

## **Drone Benefits in Agriculture**

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This paper will talk about the usage of drones in agriculture and the current and future benefits of agricultural drones.

Drones can help to map and survey fields; they are also able to spray fertilizer and pesticides over the crops. Drones are quite useful in agriculture surveillance. They can be used to determine the yield of each crop and field. Another use in surveying is the growth of the crop, an example of this would be if there is a section of crops that are shorter than the rest of the field it could be that the soil in that particular area has a nutrient deficiency. For drones to map or survey fields they can be automated or be flown manually. Automated drone usage for surveying can be easier in some instances as the drone can have a route preplanned into the system by using the Global Positioning System or GPS. While the automated drone is flying along the surveying route it will take pictures in predetermined locations over the field. Automated drones are easy to learn and use, can help to save time while surveying a field, but the downside to the drone being automated is that it will likely cost more than a manually operated drone. A manually operated not entirely difficult it can be tedious and time-consuming, this is because the pilot of the drone must fly to each surveying location over the field and stop the drone to take the photographs.

The drones are also able to relay information back to the operator or farmer in real-time. The drone can be equipped with sensors to relay if sections may need extra water if it is a dry season, fertilizer, or pesticides. They can also sense if crops are diseased or have a fungal infection and alert the farmer. These operations can save resources, time, and yield. By feeding information to the owner of the field, they can effectively use that information to complete the necessary steps to fix the small problem before it can have a widespread effect on that field.

Drones that spray fertilizer or pesticides over crops are extremely beneficial to the agriculture industry. The spraying drones are more precise than a tractor and there is less of an

opportunity for human error with a drone. Drones also help to reduce the amount of exposure to harmful chemicals that would affect the operator of the tractor. The cost is another major factor to choose a drone for this type of operation, rather than the operating and maintenance costs of a tractor.

Drones can also help reduce pollution from farming operations. Runoff from normal fertilizing and pesticides can be very harmful to the surrounding environment, drones can spray the chemicals in precise locations reducing the amount needed and the traveltime to get to the area that needs the fertilizer or pesticides. By using drones to spray, it can use the correct amount of chemicals needed and eliminate overspray. This method replaces another outdated form of spraying fields, which is crop-dusting.

The livestock sector of agriculture has also changed with the introduction of the drone. Although slow to adopt the newer technology, the benefits from the usage of drones has already begun to become apparent. They can be used to monitor the land used by ranchers for grazing livestock. This allows the livestock to be rotated and for the land to not be strained by the over-use, which would be a large financial loss for the owner of that land. Drones are also able to track the movements and location of the herd, relieving the stress and workload of the rancher.

As for the future of the partnership between the agriculture industry and drones, there is much to see. The drone is still new to the world and has already had a large impact on the way agricultural operations are handled. Drone technologies will continue to improve and meet more demands of not only the agriculture industry but other industries as well.

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