

06 May 2022

Leibniz Centre for Agricultural Landscape Research (ZALF)

Digital technology at the patchCROP Field Robotics Workshop 2022:

## Field robots for the agriculture of the future

Page | 1

Equipment manufacturers and scientific institutions presented digital tools and robotics for agriculture during the patchCROP Field Robotics Workshop on 3 May 2022. The event took place on the grounds of the patchCROP landscape laboratory in Tempelberg, Brandenburg, which is coordinated by the Leibniz Centre for Agricultural Landscape Research (ZALF).

Together with ZALF, the Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), the PhenoRob Cluster of Excellence and the DAKIS research project hosted the specialist event. In lectures, a panel discussion and technology demonstrations, scientists and manufacturers demonstrated the latest digital technology for agriculture.

In a keynote speech, Prof. Arno Ruckelshausen, Professor of Engineering and Computer Science at Osnabrück University of Applied Sciences, gave an overview of the range of digital agricultural technology available for practical use and possible development prospects. Prof. Anne-Katrin Mahlein from the Institute for Sugar Beet Research at the University of Göttingen presented digital solutions for crop protection in her keynote speech. In the BMEL-funded digital experimental field "FarmerSpace", coordinated by the University of Göttingen, research and practice partners are testing, among other things, drones and optical sensors for the detection of plant diseases as well as various agricultural robots for weed control.

## **Information systems and automation support sustainable agriculture**

The subsequent lecture program gave partner projects of the "patchCROP" landscape laboratory the opportunity to present their work. Nahleen Lemke from ZALF explained how the DAKIS project (Digital Knowledge and Information System for Agriculture) can help farms to use techniques such as artificial intelligence and robotics to manage resources more efficiently and in a way that is adapted to the landscape and the demands of society. Prof. Chris McCool, Department of Agricultural Robotics and Engineering at the University of Bonn, illustrated the progress of the research of the "PhenoRob" Cluster of Excellence on robotics and autonomous systems, for example for mechanical and sustainable crop protection. Helge Wanta from the Technical University of Dresden presented an extension of the computer game "Farming Simulator 2022", in which the research design of the "patchCROP" landscape laboratory can be depicted and the research content developed in a playful way. In the future, the virtual demonstrator will help to make the interactions of small-scale farming tangible with the help of robotics and new technologies for soil processes, yield and other factors such as biodiversity.

### **Focus on practice and applicability**

In the subsequent panel discussion, journalist Andreas Oppermann debated with researchers Prof. Cornelia Weltzien (ATB) and Dr. Maria Kernecker (ZALF) as well as Prof. Engel Arkenau, the Digitalization Officer of the Federal Ministry of Food and Agriculture (BMEL), the question of what steps are necessary for agricultural robotics to become part of everyday operations on farms. In addition to questions of approval, safety and liability, the experts also discussed the importance of independent advice and information for farms. Another important point of discussion was the question of the economic efficiency of the new technology: Will the purchase also pay off for smaller farms? The panel was unanimous on the point that the expertise and decision-making autonomy of farmers will continue to be central to agricultural processes in the future. Digital tools should only take on the role of a support system for agriculture.

### **Companies and research present digital helpers**

Following the lecture program, the manufacturers Zauberzeug and Naïo presented various agricultural robots that can be used primarily for weed control in special crops such as herbs, vegetables and sugar beet. The team from the Leibniz Institute of Agricultural Engineering and Bioeconomy (ATB) demonstrated the autonomously driven small tractor SunBot for use in the cultivation of bush berries. Representatives of Bayer presented the digital yellow trap, which digitalizes and simplifies pest monitoring in oilseed rape. In addition, the companies AgXeed, geokonzept, E-Terry and the digital experimental field LANDNETZ presented their offerings in the areas of software, surveying, precision farming, robotics and data infrastructure.

## Modern technology is tested in the landscape laboratory

The research design of the "patchCROP" landscape laboratory, the partner institutions of which had invited to the workshop, relies heavily on the support of digital tools and agricultural robotics. Here, small-scale, climate-resistant and sustainable agriculture adapted to heterogeneity is tested as a model: The field is divided into small field units of only about half a hectare. Up to nine arable crops grow side by side here on the field. However, these so-called patches cannot be cultivated using large heavy agricultural machinery. Starting this year, the research team and their practice partner, the Komturei Lietzen, have been using a maneuverable small agricultural robot from the company Naïo for cultivation, for example for weed control. Soil sensors or drones record the condition of soil and plants.

### Project Partners:

- Leibniz Centre for Agricultural Landscape Research (ZALF)
- The Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB)
- "PhenoRob" Cluster of Excellence at the University of Bonn
- "Digital Agriculture Knowledge and Information System" (DAKIS) consortium of the BMBF funding line "Agricultural Systems of the Future"

### Further information:

More information on the "patchCROP" landscape laboratory:

<https://comm.zalf.de/sites/patchcrop/SitePages/Homepage.aspx>

Video "Is more diversity in agriculture possible? The ZALF patchCROP landscape laboratory": <https://www.youtube.com/watch?v=LSdcBL6TsvE-die-zukunft/>



At the "patchCROP" field robotics workshop on 3 May 2022, manufacturers and researchers presented the latest in digital technology for agriculture, such as agricultural robots, drones and sensors. Source: © Sibylle Krickel / ZALF | Image source in color and print quality: <http://www.zalf.de/de/aktuelles>



Starting this year, the team of the "patchCROP" landscape laboratory has been working with an agricultural robot to manage the land, for example to control weeds. Source: © Sibylle Krickel / ZALF | Image source in color and print quality: <http://www.zalf.de/de/aktuelles>



In the "patchCROP" landscape laboratory, small-scale, climate-resistant and sustainable agriculture adapted to heterogeneity is being tested as a model: The field is divided into small field units of only about half a hectare – the so-called patches. Source: © Franz Gerald | Image source in color and print quality:

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**About the Leibniz Centre for Agricultural Landscape Research (ZALF) in Muencheberg, one of the institutes of the Leibniz Association:**

ZALF conducts research on the economically, ecologically and socially sustainable agriculture of the future – together with stakeholders from science, politics and practice.

As a contribution to addressing global societal challenges such as climate change, food security, biodiversity conservation and resource scarcity, we develop and design cropping systems in a landscape context that combine the need for crop

production with sustainability. To do this, we combine complex landscape data with a unique set of experimental methods, new technologies, computer-based models and socio-economic approaches.

ZALF research is systems research: from processes in soils, plants and water, to interrelationships at the field and landscape level, to global impacts and the consideration of complex interactions between landscape, society and economy.

[www.zalf.de](http://www.zalf.de)