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INSECTICIDES TO CONTROL ONION THRIPS (THRIPS TABACI Lind.)

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SUMMARY

During 1969–70, 16 insecticides were tested as high volume sprays for the control of thrips, *Thrips tabaci* Lind., on onions in the Gatton district. Results were assessed in terms of numbers of thrips remaining on the plants following treatment.

Although none of the insecticides provided good control, the more efficacious materials were omethoate and methidathion. The previously accepted standard control DDT failed completely.

A rapid increase in populations occurred during the second week after spraying, indicating that improved control could be achieved with a second spray application at 7 to 10 days after the first rather than at 14 days.

I. INTRODUCTION

Onion crops in the Lockyer Valley are regularly attacked by onion thrips, *Thrips tabaci* Lind. The populations of thrips are sometimes sufficiently large to cause a series of whitish spots and streaks covering a large part of the leaves. This is more common in the later-planted crops as the attacks usually occur during spring, by which time the early crops are ready for harvest.

Passlow (1953) stated that 'with adequate irrigation and sound farming methods to ensure continuous rapid growth, onions can be produced profitably despite the presence of thrips. Under these conditions the application of suitable insecticides will not appreciably increase yields in either bulb or seed crops'. However, growers continue to view this injury as detrimental to crop yields. Consequently, there is a demand for an insecticide that will control thrips.

For several years, this demand was satisfied by the efficacy of DDT as shown in trials conducted during 1951–1955 (Passlow, 1957). However, by the late 1960s, it was stated by growers that DDT no longer provided adequate control. A series of insecticide screening trials was conducted during 1969–1970 to find a suitable replacement.

II. MATERIALS

The series consisted of three trials in which a number of insecticides, applied as sprays, was tested for control of thrips.

The following insecticides were used—

DDT	25% w/v	emulsifiable concentrate
demeton-s-methyl	25% w/v	emulsifiable concentrate
diazinon	80% w/v	emulsifiable concentrate
methyl parathion	50% w/v	emulsifiable concentrate
methidathion	20% w/v	emulsifiable concentrate
mevinphos	100% w/v	emulsifiable concentrate
methomyl	90% w/w	soluble powder
fenthion	55% w/v	emulsifiable concentrate
monocrotophos	60% w/v	emulsifiable concentrate
aminocarb	21·7% w/v	emulsifiable concentrate
endosulfan	35% w/v	emulsifiable concentrate
carbaryl	80% w/w	dispersible powder
parathion	50% w/v	emulsifiable concentrate
dimethoate	30% w/v	emulsifiable concentrate
promecarb	50% w/w	dispersible powder
omethoate	80% w/v	emulsifiable concentrate

III. METHODS

A randomized block layout with three replicates, was used in each trial. A plot consisted of four rows, each 3 m long. All data were taken from the central two rows of each plot.

Trials 1 and 2 were conducted at the Department of Primary Industries' Gatton Research Station during September and October 1969 respectively. Trial 3 was carried out in a commercial planting at Lake Clarendon during July–August 1970.

All sprays were applied through a Rega Unispray at the rates of 1 685 litres ha^{-1} of mixed spray in the 1969 trials and 1 120 litres ha^{-1} in the 1970 trial. The percentage active constituent of each insecticide in the spray is shown in the tables of results. Insecticides were applied once only in the 1969 trials, the application dates being 9 September and 23 October respectively for trials 1 and 2. In trial 3, two applications were made on 23 July and 6 August 1970.

Thrips populations were assessed after removing the leaves of 10 plants per plot in trial 1, and 8 plants in trials 2 and 3 and placing them in 2% formaldehyde solution. In the laboratory, the plant material was removed from the solution, washed several times to remove any adhering thrips and the washings were added to the original solution and filtered. Counts were taken of the adult and nymphal thrips retained on the filter paper. Samples were taken at pre-treatment and 1, 3, 7 and 14 days post-treatment in trial 1. Pre-treatment, 4 and 7 days post-treatment samples were taken in trial 2. In trial 3, samples were taken at pre-treatment, 4 and 7 days post-treatment. A further sample at 14 days post-treatment was also regarded as pre-treatment for the second application. Two further samples were taken 7 and 14 days later.

B

TABLE 1

MEAN NUMBER OF THRIPS PER PLANT TRIAL 1

Treatment	Pre-treatment		Post-treatment								
	9 Sep 69		10 Sep 69		12 Sep 69		16 Sep 69		23 Sep 69		
	Nymphs	Total	Nymphs	Total	Nymphs	Total	Nymphs	Total	Adults	Nymphs	Total
aminocarb 0·1%	80·40	85·60	51·27	53·64	37·93	40·91	40·60	50·82	36·18	30·44	66·62
mevinphos 0·05%	89·16	95·87	44·16	45·33	42·76	43·84	35·47	40·91	29·93	30·58	60·51
demeton-S-methyl 0·02%	70·07	76·07	55·82	56·53	50·76	53·60	47·67	57·56	21·93	37·87	59·80
check	87·02	91·64	70·16	73·36	85·56	90·60	48·62	57·04	20·66	36·14	56·80
monocrotophos 0·05%	116·04	120·98	69·16	69·78	53·42	54·22	20·87	26·60	28·27	27·20	55·47
diazinon 0·05%	112·40	118·00	47·49	48·02	46·36	47·53	33·51	39·42	20·38	24·71	45·09
DDT 0·1%	101·73	108·53	69·96	72·80	54·76	58·89	48·84	61·20	24·00	20·93	44·93
fenthion 0·05%	94·49	100·76	39·18	40·00	33·40	33·87	24·20	30·87	23·73	17·13	40·87
methomyl 0·02%	76·89	81·64	46·49	47·44	44·62	46·58	32·27	41·67	22·18	18·51	40·69
methidathion 0·05%	74·71	79·47	25·53	26·40	20·53	21·93	11·80	19·10	20·02	19·20	39·22
methyl parathion 0·05%	83·73	88·09	22·40	23·40	23·87	24·49	33·29	39·76	15·42	13·04	28·47
Necessary differences for significance among treatments 5%	37·97	39·81	22·13	22·61	25·15	26·16	13·69	14·75	10·49	9·51	17·42
Necessary differences for significance among treatments 1%	51·53	54·03	30·03	30·69	34·14	35·53	18·58	20·02	14·23	12·91	23·64
Treat v. check 5%	32·88	34·48	19·16	19·59	21·78	22·67	11·86	12·78	9·08	8·24	15·09
Treat v. check 1%	44·63	46·79	26·01	26·58	29·56	30·77	16·09	17·34	12·33	11·18	20·48

TABLE 2

MEAN NUMBER OF THRIPS PER PLANT TRIAL 2

Treatment	Pre-treatment			Post-treatment					
	23 Oct 69			27 Oct 69			30 Oct 69		
	Adults	Nymphs	Total	Adults	Nymphs	Total	Adults	Nymphs	Total
DDT 0·1%	8·33	61·67	70·00	2·81	21·50	24·30	2·25	15·44	17·69
check	6·83	54·83	61·67	3·19	21·18	24·38	2·17	12·25	14·42
dimethoate 0·025%	6·33	42·17	48·50	2·42	12·68	15·10	2·46	9·46	11·92
carbaryl 0·1%	7·72	48·92	56·64	2·58	7·33	9·92	2·68	8·22	10·90
parathion 0·02%	8·33	47·58	55·92	1·38	6·88	8·25	2·38	7·71	10·08
endosulphan 0·1%	6·50	42·83	49·33	1·43	7·18	8·61	2·13	6·04	8·17
methyl parathion 0·05%	7·42	48·78	56·19	2·50	7·25	9·75	2·08	5·63	7·71
methidathion 0·05%	7·18	48·17	55·35	2·00	6·88	8·88	1·92	2·88	4·79
Necessary differences for significance 5%	4·74	29·83	33·88	1·86	8·79	10·38	1·41	5·78	6·83
Necessary differences for significance 1%	6·57	41·40	47·03	2·58	12·19	14·41	1·96	8·02	9·47

a Adults

TABLE 3

MEAN NUMBER OF THRIPS ON EIGHT PLANTS TRIAL 3

Treatment	Pre-treatment 1		Post-treatment 1				Pre-treatment 2		Post-treatment 2			
	23 Jul 70		27 Jul 70		30 Jul 70		6 Aug 70		13 Aug 70		20 Aug 70	
	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean
omethoate 0·05%	6·246	39·02	2·244	5·04	3·921	15·38	6·200	38·44	3·560	12·68	4·795	22·99
methidathion 0·05%	7·339	53·86	3·647	13·30	4·509	20·33	6·012	36·14	4·531	20·53	5·218	27·23
methidathion 0·03%	5·129	26·31	3·098	9·59	3·451	11·91	6·465	41·80	4·161	17·31	5·560	30·91
methidathion 0·01%	5·046	25·47	3·655	13·36	4·469	19·97	5·985	35·82	4·653	21·65	6·904	47·66
parathion 0·02%	6·885	47·41	4·040	16·32	4·753	22·59	6·043	36·51	2·446	5·98	5·393	29·09
promecarb 0·10%	5·984	35·81	4·132	17·07	5·002	25·02	7·689	59·12	2·979	8·88	4·024	16·19
DDT 0·10%	5·649	31·91	4·049	16·40	5·102	26·03	7·973	63·57	5·346	28·58	7·902	62·44
check	5·484	30·08	6·605	43·62	6·733	45·34	7·718	59·56	6·964	48·49	7·663	58·72
Necessary differences for significance 5%	3·007		1·992		1·777		1·059		1·613		2·210	
Necessary differences for significance 1%	4·174		2·765		2·466		1·470		2·238		3·067	

* $\sqrt{x}$ transformation.

TABLE 3—continued

b Nymphs

Treatment	Pre-treatment 1		Post-treatment 1				Pre-treatment 2		Post-treatment 2			
	23 Jul 70		27 Jul 70		30 Jul 70		6 Aug 70		13 Aug 70		20 Aug 70	
	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean
omethoate 0·05%	5·118	26·19	3·244	10·52	3·357	11·27	7·935	62·96	1·494	2·23	4·438	19·70
methidathion 0·05%	5·347	28·59	3·024	9·14	3·944	15·55	7·550	57·01	2·989	8·94	4·592	21·09
methidathion 0·03%	5·711	32·62	3·994	15·96	3·169	10·04	7·751	60·08	2·357	5·56	5·010	25·10
methidathion 0·01%	4·271	18·25	3·604	12·99	4·847	23·49	8·432	71·10	2·922	8·54	6·748	45·54
parathion 0·02%	4·618	21·33	4·089	16·72	4·606	21·21	8·096	65·55	2·353	5·54	5·960	35·53
promecarb 0·10%	5·072	25·73	3·979	15·83	3·091	9·55	8·804	77·51	2·811	7·90	3·209	10·30
DDT 0·10%	4·862	23·64	5·690	32·37	6·722	45·18	11·601	134·57	4·069	16·56	7·220	52·13
check	4·743	22·50	7·456	55·60	10·089	101·79	13·899	193·18	6·710	45·03	7·740	59·90
Necessary differences for significance 5%	1·448		1·613		2·136		3·523		1·403		2·481	
Necessary differences for significance 1%	2·009		2·239		2·964		4·889		1·947		3·443	

* $\sqrt{x}$ transformation.

TABLE 3—continued

c Total

Treatment	Pre-treatment 1		Post-treatment 1				Pre-treatment 2		Post-treatment 2			
	23 Jul 70		27 Jul 70		30 Jul 70		6 Aug 70		13 Aug 70		20 Aug 70	
	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean	Trans. Mean*	Equiv. Mean
omethoate 0·05%	8·159	66·57	3·982	15·86	5·187	26·90	10·146	102·95	3·940	15·53	6·618	43·80
methidathion 0·05%	9·167	84·03	4·787	22·92	6·012	36·14	9·689	93·87	5·430	29·49	6·972	48·61
methidathion 0·03%	7·693	59·18	5·108	26·10	4·747	22·53	10·095	101·92	4·792	22·96	7·489	56·09
methidathion 0·01%	6·641	44·10	5·151	26·53	6·654	44·28	10·359	107·31	5·522	30·50	9·668	93·46
parathion 0·02%	8·360	69·89	5·783	33·44	6·625	43·89	10·104	102·08	3·414	11·66	8·060	64·96
promecarb 0·10%	7·866	61·87	5·757	33·14	5·892	34·71	11·736	137·73	4·152	17·24	5·179	26·82
DDT 0·10%	7·466	55·75	7·008	49·11	8·441	71·26	14·142	199·99	6·732	45·32	10·798	116·60
check	7·338	53·84	10·026	100·52	12·143	147·44	15·942	254·15	9·694	93·98	10·950	119·90
Necessary differences for 5%	2·780		2·163		2·544		3·028		1·901		2·884	
significance 1%	3·858		3·002		3·531		4·203		2·638		4·003	

* $\sqrt{x}$ transformation.

IV. RESULTS AND DISCUSSION

The results of trials 1 to 3 are shown in tables 1 to 3 respectively, in terms of thrips numbers per treatment at each sampling date.

Although substantial population reductions were demonstrated, none of the treatments provided adequate control of thrips with a single application or when two applications were made with a 14-day interval. DDT, which had provided control of this pest for many years, was included in all trials as a standard for comparison but was shown to be ineffective.

However, in trial 1, it was shown that methidathion and methyl parathion were superior to other insecticides for thrips control and were carried through into trial 2 for comparison with a further selection of materials.

The effects of the various treatments in trial 2 were masked by the natural decline in populations. However, at the 7 days post-treatment count, methidathion was the only treatment to reduce significantly total thrips populations below that of check plots, even though this was not significantly different from the reduction achieved with certain other treatments.

Although the DDT treatment did result in some reduction in thrips numbers in trial 3, other treatments resulted in significantly greater reductions but the differences among these treatments were not significant. Three dosage levels of methidathion (0.01% to 0.05%) were among those more efficacious treatments. In this trial, omethoate appeared to be the most consistently effective treatment.

In both trials 1 and 3, where thrips counts were taken 14 days after application of treatments, it was noted that substantial population increases occurred during the second week after spray applications. This suggests that an earlier repeat application of a suitable insecticide would more effectively interfere with the thrips breeding cycle thus affording better control.

V. CONCLUSION

The results of these trials suggest that control of thrips in onions may be obtained with sprays of either omethoate or methidathion and repeated applications at intervals of 7 to 10 days.

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