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Research Paper :

Field evaluation of three outlet type air assisted sprayer

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ABSTRACT

Conventional method of spraying pesticides on row crops employs high volume hydraulic sprayers. This method consumes large amount of water, labour and time, almost 50 per cent of the applied spray fluid drips down to ground as a loss. With a view to evolve an alternate spraying system to replace the inefficient conventional method, three outlet type sprayer was developed. Field performance was evaluated for brinjal crop at ASPEE research field. Three nozzles were selected *i.e.* HCN/PA, BCN, NMD/S. Sprayer was operated at 2 km/h tractor travel speed and at 1450 rpm blower speed. The air assisted sprayer performed better with HCN/PA nozzle within the limit of tractor power (35 HP) Most of the droplets were in the range of 0 - 151µm. The droplet diameter with BCN nozzles were found to be better. Volume deposition was more when HCN/PA nozzle set was used.The better parameters *viz.* droplet density, uniformity coefficient was obtained with NMD/S nozzle and HNC/PA , respectively. The three outlet type sprayer could cover a swath width of 7.5m in brinjal field and actual field capacity was found to be 1.13 ha/h at 2 km/h travel speed. The field efficiency of the sprayer was found to be 75.4 per cent.

Key words : Air assisted sprayer, Air discharge rate, Air velocity, Total pressure, Droplet size, Volume deposition.

Among all methods of pest control chemical method is most commonly used, the use of pesticides constitutes probably the most important method in spite of their limitation and adverse effect on the environment. The consumption of pesticides increased considerably to the level of 7500 tonnes by the end of 7th plan from a level of 2350 tonnes at the beginning of the planning era. (Rajak, 1992). During the year 2000 global pesticide expenditure was 9500 US $, whereas Indian expenditure was 3200 crores and overall Indian pesticide industry size was 3382 crores. Major consumption *i.e.* 52 per cent for cotton, 14 per cent for rice 7.1 per cent for vegetables and 5.1 per cent for tea crop (Patel, 2001).

Chemicals used for pest control need to be applied in such a manner that they come into contact with pest, distributed evenly over the surface of the plants to form an uniformly persistent deposit to secure a protective covering with minimum wastage of the liquid and minimum expenditures in terms of active ingredients and cost involved. Presently used hydraulic sprayers are inefficient at delivering pesticide to its target but farmers use it with some success by employing doses vastly greater than those theoretically required. In these sprayers, large volume of water is required and frequent filling of tank is quite time consuming. The speed of operation is low and reliability of operator can make spraying a success or failure such sprayers are subjected to heavy loss of pesticides as more than 50 per cent of spray volume drips down to the ground, making pesticide application a hazardous task besides spoiling the soil.

In the dynamic and fast changing agricultural scenario of the country, particularly diversification in cropping pattern and commercialization of agriculture, more efficient and sophisticated equipment are required. The tractor operated air assisted sprayers with three outlet is developed by ASPEE, Mumbai for orchards as well as for row crops which improves coverage, boosts chemical effectiveness and makes spraying job easier and faster. Those parts of the plant that could not be reached by conventional spraying received a much better covering, when spraying with air assisted sprayer.

Panneton *et al.* (2000) studied the effect of air speed, air flow rate, and air jet orientation in isolated spray chamber. A carriage supporting a standard spray boom was moved at 6 km/h over micro plots of green house grown potatoes. Results showed that air speed had larger impact on leaf coverage. Higher air speeds increase the coverage on the underside of the leaves within crop canopy. Jadhav (1998) found that air-carrier sprayer could cover a swath of 8.22 m in the cotton field and actual field capacity was found to be 0.81 ha /h at 1.5 km/h travel speed. Plans and Pons (1991) stated that the effect of fan speed was directly responsible for the higher deposition. The flow from the fan at 540 rev./min and forward speed upto 4 km/h was too high for the structure of the trees and incurred large losses as drift and