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TOBACCO INSECTICIDE SCREENING TRIALS, 1961–1966

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SUMMARY

Results are reported for 28 insecticide formulations used in screening trials against the major leaf-eating tobacco pests, *Phthorimaea terrella* Walk., *Plusia argentifera* Guen., and *Heliothis* species (*H. armigera* (Hubn.) and *H. punctigera* Wall.) The most efficacious materials respectively were azinphos-ethyl, "Cyolane" and DDT.

I. INTRODUCTION

Tobacco leaf-miner (*Phthorimaea terrella* Walk.), tobacco looper (*Plusia argentifera* Guen.), budworms (*Heliothis armigera* (Hubn.) and *H. punctigera* Wall.) and cluster caterpillar (*Spodoptera litura* (F.)) are major leaf-eating pests of tobacco in Queensland. Before the advent of modern insecticides the larvae of these insects were controlled, at least partially, by the use of moth-proof covers over the seedbeds and lead arsenate dusts in the field (Atherton 1936).

The value of some of the newer insecticides against tobacco pests was tested in North Queensland by Smith (1952, 1955, 1961), Saunders and Ettershank (1961) and Davis (1963). From this work DDT, dieldrin, endrin, isobenzan and azinphos-ethyl were shown to be satisfactory for controlling the tobacco leaf-eating pests in this State.

The advent of many new insecticides likely to have value against tobacco pests and changes in the relative importance of the species in the pest complex necessitated further tests for better control of the more prominent pests.

During the tobacco seasons from 1961 to 1966, numerous insecticides were tested in eight trials conducted on field tobacco in the Mareeba district of North Queensland.

TABLE 1

INSECTICIDES USED IN THE TRIALS

Insecticide	Formulation	Active Constituent (%)	Spray Strength (%)	Trial No.
Amidithion	emulsifiable concentrate	30·0 w/v	0·1	2
Aminocarb	(a) (1) emulsifiable concentrate	21·7 w/v	0·05	2, 4, 6, 7, 8
	(a) (2) emulsifiable concentrate	21·7 w/v	0·05	6, 7
Aminocarb	(b) wettable powder	50·0 w/w	0·05	2
Azinphos-ethyl	(a) emulsifiable concentrate	40·0 w/v	0·05	1, 6, 7
Azinphos-ethyl	(b) emulsion concentrate	40·0 w/v	0·05	2, 3
Carbaryl	emulsifiable concentrate	50·0 w/v	0·1	4, 5, 6, 7
Chlorfenvinphos	emulsifiable concentrate	24·0 w/v	0·05	6, 7
"Cyolane"	emulsifiable concentrate	25·0 w/v	0·1	4, 5, 6, 7, 8
DDT	(a) emulsifiable concentrate	20·0 w/v	0·1	1
DDT	(b) miscible concentrate	25·0 w/v	0·1	3, 4, 5
Dicrotophos	(a) miscible concentrate	86·0 w/v	0·05	2, 6, 7
Dicrotophos	(b) soluble concentrate	100·0 w/v	0·05	6, 7
Dieldrin	emulsifiable concentrate	15·0 w/v	0·05	6, 7, 8
Dimethoate	emulsifiable concentrate	30·0 w/v	0·03	1
Endosulfan	emulsifiable concentrate	35·0 w/v	0·075	3, 6, 7
Endrin	emulsifiable concentrate	20·0 w/v	0·05	1, 2, 3, 6, 7, 8
Fenthion	emulsifiable concentrate	50·0 w/v	0·06	1
"I.C.I. A9013"	emulsifiable concentrate	48·0 w/v	0·05	3
"I.C.I. A9014"	emulsifiable concentrate	48·0 w/v	0·05	3, 6, 7
Isobenzan	emulsifiable concentrate	20·0 w/v	0·05, 0·075, 0·1	1 1 1
Methidathion	emulsifiable concentrate	40·0 w/v	0·05	3, 7, 8
Mevinphos	soluble concentrate	60·0 w/v	0·05	3
Monocrotophos	miscible concentrate	80·0 w/v	0·05	3
Parathion-methyl	emulsifiable concentrate	50·0 w/v	0·058	4, 5, 6, 7, 8
Phenthoate	emulsifiable concentrate	50·0 w/v	0·05	2, 6, 7
Phosalone	emulsifiable concentrate	35·0 w/v	0·05	6, 7
Phosphamidon	soluble concentrate	50·0 w/v	0·05	2
Promecarb	emulsifiable concentrate	25·0 w/v	0·05	6, 7
"Strobane"	emulsifiable concentrate	60·0 w/v	0·05	4, 5
"Thuricide"	aqueous suspension	3·0 w/w	0·1	5
Trichlorphon	soluble powder	80·0 w/w	0·1	4, 5, 6, 7, 8

II. MATERIALS AND METHODS

The insecticides used in the trials are listed in Table 1, together with the kind of formulation and percentage of active constituent in the concentrates, and the strengths of the sprays as applied in the field.

All of the insecticides were applied as sprays. Treatments were made with knapsack sprayers with wetting on both sides of all leaves.

Assessments of the effects of the materials against leaf-miner were made by counting the total number of living larvae of all instars in one leaf removed from each of 10 plants in each plot according to the procedure outlined by Davis (1963) except that the lower five leaves only were examined. The numbers of living larvae of looper, budworms and cluster caterpillar were determined by recording all larvae present on each whole plant at each count.

Pretreatment counts were made on the day of the insecticide applications; post-treatment counts were made at 1, 3, 7 and 14 days following applications, as shown in Figures 1–3.

III. RESULTS

The details for all trials in each locality for each of the pests in each of the several seasons are given in Figures 1–3.

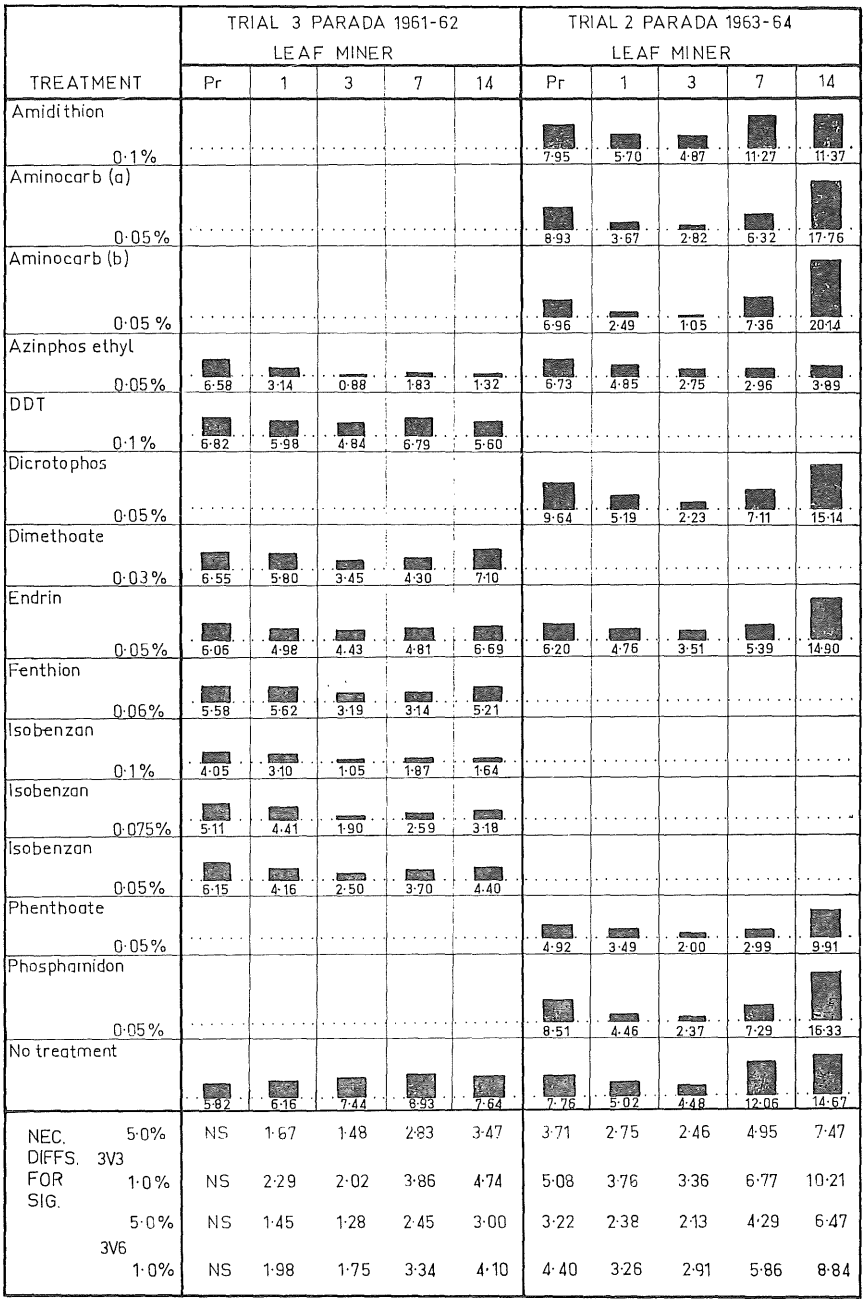

Fig. 1.—Mean numbers of living larvae per unit sample: 1961-62 and 1963-64 trials 1-2.

TREATMENT	TRIAL 3 PARADA 1964-65 LEAF MINER Pr	1	CLUSTER GRUB Pr	1	LOOPER Pr	1	BUD-WORM Pr	1	TRIAL 4 PARADA 1965-66 BUDWORM Pr	1	3	7	14	TRIAL 5 MAREEBA 1965-66 BUDWORM Pr	1	3	7	14
A 9013 0·05 %	2·23	1·88	2·31	0·33	5·37	2·70	3·10	1·33										
A 9014 0·05 %	3·37	2·57	1·66	1·63	4·92	5·10	3·49	3·04										
Aminocarb 0·05 %									5·39	2·38	2·85	2·46	2·26					
Azinphos ethyl 0·05 %	3·27	1·55	1·24	0·80	5·59	3·91	3·56	2·30										
Azodrin (Monocrotophos) 0·05 %	3·91	2·52	5·26	1·70	8·03	6·34	3·60	2·47										
Carbaryl 0·1 %									6·56	2·43	2·16	1·77	1·46	3·58	2·03	2·20	2·11	1·56
"Cyolane" 0·1 %									5·69	2·48	2·03	1·68	1·77	4·08	2·35	1·56	2·00	1·43
DDT 0·1 %	2·57	2·14	1·62	0·00	4·31	3·51	3·40	0·91	4·93	1·43	0·71	1·00	0·71	4·16	1·27	0·88	1·00	1·27
Endosulfan 0·075 %	3·40	2·02	1·52	0·91	5·90	4·10	3·67	2·62										
Endrin 0·05 %	3·01	2·70	0·91	0·33	5·07	2·48	2·14	1·05										
Methidathion 0·05 %	3·62	3·74	1·35	0·80	6·90	3·41	3·95	2·73										
Mevinphos 0·05 %	2·91	1·05	1·28	0·33	5·66	1·96	3·36	1·91										
Parathion methyl 0·058 %									3·72	1·66	2·16	1·88	1·35	3·81	2·68	2·68	1·68	1·56
"Strobane" 0·05 %									4·14	2·58	1·91	2·03	1·17	3·66	2·60	2·21	1·95	1·29
"Thuricide" 0·1 %														3·97	3·42	2·73	2·16	2·41
Trichlorphon 0·1 %									4·55	1·47	2·15	2·08	1·76	4·47	1·77	1·05	1·86	1·56
No treatment	3·05	2·29	1·52	1·79	5·95	5·89	3·93	3·56	5·06	4·55	3·34	2·10	1·97	4·36	3·85	3·60	2·93	2·26
NEC. DIFFS. FOR SIG. 3V3 5·0	2·21	1·83	2·82	1·53	3·10	3·02	1·47	1·63	1·34	1·02	1·33	0·72	0·69	1·07	0·82	0·91	1·16	0·77
3V3 1·0	3·01	2·49	3·84	2·08	4·23	4·12	2·01	2·22	1·86	1·42	1·84	1·00	0·95	1·49	1·14	1·26	1·60	1·07
3V6 5·0	1·91	1·59	2·44	1·32	2·69	2·62	1·28	1·41										
3V6 1·0	2·60	2·16	3·33	1·80	3·66	3·57	1·74	1·92										

Pr – Pretreatment
1, 3, 7, 14 days after pretreatment

Fig. 2.—Mean numbers of living larvae per unit sample for leaf-miner and per plant for looper, budworm and cluster grub: 1964-65 trial 3 and 1965-66 trials 4-5.

TREATMENT	TRIAL 6 KOAH 1965-66 LOOPER					TRIAL 7 KOAH 1965-66 LOOPER			TRIAL 8 MAREEBA 1965-66 LOOPER				
	Pr	1	3	7	14	Pr	1	3	Pr	1	3	7	14
"A 9014" 0·05%	4·83	3·13	2·30	3·49	5·07	6·26	4·78	3·78					
Aminocarb (a) (1) 0·05%	4·46	1·29	1·35	2·14	4·71	5·11	1·99	1·22	4·67	0·71	0·88	0·71	5·54
Aminocarb (a) (2) 0·05%	4·71	2·47	2·55	3·65	6·74	8·03	1·89	1·71					
Azinphos-ethyl 0·05%	4·61	3·77	4·25	3·86	3·57	5·44	3·92	2·23					
Carbaryl 0·1%	4·71	2·43	2·93	2·62	3·44	9·00	2·56	2·63					
Chlorfenvinphos 0·05%	4·52	2·97	1·90	2·77	2·78	7·43	3·72	2·54					
Cyolane 0·1%	4·76	3·53	3·13	2·04	2·96	6·79	1·27	0·97	3·86	0·88	0·88	0·88	1·77
Dicrotophos (a) 0·05%	5·15	3·70	2·71	2·86	4·15	6·89	3·87	2·14					
Dicrotophos (b) 0·05%	3·54	2·82	3·39	2·96	5·95	3·74	3·30	2·02					
Dieldrin 0·05%	4·11	3·50	3·72	4·28	5·47	5·04	3·94	2·71	5·15	4·55	3·71	3·01	4·32
Endosulfan 0·075%	3·86	2·83	3·01	3·70	4·71	5·29	4·65	3·63					
Endrin 0·05%	4·57	3·37	2·61	2·30	3·29	4·55	3·55	2·57	4·80	2·56	1·47	1·17	2·77
Methidathion 0·05%								3·14	5·97	4·68	3·44	3·57	4·74
Parathion-methyl 0·058%	3·83	1·18	1·96	1·68	4·50	5·80	1·97	1·55	4·27	2·23	1·27	1·17	5·62
Phenthoate 0·05%	3·55	2·36	2·65	2·47	4·30	6·85	3·48	2·26					
Phosalone 0·05%	4·78	3·94	3·99	5·51	3·37	6·11	4·55	3·27					
Promecarb 0·05%	4·63	3·41	4·04	5·59	5·47	4·54	2·31	2·08					
Trichlorphon 0·1%	5·73	2·21	1·82	3·53	4·19	7·30	2·93	1·92	4·39	2·40	1·39	1·77	6·47
No treatment	4·26	4·13	5·91	7·84	8·29	4·54	4·73	4·17	4·25	4·42	3·93	3·32	5·91
			4 V 4				4 V 4				3 V 3		
Necessary Differences For Significance 5·0%	1·34	1·60	1·96	2·65	1·25	3·30	1·75	1·50	1·47	1·03	1·24	0·93	1·42
1·0%	1·78	2·13	2·60	3·52	1·66	4·39	2·33	2·00	2·04	1·42	1·73	1·29	1·97
			4 V 12				4 V 12	4 V 8					
5·0%	1·09	1·31	1·60	2·16	1·02	2·69	1·43	1·30					
1·0%	1·45	1·74	2·13	2·88	1·35	3·58	1·90	1·73					

Fig. 3.—Mean numbers of living larvae per plant: 1965-66 trials 6-8.

IV. DISCUSSION

Leaf-miner was the major pest in the 1961-62 and 1963-64 seasons. In 1964-65 each of the four leaf-eating pests—leaf-miner, looper, budworms and cluster caterpillar—were present. In 1965-66 looper and budworms were the dominant pests.

Most of the insecticides used in the trials were poor in their effects against the respective pests and few were worth being submitted to further testing.

Leaf-miner.—Azinphos-ethyl 0·05% and isobenzan 0·1% were the most efficacious insecticides in killing leaf-miner larvae. Aminocarb 0·05% and phosphamidon 0·05% showed some initial promise against this pest but their residual effect was poor.

Looper.—"Cyolane" 0·1% showed good initial and residual activity against looper larvae and was the most efficacious of the insecticides tested. Trichlorphon 0·1%, parathion-methyl 0·058% and aminocarb 0·05% showed promise, particularly for initial kills. Endrin 0·05% was slower to show effect but exhibited good residual control.

Budworms.—DDT was confirmed as the most efficacious insecticide for budworm control.

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REFERENCES

ATHERTON, D. O. (1936).—Leaf miner and stem borer of tobacco in North Queensland. *Qd agric. J.* 45:12-3, 131-45, 239-48, 331-44.

DAVIS, J. J. (1963).—Tobacco leaf-miner screening trials, 1961-1962. *Qd J. agric. Sci.* 20:515-8.

SAUNDERS, G. W., and ETTERSHANK, G. (1961).—Insecticidal control of leaf-miner in tobacco. *Qd J. agric. Sci.* 18:403-5.

SMITH, W. A. (1952).—Tobacco pests in Queensland. *Qd agric. J.* 75:85-104.

SMITH, W. A. (1955).—Control of tobacco pests. *Qd agric. J.* 81:87-9.

SMITH, W. A. (1961).—Tobacco leaf-pest control investigations, 1949-1955. *Qd J. agric. Sci.* 18:33-56.

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