THRIPS IDENTIFICATION AND THRIPS CONTROL IN ONIONS

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Introduction

There were three objectives to this trial.

1. Identify species make up of thrips populations in onion fields throughout the Treasure Valley during the growing season,
2. Determine the efficacy of new insecticide products on thrips, and
3. Evaluate insecticide rotation sequences for control of thrips.

Two species of thrips were identified in commercial onion fields during the 1997 growing season. These were the onion thrips (*Thrips tabaci*) and western flower thrips (*Frankliniella occidentalis*). These species could respond differently to insecticides so it is important to determine which species are present when evaluating insecticide treatments.

Because of the number of generations per year, thrips rapidly build up resistance to insecticides. Rotating between different classes of insecticides is one method of delaying the development of resistance.

Materials and Methods

Thrips were collected at one-month intervals from plants in eleven onion fields throughout the Treasure Valley during the growing season. The thrips were collected with an aspirator, placed in vials containing 70% ethyl alcohol and sent to the OSU insect identification lab in Corvallis. Thrips were identified by species and classified as larva, nymphs, or adults. The eleven sites were Ontario, Oregon Slope, Brogan, Owyhee Junction, Adrian, Vale, and Nyssa in Oregon and Weiser, Wilder, Roswell, and Fruitland in Idaho.

Two similar efficacy trials were initiated, one near Ontario and one near Nyssa. There were fourteen treatments in each trial. Thrips counts were made just before treatments were applied and at 3, 7, and 14 days after treatment (DAT) at both sites except the Nyssa site where the onions were completely defoliated by hail 12 days after treatment. The plots were 2 beds (each 40 inches) wide by 25 feet long. Onions were planted on two double rows/bed. The treatments were replicated four times at each location.

The treatments were made with a CO2 pressurized plot sprayer set to deliver 51.1 gpa. The center two rows of each plot were evaluated by counting the total number of thrips on 15 plants.

Table 1. Application dates and conditions for the Ontario and Nyssa sites, 1997.

	Application Data	
Site	Ontario	Nyssa
Application Date	6/6/97	6/7/97
Gallonage	51.1 gpa	51.1 gpa
Wind	Calm	Calm
Air Temperature	74 F	78 F
Time of application	2:30 - 4:30 PM	3:00 - 4:30 PM

The sequence trial consisted of fourteen treatments rotated at two week intervals for a six week period of time. The evaluations were made at 14 days after treatment just prior to the next treatment. Application dates were June 6, June 20, and July 3.

Results and Discussion

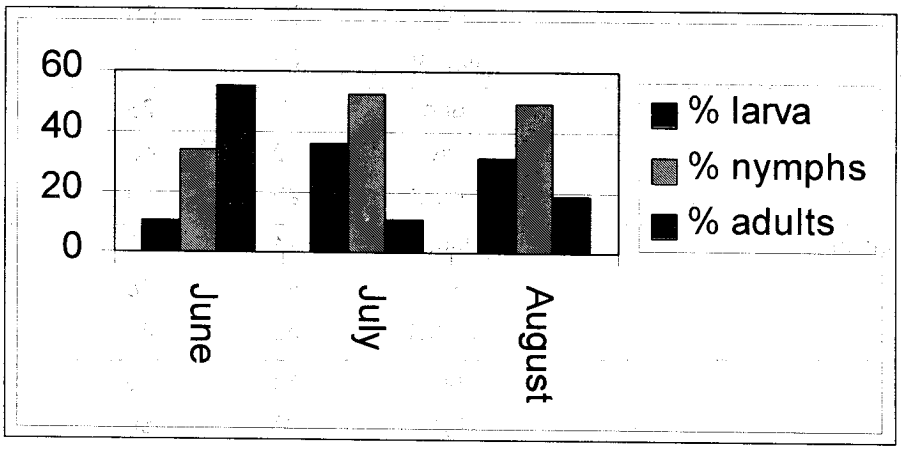
Treasure Valley thrips species identification. Eleven onion fields throughout the Valley were sampled during June, July, and August to determine the species composition of the thrips population. All of the thrips sampled at each location during the 1997 growing season were identified as onion thrips (Thrips tabaci). No western flower thrips were found in any of the samples collected. Table 2 shows the breakdown of the samples for larva, nymphs and adults.

Table 2. Onion trips survey results for the Treasure Valley during 1997.

Field location	Date	Larva	Nymphs	adults
		- - - - - - - - % - - - - - - - -		
Ontario	June	16	70	14
	July	20	68	12
	August	15	46	39
Oregon Slope	June	0	0	100
	July	51	33	16
	August	48	43	9
Weiser	June	0	0	100
	July	27	60	13
	August	26	63	11
Brogan	June	0	23	77
	July	50	45	5
	August	20	40	40
Owyhee Junction	June	24	47	29
	July	44	48	8
	August	35	41	24
Wilder	June	15	70	15
	July	35	56	9
	August	43	41	16
Roswell	June	25	35	40
	July	57	37	6
	August	28	53	19
Adrian	June	17	66	17
	July	31	62	7
	August	28	65	7
Vale	June	17	21	62
	July	34	46	20
	August	32	56	12
Nyssa	June	0	15	85
	July	32	53	15
	August	34	46	20
Fruitland	June	2	29	71
	July	20	70	10
	August	39	52	9

There was a higher percentage of adults in June than in the succeeding two months. This is because the thrips are moving into the fields as adults during June. The data would suggest most of the thrips increase in July and August was by reproduction rather than movement from surrounding areas. The average make up of the population from all sites shows high presence of adults in June compared to nymphs and larva (Figure 1).

Figure 1. Average population composition from eleven onion fields in the Treasure Valley, 1997.



Efficacy Trial. The efficacy trial contained three rates of Alert, Fipronil and a combination of Fipronil and Warrior. Alert and Fipronil are new compounds not yet registered for onions, but which have some potential for use. Concep is a natural pyrethrum extracted from plants. Gardian is a garlic oil extract used to enhance the activity of insecticides. Orthene is not currently registered on onions, although it is registered on many other crops. The results of the trial are shown in Table 3 and 4.

Table 3. Efficacy of commercial and experimental insecticides on onion thrips, Ontario, Oregon, 1997.

Treatment	Formulation	a.i. / ac.	Rate/ac.	Avg. number thrips / 15 plants			
			- - - - oz/acre - - - -	3 days after treatment	7 days after treatment	14 days after treatment	Average
1 UTC				8.6	5.2	6.6	6.9
2 Alert	2.0 s.c.	0.2	12.8 oz.	7.2	4.7	10	7.3
3 Alert	2.0 s.c.	0.25	16.0 oz.	5.9	3.9	8.6	6.13
4 Alert	2.0 s.c.	0.35	22.4 oz.	7.4	5.3	8.8	7.17
5 Warrior	2.09 cs	0.03	1.8 oz.	4.8	4.9	4.3	4.67
6 Warrior	1.0 cs	0.03	3.8 oz.	7.4	4.8	6.1	6.1
7 Warrior	1.0 ec	0.03	3.8 oz.	5.5	3.8	5.4	4.9
8 Fipronil	1.67 sc	0.068	5.2 oz.	7.1	5.3	7.7	6.7
9 Concep			64.0 oz.	11.1	6.4	8.1	8.53
10 Concep + Warrior			64.0 oz. + 3.8 oz.	6.7	4.8	7.2	6.23
11 Gardian + Warrior			32.0 oz. + 3.8 oz.	5.9	4	8.4	6.1
12 Orthene	75 s		21.25 oz.	6.2	4.5	7.4	6.03
13 Fury	1.5 ew	0.0375	3.2 oz.	6.5	5.4	8.7	6.87
14 Fipronil + Warrior	1.67 sc + 1.0 ec		5.2 oz. + 3.8 oz.	6.4	4.7	10.3	7.13
			LSD (0.05)	2.6	NS.	NS.	

Table 4. Efficacy of commercial and experimental insecticides on onion thrips, Skeen Farms, Nyssa, Oregon, 1997.

Treatment	Formulation	Rate		Avg. number thrips / 15 plants		
		lb ai/acre	oz/acre	3 days after treatment	7 days after treatment	Average
1 UTC				7.3	6.5	6.9
2 Alert	2.0 s.c.	0.2	12.8 oz.	4.3	3	3.65
3 Alert	2.0 s.c.	0.25	16.0 oz.	6.2	5.9	6.05
4 Alert	2.0 s.c.	0.35	22.4 oz.	6	5.6	5.8
5 Warrior	2.09 cs	0.03	1.8 oz.	6.1	4.6	5.35
6 Warrior	1.0 cs	0.03	3.8 oz.	4.7	4.5	4.6
7 Warrior	1.0 ec	0.03	3.8 oz.	4.6	4.4	4.5
8 Fipronil	1.67 sc	0.068	5.2 oz.	6.4	4.7	5.55
9 Concep			64.0 oz.	6.6	8.4	7.5
10 Concep + Warrior			64.0 oz. + 3.8 oz.	4.6	2.9	3.75
11 Gardian + Warrior			32.0 oz. + 3.8 oz.	4.8	3.6	4.2
12 Orthene	75 s		21.25 oz.	4.4	4.5	4.45
13 Fury	1.5 ew	0.0375	3.2 oz.	5.4	4.1	4.75
14 Fipronil + Warrior	1.67 sc + 1.0 ec		5.2 oz. + 3.8 oz.	4.7	1.2	2.95
			LSD (0.05)	1.9	3.2	

The Ontario insecticide efficacy trial was in the same location as in 1996 when there were no differences among treatments. In 1997 there were significant differences at the 3-day counts but not at the 7 and 14 day counts. The Nyssa site had significant differences at both the 3 and 7 day counts, but a severe hailstorm destroyed the foliage prior to the 14-day counts.

The pyrethrum Concep gave significantly poorer control than the synthetic pyrethroid Warrior 1.0 e.c. (Figure 2). Garlic oil (Guardian) tended to increase onion thrips control at the Nyssa site, though not significantly (Figure 3). There was no response to garlic oil at the Ontario site (Figure 4). Orthene gave good thrips control at both locations (Figure 5). Alert and Fipronil both gave variable control but may be useful as rotational insecticides if they become labeled for onion use.

Figure 2. A comparison of Concep and Warrior at two locations, Ontario and Nyssa, Oregon, 1997.

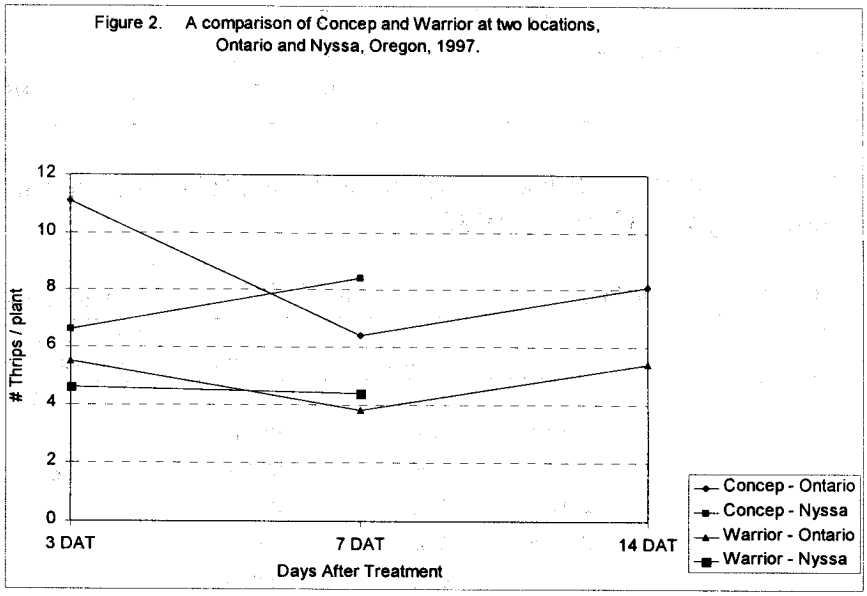


Figure 3. A comparison of Warrior and Guardian (garlic oil). Nyssa, Oregon, 1997.

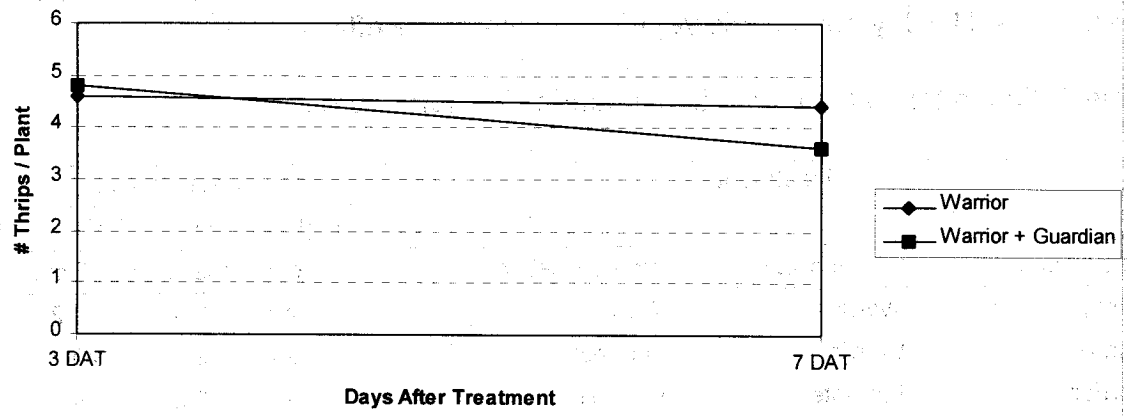


Figure 4. A comparison of Warrior and Guardian (garlic oil). Ontario, Oregon, 1997.

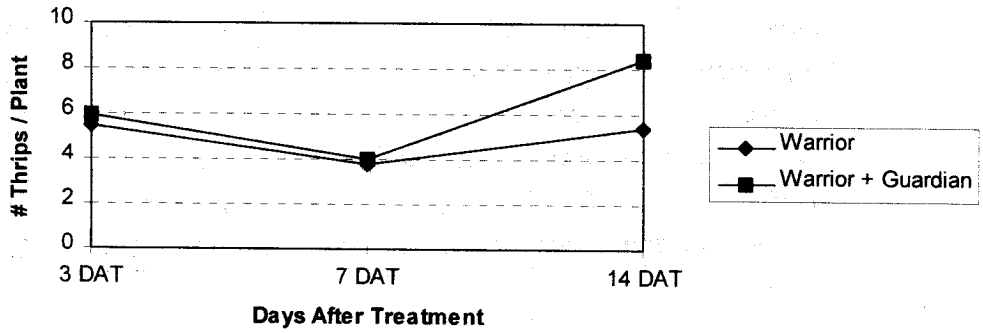
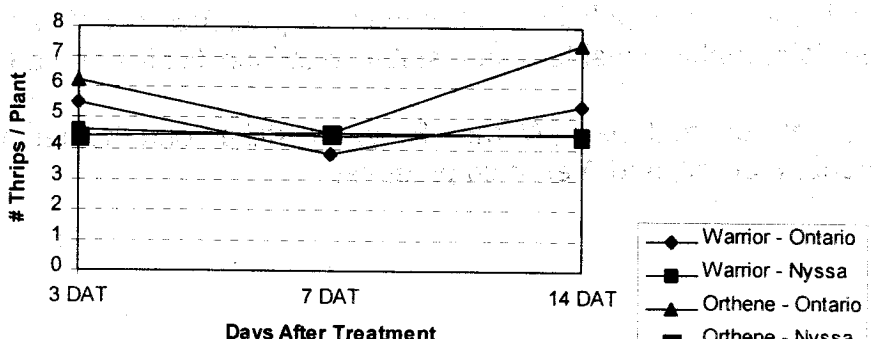


Figure 5. A comparison of Orthene and Warrior at two locations, Ontario and Nyssa, Oregon, 1997.



Sequence Trial. The sequence trial did not show any significant differences in 1997 (Table 5). The unsprayed check was one of the better treatments in this trial. This is similar to the unresponsiveness of the treatments in the 1996 year at the same location and the 7 and14 day counts this year in the insecticide efficacy trial.

Table 5. Onion thrips sequence trial, Ontario, Oregon 1997.

Treatment			Date Counted			
			6/19	7/3	7/17	Average
1st application	2nd application	3rd application	Avg. number thrips/15 plants			
Warrior	Warrior	Warrior	4.4	9.4	22	11.93
Warrior	Warrior	Lannate	2.6	12.6	20.4	11.87
Warrior	Lannate	Fipronil	2.9	10.2	14.4	9.17
Warrior	Fipronil	Lannate	3.7	13.3	18.2	11.73
Warrior	Lannate	Alert	2.2	9.8	26.2	12.73
Warrior	Alert	Lannate	4.2	12.8	23.4	13.47
Orthene	Warrior	Warrior	2.4	12.6	23.2	12.73
Warrior + Garlic Oil	Warrior + Garlic Oil	Warrior + Garlic Oil	3.8	12.6	20.4	12.27
Orthene	Warrior	Lannate	5.6	13.9	19.1	12.87
Orthene	Fury + Alert	Fury + Alert	4.1	13.2	15.1	10.8
Warrior	Lannate	Lannate	2.6	12	17.7	10.77
Warrior	Warrior + Lannate	Warrior + Lannate	3	11.2	18.1	10.77
Check	Check	Check	2.5	12.7	18.5	11.23
Warrior	Warrior + Orthene	Warrior + Orthene	5.1	10.3	20.8	12.07

Conclusions

All of the thrips sampled in the Treasure Valley in 1997 were onion thrips. Locations where insecticide sprays are ineffective in controlling thrips may be due to insecticide resistance of a local thrips population, rather than the presence of different thrips species. There is probably considerable resistance to insecticides at the Ontario site.

The synthetic pyrethroid materials (Warrior, Fury) are still among the best treatments although Orthene, Fipronil, and Alert hold potential