CHEMICAL CONTROL OF PASTURE PESTS ON THE WEST COAST

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Summary

Trials laid down in the Maruia Valley and Reefton district of the West Coast of the South Island showed that fenitrothion, diazinon and trichlorfon at 1.1 kg/ha, applied in late July, caused a significant reduction in the spring porina caterpillar (*Wiseana* spp.) population. Ethoprophos at 2.2 kg/ha was the only organophosphate tested which was effective against grass grub (*Costelytra zealandica*). It was considered that the effectiveness of all chemicals tested was reduced because of natural mortalities and unfavourable soil conditions.

INTRODUCTION

Chemical control of pasture pests has been well documented in Canterbury, but very little work on this topic has been carried out on the West Coast of the South Island. The climatic and soil conditions of this region are quite different from those of Canterbury, e.g. rainfall is generally much higher and the soils more leached and acid (Webb pers. comm.). A series of trials was therefore laid down in the Maruia and Reefton districts of the West Coast, to test the effectiveness of chemical control procedures developed elsewhere.

In recent years extensive pasture damage has been observed in the Reefton district (mainly caused by grass grub (*Costelytra zealandica*)) and the Maruia Valley (mainly caused by porina caterpillar (*Wiseana* spp.)). Damage at Maruia was mainly to late winter and spring pasture and appeared to be caused by porina caterpillars originating from summer-flying moths. Failures had regularly been observed in this area with March applications of insecticides for porina control and examination revealed that the caterpillars present in June were small and mostly still surface dwellers. It was therefore decided to experiment with a late winter application of insecticide in order to reduce pasture damage in spring, the "pinch" feed period.

METHODS

The 1971 porina trial was located on Mr J. Hunter's property in the Maruia Valley on a Maimai silt loam soil type. The other trials were all located on Mr H. van Beek's property at Cronadun near Reefton on an Okarito peaty silt loam.

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The 3.6 m x 5.5 m plots of the first two trials were treated on 1 July 1971. The treatments (2 replications) are shown in Tables 1 and 2. The granules were applied evenly by hand-shaker using sieved sand as a carrier. The emulsion was applied by knap-sack sprayer. The trial was sampled on 1 July 1971 to assess the pre-treatment population density and again on 1 September 1971 to assess treatment effects. On both occasions 15 randomly located 0.023 m² spade-square samples were taken from every plot, each sample dug to a depth of about .02 m or down to the clay sub-soil and hand sorted in the field.

TABLE 1: PORINA TRIAL
1971, MARUIA VALLEY

<i>Treatment kg/ha</i> 1.7.71	<i>Larval No./</i> <i>m² at 1.9.71</i>
control	112 a
diazinon EC 1.1	21 b
diazinon G 1.1	17 b
trichlorfon G 1.1	26 b
fenitrothion G 1.1	13 b
CV %	
natural mortality 1.7.71 to 1.9.71	
= 17%.	

EC = emulsifiable concentrate.
CV % on transformed data.

TABLE 2: GRASS GRUB TRIAL
1971, REEFTON

<i>Treatment kg/ha</i> 1.7.71	<i>Larval No./</i> <i>m² at 1.9.71</i>
control	138 a
diazinon G 1.1	82 a
diazinon G 2.2	128 a
trichlorfon G 1.1	91 a
trichlorfon G 2.2	61 a
CV %	13
natural mortality 1.7.71 to 1.9.71	
= 21%.	

G = granules.

The third trial (Table 3) was laid down in 1972 on a mixed population of both grass grub and porina. Pre-treatment sampling of the 3.6 m x 3.6 m plots was carried out (for grass grub only) on 18 May 1972. The treatments (3 replications) were applied the same day using the hand-shaker method. A cross treatment of 250 and 500 kg/ha of lime was applied on 19 April 1972 to determine whether the action of trichlorfon could be enhanced by altering soil pH (Osborne pers. comm.). Under a pH of about 7 trichlorfon breaks down more rapidly to form the more toxic but less persistent compound dichlorvos. The post-treatment sampling was carried out for both grass grub and porina in the manner described above on 8 August 1972.

RESULTS AND DISCUSSION

The results are shown in Tables 1 to 3. Analysis of pre-treatment counts showed there was no significant difference between plot means for all populations within each trial. A common pre-treatment mean was used for each trial in order to estimate levels of natural mortality between pre- and post-treatment counts.

All chemicals tested against porina significantly reduced the population. There was no significant difference between materials. Work in Canterbury and elsewhere by Taylor (1966), MacLean (1968) and Waller (1968) has shown that fenitrothion generally appears to be the best chemical for porina control. The maximum larval mortality possible due to treatment with short-lived organophosphate insecticides is unlikely to be more than about 60 to 80%, since it has been shown by French (1973) and Esson (1970) that about 25% of a population of porina caterpillars remain underground for periods ranging from 3 to 14 days. This is probably due to moulting, feeding cycles and weather conditions.

We observed that many farms in the trial areas were relatively understocked and therefore suggest that the economics of insecticide use to control porina should be carefully considered in relation to each farm.

Grass Grub and Black Beetle

Depending upon the cost of seed relative to the cost of insecticide, over-sowing of any damaged areas followed by controlled grazing may be all that is required to restore the pasture composition, as is the case in some parts of Canterbury (French 1973).

The grass grub trials showed that ethoprophos applied at 2.2 kg/ha was the only material which gave a significant reduction in the grass grub population. This effect was compounded by a high natural mortality. The real effect of the chemical caused only an extra 31% mortality above that which had occurred due to unidentified natural mortality factors. Other reasons for the relatively poor performance of all the chemicals in the trial could have been

1. A high percentage of surface litter or soil organic matter binding the chemicals and preventing further penetration (Harris 1966).
2. A low soil pH (5.7) inhibiting the chemical activity.
3. A high larval mortality which could have influenced larval feeding and movement.

The addition of 500 kg of lime/ha raised the pH to 6.5 and should have increased the proportion of dichlorvos generated from the trichlorfon (Osborne pers. comm.). Theoretically the overall effectiveness of trichlorfon should have been enhanced. In fact the data showed a negative but significant lime by treatment interaction. This could indicate that dichlorvos may have formed in excessive quantities and was rapidly dissipated before coming in contact with the larvae.

TABLE 3: GRASS GRUB AND PORINA TRIAL 1972, REEFTON

<i>Treatment kg/ha</i> 18.5.72	<i>Porina larval No./m²</i> at 8.8.72	<i>Grass grub larval No./m²</i> at 8.8.72
control	394 a	208 aA
trichlorfon G 1.1	117 b	227 aA
trichlorfon G 2.2	169 b	160 aA
diazinon G 1.1	95 b	164 aA
diazinon G 2.2	91 b	182 aA
lindane G 2.2	43 b	156 aA
ethoprophos G 2.2	48 b	48 bB
CV %	26	

Natural mortality of grass grub 18.5.72 to 8.8.72 = 59%.
CV % on transformed data.

From the limited data presented in Table 3 ethoprophos at 2.2 kg/ha is the only chemical of the organophosphates tested which should be recommended for grass grub control on this soil type. It is suggested that the most economical way of using this chemical is early spot treatment of damaged areas, as this reduces the overall cost per hectare (Kain and Atkinson 1970). In spite of the poor results from lindane in this trial, visual inspection of the plots in 1973 revealed a pasture response to lindane in the year following treatment. Paddock scale applications of lindane in the area have confirmed that lindane successfully controls grass grub on this soil type.

CONCLUSIONS

Fenitrothion, diazinon and trichlorfon applied at 1.1 kg/ha were all found to be suitable for porina control. For larval populations derived from summer-flying moths, it is recommended that treatment be carried out in late August to mid-September just prior to rain if granules are used. Ethoprophos was the only material to give significant control of grass grub in these trials.

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