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AGRICULTURAL ENTOMOLOGY

Recent Development in the Chemical Control of the Rice Stem Borer, *Tryporyza incertulas*, wlk.

by

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Introduction: The control of rice stem borer *Tryporyza incertulas* Wlk, is a difficult problem, as the egg masses remain covered by dense buff-coloured hairs making insecticidal penetration impossible and the hatched out larvae soon bore into the stems and remain concealed inside the stem. Hence effective control of this internal feeder is possible only by timing applications to kill the adults before they lay eggs and by killing the freshly hatched larvae before they bore inside the plant by giving a set of two sprays for each brood, the first spray synchronising with the emergence of moths and the second one, a week after the first spray. The method of application of insecticides in standing water of rice fields poses problems in the control of stem borer. Hence studies were carried out at the Regional Research Station, Aduthurai to find out the effectiveness of modern insecticides in controlling the rice stem borer by different modes of application. The results of the experiments conducted during *Sama* and *Thaladi* seasons are presented in this paper.

Materials and Methods: Five field experiments were conducted at the Regional Research Station, Aduthurai during 1964—'65 and 1965—'66 with CO.25 for *Samba* and ADT.8 and ASD.5 strains for *Thaladi* season. The first four experiments were conducted in randomised block design with nine treatments for 1964 - 65 trials and 18 trearments for 1965 - 66 trials replicated four times. The fifth experiment was laid out in split plot design with ASD.5 strain during 1965-66 *Thaladi* season with two main treatments, *viz.*, foliar application and irrigation water application and six sub-treatments replicated four times. To fix the exact date of stem borer brood emergence, a light trap of 300 C. P. was set up every day in the field for an hour after dusk and the moths caught in the light trap were counted. The emergence of brood was recorded by noting the sudden spurt in the number of moths caught in the light trap. The brood emergence sprays at two sprayings for each brood were carried out, one on the day of noticing the brood emergence and the other seven days after the previous one. Sprayings were limited to two effective broods per season. Soil application of systemic chemicals in standing water

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was also done, only on noticing the brood emergence, in the field with two to three inches of water kept impounded for three days. Granular application of insecticides was given as basal dressing just before planting as in the case of fertilisers. In the case of Departmental recommendation, the plots received three rounds of foliar spray, first round in the nursery a week before transplanting, second round in the main field a fortnight after planting followed by the third round of spray at the shot-blade stage of the crop. Counts of stem-borer infestation were recorded after dividing each plot into four divisions excluding two border rows on all sides. From each sub-division two units of 0.5 x 0.5 metre each were selected at random for counting the number of healthy and affected tillers for working out the percentage of stem borer infestation before giving the insecticidal treatments. In the case of "white ear" counts, the percentage of infestation was worked out by counting the number of good earheads as well as "white-ears" from each unit area. The crop was harvested leaving two rows of outskirts in each plot and the yield of grain was recorded separately for each plot. The data collected were analysed statistically and the economics of different insecticides was worked out.

Results and Discussion: Multiple regression equation calculated on the basis of data works out:

$$Y = 0.6766 + 0.016904\ x1 + 0.013664\ x2 - 0.2681172\ x3$$

where: Y = Grain yield

x1 = Productive tillers

x2 = Number of grains per panicle

x3 = Stem borer infestation percent.

't' test values for b1 = 1.547419 — Non significant

b2 = 2.151472* } Significant at
b3 = 2.411944* } 5% level.

The results (Table 1 to 4) show that all the insecticidal treatments have recorded significantly lower stem borer infestation than the untreated control in all the experiments. In the case of *Samba* (1964–1965) trial, Parathion has given the minimum incidence, while the highest yield of 6257 kg/ha is registered under Endrin treatment. Again in *Thaladi* (1964–65) experiment, though all the insecticides are found to be superior to control in reducing the stem borer infestation and increasing the yield, Endrin and Parathion have not only recorded minimum pest incidence but also have given more grain yield. The higher concentrations of Endrin, Parathion and Phosphamidon have given better performance in *Samba* and *Thaladi* (1965–66) seasons in increasing the yield when compared to lower concentrations of the respective chemicals.

Endrin 0.04 % has been found to be significantly superior to Endrin 0.02 % during *Samba* (1965–66) season. It is interesting to note that Parathion 0.05 % as brood emergence spray has not only recorded significantly less stem borer infestation during *Thaladi* (1965–66) season, but also given significantly higher grain yield than Parathion 0.05 % spray applied three rounds once in the nursery followed by two rounds in the main field. In the case of the split plot trial conducted during *Thaladi* (1965–66) season, treatment effects are found to be significant only in regard to sub-treatments, *viz.*, insecticides. All the insecticides tested have recorded significantly lower stem borer incidence than control. As regards grain yield, the treatment with Endrin though on par with Phosphamidon and Parathion, has given significantly more yield than the other treatments. It is evident from the multiple regression equation calculated on basis of biometric data recorded under this experiment that there is significant negative correlation between the grain yield and the stem borer infestation. It is seen that Endrin has given the maximum net profits of

TABLE 1. *Insecticidal control trial – Samba and Thaladi 1964-65*

B.D.=Basal dressing S.A.=Soil application

Treatments	Samba 1964-65			Thaladi 1964-65		
	Mean infestation % (Transformed values)	Grain yield in kg/ha	Net profit per hectare Rs. P.	Mean infestation % (Transformed values)	Grain yield in kg/ha	Net profit per hectare Rs. P.
Endrin granule 0.22 kg actual/ha (B.D.)	11.78	5644	118.80	13.395	3071	88.80
Heptachlor granule 2.2 kg actual/ha (B.D.)	12.66	5315	66.60	13.612	2955	71.00
Endrin 0.03% spray	12.32	5257	191.77	12.912	3235	88.97
Parathion (Folidol) 0.05% spray	11.59	5708	95.29	12.947	3217	78.49
BHC 0.1% (S.A.)	12.62	6106	109.52	14.005	3067	3.92
Thiometon (Ekatin) 0.1% (S.A.)	11.66	5644	21.52	13.050	2968	Nil
Methyl Demeton (Metasystox) 0.1% (S.A.)	12.60	6185	116.14	13.362	3042	Nil
Dimethoate (Rogor) 0.1% (S.A.)	12.43	5021	Nil.	13.847	3029	Nil.
Control	16.52	4848		17.752	2461	
Significant or not	Yes	Yes		Yes	Yes	
S.E.	0.36	142.9		0.47	134.0	
C.D. (P=0.05)	1.05	418.5		1.37	391.3	

Conclusion : (1) Samba : Infestation : 4 6 1 3 8 7 5 2 9

Yield 3 7 5 4 6 1 2 8 9

2) Thaladi: Infestation; 3 4 6 7 1 2 8 5 9 . Yield; 3 4 1 5 7 8 6 2 9

TABLE 2. *Insecticidal control trial – Samba and Thaladi 1965-66*

B.D. = Basal dressing S.A. = Soil application D.R. = Departmental recommendation

Treatments	Samba 1965-66			Thaladi 1965-66		
	Mean infestation % (Transformed values)	Grain yield in kg/ha	Net profit per hectare Rs. P.	Mean infestation % (Transformed values)	Grain yield in kg/ha	Net profit per hectare Rs. P.
BHC 10% dust (2.2 kg actual/ha) B.D.	11.01	2733	43.98	11.795	2513	314.14
Gamma BHC granule (2.2 kg actual/ha) B.D.	9.91	2739	Nil	11.240	3015	280.19
Endrin granule (0.55 kg actual/ha) B.D.	11.10	3307	277.84	11.437	2486	233.56
Heptachlor granule (2.2 kg actual/ha) B.D.	10.38	2933	145.08	10.315	2618	351.44
Phosphamidon (Dimecron) 0.05% W.P.	11.25	3215	157.63	10.317	3042	448.47
Phosphamidon (Dimecron) 0.1% W.P.	9.89	3585	242.60	10.112	3306	486.80
Phosphamidon (Dimecron) 100. 0.03%	10.55	3185	130.09	10.595	3279	538.41
Endrin 0.02%	11.05	3282	219.51	10.185	2644	305.75
Endrin 0.04%	9.58	3706	360.64	9.965	3174	493.52
Parathion (Folidol) 0.025%	9.75	3224	201.10	10.495	2988	464.22
Parathion (Folidol) 0.05%	9.21	3503	285.54	9.670	3571	682.42
Imidan 0.03%	10.39	3666	363.06	11.092	3306	571.62
Thiodan 0.15%	10.11	3417	261.58	11.257	3279	595.77
Thiometon (Ekatin) 0.1% S.A.	10.47	3474	290.49	10.392	2671	304.14
Methyl Demeton (Metasystox) 0.1% S.A.	10.72	3215	182.38	10.450	2856	391.38
Phosphamidon (Dimecron) 100. 0.03% S.A.	10.94	3359	243.02	10.680	2460	214.42
Parathion (Folidol) 0.05% D.R.	10.16	3364	252.79	11.342	2803	372.90
Control	14.44	2606		15.907	1772	
Significant or not	Yes	Yes		Yes	Yes	
S.E.	0.66	143.95		0.51	243.23	
C.D. (P=0.05)	1.92	408.97		1.47	691.19	

Conclusion :

Samba . Infestation: 11 9 10 6 2 13 17 4 12 14 7 15 16 1 8 3 5 18

Yield: 9 12 6 11 14 13 17 16 3 8 15 5 10 7 4 2 1 18

Thaladi . Infestation: 11 9 6 8 4 5 14 15 10 7 16 12 2 13 17 3 1 18

Yield: 11 6 12 7 13 9 5 2 10 15 17 14 8 4 1 3 16 18

TABLE 3. *Insecticidal control trial - Thaladi 1965-66*

Treatments	Mean infestation % (Transformed values)	Grain yield in kg/ha
Main treatments:		
A. Foliar application	12.27	3494
B. Irrigation water application	12.08	3820
Significant or not	No	No
Sub-treatments:		
Control	15.07	2940
Phosphamidon (Dimecron)	11.21	3963
BHC	11.81	3591
Parathion (Folidol)	11.58	3819
Dimethoate (Rogor)	11.59	3453
Endrin	11.80	4192
Significant or not	Yes	Yes
S. E.	0.13	162.84
C. D. (P=0.05)	0.39	534.67

Conclusion: Infestation : $\overline{2\ 4\ 5\ 6\ 3\ 1}$

Yield : $\overline{6\ 2\ 4\ 3\ 5\ 1}$

TABLE 4. *Insecticidal control trial - Thaladi 1965-66*

Treatments	Grain yield in kg/ha	Total productive tillers in 5% population	Mean No. of grains per panicle	White ear infestation	Net profiit per ha Rs. P.
A. *Foliar application (900 litres/ha)*					
Control	3009	1269	106.8	6.7	—
Phosphamidon at 1 ml/litre	3882	1320	118.1	3.9	nil
BHC 50% at 5 g/litre	3208	1295	116.2	4.4	8.56
Parathion at 1 ml/litre	3616	1322	128.6	4.0	96.18
Dimethoate at 1 ml/litre	3430	1303	134.5	4 1	nil
Endrin at 2.7 ml/litre	3843	1285	142.1	4.2	121.79
B. *Irrigation water application*					
Control	2871	1217	107.9	6.9	—
Phosphamidon 0.618 litre/ha	4043	1349	120.4	3.6	364.74
Gamma BHC 6% granules 40 kg/ha	3975	1280	109.9	4.0	nil
Parathion 1.235 litre/ha	4023	1330	119.7	4.2	427.06
Dimethoate 1.235 litre/ha	3477	1307	111.6	4.0	162 86
Endrin 2% granules 40 kg/ha	4540	1323	160.7	4.1	571.36

Rs. 191.71, Rs. 88.97 and 571.36 per hectare for the first, second and fifth experiments respectively, while the maximum net profits of Rs. 363.06 and Rs. 682.42 per hectare are obtained in the case of Imidan and Parathion for the third and fourth experiments respectively. Parathion 0.05 % and Endrin 0.04 % as brood emergence sprays have not only reduced the stem borer incidence considerably but also recorded more grain yields resulting in increased net profits per hectare. Israel (1966) and Pathak (1966) have advocated brood emergence sprays for better stem borer control. The present investigations also indicate that effective control of the rice stem borer is possible by the correct time of application of Parathion 0.05 % or Endrin 0.04 % coinciding with the brood emergence, at two rounds of spray for each brood, limiting the application to two effective broods per season rather than giving three rounds of prophylactic treatment, first round in the nursery followed by two rounds in the main field. However, it is felt that a few more trials are necessary to confirm the results.

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Weather and the Incidence of Stem-borer (*Chilo zonellus*, S) in Co. 12 Irrigated Summer *Cholam* at Coimbatore

by

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Introduction: The incidence of pests and diseases is closely knit with the prevailing weather conditions. With a view to understand the nature of such influence, experiments were started in 1954, in the four irrigated crops of *cholam*, *ragi*, cotton and groundnut raised at the Central Farm, Coimbatore. From the date of sowing to the date of harvest, micro-climatic observations were recorded amidst the crops both morning and evening at stipulated hours and also weekly observations on pests in collaboration with the Entomologist, Coimbatore. The data so collected for fourteen years from 1954 to 1967 in CO.12 irrigated *cholam* raised as a summer crop at Coimbatore were examined with particular reference to stem borer, *Chilo zonellus*, *S.*, which is a major pest of *jowar*, maize and sugarcane and also at

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