VARIETAL RESPONSE TO AN ALTERNATIVE APPROACH FOR CONTROLLING ONION THRIPS (*THRIPS TABACI*) IN SPANISH ONIONS

Lynn Jensen
Malheur County Extension Service
Clinton Shock and Lamont Saunders
Malheur Experiment Station
Oregon State University
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Introduction

Onion is a major economic crop in the Treasure Valley region of eastern Oregon and western Idaho. Annually about 20,000 acres of onion is grown in the valley. Spanish hybrids typically are grown for their large size, high yield, and mild flavor.

The principal onion pest in this region is the onion thrips. Thrips cause yield reduction by feeding on the epidermal cells of the plant, and can reduce total yields from 4 to 27 percent, depending on the onion variety, but can reduce yields of colossal sized bulbs from 27 to 73 percent. The larger sized colossal bulbs are difficult to grow and demand a premium in the marketplace. Growers typically spray three to six times per season to control onion thrips. Treatments include the use of synthetic pyrethroid, organophosphate, and carbamate insecticides. The ability of these products to control thrips has decreased from over 90 percent control in 1995 to less than 70 percent control in 2000. Onion growers are applying insecticides more frequently in order to keep thrips populations low.

New biological insecticides with low toxicity to beneficial predators have been developed, including neem tree (*Azadirachta indica* A. Juss.) extracts (azadirachtin) and bacterial fermentation products (spinosad). Both of these materials have previously been evaluated for thrips control and have performed poorly compared to conventional insecticides. Studies during the past 2 years have shown that applications of spinosad and azadirachtin coupled with straw mulch are superior to conventional insecticide programs for controlling onion thrips on the onion variety 'Vaquero' (Jensen et al. 2002, 2003a, 2003b). Vaquero was used in the study because of its vigorous growth characteristics and resistance to thrips injury compared to slower growing varieties. The objective of this study was to test this program on varieties that were highly susceptible to thrips injury.

Materials and Methods

A 1.5-acre field was planted to the onion varieties Vaquero, 'Flamenco', and 'Redwing' (cv. Vaquero, Flamenco, Sunseeds, Parma, ID; Redwing, Bejo Seeds, Oceano, CA) in a split-plot design on March 14, 2003. Vaquero is a yellow variety while Redwing and

Flamenco are red varieties. Red varieties are generally assumed to be more attractive to thrips than yellow varieties. The onion varieties were planted as two double rows on a 44-inch bed. The double rows were spaced 2 inches apart. The seeding rate was 154,000 seeds per 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. Water was applied by furrow irrigation. The field was divided into plots 36.7 ft wide by 100 ft long. There were three treatments with six replications.

The three treatments were a grower standard treatment, an untreated check, and the alternative treatment. The grower standard treatment included Warrior (lambda-cyhalothrin), MSR (oxydemeton-methyl) and Lannate (methomyl). The untreated check did not receive any treatments for thrips control. The alternative treatment included straw mulch applied to the center of the bed plus Success (spinosad), and Aza Direct (azadirachtin).

Insecticide treatments were applied as needed during the growing season (Table 1). All insecticides were sprayed in water at 30.9 gal/acre. Straw was applied only between the irrigation furrows on top of the beds to avoid confounding irrigation effects with thrips effects. The straw was applied on May 1, 2003 at rate of 1,080 lb/acre.

Thrips populations were monitored only in Vaquero. They were sampled by two methods. The first was by visually counting the number of thrips on 20 plants. The second method was by cutting 10 plants at ground level and inserting the plants into a Berlese funnel. Turpentine was used in the Berlese funnel to dislodge the thrips from the plant, where they would then fall into a jar containing 90 percent isopropyl alcohol. The collected thrips were then counted through a binocular microscope. Thrips populations were monitored weekly through the growing season.

The predator populations were monitored using pitfall traps that contained ethylene glycol. They were evaluated three times per week. The Berlese funnel was also used to monitor predators foraging on the plants. The onions were harvested on September 23 and graded on October 14 and 15.

Results and Discussion

Thrips pressure was light during the growing season compared to previous seasons. The 2003 treatments are compared in Figure 1. The alternative program had significantly lower average thrips population (10 percent level) than either the standard treatment or the untreated check (Fig. 2). There were significantly fewer predators in the standard treatment compared to either the untreated check or the alternative treatment (Fig. 3). No visual damage to the foliage was observed with the variety Vaquero. Flamenco showed severe foliage damage from thrips feeding. The visual thrips damage to Redwing appeared intermediate to Vaquero and Flamenco. Flamenco is less vigorous than Redwing and more thrips damage would be expected.

There were no yield differences among any of the treatments with Vaquero (Table 2). There was less thrips damage in Vaquero in 2003, which may have been due to the year, or the red varieties may have been more attractive to the thrips than the yellow onions. No attempt was made to monitor thrips populations in each variety.

Redwing had a significant increase in colossal sized bulbs with the alternative treatment (Table 3) compared to either the standard or untreated check and a significant increase in total yield compared to the untreated check. There was a trend, though not significant, towards higher overall yields compared to the standard treatment.

Flamenco responded to the alternative treatments with significantly less medium yield and higher jumbo and colossal yield compared to the untreated check. There was a trend towards higher total yield and larger bulb size compared to the standard treatment but this was only significant in the colossal size class (Table 4). Predator populations (Fig. 1) were significantly higher in the alternative and untreated check treatments than in the standard treatment. The predator population consisted mostly of spiders, big-eyed bugs, minute pirate bugs, damsel bugs, lacewings and lady bird beetles.

Conclusion

There are obviously conditions when thrips pressure is light enough to preclude having to control them on certain varieties, as was the case with Vaquero. This may be due to the year or more likely to the close proximity of the red varieties, which were more attractive to thrips. There were no economic advantages to controlling thrips on Vaquero in 2003 in this trial. Both Redwing and Flamenco responded favorably to the alternative treatments, producing better yield and quality than the standard insecticide program or the untreated check.

References

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Table 1. Application data for the alternative onion thrips trial, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Standard insecticide treatment			Alternative insecticide treatment		
Application date	Insecticides applied	Rate/acre	Application date	Insecticides applied	Rate/acre
Jun 7	Warrior	3.84 oz	Jun 7	Aza Direct	20.0 oz
Jun 25	Warrior	3.84 oz		Success	10.0 oz
	Lannate	3.0 pt	Jun 14	Aza Direct	20.0 oz
Jul 7	Warrior	3.84 oz		Success	10.0 oz
	Meta Systox R	2.0 pt	Jul 3	Aza Direct	20.0 oz
Jul 25	Warrior	3.84 oz		Success	10.0 oz
	Lannate	3.0 pt	Jul 11	Aza Direct	20.0 oz
				Success	10.0 oz
			Jul 29	Aza Direct	20.0 oz
				Success	10.0 oz

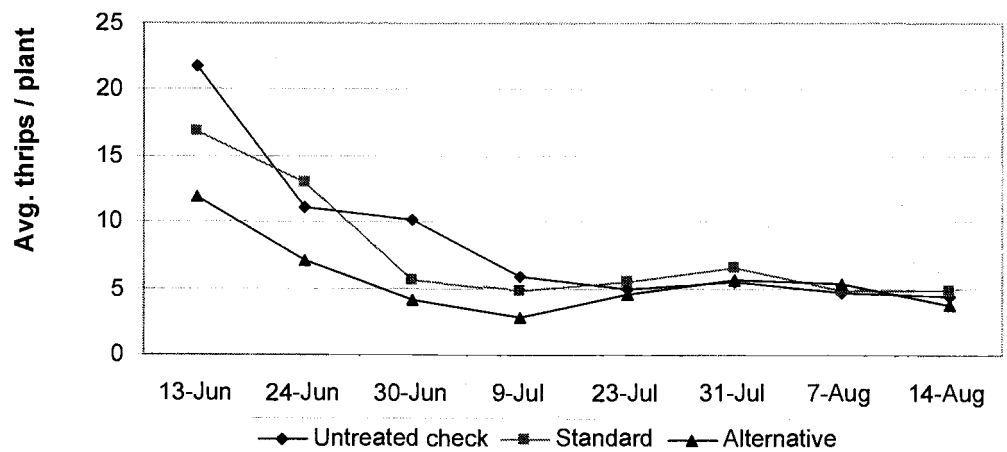

Figure 1. Thrips populations with different treatments in an alternative thrips control program, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

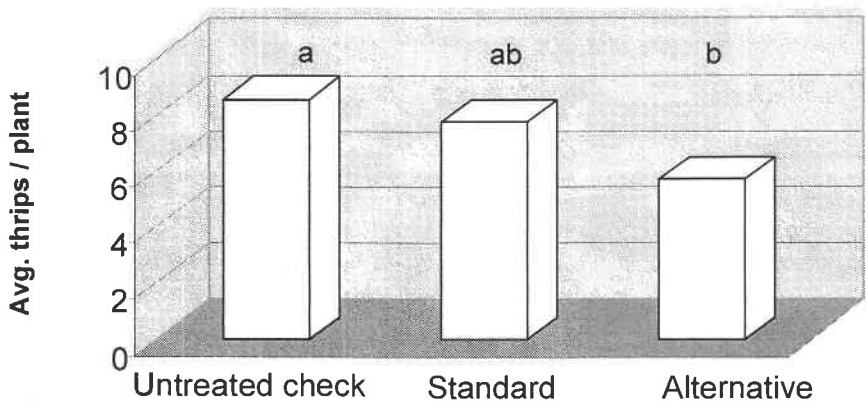

Figure 2. Average season-long thrips populations in an alternative thrips control program, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

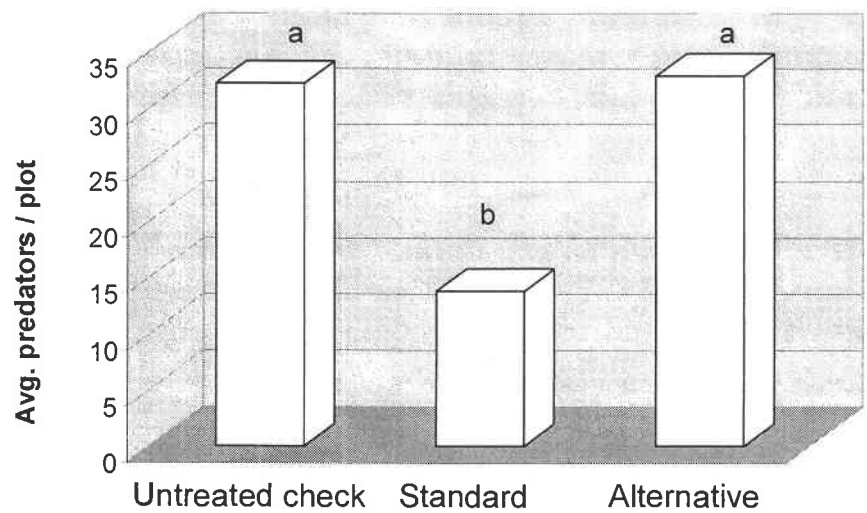

Figure 3. Predator populations in the alternative thrips trial, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Table 2. Yield and grade of Vaquero onion with different strategies for controlling onion thrips, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Medium	Jumbo	Colossal	Super colossal	Total yield
			cwt/acre		
Untreated check	9.7	459.7	464.1	124.0	1,057.5
Standard	9.8	451.0	489.6	140.9	1,091.3
Alternative	10.9	446.1	484.2	145.2	1,086.4
LSD (0.05)	NS	NS	NS	NS	NS

Table 3. Yield and grade of Redwing onion with different strategies for controlling onion thrips, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Medium	Jumbo	Colossal	Super colossal	Total yield
			cwt/acre		
Untreated check	12.0	726.4	107.4	4.0	849.8
Standard	14.2	724.2	174.3	2.2	914.9
Alternative	11.6	701.2	240.2	6.9	959.9
LSD (0.05)	NS	NS	62.2	NS	56.3

Table 4. Yield and grade of Flamenco onions with different strategies for controlling onion thrips, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Medium	Jumbo	Colossal	Super colossal	Total yield
			cwt/acre		
Untreated check	9.4	121.5	380.5	1.0	512.4
Standard	6.9	107.1	442.3	9.2	565.5
Alternative	7.7	94.0	486.1	19.1	606.9
LSD (0.05)	NS	16.9	55.5	7.8	51.8