ONION THRIP SURVEY AND RESISTANCE

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I. PURPOSE

Over the past 3 years a general resistance to the organo-phosphate insecticides has been noted in the Treasure Valley area. Table 1 shows the decrease in activity of two combinations of organo-phosphate insecticides over the past 3 years. At the present rate of decrease, these products will be totally ineffective in 2-3 years, and are now essentially useless for proper thrip control. Two possible explanations have been proposed: 1) We are dealing with different thrip species in different areas of the valley, or 2) the thrip are building up resistance to these insecticides. If thrip are becoming resistant, is there any way to identify the resistant ones so that appropriate control methods can be applied? Lastly, an accurate economic threshold level must be determined to give growers a better indication of when to spray for thrips.

II. PROCEDURES

The first step was to determine if we are dealing with one or several different species of thrips. Thrip were collected at different farms in each of the following areas of the Treasure Valley and identified:

Ontario  Oregon Slope  Weiser
Parma  Fruitland  Vale
New Plymouth  Nyssa  Homedale
Adrian

Other production areas such as the High Plains area of Texas show two different species of thrips to infest onions, the onion thrips (Thrips tabaci) and the western flower thrips (Frankliniella occidentalis) which have been shown to respond differently to some of the insecticides used to control them. It was hoped that this would explain some of the different responses of thrips to our insecticides in different areas.

Dr. William Brindley, an entomologist at Utah State University has established a method of determining lygus resistance to dylox, so it was hoped that his experience and expertise could be tapped in developing a similar test for thrip in onions. The first step was to coat small vials with known concentrations (0, .1, 1 and 10 micrograms per vial) of methyl parathion, collect thrip and place in these vials for a period of time, then count the number surviving to see if a resistance factor has occurred in the thrip.

Lastly, a series of plots infested with thrip, some partially infested and some kept free of thrip throughout the growing season were established to determine yield differences that might occur with varying degrees of thrip pressure.
III. RESULTS

All of the thrip at all sites collected were identified as the onion thrips (Thrips tabaci). It does not appear that there is more than one species involved with our onion production. This indicates a much greater probability that the thrips have developed resistance to the organo-phosphate insecticides.

The second step was to collect thrip from various locations in the valley, place into the vials and see how many were alive at different time intervals. The procedure was to use a fine bristled paint brush to brush the thrip off the onion plant and into a funnel, then brush the thrip from the funnel into the vial. Surviving the brushing technique varied, depending somewhat upon whether the thrip was an adult or nymph. The adult appeared able to withstand the technique better. Determining mortality was hard under most conditions, but extremely hard when the thrip were first placed in the vial. The best technique seemed to be to warm the vial with sunlight or an artificial light.

No resistance was determined using the concentrations involved. The thrip in the untreated vials died as quickly as those in the treated vials. By keeping the vials in a dark, cool place, they could be kept alive for 24 hours but the concentrations of parathion need to be increased to get a higher mortality at the higher concentrations. It is hoped that 1987 will give us that concentration needed.

Yield results for threshold establishment was not determined in 1986 as a severe infestation of fusarium basal rot developed in the plots during mid-August. The onion variety Valdez is apparently more susceptible to this fungus than some other varieties, since this variety showed up with basal rot in other plots also, while other varieties in the plots did now show a significant amount. Table 2 shows that in 1985, there was no decrease in yield due to thrip infestation. However, thrip injury in 1984 did cause a significant decrease in yield of 138 cwt./A over the treated plots. There was also much heavier thrip pressure in the trials in 1984 than in 1985, which may be part of the reason for the differences. It is also interesting to note that there was no significant difference in yield until the control fell below 67%. This would put the threshold level at somewhere between 25 and 70 thrips per plant. During 1985, the average number per plant did not exceed 25 and did not cause a yield reduction. One additional problem is that when the population reaches 25+/plant, control is extremely hard to obtain so some way of predicting when the populations might increase beyond 25+ thrip/plant should be explored.

Probably the threshold level for thrip is much higher than we have thought but may vary from year to year depending upon how early they infest the crop and how high the population is plus other environmental factors such as heat, humidity, etc. that influence how many generations occur in a year.
IV. CONCLUSIONS

1. The organo-phosphate insecticides effectiveness in controlling onion thrips has continually lessened over the past 3 years.

2. All thrip infesting onions in the Treasure Valley area during 1986 appeared to be Onion Thrips (*thrips tabaci*).

3. There was a significant yield reduction of 138 cwt./A. in 1984 due to thrip but no reduction in 1985.

4. Thrip populations may need to be above 25/plant in order to cause a reduction in yield but less than 60/plant.
Table 1.
ORGANO-PHOSPHATE INSECTICIDE DECREASE IN THRIP CONTROL OVER A 3 YEAR PERIOD AT THE MALHEUR EXPERIMENT STATION

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate lbs.a.i./A</th>
<th>% of Control - Year Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penncap M + methyl paration</td>
<td>0.5</td>
<td>99 88 64</td>
</tr>
<tr>
<td>Penncap M + Guthion</td>
<td>0.5 0.75</td>
<td>97 88 54</td>
</tr>
</tbody>
</table>

Table 2.
ONION THRIP EFFECT ON YIELD MALHEUR EXPERIMENT STATION, ONTARIO, OREGON

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1985 Ave. Number thrip/plant</th>
<th>% Total Control</th>
<th>% Col</th>
<th>% Jumbo</th>
<th>% Med.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Thrip Control</td>
<td>4.1</td>
<td>82</td>
<td>556</td>
<td>10.0</td>
<td>68.0</td>
</tr>
<tr>
<td>No Thrip Control</td>
<td>23.37</td>
<td>-0</td>
<td>539</td>
<td>3.5</td>
<td>75.0</td>
</tr>
</tbody>
</table>

1984
| Best Thrip Control             | 0.4                           | 99              | 386a  | 17.0    | 67.9  | 15.1  |
| #13 of 15 Treatments for Thrip Control | 24.0                         | 67              | 362a  | 10.3    | 68.9  | 20.8  |
| #14 of 15 Treatments for Thrip Control | 68.7                         | 4               | 269b  | 8.6     | 71.1  | 20.3  |
| #15 - No Thrip Control         | 71.8                         | -0              | 248b  | 8.0     | 63.7  | 28.3  |

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