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INSECTICIDAL CONTROL OF LUCERNE JASSIDS IN SOUTH-EAST QUEENSLAND

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SUMMARY

Three field trials were carried out in Queensland in 1969 to compare seven candidate insecticides with the standard DDT for control of the lucerne jassids *Austroasca viridigrisea* (Paoli) and *A. alfalfae* (Evans). All eight insecticides, aminocarb, carbaryl, DDT, demeton-S-methyl, diazinon, dimethoate, methyl-parathion and trichlorphon gave good control. Dimethoate was selected as a replacement for DDT on the basis of effectiveness and relatively low toxicity to animals and man, without leaving undesirable residues in lucerne. It was less effective than DDT one day after application but at 140 and 280 g ha^{-1} was equally effective at 4, 7 and 14 days after application.

I. INTRODUCTION

Lucerne grown in south-east Queensland under both irrigated and dryland conditions is subject to attack by the jassids *Austroasca viridigrisea* (Paoli) and *A. alfalfae* (Evans), mainly during the summer and autumn months (Hooper 1959, Waite 1974).

Prior to 1969, control of jassids in lucerne was achieved with applications of DDT. However, the establishment of maximum residue limits for chlorinated hydrocarbon insecticides in meat and dairy produce in international trade, and the subsequent ban imposed on the use of DDT and related compounds on pastures and fodder crops in Queensland, prompted the evaluation of alternative chemicals for jassid control in lucerne. The results of three field trials carried out in 1969 are reported here.

II. MATERIALS AND METHODS

The following insecticides were used in field trials:—

aminocarb—An emulsifiable concentrate containing 21·7% active constituent.

carbaryl—A dispersible powder containing 80% W/V active constituent.

DDT—An emulsion containing 25% W/V active constituent.

demeton-S-methyl—An emulsifiable concentrate containing 25% W/V active constituent.

diazinon—An emulsifiable concentrate containing 21·7% W/V active constituent.

dimethoate—An emulsifiable concentrate containing 30% W/V active constituent.

methyl-parathion—An emulsifiable concentrate containing 50% W/V active constituent.

trichlorphon—A dispersible powder containing 80% W/V active constituent.

Two trials (Trial 1 and Trial 2) were carried out at Kooralgin in south-eastern Queensland as initial screening tests. Both used an 8 $\times$ 3 randomized block design with plot sizes 9 m $\times$ 4·5 m (Trial 1) and 12 m $\times$ 12 m (Trial 2). Guard areas 3 m wide separated individual plots. All the listed insecticides except methyl-parathion were used in Trial 1. That insecticide replaced trichlorphon in Trial 2. Trial 3 at Kingsthorpe on the Darling Downs compared diazinon, dimethoate and methyl-parathion at three different dosage levels for each.

In all trials the insecticides were applied via a 1·5 m hand-held boom at a pressure of approximately 500 k Pa.

Jassid populations were determined at —1, +1, +4, +7 and +14 days for each treated and untreated plot. Samples were collected by means of a mechanical vacuum collecting unit from a 6 m length of row in the middle of the plots. The mean of three such samples per plot was used to compare the effects of treatments.

III. RESULTS AND DISCUSSION

The results of Trial 1 (table 1) show that dimethoate (280 g ha^{-1}) at 1 day and demeton-S-methyl (280 g ha^{-1}) and diazinon (560 g ha^{-1}) at 14 days post-treatment were less effective than the standard DDT. Aminocarb, carbaryl and trichlorphon at the dosages indicated were equally effective as DDT. In Trial 2 (table 2) all candidate insecticides were equally effective as DDT on each post-treatment date. The data from Trial 3 (table 3) for dimethoate support those from Trial 1 in that relatively poor control was achieved at 1 day post-treatment at all dosage levels. Dimethoate at 70 g ha^{-1} was also ineffective at 4 days post-treatment, but thereafter was not significantly different from the other treatments. Diazinon and methyl-parathion gave satisfactory control at all dosages tested on all post-treatment dates.

Dimethoate at 140 g ha^{-1} was selected on the basis of these data and availability as an acceptable insecticidal treatment for jassid control in lucerne. Following establishment of spotted alfalfa aphid, *Therioaphis trifolii* (Monell) f. *maculata* (Buckton), and blue-green aphid, *Acyrthosiphon kondoi* (Shinji), Passlow (1977 a and b) recommended dimethoate at 150 g ha^{-1} for control. Use of the chemical, therefore, is appropriate when both jassid and aphid control is required in lucerne. Turner (1969) established that carbaryl 1 100 g ha^{-1} will control populations of lucerne leaf roller, *Merophyas divulsana* Walker. Trials 1 and 2 results demonstrate that this chemical will also control *Austroasca* spp.

The economic aspects of these trials are discussed more fully by Passlow and Waite (1969). Commercial usage of dimethoate at 140 g ha^{-1} subsequent to these trials has demonstrated that the conclusions drawn are valid for the jassid species involved. However, further investigations into the infestation levels at which control is required have raised doubts as to the justification in economic terms of the control of jassid populations of the order experienced in these trials (Waite 1976).

IV. ACKNOWLEDGEMENT

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TABLE 1

TRIAL 1—MEAN *Austroasca* spp. POPULATIONS PER PLOT PRE AND POST-TREATMENT

Treatment (g ha^{-1} active constituent)	Pretreatment	Post-treatment							
	Equiv.	1 Day		4 Days		7 Days		14 Days	
		Trans.*	Equiv.	Trans.	Equiv.	Trans.	Equiv.	Trans.	Equiv.
carbaryl 1100	69·0	2·85	7·61	2·87	7·76	4·02	15·70	7·65	57·98
DDT 1100	90·5	1·51	1·78	3·21	9·78	3·65	12·83	7·04	49·03
dimethoate 280	91·3	3·73	13·38	3·41	11·15	3·28	10·25	9·29	85·83
diazinon 560	87·7	1·91	3·14	3·54	12·02	4·08	16·19	11·52	131·10
demeton-s-methyl 280	80·0	2·43	5·41	3·72	13·35	3·85	14·30	12·99	168·24
aminocarb 1100	88·3	1·19	0·92	3·95	15·11	4·68	21·43	9·94	98·35
trichlorphon 1100	94·5	2·74	7·01	4·84	22·93	4·66	21·19	10·41	107·96
No Treatment	86·5	8·28	68·10	7·73	59·24	7·87	61·44	13·42	179·65
S.E. Necessary difference for significance		0·70		0·66		0·75		1·32	
5%		2·11		2·01		2·27		4·01	
1%		2·93		2·78		3·15		5·57	

* Transformation $\sqrt{x + 0{\cdot}5}$

TABLE 2

TRIAL 2—MEAN *Austroasca* spp. POPULATIONS PER PLOT PRE AND POST-TREATMENT

Treatment (g ha^{-1} active constituent)	Pretreatment	Post-treatment							
		1 Day		4 Days		7 Days		14 Days	
	Equiv.	Trans.*	Equiv.	Trans.	Equiv.	Trans.	Equiv.	Trans.	Equiv.
carbaryl 1100	225·7	1·52	1·81	1·92	3·20	2·76	7·74	3·59	12·41
DDT 1100	172·8	1·75	2·56	1·35	1·32	2·39	5·21	2·91	7·98
dimethoate 280	198·5	1·15	0·82	1·12	0·76	1·51	1·78	3·38	10·92
diazinon 560	239·0	0·76	0·08	1·26	1·09	2·37	5·10	3·10	9·10
demeton-S-methyl 280	221·7	1·50	1·76	1·08	0·66	1·26	1·10	3·83	14·18
aminocarb 1100	240·2	0·89	0·29	1·91	3·14	2·40	5·26	3·92	14·84
methyl-parathion 420	223·7	2·09	3·85	2·48	5·64	2·82	7·43	3·75	13·53
No Treatment	219·0	10·19	103·26	11·20	125·05	10·90	118·24	10·47	109·08
S.E.		1·06		1·04		0·99		0·93	
Necessary differences for significance 5%		3·22		3·15		3·00		2·82	
1%		4·48		4·38		4·16		3·92	

* Transformation x + 0·5.

TABLE 3

TRIAL 3—MEAN *Austroasca* spp. POPULATIONS PER PLOT PRE AND POST-TREATMENT

Treatment (g ha^{-1} active constituent)	Pretreatment	Post-treatment							
		1 Day		4 Days		7 Days		14 Days	
	Equiv.	Trans.*	Equiv.	Trans.	Equiv.	Trans.	Equiv.	Trans.	Equiv.
dimethoate 280	165·43	3·88	14·60	0·76	0·08	0·91	0·33	1·10	0·72
dimethoate 140	105·33	5·40	28·70	0·86	0·24	1·39	1·45	1·05	0·62
dimethoate 70	140·64	9·45	88·85	4·57	20·46	3·75	13·37	2·63	6·45
diazinon 560	149·40	2·23	4·50	0·88	0·27	1·62	2·14	1·08	0·68
diazinon 420	104·71	1·64	3·21	0·86	0·24	1·43	1·56	1·34	1·30
diazinon 280	140·11	1·59	2·04	0·70	0·00	1·36	1·35	0·82	0·18
methyl-parathion 420	121·20	1·35	1·32	0·70	0·00	1·23	1·04	1·06	0·64
methyl-parathion 280	120·59	1·54	1·89	0·76	0·08	1·20	0·96	0·95	0·41
methyl-parathion 140	133·54	1·27	1·12	0·86	0·24	1·32	1·24	1·27	1·11
No Treatment	114·33	8·19	66·69	6·53	42·15	6·01	35·63	5·37	28·44
S.E.		0·80		1·19		1·07		1·12	
Necessary differences for significance 5%		1·69		2·50		2·65		2·36	
1%		2·32		3·43		3·10		3·23	

* Transformation $\sqrt{x} + 0{\cdot}5$

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