



Drone Technology: Importance in Indian Agriculture and Farming

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India's economy is mostly based on agriculture. The majority of rural households still rely on agriculture as their primary source of income. India's economy is also strongly reliant on agricultural products, which account for a large number of the country's exports. Despite its growing importance, agriculture is still lagging behind technological improvements. Crop failure due to bad weather and unmanaged insect problems have been the main causes of this situation. Furthermore, Indian farmers are still reliant on monsoon rains for irrigation and employ age-old farming practices. As a result, despite farmers' best efforts, the quality and quantity of agricultural products are occasionally affected.

The Indian Agriculture Industry and Drones

Drones are unmanned aerial vehicles (also known as UAVs) that are utilised in a variety of businesses for monitoring. Until now, they were largely employed by enterprises in the mining and construction industries, the army, and hobbyists.

Drone technology has received the greatest attention in the business due to its versatility and is seen as the agrarian community's future. They were first utilised by the military. When other industries learnt about the wide range of uses for unmanned aerial vehicles (UAVs), they immediately welcomed them. Drones not only improve overall performance, but they also help farmers to overcome a variety of other obstacles and get several benefits from precision agriculture. Weather, soil conditions, and temperature are all important aspects of agriculture. Agriculture drones enable farmers to adapt to unique circumstances and make thoughtful decisions as a result. The information gathered helps with crop health, crop treatment, crop scouting, irrigation, field soil analysis, and crop damage assessments. The drone survey aids in increasing agricultural production. The drone survey increases agricultural yields while reducing time and costs. However, drone technology is now becoming more widely available for application in agriculture. Even though the technology is still in its infancy in India, numerous businesses are working to make it readily available to Indian farmers and ready to be utilised to boost agricultural productivity.

Why Should Agricultural Drones be Adopted?

Experts estimate that the world's population will reach 9 billion people by 2050. At the same time, agricultural consumption is predicted to increase by roughly 70%. Drone technology combining artificial intelligence (AI), machine learning (ML), and remote sensing capabilities are becoming increasingly popular due to its benefits. With its online 'Digital Sky Platform,' the central government has recognised the importance of unmanned aerial vehicles (UAVs), machine learning, and artificial intelligence. India's drone entrepreneurs have taken advantage of the chance to improve their technological capabilities.

Only with a thorough understanding of drone characteristics can one obtain a thorough understanding of farm drones. Drones often contain a navigation system, GPS, several sensors, high-resolution cameras, programmable controllers, and autonomous drone tools. The DJI is one of the most well-known drones in the market. The majority of farmers now utilise satellite images as a starting point for agricultural management. Unmanned aerial vehicles (UAVs) equipped with contemporary technology can obtain more exact data for precision agriculture than satellites. They then input the data into agri-tech tools to provide useful information.

The following phases are involved in capturing data from an agriculture drone:

Examining the situation: This identifies the area that will be evaluated. As a result, the first phase is defining a boundary, analyzing the region, and ultimately, downloading technical GPS data into the drone's navigation system.

Using Self-Driving Drones: Because unmanned aerial vehicles (UAVs) are self-contained, they enter flight patterns into their pre-existing data collection system.

After gathering all of the essential data using sensors such as the multispectral sensor/RGB sensor, the data is processed using a variety of software for further analysis and interpretation.

Output: After collecting the data, they structure it in such a way that farmers can easily grasp it, bringing them one step closer to precision farming. 3D mapping and photogrammetry are two prominent approaches for displaying large amounts of data.

Agri-Drones are becoming More Popular

Weather conditions may be a farmer's best friend and worst opponent at the same time. Because these can't be foreseen with any accuracy, preparing for any shift in patterns becomes incredibly tough. Drones can be used to predict future weather patterns. Storm drones are already being utilised to improve forecasting accuracy. Farmers may utilise this knowledge to better prepare themselves. Storms or a lack of rain can be predicted in advance, allowing you to select the best crop to plant for the season and how to care for your planted crops afterwards.

A lot of drone-based agricultural projects are undergoing in India. Consider the following real-life scenarios:

The Indian government also announced a certification procedure for agricultural drones on January 26, 2022, which allows them to carry a payload that does not include pesticides or other liquids used in spraying drones. Such liquids can be sprayed as long as the norms and regulations are followed. The government of India recently offered a 100 per cent subsidy or 10 lakhs, whichever is less, up to March 2023 to Farm Machinery Training and Testing Institutes, ICAR Institutes, Krishi Vigyan Kendras, and State Agriculture Universities to promote the use of drones for agricultural purposes and reduce the labour burden on farmers.

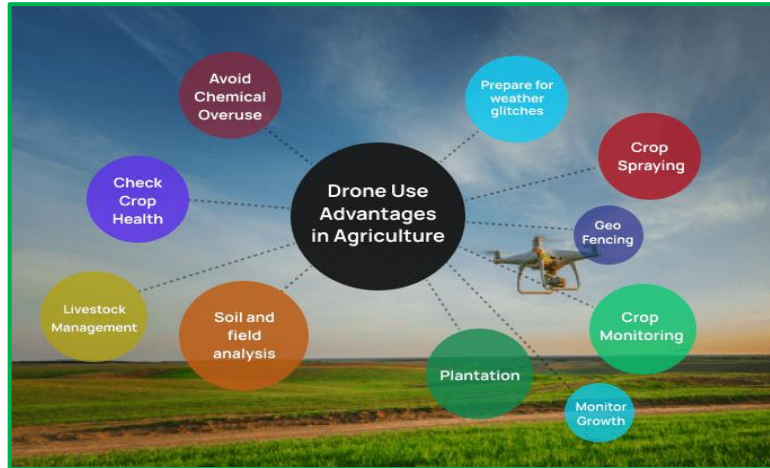
A contingency budget of Rs.6000/hectare will also be established for employing Drones from Custom Hiring Centres (CHC). Farmers will be able to acquire and utilise this advanced technology at a low-cost thanks to the subsidies and contingency money. The Indian government gave the International Crops Research Institute (ICRISAT) permission to utilise drones for agricultural research on November 16, 2020. The government believes that by taking this step, emerging academics and entrepreneurs would be inspired to explore low-cost drone solutions for India's 6.6 million communities.

Advantages of Using Drones in Agriculture

Drone technology swiftly re-establishes old farming techniques, which are then carried out in the following ways:

Crop Health Surveillance and Monitoring

Tracking the health of the plants and spotting bacterial/fungal diseases early on is critical. Agriculture drones can identify plants that reflect varying amounts of green light and Near-infrared spectroscopy (NIRS) light. This information is used to create multispectral pictures that may be used to track crop health. Crops can be saved if they are monitored closely and any faults are discovered quickly. In the event of crop failure, the farmer can document the losses to file proper insurance claims.



Crop surveillance refers to the monitoring of a crop's progress from seeding to harvesting. This involves applying fertilisers at the appropriate times, inspecting for pests, and tracking the impact of meteorological conditions. When dealing with seasonal crops, crop surveillance is the only method for a farmer to secure a timely harvest. Drones may assist in effective crop monitoring by checking the field with infrared cameras, and farmers can take active actions to enhance the state of plants in the field based on their real-time information.

Soil Analysis in the Field

Farmers can use a drone survey to understand more about their land's soil qualities. Sowing patterns, field soil analysis, irrigation, as well as nitrogen control can all benefit from multispectral sensors. Farmers can use accurate photogrammetry/ 3D mapping to assess their soil conditions in depth.

Agricultural drones can be used to help with field planning by doing soil and field research. Sensors that detect soil moisture content, topographical circumstances, soil quality, soil degradation, soil nutrients, and soil fertility can be mounted on them.

Planting

Drone-planting systems have been developed by Indian businesses that allow drones to spray pods, seeds, and essential nutrients into the soil. Not only does this technique cut expenses by over 85%, but it also improves uniformity and efficiency.

Irrigation Monitoring

Drones equipped with hyperspectral, thermal, or multispectral sensors detect regions that are too dry or need to be improved by the farmer. Irrigation monitoring yields calculations of the

Tracking livestock

Farmers may use the drone survey to keep track of not just their crops but also their cattle's movements. Thermal sensor technology aids in the recovery of missing animals and the detection of damage or illness. Drones are capable of performing this duty well and thus contribute significantly to the creation of vegetation.

Avoid overuse of chemicals

Drones have the potential to reduce the abuse of herbicides, insecticides, and other chemicals in particular. These compounds do certainly aid in crop protection. However, over usage of these might be harmful. Drones can detect even the tiniest indicators of pest assaults and offer precise information about the severity and breadth of the attack. This can assist farmers in calculating the number of pesticides needed to protect their crops rather than harm them.



Benefits of Drone Technology

As new technologies are introduced by inventors, their commercial applications grow by the day. Drone usage limits have been eased by the government, and companies are being encouraged to come up with innovative concepts. Drone surveys are becoming more cost-effective as they become more widespread. They offer several advantages in agriculture. Here are a few examples:

Enhanced Production- A farmer's production capacities can be improved by thorough irrigation planning.

Effective and Adaptive Practices- Drone use provides farmers with regular crop updates and aids in the development of stronger agricultural techniques. They can adapt to shifting weather conditions and make efficient use of resources.

Farmers' safety is improved- Using drones to spray pesticides in difficult-to-reach terrains, contaminated regions, higher crops, and power lines is safer and more convenient for farmers. It also aids farmers in avoiding crop spraying, resulting in less pollution and chemicals in the soil.

Data that is 10 times quicker for speedier decision-making- Drone surveys provide farmers with reliable data processing, allowing them to make rapid and deliberate judgments without second-guessing, saving time spent on crop scouting. The drone's many sensors allow it to capture and analyse data from the whole field. The information may be used to target issue regions such as sick or unhealthy crops, various coloured crops, moisture levels, and so on. A different type of sensors for various crops can be installed on the drone, providing for a more precise and versatile crop management system.

Farmers may use the drone survey to determine the exact area of their field, section their crops, and map their soil- Farmers utilise the data collected by drones to file crop insurance claims in the event of damage. While being insured, they even analyse the risks and losses linked with the land. Agri-drones are used by agricultural insurance companies for efficient and reliable data. They document the losses that have happened to calculate the appropriate monetary compensation for the farmers.