CLOVER CASE-BEARER MOTH CONTROL

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Summary

Treatment with chemicals toxic to clover case-bearer moth (*Coleophora* spp.) resulted in increased yield of white clover seed (*Trifolium repens*). The trial failed to distinguish between a variety of treatments in this respect. Residues of DDT on threshed straw lying in the field were highly persistent but had fallen to a low level on regrowth foliage after one month during which 4.1 in. of rain fell.

PAPERS by Dumbleton (1964), Proude (1965), Leonard (1965) and Allen (1965) have outlined the problem presented by the clover case-bearer (*Coleophora* spp.) in white clover (*Trifolium repens*) seed crops. They have shown that, provided the moth population can be reduced to a low level for a few days during the flowering period, worthwhile increases in seed yield can be obtained. Allen showed that the chances of success appeared to be improved by two applications of an effective chemical at about 10-days interval. Since two of the seven trials reported by the above authors failed to give significant increases in yield, a further trial was laid down last season.

EXPERIMENTAL

Some modification of the 1964-5 trials was made. The comparison of DDT and phenthoate at two times of application was retained and treatments comprising a repeat treatment of each of these chemicals at reduced rates was included to examine the possibility of economy of chemical. Trichlorphon was used as currently recommended.

Two replicates were laid down in each of two adjacent fields at Lincoln. One was a second-year and the other a third-year clover crop. Both had been sprayed for clover case-bearer control the previous year. Plots were two swathes of an 18 ft spray boom. The chemicals (DDT and phenthoate as emulsion concentrates and trichlorphon as a water-soluble powder) were applied after sunset on the dates and at the rates shown in Table 1. A pressure of 40 lb/sq.-in. and volume of 20 gal of mixture per acre were used. Moth counts were made before and after spraying. As in earlier trials wind and temperature conditions interfered with counting and delayed spraying.

Plots were cut on February 3 and undercut before threshing on February 11-12. The seed was machine dressed over riddles only.

At harvest, dust and straw were collected from the back of the header while threshing an untreated and a 1.0 lb DDT plot (all rates in active ingredient per acre) sprayed December 29. Subsequently regrowth foliage and weathered straw were collected from the same plots. These samples were analysed for DDT at Galloway Laboratory, Hamilton.

Rainfall recordings were taken (Table 2).

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TABLE 1: MOTH COUNTS AND YIELD, 1965-6 TRIAL

				Moths* on:			
Treatment (lb)				Dec. 22	Dec. 29	Jan. 3	Yield (lb/acre)
DDT 1.0:							
A†	.....	.....	.....	1.2 bB	7.2 bcC	8.5 abAB	353
A+B	.....	.....	.....	0.1 bB	4.5 cC	3.5 bcd B	368
B	.....	.....	.....	37.2 aA	54.2 aA	2.8 cdB	350
Phenthoate:							
A	.....	.....	.....	1.7 bB	9.5 bcC	5.5 bcdAB	347
A+B	.....	.....	.....	2.7 bB	13.2 bcC	1.5 dB	367
B	.....	.....	.....	36.7 aA	44.0 aAB	2.0 dB	368
DDT 0.5:							
A+B	.....	.....	.....	2.0 bB	10.0 bcC	4.0 bcdB	367
Phenthoate 0.94:							
A+B	.....	.....	.....	4.7 bB	23.5 bcC	3.0 cdB	367
Trichlorphon:							
A+B	.....	.....	.....	28.7 aA	59.0 aA	7.8 abcAB	358
Unsprayed	.....	.....	.....	34.3 aA	54.7 aA	12.5 aA	299
CV	.....	.....	.....	21%	23%	39%	8%

* Moths per 20 sweeps. Means of two counts per plot. Pre-treatment count on December 17, 1965 = 47.8.

† "A" sprayed December 17, 1965. "B" sprayed December 29, 1965.

TABLE 2: RAINFALL FROM TREATMENT TO TIME OF DDT SAMPLING

December Date	Points	January Date	Points	February Date	Points	March Date	Points
30	23	3	33	20	83	3	50
		6	20	23	90	4	146
		7	50	25	18	11	20
		10	30	28	3		
		24	69				
		25	49				
	23		251		194		216

Total for period: 6.84in.

TABLE 3: DDT RESIDUES (ppm DRY MATTER)

	Not Treated	Sprayed 1.0 lb DDT Dec. 29
From header Feb. 11:		
Dust	0.7	36.8
Straw	0.6	30.0
Straw from field Mar. 12	0.5	19.0
Regrowth clover Mar. 12:		
Not cut since harvest	0.1	0.2
Cut once since harvest	0.1	0.8

RESULTS

Moth counts (Table 1) followed the pattern of the previous trials (Allen, 1965), with DDT and phenthoate similar in performance in terms of knockdown (though DDT gave more zero counts) and persistence of population depression. Trichlorphon was again transient in effect, the population having returned to untreated level after five days. However, a count started one day after time "A" and not completed because of a change in weather showed an initial knockdown similar to DDT and phenthoate.

Analysis of machine-dressed yields showed no significant difference between treatments. However, treated versus untreated proved significant at the 5% level, giving a 61 lb per acre advantage to treated. The trial thus adds support to the thesis that reduction of the clover moth population to zero at some time during flowering will result in an increase in seed yield. The relatively poor yield response (in value approximately twice the cost of treatment) was probably due to the lateness of initial treatment in relation to the build up of the moth population.

At the time of laying down the trial, it seemed possible that phenthoate might be "safe" to bees in a similar manner to DDT. Subsequently Clinch *et al.* (1966) proved this incorrect and showed that phenthoate application to flowering clover is too toxic to bees. This leaves trichlorphon and DDT as candidate materials in this respect.

Following from the DDT analyses (Table 3), the possibility of contamination of nearby pasture by dust when heading DDT sprayed crops in windy conditions should be noted.

The long persistence of DDT on the straw, despite almost 7 in. of rain between spraying and sampling and including six falls of 50 or more points, lends support to the current requirement to plough DDT-sprayed clover fields after harvest.

The figures for regrowth analyses are of interest in view of Matthews' (1965) suggestion that levels of 1 ppm for dairy cows and 5 ppm for sheep may represent "safe" intake levels. Because of the apparent effectiveness of two 0.5 lb applications of DDT, this low residue of the 1.0 lb treatment on foliage and failure of residue-laden dust to give persistent re-contamination under the conditions prevailing this season, it may be worth investigating the feasibility of destroying residue-retentive straw after harvest.

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