CONTROL OF GRASS GRUB IN OTAGO AND SOUTHLAND

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Summary

Spring and summer applications of fensulfothion or lindane at 2 kg/ha were found to be suitable for controlling grass grub (*Costelytra zealandica*) in Otago and Southland containing both one and two year life cycle populations.

INTRODUCTION

No published work on control of grass grub (*Costelytra zealandica*) has related to populations with a two year life cycle. Such populations are common in Otago and Southland. This paper is a summarised account of effectiveness and optimum application times of insecticides for the control of two year grubs. A full account will be published elsewhere (Stewart 1975).

MATERIALS AND METHODS

Diazinon 10% and lindane 20% calcite granules, fensulfothion 10% attapulgit and ethoprophos 10% Scorbie granules were applied using a hand shaker to 2 m x 30 m plots of pasture at 2 kg/ha. At each of three sites there were five replicates and six application times (between spring 1973 and autumn 1974) for each insecticide. Assessment was by counts of larvae in May 1974 and 1975.

RESULTS AND DISCUSSION

Development of Larvae

Fig. 1 shows diagrammatically the most common situation where grubs with a two year life cycle are found in Otago and Southland. In spring two distinct populations are present, one of mature pre-pupal grubs (A) and the other of small grubs which have overwintered as second instars (B). The small grubs change into third instars and grow rapidly till late summer. Large grubs (A) pupate in October and November giving rise successively to beetles, eggs and larvae. With favourable environmental conditions most of these larvae will develop without check to pupate in the following spring (C—one year cycle). Under unfavourable conditions most larvae will remain as small second instar through winter and pupation occurs next spring (D—two year cycle). In most areas grubs of both cycles are found in association.

Chemical Control

Assessments of all treatments were made in May 1974 so that intervals between treatment applications and assessment varied, the minimum time being seven weeks. At the time of assessment grubs were of three types: 1. Small second instars (Fig. 1,D); 2. Large grey third instars (Fig. 1,C); 3. Large white (fat) third instars (Fig. 1,B).

Grubs of C were distinguishable from B by their colouration. Since populations C and D came from the same stock (Fig. 1,A) data on both are summed in Table 1.

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TABLE 1: PERCENT CONTROL OF GRASS GRUB BY INSECTICIDES AT THREE SITES

Month of application 1973-74 and population											
Assessment	September		October		December		January		February		March
Treatment	C+D*	B*	C+D	B	C+D	B	C+D	B	C+D	B	C+D B
First season (May 1974)											
control**	141	46	174	36	145	25	161	32	134	23	80 34
diazinon	0	20	0	19	24	24	12	12	31	0	32 0
ethoprophos	0	20	0	17	35	32	54	47	52	26	59 24
fensulfothion	61	78	58	67	82	64	77	69	58	78	72 24
lindane	50	54	37	44	49	0	62	22	20	0	24 35
Second season (May 1975)											
control**	95		110		112		98		61		160
fensulfothion	6		27		61		48		23		46
lindane	55		55		48		32		18		69
Mean rainfall (mm)											
first week after application	21.8		37.1		22.5		3.8		17.7		19.7

* See Fig. 1.

** Mean number grubs per 0.5 m².

The first two treatment applications (September and October) were made when inactive large grubs (Fig. 1,A) and small growing grubs (Fig. 1,B) were present. Emergence trapping of beetles originating from large grubs showed no treatment effects. Therefore, neither prepupal larvae nor pupae or beetles had been affected.

Table 1 shows the residual effects on larvae which did not appear until January (Population A). Diazinon and ethoprophos showed no residual action whereas fensulfothion and lindane did (fensulfothion 58-61%, lindane 37-50%). Thus residual activity of fensulfothion must have been at least eight weeks. September and October applications of diazinon and ethoprophos gave some control of small growing grubs (B) (19-20% and 17-20% respectively). Lindane and fensulfothion again performed better (44-54% and 67-78% respectively).

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In remaining treatment applications (December to March) diazinon exerted poor control over larvae of B (two year) and A,C,D (one year + two year). Ethoprophos and lindane gave better results and fensulfothion the best. Low soil moisture may have been responsible for the poor results with diazinon and ethoprophos, although in most applications at all sites more than 12 mm of rain fell within the week after application. Control by all chemicals tended to diminish as larvae of B neared maturity, particularly in March, whereas control of younger larvae C and D remained more constant (Table 1). This was probably related to activity of larvae. Inactive second instars (D) were nearly always less affected than active third instars (C).

Sampling in May 1975 showed that the effects of fensulfothion persisted into the second year (Table 1). Control by lindane generally improved in the second season. Although control by lindane was less in the first season, pasture responses in the first season approached those of fensulfothion.

In conclusion, fensulfothion and lindane are both suitable for two year cycle situations. Spring applications by drilling would be possible to give early action. Diazinon and ethoprophos cannot be recommended except for higher rainfall areas. Short-lived organophosphates are ineffective against inactive grubs.

REFERENCE

- Stewart, K. M., 1975. Chemical control of one and two year life cycle grass grub (*Costelytra zealandica* White). (In preparation.)