TESTS WITH SOME INSECTICIDES AGAINST THE RICE STEM BORER, *CHILO SUPPRESSALIS*

by

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Damage by the rice stem borer, *Chilo suppressalis* Wlk., to paddy plants has recently become extremely serious in many localities throughout the Island, commanding urgent study of effective control measures. Tests to evaluate some old and newer insecticides for the control of the larvae were conducted during the growing seasons of 1962–3 at Taipei. This paper reports the results of these tests.

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MATERIALS AND DOSAGE

The paddy plants used in this work were variety Taichung No. 65. The larvae used were those hatched from the egg clusters collected in the field in Tainan district. Insecticides used were all in a form of emulsifiable concentrate, unless otherwise stated. The dosage was 6 cc. of 0.05% emulsions per hill (equivalent to 1,200 liters per hectare); and for BHC, 30 kg. of 6% dust per hectare, which was applied in irrigation water.

INITIAL TOXICITY

Four tests were conducted, three in 1962 and one in 1963. In test one, effect of parathion and endrin on one week-old larvae was investigated. Twenty test larvae were released per hill on May lst on the plants planted in pots, 48 day-old after transplanting. Sprays were applied seven days after releasing the larvae, which were then mostly in the second instar, feeding in the outermost leaf sheaths that already changed yellowish in color from damage. The mortality of the insects was examined four days after trertment. The data are given in table 1. It appears from these data that parathion gives better control than endrin, and 0.05 per cent concentration seems to be more desirable than 0.03 per cent. In test two, the test larvae were released, 30 per hill, on the plants on June llth, which were planted in field, 84 day-old after transplanting (about 10 days before heading). Sprays were applied seven days later. The results were examined four days after spraying. The data are shown in table 1. In this test only a small part of the test insects released was recovered in some treatments. Thus the comparative effect between different treatments was not quite clear. Nevertheless, Sevin did not seem to be promising for the control of the borers. In test three, the larvae were released, 22 per tiller, on October 4th and 5th on the plants transplanted in pots on August 12th. In order to standardize

Table 1. Initial toxicity of some insecticides against one week-old larvae of the rice stem borer feeding in the outermost leaf sheaths of paddy plants at different growing stages. 1962. Taipei.

Treatment and Concentration (%)	No. of Tillers Examined	No. of Insect in Conditions Shown			Mortality* (%)
		Live	Moribund	Dead	
Test one, May 1-11; plants, 48 day-old					
Untreated	24	11	0	0	0
Parathion 0.05	22	0	0	16	100
0.05	23	0	0	13	100
0.03	27	0	3	5	100
0.03	24	0	1	5	100
Endrin 0.05	26	3	0	6	67
0.05	29	0	0	5	100
Test two, June 11-12; plants, 84 day-old (about 10 days before heading)					
Untreated	26	7	0	0	0
Sevin w.p. 0.05	24	3	0	3	50
Sumithion 0.05	29	0	0	3	100
Lebaycid 0.05	20	0	2	14	100
Endrin 0.05	19	0	0	11	100
Dimecron 0.05	20	0	0	22	100
EPN 0.05	18	0	2	24	100
Parathion 0.05	15	0	2	14	100
Telodrin 0.05	17	0	3	9	100
Test three, October 4-12; Plants, 46 day-old					
Untreated	6	105	0	5	5
Sevin w.p. 0.05	6	82	0	23	22
Sumithion 0.05	6	0	0	118	100
Lebaycid 0.05	6	1	0	123	99
Endrin 0.05	6	19	0	109	85
Dimecron 0.05	6	0	0	93	100
EPN 0.05	6	0	0	106	100
Parathion 0.05	6	0	0	109	100
Telodrin 0.05	6	8	0	112	93
BHC 6% dust	6	45	0	40	47

*In counting per cent mortality, the moribund larvae were grouped with the dead ones.

the test plants as much as possible only 6 tillers were used in each hill; and their outer leaf sheaths damaged by leafhoppers or by wind were removed five days before releasing the test insects. Sprays were applied by an oil spray gun on Oct. 8th. The results were examined four days later. The data are summarized in table 1. Sevin again gave poor initial kill in this test. The effect of endrin was not satisfactory. Excellent control was obtained with Sumithion, Lebaycid, Dimecron, EPN, and parathion. Telodrin also showed promising results. BHC dust did not give good control in this case, in which little attention had been paid on supplying irrigation water

regularly after treatment. In test four, the effect of parathion and BHC dust was re-evaluated. The larvae (25 to 40 per hill) were released on June 7, 1963 on the plants planted in pots, 38 day-old after transplanting. Treatments were made two days after releasing the larvae. In BHC treatment, irrigation water was replenished every day during the course of the test. The results were examined 7 or 8 days after treatments. The data are shown in table 2.

Table 2. Initial toxicity of parathion and BHC dust on two day-old rice stem borer larvae. June, 1962. Taipei.

Age of Plants (days)	Treatment and Concentration (%)	Per Cent Mortality and (Total Number of Larvae Recovered)
38	Untreated	5(22)
	Parathion 0.05	72(18)
	BHC 6% dust	100(9)
78	Untreated	0(32)
	Parathion 0.05	53(40)
	BHC 6% cust	90(10)

The data of table 2 show that BHC dust when used under constantly irrigated conditions, gave better initial kill than parathion which was rather poor in this test. It is noteworthy that the effect of BHC dust is due to gamma BHC disolved in irrigation water which is translocated into the feeding site of the larvae by the three routes, i. e., root absorption, by penetrating into the straw in the irrigation water, and by penetrating into the leaf sheath above the water level (the toxicant moves up the straw by capillary action). Tests with the paddy borer larvae (data not given) clearly indicated that if BHC dust is applied in paddy field with no free water standing very poor kill of the larvae resulted.

RESIDUAL EFFECT

Six tests were conducted, four in 1962 and two in 1963. In tests one and two, effectiveness of endrin and parathion was investigated. Sprays were applied with a hand sprayer on May 19th, on the plants 59 day-old after transplanting. Twenty larvae per hill were released four days later in test one, and 40 per hill, five days later in test two. The damage to the straws and the mortality of the larvae were examined on May 31st. The data are given in table 3. The results in table 3 indicate clearly that poor residual control of the rice stem borer is obtained with endrin or parathion. In tests three and four, sprays were applied on Sept. 27th by an oil spray gun on the plants planted in pots, 51 day-old after transplanting (about 14 days before heading). To standardize the test plants as much as possible only six tillers, partly 5 tillers, of similar conditions in a hill were used, their loose outer leaf sheaths were removed five days before spraying. In test three, 20 larvae were released per tiller six days after spraying; in test four, 12 larvae per tiller were released 10 days after spraying. The damage to the leaf sheaths and to the ears was examined

Table 3. Residual effect of endrin and parathion against the newly hatched rice stem borer on paddy plants 59 day-old after transplanting. May, 1962. Taipei.

Treatment 0.05%	No. of Tillers Examind.	No. of Tillers Damaged	Per Cent Mortality of Larvae and (Total No. Recovered)
Test one, larvae released 4 days after spraying			
Untreated	35	4	0(11)
	48	5	0(14)
Endrin	46	6	7(14)
	43	9	0(12)
Parathion	50	7	14(7)
	56	6	0(7)
Test two, larvae released 5 days after spraying			
Untreated	46	11	4(27)
	47	11	0(26)
Endrin	41	9	24(17)
	51	10	6(18)
Parathion	52	10	6(33)
	37	6	0(24)

on Oct. 16th and 29th repectively. The results are shown in table 4, which show that EPN is the best treatment tested. Telodrin and endrin show some effect but other insectides were residually not reliable. Test five was conducted to re-evaluate the effect of parathion and BHC dust. The plants planted in pots were treated on June 7, 1963. In BHC treatment irrigation water was replenished every day. The larvae (15 to 30 per hill) were released 5, 9, 13 and 19 days after treatments. The results were examined four days after releasing the larvae. Table 5 summarizes the data.

Table 4. Residual toxicity of some insecticides against the newly hatched rice stem borer on the plants about 14 days before heading. Sept.–Oct., 1962. Taipei.

Treatment 0.05%	Per Cent of Leaf Sheaths Damaged		Per Cent of Ears Destroyed	
	(Test three)	(Test four)	(Test three)	(Test four)
Untreated	100	100	66	66
Sevin w. p.	100	100	100	66
Sumithion	100	100	100	50
Lebaycid	100	100	100	40
Endrin	66	50	100	0
Dimecron	100	100	100	50
EFN	0	0	0	0
Parathion	100	67	100	67
Telodrin	50	60	17	60
BHC 6% cust*	89	100	17	100

*Irrigation water not supplied regularly after treatment.

Table 5. Residual effect of parathion and BHC dust against the newly hatched rice stem borer larvae. June, 1963. Taipei.

Age of Plants When Treated (days)	Treatment and Concentration (%)	Per Cent Mortality of the Larvae and (Total No. Recovered) (larvae released at indicated days after spraying)			
		5	9	13	19
8	Untreated	0(9)	0(11)	0(9)	0(9)
	Parathion 0.05	36(14)	38(8)	17(6)	0(10)
	BHC 6% dust	67(9)	82(11)	100(14)	75(8)
36	Untreated	0(12)	0(25)	0(9)	0(12)
	Parathion 0.05	29(7)	0(13)	8(13)	0(8)
	BHC 6% dust	100(9)	88(16)	100(10)	44(9)
78	Untreated	0(6)	0(24)	0(11)	0(13)
	Parathion 0.05	0(8)	5(19)	10(21)	6(16)
	BHC 6% dust	100(7)	94(17)	87(15)	100(10)

The data in table 5 indicate clearly that BHC dust gives much better residual control than parathion at the dosages used, and the residual activity of parathion was surprisingly poor. In test six, effect of Imidan was compared with parathion and BHC dust. The plants, planted in pots, 43 days after transplanting, were treated on Oct. 12, 1963; and 17 larvae were released per hill 8 days later. The results were examined 11 days afte releasing the larvae. Table 6 shows the data, which indicate that residual activity of Imidan was not satisfactory, but was better than parathion.

Table 6. Residual effect of Imidan, parathion and BHC against the rice stem borer larvae, eight days after treatment. Oct., 1963. Taipei.

Treatment and Concentration (%)	Mortality of the Larvae and (Total Number Recovered)
Untreated	0(8)
Parathion 0.05	0(13)
BHC 6% dust	100(10)
Imidan e. c. 0.05	40(13)
Imidan w. p. 0.05	30(10)

SUMMARY

Trials were conducted to evaluate initial and residual toxicity of some insecticides against the larvae of the rice stem borer, *Chilo suppressalis*. In three tests, at the dosage of 0.05 per cent concentration per hill, Sumithion, parathion, EPN, Lebaycid, Dimecron, Telodrin, and BHC dust when used under constantly irrigated conditions gave excellent or good initial kill of the young larvae, but endrin and Sevin were not satisfactory. Parathion, however, was rather poor in one test. For residual effect, Sumithion, Dimecron and Lebaycid were poor; Telodrin, endrin Imidan and parathion were not reliable. EPN, and BHC dust when used with irrigation water constantly replenished were the best residual treatments tested.

二化螟虫之藥劑試驗

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中文摘要

本試驗爲探討數種殺蟲劑對於二化螟（*Chilo suppressalis*）幼蟲之初效及殘效。在三個試驗中，以0.05%濃度，每欉 6c.c. 用量使用之 Sumithion, parathion, EPN, Lebaycid, Dimecron, Telodrin 及經常在灌溉情況下使用之 BHC 粉劑對於幼齡幼蟲有良好初效，但 endrin 及 Sevin 效力則不足。不過，parathion 在另外一次試驗中效果並不甚良好。殘效方面，Sevin, Sumithion, Dimecron 及 Ledaycid 效果不佳，Telodrin, endrin, Imidan 及 parathion 則不甚可靠，EPN 及在灌溉水經常補充之條件下施用之 BHC 粉劑均有優秀殘效。