

The impact of 5G technologies on agriculture

Dillschneider, Eva-Marie; Wegener, Jens Karl; von Hörsten, Dieter

Julius Kühn Institute (JKI) – Federal Research Centre for Cultivated Plants, Institute for Application Techniques in Plant Protection, Braunschweig, Germany.

Email of corresponding author: eva-marie.dillschneider@julius-kuehn.de

Digitization is becoming increasingly important, as more and more farmers are turning to digital solutions. Digitization includes, among many other functions, the automation of processes through the networking of different digital technologies, information and people. This allows the entire value chain to be optimized, as large volumes of data can be collected, processed and evaluated. In agriculture, data can be collected for example by sensors on tractors, harvesters or robots. Through evaluation, for example by artificial intelligence (AI), this data can provide additional and more specific information about the current demand for crop protection and fertilization, soil properties or yields.

In the cooperation project entitled "5G - Smart Country", through the new 5G technology, data will be collected in both forestry and agriculture. The aim is to develop and test 5G applications that facilitate data collection and transfer.

The institute for application techniques in plant protection is investigating the practical application of the "Spot Farming" concept in the "Smart Farming" subproject. For this purpose, the fields are divided into homogeneous subareas (spots) on the basis of soil types, erosion potentials, topography and irradiation among other factors. To these specific attributes of a spot a crop rotation can be grown, that fits to the individual attributes of the spot in best way. Spots can also offer further functions than productivity in context to surrounding landscape. This can be for example hedges and ditches as elements against water and wind erosion or as structural elements with ecological functions. However, this means that less land is available for productivity and these structures are smaller. Therefore, the spots must have the same or higher productivity and be managed accordingly more efficiently. One way to achieve this is to plant in different row spacing or seeding patterns, such as an equilateral triangle. Furthermore, the areas produced through such methods are small-scale, it will not be possible to manage them with modern, large-scale agricultural equipment. Therefore, small autonomous field robots must be integrated.

In the coming trial year, sugar beet will be sown GPS supported. This is done by using the "Dino" field robot from the Naïo company. Additionally mechanic weed control will be carried out with the robot. The goal is to collect more information about the creation of spots and their effects, as well as the application and implementation of robotics in agriculture based on the 5G technology.