

**DRONE TECHNOLOGY AS A TOOL FOR IMPROVING  
AGRICULTURAL PRODUCTIVITY**

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**Abstract.** The article deals with drone technology applications for improving agricultural productivity and efficiency. The utility and benefits of drone application in agriculture are presented in the article.

**Keywords:** Drone technology, agricultural productivity, innovation, to improve, image data analytics, yields, soil quality.

In agriculture drone technology is a phenomenal innovation allowing farmers to increase efficiency in certain aspects of the modern farming process. Agricultural drones intended to accomplish and advance precision agriculture. It is a farming management concept that seeks to leverage new technologies to boost crop yields and profitability while lowering the levels of traditional inputs needed to grow crops. This farming management concept is done by observing, measuring and taking action based on real-time crop and land data.

There are a number of applications of drone technology convergence with advanced image data analytics that can be utilized in the agriculture industry. Most applications rely on drones as a mobile aerial platform for advanced image data collection. Depending on the specific requirements of the project, drones can be equipped with a range of image data sensors. The most common application based on drone image data is crop vegetation assessment. An unmanned aerial platform equipped with infrared cameras can provide normalized difference vegetation index (NDVI) development. The NDVI-view of a certain area enables the analysis of the intensity of solar radiation absorption and therefore the condition of the monitored plants [1]. This method has been widely used for decades based on satellite- or plane-borne cameras, but the resolution of the resulting products has been insufficient to map fields, precisely, not to mention specific plants. Drone technology as a platform for image data acquisition has brought the NDVI mapping capabilities to a completely new level of accuracy making it possible to monitor the condition of not only plants, but also specific parts of plants.

Another, rather non-obvious application of drone imaging and mapping capabilities is counting and taking stock of animals' herds. With the application of high resolution infrared cameras, every single animal is a separate heat mark enabling counting with an accuracy higher than using conventional methods. Focusing on a single animal with a high-resolution infrared camera enables assessment of its health based on a temperature comparison, allowing swift identification and treatment of ill animals.

One more application of drone technology in agriculture is crop spraying. Typical modern day spraying drones have tank capacity of over ten liters of liquid pesticide with discharge rate of over a liter a minute, allowing them to cover a hectare in ten minutes. However, to leverage drone technology fully as a spraying platform, the spraying needs to be paired and synchronized with the above-mentioned imaging, processing and automated analytics capabilities in order to address the affected areas or plants with precision. Such an approach would lead not only to the improvement of dosage in the affected areas, but also to a reduction in the overall use of chemicals within the area [2].

Mapping and imaging capabilities of drone platforms with a range of sensors can be used throughout the whole production process in order to plan production better and therefore improve productivity. Before the vegetation cycle starts, drone technology can be used to assess soil condition and thus potential yields. The key application in assessing soil condition is actual 3D mapping of the terrain with precise soil colour coverage. This helps to assess the soil quality as well as the moisture and water flow precisely. Throughout the vegetation period, cyclical flights can be employed to monitor crops and the agriculture process in order to plan operations and swiftly react if issues are observed. This can instantly be done by automated drones equipped with spraying capabilities. Drone-enabled NDVI index values analysis products help to indicate the precise timing for harvesting.

The fusion of advanced aerial information acquired with the help of drones with data from other sources such as weather forecasts and soil maps can help to refine the final information and enable the farmer to take full advantage of the farm and maximize the yields to their natural limits.

The drone technology sector as well as image data processing and analytics are all in a constant state of change and development.

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2. Precision agriculture in 2021 [Electronic resource]: The future of farming is using drones and sensors for efficient mapping and spraying – Mode of access: <https://www.businessinsider.com/agricultural-drones-precision-mapping-spraying/>. – Date of access: 02.04.2021.