

Connected Agriculture

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No vegetables without data: a wide range of digital assistants will be used to produce food in the future. They will optimize yields, facilitate fresh regional products, and help protect the environment.

Autonomous fieldwork

Lightweight, unmanned robots take the place of heavy machinery to harvest crops day and night. They sow, irrigate, and apply precisely the requisite amounts of crop protection agents and fertilizer. They take soil samples, monitor pH and nitrate levels, pull weeds, and pick fruit. Cameras and sensors also record growth—while computers process the data that the robots exchange and send them to farmers' apps.

Aerial surveillance

Farmers are looking upwards to find out more about their fields. Satellites, drones, and cameras supply data needed to analyze not only soil properties but also—with the help of biomass—the nutrient and water needs of their plants. These systems help them determine which crops to plant where and when, how much fertilizer and water to use in different locations, and the ideal times for harvesting—which may vary within a single field.

Transparent supply chains

What is the story behind a banana? Where did it come from, and who stored it where and for how long? In the future, questions like these will no longer be a black box. Blockchains compile all information about planting, cultivating, feeding, shelf lives, and maintaining cooling chains. They provide everyone, including end customers, with non-falsifiable digital records. Food quality increases, and contaminated goods no longer end up on someone's plate.

Full control

Digital end devices are used to control food production remotely. People use smartphone apps to monitor their home gardens or check shelf lives in grocery stores. Farmers, however, need to acquire additional technical skills and combine weather or satellite data with the performance data from their fields. Yet that enables them to adapt production more precisely to market demand, protect the climate more effectively, and lease machinery from manufacturers based on volume and need.

Aquaponics

Aquaculture and hydroponics are combined to form efficient, closed, water-saving systems that provide restaurants and supermarkets in urban locations with tomatoes, cucumbers, lettuce, and fish. The underlying principle uses feces from the fish as fertilizer for the plants, which are grown without soil. Excess waste products are decomposed by bacteria and recirculated to the fish tank.

Urban farming

To enjoy their own fresh salad ingredients while also lowering harmful emissions, consumers are planting gardens on their rooftops or on small plots in the neighborhood. Or even in their homes. Smart mini-greenhouses are becoming as much a part of kitchens as ovens or dishwashers. Digitally connected to those in other homes, they can benefit from crowd experience and optimize their algorithms.

Vertical greenhouses

Crops are no longer planted solely on ground-level fields. Farmers grow vegetables and herbs in multi-level vertical greenhouses with nutrient solutions and specially developed light sources, where they can ripen until the most favorable point in time. Smaller such units are located in supermarkets next to produce sections, supplying customers with vegetables that are literally freshly harvested.

Smart stalls

Farm animals like cows will be wearing fitness trackers in the future, to measure whether they are healthy and sufficiently active. Sensors register data from their breath to determine whether feed compositions correctly meet their nutritional and physiological needs. Microphones and thermographic cameras supply additional data. Farmers are alerted if signs of a bacterial infection are detected—which enables lower levels of pharmaceutical products to be administered.