CONTROL OF GRASS GRUB WITH LINDANE, DIAZINON AND FENSULFOTHION

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Summary

Forty-one trials are reported in which lindane, diazinon and fensulfothion were broadcast on pasture to control grass grub (*Costelytra zealandica*). Lindane at 2 lb a.i./acre acted slowly, especially in the North Island, but gave consistent results. Diazinon at 2 lb a.i./acre gave control similar to fensulfothion at 1 lb a.i./acre. Control with these chemicals was variable. Good pasture responses were obtained in many trials even when grass grub numbers were not greatly reduced.

INTRODUCTION

TRIALS assessed in 1967 and trials with lindane assessed in 1968 are described. Only those with enough grass grub in the control plots to give definite information are reported.

Trials were spread through both Islands to cover a variety of soil and climate. The Blenheim and Canterbury trials were on light alluvial soil, those at Wanganui and Kimbolton on sedimentary soil overlaid by volcanic dust.

Most trials were done where grass grub showed some resistance to DDT. Porina (*Wiseana* spp.) caterpillars occurred in important numbers in Trials 25 and 32 only.

Trials were laid down without regard to the chance of rain following. Results obtained should, therefore, represent those obtained by farmers treating at a time of their convenience. Better control from diazinon and fensulfothion may have been obtained if treatment had been done only when heavy rain was expected. Rain falling on the trials in 1967 was considered typical for the districts where trials were done.

MATERIALS AND METHODS

The following materials were used (all rates in lb a.i./acre):

- (1) Lindane prills 20% a.i. by weight on marble core, commercial product of Farm Chemicals Company: at 1-2 lb.
- (2) Diazinon prills 5% a.i. by weight on marble core, commercial product of Farm Chemicals Company: at 2 lb.
- (3) Fensulfothion granules 5% a.i. by weight supplied by Henry H. York & Co. Ltd.: at 1 lb.

Pasture was assessed on a subjective but rigid scale, 10 representing high-producing pasture of good composition and 0 bare ground. In many

trials individual plot scores would range from about 4 to 7. A difference of one unit on this scale is obvious, and in high-producing pasture would account for a large absolute difference in pasture production.

RESULTS AND DISCUSSION

Results are listed in Table 1.

LINDANE

Trials 15, 33, 36 and 37 were done to find out when lindane should be applied. In Trial 15, the second application was made soon after the first because heavy rain followed the earlier treatment. These four trials show clearly the advantage of early treatment. The trend of results from other trials strongly supports this conclusion.

On the Canterbury Plains it would be possible to sample ground for grass grub in early February, to apply lindane to those areas found heavily infested, and still obtain useful control. Trial 37, however, suggests that best control may follow application as early as December in Canterbury. Since January and early February is a busy time on cropping farms, and rainfall then is often scarce, this is perhaps not a time when application is likely to be made. The choice probably is between an early treatment from October to December or a later treatment following a digging inspection or first signs of caterpillar damage in late February. This later treatment period is likely to give control of grass grub inferior to a treatment before Christmas.

In the North Island, on the other hand, it appears not possible to get useful control of grass grub if treatment with lindane is delayed until grub damage has begun to show or spade sampling can be done. Lindane applied in the North Island in March or April gave such poor results in Trials 3, 4, 5, 7 and 17 that there is little hope of getting a satisfactory result from lindane applied after Christmas. This last season, Trials 15, 18, 20 and 21 have demonstrated good control from lindane applied at 2 lb in November. Significantly poorer control from the later of the two applications in Trial 15 suggests that, if application had been further delayed into December or January, the control would have been poor.

In the North Island, not less than 2 lb of lindane should be used because control of grass grub from this rate is no faster and no more complete than necessary. In the South Island, 1 lb has been suggested following success in trials. This rate of lindane gave pleasing results in Trial 39, but gave control distinctly inferior to 2 lb in Trial 37.

Control of grass grub from lindane has been as good the second season as the first. Applications made in Trials 7, 12 and 14, too late to control grass grub the first season, have succeeded the second season. It is still not known whether earlier application of lindane to secure better control the first season will render control poorer in the second season.

In trials in 1967, lindane gave a pasture response often greater than can be accounted for by reduction in grass grub numbers. Lindane, like DDT, appears to inhibit feeding of grass grubs.

DIAZINON AND FENSULFOTHION

Table 1 indicates a similar performance from diazinon at 2 lb and fensulfathion at 1 lb. It is not known whether a coated granule of fensulfathion would have done better against grass grub. Porina caterpillars are not well controlled by absorbed granules of fensulfathion at

TABLE 1: TRIALS WITH LINDANE, DIAZINON AND FENSULFOTHION

Trial and Location	Treated	Assessed	Untreated			Lindane			Diazinon 2lb			Fensulfothion 1lb		
			No. Grubs	Pasture Rating	Rate (lb)	No. Grubs	Pasture Rating	Rate (lb)	No. Grubs	Pasture Rating	Rate (lb)	No. Grubs	Pasture Rating	Rate (lb)
1. Matamata	17/4/67	29/7/67	5	7.1	2	4	7.0	5	6.7	3*	6.6	3*	6.6	
2. Mangakino	3/5/67	26/7/67	38	5.2	2	36	6.0	29*	6.3	28**	6.4*	28**	6.4*	
3. Inglewood	6/4/67	30/5/67		6.5	2		7.0		7.3					
		1/4/68		6.4			6.9		6.3					
4. "	6/4/67	14/7/67	17	6.0	2	21	6.5	15	6.8					
5. Okato	11/4/67	12/7/67	17	6.0	2	18	6.2	15	7.2*	16	6.9	16	6.9	
6. Eltham	13/4/67	13/7/67		6.4					6.4					
7. "	12/4/67	13/7/67	18	5.6	2	15	6.0	11**	6.1	11*	6.3	11*	6.3	
		30/4/68		2.0			4.7**		2.5		2.6		2.6	
8. Wanganui	31/3/67	28/6/67	6	7.7	2	4	7.3	6	8.0	5	8.7	5	8.7	
9. "	15/5/67	20/7/67	8	6.8	2	7	7.5	7	6.7	9	7.0	9	7.0	
10. Taihape	20/11/67	30/4/68		6.4	2		7.8							
11. Kimbolton	3/3/67	28/6/67	30	4.9	2	25	6.2*	25	6.7**	15*	7.0**	15*	7.0**	
		2/4/68		3.9			4.2		3.3		4.0		4.0	
12. "	22/3/67	28/6/67	28		2	21								
		22/5/68		4.1			6.0**							
13. "	22/3/67	28/6/67	20					5**						
14. "	22/3/67	28/6/67			2	12	7.1	9	5.3	11	5.5	11	5.5	
		22/5/68		3.8	2		6.3**							
15. "	8/11/67	22/5/68					5.4**							
	24/11/67						6.0**							
16. Kimbolton	24/11/67	22/5/68		4.4	2			14**	6.3*	14**	5.8*	14**	5.8*	
17. Takapau	29/3/67	19/6/67	27	4.2	2	24	2.8							
18. "	9/11/67	23/5/68		4.8	2		6.1**							
19. "	23/11/67	23/5/68		6.2	2		6.8							

1 lb which was, therefore, at a disadvantage in the comparison of Trial 25.

Control of grass grub with both diazinon and fensulfothion has been variable. The importance of rainfall is demonstrated in Trials 34 and 35 on adjacent ground on the north bank of the Rangitata River. Grass grub numbers were reduced by diazinon by 96% in the one trial, but only 30% in the trial laid down 3 weeks later. In the one trial, pasture response was striking, in the other, not visible.

Alluvial soils in the South Island appear to allow good grass grub control with diazinon or fensulfothion when rainfall is favourable, in contrast with many North Island soils which do not respond so well. In the Mangakino trial on raw pumice, only 30% of the caterpillars were killed although they were very shallow and rain after application was very heavy.

There was no measurable control in the Wanganui trials. About 0.1 in. of rain fell shortly after application but none for another 3 weeks. The grass grubs were deep.

Grass grub control from applications of diazinon or fensulfothion in May was disappointing considering the abundant rainfall. It is probable that grass grubs are better able to tolerate these chemicals as they grow older; also too much pasture damage had occurred by May to be quickly repaired even if most of the caterpillars were killed. It would be better, where this is possible, to apply diazinon or fensulfothion in an earlier month just before heavy rain. The best control has been obtained from diazinon applied in March on dry ground. In Trial 22 at Rapaura, Blenheim, grass grub numbers were reduced by 98% under these conditions.

Some information on time of application and soil moisture is provided in Tables 2 and 3. These do not provide strict comparisons because trials done in different districts have been brought together.

TABLE 2: PASTURE IMPROVEMENT IN ARBITRARY UNITS FROM DIAZINON OR FENSULFOTHION APPLIED IN STATED MONTH
(Average for all Trials)

	<i>March</i>	<i>April</i>	<i>May</i>
diazinon 2 lb	1.2	0.7	0.7
fensulfothion 1 lb	1.1	0.7	0.7

TABLE 3: CONTROL OF GRASSGRUB WITH DIAZINON IN RELATION TO SOIL MOISTURE AT TIME OF APPLICATION
(Average for all Trials)

	<i>Dry</i>	<i>Medium</i>	<i>Wet</i>
No. of trials	9	9	11
Mean % reduction of grass grub numbers	61	26	48
Mean pasture response in arbitrary units	1.2	0.9	0.8

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