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ONCOPERA BRACHYPHYLLA TURNER AND ONCOPERA MITOCERA (TURNER) INSECTICIDE CONTROL TRIALS

1964–1966

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SUMMARY

Results are reported for 10 insecticide formulations used in screening trials against two major pests of pasture on the Tablelands of north Queensland namely *Oncopera brachyphylla* Turner and *Oncopera mitocera* (Turner) (Lepidoptera; Hepialidae). Efficacious materials were parathion-ethyl, chlorfenvinphos, trichlorphlon, diazinon, and DDT.

I. INTRODUCTION

The flat-headed pasture webworm (*Oncopera mitocera* (Turner)) and the round-headed pasture webworm (*Oncopera brachyphylla* Turner) have been recorded as pests of pasture on the northern tablelands of Queensland for at least 50 years (Elder 1965). The two species have an annual life cycle with early instar caterpillars first appearing in the field in February-March. These grow throughout the year and, by the beginning of the dry season (August), the larvae have reached a stage where they may cause serious damage.

The damage caused by *O. brachyphylla* increases seasonally until November-December, and that caused by *O. mitocera* until February (Quinlan, Elder and Shaw 1972; Elder 1971).

Quinlan, Elder and Shaw (1972) indicated that, where feed on dairy farms was limiting and hay costs \$34/tonne, control of webworm populations of $16/m^2$ and above was economically sound provided spray applications were made in early September. The initial insecticide studies upon which that investigation was based are discussed in the present paper.

Five trials were undertaken during 1964 to 1966 to evaluate insecticides for the control of *O. brachyphylla* and *O. mitocera* larvae.

II. MATERIALS AND METHODS

The insecticides used are listed in Table 1, together with the type of formulation, percentage of active constituents in the concentrates and the dosage per hectare.

All insecticides were applied as high volume sprays except for one treatment in trial 1 where DDT was broadcast by hand in a bran-molasses bait and for one treatment in trial 2 where DDT was broadcast in fertilizer (15%N: 9%P:0%K) at 358 kg/ha of mixture. For all other treatments in trial 2, the same fertilizer mixture was supplied at 358 kg/ha. The DDT-bran-molasses bait consisted of a mixture of 0·45 kg active constituent DDT, 11·4 kg bran and 1·8 l of molasses. Spray treatments were applied using a power driven piston pump operating at a pressure of 689 kPa with a single nozzled, hand-held lance attachment.

TABLE 1

INSECTICIDES USED IN THE TRIALS

Insecticides	Formulation	Active Constituent (%)	Application rate Active Constituent kg/ha	Trial No.
BHC gamma isomer	Miscible concentrate	16 w/v	1·12	1
Carbaryl	Wettable concentrate	80 w/w	1·12	2
Chlorfenvinphos ..	Emulsifiable concentrate	24 w/v	0·56	4
DDT	Miscible concentrate	25 w/v	0·84	2, 3
DDT	Emulsifiable concentrate	25 w/v	1·12	1, 4
DDT	Miscible concentrate	25 w/v	1·12	2, 3
DDT	Dispersible powder, bran, molasses bait	50 w/w	1·12	1
DDT	Dispersible powder in fertilizer ..	10 w/w	1·12	2
Diazinon	Emulsifiable concentrate	20 w/v	0·42	5
Dieldrin	Emulsifiable concentrate	15 w/v	1·12	1
Dicrotophos ..	Miscible concentrate	80 w/v	0·56	1
Heptachlor	Miscible concentrate	40 w/v	1·12	1
Parathion-ethyl ..	Emulsifiable concentrate	50 w/v	0·56	4
Parathion-ethyl ..	Emulsifiable concentrate	50 w/v	0·84	3
Parathion-ethyl ..	Emulsifiable concentrate	50 w/v	1·12	2, 3
Trichlorphon ..	Soluble concentrate	80 w/w	0·14	5
Trichlorphon ..	Soluble concentrate	80 w/w	0·28	5
Trichlorphon ..	Soluble concentrate	80 w/w	0·42	5
Trichlorphon ..	Soluble concentrate	80 w/w	0·56	4, 5
Trichlorphon ..	Soluble concentrate	80 w/w	0·84	3
Trichlorphon ..	Soluble concentrate	80 w/w	1·12	2, 3

Treatment effects against late instar larvae of *Oncopera* spp. were assessed using a larval sampling method based on that of Miller and Martyn (1952). The technique involved the closure of the entrances of the larval burrows (Elder 1971) by removal of all vegetation at ground level with a square-nosed spade. A 30 cm x 30 cm painted square of consolidated hardboard ('Masonite') was then placed over the cleared area. The square was left in position for two nights, after which it was lifted and the number of re-opened entrances counted. There were 20 squares per plot.

Samples of *Oncopera* larvae present were obtained from each trial by digging 50 larvae (10 from each of five locations) from the soil. Identifications using the characters outlined by Elder (1970) were made and the percentage of each species of *Oncopera* were recorded.

Pre-treatment counts were made on the day of insecticide applications; post-treatment counts were made at 1 and 6 weeks following applications in all trials and at 52 weeks in trials 1, 2, 3 and 4.

III. RESULTS

Details relative to all trials are given in Figure 1.

IV. DISCUSSION

Larvae of *O. mitocera* and *O. brachyphylla* were shown to be susceptible to the same insecticides.

Parathion-ethyl, chlorfenvinphos, trichlorphon at 0·56 kg, diazinon at 0·42 kg and DDT at 1·12 kg active constituent per ha were most efficacious in reducing *Oncopera* spp. larval populations. The persistence of DDT was demonstrated by the suppression of the generation in the year after treatment. Dieldrin, heptachlor, BHC, dicrotophos and carbaryl gave poor results and do not therefore warrant further testing.

Results for trichlorphon were somewhat variable (Figure 1, trials 4 and 5). Poor results obtained in trial 5 may have been due to a reduced spray penetration to ground level as a result of the relatively high dense grass cover (Table 2). The larvae feed only at ground level (Elder 1971).

TABLE 2

Oncopera spp., Pasture Type and Date of Insecticide Application for the Trials

Trial No.	Location	*Oncopera* spp. Present	Date Insecticide Applied	Type of Pasture
1	Maalan ..	50% *O. brachyphylla* 50% *O. mitocera*	27 Aug 64	Short sparse grasses and weeds —run down pasture
2	Millaa Millaa ..	100% *O. brachyphylla*	9 Sep 65	High (21 cm) dense *Pennisetum clandestinum*
3	Peeramon ..	100% *O. mitocera* ..	7 Oct 65	Low (1–2 cm) sparse *Axonopus affinis*—run down pasture
4	Butcher's Creek	100% *O. mitocera* ..	24 Oct 65	As for 3
5	Jaggan	100% *O. mitocera* ..	8 Oct 66	Clumps of *Panicum maximum* to 30 cm in height interspersed with sparse *Melinis minutiflora*

Chlorfenvinphos and diazinon have proved equally useful under commercial conditions. Trichlorphon has given apparent variable control and its use has declined.

Further work is required on application methods alternative to high volume spraying as many infestations are in rugged country where the use of high volume equipment is not possible. Granular insecticide use or misting techniques might be investigated. Granules may also overcome the difficulties involved in getting insecticide to the restricted feeding area of the larvae (Elder 1971) where pastures are high (up to 2 m) and dense. Under present application methods mowing or grazing has to be undertaken prior to spray application under these conditions.

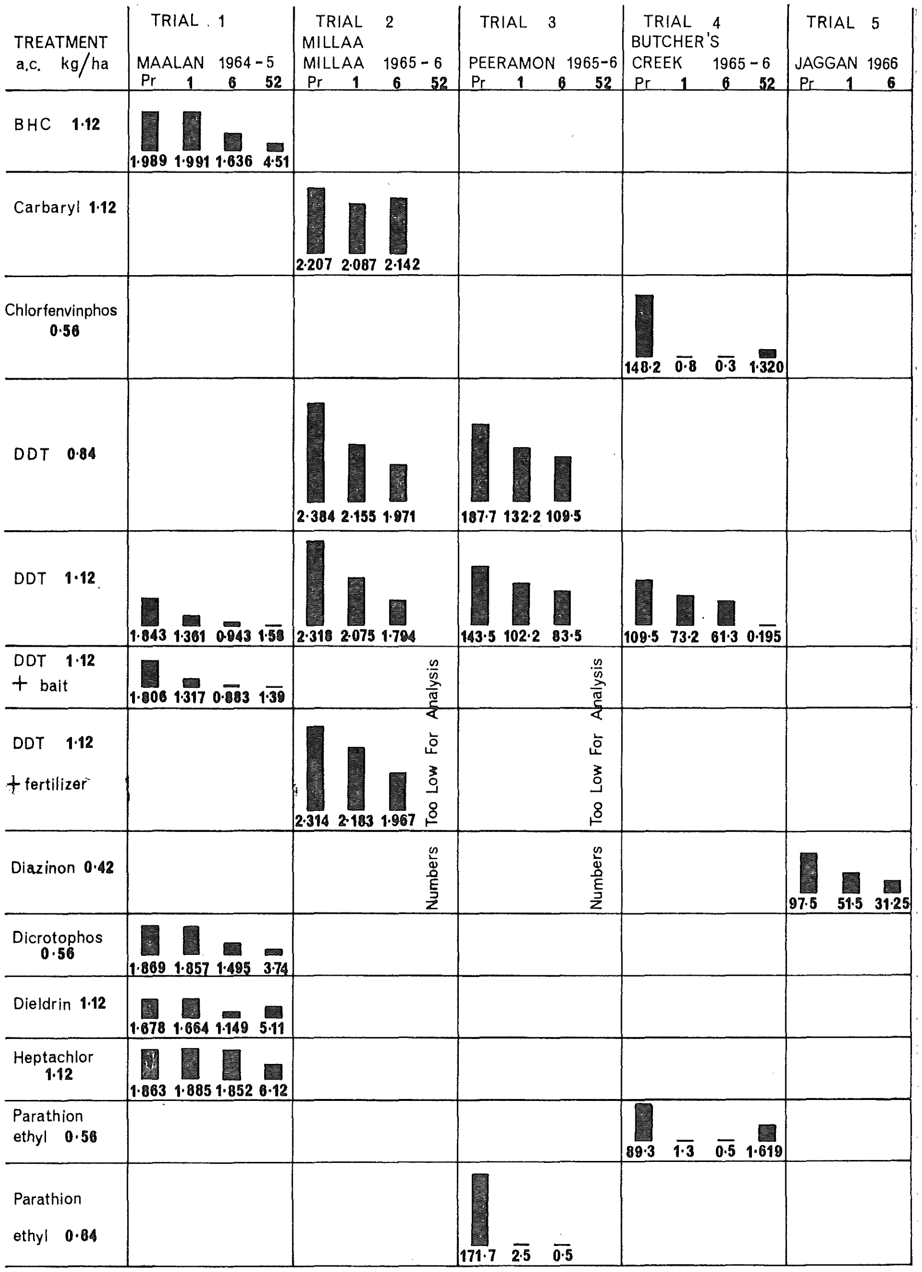

Figure 1. Mean numbers of active larvae per unit sample. There were 20 squares covering a total of 1.8 m^2 per unit sample. Numbers are the transformed means or original means as used in the analysis.

TREATMENT a.c. kg/ha	TRIAL 1 MAALAN 1964-5 □Pr ●1 ●6 ●52	TRIAL 2 MILLAA MILLAA 1965-6 Pr 1 6 52	TRIAL 3 PEERAMON 1965-6 Pr 1 6 52	TRIAL 4 BUTCHER'S CREEK 1965-6 Pr 1 6 52	TRIAL 5 JAGGAN 1966 Pr 1 6
Parathion ethyl 1·12		2·370 1·476 0·690	179·7 1·2 0·2		
Trichlorphon 0·14					77·75 88·25 55·0
Trichlorphon 0·28					85·50 68·25 52·0
Trichlorphon 0·42					98·0 52·97 49·0
Trichlorphon 0·56				109·5 7·5 13·0 1·227	75·0 42·50 37·50
Trichlorphon 0·84			197·5 2·0 2·2		
Trichlorphon 1·12		2·390 1·845 1·551	147·7 5·7 7·8		
No Treatment	1·958 1·961 1·630 4·70	2·257 2·166 2·153	129·2 120·5 116·7	133·0 120·5 109·5 1·004	98·25 90·25 63·25
NDS * 4V4 ·5	NS 0·394 0·457 2·45	NS 0·182 0·398	NS Analysis not required Analysis not required	NS Analysis not required Analysis not required 0·397	NS 27·50 14·33
·1	NS 0·540 0·627 3·36	NS 0·249 0·545	NS	NS 0·556	NS 38·02 19·81
Transformation+	X X X SR	L L L	O	O L	O O O

* Necessary difference for significance   NS = No significant difference

\+ X = log X; SR = $\sqrt{X + \frac{1}{2}}$; L = log (1 + X);

O = Analysis undertaken on original units

□, Pr = Numbers at pretreatment

● 1, 6, 52 = Numbers at 1, 6 and 52 weeks post treatment respectively

Time of application (Table 2) did not affect spray efficiency for the five trials. Larval feeding area which is related to larval length is smaller, earlier in the year (Elder 1971).

Insecticide applications in July and early August should be investigated to determine whether the smaller feeding area of larvae makes spray coverage more critical.

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