

Investigations into the control of the rice stem borer *Schoenobius incertulas* Wlk in Madras State

by

E. V. ABRAHAM and T. SANTHANARAMAN,
Agricultural Department, Madras.

Introduction: The stem borer - *Schoenobius incertulas* Wlk - is well recognised as one of the most serious insect pests of rice. In South India, the pest takes a heavy toll of the rice crop, year after year. The control of the pest is a difficult problem owing to the concealed existence of the larvae inside the stem. Various workers have attempted to evolve a suitable insecticidal way of controlling the pest in and outside India.

Iyatomi (1951) conducted investigations on the control of an allied species of a stem borer on rice in Japan and found that parathion (Folidol) was superior to systox in efficacy. In India, Santhanaraman (1952) has recorded BHC and Parathion (Exatox 20) as giving encouraging indications for control. Israel and Veda-moorthy (1954) found seed-soaking followed by irrigation with Folidol spray fluid at weekly intervals to be effective against the pest. Anantanarayanan et-al (1956) recommended two to three rounds of parathion (Folidol) sprayings coinciding with mass emergence of moths. Banerjee and Basu (1957) observed Tetrax-1, a systemic chemical, to be useful against the pest, in West Bengal. Nagaraja Rao (1958) tested some systemic insecticides and found systox and Folidol as potential chemicals.

The results of large scale field experiments conducted by the authors at the Agricultural Research Station, Aduthurai, in the Tanjore delta during 1954-'55 and in the Central Farm, Coimbatore from 1954 to 1957 are briefly furnished in this article.

Materials and methods: In all, three experiments were conducted at Aduthurai during 1954-'55 season when a severe out-break of the pest was experienced in the tract. Two of the experiments were conducted on variety Co. 25 and the third was confined to ADT. 25 which are among the worst affected varieties of paddy in the tract. The investigations were conducted on the second crop (Thaladi) on which the infestation is usually intense. In one experiment the insecticidal applications were timed at three stages, namely, (i) once in the nursery about a week prior to the transplanting of seedlings, (ii) a fortnight since planting and (iii) one month since planting.

The above timings were designed with a view to controlling the initial mild pest population that infests the crop in the nursery stage and to tackle the pest in the early post planting period when heavy emergence of moths, large scale oviposition and severe tiller damage are invariably experienced.

In the second experiment, the insecticides were applied at the following periods :—

- (i) a fortnight since planting and
- (ii) at the shot-blade stage of the crop.

The treatment at the nursery stage was eliminated in this experiment in view of the negligibly low incidence of the pest at this stage. Instead of two rounds in the early post planting period, only one round was given and a second round was timed at the shot-blade stage which coincides with a major emergence of moths that account for the white earhead formation.

The third experiment was conducted on variety ADT. 25 on methods similar to the second experiment, but with less number of variants.

The insecticides chosen for the first two experiment were sprays of endrin (hexa chloro epoxy octahydro endo-endodimethano naphthalene) at 0.04% and 0.02% dilutions, parathion (diethyl para nitophenyl thiophosphate - (Folidol E. 605) at 0.025% dilution) and dusts of BHC (benzene hexa chloride) 10% and mixture of BHC 10% and DDT (dichloro-diphenyl trichloro ethane) 5% in equal proportions. In the third experiment, endrin and isodrin (hexa chloro hexa hydroendo - endodimethano naphthalene) 0.02% spray and 2% dust alone were the insecticides tried. For each treatment, a large field of about 40 cents in extent was taken instead of small randomised and replicated plots. Although this method would not lend itself to statistical scrutiny of data, this was considered to be the best suited in view of the peculiarly scattered nature of infestation by the pest and the consequent chance of its non-incidence in small randomised plots, whether treated or not. The area for each treatment was divided into six equal subplots leaving a 3 feet border all around as outskirts. Six 2 feet square samples of areas were examined at random from each subplot, for taking borer infestation counts. Thus in all, 36 such samples were examined at periodical intervals. The counts were taken a month

after planting, six weeks after planting and at the shotblade stage for infested tillers and at the earhead stage for white earheads. The yield was similarly recorded from 36 random two feet square samples, taking six samples, from each subplot.

At Coimbatore, trials were conducted for three seasons from 1954—'55 to 1956—'57, the variety chosen being Co. 19. Besides endrin and parathion, BHC spray was also tried at this centre. The insecticides were applied in three stages, viz, at the nursery, a fortnight since planting and at the shotblade stage. During the two seasons 1954—'55 and 1955—'56, endrin was tried at a low dilution of 0.01% and subsequently, it was tried at 0.02% concentration.

A field of about 20 cents was taken for each treatment. The area under each treatment was divided into four equal subplots and five 2 feet square samples were examined from each subplot for infestation counts. Twenty such samples were thus examined under each treatment. Counts were taken twice, viz., once about six weeks after planting and again at the earhead stage. The yield of 20 similar samples was recorded from each treatment.

The data gathered are furnished under appendix.

Conclusions: From an examination of the data gathered from the experiments, it is seen that among the insecticides included in the trials, sprays of endrin 0.02%, parathion 0.025% and BHC 0.1% are effective in reducing infestation and increasing the yield. Isodrin also gave encouraging indications, but it was too costly for adoption. The Control of stem borer and a variety of other pests such as thrips (*Thrips oryzae*), jassid (*Nephotettix bipunctatus* Fb) grasshoppers (*Oxya velox* F and *Hieroglyphus banian* F), etc. would have contributed to the increased yields obtained.

No benefit seems to have accrued due to an additional treatment in the nursery stage and as such a nursery treatment is not essential under ordinary circumstances. One round of treatment is essential in about two weeks since planting as the heaviest damage is often experienced at this stage. The emergence of a major brood of the pest by about the shot-blade stage and damage caused to earheads warrant one round of spraying at this period. The cost of the chemical for treating one acre with endrin 0.02% (1 oz of 19.5% e. c. in 6½ gallons), parathion (Folidol 1 oz. in 12½ gallons) and BHC 0.1% (1 lb. of 50% wetttable powder in 6½ gallons) approximates

to Rs. 10:30, Rs. 12:75 and Rs. 21:54, respectively. The use of endrin or parathion is more economical; 60 gallons of the spray fluid will suffice to cover an acre in the early post planting stage and about 80 gallons at shot-blade stage. The quantity of actual endrin to be applied in two rounds works out to 0.28 lb. and that of parathion (Folidol) works out to 0.35 lb. per acre.

The insecticides are poisonous and should be handled with due care.

Acknowledgment: The authors' thanks are due to the Government Entomologist, Coimbatore for the guidance rendered in the investigations and to the Superintendents at the Agricultural Research Station, Aduthurai and Central Farm, Coimbatore for affording the required facilities for conducting the experiments.

BIBLIOGRAPHY

1. Ananthanarayanan, K. P. et al 1956 A note on the recent developments in the chemical control of the paddy stem-borer-*Schoenobius incertulus* W. Science and Culture. 2 : 551 - 553.
2. Banerjee, S. N. and Basu, A. C. 1957 Experiments with a systemic insecticide for the control of *Schoenobius incertulus* Wlk (Lepidoptera, Pryalidae), a stem borer of paddy in West Bengal. Bull Ent. Res. 48 (2) : 292 - 303.
3. Israel, P. and Vedamoorthy, G. 1954 New experiences with Folidol E. 605 in the control of rice stem borer. Curr. Sci. 23 (7) : 211 - 212.
4. Iyatomi, K. 1951 Preliminary experiments on systemic insecticides against rice stem borer. Shizuoka Agril. Expt. Sta. pamphlet.
5. Santhanaraman, T. 1952 Some experiments on the control of the rice stem-borer and the rice mealy bug. Plant Protection Bull, India 4 (4) : 93 - 100.

APPENDIX

Trials on control of rice stem borer at Aduthurai and Coimbatore.

Trials at Aduthurai		Endrin 0.04 % I	Endrin 0.02 % II	Parathion 0.25 % III	BHC 10 % IV	BHC 10 % & DDT 5 % V	Control VI	Remarks
<i>Experiment I.</i>								
1.	Average percentage of infestation ..	3.09	2.03	4.06	4.03	5.6	7.08	Variety Co. 25. Planted: 4 to 8-10-1954.
2.	Calculated acre yield (based on on yield from 36 two feet square samples) in lb.	5808	5445	5203	5203	4810	4931	Area under each treatment: 40 cents
3.	Percentage on control ..	117.79	110.42	105.52	105.52	97.55	100	<i>Time of treatment:</i> 1. in the nursery, a week prior to planting. 2. a fortnight since planting. 3. a month since planting.
<i>Experiment II.</i>								
1.	Average percentage of infestation ..	2.02	4.07	5.00	4.03	5.01	12.07	<i>Time of treatment:</i> 1. a fortnight since planting. 2. at the shot blade stage. other details same as above.
2.	Calculated acre yield in lb.	5869	6111	5233	4991	4840	5142	
3.	Percentage on control ..	114.14	118.81	101.77	97.06	94.13	100.00	
<i>Experiment III.</i>								
1.	Average percentage of infestation ..	4.01	3.07	6.02	6.02	11.02	11.02	Variety: ADT 25 planted on 7 and 8-11-1954. Area under each Treatment: 40 cents.
2.	Calculated acre in lb.	4235	3781	3358	3025	3025	3025	<i>Time of treatment:</i> 1. a fortnight since planting 2. at the shot-blade stage.
3.	Percentage on control ..	140.00	124.99	111.01	100	100	100	

APPENDIX (Contd.)

Trials at Coimbatore		Endrin 0.01 %	Parathion 0.025 %	BHC 0.01 %	Control	Remarks
<i>Experiment II.</i>						
1. Average percentage of infestation	..	1.03	0.07	0.08	3.00	Variety: CO. 19. Planted on 30-10-1954 to 4-10-1954.
2. Calculated acre yield (based on yield from 20 random two feet square samples) in lb.	..	3755	4551	4418	3080	Area under each treatment: 2 cont. Time of treatment: as in experiment I.
3. Percentage on control	..	121.91	149.76	143.44	100	
<i>Experiment V.</i>						
1. Average percentage of infestation	..	0.07	0.04	0.05	4.01	Variety: Co. 19. Planted on 16 to 20-2-1955.
2. Calculated acre yield in lb. (as in experiment IV above)	..	2868	3377	3395	2530	Area under each treatment 20 conts.
3. Percentage of control	..	113.36	133.48	134.19	100	Other details as above.
<i>Experiment VI.</i>						
1. Average percentage of infestation	..	0.03	0.01	0.02	1.05	Variety: Co. 19. Planted on 30-10-1956 to 4-11-1956.
2. Calculated acre yield in lb. (as above)	..	4085	4820	4820	3970	Other details as above.
3. Percentage yield on control	..	107.78	129.82	104.75	100	"
<i>Experiment VII.</i>						
1. Average percentage of infestation	..	0.05	0.05	Not included	1.64	Variety: Co. 19. Planted on 3 and 4-11-1956.
2. Calculated acre yield in lb. (as above)	..	3025	3250		2975	Other details as above.
3. Percentage yield on control	..	101.68	109.33		100	"

Note: The infestation was very light at Coimbatore while it was fairly heavy at Aduthurai.