CHEMICAL CONTROL OF CLOVER CASE-BEARER MOTH

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Summary

The trial reported is the second in a series to find a satisfactory alternative insecticide to the organochlorine group for the control of clover case-bearer moth (*Coleophora* spp.). Two materials were used in the experiment, trichlorphon and S4400, and applied during flowering. The results were assessed on the control of moths and significant yield increases. No assessment of larvae control was made although 100 mature clover heads were collected from each replicate on January 30, 1966. The seed from these 100 heads was rubbed out, sieved and weighed.

INTRODUCTION

THE TRIAL was carried out to confirm last season's preliminary work (Proude, 1965) with trichlorphon, and to obtain information on the new insecticide S4400.

Whenever possible, the same procedure used in the previous season's trials were adhered to. The first was to be applied to clover when the moth count reached an average of more than 10 moths per 20 sweeps (or 20-pace drag) of a 12 in. diameter nylon net. This season, to suit the size and number of replicates, a series of 5×10 sweeps per replicate was used.

Spraying also coincided with the peak of flowering, with the thought that it would be from these flowers that the farmer would actually harvest his seed.

The trial was severely affected by a 5° frost on December 28 at the time when normally a second spray would have been considered applicable. The frost desiccated the bulk of flowers, reducing seed set, and making the flowers unattractive to the moths.

METHOD AND MATERIALS

LOCATION

The trial was located at Leeston on the same property as the 1965 trials. The paddock was a first-year paddock being entered for Mother seed certification.

CLIMATIC CONDITIONS

The climatic conditions were such that abundant vegetation was produced at 5° frost on December 28, 1965, which would be considered unseasonal.

MATERIALS USED

Two applications were made of trichlorphon 1 lb and S4400 $\frac{1}{2}$ lb ingredient per acre).

METHOD OF APPLICATION

Three replicates of an area 36 ft $\times$ 150 ft were sprayed for treatment with a motorized spray unit with a 7 ft boom. Water only

was applied to the control. The second spray was applied to provide additional information concerning the kill of moths, and in addition to the insecticide a mixture of diquat and paraquat was added as a harvest aid. Spraying was carried out in the evening in winds under 5 m.p.h. and temperatures not below 50°F.

SAMPLING METHODS USED

Moth counts were taken before and at various intervals after spraying (see Table 1 and Fig. 1).

TABLE 1: MEAN COUNTS OF ADULT MOTHS PER 10 SWEEPS*

Date	Trichlor- phon 1 lb	S4400 ½ lb	Untreated	Least Difference for Significance	
				5%	1%
22.12.65	Av. of 10 × 10 sweeps 24.40				
	<i>First treatment applied (evening)</i>				
23.12.65	 0.40 bB	0.33 bB	13.40 aA	0.51	0.84
24.12.65	 0.80 bB	0.13 bB	13.13 aA	1.16	1.92
26.12.65	 2.80 cB	4.40 bB	17.07 aA	0.72	1.20
27.12.65	 5.93 bB	4.93 bB	21.80 aA	1.05	1.75
28.12.65	 Frost 5°F				
30.12.65	 3.00 bAB	1.33 cB	5.80 aA	0.93	1.54
31.12.65	 3.60 a	3.07 a	6.13 a	1.83	3.03
5.1.66	 0.67 a	0.27 a	0.40 a	0.74	1.22
12.1.66	 8.53 a	7.33 a	7.47 a	1.17	1.94
27.1.66	 25.20 a	24.40 a	23.73 a	3.75	6.21
	<i>Second spray applied (evening)</i>				
0.73 bB	1.07 bB	28.1.66	 15.80 aA	0.80	1.32
1.80 bB	1.33 bB	29.1.66	 16.20 aA	1.29	2.14
1.40 bB	2.33 bB	30.1.66	 8.87 aA	1.26	2.09

100 heads collected on 30.1.66. Dried in calico bags.

* Counts were transformed ($\sqrt{n + 0.5}$) before statistical analysis.

In this trial no attempt was made to estimate the control of larvae, but 100 mature clover heads were collected from each replicate on January 30, 1966, and the seed obtained (by rubbing between the hands then sieving) was weighed (see Table 2).

TABLE 2: GRAM WEIGHTS OF SEED PER 100 HEADS, JANUARY 1, 1966

S4400 ½ lb		2.85 bA
Trichlorphon 1 lb		3.12 aA
Untreated		2.15 cB

HARVEST

The crop was harvested on February 5 and 6, 1966, using a header fitted for clover seed harvesting. The seed from each replicate was harvested and weighed separately. For ease of handling the seed from the three replicates was then bulked together and machine dressed by the Crop Research Division, D.S.I.R., Lincoln (see Table 3).

Fig. 1: Effect of treatments on moth numbers.

TABLE 3: HARVESTED YIELDS FROM 36 ft × 150 ft (5,400 sq. ft)

	S4400 ½ lb	Trichlor- phon 1 lb	Untreated	Least Difference for Significance	
				5%	1%
Header dressed weights (lb)	22.0 aA	19.0 aAB	14.0 bB	3.8	6.2
Final machine dressed weights (lb)	6.8	7.2	6.2		
% Seed lost from header to machine dressed	68.9	61.8	56.0		
% Increase over con- trol	10	16	—		
Yield per acre (lb)	177 aA	153 aAB	113 bB	31	51

DISCUSSION

The figures presented in the moth count table show that trichlorphon and S4400 are highly effective in controlling adult case-bearer moths. In individual determination after sprays, both materials gave a high proportion of zero counts 2 to 3 days after treatment.

As far as yield increase is concerned, the season 1965-6 was not particularly favourable for clover case-bearer moth trials. At about the time when the second spray was considered, an unseasonal frost (5°F) caused severe damage to flowers and immature seed sets and moth counts also fell from 21.8 recorded on December 27 to 5.8 on December 30 and near to zero on January 5.

The slight increase in yield of the two treated areas over control can only be explained as the result of the first spray applied on December 22 reducing the case-bearer moth damage on the first seed sets. This is substantiated by earlier reports that insecticides with a good knock-down effect of moths applied during the peak flowering period of white clover and when moth counts are in excess of 10 moths per 20 sweeps will result in an appreciable yield increase.

CONCLUSION

Trichlorphon, which has proved to be safe to field bees (Palmer-Jones, 1963) and which can be applied to fodder crops close to harvest, appears a suitable alternative to organochlorine insecticides against this pest of clover seed production.

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REFERENCES

- Proude, C. K., 1965: *Proc. 18th N.Z. Weed & Pest Control Conf.*: 179.
Palmer-Jones, T., 1963: *J. Agric. Res.*, 6 (3): 303.