PROGRESS REPORT ON FUNNEL ANT CONTROL

By G. WILSON

The funnel ant, *Aphaenogaster pythia* Forel, infests several hundreds of acres in each of the mill areas of Mossman, Hambledon, Mulgrave and Tully, is present to a lesser extent in the Innisfail, Ingham, Proserpine and Mackay districts and has been recorded in a few minor infestations at Bundaberg. In the first-named four areas, each year a few farms are added to the list of those known to be infested, but it is probable that the additional records arise from an increasing awareness of the pest on the part of canegrowers rather than from any appreciable spread of actual infestation. While plant cane occasionally suffers diminished yield due to the ants, the major losses occur in ratoons, in the form of reduced growth and patches of complete ratoon failure. The effect on the cane is attributed to the insects' habit of tunnelling the soil extensively, leading to over-aeration, loss of moisture and separation of the roots from the soil; also, it is due to some direct root injury by the ants, which have been observed, in cages, to lacerate roots and feed on the sap.

Field experiments and laboratory work aimed at the control of the pest have been carried out using DDT, BHC, chlordane, aldrin, dieldrin, telodrin, heptachlor, diazinon, and parathion. Prior to 1958 the effects of insecticides applied in the field were variable, inasmuch as particular combinations of insecticide with method of application, that proved superior to other combinations in individual trials by giving significant increases in yield, failed to confirm either their superiority or the significant increase in other trials, and none of the treatments devised effected any appreciable reduction in the numbers of ants present. With ants persisting in all trial plots, the real loss of yield caused by them could not be reliably assessed.

In 1958, a randomised trial with five replications was put down in the Tully area in which aldrin at 4 lb per acre and lindane at 4 and 8 lb per acre were applied by two methods, viz., (1) broadcast, disced and ploughed into the soil prior to planting, and (2) applied as side dressings in the half-open drill when the young plant cane was well established. In the plant crop the mean yields, ranging from 18.4 to 21.6 tons of cane per acre, showed no significant differences between treatments. In the first ratoons patchy severe damage by the ants introduced high intra-treatment variation and again the mean yields failed to show significant differences; however, the results gave some guidance for future work, particularly when viewed in conjunction with the results of an exploratory trial conducted in the same field. In that exploratory trial aldrin and γ BHC at 20 lb per acre and chlordane at 40 lb per acre had been broadcast, disced and ploughed in prior to planting. While BHC did allow
some ants to persist, the aldrin completely eliminated them for the duration of the plant and first ratoon crops, not only from the treated plots but also for a distance of some 30 feet along the rows outside the plots, in a downhill direction. The writer and the cane grower had no hesitation in agreeing on an estimate of 30 tons per acre for the cane where the ants had been eliminated, as compared with 13 tons per acre in the untreated rows on each side. In the randomised trial there were virtually two sets of untreated controls, one set having been reserved for the application of a poison bait which had no effect. These two groups of untreated plots gave mean yields of 12.3 and 13.4 tons per acre respectively. Where applied as side-dressings, 4 lb of aldrin, and 4 and 8 lb of γ BHC gave mean yields respectively of 15.5, 16.4, and 17.1 tons per acre; where applied broadcast the corresponding mean yields were 19.7, 19.2, and 20.6 tons per acre. The estimated difference of 17 tons per acre in the exploratory trial compared with only 6 to 7 tons in the randomised trial in which ants still persisted, indicated that the use of relatively large amounts of aldrin could be economically sound; on the other hand, the elimination of ants well outside the treated area showed that the application of 20 lb of aldrin per acre was unnecessarily high. The randomised trial results pointed to broadcasting as the most effective method of application. Since cane varieties appear to differ in their susceptibility to funnel ant damage, it should be noted that the variety concerned was an apparently rather susceptible one, Q.57.

In 1959, a trial was put down in Mullgrave using aldrin at 5, 10, and 15 lb per acre, applied by three methods viz., (1) broadcast wholly in one operation, disced and ploughed in, (2) half the stipulated amounts broadcast and incorporated in the soil in the manner previously described, the balance being applied after ploughing and prior to a subsequent disking; (3) wholly applied as a side-dressing in the half-open drill five months after planting. In the plant crop there were no significant differences between mean treatment yields, the variety grown being Pindar which is not very susceptible to damage by ants. Drought so affected the first ratoons as to render the plot yield data valueless. Information was obtained from counting the number of ant hills that developed after the various treatments. In Table I are shown the counts of hills in the plant and first ratoon crops, the relevant area for each count being one sixth of an acre.

**TABLE I**—Numbers of hills raised by funnel ants where aldrin had been applied in various rates and methods of application and in untreated controls.

<table>
<thead>
<tr>
<th>Method</th>
<th>Single broadcast</th>
<th>Divided broadcast</th>
<th>Side dressing</th>
<th>Untreated control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate per acre</td>
<td>5 10 15</td>
<td>5 10 15</td>
<td>5 10 15</td>
<td>0</td>
</tr>
<tr>
<td>Plant crop</td>
<td>10 0 0</td>
<td>12 3 1</td>
<td>6 27 21</td>
<td>111</td>
</tr>
<tr>
<td>First ratoons</td>
<td>195 6 3</td>
<td>48 0 0</td>
<td>30 18 18</td>
<td>312</td>
</tr>
</tbody>
</table>

Five pounds of aldrin per acre were not sufficient to eliminate the ants in either the plant or ratoon crop by any of the methods of
application, and the side-dressing method also failed to do so at any of the rates. In the plant crop the single broadcast application eliminated the ants at the 10 and 15 lb rates, while the divided broadcast method did not quite do so; however, the relative efficacies of single versus divided broadcasting were reversed in the first ratoons. Nevertheless, so few hills developed following either of these methods that a double field spraying operation would not be decided upon without further study.

Another method of application, broadcasting insecticides on the soil surface after the final cultivation of the plant crop, was tried in an exploratory trial with three replications in January, 1960, using dieldrin and heptachlor dusts at 2, 5, and 10 lb of active ingredient per acre. In adjoining plots aldrin at 15 and 20 lb per acre had been broadcast and disced and ploughed in prior to planting, in 1959. A count of ant hills was made in the first ratoons in February, 1961, the dieldrin and heptachlor having been, by then, incorporated in the soil by the normal cultivation of the ratoons. In areas of 1/30th acre of each treatment the numbers of hills found were:—aldrin 15 lb, 0; 20 lb, 0; dieldrin 2 lb, 40; 5 lb, 14; 10 lb, 5; heptachlor 2 lb, 30; 5 lb, 1; 10 lb, 0; untreated controls, 31. Since the heptachlor had lain exposed on the soil surface for about seven months before it was incorporated during ratooning, its efficacy at the 5 lb level was highly promising, particularly as aldrin at that rate had not been impressive in other trials.

In 1960, in a trial with five replications in Mulgrave, aldrin and heptachlor were compared, each at 5, 10, and 15 lb per acre, broadcast, disced and ploughed in. In the plant crop the infestation by ants was not heavy and since no growth differences could be detected and machine harvesting would cause difficulties, plot yields were not obtained. A count of ant hills was made immediately prior to harvest in 1961; on areas of 1/12th acre for each treatment the numbers of hills found were:—untreated controls, 30; aldrin at 5, 10, 15 lb per acre, 6, 0, 3 respectively; heptachlor at similar rates, 2, 0, 0 respectively.

Up to this stage, the use of insecticides against the funnel ant on a farm scale appeared likely to be rather costly. None of the trial results quoted above included the second ratoon crop, and, if three-crop protection required the use of approximately 12 lb of aldrin per acre, prevailing prices indicated an outlay of about £14 to £15 per acre. The Bureau of Sugar Experiment Stations discussed with various formulators the prospect of preparing an emulsifiable preparation suitable for application to the soil, even if not suitable for more refined purposes, and a 60 per cent aldrin emulsifiable concentrate was evolved costing about 14/- per lb of aldrin. This formulation at 12 lb of aldrin per acre cost not more than £9 including freight and was recommended as an interim procedure for the benefit of growers who had for many years sought relief from the losses caused by funnel ants. Since that treatment would also control greyback grubs a separate application of BHC to control them was unnecessary, but might be required where other species, such as frenchi or consobrina grubs, were likely to occur.

Further work is proceeding to improve the economics of control.
In 1961, two trials were put down to compare single with divided broadcast applications, using aldrin at 6, 9, 12 and 15 lb per acre. In one of these, in Tully, a susceptible variety, Vidar, is employed, while the more resistant Pindar has been planted in the other in Mulgrave. In yet another trial at Tully, planted with Vidar in 1961, aldrin at 6, 9, 12, and 15 lb per acre is being compared with heptachlor at 3, 6, 9, and 12 lb per acre, each applied in a single broadcast, then disced and ploughed in prior to planting. In the latter trial a count of ant hills was made only six weeks after planting. At that early stage hills would be under construction by ants coming up from several feet below in the sub-soil, which had not been affected by the insecticides in the ploughed soil. Consequently, the numbers of hills are larger in treated plots than was the case in other trials quoted above where counts were made at a later stage. On areas of one sixth of an acre for each treatment the numbers of hills found were:—untreated controls, 435; aldrin at 6, 9, 12 and 15 lb per acre, 28, 5, 11, 2 respectively; heptachlor at 3, 6, 9, and 12 lb per acre, 12, 14, 2, 6 respectively.

In order to ascertain whether in any field the insecticides need be applied again at the full rate when the field is again ploughed and planted some four years later, an area of three acres was treated with aldrin at 12 lb per acre in 1961, so that a quantitative trial can be sited thereon when the field is next planted in 1965. A similar area will be treated with heptachlor at a rate to be selected, in 1962.

Work is also proceeding to find out whether the application of aldrin or heptachlor against the funnel ant can be made to control cane grubs other than the greyback.

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