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Comparative Study On Some Different Spraying Techniques To Control Onion Thrips (*Thrips tabaci* Lind. [Thysanoptera: Thripidae])

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Summary

A . Laboratory evaluation of spraying techniques :-

A major importance of the present work was the evaluation of four sprayers under laboratory and field conditions in comparison with conventional motor sprayer.

Laboratory data on spray parameters showed that flow rate significantly varies depending on the type of machine tested. Such difference may be attributed to either drift loss, very fine droplets produced or meeting of such fine droplets with bard surfaces at variable spray heights.

The present study also revealed that the effect of air charging with electrostatic forces, centrifugal energy and hydraulic energy is significantly correlated with the flow rate, droplet formation and droplet distribution in case of knapsack motor sprayer Agrimondo with shear nozzle, knapsack motor sprayer Agrimondo with electrostatic unit, rotary spinning sprayer Matabi, hydraulic Matabi sprayer and conventional ground motor sprayer. Similar results have been reported by **Burt and Smith (1974), Fraser and Exisenklam (1956) and Hindy et al. (1991).**

A rotary spinning disc Matabi in laboratory can be treated as a demonstration of the rotary atomizers pattern through using a narrow restrictor. Also, the results demonstrated the relationship between working hours and both R.P.M and spray deposits on watery sensitive cards. The daily working hours of this sprayer depends on the type of battery, the physical properties of the spray solution used (viscosity, and surface tention), and the ambient climatic conditions. The proper spray height for Matabi spinning disc was 0.5m, as recommended at the present time. Both the tested rotary normal pneumatic atomizers and pneumatic atomizer with electrostatic unit produces a rich number of fine droplets. With using spray gun and hydraulic Matabi sprayer as hydraulic nozzles

because of successive falling of operating pressure during spraying operation and the low quality of the used nozzles.

Data showed that increasing flow rate of pneumatic motor sprayer is more valuable in case of full tank capacity than half tank capacity at three air hose positions: vertical, upper 45º and down 45º. The flow rate of pneumatic sprayer depends on amount of air pressured on liquid surface, the gravity and the r.p.m of motor sprayer. All these factors affect flow rate values besides the physical properties of the liquid used. Also, swath width of pneumatic motor sprayer depends on the r.p.m motor, physical properties of sprayed solution and the ambient climatic conditions during execution of the test. According to the spray deposits quality, the tested atomizers can be arranged in a descending order from the best to the worst as follows:

1-Rotary spinning disc Matabi sprayer (18 L/fed)

2- Knapsack motor sprayer Agrimondo with charging unit (42 L/fed)

3- Knapsack motor sprayer Agrimondo with shear nozzle (79 L/fed).

4- Hand held hydraulic Matabi sprayer (56 L/fed).

5- Conventional ground motor sprayer (578 L/fed).

B. Field evaluation of the spray technique

B.1. First season experiment (2017)

The spray bulk produced by five spraying techniques was evaluated depending on satisfactory spray coverage on target plants as well as lost spray on the ground between plants. It should be taken into consideration that the drift spray counts were not included in this study.

The best equipment saving lost spray on ground, is electrostatic Agrimondo sprayer with 15.6% lost spray. The worst equipment is the conventional ground motor sprayer with 44.6% lost spray on ground. Data confirmed that there is a positive relationship between rate of application and the spray lost on ground between the treated plants. Also,

20% of the droplets were deposited on the lower surfaces of knapsack motor sprayer with electrostatic unit.

Spray homogeneity resultant from the tested equipment can be arranged in a descending order from the best to the worst as follows, a knapsack motor sprayer with charging unit, knapsack motor sprayer with normal unit, Rotary spinning disc Matabi sprayer, hand held hydraulic Matabi sprayer and conventional ground motor sprayer. However, from a conventional view, the equipment's can be arranged in a descending order as follows, knapsack motor sprayer Agrimondo with electrostatic unit and with normal unit 11.6 fed/day for both of them, conventional ground motor sprayer 4.4 fed/ day hand held hydraulic Matabi sprayer 3.4 fed/day and rotary Matabi spinning disc sprayer 2.3 fed/day.

B. 2. Bioresidual activity of Marshal on *thrips tabaci lind*. on onion crop during 2017 season

Bio residual data showed that, the best efficiency of Marshal with high value of reduction percentages was produced by knapsack motor sprayer Agrimondo with charging unit, followed by knapsack motor sprayer with normal unit, handheld hydraulic Matabi sprayer conventional ground motor sprayer and Matabi rotary (spinning disc) sprayer. The optimum droplet spectrum for controlling (*thrips tabaci* lind.) on onion crop must be at least 250droplets/cm² with an average droplet size of 50µm (VMD) to produce satisfactory control.

B. 2. Second season experiment (2018)

B. 2. 1. Spray quality

Similar results were obtained using two insecticides with recommended and ¾ recommended dose using the same five tested spraying techniques. So, data on satisfactory spray coverage, lost spray on ground between plants and drift spray outside the treatment with downwind were collected. Data showed that electrostatic Agrimondo

sprayer produces the ideal spray quality on onion crop, the highest reduction of lost spray on ground (15.6%) and the least spray drift outside the treatment. The worst equipment is the conventional ground motor sprayer with 44.6% as lost spray on ground due to big droplets, amount of water and the high operational pressure used.

B.2.2. Bio residual activity of certain insecticides against *thrips on* onion crop during 2018 season 2018

Data showed that, there is a relationship between decreasing droplet sizes (VMD) and increasing number of on the efficiency of insecticides used against Thrips on onion. It must be controlled with low volume spraying machines ranging from 18-42 L/fed. That can be accomplished through using electrostatic and pneumatic energy or both of them or by using centrifugal energy by spinning disc sprayer. The worst quality spray and poor efficiency of bio residual activity of insecticides sprayed is produced through using hydraulic energy through ground motor spray or hand held hydraulic spray.

Data also showed that there are no significant differences between recommend doses and ¾ recommend doses with recent equipment. That can save 25% of the insecticides prices used in controlling Thrips and saves agricultural environment from pollution.

On the other side, we found that there is no significant differences between initial spraying after 24 hours and residual spraying after spraying 7 days and 12 days by recent sprayer and hydraulic Matabi sprayer.

Also, electrostatic sprayer showed the lowest drift spray results, but the biggest drift spray results were produced by rotary Matabi spinning disc.