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Application of Drone in Indian Agriculture

Dr. Madhavi D. Jangilwad and Dr. Ashwini C. Chandel

Dept. of Soil Science and Agricultural Chemistry, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola-444104, Maharashtra, India.

ARTICLE ID: 018

Introduction

Agriculture is one of the most crucial elements for the sustainability of human civilization. It has been forecast that agricultural consumption would increase by 69% from 2010 to 2050 due to increase in population. The current technological trends in agricultural practices are not suitable for small land holdings that are a norm in developing countries. As such, meeting future food demands seems like an uphill task for such countries. To stay sustainable, maximize productivity and optimize land spaces, the concepts of advanced farming techniques need to be explored and integrated into agriculture. One such concept is drones with data-gathering equipment for agriculture which is now known as precision agriculture.

What is Agriculture Drone?

An agricultural drone is an unmanned aerial vehicle used to help optimize agriculture operations, increase crop production, and monitor crop growth. Sensors and digital imaging capabilities can give farmers a richer picture of their fields. Using an agriculture drone and gathering information from it may prove useful in improving crop yields and farm efficiency.

Fig1. Some of images of Drone

How drones can be used?

In precision agriculture, drones have a range of uses from soil and crop field analysis to planting and pesticide spraying. Drones can be used with different imaging technologies like hyper spectral, multispectral, thermal etc. that can provide the farmers with time and site-specific information regarding crop health, fungal infections, growth bottlenecks etc. Drones can also identify drier regions in a field and measures can then be taken to irrigate such regions with better techniques. Precision agriculture provides farmers with such concrete

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information that enables them to take informed decisions and utilize their resources more efficiently.

Application of Drone in Crop Monitoring

1. Soil and field analysis:

Drones can be instrumental at the start of the crop cycle. They produce precise 3-D maps for early soil analysis, useful in planning seed planting patterns. After planting, drone-driven soil analysis provides data for irrigation and nitrogen-level management.

2. Plant counting and crop emergence:

High resolution cameras on drones, and plant-counting algorithms can accurately and efficiently provide inventory information, track crop emergence, drive replanting decisions and help predict yield.

3. Crop damage assessment and documentation:

Drone data provides critical information for measuring and documenting damage to crops caused by floods, fire, pests, weather events, etc. These reports can complement and reinforce insurance claims.

4. Crop scouting:

A quality drone and multispectral camera system can detect disease and stress early (sometimes before it is visible from the ground or with standard color cameras). Use this information, coupled with proven agronomic methods, to focus your treatment plans.

5. Crop spraying:

Drones can scan the ground and spray the correct amount of liquid, modulating distance from the ground and spraying in real time for even coverage. The result increased efficiency with a reduction of in the amount of chemicals penetrating into groundwater.

6. Crop monitoring:

Vast fields and low efficiency in crop monitoring together create farming's largest obstacle. Monitoring challenges are exacerbated by increasingly unpredictable weather conditions, which drive risk and field maintenance costs.

7. Irrigation:

Drones with hyper-spectral, multispectral, or thermal sensors can identify which parts of a field are dry or need improvements. Additionally, once the crop is growing, drones allow the calculation of the vegetation index, which describes the relative density and health of the crop, and show the heat signature, the amount of energy or heat the crop emits.

Conclusion

Drones can help farmers to optimize the use of inputs (seed, fertilizers, water), to react more quickly to threats (weeds, pests, fungi), to save time crop scouting (validate treatment/actions taken), to improve variable-rate prescriptions in real time and estimate yield from a field.