EFFECT OF NOZZLE TYPE, SPRAY PRESSURE, SPRAY VOLUME, AND TIME OF APPLICATION ON THRIPS CONTROL

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Introduction

Controlling thrips in onion is very difficult due to the thrips habit of completing much of its life cycle in the neck region of the onion, where it is difficult to place insecticide sprays. Also, new onion varieties have more foliage which makes spray coverage difficult. Couple these factors with thrips resistance to many of the registered insecticides and it is easy to see how difficult it is to get economic control. Any factor that increases control can give a grower a productive advantage. Spray manufacturers usually recommend either cone or double flat fan nozzles for insecticide applications and flat fan nozzles for herbicide applications. Both the cone and the double flat fan nozzle give better spay coverage than the flat fan.

Materials and Methods

A 2-acre field, soil type Owyhee silt loam, was planted with the onion variety 'Vaquero' (Nunhems, Parma, ID) on March 24, 2006. The onions were planted as two double rows on a 44-inch bed. The double rows were spaced 2 inches apart at the seeding rate of 137,000 seeds/acre. Lorsban 15G® was applied in a 6-inch band over each row at planting at a rate of 3.7 oz/1,000 ft of row for onion maggot control. Planting conditions were less than ideal, with the onions planted into wet soils, leading to soil compaction and low water infiltration during the growing season. Water was applied by furrow irrigation.

The trial area was divided into plots four rows (two beds) wide by 27 ft long. There were four replications of each treatment. Insecticide applications were made using a CO_2-pressurized plot sprayer on a weekly basis beginning on June 7 with Warrior® and MSR®. Warrior at 3.7 oz/acre and Lannate® at 3.0 pt/acre were applied on June 21 and evaluated 2 days later. The spray mixture was buffered to pH 6.0 and a silicone surfactant was added prior to application. Treatments included three nozzle types: twin flat spray tips, hollow cone spray tips, and flat fan tips; two spray pressures of 45 and 60 psi; two spray volumes of 30 and 60 gal/acre; and an early and mid-day application time for each, for a total of 24 treatments. Evaluations were made by counting the total number of thrips on 15 plants in each plot.

Treatment differences were compared using ANOVA and least significant differences at the 5 percent probability level (LSD 0.05).

Results and Discussion

Only the June 21 application showed significant differences in thrips control. The early applications of Warrior and MSR were not effective in controlling thrips. Iris yellow spot virus symptoms showed in early July in this trial. The applications of Warrior and Lannate on June 21 and June 27 showed significant differences between treatments, but none of the July treatments showed differences, even when Carzol® was added. The June 23 evaluation showed clear differences in some of the treatments (Table 1). There was no difference in the time of day that the insecticide was applied, nor in the pressure used (45 vs. 60 psi). There were significant differences in spray volume and in nozzle type. The double flat fan nozzle gave the best control, followed by the cone nozzle. The flat fan gave the poorest control (Fig. 1).

The amount of water used in the spray mixture was also significantly different with the 60-gal rate being superior to the 30-gal rate (Fig. 2).

Table 1. Evaluations on June 23 of thrips control with different nozzle types, pressure, spray volume, and application time. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

Treatment	Average thrips/plant
Spray Pressure	
45 psi	46.5
60 psi	46.0
LSD (0.05)	NS
Application time	
Early morning	46.4
Early afternoon	46.4
LSD (0.05)	NS
Application amount	
30 gal/acre	50.4
60 gal/acre	42.4
LSD (0.05)	0.8
Nozzle type	
Flat fan	51.1
Double flat fan	42.5
Cone	45.7
LSD (0.05)	0.7

Conclusion

Time of day for insecticide applications for thrips control was not important in the trial. Time of day should be considered for other factors such as wind, inversions, temperature, and ease of application.

Pressure differences were not important. Neither the 45 psi nor the 60 psi made any difference in thrips control. The higher pressure produces smaller sized spray droplets that are more prone to drift away from the target area under some conditions, such as moderate winds or high temperatures.

Double flat fan nozzles gave the best thrips control, followed by cone nozzles. Flat fan nozzles gave the poorest control. Double flat fan nozzles have two orifices, each half the size of a regular flat fan orifice. This makes them more prone to plugging, so adequate screens should be used to prevent large particles from reaching the nozzle.

A positive response was seen with higher spray volume. Applying 60 gal of spray requires more time and effort, but growers should realize they may lose some control by reducing the volume.

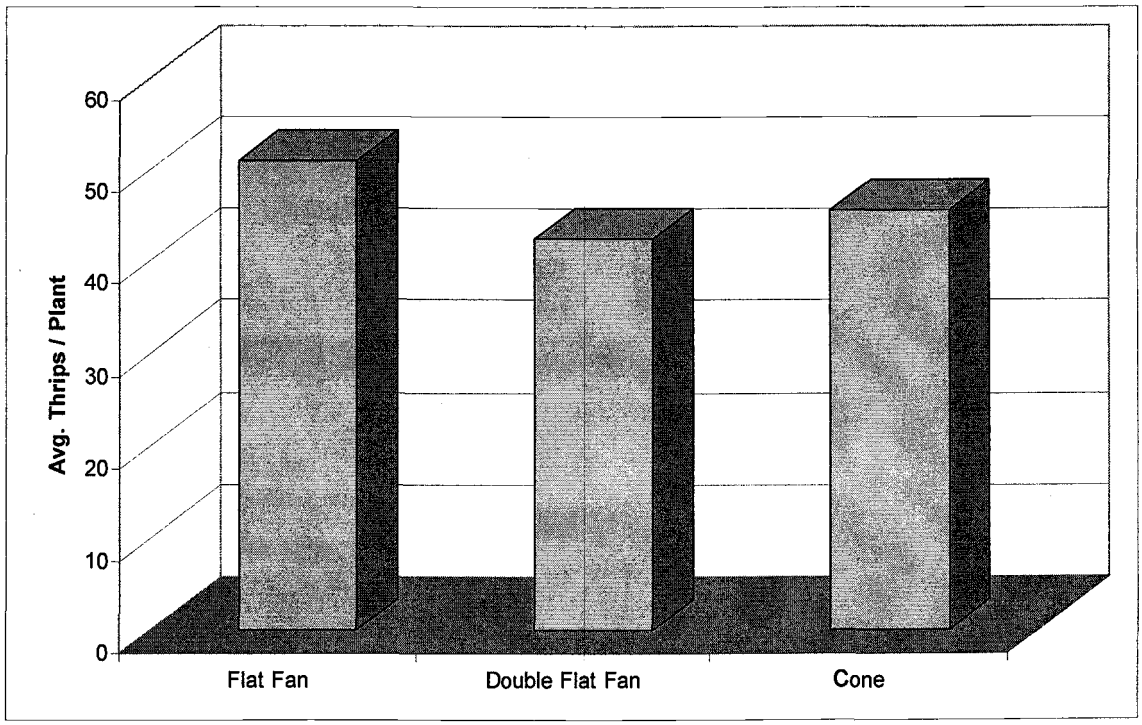

Figure 1. Comparison of nozzle design for thrips control. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

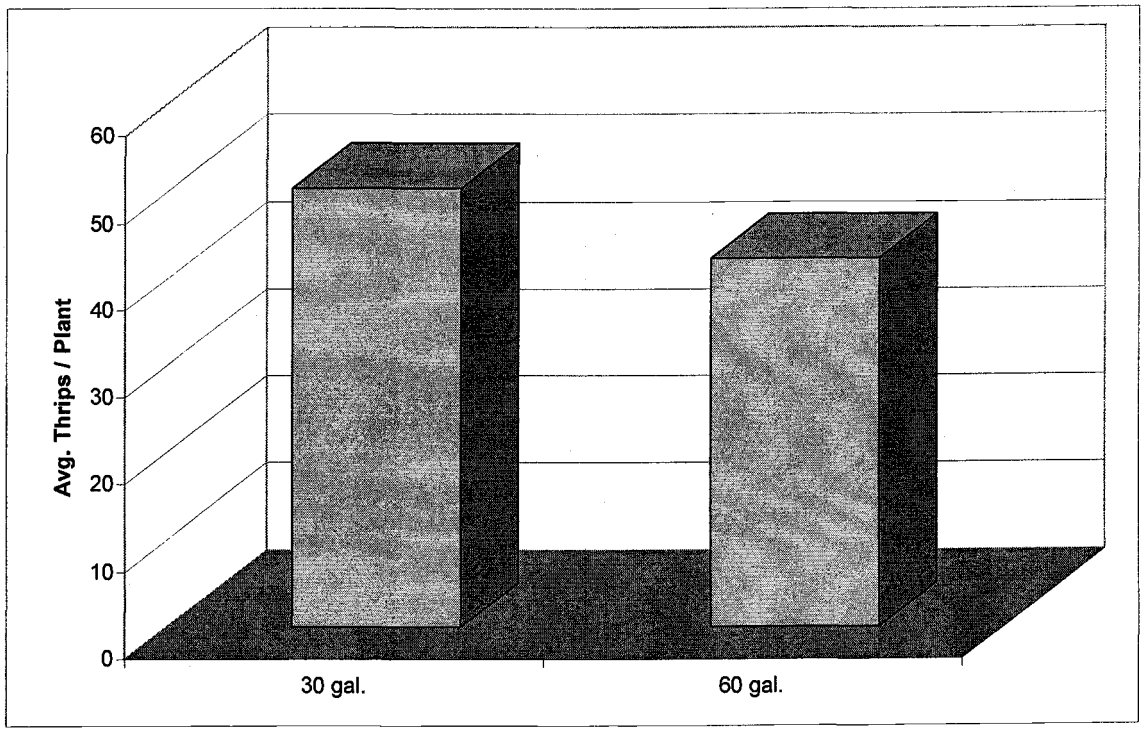

Figure 2. Comparison of spray volume on thrips control. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.