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New control for Esperance armyworms

G. R. Strickland and G. D Rimes, Entomology Branch

Armyworms are periodically responsible for serious cereal crop damage in Australia, often causing up to 80 per cent crop loss.

The species usually held responsible is the southern armyworm (Persectania ewingii (Westw.)) but it now appears that the inland armyworm (P. dyscrita (Common)) and common armyworm (Pseud lateitia convecta (Walker)) cause most damage in Western Australia. Certainly, it was the latter two species which were associated with the major outbreak at Esperance in 1975 where some 14 200 ha required control treatment.

This was the first serious outbreak of armyworm for nine years in Western Australia.

Investigations elsewhere in Australia have indicated that armyworm moths are capable of extensive migratory flights, thus producing sporadic severe outbreaks of this type.

Armyworm damage occurs in two phases associated with the development stage of the crop.

In the first phase the worms are concerned mainly with eating the lower flag leaves and sheaths of the tiller.

In the second, or “head lopping” phase, the flag leaf is withered and the worms are forced to climb the head and upper sections of the tiller to find green material. During this phase they chew through the tillers, causing the head to fall to the ground. This may result in a 70 to 80 per cent crop loss over four or five days.

An indication of imminent severe damage is that seeds of lower story plants such as cape weed and rye or barley grasses are completely eaten out. The worms then attack the “beard” of barley ears before chewing through the stems below the ear. Large populations of mature caterpillars are likely to be found in mature crops or thick sections of crops because of the insects’ gregarious and migratory habits.

A major new problem in the control of armyworm outbreaks is that use of DDT has been restricted by residue and withholding period problems, especially with a crop such as barley in which the grain is unprotected by glumes.

The 1975 outbreak was therefore used to collect biological data on armyworms and to test alternative insecticides including U.L.V. (ultra low volume) carbaryl, U.L.V. endosulfan, L.V. (low volume) endosulfan and L.V. trichlorfon. A trial was carried out at 38 km west of Esperance with other observations made of commercial spraying results on a farm 58 km east of Esperance.

Effects of insecticides on armyworms

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Recommanded rate</th>
<th>Trial rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g A.I./ha</td>
<td>ml product/ha</td>
</tr>
<tr>
<td>ULV endosulfan (45% w/v product)</td>
<td>350</td>
<td>780</td>
</tr>
<tr>
<td>ULV carbaryl (25% w/v product)</td>
<td>1125</td>
<td>4480</td>
</tr>
<tr>
<td>LV trichlorfon (60% w/v product)</td>
<td>560</td>
<td>940</td>
</tr>
<tr>
<td>LV endosulfan (35% w/v product)</td>
<td>350</td>
<td>980</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre-spray sample*</th>
<th>Day 1**</th>
<th>Day 4</th>
<th>Day 7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1  2  3</td>
<td>1 2 3</td>
<td>1  2 3</td>
</tr>
<tr>
<td>Nil—control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ULV endosulfan</td>
<td></td>
<td>31 11 0</td>
<td>31 11 0</td>
<td></td>
</tr>
<tr>
<td>ULV carbaryl</td>
<td>350</td>
<td>16 24 29</td>
<td>24 34 3</td>
<td></td>
</tr>
<tr>
<td>LV trichlorfon</td>
<td>560</td>
<td>43 0 6</td>
<td>22 26 4</td>
<td></td>
</tr>
<tr>
<td>LV endosulfan</td>
<td>350</td>
<td>51 0 10</td>
<td>13 17 4</td>
<td></td>
</tr>
</tbody>
</table>

* Taken day before treatment
** Day 1 after treatment
1 = active armyworms, 2 = dying armyworms, 3 = dead armyworms
A.I. Active ingredient
w./v. Weight/volume

Trial rates differ slightly from the recommended rates such departures are normal in small plot applications.
1975 trials

The trial was conducted in a 2-row barley crop at the milk-dough stage with the flag leaf withering. It consisted of five replicated plots including a control and the four treatments. Plot size was 80 m by 80 m, with 80 m buffers between plots to prevent over-spray effects. Treatments shown in the Table were applied with a U.L.V.-L.V. “Terra Mister” spray at the rear of a four-wheel-drive vehicle on November 20, 1975. Weather conditions were suitable and included a 10 to 15 knot breeze and an air temperature of some 30°C.

The swath pattern was determined by the effect of the oil droplets on photographic paper, then maintained at a width of 40 m throughout the trial.

Pre- and post-treatment samples were taken for one week—four from each treatment plot and eight from the control plot. Sample areas were 0.5 sq m and worms were classified as alive, dead or dying.

In the east Esperance work, also on a barley crop, DDT and trichlorfon were applied aerially at rates of 570 g a.i./ha and 675 g a.i./ha respectively. Sampling was done by walking through the crop and taking a 0.5 sq m sample every 20 m.

Discussion

The results in the Table indicate that the L.V. compounds performed considerably better than the U.L.V. compounds. L.V. trichlorfon performed best overall, giving a 93 per cent. kill after seven days.

One factor affecting the performance of the U.L.V. formulations may have been poor penetration in the heavy crop. The small droplet size of U.L.V. compounds compared with L.V. compounds, makes them more susceptible to wind dispersion.

Another factor is the location of the caterpillars during spraying. In the west Esperance trial sprays were applied when the “head lopping” stage had been in progress for about four days and many worms had virtually stopped feeding and were sheltering at the base of the barley plants. This situation undoubtedly inhibited the spray effect and emphasises the need for correct timing and thorough penetration of chemicals.

Spraying could be more effective at night as the armyworms begin feeding actively in the cool of the evening.

Because of such complications it could not be concluded that U.L.V. carbaryl and U.L.V. endosulfan are ineffective against armyworms—they could well prove useful with better timed applications.

Spraying earlier than the “head lopping” stage could be effective and prevent early crop damage, although it must be remembered that as the moths fly from early September until the end of November, re-infestation is likely if the crop is sprayed too early.

Light traps are being successfully used in South Australia and Tasmania to help in this problem and alert farmers to moth activity and potential armyworm attack.

Observations at the east Esperance site confirmed that trichlorfon could be a suitable alternative to DDT for the control of armyworms. In spite of high caterpillar populations (up to 200 per sq m), both trichlorfon and DDT achieved 100 per cent kills.

The effectiveness of trichlorfon in this situation compared with the trial at west Esperance was probably associated with better timing of the application, when the lower foliage of the crop had withered but before the upper stems had been attacked.

Because of the Esperance area’s relatively mild climate, long growing season and importance for barley production, armyworms must be regarded as a persistent and serious insect pest.

At the same time, imminent restrictions on the use of DDT as a control treatment make it essential that alternatives be tested as quickly as possible, for economy, for efficiency, and for effectiveness of application methods.

The trial results suggest that trichlorfon is a suitable material to eradicate armyworms and that timing of the applications will be of paramount importance.