September 2020

agroscope

Agroscope good food, healthy environment

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Integrated Control of Spotted-Wing Drosophila

Native to Asia, the spotted-wing fruit fly *(Drosophila suzukii)* has caused significant local crop losses in soft- and stone-fruit production as well as viticulture since its first appearance in Switzerland in 2011. The fruit fly attacks the ripening or ripe fruit of many cultivated and wild fruit species, rendering it unmarketable. Together with partners from the research, extension, practice and enforcement sectors, Agroscope promotes the development and implementation of damage-minimising control approaches which aim for a sustainable, economically viable coexistence with the pest whilst bearing in mind the growing quality requirements of retailers and consumers.

Finding Solutions Together

Agroscope conducts system-oriented research along the main value chains in the agriculture and food sector. But what lies behind this very general description? By means of concrete examples, our new magazine *agroscope*, which will be published several times a year, shows the topics we are working on as well as which relationships and interactions in the system merit particular attention.

A key issue of our time to which Agroscope hopes to make an important contribution is as follows: How can we meet the need for healthy foods in an even more sustainable manner, today and in future? We know that there is no universally valid, and above all no consistent answer: after all, we are trying to reconcile the competing, at times contradictory demands and expectations of economics, ecology and society. Nevertheless, Agroscope can help to develop possible solutions, depicting all their benefits and drawbacks in a transparent manner, and offering them as a basis for decision-making.

Agroscope provides scientific criteria to help support unbiased discussion and deal with conflicting objectives. A current example of this is the study on the environmental impact of the Drinking-Water Initiative (page 6). Such studies are a prerequisite for competently weighing up competing interests.

However, Agroscope also aims to support farming families in their everyday lives. For this, closeness and ongoing mutual exchange are needed. The new Agroscope site strategy (page 4) will reinforce this practical relevance and strengthen cooperation with stakeholders from research, extension and education. Together, we work on the production and provision of our daily food in an environment which will also serve future generations as a basis for food production.

Eva Reinhard

Agroscope is the Swiss Centre of Excellence for Agricultural Research, and is affiliated with the Federal Office for Agriculture (FOAG). Agroscope makes an important contribution to a sustainable agriculture and food sector as well as to an intact environment, thereby contributing to an improved quality of life.

Kaolin – Effective against Spotted-Wing Drosophila in Vineyards with no Impact on Wines

Kaolin was tested in viticulture to control the dreaded pest *Drosophila suzukii*. The trials showed that this natural product has a comparable efficacy to conventional insecticides without any adverse effect on wine quality.

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Fighting Antibiotic Resistance

Alternatives to antibiotics must be found to combat antibiotic resistance in animal production. The plant sainfoin reduces postweaning diarrhoea in piglets, thus reducing the need for antibiotic treatment

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Other Themes

Events

15 / 9 / 2020, Agroscope Reckenholz
News from Arable Farming Research 2020

15 –16 / 9 / 2020, Agroscope Tänikon
Milking Technique Conference – Agroscope and Agridea

24 / 9 / 2020, Agroscope Posieux
Conference on Animal Production 2020

6 / 10 / 2020, Agroscope Tänikon
43rd Agroscope Agricultural Economics Conference
Swiss Agriculture in Transition

3–4 / 11 / 2020, Landwirtschaftliches Institut Grangeneuve, Posieux
Training Course on Rural Construction 2020

5 / 11 / 2020, Kongresszentrum Allresto, Bern
National Conference on Spotted-Wing Drosophila

28 / 1 / 2021, University of Bern
8th Agroscope Sustainability Conference

All Agroscope events open to the public are advertised on our website.

Moving Forward with Strength

The implementation of the new site strategy has begun: in future, Agroscope will consist of a central research campus in Posieux (canton of Fribourg), a research centre in Changins (canton of Vaud) and Reckenholz (canton of Zurich), and peripheral experimental stations. The efficiency gains arising from the new strategy will be reinvested in research. The planned expansion of the peripheral experimental stations will decisively strengthen practical relevance.

Main sites

Posieux Campus
Animal-related research (including feed) / Food and nutrition research / Monitoring programmes and sustainability assessment / Centre for Laboratory Infrastructures & Research Technology

Changins
Basics of plant protection for all crops / Arable cropping systems and oenology

Reckenholz
Plant breeding and variety development / Agroecology and natural resources

Experimental stations

Alpine and Mountain Farming: *Valais, Bern, Grisons, Uri, Ticino* / Digitalisation: *Tänikon* / Fruit and Berry Growing: *National network* / Horses: *Avenches* / Invasive Alien Species: *Cadenazzo* / Oenology: *Changins* / Raw-Milk Products: *Grangeneuve* / Smart Technologies: *Schaffhausen, Thurgau* / Special Crops in the Alpine Region: *Conthey* / Substance Flows: Nitrogen and Phosphorus: *Sursee* / Viticulture Centre: *Wädenswil* / Vegetable Production: *Ins* / Viticulture and Oenology: *Leytron* / Viticulture and Vine Breeding: *Pully*

How can we meet challenges such as climate and structural change, novel pests, the loss of biodiversity, or society's pressing demands to produce ever more food of higher quality within a limited space, and as far as possible without plant-protection products? One answer to this question is, with a strong agricultural research sector!

Future-Oriented Solutions from Research

With its broad-based research and development activities, Agroscope provides innovative and system-based solutions and findings for today's and tomorrow's problems. In this way, Agroscope makes a valuable contribution to the discussion of how the agriculture and food sector can produce in a more efficient and sustainable manner. But that's not all – Agroscope also develops independent scientific criteria for decision-making and for the further development of agricultural policy.

The new site strategy more effectively pools Agroscope's internal skills and activities while expanding the Swiss-wide network. The creation and expansion of the peripheral experimental stations, which are run in partnership with the production branches, cantons and extension services, opens up new opportunities for knowledge exchange and practice-oriented research.

Building Bridges between Research and Practice

The aim of the peripheral experimental stations is to answer application-oriented questions in their respective regional and climatic context, based on the scientific principles developed on the Posieux campus and at the Changins and Reckenholz research centres. This will be done in close connection with the agricultural sector and with multipliers that will disseminate practice-oriented findings and successful solutions.

The approach of the experimental stations, involving intensive cooperation with the cantons and the sector, is not a new one. Agroscope already operates special sites for answering practical questions, e.g. in Conthey for special crops, in Cadenazzo for invasive pests, and in Tänikon for digitalisation.

From the Experimental Farm to Commercial Farms

In the Tänikon experimental dairy housing for emission measurements, for example, measurements contributing to the reduction of ammonia and greenhouse gas emissions are tested under controlled experimental conditions. In a following step, the results are verified in the network of commercial farms under real-life conditions and tested in terms of their technical feasibility and practicability. If the results are positive, they enter broad practice via education and extension.

Eva Reinhard, Head of Agroscope, sees a major opportunity in optimised, standardised knowledge exchange with practice, as well as in focusing and strengthening research and networking: "I am convinced that the shared commitment of all involved stakeholders will motivate, promote, and thus strengthen the agriculture and food sector. In particular, it will enable the faster transfer of research findings into practice. This is a decisive step in our efforts to make agricultural production more sustainable, more efficient and economically more successful." —

Conclusions

The networking of the Posieux, Changins and Reckenholz sites with the experimental stations is crucial for Agroscope's service provision and for knowledge exchange with practitioners. Here, three interdependent 'spheres of influence' are key:

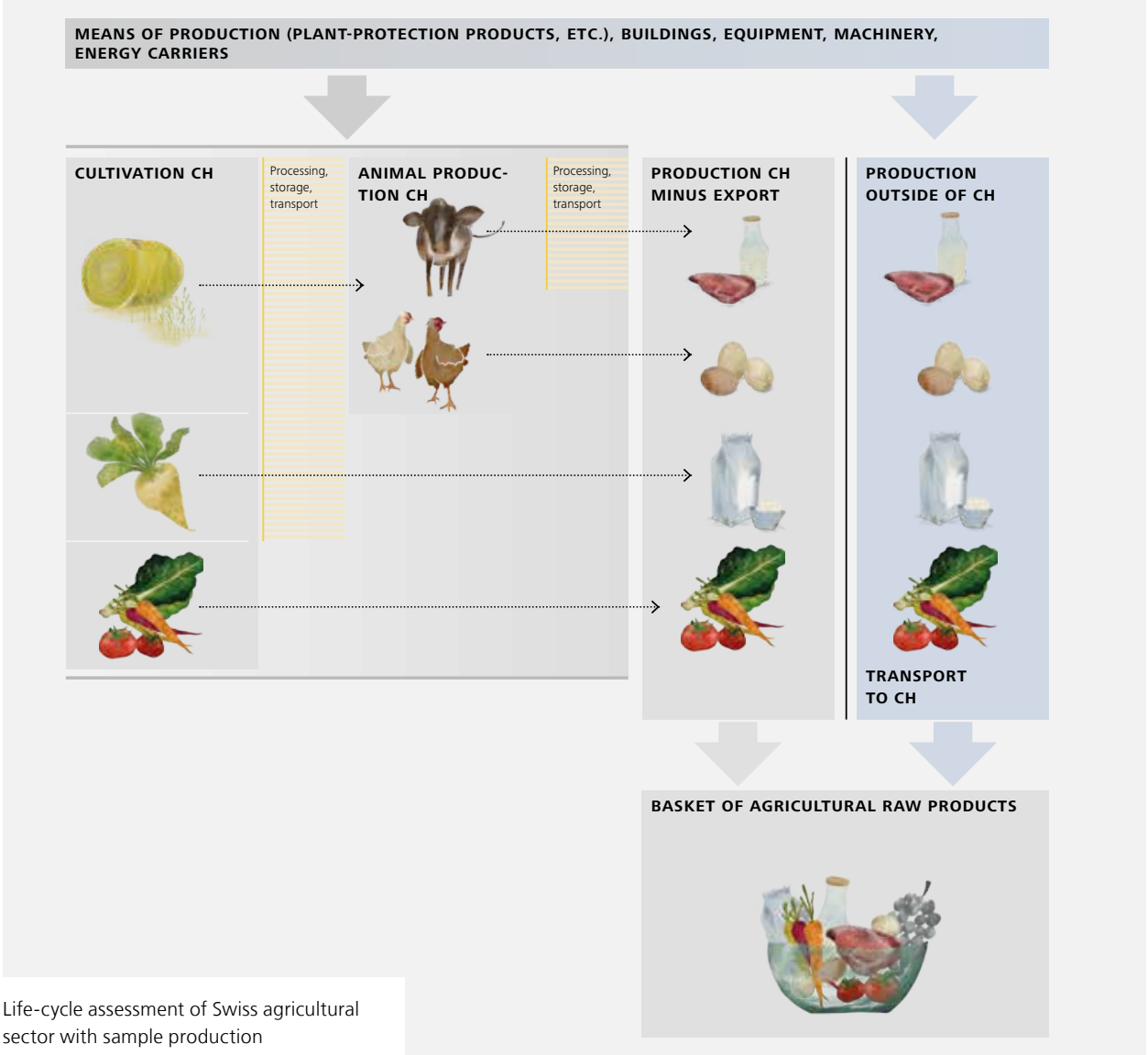
- System research on the Posieux campus and at the Changins and Reckenholz research centres
- Practice-oriented research and knowledge exchange via the experimental stations
- Implementation of solution approaches from research in the agri-food sector and in food processing

Agroscope Future Project: Detailed Concept and Implementation Planning for the Future Site Strategy (available in German and French)

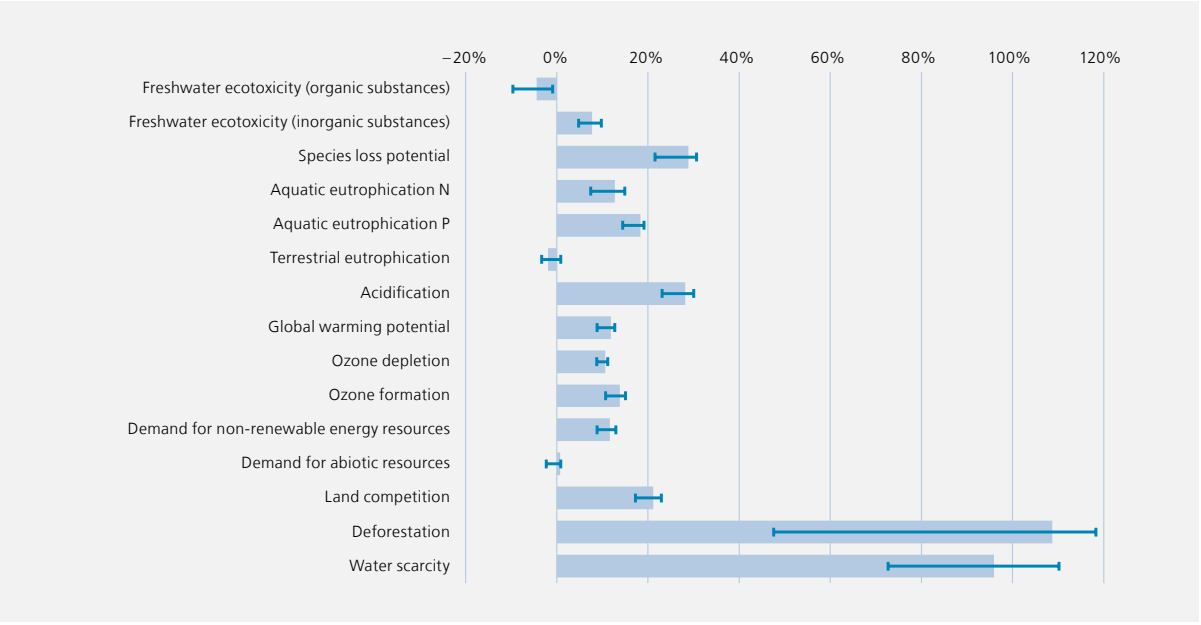
Study on Environmental Impacts of Drinking-Water Initiative

In an in-depth study, Agroscope analysed the possible environmental impacts of implementing the Drinking-Water Initiative. The life-cycle assessment shows that pesticide and nutrient pollution of Swiss water bodies and groundwater could be reduced. In addition, inland biodiversity could be improved slightly. Overall, however, rising food imports would lead to increased environmental pollution.

Maria Bystricky, Thomas Nemecek, Simone Krause and Gérard Gaillard



Life-cycle assessment of Swiss agricultural sector with sample production



Total basket of products (domestic production + imports): Deviation of the environmental impacts of the intermediate scenario from the reference and fluctuation range of all 18 DWI scenarios

The Popular Initiative 'For Clean Drinking Water and Healthy Food – No Subsidies for Pesticide and Prophylactic Antibiotic Use' aims to significantly tighten Proof of Ecological Performance (PEP) requirements. It is expected that the electorate will vote on this Drinking-Water Initiative (DWI) in 2021. Adoption of the initiative would lead to fairly major changes in the Swiss agricultural sector. In an in-depth study, Agroscope explored possible environmental impacts of implementing the DWI, based on 18 scenarios.

The Life-Cycle Assessment Method

The results of the investigations are summarised in the study 'Potential Environmental Impacts of Implementing the Drinking-Water Initiative'. The researchers used life-cycle assessment to investigate possible environmental impacts. Life-cycle assessment is a recognised environmental assessment method. It gives indications of the extent to which certain measures will impact the environment and with what overall consequences, and highlights potential trade-offs.

Focus on Two Measures

In their calculations, the researchers focused on two measures of the Drinking-Water Initiative: firstly, forgoing the use of pesticides; and secondly, farms keeping only as many animals as could be fed with forage that could be produced on-farm. A Swiss 'basket of agricultural raw products', consisting of domestic products and imports, served as a basis of comparison for the impact assessments. The same scenarios as in the predecessor study 'Drinking-Water Initiative Impact Assessment: Economic and Agricultural Structural Effects', published by Agroscope in 2019, were investigated.

Increasing Environmental Impact of Swiss Basket of Products

The life-cycle assessment shows that the investigated measures of the Drinking-Water Initiative can reduce pesticide and nutrient pollution in Swiss water bodies and groundwater and slightly improve inland biodiversity. The overall result, however, would be increased environmental pollution due to rising food imports, with meat imports contributing more heavily to this than imports of plant-based foods. Hence, the improvement in water quality in Switzerland would necessarily come at the expense of sometimes significant environmental pollution in the countries of origin of the imported products. —

Agroscope Science 99, Potential Environmental Consequences of Implementing the Drinking-Water Initiative, 2020 (summary in English)

Possible Developments in Agricultural Policy from 2022

Model projections from Agroscope show how the AP22+ could impact production, income, and the ecological footprint of the Swiss agricultural sector.

→ Publication

Scenarios for the Future

The SALBES Project examines developments in agricultural production and biodiversity arising in the context of climate change, the markets, new technologies, and policy.

Growing Rice in Switzerland

Temporarily flooded fields are considered to be of limited agricultural value. In order to manage them in an economically and environmentally sound manner, Agroscope is testing wet rice cultivation in northern Switzerland. In addition to the technical aspects of cultivation, there is the issue of motivation for wet rice cultivation on the Swiss Central Plateau. A film depicts Agroscope's pilot trials in wet rice cultivation.

→ Video

Towards Pesticide-Free Agriculture

Together with over 20 other European research institutions, Agroscope has signed a Memorandum of Understanding for the promotion of a sustainable agri-food system in Europe. The declaration of intention establishes formal cooperation between the partner institutions.

Pest Control with Gene Drives

To control pests without pesticides, genetically modified organisms of the same species could be used. But how can the environmental impact of such gene-drive elements be recorded and assessed? Experts from Agroscope have authored a concept study on this topic.

→ Press release

Identification and Control of Yellow Nutsedge

The video explains the biology and characteristics of yellow nutsedge *(Cyperus esculentus)* and shows how this invader can be identified and controlled.

→ Video

Plastics in Agriculture

Every year, plastic residues from products used in agriculture, but also from littering or foreign substances in organic waste, end up in the soil. Alternatives waste such as biodegradable plastics currently form the subject of research.

→ Publication

Sources of Pollen and Nectar for Honey Bees

In order to survive, bees need nectar as a source of energy, and pollen as a source of proteins, fats, minerals and vitamins. A new leaflet introduces important Swiss honey plants.

→ Publication

United in the Fight against Japanese Beetle

Agroscope has been awarded the contract for an EU Horizon2020 Project. Together with European partners, it aims to develop sustainable strategies for controlling the quarantine pest, Japanese beetle.

Agroscope's International Networking in a Map

Agroscope is involved in numerous networks, working groups and expert groups, conducts cooperative ventures and partnerships with research-related organisations, and collaborates with other institutions on international research projects. The interactive map provides an overview of all the institutions worldwide with which Agroscope maintains a form of cooperation.

→ Map

Managing Water and Nutrients More Efficiently

Agriculture will need to adapt to dry summers and wet winters. With the aim of developing adaptation strategies, Agroscope experts have carefully calculated possible scenarios for the current climate as well as for the near and distant future.

→ Press release

How to Monitor Livestock Health Digitally

An overview of digital systems available on the market shows that the greatest range is on offer for monitoring dairy cows and the smallest for monitoring fattening and dairy sheep and goats.

→ Article

Sustainable Crop Protection: Innovation and Responsibility

Interview with Alain Gaume, Head of the 'Plant Protection' Strategic Research Division and Member of the Agroscope Executive Board

What challenges face the agricultural sector in terms of plant protection?

Due to ongoing globalisation and climate change, we face a series of growing problems when protecting our crops: insects, bacteria, viruses, phytoplasmas and fungal diseases. At the same time, the number of authorised plant-protection products is decreasing, or PPPs are losing their effectiveness because pests and pathogens are developing resistance.

What expectations do consumers have?

Switzerland's population is calling ever more forcefully for food and drinking water to be free from residues and for the plant-protection products used to be environmentally compatible. On the other hand, many people show little understanding when the apples on sale in the shops that are produced without or with limited use of fungicides have a few spots on them.

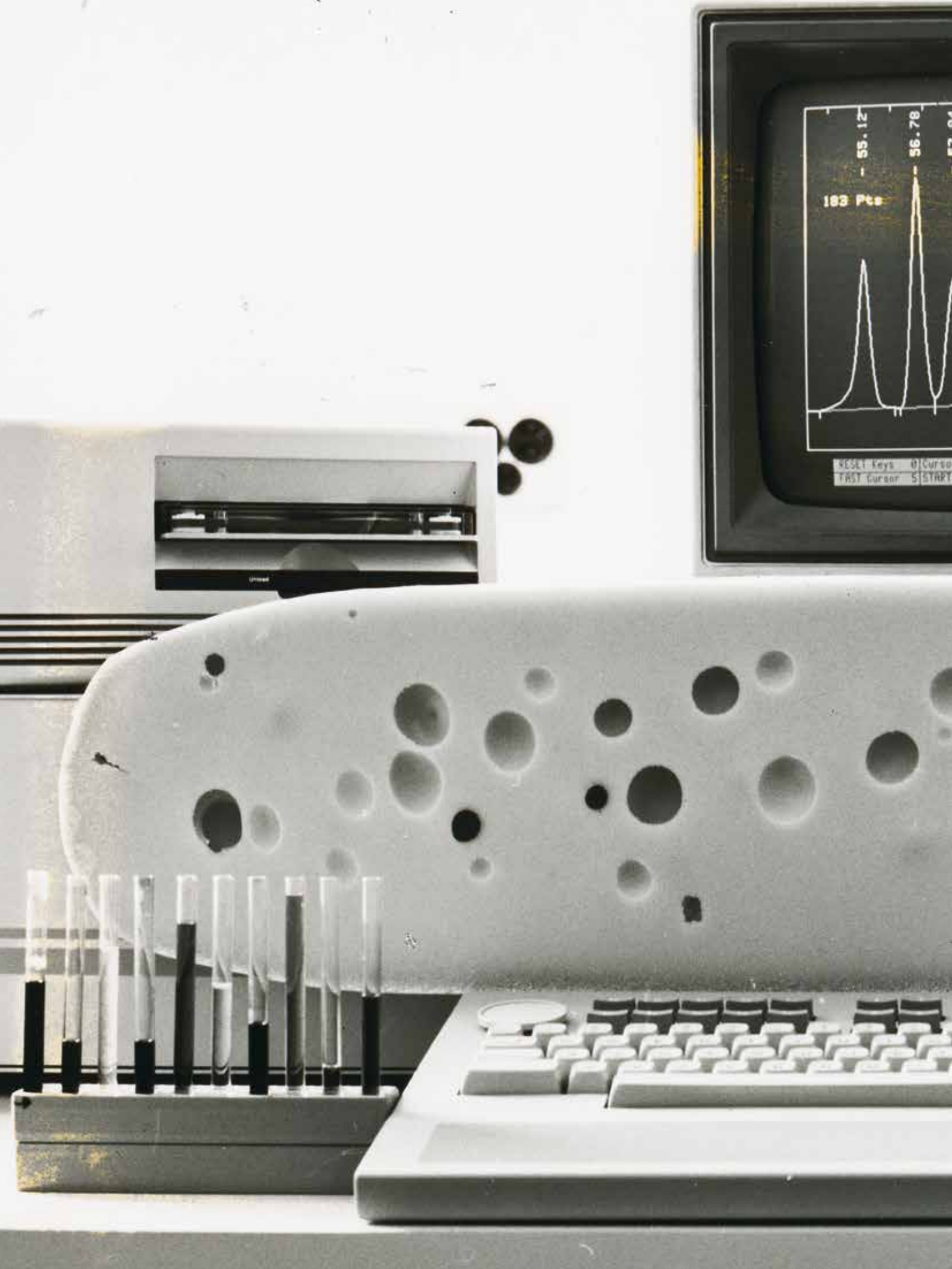
What innovations are urgently required?

There is a great need in research – for example, it is important for us to gain a better understanding of the biology of various disease pathogens and pests, especially of invasive species; to search for control agents that are more environmentally compatible and to test them in the laboratory and field; and to develop new varieties with greater disease resistance. In addition, farms must be provided with decision-making and risk-forecasting tools, as well as with new, more precise methods allowing a reduction of the amounts of plant-protection products used (and used ideally only in an emergency).

How would Agroscope like to contribute to overcoming these challenges?

Together with its national and international partners, Agroscope is actively involved in the research and development of these innovations. In this way, we shoulder our share of the responsibility. It is now up to the farms to make prudent use of the new resources provided. Specifically, over 40 Agroscope projects are devoted to the sustainable protection of crops and the further development of integrated production. —

1 Drought: a growing challenge for agriculture |
2 Antibiotic-resistant bacteria in focus | 3 Use of spray drones in a potato field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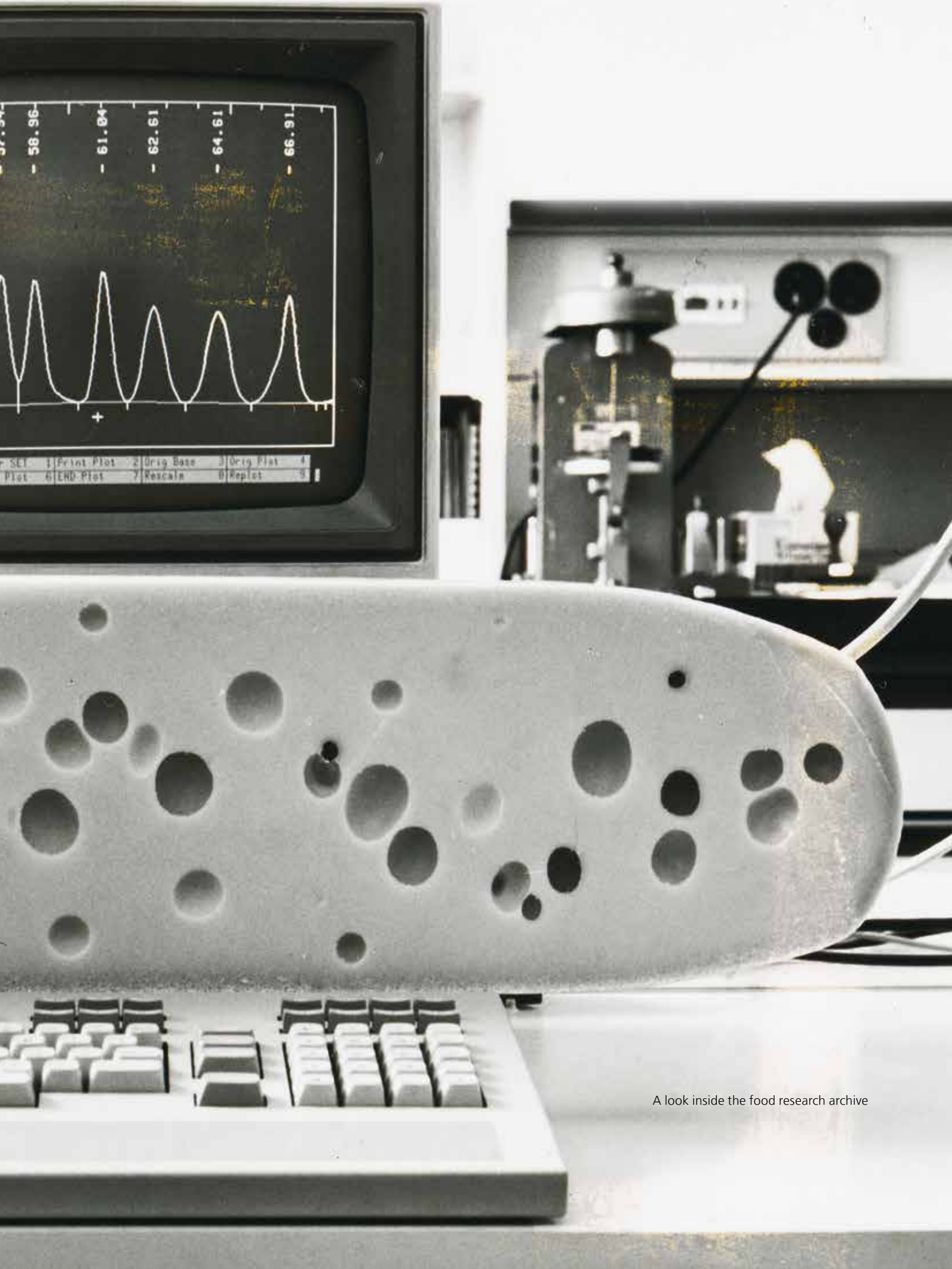

A look inside the food research archive

1 Pest control via sown wildflower strips | 2 Molecular monitoring of potato viruses | 3 Sorghum as an alternative to maize | 4 In-vitro vine on a culture medium | 5 Miniature ecosystems with different soil microbiomes | 6 Soil profile of a potato field | 7 Green lacewing larvae for aphid control

4

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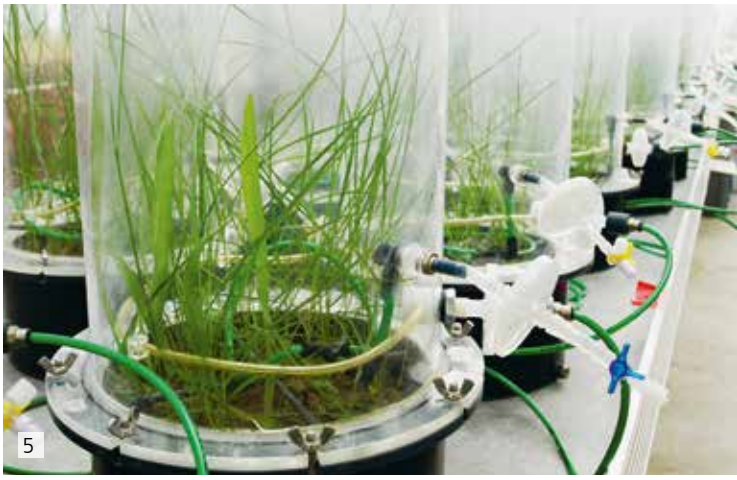

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Kaolin – Effective against Spotted-Wing Drosophila in Vineyards without any Impact on Wines

Kaolin was tested in viticulture to control the dreaded pest *Drosophila suzukii.* The trials showed that this natural product has a comparable efficacy to conventional insecticides without any adverse effect on wine quality.

Christian Linder, Johannes Rösti, Fabrice Lorenzini, Pascale Deneulin, René Badertscher and Patrik Kehrli

© Christian Linder Agroscope

A male spotted-wing drosophila on a grape berry.

Since 2014, the spotted-wing drosophila *(Drosophila suzukii)* has been causing substantial damage in Swiss vineyards. To counter this threat, insecticides are used in a strictly circumscribed manner. Nevertheless, winegrowers are reluctant to apply insecticides just before grape harvest due to residue issues and potential loss of image. Pest control thus relies primarily on prophylactic measures, particularly on proper aeration and lighting of the grape zone. The use of kaolin, a chemically inert white rock powder based on aluminosilicate, may constitute a valuable alternative to insecticides. The particles of this mineral stick to the surface of the grapes, forming a physical barrier that reduces damage. However, the impact of multiple kaolin applications shortly before grape harvest on the chemical and organoleptic properties of the wines produced is poorly documented. This article presents a synthesis of our results concerning the efficacy of kaolin against *D. suzukii* as well as the effect of its use on the chemical and sensory properties of wines.

Grape clusters treated with kaolin.

Kaolin applied on different grape varieties

To control *D. suzukii,* kaolin (Surround WP®) was applied in 23 field trials on different grape varieties in several wine regions of Switzerland in autumn 2016. Comparable to conventional insecticides, kaolin had an overall efficacy of 54%. Moreover, no significant differences were observed between applications of kaolin at concentrations of 1% and 2%.

Quality of 'Mara' red wines unaffected

In addition, a wine-quality trial was conducted with the red grape variety 'Mara'. This trial revealed that three applications of 1% or 2% kaolin did not affect fermentation or the chemical properties of the wines compared to an untreated control. The aluminium concentration in the wines rose slightly with the applied dose of kaolin, but remained nearly 40 times lower than the tolerated threshold. Furthermore, tasters were unable to distinguish between the wines produced from grapes treated with kaolin and the untreated (control) wine. —

Conclusions

- Approved for use in organic farming, kaolin ensures satisfactory protection of grapes against *D. suzukii.*
- This natural product poses no problem in terms of residues or resistance.
- Its impact on beneficial organisms is negligible.
- The chemical and organoleptic properties of the red grape variety 'Mara' were not affected.
- The results of this study show that kaolin applications are effective against *D. suzukii* and do not pose major risks to the environment, wine quality or human health.

Efficacy of kaolin treatments against Drosophila suzukii and their impact on the composition and taste of processed wines, Vitis, Journal of Grapevine Research, vol. 59 (2), 2020

Fighting Antibiotic Resistance: a Plant to Reduce Diarrhoea in Piglets

Alternatives to antibiotics must be found to combat antibiotic resistance in animal production. The forage plant sainfoin reduces postweaning diarrhoea in piglets, thus reducing the need for antibiotic treatment.

Catherine Ollagnier and Nicolas Pradervand

Diarrhoea in piglets is a problem affecting pig farms worldwide. It occurs after weaning, a major traumatising event in a piglet's life. Separated from its mother, deprived of maternal antibodies, it must adjust to a new feed, to new gastrointestinal flora, and sometimes to pathogens that challenge its digestive tract. In addition, the piglet is in a new environment, with new conspecifics. All these changes weaken the animal, which often develops diarrhoea, usually within ten days of weaning. Although the etiology of the diarrhoea is not always infectious, the most common pathogenic agent is an enterotoxigenic *Escherichia coli* (ETEC). Post-weaning diarrhoea generates economic losses not only due to the cost of the medication used in its treatment, but also due to piglet mortality.

Scientific article at
agrarforschungschweiz.ch

Fighting antibiotic resistance

Postweaning diarrhoea is usually treated with antibiotics. This strategy, which appears to be the most practical one, is nevertheless only a short-term solution. With the emergence of antibiotic-resistant bacteria that threaten human health, it is essential to discover alternative treatments, particularly in animal production. Optimising piglet feed also constitutes a solution for limiting the occurrence of postweaning diarrhoea. A recent study (see References) demonstrated that chestnut tannins can reduce the severity of diarrhoea and avoid the need for antibiotic treatment. Sainfoin *(Onobrychis viciifoli)* is also a tannin-rich feed that is easily grown in Switzerland.

With the emergence of antibiotic-resistant bacteria that threaten human health, it is essential to discover alternative treatments, particularly in animal production.

Agroscope researchers conducted an experiment on twenty piglets to assess the efficacy of sainfoin in reducing postweaning diarrhoea. Piglets were assigned to two groups of ten individuals each. The first group was fed a standard feed formulated according to Swiss recommendations, whilst the second group was given a feed containing 12.6% sainfoin. Four days after weaning, all of the piglets were infected orally with a strain of ETEC. The sainfoin significantly reduced the severity and duration of the diarrhoea, enabling the complete avoidance of antibiotic treatment. —

Conclusions

- Tannins are widely recognised for their antioxidant and antibacterial properties.
- 12.6% sainfoin (which is rich in tannins) added to the feed of weaned piglets reduces postweaning diarrhoea caused by an ETEC infection.
- Sainfoin should be considered as an effective bioactive compound when formulating a feed to reduce postweaning diarrhoea.

References

Girard M., Thanner S., Pradervand N., Hu D., Ollagnier C. & Bee G., 2018. Hydrolysable chestnut tannins for reduction of postweaning diarrhea: Efficacy on an experimental ETEC F4 model. PLOS ONE 13 (5), e0197878.

Swiss Farms: Ever-Increasing Size and Specialisation

The number of farms with a minimum area of 30 ha is growing, and specialisation – particularly in animal production – is on the increase. Even so, structural change is proceeding at a slower pace in Switzerland than in neighbouring countries.

Alexander Zorn

In Switzerland, structural change is proceeding at a slower pace than in neighbouring countries.

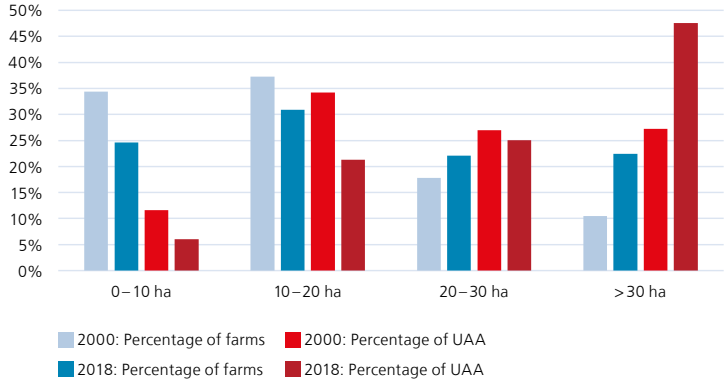
The number of farms in Switzerland has been falling for many decades. Structural change is known, but goes hand in hand with numerous other changes that for the most part are less commonly acknowledged. This report traces the development of the Swiss agricultural sector in the period 2000–2018, based on data from the Federal Office for Agriculture's agricultural policy information system.

Less surprising is the fact that as the number of farms decreases, the area of the remaining farms increases. In particular, farms with an area in excess of 30ha are becoming more common, whilst the number of small farms is falling. At the same time, specialisation is on the increase, particularly in animal production: the keeping of dairy cows and pigs is concentrated on fewer and fewer farms. In plant production, farms are specialising in the cultivation of root crops and vegetables.

Slower change than in neighbouring countries

Structural change in the Swiss agricultural sector is proceeding more slowly than in neighbouring countries. From 2005–2016, the number of farms in Switzerland, France, Austria, Germany and Italy fell at an annual rate of 1.8%, 2.0%, 2.3%, 3.1% and 3.7%, respectively. The annual growth in area of Swiss farms (1.7%) is also slower than in France (2.1%), Germany (3.0%) and Italy (3.7%). Only in Austria are farms growing more slowly (0.5%) in terms of area, owing to a sharp decrease in utilised agricultural area.

Distribution of farms and the utilised agricultural area (UAA) across four size classes



Source: Figures based on the AGIS data for the SFOA.

Conclusions

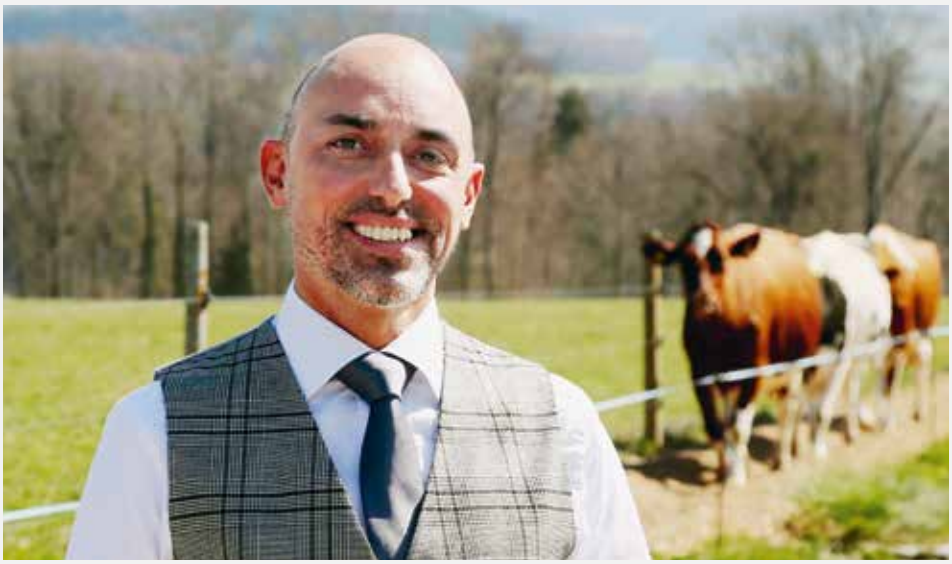
- Large farms of at least 30ha agricultural area are becoming more common, whilst the number of smaller farms is declining.
- Structural change is proceeding at a slower pace in Switzerland than in neighbouring countries. In Germany and France, farms are on average considerably bigger and are growing more quickly than in Switzerland.
- Agricultural specialisation is increasing. Fewer and fewer farms are keeping dairy cows and pigs. In plant production, the focus is primarily on the cultivation of root crops and vegetables.
- In the next ten years, 30% of farm managers will be reaching the upper age limit for drawing direct payments (65 years). This is leading to a generational change that could have an effect on structural change, particularly on farm growth.

Farm managers are becoming older on average

A change can also be observed in the age distribution of the farm managers, whose average age is increasing. In the next ten years, around 30% will reach the upper age limit for drawing direct payments of 65 years. This is leading to a generational change that could have an effect on structural change, particularly on farm growth. —

Publication: Agroscope Transfer no. 88, Kennzahlen des Strukturwandels der Schweizer Landwirtschaft auf Basis einzelbetrieblicher Daten, 2020

Joël Bérard: New Head of the ‘Animal Production Systems’ Division at Agroscope



Joël Bérard became the new Head of Agroscope’s ‘Animal Production Systems and Animal Health’ Strategic Research Division on 1 April 2020. In this capacity, he is also a member of the Executive Board.

The career trajectory of the new Head of the ‘Animal Production Systems and Animal Health’ Research Division has encompassed various internships in Italy, Germany and Switzerland, where he researched in the field of livestock production with a passion and gathered ideas for a sustainable future. From his birthplace in Val d’Aosta, a bilingual region of Italy, he brings his perfect French with its lilting intonation and a close connection with nature and the mountains. Before arriving at Agroscope, Bérard – a food engineer with a degree from the University of Parma – was from 2017 Head of Research at Agro Vet-Strickhof, the education and research centre created by Strickhof, the Vetsuisse Faculty of the University of Zurich and ETH Zurich.

Joël Bérard looks forward to his tenure at Agroscope, where he intends to further develop and implement research into livestock production systems, making full use of the organisational, coordinating and negotiating skills that he has acquired over the years. He hopes to promote exchange between the different Research Groups, as he is convinced that “especially in research, 1 plus 1 sometimes equals 3.”
A well-known figure in the scientific community and livestock sector, Joël Bérard possesses an extensive network of contacts. —

	2018 CHF	2019 CHF	Divergence CHF	Divergence in per cent
Functional Earnings				
Financially impacting	22,742,226	20,574,200	–2,168,026	–9.5%
Non-financially impacting	299,367	1,961,291	1,661,924	555.1%
Total revenues	23,041,593	22,535,491	–506,102	–2.2%
Functional Expenditure				
Financially impacting	131,251,182	136,277,092	5,025,910	3.8%
Non-financially impacting	6,388,389	5,147,978	–1,240,411	–19.4%
Service accounting between offices	46,788,938	44,568,499	–2,220,439	–4.7%
Total functional expenditure	184,428,509	185,993,569	1,565,060	0.8%
Statement of Investments				
Investment income		–54,062	–54,062	
Investment expenditure	5,821,310	7,607,529	1,786,219	30.7%
Reserves				
Creation of earmarked reserves	2,710,142	2,165,675	–544,467	–20.1%
Use of earmarked reserves	659,005	3,551,987	2,892,982	439.0%
Third-Party Funds				
Acquisition of third-party research funding	14,329,086	14,306,739	–22,347	–0.2%

1350
lectures and posters

2156
lessons (universities, technical colleges, vocational schools and courses)

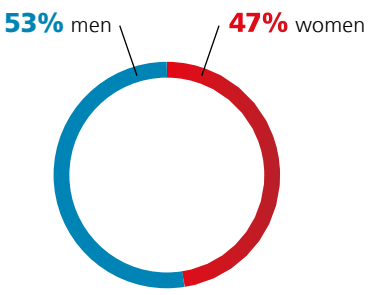
107
supervised dissertations

61
supervised semester, bachelor and master theses

1076
publications, including 536 practice-oriented publications; 540 scientific publications

875 full-time positions (FTE) with
1037 employees

50 doctorates
45 trainees
39 internships
37 postdoc



Antibiotic resistance

'Antibiotic resistance' describes the ability of some bacteria to adapt and withstand the effects of antibiotics. Thus, it is not animals or humans that become resistant, but the bacterial pathogens. Research in this area contributes to human and animal health.

Life cycle assessment

Life-cycle assessment (LCA) is a method for the environmental evaluation of products, processes and systems. It considers the entire life cycle and quantifies the environmental impacts for each stage of the life cycle – from extraction of the raw materials to disposal of the product and its production waste. In addition, it calculates the indirect environmental impacts associated with the manufacture of primary products and resources.

Structural change

Structural change in the Swiss agricultural sector is due not only to mechanisation and industrialisation, but also to the interaction between rural development and urbanisation. Swiss farms are decreasing in number while increasing in surface area, and are becoming increasingly specialised.

Weaning diarrhoea in piglets

Diarrhoea often occurs in piglets in the first ten days after they are separated from the sow, weakening them. The piglet must become accustomed to the change from the sow's milk to another form of nourishment. In addition to this, the piglet must also adjust to a new environment, new conspecifics, and in some cases to pathogens. The addition of tannins to the feed reduces the incidence of diarrhoea.

Drinking-Water Initiative

The Swiss Popular Initiative 'For Clean Drinking Water and Healthy Food – No Subsidies for Pesticide and Prophylactic Antibiotic Use' ('Drinking-Water Initiative' or 'TWI' for short) calls for only those farms that preserve biodiversity, produce without pesticides, dispense with prophylactic or regular antibiotic use in animal husbandry, and are able to feed their livestock with the fodder produced on the farm, to be supported with direct payments.

Disease-resistant varieties

The breeding of disease-resistant varieties aims to develop and make available new, more-resilient crop varieties for cultivation. If, for example, vines are less susceptible to powdery mildew or apple trees are more resistant to fire blight, farmers can save on the use of plant-protection products, reduce costs, and protect the environment.

Pesticides

The term 'pesticides' is used according to the definition of international bodies (the European Food Safety Authority (EFSA) and the World Health Organization (WHO)): pesticides are agents used to protect the health of crops and prevent their destruction through diseases and pest infestation. This includes herbicides (to control undesirable plants), fungicides (to control fungi) insecticides (for insect control), acaricides (to control mites), and plant-growth regulators and repellents.

Masthead

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Alain Gaume
Head of Plant Protection Division at Agroscope

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