NEW ERA AGRICULTURE MAGAZINE

Application of Drones in Agriculture in India

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Introduction:

India is primarily an agrarian economy. Agriculture remains the chief source of income for the majority of the rural households. India's economy is also heavily dependent on the agricultural produce that constitutes a major portion of its exports as well. However, despite mounting importance of agriculture, the sector is still far behind in technological advancements. Crop failure due to adverse weather conditions and uncontrolled pests issues have been the key contributors to this scenario. Moreover, Indian farmers are even now dependent on monsoon rains for irrigation and use age-old methods for other farming practices. Hence, the quality and quantity of agricultural produce is sometimes compromised in spite of the relentless efforts of farmers.

Drones are unnamed aerial vehicles (also known as UAVs), which are used for surveillance in various industries. Till now, they were primarily used by companies working in industrial sectors such as mining and construction, army, and hobbyists.

But now, drone technology is increasingly available for use in various sectors of agriculture as well. Though the technology is still nascent in India, many companies are trying so that it is easily available to Indian farmers and ready to be used to increase efficiency in Agricultural Production.

In recent times, multiple pronouncements by the government of India have stated the focus of the government on promoting drones in the Agricultural sector. As per the Indian federal budget of 2022-23, the government is keen to use 'Kisan' (Hindi for farmer) Drones to boost the agricultural sector in the country. Kisan Drones will be promoted for crop assessment, digitization of land records and spraying of insecticides and nutrients.

'The prospects offered by drones for the agricultural sector are constantly expanding. Some typical drone applications are soil sampling and fertilizing, pesticide spraying, animal population surveillance, real-time imagery and sensor data collection, and

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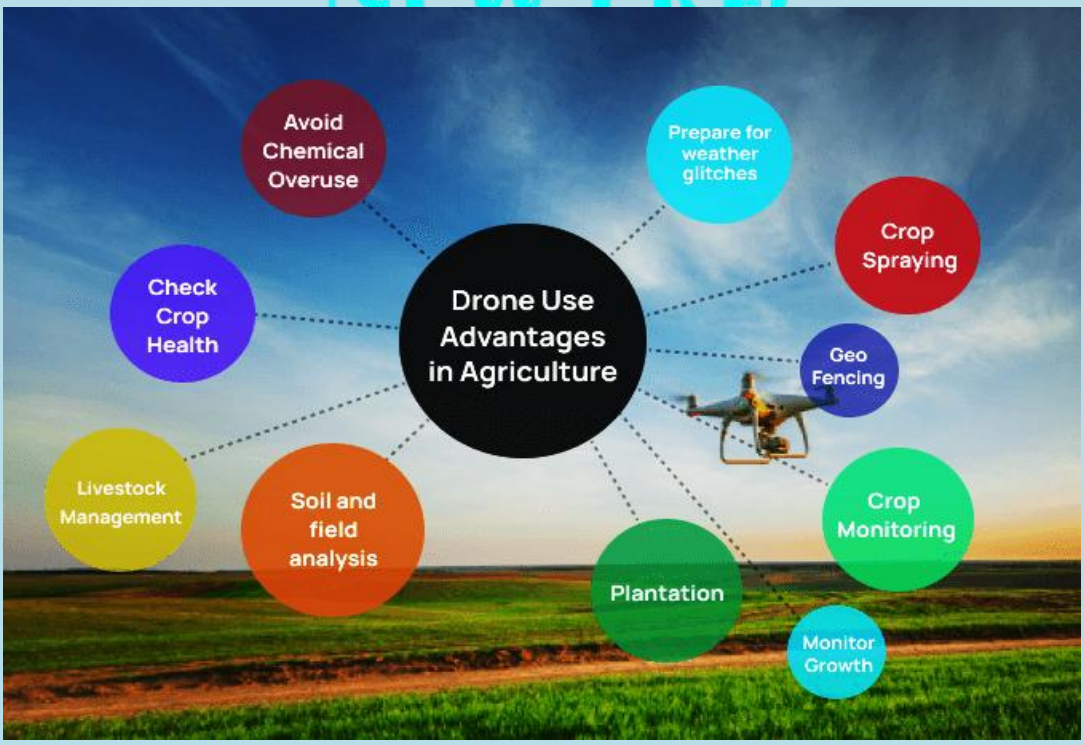
field management.' Moreover, market researchers forecast that the drone services market is estimated to grow approx. 3-fold in 5 years from 2021-2026 from USD 5.48 Billion to USD 15 Billion by 2026 (Research and Markets, April 2022). The application of drones in agriculture offers a lot of potential and hence it is important to study drones from an Indian agricultural perspective.

The Use of Agri- Drones is on the Rise:

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.

A lot of drone-based agricultural projects are undergoing in India. Consider the following real-life scenarios: On 26th January 2022, the Government of India has also 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, a 100% subsidy or 10 lakhs, whichever is less, up to March 2023 to the Farm Machinery Training and Testing Institutes, ICAR Institutes, Krishi Vigyan Kendra & State Agriculture Universities.



Advantages of Using Drones in Agriculture:

The use of drone technology in Agriculture is here to stay. This emerging technology can help reduce time and increase the efficiencies of the farmers. The use of drones in the agricultural sector is only expected to rise as the industry matures, and so it is good to know how to use this technology judiciously.

Soil and field analysis:

For efficient field planning, agricultural drones can be used for soil and field analysis. They can be used to mount sensors to evaluate moisture content in the soil, terrain conditions, soil conditions, soil erosion, nutrients content, and fertility of the soil.

Crop monitoring:

Crop surveillance is the supervision of crop progress from the time seeds are sown to the time for harvest. This includes providing fertilizers at the right time, checking for pest understanding and planning for the next farming season. Drones can help in effective crop surveillance by inspecting the field with infrared cameras and based on their real-time information, farmers can take active measures to improve the condition of plants in the field.

Plantation:

Drones can help in planting trees and crops, which was done by farmers before. This technology will not only save labor but also help in saving fuels. Soon, it is expected that budget-friendly drones will be used instead of huge tractors, as they emit harmful gases and pollute the environment in the process.

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.

Crop spraying:

Agri-drones can be used to spray chemicals as they have reservoirs, which can be filled with fertilizers and pesticides for spraying on crops in very little time, as compared to traditional methods. Thus, drone technology can usher in a new era for precision agriculture.

Check crop health:

Farming is a large-scale activity that takes place over acres of land. Constant surveys are necessary to monitor the health of the soil and the crop that has been planted. Manually, this may take days, and even then,

there is space for human error. Drones can do the same job in a matter of hours. With infrared mapping, drones can gather information about both the health of the soil and the crop.

Monitor growth:

Even when everything is going according to plan, crops need to be surveyed and monitored to ensure that the right amount of yield will be available at the time of harvest.

Benefits of Agri- drones:

- **Security-** The drones are operated by trained drone pilots. So, there are no chances of their misuse.
- **High efficiency-** Drones do not have any operational delays and can work double the speed of human labor.
- **Water saving-** In comparison to traditional spraying methods, agricultural drones use ultra-low volume (ULV) spraying technology, thus saving more water.
- **Low cost and easy to maintain-** Agri drones are sturdy, low in cost, and require minimum maintenance. Some of the key features include a detachable container, low-cost frame, precise spraying of pesticides. Limitations of Agri- Drones.
- **Connectivity issues-** Often, online coverage is unavailable in rural areas. Under such circumstances, a farmer needs to invest in internet connectivity, which can turn into a recurring expense.
- **Weather dependent-** Drones are heavily dependent on good weather conditions. Under rainy or windy weather conditions, it is not advisable to fly drones.
- **Knowledge and Skill-** Using new technology is a welcoming change but using it daily requires the right skill set and adequate knowledge. An average farmer may struggle to understand Drone functions. Either he must acquire the knowledge or remain dependent on an experienced Person.

Funds for Kisan Drones:

For promotion of Kisan Drones, the following provisions have been made under the guidelines of Sub-Mission on Agricultural Mechanization (SMAM).

- Financial assistance @ 100% of the cost of drone up to a maximum of Rs. 10 lakhs per drone is provided for purchase of drones for their demonstration by institutes under Indian Council of Agricultural Research, Farm Machinery Training & Testing Institutes, Krishi Vigyan Kendras (KVKs), State Agriculture Universities (SAUs), State and other Central Government Agricultural Institutions/Departments and Public Sector Undertakings (PSUs) of Government of India engaged in agricultural activities. The Farmers Producers Organizations (FPOs) are provided grants up to 75% of the cost of

agriculture drone for its demonstrations on the farmers' fields. A contingency expenditure of Rs.6000 per hectare is provided to these implementing agencies that do not want to purchase drones but will hire drones for demonstrations from Custom Hiring Centres (CHCs), Hi-tech Hubs, Drone Manufacturers and Start-Ups. The contingent expenditure to implementing agencies that purchases drones for drone demonstrations is limited to Rs.3000 per hectare.

- In order to make available drone services to farmers on rental basis, financial assistance @ 40% up to a maximum of Rs. 4.00 lakhs are provided for purchase of drones by CHCs under Cooperative Society of Farmers, FPOs and Rural entrepreneurs. Agriculture graduates establishing CHCs are eligible to receive financial assistance @ 50% of the cost of drone up to a maximum of Rs.5.00 lakhs per drone.
- For purchase of drones on individual ownership basis, the Small and Marginal, Scheduled Caste/Scheduled Tribe, Women and North Eastern State farmers are provided financial assistance @ 50% of the cost up to a maximum of Rs. 5.00 lakhs and other farmers @ 40% up to a maximum of Rs. 4.00 lakhs.

Sources:

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