THRIPS CONTROL ON DRY BULB ONIONS

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Abstract

Onion thrips are the key direct insect pest of dry bulb onions. We have evaluated candidate chemistries and sequences of currently registered products for their ability to suppress thrips populations in dry bulb onions in Washington State. Additionally, we have evaluated currently registered products when applied via chemigation and investigated the impact of in season nitrogen applications on thrips populations. All of the sequences of applications significantly reduced thrips numbers, and increased potential profitability. The most effective insecticides for controlling thrips were Lannate™ (methomyl), and Radiant™ (spinetoram). The insecticides Agri-Mek™ (abamectin), tolfenpyrad, cyazypyr and Movento™ (spirotetremat) provided adequate control of thrips. Lannate, Radiant, and Movento all decrease thrips populations when applied via chemigation as well.

Introduction

Thrips infestations are a persistent problem throughout Western US dry bulb onion fields. Thrips' mobility and biology can impact control strategies, and impact insecticide performance in controlling thrips. When we initiated this thrips control program in 2001 most onion fields in Washington State were treated with multiple insecticides for thrips control. Pyrethroids were the predominant insecticide used for thrips suppression. Pyrethroids have been ineffective since 2003. Insecticides registered since 2001 are all substantially more expensive than to apply then previously used chemistries. Our research has also documented that thrips are surviving for several months in storage and are continuing to infest over 15% of the onions in storage even after the onions received a substantial insecticide load in the production field. These residual thrips infestations reduce onion shelf life and increase the incidence of neck rots. We have also

documented that in pairwise comparisons (treated for thrips vs. no treatment) among 39 onion cultivars that application of no insecticide treatment of thrips results in a 15 to 35% (depending on cultivar) decrease in bulb size at harvest among cultivars. Bulbs are graded by size and economic returns to growers decrease as bulb size decreases. Onion thrips have also been identified as the vector for Iris yellow spot virus. Our thrips research program evaluates insecticide efficacy, and application techniques in Washington State onion fields.

Materials and Methods

In the experiments detailed below field plots of onion (var. 'Sabroso' Nunhems, Parma, ID) were established at the WSU Research Farm in Pasco, WA and grown using drip irrigation and standard grower practices for agronomic and pest management inputs excluding thrips treatments. On April 1, 2012, an onion plot 120 feet wide and 350 feet long was established with two double rows of onions planted on each 44 inch wide bed. Double rows are 2 ½ inches apart with 3 inches in row spacing. Lorsban™ 15G (chlorpyriphos) was applied at planting and incorporated over the double row at the rate of 3.7 oz./1,000 row feet. Plots were established in a random complete block design with four replications. In each instance, plots were 7.5 feet wide and 30 feet long. Applications (except where specified) were made with a CO_2 pressurized back pack sprayer applying 30 gallons of water carrier per acre at 35 psi. Efficacy was evaluated four or five days after applications by counting the number immature and adult thrips per plant on 10 individual plants per plot in the field. All data for each sample date were analyzed by ANOVA and treatments means were compared to thrips population means from non-treated control plots in pairwise *t*-tests. At the end of the growing season onion yield and size were evaluated for comparison among treatments.

Results/Discussion

Sequences of insecticides were evaluated for efficacy against thrips. Applications were made weekly starting on 8 June 2012. The aim of this research was to provide producers possible insecticide management regimes to use on their farms. Figure 1 shows the average thrips count per treatment. All treatment sequences averaged significantly ($p<0.05$) fewer thrips per plot than the untreated check. The weekly count data (data not shown) followed the same trend. The total yield for the sequential applications is also illustrated in Figure 1. Yields and overall thrips pressure were low this year, and there were no statistically significant differences in terms of overall yield and bulb size. There were some numerical trends, where all treatment regimes increased yield. Figure 2 shows the various sequences evaluated in the trial. The total cost of each treatment sequence is listed in addition to the net potential increase in revenue calculated from the plot yield in Figure 2 using the market price of $240 per ton. All treatment sequences resulted in increase profitability in this study (results not statistically different from one another).

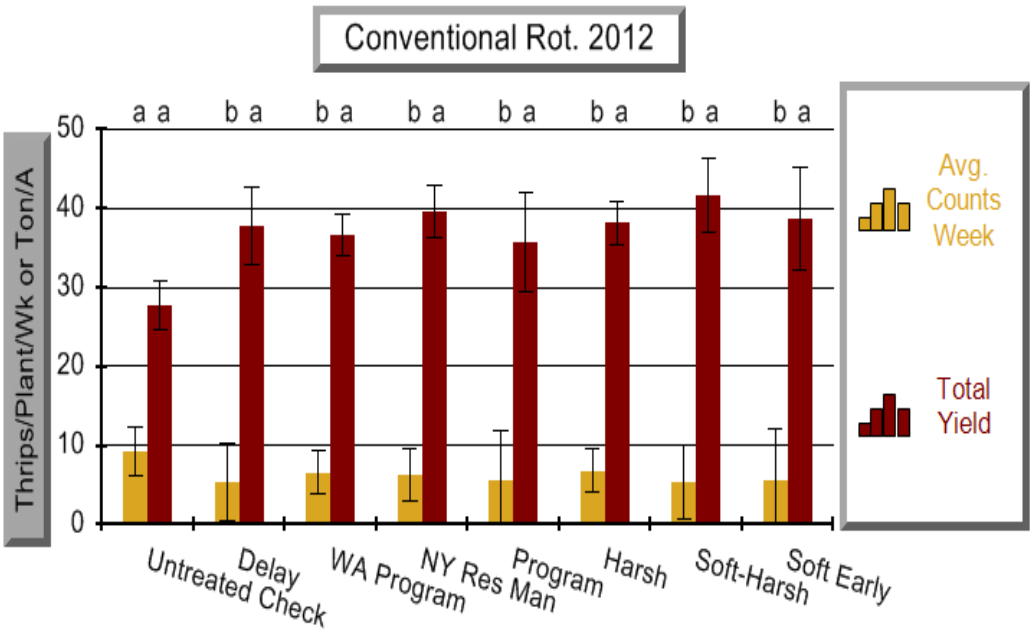

Figure 1. Thrips per plant and yield (tons/A) versus sequential chemical treatments. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

Week	1	2	3	4	5	6	7	8	Cost/A $	yield tons/A	Net over Check $/A	Thrips/Week
Untreated Check									0	27.75	0.00	9.3 a
Delay		Radiant + Movento	Movento	Radiant	Agrimek		Lannate		275	37.83	2144.20	5.4 b
WA Program		Movento	Movento	AzaDirect + Radiant	AzaDirect + Radiant		Lannate	Lannate	303	36.59	1818.60	6.6 b
NY Res. Man.	Movento	Movento	Agrimek	Agrimek	Lannate	Lannate	Radiant	Radiant	356	39.60	2488.00	6.3 b
Program	AzaDirect + Radiant	Movento	Radiant	Agrimek		Lannate	Lannate		293	35.70	1615.00	5.6 b
Harsh	Lannate	Movento		Lannate	Agrimek	Radiant	Lannate		239	38.23	2276.20	6.8 b
Soft to Harsh	Movento	Movento	Radiant	Radiant	Agrimek	Lannate		Lannate	305	41.63	3026.20	5.5 b
Soft Early	Radiant + Movento	Movento		Radiant	Agrimek		Lannate		275	38.75	2365.00	5.7 b
Based on average retail product prices and onions selling at $240 per ton. ((Treatment yield-UTC Yield)*240)-Product cost/A.												

Figure 2. Application sequences by treatment week with cost per acre and net increase in potential revenue due to increased yield documented in Figure 2.

Figures 3 & 4 depict data from trials evaluating weekly applications of insecticides to control thrips in onions. The data in Fig. 3 indicates that Entrust was the most effective compound evaluated in that trial. In Figure 4, the AgriMek, Torac, Torac + Lannate, and Lannate all provided significantly better control than the untreated check, but not different form one another.

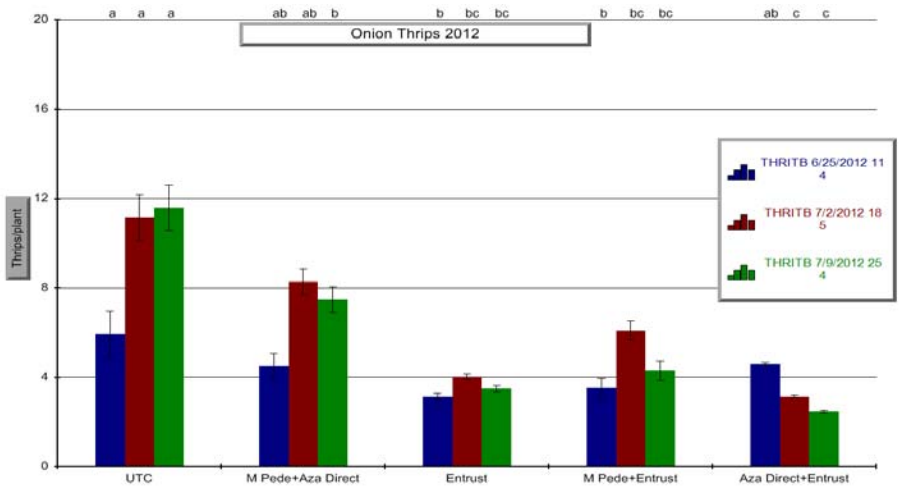

Figure 3. Thrips per plant versus chemical treatments. Weekly applications were made of each product. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

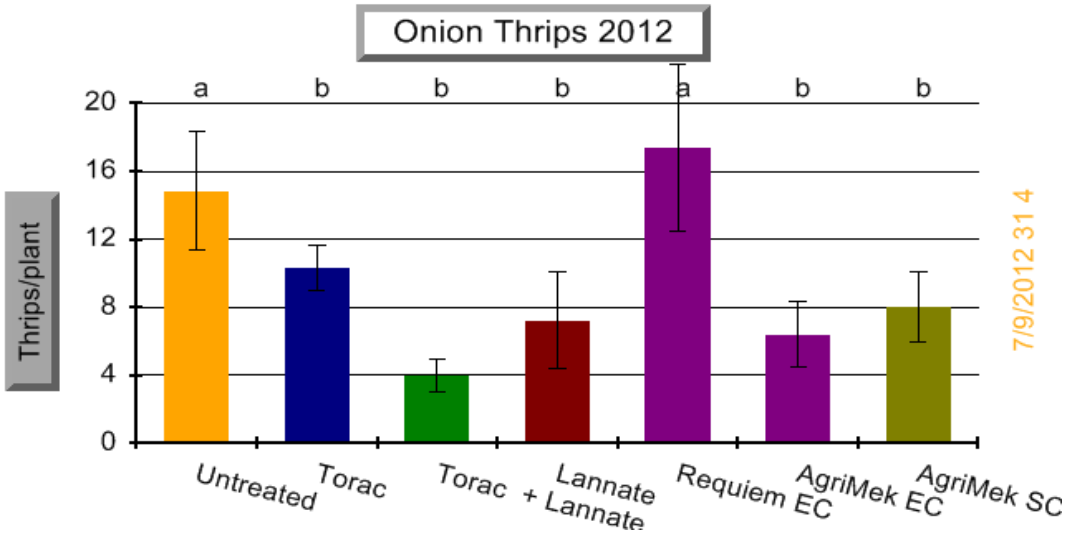

Figure 4. Thrips per plant versus chemical treatments. Weekly applications were made of each product. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test)

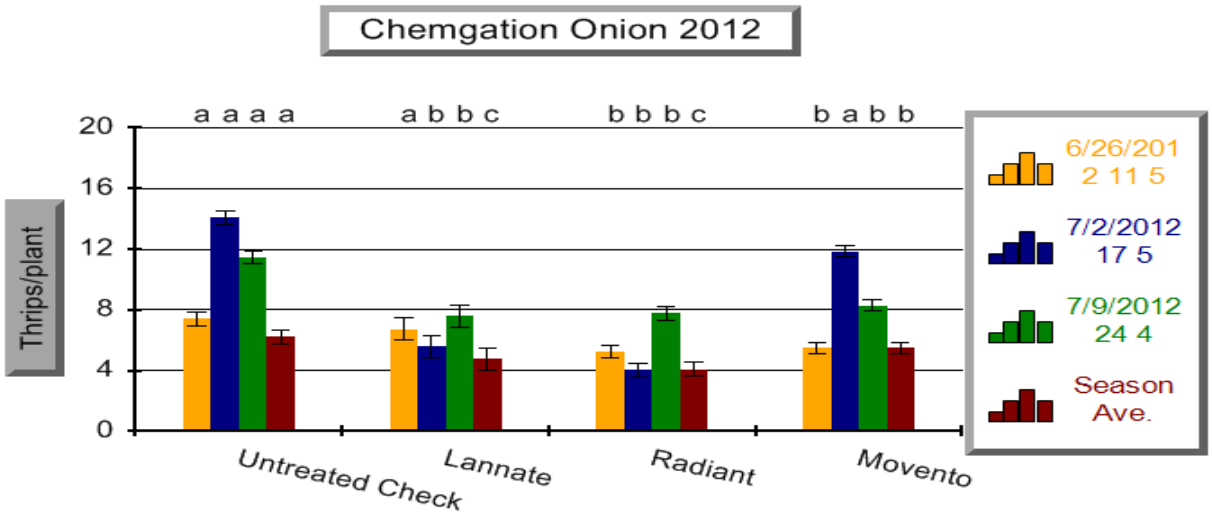

Figure 5. Thrips per plant versus chemical treatments. Weekly applications were made of each product applied with 0.1 inches of irrigation water. Treatments with the same letters are not statistically different from one another (P=0.05 Student-Newman-Keuls test).

Figure 5 depicts chemigation treatments. In Figure 5, the Lannate, Radiant, and Movento all provided control of thrips that was significantly better than the untreated check. This is the second year that this trend has occurred, making it seem likely that these compounds will perform well when applied via chemigation.

Conclusions

Using insecticides that are effective at controlling thrips increases yield and size class of dry bulb onions. Radiant and Lannate were found to be the most effective products while Movento, cyazypyr (data not shown above), tolfenpyrad and AgriMek provided good suppression of onion thrips. All of the sequential applications tested provided excellent season long control of thrips and if adopted by commercial growers could increase economic returns. Weekly applications are not always needed as shown on the sequences where applications were skipped either early during the season or at the middle of the season. It is important for producers to consider the mode of action of the different chemistries when integrating them into their control programs. Chemigation proved to be an effective way to apply Lannate, Radiant, and Movento. Nitrogen applications appear to contribute to increased numbers of onion thrips. Timing of nitrogen applications seems to be important, but further study is needed to refine this theory.

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