deutsche Landwirtschafts-Gesellschaft, DLG) on the methodological-didactical preparation of information and training material and provide editorial support for the project homepage. The joint venture with 17 partner organisations aims to enhance the transfer of knowledge to practitioners in order to future-proof cattle, pig and poultry farmers in Germany through ethologically sound and environmentally friendly livestock management. "Together with DLG we support what we term 'farms for the future'. They are the vanguard. They share their experience with regard to animal welfare, improve management operations and adapt them to the individual farms' circumstances," Christian Lambertz explains. There are three networks composed of up to 50 farms each for the livestock categories of cattle, pigs and poultry. The valuable experience gained by FiBL in the course of its coordination of the Tierschutz-Kompetenzzentrum (centre of excellence for animal welfare), which was already established in 2014, is being applied to the acquisition of and support for the farms involved.

## Piglet castration only with anaesthetics

From 1 January 2021 the castration of piglets without anaesthetics will, at long last, be prohibited on all farms in Germany. "As part of the pilot and demonstration project on animal welfare we tested the two alternatives of administering anaesthetics by injection or by inhalation on organic holdings," says Christian Lambertz. The focus here was on animal welfare. The results have shown that with both procedures a great number of individual components must be flawlessly

coordinated in order to avoid harm to the piglet. The difficulty in administering anaesthetics by inhalation is to coordinate the workflow in such a way that the required administration of painkillers takes place at the appropriate time prior to castration. The administration by injection only offers a higher level of welfare if the anaesthetics are administered at an optimal dosage allowing the animals to fall asleep as calmly as possible.

The animal welfare team, together with the FiBL Academy, organised online seminars for producers of weaners and for pig fatteners on castration under anaesthesia and other alternatives such as immunocastration or the rearing of boars in order to find new approaches to the issue. A total of eight online seminars held during the Covid-19 pandemic allowed more than 200 actors in the areas of weaner production, pig fattening, advisory services and veterinary medicine to avail of information on and discuss the pros and cons of the various alternatives.

## Taking good care of turkeys

Another collaborative project focuses on turkeys. "We investigate key issues in organic turkey production with regard to genotype, feeding and management," explains Christian Lambertz. Together with the Weihenstephan-Triesdorf University of Applied Sciences and the centre for research and education on poultry at the Kitzingen state farm (Versuchs- und Bildungszentrum Geflügel, Staatsgut Kitzingen) trials are under way with feedstuffs rich in amino acids as well as a yeast-based feed containing high natural levels of vitamin B2 with a view to balancing the contents of these substances in the base feed. The scientists are also looking at how widely used turkey lines respond to the different ration compositions and are investigating the impacts of herbage silage and of free-range management of turkeys on grass ranges.

Sigrid Kirchmeier and Gudrun Plesch, FiBL Germany

## Animal Welfare Unit FiBL Germany

[www.fokus-tierwohl.de](http://www.fokus-tierwohl.de), [www.mud-tierschutz.de](http://www.mud-tierschutz.de)

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Funding: German Federal Ministry of Food and Agriculture (BMEL)



Alternatives to the castration of piglets without anaesthetics must be adapted to and optimised for each individual holding.



The rearing of organic turkeys is highly demanding in terms of their nutritional requirements.



Animal welfare is a question of ethologically sound and overall good management.

# Climate change: Better think ahead than lag behind

## Early detection of the spread of pest insects

Climate change is here. In order to appraise and prepare for its impacts, Switzerland has brought together experts from a wide range of disciplines in the NCCS network. One of these experts is FiBL's Sibylle Stöckli, who is working on predicting the spread of harmful organisms.

Unfortunately, climate change has already become reality. Temperatures are rising – in Switzerland by 0.39°C per decade since 1961 – with impacts including floods, summer droughts and the spread of non-native species. In order to assess the complex future consequences of climate change, Switzerland established the National Centre for Climate Services (NCCS) in 2015. It is a network that offers information on the past, present and future climate and the resulting impacts. FiBL's Sibylle Stöckli is involved in the NCCS, together with climatologists, geographers and agronomists from other institutes. Her role is to gather information on the future spread of invasive non-native pest insects. "We developed climate impact models that allow us to produce precise risk analyses for Switzerland despite the country's very diverse topography. These analyses make it possible for us to fairly accurately predict whether a location's climate allows for the long-term survival of a new type of pest insect," says Sibylle Stöckli. "The findings are then used by

farmers, advisors and specialist agencies to find out about adaptation measures in a timely manner and to develop possible plant protection strategies."

### Prognosis: The brown marmorated stink bug will conquer many new areas

The brown marmorated stink bug, a species introduced from Asia, causes major yield losses in fruit and vegetable crops. Together with partners in research, Sibylle Stöckli developed simulations which show that this invasive species will probably advance mainly to higher altitudes over the next thirty years and continue to expand its range in north-western Switzerland. Moreover, we may regularly see two or even three generations per year in the future. "This shows just how important it is today to think of tomorrow and to introduce early warning systems," says Sibylle Stöckli.

Franziska Hämmerli, FiBL Switzerland

### National Centre for Climate Services NCCS

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Funding: Swiss Federal Office for Agriculture FOAG

Partners: Agroscope Reckenholz, CABI Delémont, MeteoSwiss

FiBL scientist Sibylle Stöckli models where new pest insects will occur as a result of the changing climate



Staying ahead of pest species such as the brown marmorated stink bug is one of the objectives of the NCCS climate network.



## The changing climate determines where milk flows

Dairy farms rely on high quality home-produced forages for efficient milk production. FiBL researchers are investigating how feed production and, in turn, milk yields could develop across Europe as the climate changes.

Most European dairy farms rely upon on-farm produced forages as the primary source of nutrition for their cows. However, the productivity of forage crops depends on favourable weather conditions. In order to assess the possible consequences of climate change for the performance of farms in different climate zones, FiBL analysed a database containing the economic data of some 100,000 dairy farms from all over Europe. They linked the data to maps published by the Food and Agriculture Organization of the United Nations (FAO) that depict potential medium-term and long-term green forage and field crop yields.

### More milk in the north, less in the south

The analysis shows that northern regions and mountainous areas such as the Alps could see forage yields increase by up to 12.5 per cent. That could be utilised to boost dairy production. However, it is important to take a critical look at whether these regions are suited to increased livestock densities.

A more environmentally sound option would be to use less bought-in feed and, above all, less concentrate feed, especially in light of the increasing competition between feed and food for a growing world population.

The changes are expected to be less pronounced in the Central and Western Atlantic zones. Here, a switch to more drought-tolerant forage crops – for example, to alfalfa instead of grass leys – could result in increased productivity.

In Europe's southern regions, forage yields and thus milk yields are expected to decrease. A switch to other forage crops might prove a successful adaptation strategy in these areas.

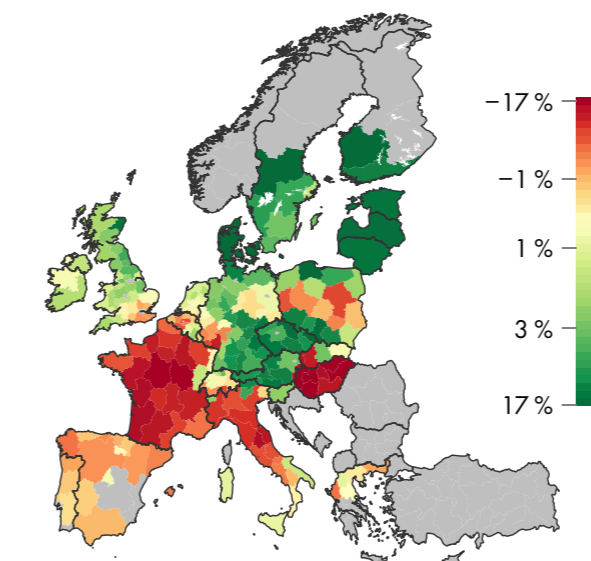
### Grassland has the greatest level of stability

The analyses also show that pure grassland farms will be least affected, as grassland yields are relatively stable. Farmers who rely more on forage crops will be able to maintain or even increase the current level of productivity in practically all regions if they optimise their choice of forage crop for the climate.

However, these overall rather positive results only apply if the systems remain relatively stable. There is also a possibility that increased extreme weather events and heat waves could negate any positive effects of a warmer climate.

Simon Moakes, FiBL Switzerland

### Development of dairy productivity



This is how climate change might impact dairy production in Europe by 2050.

### GenTORE

Contact: [simon.moakes@fibl.org](mailto:simon.moakes@fibl.org)

Funding: EU Horizon 2020

Partners: 16 universities and institutes, led by INRAE

The study includes data from about 10,000 meteorological stations and 100,000 farms

# How to increase the sustainability of global supply chains

Consumers are demanding more corporate responsibility and more sustainable products; from palm oil to fair organic clothing. Often public and private measures aiming to improve supply chain sustainability are redundant and conflicting, causing confusion among producers and consumers. FiBL researchers test the Smart Mix approach for sustainable supply chains.

Governments in consumer countries face a significant challenge within the context of complex globalised supply chains; satisfying the public's growing demand for sustainable products while respecting government sovereignty in producer countries. Legislation alone has proven ineffective in many sectors. A mix of governmental measures and private initiatives try to ensure the commodities and products



Mareike Weiner, Smart Mix expert from FiBL, is investigating the potential for improvement of environmental and social standards in the supply chain of the German textile sector.

which claim sustainable supply chains meet consumers expectations. To be effective, this mixture of approaches must be deliberately coordinated and interactive, creating a Smart Mix.

## Cross-sector supply chain analysis

Real-world examples of Smart Mixes in five sectors were analysed: conflict minerals, timber, palm oil, single-use plastics, and finances, to identify successes, barriers, and how they were overcome. The goal: take lessons from the five sectors to improve environmental and social standards of the German textile sector.

## Lessons learned: German textile sector

Although numerous public and private measures exist in the textile sector, most were developed independently and showed little or no interaction with other measures – no Smart Mix. Lessons from the different sectors helped create governance scenarios. A maximal government intervention involvement scenario holds promise; featuring new regulations, requiring mandatory due diligence with a state-based oversight body and sanctions for non-compliance, similar to the timber sector.

There is no cross-sectoral blueprint for a Smart Mix, as the challenges, elements and specifics of each supply chain are too different. The Smart Mix approach is certainly not the «silver bullet» for sustainable supply chains, FiBL researcher Mareike concludes, “a Smart Mix within the supply chain of a sector doesn't imply sustainability throughout the entire supply chain ... but it helps.”

Lauren Dietemann, FiBL Switzerland

*«Smart Mix» defined: a mix of measures that includes at least one binding public measure; accompanied by at least one voluntary cooperative measure that gives guidance to the actions that should be undertaken to achieve stated objectives; and at least one voluntary private measure that must have consequences outside the jurisdiction of the intervening government. The mix of measures must interact and thus improve the achievement of the objectives of at least one of the measures.*

## SMART-MiX+PI

Contact: robert.home@fibl.org  
Funding: German Federal Ministry for Economic Cooperation and Development BMZ  
Partner: Systain Consulting GmbH



Local residents take action for more green in the city - for example in the winter vegetable workshop with Wolfgang Palme from the Higher Federal College and Research Institute for Horticulture, Schönbrunn.



Robust and full of vitamins: kale also thrives at low temperatures in Seestadt.

# The edible city

Attempts at bringing more green into grey towns and cities often fail due to the costs involved. At the same time, more and more city dwellers want to actively engage in gardening and design urban green spaces. An interdisciplinary team with FiBL participation came together to explore costs, added value, and climate impacts.

How can residents participate in an “edible city” while reducing public costs for urban greening and raising the social and ecological added value? These are the questions that sustainability experts from FiBL have been exploring since 2019, together with landscape planners, social scientists and community gardeners. Their “laboratory” is Seestadt Aspern, a new urban lakeside quarter in the east of Vienna that is one of the largest smart-city pilot areas in Europe.

## Life-cycle assessments of gardens and greened balconies

The FiBL team focuses on sustainability assessment. The carbon footprint and biodiversity of roof, community and balcony gardens are evaluated. Moreover, the team appraises the savings consumers can make by growing their own produce and the costs the public sector might save for professional green space maintenance. The results of the comprehensive assessment will be published in the spring of 2021 at [www.essbareseestadt.at](http://www.essbareseestadt.at)

Baseline data were obtained from a survey of 300 Seestadt residents about their needs and gardening ambitions. The spatial extent of roof and balcony gardens was also surveyed, as were the crops most frequently grown in these spaces. In addition, the yields of seven vegetable and herb crops cultivated in Seestadt's “Kraut & Blüten” community garden, which is roughly 1000 m<sup>2</sup> in size, were recorded and analysed. As the community garden was only in its second year

of existence in 2019, the gardeners' focus was still on learning and productivity was as yet low. The gardeners were trying out a lot of things such as growing their own transplants, or working with mulches.

## Local residents pitch in and push ahead

All those involved have a desire to create and this has become manifest in many ways: In addition to the communal gardening endeavours, they planted hedges and strips of fruit trees, exchanged seeds, produced compost and organised gardening workshops and field trips. In the “Salon essBar” – a wordplay on the German word for “edible” – the researchers regularly invite residents to a project bazaar to provide an overview of the activities and a space for new ideas, of which there are many: “To ensure that the ideas for edible Seestadt continue to flourish after the project has ended, committed Seestadt residents have established an association. This is one of the outcomes that delights us most,” says Stefan Schweiger, FiBL project manager.

Elisabeth Klingbacher, FiBL Austria

## Edible Seestadt

Website: [www.essbareseestadt.at](http://www.essbareseestadt.at)  
Contact: [stefan.schweiger@fibl.org](mailto:stefan.schweiger@fibl.org)  
Funding: Austrian Federal Ministry of Transport, Innovation, and Technology (BMVIT), Austrian Research Promotion Agency (FFG)  
Partners: United Creations, Institute of Landscape Planning (ILAP) at the University of Natural Resources and Life Sciences, Vienna (BOKU), Institut für partizipative Sozialforschung IPS, Gartenpolylog, PlanSinn Planung und Kommunikation GmbH

# Little land, lots of biodiversity

**Micro farms on the rise:** The number of micro farms, holdings with an agricultural area of more than 1500 square metres, has been growing, especially in Romandy. What are the needs of these micro farms, what kind of training and advice do they require? A project initiated by the Canton of Vaud and FiBL is dedicated to this new movement.

For about five years now, the phenomenon of “microfermes”, micro farms in English, has been gaining ground in Romandy, the French-speaking part of western Switzerland. Vaud was the first canton to respond to the movement and, together with FiBL, launched a project aimed at studying the phenomenon and supporting the farms.

## Characteristics of micro farms

So what are “microfermes”? There is no generally accepted definition. Holding sizes range from 0.15 to five or six hectares. Because the farms are small, they often use “intensive” alternative forms of production such as permaculture, agroforestry systems or mixed cropping. Other characteristics are as follows: The initiators or entities behind micro farms often come from non-agricultural backgrounds, and about half of them have no formal agricultural training. They strive for a high level of autonomy and pay particular attention to resource conservation; the vast majority are organic producers, but only a small proportion hold organic certification. Their farm machinery tends to be small in size if they use any at all, and they often keep small livestock such as chickens, ducks or goats. Generally they not only want to be self-sufficient, but also sell farm products. Currently there are about 50 micro farms in Romandy.

Those who wish to set up a micro farm are usually faced with the following questions: How do I get access to land? What financing options are there? What training and further education do I need? How do I develop a business model? What are the farming techniques I can use and which ones do I want to use? The Microfermes project was able to build on the successful BioDiVerger trial: low-input orchards set up with FiBL support on the grounds of the Marcelin education centre in Morges. BioDiVerger has shown that silvo-arable vegetable production can be an economically successful venture on as little as half a hectare.

## Networking, courses, fact sheets and an educational trail

As part of the project, the Microfermes and Permaculture Interest Group was established which counts 110 members to date, about half of whom are already active as “micro farmers”. Experience is shared in this network and members give each other mutual support. FiBL and Agridea have developed and run courses on the economic aspects. An information booklet on training courses open to micro farm operators has been published and leaflets and online publications are in preparation. They should be available by mid-2021. By then we also expect to be able to open the thematic educational trail in the Marcelin grounds in Morges.

Hélène Bougouin, FiBL Switzerland

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## Microfermes – Micro farms

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Funding: Directorate-General for Agriculture of the Canton of Vaud (DGAV)

Partner: University of Lausanne, Agridea



Seedling production in the permaculture garden at Marcelin, Morges.



BioDiVerger agroforestry site, Marcelin, Morges: orchard combined with the production of culinary herbs and berries.



A pond at the centre of the permaculture garden fosters biodiversity.



Students from the University of Lausanne weeding the permaculture garden.

# Living Labs

In a variety of European research projects, FiBL has been working with the Living Labs approach. FiBL is testing the suitability of Living Labs to achieve social, ecological and economic improvements in farming and the food sector.

FiBL's work with the Living Labs approach enables all actors involved, from farmers to consumers, to jointly develop social, technological and societal strategies to address ecological, economic and social problems.

From its numerous on-farm trials and networks, FiBL brings many years of tradition and experience of working with users, i.e. with those involved in the systems and processes that are to be further developed. The results of this joint work include innovative approaches in crop production, soil cultivation and livestock husbandry. This direct exchange also leads to research and development being initiated, co-designed and implemented by the farmers.

Living Labs bring new user groups on board. They come from the food processing sector, advisory services, agricultural engineering, the authorities and consumers. The potential of Living Labs in the food sector lies in this joint development of new approaches.

## It often starts with consumer wishes

Often the starting point of a Living Lab is a problem or challenge expressed by the users (e.g. farmers, advisors, consumers). The Living Lab meets this challenge by developing a "prototype" or "test product", a specific advisory service for example. The process

## Three key features of a Living Lab

- A Living Lab, also known as "real lab" in German, is embedded into real life. Research and innovation processes are user-centred and therefore, where possible, take place in the territorial context they are addressing. Innovation is facilitated by the locality.
- In a Living Lab, action is taken together (co-creation).
- A Living Lab provides differentiated and targeted feedback on the development of products, services and strategies. It acts as an intermediary between citizens, research organisations, companies, cities and regions, with the aim of generating joint added value and rapidly delivering a "prototype".

is characterised by co-creation: Users and sometimes several stakeholder groups are actively involved in the development of the product to be tested.

Living Labs face a number of different challenges, one of the most important being to keep users' needs in sight and maintain the commitment of all participants.

## The example of the weeding robot for vegetable production

In Switzerland, a Living Lab is working with FiBL as part of the EU Desira project to develop a basis for the organic sector's use of digital technologies, using the example of weeding robots in organic vegetable production. The first step is to clarify the users' expectations and needs with regard to such technologies and to discuss the barriers to their introduction from the perspective of application and development. The second step involves the development of scenarios of the potential role weeding robots or other digital technologies could play in organic farming in the future. The results of these scenarios will be incorporated into the development of a code of conduct that could serve as the basis of a guideline for the organic sector in dealing with digital technologies.

## Better livestock health and less antibiotics use through Living Labs

As part of the EU-funded Roadmap project, eleven Living Labs are working on reducing antibiotics use in livestock farming and on improving livestock health.



Living Labs should be held in person. However, in the times of the Covid-19 pandemic, they are by necessity conducted online.

Living Labs have been established in Belgium, the Netherlands, France, Denmark, Italy and Switzerland, bringing together stakeholders from across the food supply chain, research and extension. Naturally, the approaches discussed for improvements in livestock farming are as diverse as the challenges faced in the individual countries, with different types of livestock and production systems.

In the United Kingdom, information for staff caring for calves is to be improved. Such staff often come with poor training and a small skill set, but they are in close contact with the animals and could detect diseases early. In Belgium, the focus is on coaching for farms involved in pig farming and on an app for disease detection.

For FiBL, the focus is on organic pig husbandry and the fattening of cattle and calves. The aim of the first meeting – held online – was to identify the challenges to good animal health in organic pig farming. These include, for example, that veterinarians tend to have little knowledge of organic farming and that the flow of information between breeders and pig finishing holdings needs to be improved. In a next step, tangible measures will be derived from this analysis, tested and evaluated. Subsequently, the Living Lab on cattle and calf fattening will aim to improve veterinarians' support in herd management with a view to disease prevention.

## ALL-Ready develops Living Labs for agroecological food systems

To date, Living Labs have rarely been used in the food sector. Yet there are numerous examples in which farmers and the downstream supply chain have joint-

ly developed and implemented services, products and strategies. The goal of sustainable food production necessitates urgent changes. However, cooperation in the food sector is often hampered by dependencies, competition and power structures.

In the EU-funded ALL-Ready project, the concept of Living Labs is being advanced with a view to using it to change food systems. Tangible and robust guidelines for the implementation of Living Labs in Europe are to be developed.

Bernadette Oehen, FiBL Switzerland

## Living Labs with FiBL involvement

Websites: [www.roadmap-h2020.eu](http://www.roadmap-h2020.eu),  
[www.desira2020.eu](http://www.desira2020.eu)

Contact: [bernadette.oehen@fibl.org](mailto:bernadette.oehen@fibl.org)

Funding: EU





Residue analysis on behalf of FiBL: Friedle Laboratory in Tegernheim near Regensburg.

## The organic data bankers

Are my inputs authorised for use in organic agriculture? Are they safe? Where can I buy organic seeds? Where can I buy organic livestock? These are all questions FiBL aims to answer. To this end, FiBL has developed, for example, a database for organic livestock. Moreover, FiBL's certification of inputs provides even more certainty.

Hardly any farmer these days is looking for dairy calves or store cattle for his herd by searching through ads in the local advertising paper or the regional farming press. Hardly any gardener leafs through a half dozen catalogues for their seed order or asks their label organisation whether the use of this or that fertiliser additive is permitted. What is needed are up-to-date, user-friendly databases. And if the relevant databases are interlinked, then their utility becomes great. Since 2019, a team led by Rolf Mäder of FiBL Germany, together with the Gütegemeinschaft Betriebsmittel (GGBM) quality assurance association for inputs, has been developing a certification programme for inputs. The GGBM comprises the organic farming associations Bioland, Demeter and Naturland. In the past, experts already conducted reliable checks of wheth-

er inputs meet statutory stipulations upon organic farming, and whether they comply with scientific demands and the criteria of private-sector associations. "With this step, however, we are immensely improving quality assurance for inputs," says Rolf Mäder.

### Documentation, inspection, laboratory tests

The first step of the certification procedure involves an assessment of the documentation submitted for the product. This is followed by an on-site inspection conducted by an inspection organisation commissioned by FiBL to check the processes during production. Additionally, at regular intervals all inputs are tested in the laboratory for the presence of a wide range of possible unauthorised and undesirable substances.

Because this process requires a high level of effort, the certificate comes at a cost – the price tag for clients will be higher than the previous assessment without a certificate. But it's worth it: Certification minimises the risk of contamination or fraud, producers can mark their produce with a quality label on the packaging and in the listing of approved inputs, and products become more attractive accordingly.

The first inputs will be certified as part of a field trial in Germany in the spring of 2021. Certification for further countries will follow.

### Database for organic livestock

The FiBL team in charge of inputs also manages the organicXseeds seed database, a platform for anyone offering or looking for organic seed and planting material. Under the new EU Organic Regulation, from 1 January 2022 every EU member state must establish a database that lists, in a transparent fashion, the nationally available organic young stock and breeding stock as well as juvenile aquaculture stock. This was reason enough for FiBL to now use its experience with organicXseeds to set up a database for organic livestock. "People in agriculture, trade, breeding, inspection as well as in the competent authorities are to be given a fast and efficient way of checking the availability of organic young stock, breeding stock and juvenile aquaculture stock," project manager Xenia Gatzert explains. The database will list suppliers, and where necessary it will also allow for applications for exemptions for the purchase of non-organic livestock to be submitted and processed. An expansion of the database to other EU member states is planned.

### Central database can be used individually

In order to be able to implement new database projects even more quickly and productively, FiBL Switzerland and FiBL Germany are establishing their own technical infrastructure around a central database. "A key element here is access rights management (Entity-Attribute-Value Model, EAV), which defines which applications and which users are allowed to read, save or change which of the data in the central database," explains Rolf Mäder. "As a first pilot project, we are developing an app to manage the product and company data for the inputs lists. Subsequently, we will set up the database for organic young stock, breeding stock and juvenile aquaculture stock." In the longer term, the existing databases such as organicXseeds will also be moved to the new central database. An interface platform will allow for the retrieval of data via external applications. For example, a provider of a digital arable plot register can make data from the inputs list available as part of its offering. This means that farmers will be able to call up information on the availability of organic seeds or permitted fertilisers in the plot register itself. An important feature of the central database is the single sign-on (SSO). This means that after a single authentication, users gain access to all the applications managed by FiBL, such as organicXseeds, organicXlivestock or bioC.info, for which they have registered. Hella Hansen, FiBL Germany

### Certification programme for inputs for organic agriculture in Germany

Website: [www.betriebsmittelliste.de](http://www.betriebsmittelliste.de)

Contact: [rolf.maeder@fibl.org](mailto:rolf.maeder@fibl.org)

Funding: German Federal Programme for Organic Agriculture and other forms of Sustainable Agriculture (BÖLN)



organic  
Xlivestock

### Database of available organic young stock, breeding stock, and juvenile aquaculture stock for Germany

Website: [www.organicXlivestock.com](http://www.organicXlivestock.com), expected to be available from mid-2021

Contact: [xenia.gatzert@fibl.org](mailto:xenia.gatzert@fibl.org)

Funding: German Federal Programme for Organic Agriculture and other forms of Sustainable Agriculture (BÖLN)

organic  
Xseeds

### Seed database

Website: [www.organicXseeds.com](http://www.organicXseeds.com), available in eight countries to date

Contact: [matthias.klaiss@fibl.org](mailto:matthias.klaiss@fibl.org)

Funding: competent authorities of Germany's federal states (Länder), licence holders, FiBL Switzerland, FiBL Germany

# Knowledge for success in organic farming

When farmers refrain from using chemical inputs, they need to be given alternatives. These are usually quite complex, which makes organic farming particularly knowledge-intensive. That is why FiBL uses a variety of ways and means to promote the exchange of knowledge for successful organic agriculture around the world.

## In action: Knowledge by video

A field robot autonomously hoed sugar beet for the first time in the canton of Thurgau. And FiBL filmmaker Thomas Alföldi was right there with his video camera. First he filmed the robot from all angles, sent up his drone and then interviewed the farmer about his



The FiBL YouTube channel of film-maker agronomist Thomas Alföldi has more than 12,000 subscribers.

experience with the robot. Back at home he edited all the material into a five-minute technical video. "Video is a fantastic medium for documenting the experiences of farmers and advisors," says Thomas Alföldi. Over the past ten years he has produced almost 400 short films for FiBL's YouTube channel. The videos have had 6.5 million combined views to date. The agronomist filmmaker is also involved in various EU projects outside of Switzerland. During the times of the coronavirus epidemic he has been running numerous webinars where he gives advice on how to make informative technical videos using simple means.

YouTube channel: [www.youtube.com](http://www.youtube.com) > FiBLFilm  
Contact: [thomas.alfoldi@fibl.org](mailto:thomas.alfoldi@fibl.org)

## East Africa: Courses via text and App

Digital dissemination of knowledge – a vast area such as East Africa is predestined for this strategy. Many people have a mobile phone, and the short message service SMS is the most popular means of communication. However, it is too expensive to go online with a mobile phone, which is why in rural areas few people have internet access.

So how can organic farming knowledge be disseminated? "Text messages are cheap and reach many farmers," says Benjamin Gräub, FiBL project manager in Nairobi, the capital of Kenya. "We are developing a course based on text messages that convey basic knowledge on organic farming. Our intention is for the course to reach 5000 people." The course is based on FiBL's already published African Organic Agriculture Training Manual, which is available online for free. "We will convert at least one of the manual's modules into a course consisting of 150 text messages". Moreover, Gräub intends to soon develop an app-based course on organic agriculture, as it is foreseeable that internet data will become cheaper in Africa in the future.

Contact: [benjamin.graeb@fibl.org](mailto:benjamin.graeb@fibl.org)  
Project: Digitalisierungspilot (pilot digitalisation)  
Funding: Leopold Bachmann Stiftung  
Partners: Biovision Africa Trust, Arifu, Yelder



Women farmers in Gladys Muthoni (left) and Lydia Mieere follow an organic farming course delivered by means of text messages.



Working group course format: knowledge exchange among farmers.

## Active knowledge exchange

FiBL is committed to sharing knowledge by means of courses and other event formats. For example, the FiBL Academy in Germany runs 80 professional development courses per year. At FiBL Switzerland, more than 40 courses are held each year, with a total of almost 1500 participants.

Courses: [www.fibl.org](http://www.fibl.org) > Info centre > Events

## Official teaching materials on organic farming

In 2019, the first official teaching materials were published for apprentices in Switzerland who decided to train as a "farmer with a focus on organic agriculture". On a total of 316 pages, the new teaching materials set out 120 lessons specifically on organic farming. These lessons are taught in separate classes in the third year of the apprenticeship. The chapters cover "General organic agriculture", "Organic plant production" and "Organic animal husbandry". Some 30 authors and editors contributed to the teaching materials, including several FiBL experts.

Contact: [robert.obrist@fibl.org](mailto:robert.obrist@fibl.org)  
Orders: [www.edition-lmz.ch](http://www.edition-lmz.ch) (CHF 149.-)



A debut: the first official teaching material for prospective organic farmers in Switzerland.

## Globally online: Expert knowledge on organic farming

The FiBL Communications Department manages numerous websites and publications that disseminate knowledge worldwide. Almost all published formats, be they tips for practitioners or factsheets on the latest state of scientific knowledge, are available free of charge in the form of PDF documents.

FiBL publications: [shop.fibl.org](http://shop.fibl.org)  
Organic farming in Europe: [www.organic-farmknowledge.org](http://www.organic-farmknowledge.org)  
Organic farming in Africa: [www.organic-africa.net](http://www.organic-africa.net)  
Organic farming in Switzerland: [www.bioaktuell.ch](http://www.bioaktuell.ch)



Access to clarity: Lauren Dietemann, Helga Willer and Andreas Basler (left to right) make well-structured knowledge on organics available on the web.



The whole farm cycle – from soil to marketing – is explained in seminars for farmers interested in converting to organic.

## FiBL Academy: Learning from and with others – online too

Whether for advisors or inspectors, young recruits or farmers, high-quality training courses on the topics of sustainable agriculture and food production are delivered under the umbrella of the FiBL Academy. The seminars always have direct practical relevance. They not only provide participants with a wealth of professional input, but also place particular emphasis on exchanging ideas and promoting networks.

“We believe it is crucial to offer tailored programmes to all professional groups,” says Vera Bruder, Director of the FiBL Academy, explaining: “Our trainee programme on organic farming and food production provides a tailor-made introduction for recruits to the profession. Other courses that we offer are aimed at particular target groups such as advisors or farmers interested in converting to organic farming.” The Academy focuses mainly on the topics of advisory skills, converting to organic farming, developing farming businesses, improving animal welfare and supporting junior employees.

### Development of online seminars

The FiBL Academy is growing: “In 2019 we ran a total of 70 one-day to three-day courses across the whole of Germany,” Vera Bruder explains. She feels it is important that course provision is constantly evolving. “We evaluate our seminars and take stock honestly; nothing is so good that it can’t be improved. The feedback from participants gives us lots of food for thought, and we are motivated, too, by the enthusiastic response that we get time and time again”. In 2020, the year of coronavirus, the Academy has run roughly the same number of courses as in 2019, although these have been split between in-person seminars lasting one or several days and a new format: online seminars. The spring of 2020 forced the staff at the FiBL Academy to extend their provision to virtual seminars in addition to face-to-face ones. This was initially a great deal of work, but surprisingly had positive outcomes as well. For example, introductory seminars on the topic of delivering environmental learning online were a big hit, with almost 100 people taking part.



Taking a close look in the animal health seminars. Practitioners and advisors hone their observation skills and learn to spot problems early.



Methodological training: jointly devising communication and advisory approaches.

There was also much interest – up to 55 participants – in the seminars on alternatives to castrating male piglets without anaesthetic.

“It would have been difficult for the Academy to run such large courses face-to-face even before the coronavirus pandemic,” Vera Bruder notes, “and an online course is easier for the participants to fit into their everyday lives.”

### Flexible learning on-screen

One example of this is a smaller virtual training course on time management and self-management, with 15 advisors, which has newly been split into four mornings over two weeks. Feedback from the participants indicates that an arrangement like this can be more easily accommodated in advisors’ stressful daily lives than the previous course structure of three consecutive days. Another advantage is that these professionals can immediately implement and integrate what they have learned into their working day, and they have the opportunity to discuss any problems or questions with the instructors and the group in the next session.

Experience shows that online formats offer flexible options and cater for different requirements. It is possible to present course content in a virtual environment

in a variety of ways. Forming personal connections and sharing ideas is also possible, even if restricted. In summary: even after the crisis, the online seminars will remain part and parcel of the FiBL Academy alongside the tried-and-tested courses held face-to-face. Elsa Gerhard, FiBL Germany

### FiBL Academy

Seminars and online registration: [akademie.fibl.org](http://akademie.fibl.org)  
 Information about the Academy: [www.fibl.org](http://www.fibl.org) >  
 Locations > Germany > Work areas >  
 FiBL Academy  
 Contact: [vera.bruder@fibl.org](mailto:vera.bruder@fibl.org)

FiBL Academy courses are part of the German federal scheme for organic farming and other forms of sustainable agriculture (Bundesprogramm ökologischer Landbau und andere Formen nachhaltiger Landwirtschaft, BÖLN), established and funded by the Federal Ministry of Food and Agriculture (BMEL).



Galina Hagn, manager of the “Bioschance” biodynamic horticultural enterprise in the middle of a new housing development in Vienna, spoke to the course participants about her oasis in the concrete desert.

## Organic from all four winds

Austria has set a course to organic farming. It has done that for some time now and quite successfully so. However, many consumers consider organic farming and food production to be something quite complicated. In order to resolve this complexity, it is important to present issues in a simple accessible way, which is exactly what the event series entitled “Kurs Richtung Bio” (Setting course towards organic) intends to do.

### 150 guests on the first night

The “Kurs Richtung Bio” events focus on typical organic foods and innovative practices from Austria’s east, west, north and south. The first event took place in November 2019, focusing on eastern Austria. More than 150 people gathered at the WUK (Werkstätten- und Kulturhaus) in Vienna. As planned for the following three events, the evening offered a sensual journey through organic culinary delights, a critical futures workshop and lively discussions about organic agriculture.

### Cattle as managers, urban vegetable production

Producers told their stories about outstanding organic foods, practices and ideas. The topics ranged from the presentation of innovative techniques for small-scale structured, future-oriented agriculture, organic cattle as managers of natural landscapes, organic vegetable production in the city, soil cultivation with horses and spontaneous fermentation in wine cellars to the challenges of getting to 100 per cent organic ingredients in the catering sector. Martin Grassberger, prominent medical doctor and author of the award-winning book “Das leise Sterben” (“Dying quietly”), addressed pressing questions about the global health and environmental crisis. The culinary expert and cookbook author Katharina Seiser guided participants through the variety of organic foods typical of the region – tastings included. More than one hundred organic specialties were on display afterwards for the guests to sample and the successful evening was concluded over organic bread and wine.

Elisabeth Klingbacher, FiBL Austria



Culinary expert Katharina Seiser guides guests through the almost infinite variety of organic specialties produced in eastern Austria.

The “Kurs Richtung Bio” event format focuses on the interaction between all participants. Over a period of four consecutive years, one “regional evening on points of view on organic farming and food, its future, and organic culinaria” is to take place each year. The aim is to tell stories about organics and to enter into a dialogue with interested consumers in order to enrich and deepen their everyday involvement with questions of nutrition, health and the environment. In communication with consumers, multipliers and journalists, a main intention is to promote an understanding of organic practice, strengthen confidence in organics and mainstream knowledge about the benefits of organic farming in everyday consumer life.

### Kurs Richtung Bio

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Partner and funding: AMA-Marketing GesmbH



# Expedient or nonsensical? Organic farming in developing countries

What do Kenyan women farmers think of organics?  
Why should cocoa be grown in agroforestry systems?  
Four FiBL researchers discuss the opportunities and limitations of organic farming in the developing world.

## What are the benefits of organics in the tropics?

**Beate Huber:** Based on our data from Kenya, India and Bolivia, we can clearly say that the level of organic farmers' economic security in the tropics can definitely match that of conventional farmers. Moreover, organic agriculture brings distinct advantages when other factors such as environmental protection or food safety are taken into account. However, if adherence to organic standards does not go beyond the minimum baseline, the benefits of organic farming are lost and farms usually produce significantly poorer yields. This is because the more the forces of nature are utilised, the better the system's performance and environmental benefits. An example would be the higher level of biodiversity resulting from the cultivation of a greater number of different crops.

**Gurbir Bhullar:** Our latest project in the Philippines exemplifies this. The area was a very beautiful forested, hilly region. Today, the area has been cleared and converted into a conventional maize monoculture with high levels of chemical inputs. Within a few years, the soil had eroded and the local drinking water had become polluted with chemicals. Yes, the conversion to organic agriculture would get rid of these chemicals. But in this case, it would not be sufficient to simply switch to organically grown maize. The entire system needs to be changed. Permaculture, agroforestry or other agroecological systems would be called for, for example.

## Is agroforestry the new organics?

**Monika Schneider:** That's a good point, especially when it comes to crops like cocoa or coffee. For these crops, agroforestry systems would be relatively easy to implement, highly expedient, and also build on traditional systems. However, not all organic standards make it mandatory to implement these kinds of cropping systems. Organic certifiers and legislators should seriously consider whether it would be more prudent to include agroforestry systems in the standards or to continue to leave their adoption up to the producers.

## So do we need new organic standards?

**Beate Huber:** For crops like cocoa and coffee this should definitely be given consideration. But we

must not forget that in most places organic standards only have an impact on export crops such as cocoa, coffee or cotton. However, organics is also important for the many smallholders who are often too small for



FiBL researcher Irene Kadzere works on knowledge hubs for organic agriculture and research projects in Africa.

certification while actually producing about 80 per cent of the world's food. In our projects, we therefore work almost exclusively with smallholder families. Ultimately it's about them having enough to eat and being able to make a better living. It's not about them getting certified. Where organic farming fits into this, in terms of making a contribution, is a matter of assessment.

**Monika Schneider:** It is also important to not just raise the standard of living to a level that is barely above the poverty line as defined by the countries in question, because that is not enough to be a farmer and be proud of it. In Bolivia the government implements the concept of "well living", which aims incomes far above the international poverty lines. Organic farming then raises them up another notch. The fact that they are well organised, in cooperatives for example, is crucial. This is the case with our partner in Bolivia, El Ceibo. There, the cocoa farmers participate in the

entire value chain and achieve better incomes as a result.

## Are organic farmers really financially better off, despite lower yields?

**Monika Schneider:** Many want to achieve the same yields in organic farming by simply replacing conventional fertilisers and sprays with organic alternatives. But often that doesn't work because the inputs are simply not available.

Agroforestry systems are an interesting alternative. In our trials in Bolivia we can see that agroforestry systems yield less cocoa than the monocultures, but all the yields combined, including timber and various fruit crops, leave more money in the farmers' pockets at the end of the day.

**Beate Huber:** Sometimes there are financial advantages specifically for women, as we found in the Syprobio project in West Africa. Using organic methods, they can generate their own income without having to spend a lot of money on external inputs such as fertilisers or pesticides, money that does not flow into the men's pockets. This gives them a level of financial independence. Organic agriculture can even contribute to emancipation in this way.

**Irene Kadzere:** In Africa, women also grow nutritious local vegetables along with the main cereal crops such as maize. Some women say that these vegetables can get destroyed if herbicides are used. In this situation organic farming helps to diversify

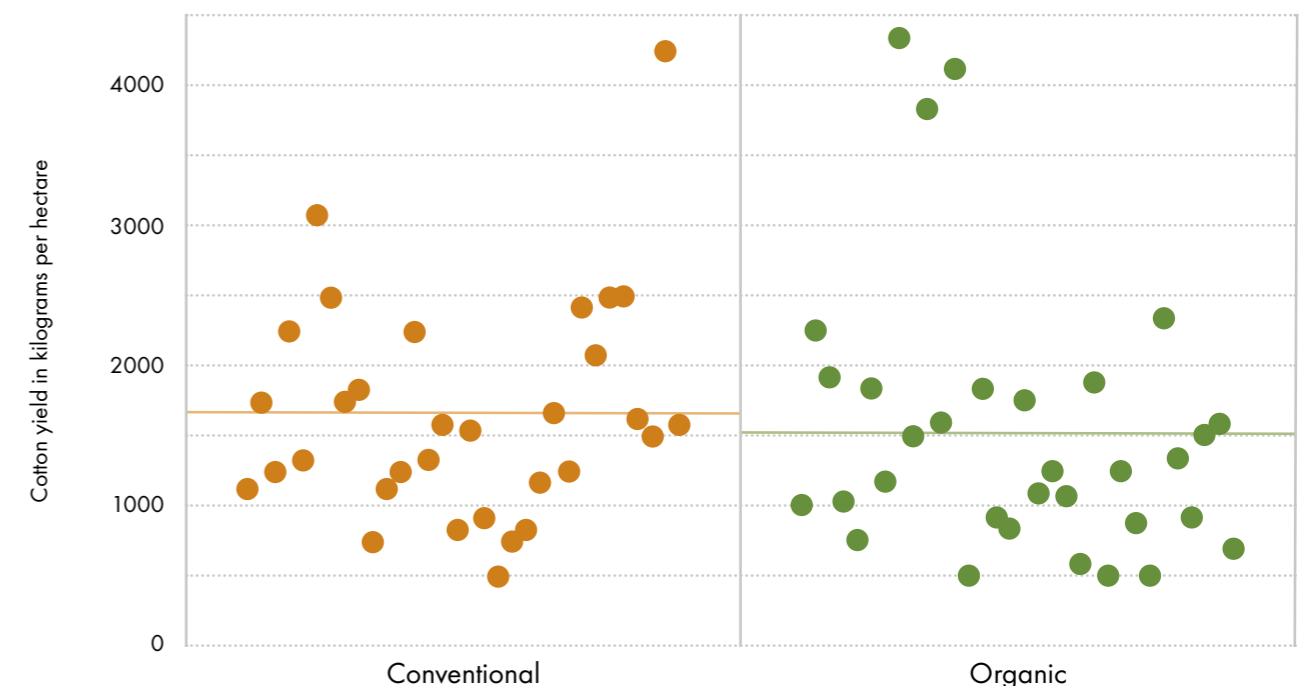


Beate Huber is Head of the Department of International Cooperation at FiBL Switzerland and manages the SysCom long-term system comparisons in the tropics.

food, nutrition and incomes, and is therefore considered the safer option.

**Beate Huber:** From a global perspective, and based on studies, we assume that at a rough estimate yields in organic agriculture are on average 20 per cent lower. However, these kinds of studies mostly compare ideal versions of organic and conventional agriculture respectively. But if we go beyond the research plots and take a look at the farmers' fields, as we did in a socio-economic study in India, we can see that the dif-

## India: Cotton yields on individual farms





Gurbir Singh Bhullar manages the long-term cotton trials.

ferences in yields between individual farms are much greater than the yield gaps between organic and conventional production. In other words, differences in

yields are determined to a much lesser degree by organic or conventional practices respectively than by the individual practices employed by the farmers and by the prevailing local conditions.

**What determines whether or not correct cultivation methods are implemented?**

**Irene Kadzere:** Mainstays of organic farming: knowledge-building and knowledge-sharing. In our projects in Kenya we can see that with organic agriculture, farmers acquire new knowledge about nature, the importance of soil building and the complementarity of livestock and crop production. Organic agriculture is a holistic approach when it is done well.

**Monika Schneider:** Especially in developing countries there are unfortunately only a few organisations that are dedicated to knowledge-building. It takes a lot of research, advice and knowledge exchange to adapt a technique to local conditions of production.

**Gurbir Bhullar:** Successful organic agriculture also requires adapted seeds. In India, we have therefore started to breed special organic cotton varieties in cooperation with farmers.

**Beate Huber:** This is a very important project. Conventional cotton seed has been genetically modified, is expensive and requires special, similarly expensive sprays. While a small farmer may just about be able to

afford these inputs, in a worst case scenario he or she will be left with nothing but debt if the harvest fails. If however the farmers propagate their own seeds, produce their own fertiliser and benefit from an organic price premium, they do not get caught in a debt trap and are financially better off.



Monika Schneider manages the long-term trials on cocoa and agroforestry in Bolivia.

**Gurbir Bhullar:** Consumers in India are also becoming more aware of the issue of chemical exposure. Overall, it is becoming increasingly important to eat a healthy diet. I think the Covid-19 pandemic will also have an impact in this regard and strongly increase the demand for organic products.

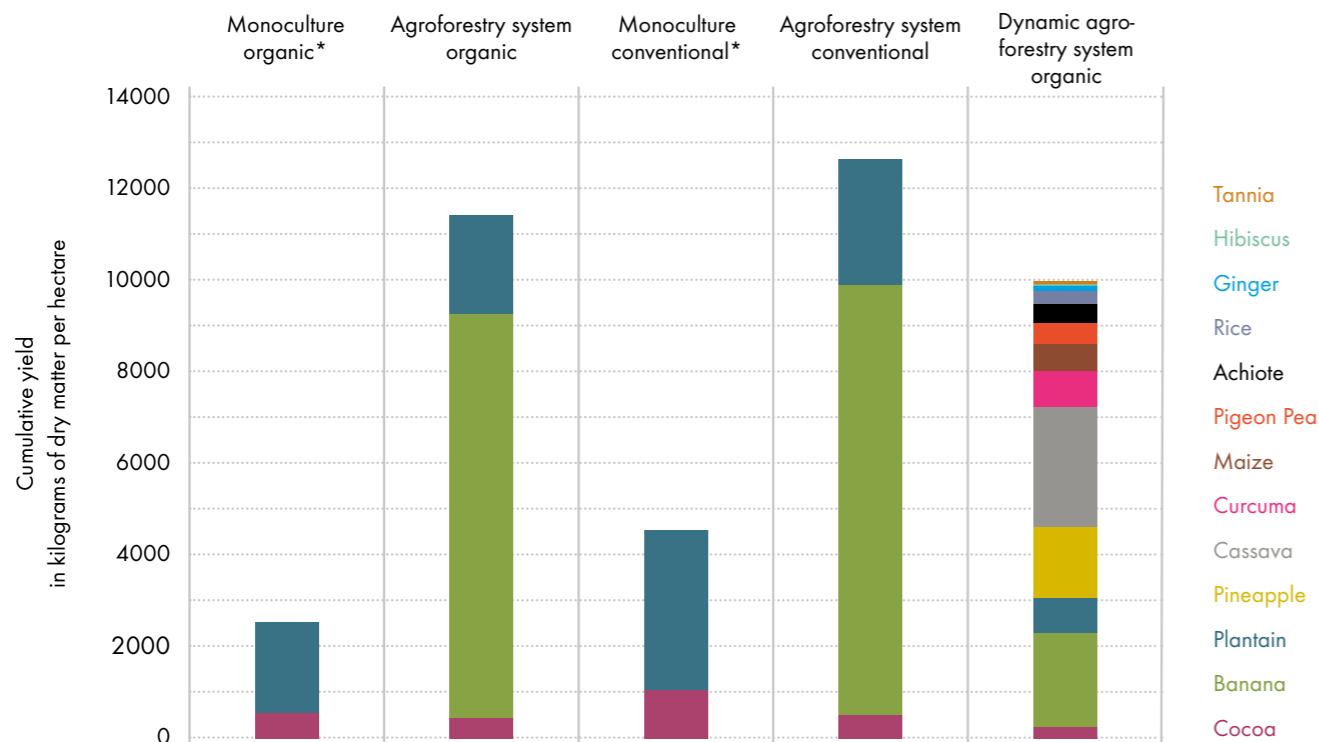
**So there is a high level of demand for organic food?**

**Monika Schneider:** About thirty years ago, when organic agriculture was introduced in developing countries, the primary concern was to produce certified products for export. This situation has changed now and organic products are also gaining importance in the domestic markets.

**Irene Kadzere:** While there are many small local success stories, there is still a lack of larger-scale organic initiatives that give women farmers access to local and international markets where they can achieve higher prices. Without this access, organic agriculture is not profitable.

Interview: Franziska Hämmerli, FiBL Switzerland

**Bolivia: Cumulative yields obtained in 2009 to 2014 in different cropping systems**



\* 3 years with Plantain for shading of young cacao trees

**What is the reputation of organics among the people?**

**Irene Kadzere:** I think the low pesticide load of organic food is a big plus. Kenyan officials told me at the inaugural meeting of ProEcoAfrica that the project came just in time, given that people have significant concerns about chemical residues in food. Female smallholder farmers who produce for the local market and have no label or certification also told us that many customers come to them specifically for their shopping because they know they don't use agrochemicals. In Kenya, it is the women's responsibility to provide healthy food for their families.

**Gurbir Bhullar:** These women have a sense of what our measurements in Kenya confirm: Conventional cereals and vegetables contain quite high levels of residues of many different chemicals, including even neurotoxins. However, mostly these values are below the threshold values.

**Monika Schneider:** We have the same discussions here about our drinking water. Agrochemicals are being detected in the water but mostly they don't reach the threshold values. People are worried nonetheless.

**Twelve years, three countries**

The most important findings of the SysCom long-term trials in Bolivia, Kenya and India are summarised in a report. Download at: [systems-comparison.fibl.org](http://systems-comparison.fibl.org)

Funding: Swiss Agency for Development and Cooperation SDC, Liechtenstein Development Service LED, Coop Fund for Sustainability, Biovision.

Partners: 12 research institutes, companies and foundations





No, it's not a lime, it's an orange infected with HLB. This disease turns the leaves and fruit a yellowish-green, and makes the oranges bitter and deformed.

## Oranges in danger

Citrus fruit producers globally are under threat from citrus greening. This bacterial disease (also known as HLB) is killing the trees on a massive scale. So far neither clear-felling nor pesticides have succeeded in stopping the disease. However, new cultivation methods can halt the spread, as a FiBL project in Mexico shows.

A glass of cold orange juice for breakfast – this luxury is at risk. Owing to citrus greening, exports of organic orange juice from Cuba have fallen within a few years from around 1000 tonnes to approximately 25 tonnes today - a collapse of more than 95 per cent. When, in 2011, HLB was also sighted in Yucatan, in southern Mexico, the Coop supermarket chain sprang into action and set up a project with FiBL to pre-empt the disease. Firstly, growers were taught to remove host plants and to recognise the disease vector, the Asian citrus psyllid *Diaphorina citri*. They also learned which bioinsecticide would help and when, and so



FiBL project leader Salvador Garibay (2<sup>nd</sup> from right) talking to Mexican orange producers.

avoided having to spray with the chemical insecticides prescribed by the government.

### Colourful flowers are a valuable ally

Field trials conducted at different sites over several years revealed something astonishing: on average, 570 specimens of the psyllid are present in each hectare of organic orange orchard every year, whereas 4230 were found in conventional orchards. This means that there are seven times fewer in organic systems.

"This result shows clearly what can be achieved just by not using the herbicides that conventional growers use to suppress the vegetation beneath the trees," says Salvador Garibay, the FiBL project leader and a Mexican by birth. "In organic farming, where herbicides are banned, flowers of all colours appear automatically and attract a more diverse and therefore better-balanced insect population. This brings ecological equilibrium to the agrarian system." Conventional growers can benefit from these findings as well.

In addition, plant tonics are being trialled to improve the trees' natural resistance to insects and bacteria. Moreover, the team found among existing bioinsecticides a fungus that kills the psyllid. Tests are now being carried out to see if this fungus is harmless to beneficial insects. A wasp that parasitises the psyllid is also soon to be assessed for release. In short, the team is working flat out to save the citrus trees.

Franziska Hämmerli, FiBL Switzerland

### Project on the control of citrus greening disease/HLB

Contact: salvador.garibay@fibl.org  
Funding: Coop Sustainability Fund



Information source for decision-makers: FiBL Europe in Brussels.

## Organic across Europe

Based in Brussels, FiBL Europe was founded in 2017 to represent all FiBLs at a European level. The team of five benefits from the backing and expertise of over 300 FiBL researchers and provides information for farmers, companies in the food sector and decision-makers. Three current activities are presented here.

### Organic and the SDGs

The scientific evidence produced by FiBL scientists was placed at the centre of discourse at global level about the Sustainable Development Goals (SDGs) of the United Nations. FiBL Europe organised the conference "The contribution of Organic Agriculture to the SDGs: Scientific evidence from comparative research" in February 2019. The FiBL researchers, together with other leading scientists in the field, underscored that organic agriculture has the potential to contribute to the achievement of several SDGs in low-income countries. Policy-makers in the fields of international development and cooperation agreed that organic and agroecological approaches should be supported.

Contact: miguel.deporras@fibl.org

Partners: FiBL Switzerland, European Commission, European Parliament, FAO

### European and affiliated Input Lists

The European Input List, being one of the core missions of FiBL Europe since its foundation in 2017, marked the start of intensive cooperation among the various national partners involved in the project. Since then FiBL Europe, FiBL Switzerland, FiBL Germany and InfoXgen, the publisher of the Austrian Input List, all having decades of experience in producing national input lists for their respective countries, have been joining forces within the fields of input evaluation. As one key outcome, the European Input List, a supranational joint directory of products that can be legally

used in organic farming, was published in 2018 for the first time. With the primary goal to establish a one-stop-shop for the various target groups, the cooperation importantly also fosters exchange on technical aspects, further development of input evaluation criteria as well as extension of the geographical scope of the European Input List to even more countries. Since its first release in 2018 the List has already grown to embrace two new lists for Croatia and Italy.

Contact: pia.pedross@fibl.org

Partners and funding: FiBL Germany, FiBL Switzerland, InfoXgen

### Online training for newcomers

FiBL Europe is a project partner in the ongoing Erasmus+ project StartUpBio, which runs from November 2019 to November 2021. The project develops online training materials and courses for newcomers to organic production in Mediterranean countries. It targets an audience that wishes to start an agricultural business as well as farmers who want to convert from conventional agriculture. Both a basic and an advanced online training course have been developed, combining webinars, video material and infographics. FiBL Europe's main role is to evaluate and validate the content and appropriateness of the training material.

Contact: lisa.haller@fibl.org

Co-funding: Erasmus+ Programme European Union  
Partners: Centoform (IT), Ecovalia (ES), Federbio Servizi (IT), AKEP (EL), Agrobio (PT)

# Thank you, Urs!

Urs Niggli was the Director of FiBL Switzerland for 30 years and made a crucial contribution to the institute's advancement. In March 2020, Urs Niggli spent his last working day in Frick. Together with him we looked back over the past three decades, picked out a few highlights and talked about his motivations.

"The whole of FiBL has been a highlight" Urs Niggli replied when we asked him about outstanding moments in his 30 years at the institute. For him, major successes include the growth to date to around 300 employees in six countries, the expansion of activities in all areas of organic agriculture, and the successful entry into the EU research arena.

## "FiBL is a success story"

With great delight, the former Director recounts that FiBL researchers have been able to publish in the world's foremost journals and that FiBL was the first institution to publish on a topic in the field of organic



Led FiBL for three decades and was crucial for its success: Urs Niggli.

agriculture in the journal "Science", the most important of its kind alongside "Nature".

"FiBL's development and the successes that have been achieved here for the worldwide organic movement do make me proud. FiBL is a success story." Urs Niggli is also positive about the institute's future: "The institute is very well positioned on excellent foundations. I am convinced that it will continue to develop successfully."

Things were different when Urs Niggli began his career at FiBL in 1990, then still located in Oberwil in the canton of Basel-Landschaft: "FiBL was a rarity and a very small institution. There was no laboratory, no technical infrastructure and a mere 20 people," the Solothurn native recalls.

## The joy of fulfilling work

Thirty years devoted to organic research – that's an impressive number, behind which stands a great deal of perseverance and motivation. Where did he find the strength? "This work simply gave me great joy – I was able to express myself through my work."

Urs Niggli was able to achieve fulfilment in the organic sector and help shape and advance both the institute and organic farming. "I'm very interested in sustainable food and farming and I think that they are future-proof only in their sustainable forms. Organic agriculture is a great tool for both."

## FiBL says "Thank you!"

The FiBL team is extremely grateful for his commitment to global organic research and the institute's advancement over all these years. Urs Niggli not only significantly shaped FiBL, but with his outgoing manner he was also always receptive to the staff's concerns and suggestions. So once again all of us at FiBL would like to say a heartfelt: Thank you, Urs!

Seraina Kalchofner, FiBL Switzerland

## So what does Urs Niggli do now?

Thoughts of retirement are far from the 67-year-old's mind. Instead, in 2020 he founded "agroecology. science" an institute for sustainable food and farming systems. As head of the institute he is currently supporting the UN in their preparations for the 2021 World Food Summit. He also acts as scientific advisor for Agroscope and is chairman of FiBL Austria. His book "Alle satt? Ernährung sichern für 10 Milliarden Menschen" (All fed? Securing food for 10 billion people; German edition only) was published by Residenz Verlag in 2021.

# FiBL Europe

FiBL Europe is based in Brussels and represents the national FiBLs as well as two partner institutions (ÖMKi in Hungary, IBLA in Luxembourg) at a European level. FiBL Europe provides a single access point for the full competences of the national FiBLs. It offers applied research, consultancy and training.



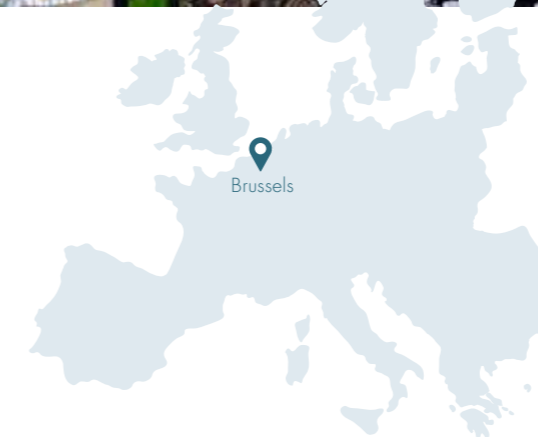
Board: Andreas Kranzler, Dóra Drexler, Felix Heckendorn, Beate Huber (President), Lucius Tamm, Robert Hermanowski.



5 employees

1 intern

0.5 million euros annual budget



## Profit and loss account

	2018 in euros	2019 in euros
<b>Income</b>		
Internal revenue	417'344'00	471'517'00
External project income	34'766'00	47'071'00
<b>Total income</b>	<b>452'110'00</b>	<b>518'588'00</b>
<b>Expenditure</b>		
Expenditure on personnel	330'136'00	392'327'00
Misc. expenditure	72'940'00	90'339'00
Services	14'958'00	938'00
<b>Total expenditure</b>	<b>417'568'00</b>	<b>482'406'00</b>
<b>Operating result</b>	<b>34'076'00</b>	<b>34'983'00</b>



# FiBL Switzerland

Interdisciplinarity and rapid transfer of knowledge between research, extension and practice are the strengths of FiBL Switzerland. Its competencies are also in demand in numerous international projects. In addition to offices and laboratories, FiBL Switzerland's site at Frick includes a farm holding, an orchard, a vineyard with its own wine press and a restaurant, all of which are run organically. In 2016 the Suisse Romande department, based in Lausanne, was established to strengthen FiBL's presence in French-speaking Switzerland.

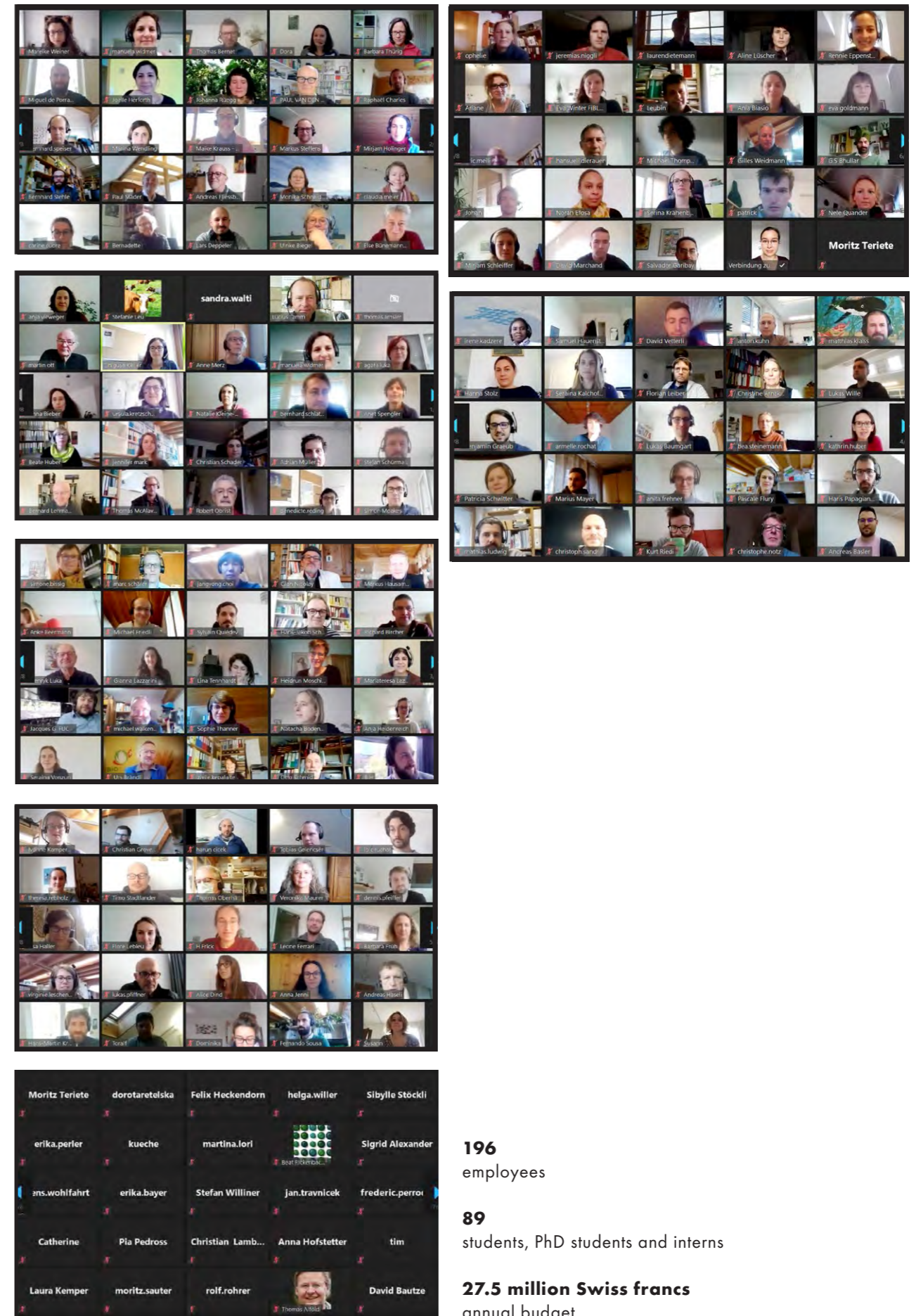


Foundation Council (from left): Bernhard Lehmann, Ulrich Siegrist, Roland Frefel, Martin Ott (President), Claudia Friedl, Urs Brändli, Ralf Bucher, Peter Felser. Absent from the picture is Markus Hausammann.



## Profit and loss account

	2018 in CHF	2019 in CHF
<b>Income</b>		
Research	11'889'610	14'203'014
Federal contribution	7'350'700	7'350'700
Extension, training and communication	3'783'452	1'157'848
International cooperation	3'742'596	3'359'636
Research farms	269'901	281'711
Restaurant, internal services	565'609	511'615
Donations, misc. income	1'117'419	676'484
<b>Total income</b>	<b>28'719'287</b>	<b>27'541'007</b>
<b>Expenditure</b>		
Expenditure on personnel	17'124'176	16'966'572
Material expenditure		
- Materials for trials, laboratory consumables, analytics, project costs	8'740'257	7'480'897
- Cost of office, workshop space, office supplies, other exp. for administration, IT, advertising	2'154'759	2'260'733
Financial expenses	194'304	221'763
Depreciation	833'876	836'417
<b>Total expenditure</b>	<b>29'047'372</b>	<b>27'766'382</b>
<b>Extraordinary revenue</b>	<b>345'100</b>	<b>260'250</b>
<b>Surplus for the year</b>	<b>17'015</b>	<b>34'875</b>



196 employees

89 students, PhD students and interns

27.5 million Swiss francs annual budget

# FiBL Germany

FiBL Germany offers scientific and practice-oriented expertise on current issues in organic agriculture and food production at its sites in Frankfurt am Main, Bad Dürkheim, Witzenhausen and Augsburg. Current work priorities include the inputs list, animal welfare, the FiBL Academy, the "Öko-Feldtage" (organic field days), rural areas and value chains.



Board (from left): Robert Hermanowski, Uli Zerger, Urs Niggli, Jörg Große-Lochtmann, Wolfgang Gutberlet, Felix Prinz zu Löwenstein, Alexander Gerber, Steffen Reese, Gerold Rahmann. Absent from the picture are Beate Huber, Jürgen Heß (Chairman of the Board), Jan Plagge.



**59**  
employees

**5**  
students, PhD students and interns

**6 million euros**  
annual budget



## Profit and loss account

	e.V. 2018 in euros	e.V. 2019 in euros	GmbH 2018 in euros	GmbH 2019 in euros
<b>Income</b>				
Research & Development	1'059'513	852'292	0'000'000	0'000'000
Other	191'740	94'618	3'797'816	4'472'332
<b>Total income</b>	<b>1'251'253</b>	<b>946'910</b>	<b>3'797'816</b>	<b>4'472'332</b>
<b>Expenditure</b>				
Expenditure on personnel	683'312	526'366	1'147'326	1'525'892
Material expenditure / project costs	499'126	339'091	2'252'595	2'559'893
Cost of office, administration	31'019	32'760	291'084	297'282
Depreciation	682	555	10'852	12'045
<b>Total expenditure</b>	<b>1'214'138</b>	<b>898'772</b>	<b>3'701'857</b>	<b>4'395'111</b>
<b>Operating result</b>	<b>37'114</b>	<b>48'138</b>	<b>95'958</b>	<b>77'221</b>

# FiBL Austria

With practice-oriented research and market development projects, FiBL Austria plays an active role in the comprehensive exchange of knowledge along the organic food production chain – including the provision of sound knowledge about organics for consumers.



Board (from left): Eva Hieret, Alexandra Pohl, Werner Zollitsch, Josef Renner, Urs Niggli (Chairman of the Board), Gerhard Zoubek, Andreas Kranzler, Martin Preineder.



**30**  
employees

**8**  
students, PhD students and interns

**1.2 million euros**  
annual budget



## Profit and loss account

	2018 in euros	2019 in euros
<b>Income</b>		
Research and innovation	920'000	590'000
Training & Education	570'000	420'000
Other	360'000	220'000
<b>Total income</b>	<b>1'850'000</b>	<b>1'230'000</b>
<b>Expenditure</b>		
Expenditure on personnel	1'150'000	922'000
Misc. expenditure	53'000	44'000
Project material cost	547'000	196'000
Office expenditure	81'000	66'000
<b>Total expenditure</b>	<b>1'831'000</b>	<b>1'228'000</b>
<b>Surplus</b>	<b>19'000</b>	<b>2'000</b>

# FiBL France

FiBL France is headquartered in the south-east of the country where it conducts laboratory and field trials in collaboration with a network of farmers and other partners. Research topics emerge in response to evolving needs and currently revolve around agroforestry, small ruminant and pig health, and soil and plant health.



Board (from left): Lucius Tamm, Frédéric Rey, Felix Heckendorn (President), Raphaël Charles.



**6**  
employees

**2**  
students

**0.25 million euros**  
annual budget



## Profit and loss account

	2018 in euros	2019 in euros
<b>Income</b>		
Research	145'000	175'600
Services, training	35'162	14'510
Extraordinary revenue	16'467	13'422
<b>Total income</b>	<b>196'629</b>	<b>203'532</b>
<b>Expenditure</b>		
Expenditure on personnel	24'875	27'718
Project cost	138'158	128'905
Operational costs	21'187	34'393
Depreciation	7'443	13'575
<b>Total expenditure</b>	<b>191'664</b>	<b>204'591</b>
<b>Operating result</b>	<b>4'965</b>	<b>-1'059</b>

# ÖMKi

The Hungarian Research Institute of Organic Agriculture ÖMKi works on research-innovation tasks leading to practically implementable results, thus guaranteeing the sustainable development of agriculture and food production in Hungary. To this end the organisation develops professional networks in cooperation with farmers, Hungarian and international research institutes covering the fields of horticulture, arable cropping, viticulture, animal husbandry and precision farming technologies.



Board (from left): Dóra Drexler, Árpád Nagy, Zsófia Hock, Ferenc Frühwald (President).



**22**  
employees

**5**  
students and interns

**0.74 million euros**  
annual budget



# FiBL's clients, donors and supporters

2019 / 2020

We thank all firms, institutions and private donors for their support. For reasons of data privacy we do not list the names of the private individuals who have made donations or contributions. We nevertheless wish to extend our heartfelt thanks for their generous backing.

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## Back cover, top left

A new star on the horizon of the organic breeding bull scene: Jansrud. He excels at converting roughage, has a friendly disposition and passes on his traits of longevity, excellent health and good milk yields. Also in the photo: Anet Spengler, project manager for organic dairy breeding and FiBL cattle expert, and Marco Bettini, animal caretaker and head of livestock husbandry at the Plantahof. Read more on page 28.

## Back cover, top right

Functional biodiversity has potential to control the cicadas in lavender fields. Read more on page 24.

## Back cover, below left

Using molecular markers to find robust cultivars more quickly is one of the goals of FiBL's plant breeding team. Read more on page 26.

## Back cover, below right

Farmers Gladys Muthoni (left) and Lydia Mieere follow an organic farming course delivered by means of text messages in East Africa. Read more on page 48.

