Drone Technology in Horticultural Crops

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Unmanned Aerial Vehicles (UAVs) is known as Drones that are regarded as pilotless aircraft techniques utilized in various areas such as Industrial monitoring system, shooting, battleground observation, space ambulance, product liberation and several more applications. It is controlled by specific point and useful as diminutive distance flying areas. In Horticulture, there are various functions of drone tools like crop supervising, crop quantity and verve considerations, crop record, production of recommendation records, meticulousness drenching, and examination of farm infrastructure, high declaration mapping and examination of individual areas, crop scratch measurement and insurance claim forensics. In general, UAVs are equipped with the cameras and sensors for crop monitoring and sprayers for pesticide spraying.

Drones are preferred over full size aircrafts due to major factors like combination of high spatial resolution and fast turnaround capabilities together with low operation cost and easy to trigger. These features are required in precision agriculture where large areas are monitored and analyses are carried out in minimum time. Using of aerial vehicle is possible due to miniaturization of compact cameras and other sensors like infrared and sonar (Dutta and Goswami, 2020).

Agricultural drones allow users/farmers to watch their fields from the sky and depiction intending problems on the farm such as irrigation issues, soil dissimilarity as well as pest and fungal infestations, having determined these issues, the farmer can come up with better results to develop crop supervision and production. The current research shown that almost 85% of drone machinery is mostly used by military and rest 15% used by civilians for various applications. However, with the rapid growth of technology, it is reported that growth of Drones technology is increasing 25-32% every year especially in the area of Agriculture. Lots of researchers and drones manufacturing companies are either coming up or in process of releasing varied models of drones specially made up for agriculture (Rana and Mahima, 2020).

Applications of Drones in Horticulture crops

a) **Soil health monitoring:** Drone collect and process data received from monitoring that can help check, control, and maintain the soil's health. It can also provide the essential nutrients to the soil to improve their health and well-being. Through its operations of 3D mapping and data processing, drones achieve this operation of analysing soil health.

b) **Crop health monitoring:** Drones can be used for monitoring the conditions of crops throughout the crop season so that the need-based and timely action can be taken.

c) **Fertilizer spraying:** The drone operators are free to monitor the drone spraying fertilizers that keep insects, pests, and worms away and increase crop life longevity.

d) **Seeding process:** Seeding, especially, requires manual labour as it is a time-consuming procedure. To ease this tiring process, drone technology is employed to sow the seeds of the copious varieties of crops.

e) **Analyzing deficiencies:** Drones helpto analyse, identify, and survey the crops for any deficiencies. Their high-resolution cameras and sensors, additionally instilled with lasers, help to perform these operations quickly.

f) **Plantation:** Drones can help in planting trees and crops, which was done by farmers before. This technology will not only save labor but also help in saving fuels.

g) **Avoid overuse of chemicals:** Drones can prove to be especially effective in reducing the

overuse of pesticides, insecticides, and other chemicals.

Benefits of using drones in Horticulture crops

1. **Security:** The drones are operated by trained drone pilots. So, there are no chances of their misuse.

2. **High efficiency:** Drones do not have any operational delays and can work double the speed of human labour.

3. **Water-saving:** In comparison to traditional spraying methods, agricultural drones use ultra-low volume (ULV) spraying technology, thus saving more water.

4. **Low cost and easy to maintain:** Agri drones are sturdy, low in cost, and require minimum maintenance. Some of the key features include a detachable container, low-cost frame, precise spraying of pesticides (Singh, 2023).

Conclusion

The Horticulture sector needs revolutionary changes to meet the demands of ever-growing population, farmer's welfare and the emerging uncertainties at national and international level. Drones have great potential to transform Indian horticulture. With the advancement of technology in the future, the production of drones is expected to become economical. It provides real time and high quality aerial imagery compared to satellite imagery over agricultural areas. Also, applications for localizing weeds and diseases, determining soil properties, detecting vegetation differences and the production of an accurate elevation models are currently possible with the help of drones. Drones will enable farmers to know more about their fields. Therefore, farmers will be assisted with producing more food while using fewer chemicals. Nearly all farmers who have made use of drones have achieved some form of benefit. They can make more efficient use of their land, exterminate pests before they destroy entire crops, adjust the soil quality to improve growth in problem areas, improve irrigation to plants suffering from heat stress and track fires before they get out of control. I conclude that we should effectively adopt and leverage the potential of drone technology and bring awareness in the farmers, for transforming the agriculture sector and life of millions of farmers in India.

References

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