EVALUATIONS OF INSECTICIDES ON PASTURE PESTS EXCLUDING GRASS-GRUB AND PORINA

R. E. LEE

Department of Agriculture, Wellington

Summary

An evaluation is made of insecticides used in trials laid down against pasture pests by officers of the Farm Advisory Division of the Department of Agriculture. The insect pests were black beetle (*Heteronychus sanctae-helenae* (Blanch.)), armyworm (*Pseudaletia separata* (Walk.) and *Persectania avera* (Walk.)), black field cricket (*Teleogryllus commodus* (Walk.)), stem weevil (*Hyperodes bonariensis* (Kusch.)), white-fringed weevil (*Graphognathus leucoloma* (Boh.)), soldier fly (*Altermetaponia rubriceps* Macq.), European brown snail and cereal aphid (*Rhopalosiphum padi* (L.)).

BLACK BEETLE

Heteronychus sanctae-helenae

TWENTY-TWO trials have been laid down since 1957 against both beetle and grub stages. Many insecticides have been used. The chlorinated hydrocarbons seem most likely to supply the answer to this difficult pest.

Of this group the most consistently effective insecticides have been lindane, dieldrin and "Telodrin". Dieldrin has been shown to give good control in dust, spray, and prill form at a rate of 4 oz while lindane at 1 lb has given equally good results, likewise for "Telodrin" at 1 lb. (Quantities given throughout are in terms of active ingredient per acre.)

Heptachlor and endrin sprays and dusts at 2 lb have exhibited good control in many trials. Aldrin at 3 lb gave excellent control in the one trial laid down. These materials need more investigation to determine minimum effective rate.

Of the organo-phosphorus materials tested "Mirex" and "Kepone" showed a good degree of control in one trial in 1963. Phorate and carbophenothion both at 3 lb have shown little ability to control. When sprayed, ethion at 2 lb, methoxychlor and toxaphene at 6 lb, fenthion 1 lb, fenchlorphos 3 oz and malathion 1.5 oz, have seldom shown any degree of control in the little work done with them.

The plot size of these trials has normally been between 1/160 ac and 1/250 ac. Method of assessment has been made mainly on pasture responses using a pointing system on an individual plot basis while larvae counts have sometimes been made.

Most of the work has been directed at controlling the larval stages. The evaluation already given corresponds very closely with the results of trials directed at the imago. However, several organo-phosphates, namely "Dibrom" 2 lb and dichlorvos 2 lb, have been found to give a good kill when applied against the adult.

Several reports from officers have stated that the larvae is ryegrass-selective (*Lolium* spp.) in feeding, but this has yet to be proven. Paspalum pastures appear to be able to stand up to infestation much better than ryegrass possibly because of a stronger and deeper rooting system.

TABLE 1: INSECTICIDES TESTED AGAINST BLACK BEETLE

<i>Effective:</i> Heptachlor 2 lb, Dieldrin 4 oz, Lindane 1 lb, "Telodrin" 1 lb.	<i>Inconclusive Poor Control:</i> ethion 2 lb, methoxychlor 4 lb, toxaphene 6 lb, fenthion 1 lb, fenchlorphos 0.5 lb, dichlorvos 2oz, malathion 1.5 oz, carbaryl 4 lb, rotenone 0.5 lb, <i>Bacillus thuringiensis</i> 10 lb.
<i>Promising:</i> Endrin 3 lb, Aldrin 3 lb, "Mirex" 3 lb, "Kepone" 3 lb.	
<i>Not Effective:</i> DDT 6 lb, Phorate 2 lb, Carbophenothion 2 lb.	

WHITE-FRINGED WEEVIL

Graphognathus leucoloma

Many of the areas of the black beetle trials have also been infested with larvae and adults of the white-fringed weevil, but less certain results have been obtained. The organo-phosphates and carbamates have again proved unsatisfactory while only dieldrin, "Telodrin" and lindane, usually at high rates, have been reported to give control repeatedly, when applied to pasture. Dieldrin and heptachlor at 8 oz mixed with seed before drilling has given good seedling protection in the presence of a heavy infestation of black beetle and white-fringed weevil.

BLACK FIELD CRICKET

Teleogryllus commodus

Seventeen trials have been completed over the last three seasons of cricket infestation. Twenty-eight insecticides have been tested, some in many forms. Results have been difficult to assess in many trials and there is much inconclusive information.

RESULTS

Sprays, Prills and Dusts

Chlorinated hydrocarbons: dieldrin 4 oz — excellent; DDT 8oz — fair to good; "Telodrin" — inconclusively poor; lindane — poor to fair; heptachlor, endrin, and aldrin — not yet tested.

Organo-phosphates: "Dibrom", malathion, dichlorvos, and fenchlorphos all at 2 lb have on several occasions shown some fair degree of control. Ethion and mevinphos, both at 2 lb, have shown inconclusive poor control. Little success has been obtained with toxaphene, methoxychlor, diazinon, trichlorphon, dioxathion, azinphos-methyl and parathion.

Carbamates: "Zectran" 2 lb and UC10854, UC16888, both at 1 lb, have shown inconclusive poor results. Carbaryl 2 lb has consistently shown poor control.

Baits

Heptachlor 2 oz in 20 lb of bran has consistently been the best bait tested. Dieldrin 2 oz has also given excellent to good control as a bran bait and bait prill. Malathion, diazinon, lindane, DDT, all at 2 oz, have performed well as baits. Inconclusive poor results were obtained with *Bacillus thuringiensis* 6 lb and "Zectran" 2 lb in bait formulations.

Best results were obtained with bran as carrier followed by wheat, bait prill formulations and lastly sawdust. Several trials indicated that the addition of molasses did not improve the performance of bran baits.

Difficulties were encountered from the mobile nature of the insect, and even with relatively large plots (1/10 ac) it was hard to assess the effects, or to prevent subsequent immigration. A modified technique was that sacks were secured on the ground in the centre of the plots, to provide shelter to which crickets

would naturally migrate (instead of into the ground cracks). This aided counts of live and dead crickets on the plots to be made.

TABLE 2: BAITS FOR CRICKET CONTROL IN ORDER OF EFFECTIVENESS

<i>Insecticide</i> (oz)	<i>Carrier</i> (lb)
Heptachlor 2	Bran 20 to 25
Dieldrin 2	Bran 15
Lindane 2	Bait prill 16
Malathion 3	Wheat 10 to 20
DDT 3	Wheat 10 to 20

SOLDIER FLY

Altermetaponia rubriceps

Thirteen trials have been carried out with six different insecticides. In all of these trials the treatments have been aimed at the larval stage and the method of assessment has been visible pasture response. Most of the trial work was done on a similar plot size as that done with black beetle (1/160 to 1/250 ac).

RESULTS

Dieldrin spray at 2.5 lb has exhibited good pasture responses. At lower rates it has been relatively ineffective. A fair degree of control has been made of grubs treated with heptachlor spray at 2.5 lb. DDT, lindane, and toxaphene, all at 6 lb, have not shown any pasture responses in badly infested areas.

Organo-phosphorous materials remain to be tested.

The little work done so far on this pasture pest stresses the need for a screening system for insecticides that would save countless hours spent in the field assessing their capabilities.

ARMYWORM

Pseudaletia separata and *Persectania aversa*

Three trials have been completed using seven insecticides. Of the three trials no treatment has been included in more than one trial. However, assessment of results are generally easy to arrive at.

In the first trial "Dibrom" spray was applied at 0.5, 1, and 2 lb and gave good control at the two higher rates while at 0.5 lb kill was slower and unsatisfactory. Carbaryl spray at 1 lb failed to control.

In the second trial dieldrin was mixed with superphosphate and applied at 4 oz. Dieldrin spray was also applied at the same rate. Both treatments gave excellent control. DDT at 4 oz, mixed with superphosphate, resulted in poor control.

Treatments of the third trial were trichlorphon spray at 1 lb, *Bacillus thuringiensis* spray at 6 lb and the bacteria in bait prill form at 1 lb and lastly DDT bait prills at 1 lb.

Some dead caterpillars were found on the trichlorphon plots on the first afternoon, heavy rain followed on the second day and no treatments were found effective on the third day.

STEM WEEVIL

Hyperodes bonariensis

Three trials have now been completed against this elusive insect. In one trial DDT was used at 2 lb. DDT, mixed with lime as carrier,

was found to give a replicated pasture response. Dieldrin included in two trials at 2 lb gave no responses. Phorate sprayed at 1 lb resulted in no discernible responses. It was reported that when spraying phorate "in spite of respirator and protective clothing symptoms of poisoning of the field staff were becoming more increasingly apparent".

CEREAL APHID *Rhopalosiphum padi*

Six field trials have been directed at restricting the activities of barley yellow dwarf virus disease of wheat. Lindane, the only non-systemic insecticide used, was found to give a much increased harvest when applied as a 0.5 lb spray. Similar results have been obtained with dimethoate spray at 0.75 lb and phorate spray at 0.5 lb.

When sprayed, triamide used at 0.25 lb resulted in no significant difference in harvested wheat while aphids were present during the growing season. Many trials are at present being laid down using sprays, dusted seed and pelleted insecticides sown with seed. All materials being tested are of the systemic type. Technique of these trials involves treated strips generally seven coulter wide and several chains long. Treated strips are harvested separately and harvested grain subjected to comparative analysis.

EUROPEAN BROWN SNAIL

Two trials were carried out against this pest. The snail was subjected to a three-day exposure to metaldehyde emulsion (0.5 lb) and "Zectran" at the same rate sprayed on plots 1 yd square. Neither treatment was found to give any degree of mortality. Difficulty was encountered in keeping the snails on the plots, even with 4 in. mixed coarse salt and ash borders.

GENERAL

Many of the trials carried out have resulted in inconclusive effects due to poor timing of application, adverse weather, poor co-operation from farmers, failure to find trial sites of uniform infestation and a variety of other reasons. Much of this work could have been shown to be unnecessary if facilities had been available to do laboratory screening before the insecticides were taken into the fields. At the present time this situation still exists. Until this initial screening can be done testing for effectiveness of many materials now at hand will be an immense undertaking with many failures.

From the listed trial work and the work of others the following control recommendations can be made:

Armyworm:	Trichlorphon spray
Black field crickets:	Malathion wheat bait
Black beetles:	Dieldrin prills
White-fringed weevil:	Dieldrin prills
Soldier fly:	?
Stem weevil:	?
Cereal aphid:	Systemic organo-phosphates
European brown snail:	Metalddehyde dust.