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Performance evaluation of tractor mounted tall tree air carrier sprayer for spraying on mango orchard

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ABSTRACT

In orchard, it is difficult to spray the pesticide uniformly throughout the tree by conventional methods. Air carrier sprayer is a viable alternative to hydraulic sprayer especially when sprayer has to deposit chemical on target, which are far from sprayer. An air carrier sprayer was evaluated for pesticide application in Mango orchard. The flow rate of spray nozzle was measured by operating sprayer at a speed of 7, 8.5 and 10 km/hr with four different dosage discs. The flow rate of air carrier sprayer varies from 0.6 lit/m in to 2.42 lit/m in. with different dosage discs. The spray swath and horizontal throw of air carrier sprayer increases with increase of speed. The air velocity increase in distance from blower outlet from 3 m to 15 m. The VMD, NMD and UC values vary from 279.87 µm, 2.456 to 258.44 µm, 93.55 µm, 3.52 for 0.92 to 2 lit/m in. discharge rate, respectively. The air carrier sprayer deposit spray uniformly on inner and outer side of tree at different locations and hence recommended for orchard spraying.

Key words : Air carrier sprayer, Mango orchard, VMD, NMD, Spray deposition.

Mango is one of the most important fruit crops of India grown throughout country except in temperate zone. Countless number of Nymphs and adults sucks the cell sap from inflorescence and flower buds during flowering season causing shedding of flowers and young fruits. However, despite the country having a comparative advantage over other mango producing countries in terms of total production, the productivity continues to be low. One of the major constraints for low productivity in mango is high incidence of pests and diseases. More than 200 insect species and 70 diseases have been reported to affect the mango crop, resulting in total yield loss of about 20-60 per cent. (Trivedi *et al.*, 2004).Application of agrochemicals is necessary to avoid damage to crop.

Application of agrochemicals is necessary to avoid damage to crop. It requires proper device to apply insecticide uniformly and efficiently on tree. In conventional methods, manually operated high volume hydraulic sprayers and power operated hydraulic sprayers with long lances or spray gun are used to carry spray fluid to different targets. It is difficult to spray the pesticide uniformly and efficiently throughout the tree by this method of spraying. Though this method gives good pest control, consumes large volume of liquid per tree, great amount of labour and time. Also most of the spray solution is lost due to dripping and drift. Owing to the concerned towards the protecting environment from pollution by execive use of pesticide and to economize the spraying method there is a need to find suitable alternative.

Air carrier sprayer is viable alternative to hydraulic sprayer when spray has to deposit the chemicals to tall target far from the sprayer. Kasyap (1989) developed an orchard air carrier sprayer to spray on mango orchards. These sprayers were evaluated to provide the effective spraying technology to the farmers, which give good and economical pest control. Randall (1971) investigated the effect of air volume, pressure, ground speed and velocity on uniformity of distribution of spray material. Reddy and Ghadge (1989) designed an axial flow blower to be mounted on 18.5 hp tractor and the efficiency of the blower was tested in terms of spray deposition in grape vineyard.Bhargav (2001) developed and evaluated air sleeve boom sprayer for citrus. He found that air velocity helped in penetration and breakup of liquid into droplets. Higher the velocity, more uniform was droplet spectrum. The VMD increases at centre of canopy with increase in air velocity.The smaller droplets were found to advantageous in penetration in dense foliage.Panneton and Piche (2005) conducted spray experiment on potato to determine the effect of spray quality and volume of application under increasing air assistance. The use of very fine spray, air assistance tend to increase deposit uniformly along the vertical extent of the plants and to reduce coefficient of variation of the deposits. The air assistance is useful when there is need to increase the uniformity of the deposits.

METHODOLOGY

A field experiment was conducted to study the performance of tractor mounted tall tree air carrier