FIELD EXPERIENCES IN CONTROL OF BLACK FIELD CRICKETS

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Summary

During the past few years, because of the severe restrictions placed on the use of dieldrin, except in granulated form, many alternative chemicals have been evaluated in the field for the control of black field crickets (*Teleogryllus commodus*). In the main, these have been applied in a bait form, but some, such as carbaryl and the newer coded carbamates, have been used as wettable powder formulations.

Carbaryl was disappointing in the control of black field crickets despite being recommended and used overseas for the control of locusts. Emulsifiable concentrates of malathion and diazinon gave too short a control. The best results till recently were obtained with heptachlor baits, its use for black field cricket control being determined by permit and withholding periods. However, present work indicates a high degree of residual control using diazinon baits based on kibbled corn. The paper therefore deals with field evaluation of diazinon compared with other chemicals.

INTRODUCTION

THE black field cricket (*Teleogryllus commodus*) seems to have become an annual pest in much of the North Island pastures. Some years ago the cricket was regarded as a problem principally associated with dry summer conditions occurring every second or third year. However, in the northern districts of New Zealand, damage is occurring every year, especially on clay soils, increasing to epidemic proportions under extremes of dry weather when the cracks developing in the soil provide good sheltering places.

THE PROBLEM

The black field cricket attacks desirable pastures of grass species which cannot be replaced until the epidemic is over and the insect has been killed or dies naturally in the late autumn. Soon after, winter is upon the area and it is then too late to establish satisfactory pasture on these soil types. On the dairy farms of the Hauraki Plains, butterfat production may be seriously affected. Butterfat can be reduced by up to 30 to 40% because of lost pasture production.

The black field crickets winter in the egg stage, hatching out during October-November into small nymphs with undeveloped wings. They grow with each moulting until they reach maturity in the late summer. Because of the lush feed and pasture growth, small nymphs are usually not seen in spring and early summer. Not until they are fully grown and the pasture round the cracks becomes bare is attention drawn to them. A more detailed description of the life-cycle of the black field cricket is given by Cottier

in Atkinson *et al.* (1956). Under plague conditions bird populations seems to increase in the area, but these appear to be of little consequence in reducing major outbreaks. Under heavy infestation the pasture becomes bare and all grasses except the tough perennials such as *Paspalum* (*Paspalum dilatatum*) are destroyed. Ryegrass (*Lolium* spp.) is particularly susceptible.

CONTROL

Until the introduction of the Agricultural Chemicals Regulations (Insecticides) 1961, the main form of control was by poison baits. These were usually based on an attractant bait of bran, sawdust and molasses with a chlorinated hydrocarbon such as DDT or lindane. The bait was applied through such equipment as bulk top-dressers or fertilizer spreaders. Later dieldrin at 4 oz (all rates in active ingredient per acre) as an emulsifiable concentrate was sprayed on the pasture. The powerful residual action of dieldrin in foliage resulted in pasture contamination, necessitating the gazetting of long withholding periods from time of application to grazing of stock. Because of this, dieldrin had to be replaced with compounds non-residual in body tissue.

Using heptachlor as a standard, a series of trials has been conducted from 1962. Insecticides incorporated in bran, sawdust baits and as sprays have been used. The insecticides were:

- (1) The carbamate group:
Carbaryl.
"Zectran".
UC10854.
UC16888.
- (2) Organophosphates:
Diazinon
Malathion

METHODS

In order to evaluate the insecticides critically, trials were based on 1/50th of an acre plots. Materials were applied with an Oxford sprayer, a Cyclone seed spreader, and by hand. To assess the effect on the insects, two empty sugar sacks per plot were laid following treatment and left overnight. Because of their shy nature and hiding habits, the black field crickets were attracted to the sacks. The following morning the number of dead, moribund or live crickets could be counted on lifting the sacks. A wooden frame curtained at the base with scrim prevented crickets escaping on uneven ground. The frame was dropped round the sack, which was then gently rolled back from the front. The pressure behind the roll contained black field crickets yet to be counted.

RESULTS 1962-3

TRIAL 1: WAIMATE COUNTY, NORTHLAND

The black field crickets were fairly evenly distributed over the one acre trial block and were present principally as adults in the early flight stage. Final assessment showed that the baits were the only form to give any practical control of the crickets. Of these, the heptachlor bait was outstanding in the control obtained and was significantly superior to any other treatment. The two new carbamates, "Zectran" and UC10854, appeared to warrant further testing in later trials.

TRIAL 2: LAID NORTHLAND

Again heptachlor bran bait was the most completely effective treatment. It appeared quite obvious from these two trials that the straight sawdust baits were quite unattractive to black field crickets even though formulated with molasses. It was decided that for future work only pure bran baits or impregnated bran baits diluted with sawdust for greater economy should be considered. In his trial it was found that "Zectran" and UC10854 were almost ineffective and did not warrant further testing. Trials 1 and 2 were duplicated on the Hauraki Plains. Heptachlor bran baits were found to be definitely superior in residual control to the other tested chemicals.

A desire for a low residue type of insecticide resulted in the use of from $\frac{3}{4}$ to $1\frac{1}{2}$ lb active malathion per acre. This treatment, however, gave control of only up to 7 days, allowing heavy reinfestation of the treated zone. Malathion wheat bait containing 1.25% active ingredient per acre was introduced with a spreading rate of 10 lb per acre. It proved to be somewhat longer in its effect and reasonably satisfactory.

A new series of trials was programmed for early 1964 during the height of the black field cricket period, and it was decided to include a diazinon bait applied at from 4.8 oz to as low as 1.6 oz.

Diazinon was used in these trials in the form of a bait because it appeared to have two major advantages:

- (1) A long residual life as a pesticide on the pasture.
- (2) It would leave no residue in milk and meat of animals following ingestion of treated pastures.

The application of diazinon in the bait form was aimed at getting a maximum amount of the insecticide to the level of black field cricket feeding. Factors include the effect of wind and rain on freshly treated pastures. It is possible that, within the first few hours, some granules might remain at higher levels in the pasture and could be eaten by animals allowed to graze immediately after application. If this occurred, it could be clearly demonstrated that no residues would result either in milk, meat fat of cows, or the meat fat of sheep. A residue tolerance of 10 ppm has been granted in the United States for diazinon in various forage crops such as lucerne, bean forage and bean hay. Trials carried out prior to the presentation of the petition for this tolerance showed that residues in excess of 10 ppm in forage crops did not produce residues in milk or meat of cows fed such material.

Diazinon is being tested in New Zealand for the control of grass-grub (*Costelytra zealandica*) in a granulated form, which has the advantage of being granted a nil withholding period.

The bait in these trials was based on a maize grit produced by finely chopping maize kernels to a specific granule size on the surface of which the diazinon was incorporated.

RESULTS 1964

TRIAL 1

Diazinon bait was applied at 10 lb to a 10-acre block. The affected area was a ryegrass, browntop (*Agrostis tenuis*), paspalum, white clover (*Trifolium repens*) zone in a very dry and cracked condition, and black field crickets present would be about the sixth and seventh instar. All baits were applied with a metric spinner mounted on a tractor and the sprays with a normal type sprayer equipment. The assessment showed that all baits had given effective control and that initially the diazinon and dieldrin baits were comparable

in residual control. Further evaluation some weeks after initial treatment showed diazinon baits to be well ahead of dieldrin. The same trial was duplicated at Kaiwaka, North Auckland, and the results were as in Trial 1.

TRIAL 3

The black field cricket population in this trial was not in a plague proportion but obvious enough to cause reduction in rye-grass and clover populations. The pasture was mainly of English grasses and some paspalum—second year pasture. One acre trial blocks were treated respectively with 7.5 lb (2.4 oz a.i. of diazinon) and 5 lb of diazinon bait (1.6 oz a.i. of diazinon).

Plots 7.5 Diazinon Bait

After two weeks these plots showed excellent control, with little difference from the previous trial using 10 lb. Black field crickets were noticed to be dying even though the grass was short.

Plots 5 lb Diazinon Bait

There were some live crickets apparent, although the population was considerably reduced. This low rate was nowhere near that of the plots treated with 7.5 lb of diazinon bait.

CONCLUSIONS

It appeared from all these trials in which diazinon bait was included that control comparable with or in many cases superior to dieldrin type bait was experienced with applications from 7.5 to 10 lb, that is, 2.4 oz to 3.2 oz a.i. From the coverage point, 10 lb of diazinon bait would be more desirable than the 7.5 lb, the quantity recommended being related to the type of equipment available to the user. It was interesting to note in these trials that birds attacked malathion wheat bait, but did not touch the diazinon baits. It appears that diazinon baits could have a possible repellency effect.

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REFERENCE

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