한국식물보호학회지 제17권 제 1 호
Kor. J. Pl. Prot. 17(1) : 71~73 · 1978

Control of Overwintering Striped Rice Borer, *Chilo suppressalis* W. in Straw Handicrafts with Phostoxin Fumigation.

Chang Y.D.,* H.S.Kim,* J.K.Yoo*

Phostoxin 燻蒸 處理에 依한 볏짚 製品內의 越冬 二化螟虫 防除

張 英 德*·金 洪 善*·劉 載 起*

ABSTRACT

Overwintering striped rice borer, *Chilo suppressalis* W. larvae, pupae and adults in rice straw handicrafts were exposed to different doses and periods of phostoxin in gas chambers(ave.temp. 27C).

The following results were obtained;

1. For 100 percent mortality, larvae required 48 hours, pupae 24 hours and adults only 8 hours of exposure.

2. The insecticidal effect of the fumigant was more dependent upon the length of exposure than the dosage of fumigant.

INTRODUCTION

Striped rice borer, *Chilo suppressalis* W. overwinters in rice straw or stubble. The farmers make rice straw handicrafts such as cushions and baskets for exportation to the U.S. and the other countries. But, we are having quarantine problems with this overwintering stage of larvae in straw materials. The insects develope into pupae in straw and hatch out after overwintering. Eventually they are migrate into other countries with straw handicafts.

Isa(1969)reported that Methyl Bromide at the rate of 20 grams per cubic meter for 16 hours of exposurs and 16 grams per cubic meter for 24 hours period of exposure are the minimum doses required to obtain complete mortality for corn borer larvae, while Hydrogen phosphide used at the rate of 9 grams(3 tablets) per cubic meter for 72 hours period of exposure failed to control the corn borers in corn stalks.

There are several other fumigants such as MB, EDB and so on but we used phostoxin in our experiments, because it was available easily in the domestic market, and it didn't need any specific facilities or equipments. Up to now, no one has reported yet on

*Institute of Agr. Sciences,O.R.D., Suwcon, Korea(農振廳·農技研)

fumigation studies for the control of striped rice borer in Korea. The trials reported in this paper were conducted in 1977 to find an effective control measures for the striped rice borer in straw handicrafts.

MATERIALS AND METHODS

1. Treatment for larvae-Overwintered larvae collected from fields were contained with a piece of straw handicrafts (8cm x 12cm) in glassware(diameter 10cm x height 13cm). After the larvae bore deep into the straw, the straw with larvae was put in a cage($1m^3$) for fumigation with phostoxin 30% at four dosage levels (12, 15, 18, $21g/m^3$) and four time periods(8, 16, 24, 48hrs) with 3 replicates of ecah.The effect of the treatments was compared by counting the number of dead larvae. All treatments were done under outdoor condition, and the average air temperature during the whole period was 27°C.
2. Treatment for pupae-Overwintered larave were pupated in the incubator at 25°C. Three day-old pupae, in a petri dish with filter paper at the bottom, were treated in the same way as the larvae.
3. Treatment for adults(moths)-Moths collected from fields were kept with rice seedlings grown on a tray (16x20x30cm) in a cage (14x17x17xcm). The fumigation was done in the same type of cage used with the larvae and pupae. The treatments for pupae and adults were carrid out outdoors, but protected from sunlight.

RESULTS AND DISCUSSION

As shown in table 1. the period of exposure to 16 hours, and 12, 15, 18, 21 grams per cubic meters were resulted in 23.3-35.7 percent mortalityof the larvae. And the percentage of dead larvae with in 24 hours of treat-ment was almost a hundred percent. When we compared the mortality with 16 hours and 24 hours of exposure, it was low in 16 hours but very high in 24 hours exposure period. It was only an 8 hours period differences of exposure. We found the reason; when

Table1. The effect of different doses and periods of exposure of phostoxin on everwintering larvae in rice straw.

Dose (g/m^3)	Period of exposure in hours	Alive	Dead	Mortality (%)
12		112	34	23.3
15		101	55	35.3
18	16	90	50	35.7
21		97	49	33.6
12		2	98	98.0
15		2	106	98,1
18	24	1	102	99.0
21		1	95	99.0
12		0	102	100
15		0	110	100
18	48	0	100	100
21		0	104	100
12		0	100	100
15	72	0	98	100
18		0	95	100
21		0	102	100

Table 2. The effect of different doses and periods of exposure of phostoxin on overwintering pupae in rice straw.

Dose (g/m^3)	Period of exposure in hunrs	Alive	Dead	Mortality (%)
12		5	4	44.4
15		3	6	66.6
18	8	3	6	66.6
21		4	5	55.5
12		2	7	77.7
15		3	6	66.6
18	16	2	7	77.8
21		1	8	88.8
12		0	9	100
15		0	9	100
18	24	0	9	100
21		0	9	100
12		0	9	100
15		0	9	100
18	48	0	9	100
21		0	9	100

we broke the gas chamber the phostoxin tablets were still in perfect form in 16 hours exposure but it were completely sublimated 8 hours later. In this respect, the mortality was related to the rate of sublimation of the fumigant. From this data the effect of fumigation was more dependent upon the length of exposoure than the dosage of phostoxin.

Dead pupae appeared after 8 hours of treatment and the percentage of dead pupae was 45 to 67 percent. After 16 hours of treatment the mortality was varied from 67 to 89 percent. All the levels of dosage showed 100 percent mortality after 24 hours of treatment (table 2). It was same trend as effected by larval treatment in that stage of pupae.

Table 3. The effect of different doses and periods of exposure of phostoxin on moths of first generation.

Dose (g/m^3)	Period of exposure in hours	Alive	Dead	Mortality (%)
12		0	8	100
15		0	8	100
18	8	0	8	100
21		0	8	100
12		0	8	100
15	16	0	8	100
18		0	8	100
21		0	8	100
12		0	8	100
15	24	0	8	100
18		0	8	100
21		0	8	100

Table 3. shows that adults were highly sensitive to the fumigation. At 8 hours after treatment the mortality was 100 percent with all dosage levels.

摘 要

輸出 벗짚 製品內에 들어있는 越冬 二化螟虫을 防除하기 爲하여 Phostoxin 30% 燻蒸劑를 27°C 氣溫狀態에서 $1m^3$들이 프라스틱 chamber를 使用하여 濃度및 處理時間을 달리하여 試驗한 結果 다음과 같은 結果를얻었다.

1. 越冬幼虫은 處理 48時間, 蛹은 24時間, 成虫은 8時間에서 100%의 殺虫率을 얻었다.
2. 藥劑의 使用濃度 보다는 處理時間의 長短에 따라서 殺虫效果의 差異가 있었다.

REFERENCES CITED

1. Isa,A.L., A.H. Kamel, E.Z.Fam and W.H.Awad llah 1970. *On the effect of certain fumigants on the overwintering corn borers larvae.* Agric. Res. Rev. Cairo:48 (1):43-47
2. Lindgren, D.L. and Vincent, L.B.1966. Relative toxicity of Hydrogen phosphide to various stored product insects. Jour. Stored. Res.2(2): 141-46
3. Mcgregor,H.E. 1961. Evaluation of phosphine gas as a fumigant for shelled yellow corn stored in concrete silo-type storage. Northwest Miller. 265 (13):38-39
4. Schesser, J.H. 1973. Fumigation of diapausing arvael of the European corn borer with phosphine. Proceedings North Central Branch-E.S.A. 28:111-12
5. Storey, C.L.1971. Effect of temperature and commodity on the distribution of Ccl_4-CS_2 (80:20) and
6. EDC-Ccl_4(75: 25) applied by gravity penetration and closed recirculation. Jour. Econ. Ent. 64:227-30