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Drone: An innovative tool for Pest Surveillance and Management in Crops

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Indian agriculture has made enormous progress in food grains production. It is one of the most important sector as it contributes to approx. 18% of India's GDP and generates employment to nearly 50% of national human workforce. The land mark achievements in agriculture in the 60s and 70s were the result of a combination of inputs like introduction of high yielding varieties, increased fertilizer application, expansion of irrigation facilities, massive extension efforts, improved farm practices etc. However, the growth of agriculture sector has not kept pace with the population increment and has stagnated. The imperative of National food security, nutritional security and economic development demand is focused and determined approach to raise productivity and production in agriculture.

There are various biotic and abiotic stress which are threat for overall crop production. It has been estimated that global losses due to diseases and pests are over 37%. Pest and diseases represent a significant threat to biological system security and food production, demonstrating the requirement for creating suitable methods to minimize the losses caused by them. Thus in context with Indian agriculture, effective control of pest and diseases is a national concern because this not only affects the overall supply of the food commodities to the communities due to decrease in productivity but badly affects the quality of the agricultural produce. The issue is therefore, directly linked with the sustainable food security, diminishing availability of food for consumption, economic growth and after-all hunger and poverty in the society.

Hence, effective management of pest and diseases should be carried out plus maintaining the harmony of the ecosystem. Integrated pest and disease management strategies assisted in efficient management to a certain extent but are not feasible in all circumstances. The threat to locust is very important in agriculture as they causes huge crop losses Moreover, the rapid evolution of pest and pathogens demands use of new innovative techniques linked with scientific technology. So in order to minimize the losses and uplift the agricultural production, collaboration

of new tools and techniques is essential. These tools not only facilitate in surveillance of pest and diseases moreover will also assist in carrying out management practices. Drone has emerged as a vital tool in this regard and is gaining considerable attention in recent years. Providing adequate training and skill regarding drones to farmer and rural youths will aid in effective monitor of pest and diseases and thus in turn get prepare to combat it. The introduction of drone in agricultural sector has revolutionized the scenario of surveillance. In the age of modernization, drone camera emerged as an effective tool for survey of pest and diseases, cultivable land in forest areas, detection of flora and fauna, irrigation pattern needed, soil condition etc. In addition to agriculture, it has got vast application in other fields such as defense and navigation, spy agency, identification of gas leakage, disaster management and relief etc. The use of drones with digital camera embedded in agriculture is the broad expansion. In our country, application of drone is not very much popular likewise the western countries, but still few state governments and private firms are collaborating with farmers and helping them through various schemes. The Maharashtra and Tamil Nadu state government are classic examples in this regard. However, in north eastern states, drones have been extensively used for monitoring plantations in their regions.

Drones facilitate constant monitoring of an object or an area over a long time period. As a plant protection tool, it is being applied in pest and disease surveillance over large areas. The camera provides a clear and precise aerial view of a field and issues such as irrigation problems, soil variation, pest and disease samples show a near infrared view as well as visual spectrum view. It enables the farmer to differentiate the healthy and unhealthy plant on the basis of colour spectrum. Irrigation patterns can be determined by using the drone enhanced sensors. 3D mapping provides useful and accurate data on soil fertility and thus facilitate farmers to select crop rotation and the type and quantity of chemical to be used. Moreover, drones can also be equipped with various sprayers in order to spray chemicals over large areas. The accurate and adequate data obtained from these drones enable the farmers to make better decisions, need based investments and thus obtain a higher and better yield of crops by minimizing losses.

Fig. 1 : Drone for agricultural use

Thus the combination of agriculture with scientific tools will facilitate the rural youths to take over farming rather than searching for any reckless job. The agriculture industry, if brought

to its peak efficiency, will improve the GDP to higher levels which in turn will stabilize the inflation in food industry. Thus it can be stated that drones can play a major role in the agriculture sector of India and hence must be encouraged by providing funds through various government based schemes. Drones with sensors are used to monitor crop health, detect outbreaks of pests, insecticide application and release of natural enemies. The drone mediated technologies in pest management exhibit great scope and assuring alternative to conventional pest management way, should be positively promoted in Indian agricultural research and technology development and strengthen widely for the effective utilization as a part of integrated pest management practices.

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