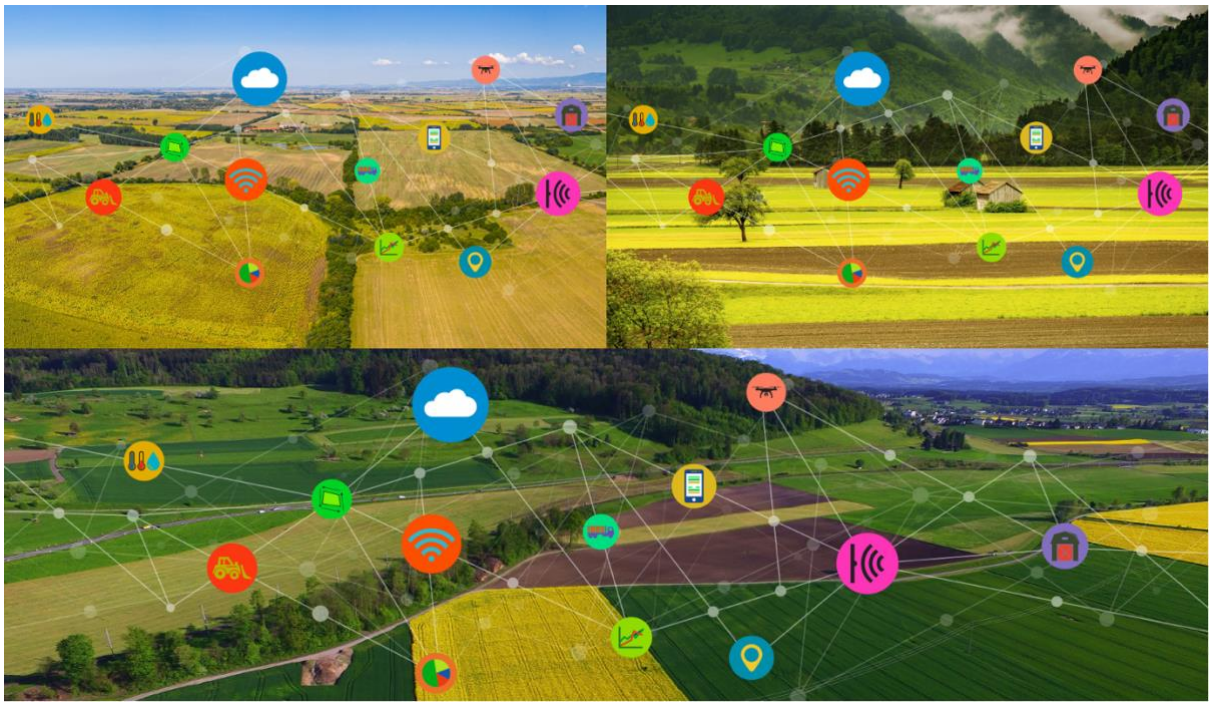
D4AgEcol

DIGITALISATION FOR AGROECOLOGY

Newsletter – Issue 4

January 2025



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No.101060759.

Table of Contents

1. Welcome Address from the Coordinator

Welcome to the 4th edition of the D4AgEcol newsletter! As we embark on a new year, we are thrilled to share updates and insights from our ongoing journey toward advancing digital solutions for agroecological systems. This edition highlights our recent milestones, collaborative initiatives, and the inspiring work being done by partners across the network. While we have been very active in analyzing the impacts of digital tools and technologies in several workshops across Europe, we are now working on the implications for the need for action and policy interventions. Your engagement and feedback are vital as we continue to shape innovative and sustainable practices in agriculture. Thank you for being a part of this journey. Together, we're driving meaningful change for farmers, communities, and ecosystems.

Enjoy reading!

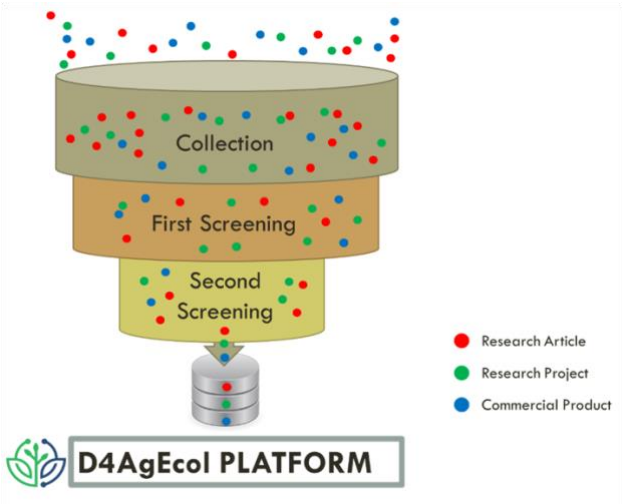
Your Coordinator D4AgEcol: Andreas Meyer-Aurich

2. Digital Tools Platform

Digital technologies in agriculture have revolutionized the way farmers monitor crop health, manage pest outbreaks, and utilize inputs such as water and fertilizers judiciously, reducing waste and environmental footprint. The deployment of digital tools such as terrestrial robots, Unmanned Aerials Vehicles (UAVs), Farm Management Information Systems (FMIS), Internet of Things (IoT) systems, multispectral cameras have provided a digital backbone for precision agriculture practices, enabling real-time data collection and analysis for decision-making. These systems have contributed significantly to enhancing the efficiency of crop production through improved monitoring and targeting of inputs. The same holds in livestock farming, where digital tools are applied to monitor animal health and welfare, optimizing feeding strategies, and ensuring efficient resource utilization and in agroforestry, where the integration of trees with farming, benefits from digital tools in mapping and managing tree-crop interactions and modeling ecological processes.

Thus, the adoption of digital tools across these diverse farming systems is essential for advancing agroecology. They provide the necessary data and models to inform sustainable practice and policy, foster resilience in food systems and ultimately contribute to the health of the planet and its inhabitants. In D4AgEcol, a digital tools platform was developed with the aim to i) map the existing and emerging digital tools that are used in crop and livestock farming, ii) categorize them based on economic and environmental benefits, iii) select digital tools for extensive assessment for the living labs and iv) create a database in the form of an online repository.

The digital tools platform has been developed based on a systematic review of research articles, research projects and commercial products. The platform categorises existing and emerging digital tools that are used in crop and livestock farming based on economic and environmental benefits. To explore the platform visit https://platform.d4agecol.eu/.



3. Digital Tool Scoping Workshops

In the following, there is information on selected DTSW. In the forthcoming 5th newsletter, the rest of the DTSW conducted within D4AgEcol project will be presented. Also, additional information on the DTSW will be available through the factsheets which will be published in the project's website.

Unmanned aerial vehicle sprayer for vineyards

The Agricultural University of Athens organized their DTSW on the 4th April 2024. The workshop focused on the use of aerial unmanned vehicle drones for spraying vineyards, highlighting a cutting-edge technological advancement poised to revolutionize agricultural practices, aiming to harness the potential of drone technology for optimizing crop management while minimizing environmental impact. 28 stakeholders attended the agroecology indicator evaluation section, while 5 stakeholders participated in the technology ADOPT tool assessment. A brief presentation of the unmanned aerial vehicle sprayers was was shown to the stakeholders participated in the DTSW. The main outcomes of the workshop have been that unmanned aerial vehicles sprayers can be implemented and provide various benefits in all kinds of crops (organic, conventional) but the discussions mainly focused on vineyards. The agro-ecological potential of drone spraying seems promising, especially for vineyards with steep slopes. Replacing the on-ground sprayer with spray drones can help reduce human exposure to pesticides, save labour costs and even increase profit margins in the case of spot spraying applications. Even though, spraying drones are commercially available, there are also problems, such as the legislative framework that makes it illegal and the legal provisions that make most of the applications of drone spraying illegal in the EU. Concerning the adoption rate of the technology, the ADOPT tool predicted a 42% adoption rate of the unmanned aerial vehicle sprayer technology with the time to reach peak adoption being *approx.* 20 years. All in all, the event was successful with the active participation of the stakeholders, however, the participation during the ADOPT tool assessment was low.

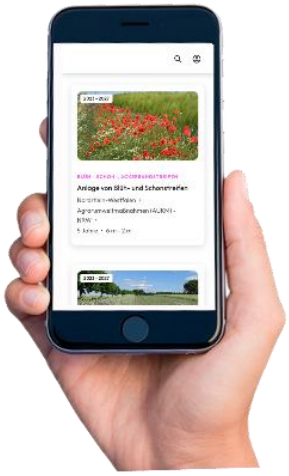


Small-sized equipment retrofitted for autonomous strip cropping

The workshop to assess autonomous strip cropping was organised at the Harper Adams University on 18 April 2024. Autonomous strip intercropping has been tested on the one-hectare Hands Free Farm since 2023. The crop portfolio of the test field currently includes winter and spring cereal, spring field bean, and clover ley strips. The workshop was attended by 15 participants with a diverse background including farmers, farm advisors, digitalisation experts, and members of academia from different fields of expertise such as agroecology, agronomy, ecology and economics. Intercropping, or the cultivation of multiple crops together, is one of the most studied agroecological farming practices and is a way of promoting in-field biodiversity. Strip intercropping, in which the different crops alternate in rows, is the most technically feasible intercropping system. However, it still faces technical and economic challenges, and it consequently has a limited adoption in modern agriculture. Autonomous intercropping allows intercropping without substantially increasing labour requirements compared with single-crop fields. The equipment originates from a conventional 28-kW ISEKI tractor without implements (i.e. no-till planter, sprayer, mower) and a 2-m- head Claas combine built for the Asian market. The tractor and the combine harvester were retrofitted for autonomous operation as part of a collaboration between HAU, Farmscan AG UK, the Agri-EPI Centre and Precision Decisions. This equipment set has been in use on the Hands-Free Farm at HAU for over six years and first implemented for autonomous strip intercropping in Spring 2023. The peak adoption rate is estimated at 6% of the target population. This peak level will be reached in just over 16 years. Half of the estimated peak value (3%) will be reached in 7 years. A higher expected profit benefit for farmers in the first years of use would significantly increase the adoption rate; easier access to trial use would accelerate adoption.

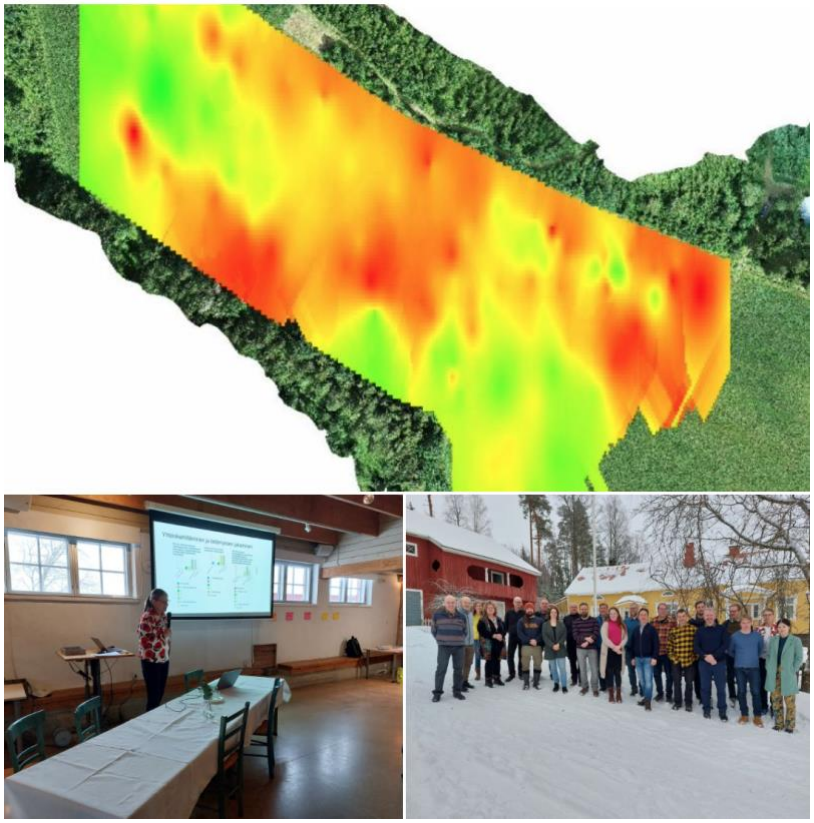
Online tool for agri-environmental-climate measures

The workshop to assess the online tool for agri-environmental-climate measures was conducted by The Leibniz Centre for Agricultural Landscape Research (ZALF) on the 21st of February 2024 at the Institute in Müncheberg, Germany. During the workshop, the NatApp application was presented and discussed. The NatApp is an information and documentation application, with which farmers can get informed about agri-environmental climate measures (AECM) and other contract-based nature conservation measures and document them. The idea for the NatApp dates to 15 years ago at ZALF, when the need for one single platform offering a wide overview of all available measures was becoming more and more evident. Its development included 3 versions of the NatApp, until finally Flynet joined the project at ZALF and started developing the application. The NatApp's main applications are (1) its use as an information tool, and (2) its use as a web-based and app-based documentation tool. On one hand, it can be used as a condensed platform to get information about all European, German, and regional/local measures that farmers can choose to implement. On the other hand, famers can use the application to allocate the measures, plan them, and document their execution through photos, GPS-tracks etc. as documentation. Currently, the NatApp is not on the market yet, and links with other digital technologies and systems need to be implemented for it to work. However, it holds great potentials since the need for a platform that collects information about available measures (that are otherwise scattered and not easy to find) is still high among farmers, as some surveys show. The peak adoption rate is estimated very high at 91% of the target population. This peak level will be reached in almost 10 years. Half of the estimated peak value (45 %) would be reached in 4.3 years after the application was launched on the markets. A higher expected profit benefit for farmers in the first years of use would significantly increase the adoption rate; an easier access to test the app would accelerate adoption.



Unmanned-aerial-vehicle-based green fertiliser mapping

The workshop was organised by LUKE in cooperation with The Knehtilä Farm and it took place in the premises of the latter, in Hyvinkää, Southern Finland on 16 February 2024. The Knehtilä Farm, which is part of the Palopuro agro-ecological symbiosis, is an organic crop production farm using digital technologies. The impact of green fertiliser mapping on agroecology was evaluated by various participants representing education, research, policy, farmers and NGOs. The farmers at the workshop re- presented regenerative or organic crop production farms and most of them had experience in precision farming. As cereal production is typical in the area, this was the farming system that was specifically focussed on in the assessment. Green fertilizer mapping aims to define the amount of nitrogen fixation by legume plants in the field. To do this, an unmanned aerial vehicle (UAVs), also known as a drone, can be flown over a field at different altitudes to take images. The images of the entire field, taken at a higher altitude, can be used for biomass estimation, while low-altitude images help to estimate the growing density of legume plants using AI-assisted recognition of the number of flowers. The amount of fixed nitrogen in a growing site is calculated based on mathematical models for different types of legume plant. To validate the biomass estimation some growth samples are measured as ground reference. Such green fertiliser mapping is provided as a service to farmers, where the role of a farmer is to take a leased drone to the target field and monitor the safety during the flights. The rest is done automatically. The service concept was put together in response to a need that has arisen for the application of green fertilizing in precision farming. While the concept of green fertiliser mapping is new, it combines several well-known technologies. The service, however, is not available yet on the market. The peak adoption rate is estimated very high at 96% of the target population in the case that the technology will achieve market readiness. This peak level would be reached in a bit more than 7 years. Half of the estimated peak value (48 %) will be reached in 3.2 years. A higher perceptible environmental impact of the technology would significantly increase the adoption rate; a lower technology complexity would accelerate adoption.

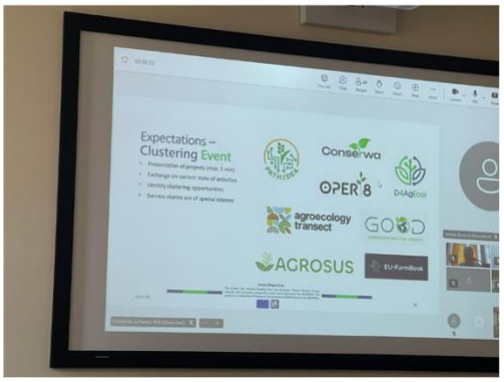


Site-specific fertiliser application based on sensors and maps

The workshop to assess the YARA nitrogen sensor took place at the ATB (Leibniz Institute for Agricultural Engineering and Bioeconomy) Field Lab for Digital Agriculture on 19 June 2024. On the day of the workshop, the institute's current field trials and technology pro- jects were presented to the public, followed by the workshop including participants from academia, technology development, and farming. To optimise fertiliser use, nitrogen sensors can be used to estimate the amount of nitrogen needed in different parts of the field. These sensors are mounted on the roof of the tractor and connected to a terminal in the driver's cab. As the tractor drives across the field, the sensor quickly and with high spatial resolution records the level of nitrogen in the crop based on its light reflecting properties. The newer sensors have their own light source, making it possible to use them at any time of day. The data can then be used to calculate the exact amount of fertilizer required at any given site based on the plants' nitrogen needs. The specific technology assessed here was developed by YARA, a company that primarily produces fertilizer and was founded in Norway in 1905. Some commonly cited benefits of these sensors include the very precise measurement of nitrogen levels, ease of use, broad compatibility with fertilizer spreaders, and more efficient fertiliser use. In addition, these sensors can be used in most common crops in arable farming and grassland, as well as in some speciality crops (for example, asparagus or cherry). The adoption model assessment of the YARA N technology is pending and it will be presented in the future newsletter no. 5.

4. General Assembly at AUA

In July 2024 partners of the D4AgEcol project met together with the external expert advisory board (EEAB) to review the state of the art of the project and agree on next steps to be done. Special emphasis was laid on the organisation of the remaining Digital Tool Scoping Workshops and the design and organisation of upcoming workshops for the policy roadmaps. There was also a separate session dedicated to clustering activities where the projects Oper8, Path2DEA, GOOD, AGROSUS, Agroecology TRANSECT, CONSERWA, EUFarmbook and Beatles presented their objectives and work and potential common actions were discussed. Finally, our EEAB recognized the significant challenge and important mission of our project and the successful results of the project, so far. They additionally pointed out that further discussions and exchanges are required on the topic of what data can be used for agroecology.



5. National Policy Workshops

The national policy workshops will suggest the national plans and roadmaps for action in the field of digitalisation with a focus on agroecology in the seven European countries participating in D4AgEcol. The workshops will identify potentials, opportunities, local constraints, needs for action in the fields of science, policy, and society. With the overall objective of WP4 being the development of roadmaps on digitalisation as enabler for

agroecology, the national workshops will include the voice of different stakeholders in the national roadmaps. Between December 2024 and February 2025, the seven events will reach more than 300 stakeholders, discussing research, innovation, and regulation needs, to design the right incentives to adopt digital tools among farmers and the surrounding society. Building upon the results of the other work packages, these co-creative efforts will identify the actions needed from researchers, civil society, and policymakers.

6. Let's meet at upcoming Events!

EVENT	DATE	LOCATION	D4AgEcol Partner
GIL	25.02.-26.02.2025	Wieselburg, Austria	ATB, LfL
National Stakeholder workshop Germany, Berlin Green Week	22.01.2025	Berlin, Germany	ATB, ZALF, LfL
National Stakeholder workshop Denmark	23.01.2025	Copenhagen, Denmark	UCPH
National Stakeholder workshop, United Kingdom	31.01.2025	Newport, United Kingdom	HAU

Project Coordinator:

Andreas Meyer-Aurich (ATB) E-Mail: **AMeyer-Aurich@atb-potsdam.de**

Assistant Project Manager – Contact person:

Friederike Schwierz (ATB) E-Mail: **FSchwierz@atb-potsdam.de**

For more information visit our website:

www.d4agecol.eu

Be always updated on D4AgEcol news by following our social media

D4AgEcol Project **@D4AgEcol** **D4AgEcol**