Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 03, Issue: 05 (SEP-OCT, 2023)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Drone Technology in Agriculture

(*Lachha Choudhary, Manikaran Sandhu, Chetna Sharma and Rahul Jakhar)
Ph.D. Scholar, College of Agriculture, SKRAU, Bikaner
*Corresponding Author's email: lachha1103@gmail.com

Government have initiatives to improve development in agriculture by using technologies. One of the technologies is unmanned aerial vehicle (UAV) or also known as drone. The use of drones in almost every sector of the economy is growing fast, but drone usage in the agricultural sector is booming. From scouting to security, drone use will become more omnipresent on large and small scale farms in a few years. The information gathered by drones on farms is often used to better inform agronomic decisions and is part of a system generally referred to as 'precision agriculture'. Modern farmers have already started using high-tech solutions such as UAVs for monitoring and forecasting in agriculture. Drones can collect data on crop yield, livestock health, soil quality, nutrient assessments, weather and rainfall patterns, and other aspects.

There are different kinds of unmanned aerial vehicles available and can be categorized into the following groups:

- Fixed wing.
- Rotary wing.
- Tethered vehicle.
- Lighter-than-air (LTA).

Component of agricultural drones include

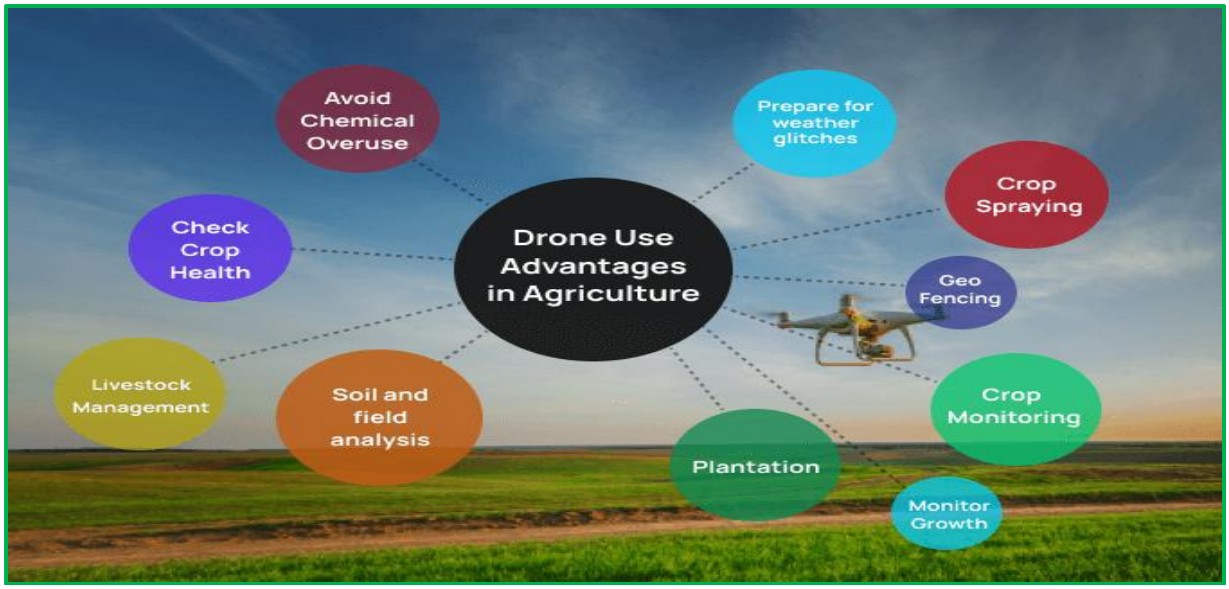
- Frames
- Controller Systems
- Propulsion Systems
- Camera Systems
- Navigation Systems
- Batteries (power systems)

Govt. announces heavy subsidies to farmers for buying drones

The "**sub-mission on agricultural mechanisation**" (SMAM) scheme envisages granting up to 100% or Rs 10 lakh as grant funding for drone purchase by ICAR institutions, Krishi Vigyan Kendras and State agriculture universities. It provides for 75% grant funding for drone purchases to farmer producer organisations (FPOs).

Rs 6,000 per hectare (will) be given as contingent expenditure to implementing agencies that hire drones for demonstrations. Rs 3,000 per hectare to be given as contingent expenditure to implementing agencies that buy drones for drone demonstrations. Forty per cent or up to Rs 4 lakhs of grant funding for drone purchase to existing custom hiring. Fifty per cent or up to Rs 5 lakh of grant funding for drone purchase to agriculture graduates establishing Custom Hiring Centres.

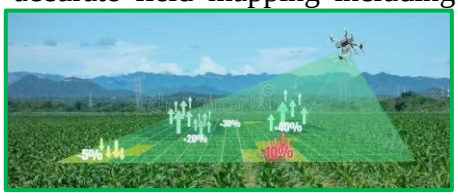
Application of Drones in Agriculture



Scouting/Monitoring Plant Health: Drones equipped with special imaging equipment called Normalized Difference Vegetation Index (NDVI) use detailed colour information to indicate plant health. This allows farmers to monitor crops as they grow so any problems can be dealt with fast enough to save the plants. This image illustrates simply how NDVI works.

It is crucial to track the health of the vegetation and spot bacterial/fungal plagues in the early stages. Agriculture drones can see which plants reflect different amounts of green light and Near-infrared spectroscopy (NIRS) light. This data helps produce multispectral images to track crop health. Quick monitoring and discoveries of any defects can help save crops. In circumstances of crop failure, the farmer can also document the damages for accurate insurance claims.

Monitoring Field Conditions: Drone field monitoring is also being used to monitor the health of soil and field conditions. Drones can provide accurate field mapping including elevation information that allow growers to find any irregularities in the field. Some agricultural drone retailers and service providers also offer nitrogen leval monitoring in soil using enhanced sensors. This allows for precise application of fertilizers, eliminating poor growing spots and improving soil health for years to come.



Planting & Seeding: One of the newer and less wide spread uses of drones in agriculture is for planting seeds. Drone startups in India have invented drone-planting systems that allow drones to shoot pods, their seeds, and crucial nutrients into the soil. This technology doesn't only reduce costs by almost 85% but also increases consistency and efficiency. They are also able to plant much more efficiently with a team of two operators and ten drones capable of planting 400,000 trees a day.

Spray Application: Drone use to apply spray treatments is already widespread in south-east Asia, with South Korea using drones for approximately 30% of their agriculture spraying. Drone sprayers are able to navigate very hard to reach areas, such as steep tea fields at high elevations. Drone sprayers save workers from having to navigate fields with backpack sprayers, which can be hazardous to their health.

Security: Drone security is a fast growing industry apart from agriculture but is also extremely useful to farm management. Drone cameras can provide an overview of farm operations throughout the day to ensure operations are running smoothly and to locate equipment being used. Security drones can be deployed to monitor fencing. Drone cameras are also being used in exciting ways to protect farm animals. Monitoring remote areas, which used to take hours of walking can now be completed in a few minutes.

Drone Irrigation: New research out of Australia is also creating exciting opportunities for drone use in agriculture. As climate change increasingly affects drought conditions, creating more efficient irrigation solutions is vital.

Livestock management: Drones can be used to monitor and manage huge livestock as their sensors have high-resolution infrared cameras, which can detect a sick animal and swiftly take actions accordingly. So, the impact of drones on precision dairy farming is soon to become a new normal.

Challenges of Using the Drones in the Agricultural Industry

There are various expected challenges for farmers who are currently using drones on their farms. These include:

- High cost to set up.
- It may contribute to airspace interferences, especially for the manned aircrafts
- There are flight time limitations, which has a negative impact on the distance that can be covered at any given time.
- The image quality is affected when there are heavy rains.
- A high amount of sunlight is required for image capture.
- The battery life of a drone survey is a limitation. It reduces the drone's flight time.
- Among the many serious negative environmental consequences, the threat to wildlife, particularly birds, is a major concern.
- A traditional farmer is unable to perform the necessary analysis on drone images.
- To operate agriculture drones, you'll need some basic knowledge and skills.

Conclusion

Drones have already vastly altered the agricultural industry and will continue to grow in the coming years. While drone use is becoming more useful to small farmers,there is still a ways to go before they become part of every farmer’s equipment roster, particularly in developing nations. Regulations around drone use need to be made and revised in many countries and more research needs to be done on their effectiveness at certain tasks, such as pesticide application and spraying. There are many ways drones can be useful to farmers but it is important to understand their limitations and functions before investing in expensive equipment.