



Mitigation of excessive use of the chemicals in various agriculture crops by the adoption of various technologies

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Introduction: India is a country, in which majority of the population depends on agriculture and agriculture allied sector. It holds good rank in the production of numerous crops like wheat, rice, banana, mango, etc. Therefore, there is a wide use of chemicals to control diseases and pests through various techniques. However, excessive use of chemicals degrades the quality of soil that affects the quality of the plants and its harvested products and ultimately reaches to the human beings through various food chains. These chemicals may also penetrate into the soil and pollute the ground water table. In addition, it also affects the marine ecosystem, which is connected with the humans, directly and indirectly. Besides, it has become the burden for the small and marginal farmers to purchase

the costly chemical insecticides, pesticides, etc.

Technologies to curb the excessive use of insecticides :

Electrostatic sprayer : It is a simple spraying system, which consists of a tank, spray gun, nozzle and electrode. In this system, high pressure air combines with water and passes through the spray gun. The spray droplets gets ionized by the electrodes. The induced negative charge on the droplets are attracted towards the plant leaf, because of positive charge on the leaf. It helps to produce more uniform sized droplets, which disperse well due to the repulsive force between each other, due to the presence of same charge on them. This technology provides uniform coverage of the plant canopy and helps to remove the

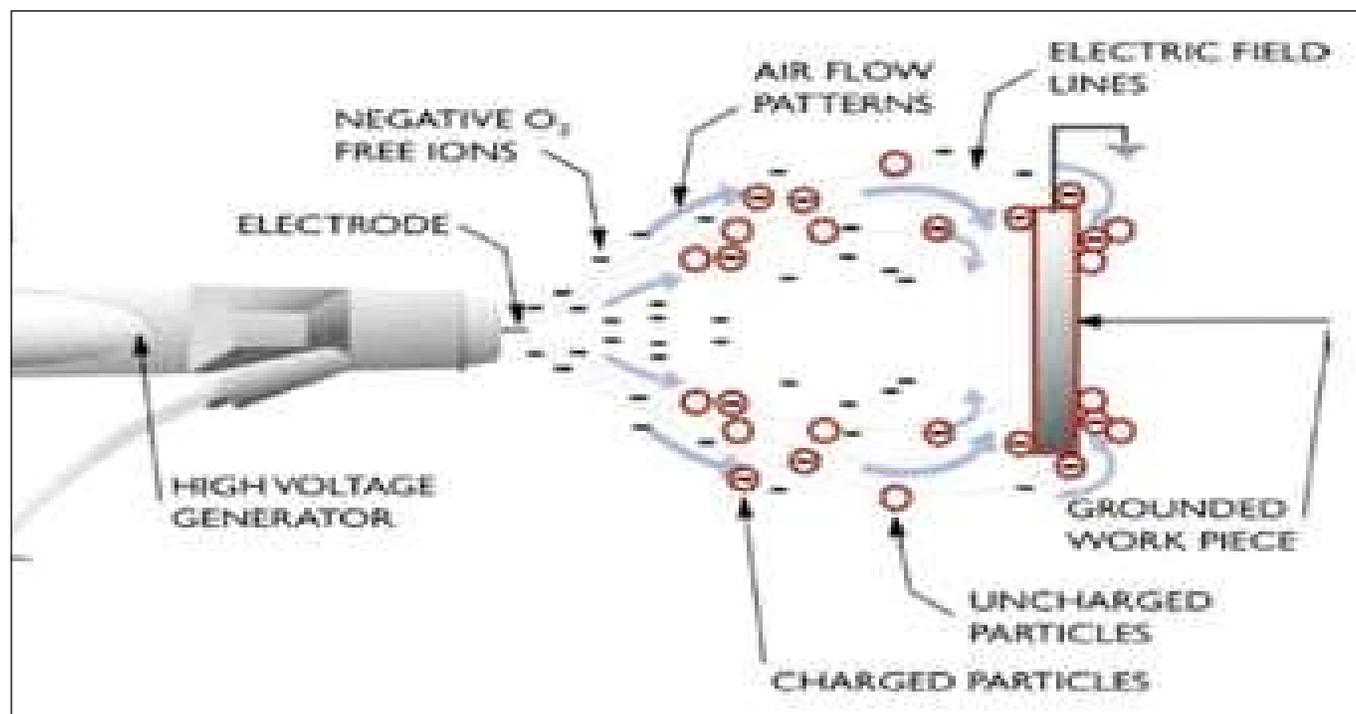


Fig. 1: Principle of an electrostatic sprayer



Fig. 2 : (a) Sprayer equipped with ultrasonic sensors and LIDAR and (b) Ultrasonic sensor



Fig. 3 : (a) The herbicide spot sprayer system (b) Experimental prototype machine

disease infestation thoroughly. It also saves considerable amount of the costly insecticides. It has also contributed to reduce the degradation of the quality of soil.

Ultrasonic sensor based orchard sprayer : This system consists of a boom equipped with the electronic circuit. The ultrasonic sensor of the electronic circuit helps to identify the location, where insecticide needs to be sprayed. It sends signals to the micro controller unit, whenever, any object comes in front of the sensor. At the same time, micro controller unit allows to release the spray liquid through the nozzle simultaneously by actuating a relay that receives signals from the pre-programmed microcontroller. Therefore, it reduces the unnecessary

application of the insecticides at the empty spaces and consequently, saves the considerable amount of the insecticide.

Herbicide spot spraying system : This system recognizes weeds surrounding the crop using camera based image analysis. The specialized nozzles applies desired quantity of herbicides directly on the detected weeds. The system has a great potential to apply a range of herbicide formulations, especially glyphosate. It also provides more than 90 per cent control over the broadleaf weeds problem in potatoes. It has capability to reduce the use of herbicide by 50 folds in the actual field conditions.

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