INSECTICIDE ROTATION TRIAL FOR MAXIMUM EFFICACY AGAINST THRIPS IN DRY BULB ONIONS, 2010

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Objective

Our objective was to determine the most effective insecticide application sequence and rates to provide season-long thrips control and reduce the risk of resistance development. **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.**

Introduction

Resistance management is a key component of this trial, to determine the most effective strategies to maintain yield and quality while rotating insecticides with different modes of action. The 2008 trial suggested that rotations that included Lannate®, Carzol®, Movento®, and Radiant® in different rotations were significantly better than those with other insecticides in the rotation. Since Carzol is unlikely to receive a registration, other products with a higher likelihood of getting labeled were included. These were Agri-Mek® (currently labeled in Washington, Colorado and New York under a Section 18) and DuPont's new product Cyazypyr™ (not currently labeled). This project was designed to determine the optimum rate, timing, and rotation sequence of labeled insecticides, plus insecticides that may be labeled in the next few years.

Materials and Methods

A block of onion 29 ft wide by 390 ft in length was planted to 'Vaquero' (Nunhems, Parma, ID) on March 18, 2010. 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 at planting in a 6-inch band over each double row at a rate of 3.7 oz/1,000 ft of row for onion maggot control.

The plots were 30 ft long by 7.3 ft wide. Insecticide applications were made with a CO_2-pressurized backpack sprayer. Materials were applied with water at 35.0 gal/acre. Thrips counts were made weekly by visually counting the total number of thrips on 15 plants in each plot. Foliage injury ratings were taken as a subjective measurement of foliage damage caused by thrips feeding and iris yellow spot virus (IYSV) disease development. A scale of 0-5 (0 = no injury, 5 = complete silvering of the leaves) was used. The onions were harvested September 9-10, 2010, and graded on September 16-17, 2010.

The experimental design was a randomized complete block with four replications. Thirteen different insecticide rotation sequences were applied. The insecticides tested were Lannate, Radiant, Movento, Agri-Mek, and Cyazypyr. Rates, application dates and sequences are listed in Table 1. Environmental conditions at each application date are listed in Table 2.

Table 1. Rates, application dates, and sequence of insecticide applications in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

Treatment Number	Application Date							
	May 25	Jun 3	Jun 14	Jun 22	Jun 29	Jul 6	Jul 13	Jul 20
1		Radiant[a]	Radiant	Movento	Movento	Lannate	Lannate	Radiant
2		Radiant	Radiant	Movento	Movento	Lannate	Lannate	Agri-Mek
3		Lannate	Lannate	Movento	Movento	Radiant	Radiant	Lannate
4		Cyazypyr	Cyazypyr	Lannate	Lannate	Radiant	Radiant	Lannate
5		Lannate	Lannate	Cyazypyr	Cyazypyr	Radiant	Radiant	Lannate
6		Cyazypyr	Cyazypyr	Movento	Movento	Radiant	Radiant	Lannate
7		Movento	Movento	Radiant	Radiant	Lannate	Lannate	Lannate
8		Movento	Movento	Radiant	Radiant	Lannate	Lannate	Agri-Mek
9	Movento	Movento	Radiant	Radiant	Lannate	Lannate	Agri-Mek	Lannate
10		Movento	Movento	Radiant	Radiant	Lannate	Lannate	Radiant
11		Agri-Mek	Agri-Mek	Movento	Movento	Radiant	Radiant	Lannate
12		Movento	Movento	Agri-Mek	Agri-Mek	Lannate	Lannate	Radiant
13	Cyazypyr	Cyazypyr	Movento	Movento	Radiant	Radiant	Lannate	Lannate

[a]

Product	Rate
Radiant	8.0 oz
Movento	5.0 oz
Lannate	3.0 pt
Agri-Mek	1.0 pt
Cyazypyr	13.5 oz

Table 2. Application information for insecticide trials in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

Application date	Time	Temperature	Relative humidity (%)	Wind (mph)
May 25	9:30 A.M.	50°F	66	0
June 03	4:30 P.M.	68°F	49	7.7
June 14	7:00 A.M.	59°F	59	6.8
June 22	7:30 A.M.	52°F	85	3.8
June 29	6:30 A.M.	65°F	72	6.9
July 06	8:00 A.M.	59°F	58	7.0
July 13	5:00 A.M.	79°F	22	3.1
July 20	6:45 A.M.	57°F	53	3.7

Results and Discussion

The thrips population data are shown in Table 3 and the foliage damage evaluations in Table 4. Treatments are listed by number so the reader should refer to Table 1 for specific information about each treatment. The season average thrips population is shown in Figure 1.

Table 3. Weekly and season average thrips counts in onions. Each number is an average of total thrips/plant, 15 plants/plot, averaged over 4 replications. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

Treatment number	8 Jun	17 Jun	23 Jun	1 Jul	22 Jul	5 Aug	Season average
				average thrips/plant			
1	4.4	4.3	11.5	14.1	8.5	7.8	8.4
2	2.6	4.5	11.0	14.0	9.5	9.2	8.4
3	7.8	6.0	13.8	12.8	6.4	7.1	9.0
4	8.4	10.6	14.5	19.3	14.4	9.4	12.7
5	5.8	4.6	15.0	19.1	10.8	9.5	10.8
6	7.2	8.4	11.0	14.3	5.6	8.0	9.1
7	7.4	9.2	5.7	2.1	17.2	8.9	8.4
8	5.3	6.7	3.2	2.3	22.3	7.8	7.9
9	4.9	4.1	2.0	11.3	20.2	10.8	8.9
10	8.6	7.5	3.7	3.4	15.7	7.9	7.8
11	6.3	6.0	11.1	14.3	4.9	11.9	9.1
12	7.8	8.2	6.4	5.4	17.7	10.4	9.3
13	5.5	19.5	14.7	4.8	8.3	7.3	10.0
LSD (0.05)	3.1	7.0	3.6	4.5	5.7	NS	2.4

Table 4. Onion foliage damage caused by thrips feeding. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

Treatment Number	Average injury[a]
1	0.5
2	0.5
3	0.5
4	1.0
5	1.6
6	0.5
7	0.5
8	0.5
9	1.0
10	0.5
11	0.5
12	0.8
13	0.6
LSD (0.05)	0.4

[a]Injury scale: 1-5 with 1 = no damage, 5 = complete silvering of foliage from thrips and iris yellow spot virus injury.

There were significant differences in thrips control with treatment 4 having the least control and treatment 10 having the best control. Most of the treatments were not significantly different from each other, suggesting all control with the different insecticide sequences was similarly effective. Early insecticide applications (May 25) did not give better thrips control than applications starting on June 3.

Thrips pressure was low in 2010 with resulting low ratings for damage. Foliage damage caused by thrips feeding and IYSV differed significantly by treatment only in a few treatments; most treatments were similar to each other. Treatments 4, 5, and 9 had significantly higher damage ratings than all of the others except treatments 12 and 13. Treatments containing Cyazypyr generally had higher damage ratings than other treatments, although treatment 6, which also had Cyazypyr, had a low damage rating. The data from the 2009 report suggested that applying Lannate early might not be effective, but 2010 data suggest that, at least when thrips pressure is low, early applications of Lannate are as effective for thrips and IYSV control as any of the other sequences tested.

Table 5 contains the yield and grade information. There were no significant yield differences in any of the size categories or in total yield. There was no trend for higher yield with increasing thrips control (Fig. 2) but colossal and supercolossal yields may be increased by effective thrips control (Fig. 3). When temperatures are relatively cool, as they were during the summer of 2010, and when thrips pressure is light, any of the insecticide rotations are adequate for good yields.

Table 5. Yield and grade of onions treated with different rotation sequences of insecticides for thrips control. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

Treatment	Medium	Jumbo	Colossal	S. Colossal	Total yield
			cwt/acre		
1	35.6	788.6	124.0	24.5	972.8
2	31.1	726.7	171.6	22.2	951.5
3	27.4	761.5	143.8	21.1	955.8
4	41.1	840.0	109.9	7.0	998.1
5	33.3	731.6	111.7	8.6	885.2
6	35.7	743.4	145.5	13.7	938.3
7	39.1	794.1	103.5	9.7	946.4
8	24.8	766.9	158.6	13.4	963.7
9	33.8	707.7	150.3	18.4	915.3
10	27.6	739.5	181.4	18.7	967.3
11	25.5	685.0	208.9	33.1	952.5
12	36.0	777.6	145.7	15.1	974.4
13	33.8	749.8	114.6	18.5	916.8
LSD (0.05)	NS	NS	NS	NS	NS

Conclusions

Early thrips control (May 25) was not better than starting a control program on June 3. This may not be true on years when temperatures are normal.

Cyazypyr did not appear to give consistent thrips control but this did not seem to negatively impact yield. Treatment 4 with Cyazypyr gave the highest total yield but there was a tendency for all Cyazypyr treatments to have low colossal and supercolossal bulbs.

Generally, all of the rotations provided adequate thrips control, IYSV damage control and total yield. Yield was lower in 2010 compared to 2009 data by almost 100 cwt/acre. This was consistent with grower experiences.

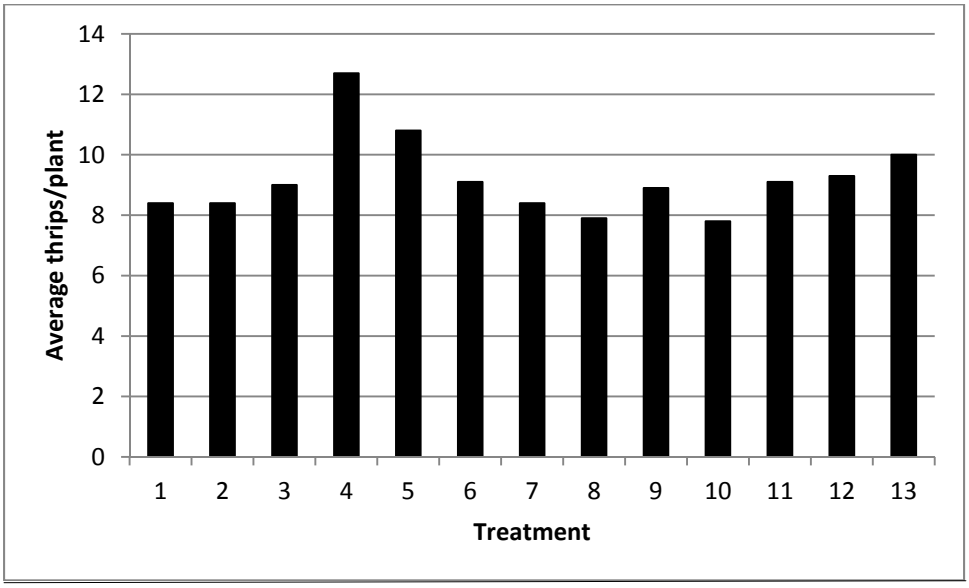

Figure 1. Season average thrips/plant with different insecticide rotations in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

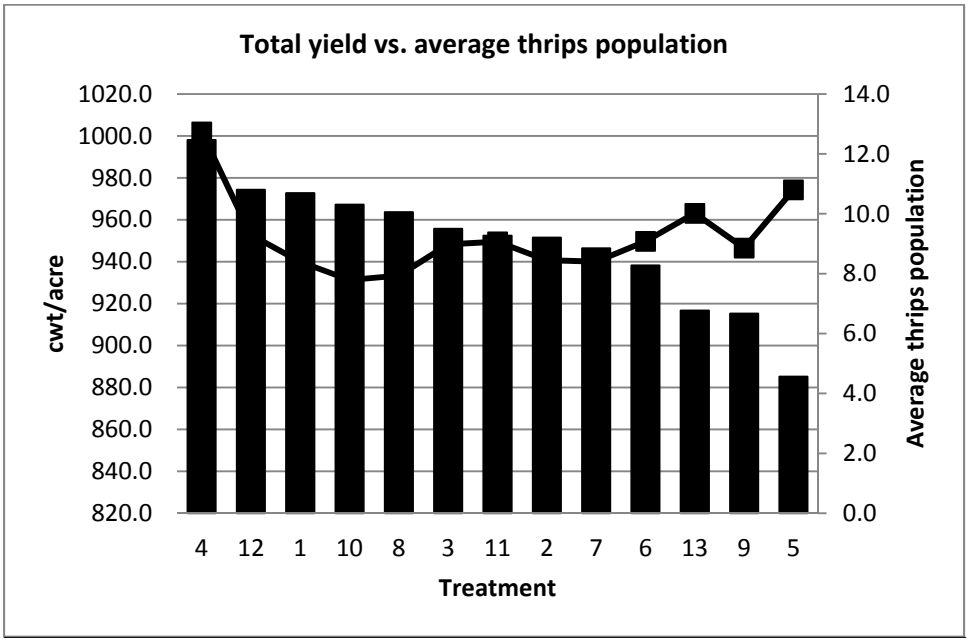

Figure 2. Total onion yield (bars) compared to average thrips populations (squares). Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.

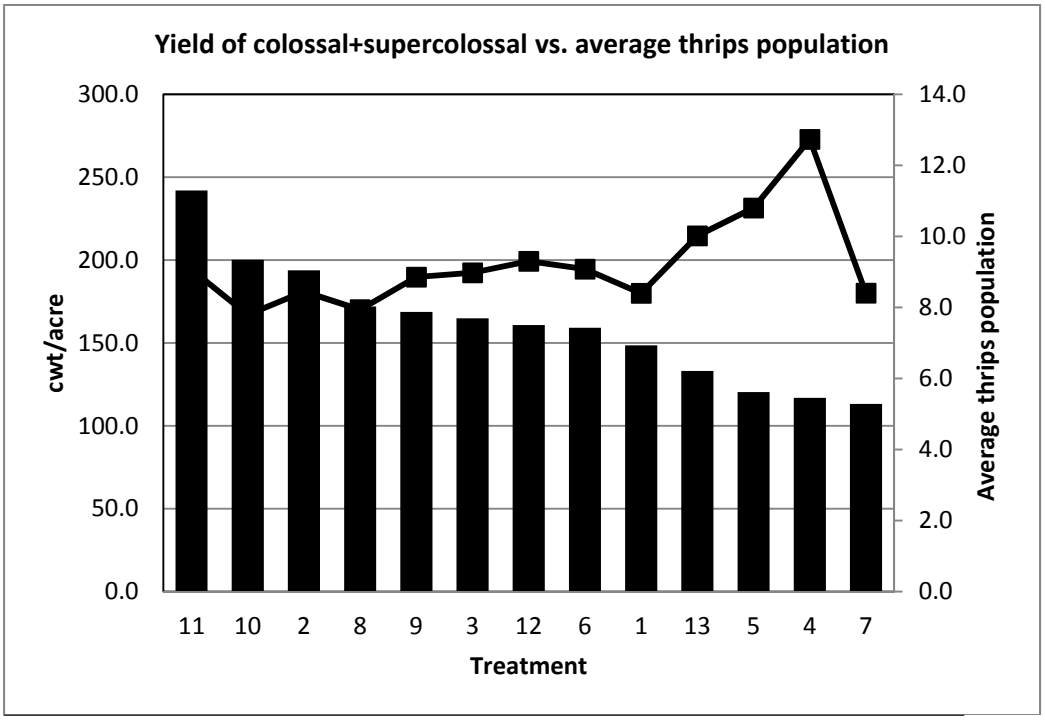

Figure 3. Colossal plus supercolossal onion yield (bars) compared to average thrips population (squares), Malheur Experiment Station, Oregon State University, Ontario, OR, 2010.