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Drone-based Technologies in Agriculture in India

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The human population in India is increasing day by day, which makes food security more challenging. The Indian agricultural sector contributes a tremendous 18% to the country's GDP. It is considered the prime source of livelihood for approximately 58% of the country's population, mainly in rural areas. Unprecedented rainfall, climate change, costly inputs, the practice of primitive technologies and small land holdings are the major challenges facing today in the agriculture sector.

Drone technology has gotten most of the recognition in the industry because of its diverse, time-saving applications and is considered the future for the agrarian community. The technology was initially developed by US and France during the 1st world war for military purposes. However, other sectors quickly embraced unmanned aerial vehicles (UAVs) when they learned about its widespread applications. The purpose of adopting drone technology is to focus on an accurate and reliable information. The agriculture drone empowers the farmer to adapt to specific environments and make mindful choices accordingly. The gained data helps in regulating crop health, crop treatment, crop scouting, irrigation, and carrying out field soil analysis and crop damage assessments. The drone survey helps boost crop yields and minimize time and expenses. Even for pesticide and nutrient application to the crops drones are widely used in recent days.

Due to these reasons drone technology equipped with artificial intelligence (AI), machine learning (ML), and remote sensing features is rising in demand. The central government has recognized the advantages of unmanned aerial vehicles (UAVs) and it relaxed the rules and regulations imposed on the use of drones (certain categories of drones used for agriculture) to promote its use. The SOP developed by the Ministry of Agriculture and Farmers welfare has detailed the certification procedure for drone pilot, procedure to fly drones, restricted area for drone flying, *etc*.

Mainly fixed wing and multi-copter drones are recommended for farmers. Some best drones for agriculture purposes are e- Bee X, DJI Agras T30, DJI Agras T10, DJI Agras T20 and XAG P20. The XAG P20 crop spraying drones have a spraying system that atomizes chemicals for better coverage and efficiency. The two most popular crop-spraying drones on the market are manufactured by DJI and can cover up to approximately 30 ac/h.

Govt. scheme for drone promotion

On 26th January 2022, the Government of India released a certification scheme for agricultural drones, which can now carry a payload that does not include chemicals or other liquids used in spraying drones. Such liquids may be sprayed by following applicable rules and regulations.

On 23rd January 2022, to promote the use of drones for agricultural purposes and reduce the labour burden on the farmers, the government of India has recently offered 100% subsidy or 10 lakhs, up to March 2023 to the Farm Machinery Training and Testing

Institutes, ICAR Institutes, Krishi Vigyan Kendras & State Agriculture Universities. Additionally, a contingency fund of Rs.6000/hectare will also be set up for hiring Drones from Custom Hiring Centres (CHC). The subsidy and the contingency funds will help the farmers access and adopt this extensive technology at an inexpensive price.

On 16th November 2020, the Indian government granted the International Crops Research Institute (ICRISAT), to use of drones for agricultural research activities. With this move, the government hopes to encourage budding researchers and entrepreneurs to look at budget-friendly drone solutions for more than 6.6 lakh Indian villages.

Current status of drone application in the country

State governments in Karnataka, Haryana, Punjab, Tamil Nadu, and Madhya Pradesh are collaborating with drone manufacturers, farmer producer organizations, and state agriculture universities to develop fertilizer spraying drones. The state governments are also collaborating with state universities to help farmers become acquainted with the use of drones.Drones are being used in the agriculture sector in Rajasthan, and an action plan has been developed for their multi-purpose use in spraying farm chemicals and water-soluble fertilizers on crops. The Agriculture Department of the state government is investigating the technical parameters and safety features of drones. Maharashtra and various other states are also looking into possibilities of adopting the new technology, including collaborations with drone companies.

The cost of agriculture pesticide spray drones can vary between Rs 2 and Rs 10 lakh, which is not affordable to farmers, besides expertise is needed to handle the drones. In order to make this technology available to farmers, private sector will offer rental services. Agriculture pesticide spray drones will be made available for hire at 66 Krishi Yantra Dhare centers in 10 districts across the state through a private farm equipment rental company.The department of agriculture estimates that the service of a drone that has the capacity to carry a 10 kg payload will cost Rs 350-450 per acre. There are 22 registered drone manufacturers and importers in India according to data.Agriculture graduates establishing Custom Hiring Centers would be eligible to receive 50% of the basic cost of a drone and its attachments or up to Rs.5 lakhs in grant support for drone purchases. Rural entrepreneurs should have passed the class tenth examination or its equivalent from a recognized Board, and should have a remote pilot license from an Institute specified by the Director General of Civil Aviation (DGCA) or from any authorized remote pilot training organization.