PRESS RELEASE

Fruit-growing digitization project SAMSON: Federal Minister Cem Özdemir hands over funding notification at the International Green Week

New "farm of the future" in the Alte Land – Start of the research project "Smart automation systems and services for fruit growing in the Lower Elbe region" ("SAMSON") funded by the German Federal Ministry of Food and Agriculture (BMEL)

As part of the awarding of the "Digital Future Farms and Future Regions for Sustainable Agriculture" funding notification at the International Green Week (IGW) in Berlin, Germany, the Federal Minister of Food and Agriculture Cem Özdemir handed over the grant approval for the farm of the future "SAMSON" to the project partners Fraunhofer IFAM, HAW Hamburg, hochschule 21, and TU Hamburg on January 24, 2023.

With the "Guideline on funding the establishment of experimental fields as farms of the future and regions of the future of digitalization in agriculture as well as in upstream and downstream value chains", the Federal Ministry of Food and Agriculture intends to identify ideas and action approaches for agricultural, climate-efficient farms of the future and rural regions of the future. The aim is to advance the sustainable digital transformation in the agricultural sector and strengthen rural areas characterized by agriculture. The focus is on the opportunities offered by the availability of high-performance mobile communications networks. The projects to be funded are oriented to the needs of practice, test digital applications that have already been developed, and ensure a transfer of knowledge between science and practice on site.

Commercial fruit growing in the Lower Elbe region of northern Germany is the second largest contiguous fruit-growing area in Europe, covering an area of about 10 000 hectares. The annual harvest averages 300 000 tons of fruit. This agricultural region, known as the "Altes Land", produces about one-third of all German dessert apples.

Smart automation systems and services can help to sustainably reduce the use of crop protection products, water, energy and labor-intensive manual work, thus not only protecting the environment and lowering operating costs, but also optimizing crop yield and quality at the same time. This makes it possible to increase the productivity and competitiveness of both individual farms and the entire agricultural region. The automation systems to be developed record and evaluate cross-seasonal key data on crop yield, quality, cultivation data, and treatments over a long time horizon. The determined data and results are interactively available to the fruit-growing farms on mobile devices.

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When handing over the funding notification for the SAMSON project, the Federal Minister of Food and Agriculture, Cem Özdemir, emphasized: "With the optimized and targeted use of pesticides, the project not only makes a significant contribution to environmental protection, but also to the EU's "Farm to Fork" strategy, which aims to make the European food system more sustainable in various dimensions", and added: "In this context, SAMSON is a very beneficial and exciting project, with results that are not only of great interest locally and regionally, but also internationally".

The regional network for applied research and development from the environment of the fruit growing region Altes Land or Lower Elbe respectively, which fulfills the tasks, consists of:

- the head and coordinator of the joint project Fraunhofer Institute for Manufacturing Technology and Advanced Materials (Fraunhofer IFAM) – Stade branch – Automation and Production Technology,
- the Hamburg University of Applied Sciences (HAW Hamburg) – Department of Informatics as well as Research and Transfer Center Smart Systems (FTZ SMSY),
- the hochschule 21 – Department of Technology, Buxtehude, and
- the Hamburg University of Technology (TU Hamburg) – Institute for Technical Logistics.

Current challenges for fruit growing: Labor market and economic situation, plant protection and climate change

Labor shortage and rising production costs, forced by the energy crisis and inflation, are challenges that have to be overcome in addition to growing quality demands and stagnating sales prices. The critically discussed use of pesticides and climate change are also causing additional tension among fruit growers.

The successful management of tree fruit orchards is based primarily on the expert knowledge and years of experience of fruit growers with regard to soil care, tree pruning, as well as flowering progress and the previous year's crop yield, etc. Climate change, which is noticeable through increasingly occurring extreme weather events, such as extreme drought, above-average solar radiation, hail, and late frosts, poses a threat to the sensitive ecosystem that must be taken seriously.

This complexity of the overall interrelationships is increasingly difficult for producers and advisors to overview in detail in the management of the individual areas – both on the individual farm and in the entire growing region. Up to now, existing information has been reduced and generalized until general recommendations for action are made for large areas of the entire growing region. This can result in applications, such as plant protection measures or green strip treatments, that would not be necessary for individual trees or areas on a specific farm.

With digital tools to a sustainable fruit growing farm

The SAMSON project addresses the sustainable saving of resources through the cross-season collection of cultivation data – such as growth, alternation, harvest results, water use, treatment activities, etc. – in order to derive data-supported single recommendations down to the individual fruit tree, for example for the targeted use of plant protection products. Although modern spraying systems for crop protection treatments can individually adapt the spraying patterns to the tree and crown structure based on 3D sensor technology, they only take the status quo into account. In commercial fruit growing, however, the optimal decision on whether to treat a specific tree with a crop protection product is not based on momentary observations, but rather incorporates numerous influencing factors – such as weather conditions and the severity of the tree's acute disease state – from the weeks, months and years leading up to the actual treatment. Smart assistance systems, which will be developed in this project, can lead to an increase in efficiency and sustainable resource savings in apple production, for example.

Fruit Growing – An attractive labor sector with a future

The introduction of smart assistance systems can not only increase the attractiveness of the various professions in traditional fruit growing, but also open up new fields of activity. This increases the chances of attracting urgently needed skilled workers to the branch and ensuring the survival of the farms.

In this context, within the SAMSON project, for example, local master orchardists students are also actively involved in the research and development (R&D) work: they put the technology modules developed within the R&D activities to the test in concrete future projects on their own orchards with regard to their practical suitability and subsequently evaluate this together with the researchers.

SAMSON – The research and development focus of all project partners in detail

On the basis of extensive data collection, evaluation and provision, the aim is to provide orchardists with digital tools and automation solutions tailored to their needs, to optimize plant protection and irrigation, as well as to establish a comprehensive transfer of knowledge between research and practice:

On the way to the digital fruit farm

- Digitization strategies and mobile data networks for sustainable fruit farms in the Alte Land
  - All project partners
- Fruit wall as enabler for digital and automated cultivation
  - Fraunhofer IFAM
- Holistic data models of fruit farms in the Alte Land
  - HAW Hamburg
- Smart and interactive farm management system
  - Fraunhofer IFAM

Optimization of crop protection and irrigation

- Networked weather stations as data sources of environmental factors
  - Fraunhofer IFAM
- Automated recording and cataloguing of cultivated areas and crop data
  - Fraunhofer IFAM
- Sensor systems for the detection and classification of damage factors
  - HAW Hamburg
- Data-based prediction models for optimized crop protection
  - HAW Hamburg
- Automated water management and frost protection systems
  - Fraunhofer IFAM
- Modules for individual treatment of plants and areas
  - hochschule 21
- Prediction of apple quality in relation to plant protection and cultivation measures
  - TU Hamburg

Knowledge transfer into practice

- Workshops with local growers to exchange information on digitization strategies
  - All project partners
- Project-related website and digital marketplace
  - TU Hamburg, Fraunhofer IFAM
- Technology demonstrations for practical use on the experimental field
  - All project partners
- Future projects at vocational schools in the context of the orchard master training
  - Fraunhofer IFAM
- Evaluation concepts
  - TU Hamburg

Funding

The German Federal Ministry of Food and Agriculture (BMEL) is funding the research project "Smart automation systems and services for fruit growing in the Lower Elbe region" ("SAMSON"; funding code: 28DE201B21). The project will have a duration of three years and will end in December 2025. On behalf of all project partners, Fraunhofer IFAM would like to thank the Federal Ministry for the funding and the Federal Office for Agriculture and Food (BLE) as project manager for their support.

With support from

Federal Ministry of Food and Agriculture

by decision of the German Bundestag

Project manager

Federal Office for Agriculture and Food

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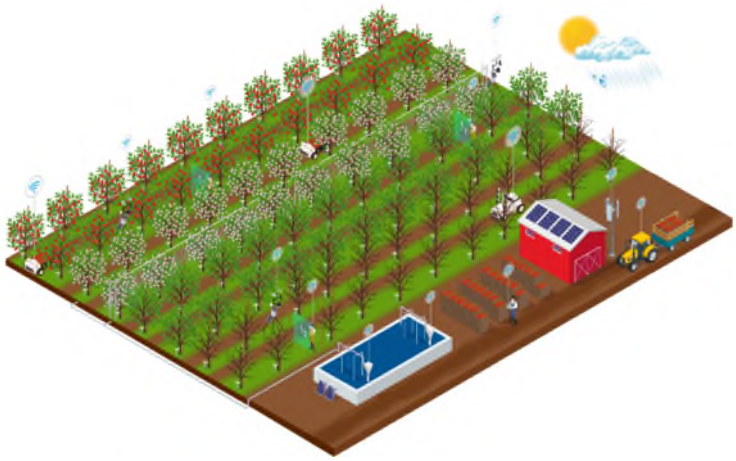

Figure 1 l Caption
Concept illustration of the fruit growing farm of the future in the Alte Land – digital networking, autonomous machines, and AI-based evaluation algorithms are being researched on the experimental field in the SAMSON project (© Fraunhofer IFAM).

Figure 2 l Caption
Start of the fruit-growing digitization project "SAMSON": Federal Minister Cem Özdemir hands over the funding notification to Alexander Kammann (hochschule 21), Christian Böhlmann (Fraunhofer IFAM), Prof. Dr. Tim Tiedemann (HAW Hamburg), Jiahua Wei (TU Hamburg), and Benjamin Schulze (Fraunhofer IFAM); (f.l.t.r.; © BMEL/photothek).