

Digital Farming: Enabling Farmers to Protect Our Planet through Digital Solutions



What is Digital Farming?

- Digital Farming is the evolution of agriculture into a digitalized industry – local, data-driven insights can improve on-farm decision-making and execution, helping farmers to predict what is coming around the corner and to act upon it more effectively.
- Arable land can vary considerably, even within one and the same parcel of land, depending on the topography, soil type, water levels, and nutrients flowing to plants – all of which have repercussions for their biomass. In the future, Digital Farming will be able to deliver hyper-local and field-specific information in order to facilitate quick and intelligent action on the field.
- Making decisions will become more focused, smarter, and simpler – by combining the power of a farmer's instinct with cutting-edge technologies such as satellite imagery, variable application algorithms, high-tech sensors, mobile applications, or GPS, a farmer can make the most informed choices.
- Using Digital Farming technologies, farmers can optimize their business management – save time, lower costs, increase yields and use the planet's resources more efficiently and sustainably.
- Digitalization can give farmers timely field-level information for selecting the right varieties and accurate dosing of fertilizer or crop protection, determining the ideal time for crop protection measures and recognizing plant stress factors at an early stage.
- Digital technologies not only open up entirely new opportunities in industrialized nations but also bring highly specialized expertise to the world's poorest countries.



What is the role of Bayer?

- In its Digital Farming approach, Bayer aims to provide practical and usable decision making tools that can make risk management on the farm a much easier task and help to improve profitability in a sustainable manner. By identifying the perfect timing and quantity of each product application for each field, products can be personalized for every farmer.
 - Growth stage models and infrared images will be able to indicate areas of a field suffering stress factors – even earlier than the human eye. This and other integrated data will help create feasible recommendations to enable increased yields while also considering the environmental footprint.
 - Bayer prides itself on innovative and forward-looking technology, and the same applies when exploring the future of precision agriculture: Digital Farming. Together with research institutes and the agrivalue chain, research is being done in areas such as ecosystem, crop simulation, and soil mapping.
 - Bayer aims to focus on its core competencies – crop protection and seeds – and to partner with experts in fields such as climate modeling, soil mapping, and farm machinery to deliver its customers the best possible digital solution.
 - In the near future, real-time analysis will help farmers identify pests, diseases, and weeds down to the square meter.
- Current status:
- 1) Bayer offers customers digital tools to analyze infection processes and analytics for productivity based on 30 years of satellite data.
 - 2) Bayer is testing hyper-localized decision support tools to optimize the use of our crop protection products.

What are the key benefits of Bayer's Digital Farming activities?



• Greater outcome with less input:

Per square meter farmers may be able to optimize crop protection use, while at the same time enhancing yield potentials with the same amount of water.



• **Simplifying documentation:** Compliance with regulations and documentation of activities will be made simpler, more accurate, and more traceable.

• **Increased knowledge through collaboration:** Partnerships with research institutions are taking great strides in ecosystem and crop simulation modeling as well as soil mapping.



• **Protecting the environment:** Bodies of water, as well as non-target areas, will be better protected through intelligent compliance with regulatory requirements within Digital Farming recommendations.



• **Digital technology for risk mitigation:** Predictability in agronomic activities can help manage volatility such as weather, soil quality, and pest pressure, while, at the same time reducing the risk of adverse environmental impacts.

• Logistical optimization:

Farmers will be able to plan their job steps more accurately which will result in less CO₂ emissions as well as less soil compaction.



• Improved quality of crops:

Modelling for diseases and precisely treating in advance, e.g. knowing exactly when and where to apply a fungicide will help reduce or eliminate mycotoxins, such as mold, from growing on harvested crops.



Partnering to Advance the Future of Digital Farming



- Bayer is partnering with numerous universities, research institutes and members of the value chain, as well as entering into public private partnerships in order to accelerate this evolution of agriculture.
- Research is being done through many innovative initiatives that will help bring new technologies to the market. Some include ecosystem modeling based on geo-data such as climate and terrain and remote sensing in order to better understand the world above and below us, and spectral disease recognition to better analyze how plants are affected by disease pressures.
- Significant investments are being made in venture capital partnerships to further develop new technologies and to support innovative business ideas. Collaborating with outside partners offers insights into new areas of innovation and cutting-edge technologies.

Digital Farming figures



It is estimated that, with new technologies, **Internet of Things (IoT)** has the potential to help increase agricultural productivity

by **70%** by 2050. (FAO)



70-80%

of the new farm equipment sold today has a precision agriculture component. (CEMA)

76% of UK farmers cited "improved accuracy" as a reason for using precision farming technologies. (DEFRA 2013)

There will be **27 billion** connected devices in 2024; 225 million will be used in agriculture. (Machina Research)

90% of all crop losses are due to weather. This crop damage could be reduced by **25%** using predictive weather modelling and precision agriculture techniques. (IBM Research)

