

## Control of Rice Gall Fly by Water-Surface Application of Granular Insecticides with Special Reference to Timing of Application

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### ABSTRACT

Studies were made to test the efficacy of four granular insecticides in four timings of application for the control of the rice gall fly. Phorate and carbofuran were equally effective in checking the incidence of gall fly. The commencement of the first application on 15th, 20th and 25th days after planting gave better check on silver shoot infestation irrespective of insecticides.

### INTRODUCTION

With the introduction of high yielding varieties, the gall midge, *Pachytiplosis oryzae* (Wood Mason) assumed serious proportions particularly in the Thanjavur delta and Vaigai River Project area of Tamil Nadu. Gopalakrishnan *et al.* (1954) estimated the damage caused by gall fly to be about 20 per cent in the composite Madras state. Several spray formulations of organophosphate insecticides (Israel *et al.*, 1959; Katarki and Bhagavat, 1960; Krishnamurthy Rao and Krishnamurthy, 1960) and certain systemic granular insecticides (Roy and Panda, 1971; Velayutham *et al.*, 1971) were found to be effective against gall fly.

The control of gall fly with a few selected granular insecticides with special emphasis on the time of appli-

cation was attempted at the Agricultural College and Research Institute, Madurai, and the results are presented in this paper.

### MATERIALS AND METHODS

The rice variety IR. 8 was used in the two trials conducted during 1972-73. Carbofuran 3G, phorate 10 G, quinalphos 5 G, and fenthion 5G at 2.5 kg a.i./ha were tested as water-surface application.

Two rounds of the chemicals were given at an interval of one month and the first application was made on 15, 20, 25 and 30 days after planting respectively. A common spray of toxaphene+DDT at one litre per acre was given to check the leaf roller damage at the preflowering stage.

In each experiment, there were seventeen treatments including four

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insecticides each at four times of application and one untreated control. The experiment was laid out in a randomised block design with three replications.

In the randomly selected five hills, the total number of tillers and 'silver-shoots' due to gall fly were recorded and the percentage of infestation worked out. In the first season crop of 1972-73, four counts were made at 15 days interval starting the first count 23 days after planting. As there was no incidence of pests in the first count, the data from the other three counts were utilised for statistical analysis.

In the second experiment, the first count was made a fortnight after

planting and thereafter four counts at 15 days interval were made.

## RESULTS AND DISCUSSION

Among the four granular insecticides applied to paddy, phorate and carbofuran were found to be effective in minimising the infestation of gall fly in both the experiments. The results of the first experiment revealed that phorate and carbofuran treated plots had only 3.12 and 6.95 per cent infestation of gall fly respectively compared to 22.14 per cent in the untreated control plot (Table I). In the second experiment the percentage of infestations of gall fly were 1.43 and 2.58 in phorate and carbofuran treated plots respectively as against 14.34 in check (Table II).

TABLE I Effect of four granular insecticides in the control of rice gallfly in four timings of application in the first experiment (1972 — 73)

Insecticides	Time of application (Days after planting)				Mean	% decrease from control
	15	20	25	30		
Carbofuran	5.26 (11.41)	4.10 (8.91)	6.06 (13.29)	12.41 (17.27)	6.95 (12.72)	68.61
Phorate	3.82 (8.15)	2.36 (6.78)	1.05 (4.49)	5.24 (11.45)	3.12 (7.72)	85.91
Quinalphos	17.63 (22.14)	23.89 (26.82)	18.39 (22.19)	27.46 (29.73)	21.84 (25.22)	1.36
Fenthion	18.91 (23.47)	17.25 (22.19)	23.56 (26.40)	17.02 (23.02)	19.19 (23.77)	13.32
Mean	11.41 (16.29)	11.90 (16.17)	12.27 (16.59)	15.53 (20.77)	—	—
Control mean %	—	—	—	—	22.14	—
C. D. (P = 0.05)	2.93					

Mean of 9 values in 3 fortnights and 3 replications  
 Figures in parentheses are transformed values

The effectiveness of phorate against gall fly, has also been reported by Cantelo and Kovitvadhi (1967). The significant superiority of phorate over carbofuran is considered due to the variation in the action of these chemicals through the plant tissues against the larvae of the gall fly. Ashworth and Thomas (1970) in their studies on the uptake and metabolism of  $C^{14}$  tagged carbofuran in tobacco plants reported that it was absorbed readily and translocated to leaves without accumulating in the roots. They observed that carbofuran first makes its appearance in between veinlets and later diffusion occurs to the peripheries. More of carbofuran was found in older leaves than in terminal growths while the reverse was true for phorate and disulfoton (Metcalf *et al.*, 1957; Tsao and Clark, 1961). Since the first instar larva of

gall fly reaches the shoot apex without boring into plant tissues and feeds at the base of the growth cone (Perera and Fernando, 1970) it is possible that phorate may be more effective than carbofuran as phorate is taken up to the meristematic tissue of the plant quickly. In the first experiment there was no significant interaction between insecticides and the times of application. However, the lowest incidence of 1.05 per cent was observed on 25th day after planting in plots treated with phorate. The next lower incidence of 4.10 per cent was noticed on 20th day after planting in the case of carbofuran treatment (Table I).

In the second experiment while considering the effect of insecticides over times of application, carbofuran and phorate were found to be effective when applied on 25th day after planting (Table II).

TABLE II Effect of four granular insecticides in the control of rice gall fly in four timings of application in the second experiment (1972 — 73)

Insecticides	Time of application (Days after planting)					% decrease from control
	15	20	25	30	Mean	
Carbofuran	3.72 (9.56)	3.60 (8.37)	1.09 (4.80)	1.91 (6.67)	2.58 (7.43)	82.01
Phorate	2.34 (6.85)	0.71 (3.86)	0.83 (3.82)	1.83 (6.18)	1.43 (5.18)	97.00
Quinalphos	9.40 (16.32)	8.60 (13.85)	12.67 (19.06)	15.88 (23.20)	11.59 (18.11)	19.18
Fenthion	10.85 (18.11)	6.09 (14.36)	10.33 (17.42)	16.17 (22.56)	10.86 (18.11)	24.26
Mean	6.58 (12.71)	4.75 (10.24)	6.23 (11.28)	8.9 (14.65)	—	—
Control mean %	15.15	12.14	13.66	16.40	14.34	—
C. D. (P = 0.05)	1.07					

Mean of 15 values in 5 fortnights and 3 replications

Figures in parentheses are transformed values

In general, the two applications of granular insecticides at monthly interval commencing the first application on the 15th, 20th or 25th day after planting as against 30th day, gave maximum check on silver shoot infestation. No literature is available on the effect of time of application of granular insecticides in the control of rice gall fly. All the studies conducted so far pertain only to the foliar sprays. One or more applications with various pesticides commencing the first application 15 days after planting were reported as effective against gall fly by several workers (Cantelo and Kovitvadhi, 1967; Roy and Panda, 1971; Velayuthara *et al.*, 1971; Anonymous, 1971). The finding in the second experiment revealed in contrast to above works that commencing the first application on 25th day

after planting with either phorate or carbofuran to be most effective of all the timings tried (Table II).

Maximum percentage of shoots attacked by gall fly coincided with maximum tillering of the plants (Gopalakrishnan *et al.*, 1954; Israel, 1959). From the above point of view the present findings on the time of application of pesticides are found to be best suited to attack the vulnerable stage of the pest.

Carbofuran and phorate gave higher yield of grain (Table III). The increase in yield is mainly due to the control of insects. The reduction in gall fly infestation following insecticidal application resulted in increased yield (Ketarki and Bhagavat, 1960; Ou and Kanjanasoon, 1961).

TABLE III Effect of water surface Application of Granular Insecticides on grain yield (kg/plot)

Treatment-I Application (days after planting)	Experiment I	Experiment II	Mean
Carbofuran (15)	11.15	7.30	9.23
—do— (20)	11.30	7.66	9.48
—do— (25)	10.65	7.46	9.06
—do— (30)	9.58	7.40	8.49
Phorate (15)	11.17	4.28	7.73
—do— (20)	11.22	5.21	8.22
—do— (25)	11.50	5.23	8.36
—do— (30)	10.98	6.50	8.74
Quinalphos (15)	8.57	5.53	7.05
—do— (20)	6.68	4.76	5.72
—do— (25)	7.02	4.36	5.69
—do— (30)	6.33	4.23	5.28
Fenthion (15)	8.78	5.08	6.93
—do— (20)	9.23	4.56	6.89
—do— (25)	8.20	3.96	6.08
—do— (30)	9.10	4.63	6.87
Control	6.35	4.83	5.59
C. D. (P=0.05)	1.12	0.18	

Mean of 3 values

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