INSECTICIDE SCREENING FOR EFFECTIVENESS IN CONTROLLING THRIPS IN DRY BULB ONIONS - 2009

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Introduction

Controlling thrips (onion and western flower) is becoming increasingly difficult for commercial onion growers in the Treasure Valley. One of the problems is resistance to some of the commonly used insecticides. The objective of this trial was to screen registered and nonregistered insecticides to find those that have potential for use in thrips control programs. **Not all insecticides referred to in this report are registered for use on onions. Always obtain and read the insecticide label to ensure that the product is registered for the crop for which it is intended.**

Materials and Methods

A 1-acre field, soil type Greenleaf silt loam, was planted with the onion variety 'Vaquero' (Nunhems, Parma, ID) on March 20, 2009. The onions were planted as 2 double rows on a 44-inch bed. The double rows were spaced 2 inches apart. The seeding rate was 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. Water was applied by drip irrigation. The field was divided into 30-ft plots, each 2 beds wide. There were 21 treatments and each treatment was replicated 4 times.

Treatments were made by CO_2-pressurized plot sprayer with four nozzles spaced 19 inches apart. It was set to apply 38 gal/acre, with water as the carrier. A non-ionic surfactant was added to all treatments, and Carzol®, MSR®, Acephate, Ultiflora®, Nexter® and Lannate® were buffered to pH 6.0. Treatments were applied on a weekly basis beginning on June 4. Thrips counts were also made on a weekly basis by visually counting the total number of thrips on 15 plants in each plot. Insecticides tested included Radiant®, M-Pede®, Ultiflora, MSR, Aza-Direct®, BeLeaf®, Mustang®, Neemazad®, Acephate, Knack®, Nexter, Movento®, and Trilogy®. These products were compared to an untreated check and a grower standard. The grower standard consisted of two consecutive applications of Radiant followed by two successive Movento applications, then four consecutive Lannate applications on a 7- to 10-day interval. Radiant is a new insecticide from Dow AgriScience that is closely related to Success®. Movento is a new, systemic insecticide being introduced by Bayer. Trilogy is a neem product sold by Certis. Acephate is an old product used mostly on tree fruit. MSR is a labeled insecticide, but was tested at a rate higher than the current labeled rate. Mustang is a synthetic pyrethroid insecticide marketed by FMC. BeLeaf, Ultiflora,

Knack, and Nexter are new products. Knack is an insect growth regulator and Neemazad is a neem oil product. Foliage injury ratings were taken as a subjective measurement of foliage damage caused by thrips feeding and iris yellow spot virus (IYSV) disease symptoms. A scale of 0-5 (0 = no injury, 5 = complete silvering of the leaves) was used. The treatments are listed in Table 1.

The application dates and environmental conditions are listed in Table 2. The onions were harvested September 17-18, 2009, and graded October 14-15, 2009.

Results and Discussion

Thrips counts were made by counting the total number of thrips on each of 15 plants in each plot (Table 3). Evaluations of thrips and IYSV damage to the onion foliage were made on July 21 and August 10. The evaluations are shown in Table 4; season average thrips populations are illustrated in Figure 1.

A comparison of the thrips damage rating vs. average thrips population (Fig. 2) did show a relationship (R^2 = 0.5379), but not as strong as might have been expected.

Yield and grade are shown in Table 5. There were significant differences between treatments in all the size categories plus total yield. The treatments with the highest total yield generally had high yields of colossal and supercolossal bulbs and low yield of mediums. The standard treatment of weekly consecutive applications of Radiant, Radiant, Movento, Movento, Lannate, Lannate, Lannate, and Lannate was one of the best treatments. Radiant and Radiant with either M-Pede or Trilogy were excellent treatments; however, the addition of M-Pede or Trilogy did not improve yield over Radiant alone. Acephate has consistently performed well in past years and did so again this year. The addition of Neemazad to either the standard program or Radiant reduced total yield and yield of large-sized bulbs compared to either treatment alone. Movento performed well, but did better as part of the standard program than alone. Mustang, a synthetic pyrethroid, had the lowest colossal, supercolossal and total yield of any of the treatments. This is consistent with other synthetic pyrethroid treatments over the past 4 years, and is most likely due to the heavy use of this class of products during the late 90's and early part of this century.

Thrips and IYSV damage and average thrips population were compared to total yield (Figs. 3 and 4). There was a good relationship between thrips IYSV damage ratings and total yield, with an R^2 of 0.7516, suggesting that this method of evaluating thrips may be more meaningful than looking at thrips populations. This close relationship with yield is likely because foliage injury ratings also include IYSV injury plus thrips damage. The symptoms of thrips and virus injury are difficult to separate.

Conclusions

Radiant alone did an excellent job of controlling thrips, but the use of a single insecticide for multiple applications is not a sustainable practice. The standard program of Radiant,

Movento, and Lannate was an effective and sustainable approach to controlling thrips. Acephate, though not registered for use on onions, has potential to aid in thrips control if registration can be accomplished. Movento showed greater efficacy as part of a rotation than as a stand-alone product. None of the other products tested were very effective in controlling thrips. Foliage damage ratings were a better indicator of impact on size and yield than thrips populations.

Table 1. Insecticide treatments evaluated in the onion thrips efficacy trial. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

	Treatment	Rate/acre
1	Standard*	
2	Untreated Check (UTC)	
3	Trilogy	1.0% v/v
4	Radiant	8.0 oz
5	Radiant + M-Pede	8.0 oz 1.0 % v/v
6	M-Pede	1.0% v/v
7	Mesa (Ultiflora)	32.0 oz
8	Movento + DyneAmic	5.0 oz 0.25% v/v
9	MSR	3.0 pt
10	Aza-Direct	3.5 pt
11	BeLeaf	2.8 oz
12	BeLeaf + Mustang	2.8 oz 4.0 oz
13	Mustang	4.0 oz
14	Trilogy + Radiant	1.0% v/v 8.0 oz
15	Neemazad + Radiant BioLink	72.0 oz 8.0 oz
16	Standard* + Neemazad BioLink	72.0 oz
17	Acephate	16.0 oz
18	Carzol	1.25 lb
19	Lannate	3.0 pt
20	Knack	16.0 oz
21	Nexter + Adjuvant + Buffer	12.0 oz 0.25% v/v 0.25% v/v

*Standard = Radiant, Radiant, Movento, Movento, Lannate, Lannate, Lannate, Lannate applied consecutively at 7- to 10-day intervals.

Table 2. Insecticide application information. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

Application date	Time	Temperature	Relative humidity	Wind
June 4	8:00 A.M.	66°F	65	5.1
June 10	7:00 A.M.	59°F	71	7.0
June 16	7:30 A.M.	57°F	93	3.4
June 23	7:30 A.M.	49°F	77	4.4
July 1	6:30 A.M.	60°F	39	6.1
July 10	6:30 A.M.	56°F	67	1.2
July 20	6:00 A.M.	59°F	45	5.0
July 29	7:00 A.M.	63°F	68	3.6

Table 3. Weekly and season-average thrips counts. Each number is an average of total thrips/plant, 15 plants/plot, averaged over 4 replications. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

Treatment	5-Jun	18-Jun	29 Jun	2-Jul	6-Jul	13-Jul	22-Jul	3-Aug	Season average
	average thrips/plant								
Standard	10.3	8.9	16.4	17.0	23.6	18.1	9.3	13.8	14.7
UTC	12.2	40.0	49.7	33.7	27.4	37.0	9.8	11.1	27.6
Trilogy	13.3	27.3	44.5	30.3	26.9	27.5	10.6	12.3	24.1
Radiant	11.1	8.1	32.1	53.8	24.1	26.3	8.4	12.4	22.0
Radiant + M-Pede	12.5	9.4	25.7	29.9	25.9	29.2	11.4	12.9	19.6
M-Pede	13.7	42.3	67.0	61.9	32.7	29.8	9.3	12.0	33.6
Mesa (Ultiflora)	13.1	26.5	57.0	54.2	34.0	26.8	9.7	11.6	29.1
Movento	9.6	33.9	38.0	47.1	26.3	24.5	12.6	10.2	25.3
MSR	12.5	15.0	42.6	48.7	50.8	28.7	11.5	11.8	27.7
Aza-Direct	12.0	36.3	63.6	39.1	44.0	28.6	10.9	10.9	30.7
BeLeaf	12.2	28.2	62.6	67.2	39.8	25.4	14.6	10.5	32.6
Mustang + BeLeaf	10.0	26.0	69.2	51.1	42.5	25.0	10.9	12.2	30.9
Mustang	10.5	18.3	50.5	36.3	34.9	25.0	9.3	10.2	24.4
Radiant + Trilogy	11.0	9.4	19.1	54.8	31.5	27.1	8.0	11.3	21.5
Radiant + Neemazad	7.6	9.4	17.8	29.6	27.6	21.0	8.1	11.0	16.5
Standard + Neemazad	8.4	11.8	16.2	15.2	29.5	31.9	10.2	10.5	16.7
Acephate	8.6	7.2	13.6	33.9	26.1	21.5	11.0	11.9	16.7
Carzol	9.8	10.8	25.9	37.0	32.3	26.7	11.6	12.4	20.8
Lannate	8.3	6.8	27.8	46.5	29.8	23.9	9.6	10.6	20.4
Knack	10.8	32.4	61.0	42.6	33.5	18.8	9.7	12.2	27.6
Nexter	10.2	39.0	38.2	47.2	39.5	26.4	8.6	10.9	27.5
LSD (0.05)	ns	16.5	25.5	ns	ns	ns	ns	ns	6.2

Table 4. Onion foliage damage caused by thrips feeding and iris yellow spot virus disease. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

		Thrips damage rating (1-5)*		
	Treatment	7/21	8/10	Average
1	Standard	1.1	1.6	1.4
2	UTC	2.8	3.0	2.9
3	Trilogy	1.9	2.5	2.2
4	Radiant	1.1	1.4	1.3
5	Radiant + M-Pede	1.1	1.4	1.3
6	M-Pede	2.1	2.6	2.4
7	Mesa (Ultiflora)	2.3	2.1	2.2
8	Movento	1.0	2.1	1.6
9	MSR	2.0	2.6	2.3
10	Aza-Direct	2.0	2.3	2.1
11	BeLeaf	2.3	2.6	2.4
12	Mustang + BeLeaf	2.4	3.8	3.1
13	Mustang	2.6	4.3	3.4
14	Radiant + Trilogy	1.0	1.5	1.3
15	Radiant + Neemazad	1.4	1.3	1.3
16	Standard + Neemazad	1.0	1.5	1.3
17	Acephate	1.1	2.0	1.6
18	Carzol	1.4	1.5	1.4
19	Lannate	1.3	2.1	1.7
20	Knack	2.1	2.3	2.2
21	Nexter	2.1	3.0	2.6
	LSD (0.05)	0.4	0.6	0.4

*1 = no feeding damage, 5 = complete silvering of foliage.

Table 5. Yield and grade response to insecticide treatments. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

Treatment	Medium	Jumbo	Colossal	Super-colossal	Yield total
			cwt		
Standard	27.3	793.8	223.0	15.7	1059.9
UTC	47.9	773.2	55.4	4.4	880.9
Trilogy	41.0	785.0	73.0	0.0	899.0
Radiant	34.7	686.3	316.1	35.7	1072.7
Radiant + M-Pede	25.2	700.4	310.1	15.5	1051.2
M-Pede	59.8	777.8	50.5	3.0	891.0
Mesa (Ultiflora)	43.5	810.3	57.0	0.0	910.8
Movento	34.3	750.7	201.6	9.5	996.1
MSR	40.1	760.5	83.7	0.0	884.2
Aza-Direct	50.7	733.3	54.4	2.5	841.0
BeLeaf	45.2	799.9	46.3	0.0	891.4
Mustang + BeLeaf	63.9	732.9	48.6	3.0	848.4
Mustang	40.3	728.0	33.8	0.0	802.1
Radiant + Trilogy	31.0	883.7	188.0	6.0	1108.7
Radiant + Neemazad	31.7	769.9	147.9	3.5	952.9
Standard + Neemazad	34.3	821.2	121.4	6.0	982.9
Acephate	22.9	713.6	271.0	27.8	1035.2
Carzol	36.3	795.5	136.7	0.0	968.5
Lannate	38.5	750.7	199.8	9.5	998.5
Knack	44.5	798.2	73.7	0.0	916.4
Nexter	46.5	818.1	61.9	2.5	929.1
LSD (0.05)	14.6	89.9	74.8	15.1	94.9

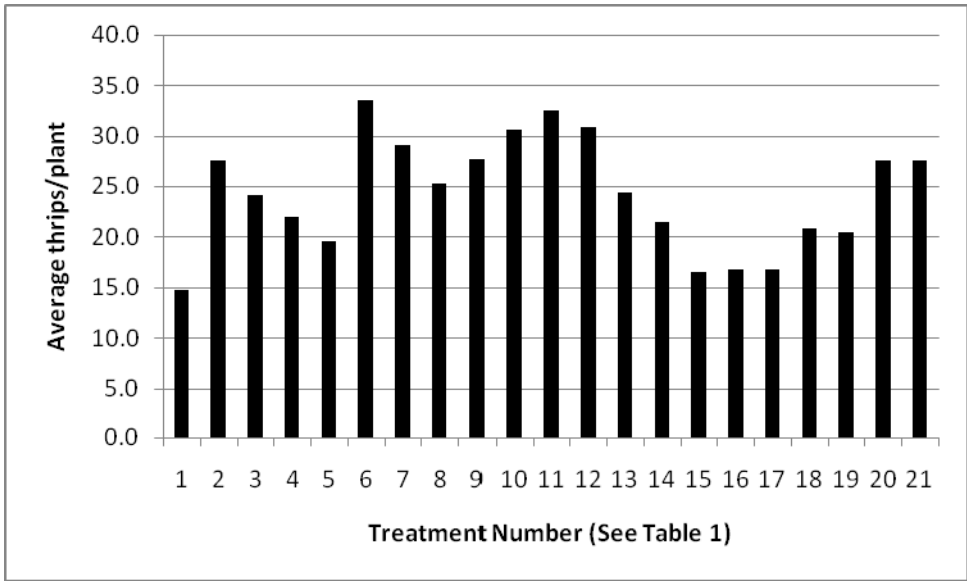

Figure 1. Season average thrips population by treatment. Malheur Experiment Station, Ontario, OR, 2009.

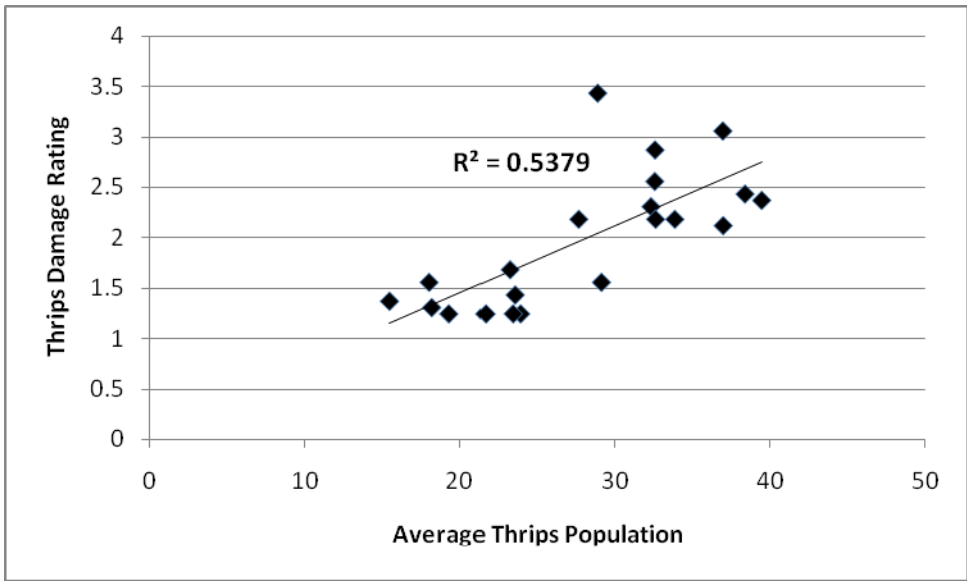

Figure 2. A comparison of thrips damage rating vs. average thrips population. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

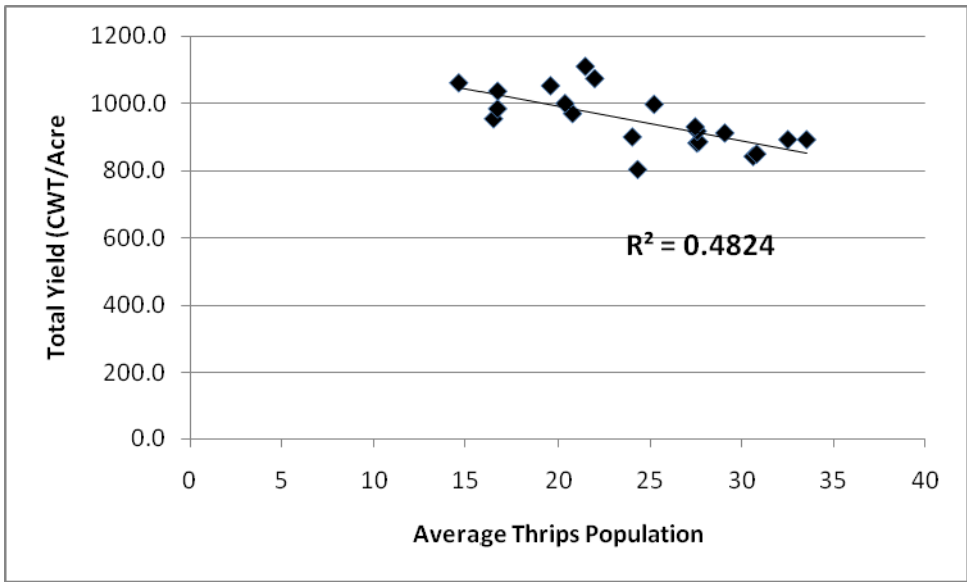

Figure 3. A comparison of average thrips population vs. total yield. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.

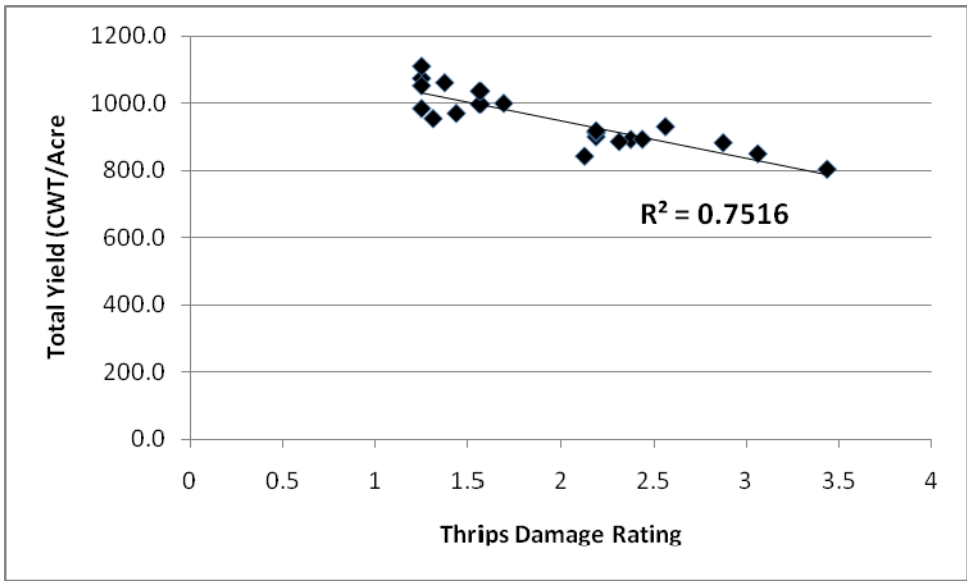

Figure 4. A comparison of thrips damage rating vs. total yield. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009.