



## DRONE TECHNOLOGY- A NEW STEP IN AGRICULTURE

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### ABSTRACT

Drones are the futuristic technology of farming to drive the agriculture sector to new heights by monitoring crop growth by assessing and mapping technologies. Drones can transform traditional farming into smart farming. The activities carried out by the drone are precise, optimum and target-oriented in nature. With the help of multiple sensors, photo cameras, and programmable software available in drones, it is easy to manage farms, save resources, and get more return on investment. Drones help carry out timely farm operations and make farming better to manage. Nowadays, the government also provides a considerable amount of subsidies to purchase drones to increase the income level of the farming community. The benefits of drone technology make it a new step in agriculture for achieving better productivity and profitability for the farming community.

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### INTRODUCTION

Drones are unmanned aerial vehicles (UAVs) or remotely piloted aerial systems (RPAS) controlled either by a pilot on the ground or with the help of technologies. The drones are working with the help of navigation systems, GPS, multiple sensors, high-resolution cameras, programmable controllers and other tools of autonomous technologies. The working principle of a drone includes four major steps that are 1. analyzing the area, 2. uploading the data to software for further analysis, 3: data processing, 4. Data output for getting a replica of the area in a precise image manner. Drones generally collect raw data of the location and translate it into the algorithm for creating prescription maps for various applications in respective fields.

### DRONE TECHNOLOGY IN AGRICULTURE, WHY?

Earlier drones were only limited to the military, but their uses are increasing in precision agriculture. The productivity and efficiency of the Indian agriculture sector are not up to the mark of the country's potential status due to unsuitable crop monitoring methods, unprecise irrigation methods, faulty use of chemicals, and inadequate resource management activities. The purpose of adopting drone technology in

agriculture is to get accurate and reliable information on external factors like weather, soil conditions and temperature, which play a crucial role in present-day farming. The adoption of drone technology in agriculture empowers the farmers to adopt smart agriculture practices to make mindful choices accordingly. Precise application of technologies with the help of drone survey helps maximize crop yields and return on investment (ROI) and minimize the time, resources and expenses in farming.

## **DRONE TECHNOLOGY USES IN AGRICULTURE**

Technology adoption is the key to achieving the productivity of existing cropping systems. Drone technology is one of the novel technology applications in farming. Drones are presently used in the below areas of agriculture to increase efficiency and save resources.

**SOIL ANALYSIS:** To prepare precise 3D maps based on multispectral remote sensing of soil moisture content, physical soil conditions and soil topography level.

**CROP ASSESSMENT:** Crop assessment or monitoring is the biggest headache on large farms. For easier crop health assessment, crop damage identification is possible based on NDVI difference values, different reflection amounts of green light, and near-infrared spectroscopy (NIRS) light monitoring.

**SPRAYING:** With the help of RGB (red, green, blue) sensors and optical fibre sensors, problematic areas can be identified and treated.

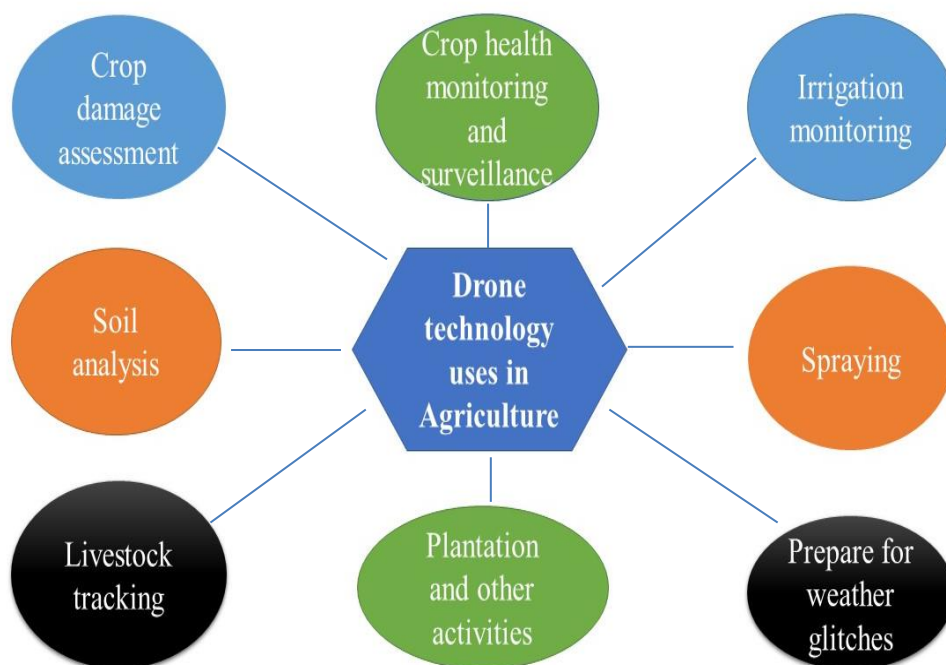
**PLANTING:** By topography and algorithm images of the area with the help of electronic speed controllers (ESC) and micro-controllers attached to brushless DC motors (BLDC) of UAV machine, planting of shoot pods, seeds and nutrients can be carried out.

**LIVESTOCK TRACKING:** The livestock 3D visualization with the help of the YOLO (you only look once) model and R-CNN algorithms accurate livestock monitor is carried out.

## **BENEFITS OF DRONE TECHNOLOGY IN AGRICULTURE**

- **ENHANCED PRODUCTION:** drones help achieve more output per unit area by combing comprehensive irrigation management, crop health assessment, soil health care, and adoption to changing environment.
- **MORE SAFETY FOR FARMERS:** the drone is the best choice to apply chemicals in challenging areas like terrains, taller plants, infected areas, etc.
- **FASTER ASSESSMENT:** surveying area to create maps, crop quality assessment, and crop damage analysis to claim crop insurance assessment is faster.
- **HIGH EFFICIENCY:** there is no delay in operations and completes the activities in a short period.

- **Large-scale farm maintenance:** With the help of sensor technologies available in drones, it is easy to maintain and carry out operations on a large scale.
- **MORE VERSATILE AND COST-EFFECTIVE:** They provide more accurate and cost-effective data than satellite images.
- **HELPS IN ENVIRONMENTAL DATA MONITORING:** Monitored data is used for smart climate agriculture as a pathway for sustainable farming.
- **REDUCING FARM OPERATIONAL COST:** Labour cost can be saved in spraying work, thereby; reducing the cost of cultivation.



**Fig.1 Uses of drone technology in agriculture**

### LIMITATIONS OF DRONE TECHNOLOGY IN AGRICULTURE

- **WEATHER DEPENDENT:** not advisable to fly drones under rainy or windy conditions. Windy weather leads to mismatching the spraying pattern of drones.
- **SPECIAL KNOWLEDGE AND SKILL:** require special knowledge and skills to operate and understand drones for agriculture purposes.
- **NOT HELPFUL FOR SPECIFIC CROPS AND PROBLEMS:** Specific mimicry behaviour of weeds, plants, insects and diseases leads to faulty analysis.

- **FLIGHT TIME AND RANGE:** carrying out larger area operations is difficult to manage due to flight time, which is limited to 20-60 minutes in the majority of drones and short-range flying.
- **HIGH INITIAL COST:** Agricultural drones used for surveying and spraying may cost up to \$25000 (precision hawk Lancaster type) based on features and sensors.

## **SCHEMES AVAILABLE FOR DRONE TECHNOLOGY IN AGRICULTURE:**

### **SUB-MISSION ON AGRICULTURAL MECHANISATION (SMAM) SCHEME-2022:**

- The SMAM scheme grants up to 100% or ten lakhs as a grant fund for purchasing drones by ICAR institutes, KVK and SAUs. It also provides 75% grant funds for drone purchases to farmer producer organizations (FPOs).
- 50% or up to 5 lakhs of a grant fund for drone purchase to agriculture graduates establishing custom hiring centres (CHCs)
- 40% or 4 lakh grants to existing CHCs, FPOs and rural entrepreneurs.

### **KISAN DRONE SCHEME-2022:**

- Kisan drone yatra or Kisan drone suvidha scheme has flagged 100 drone start-ups to develop drones for transport fruits, vegetables and other commodities to market directly from farm.
- It also includes crop surveying assessment, digitalization of land records, and spraying chemicals and nutrients to crops.

## **CONCLUSION**

Undoubtedly, drones are the future of Indian farming community to transform traditional farming into smart farming. The activities carried out by the drone are precise, optimum and target-oriented in nature. With the help of multiple sensors, photo cameras, and programmable software available in drones, it is easy to manage farms, save resources, and get more return on investment. Drones help carry out timely farm operations and make farming better to manage. Nowadays, the government also provides a considerable amount of subsidies to purchase drones to increase the income level of the farming community.

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