

## Efficacy of Quinalphos Granule and Emulsifiable Concentrate in the Control of Rice Pests

By

M. A. HUSSAIN<sup>1</sup> and K. M. AZAM<sup>2</sup>

### ABSTRACT

The results from Rajendranagar trial revealed that quinalphos granules at 1.5 kg a.i./ha applied at 10 and 30 DAT, and emulsifiable concentrate at 250 ml a.i./ha applied at 55 DAT gave the best control of the rice stem borer, gallmidge and leaf folder and increased the yield. At Warangal, quinalphos granules at 1.5 kg. a.i./ha gave the best control of gall midge and stem borer at vegetative stage, while emulsifiable concentrate at 250 ml a.i./ha was superior in terms of white ear and leaf folder control.

### INTRODUCTION

Field experiments were laid out at Agricultural Research Institute, Rajendranagar and Agricultural Research Station, Warangal during *Kharif* 1972, to evaluate the efficacy of quinalphos (Ekalux) granule formulation and emulsifiable concentrate, against the major pests of rice taking some of the proven established insecticides *viz.*, parathion E.C., Endrin E. C. and Dursban granules and E. C., as standards. Evaluation was made against rice stem borer, *Tryporyza incertulas* Walker, rice gall midge, *Pachydiplosis oryzae* Wood-Mason and rice leaf folder, *Cnaphalocrocis medinalis* Gueno.

### MATERIALS AND METHODS

The trials were conducted during *Kharif* 1972 at Agricultural Research Institute, Rajendranagar and Agricultural Research Station, Warangal. IR 8,

which is susceptible to stem borer, gall midge and leaf hoppers was used in the trials at both locations. The trials were laid in randomized block design with 8 treatments and 4 replications at Rajendranagar and 10 treatments and 4 replications at Warangal. The seedlings were planted using a spacing of 20 × 15 cm and each treatmental plot was of 8 × 5 m in dimension. The details of the treatments are presented in Tables I and II for Rajendranagar and Warangal, respectively.

The infestation by gall midge, stem borer and leaf folder was recorded from 60 clumps selected at random in each plot. Observations in respect of stem borer and gall midge were recorded at 30 and 50 days after planting (DAT) and again a week prior to harvest for stem borer damage (white ears). Observations for leaf folder damage were taken at 90 DAT. Yield data were recorded in each treatment.

<sup>1, 2</sup>- Entomology Department, College of Agriculture, Rajendranagar, Hyderabad

## RESULTS AND DISCUSSION

### Experiment I - Rajendranagar :

Quinalphos granules at 1.5 kg a.i./ha was found to be the most effective in conjunction with quinalphos EC at 250 ml a.i./ha.

**Gall midge :** Though gall midge infestation was not high at 30 DAT but the treatments 2 (quinal. Gr-Gr-EC), 3 (quinal. Gr-EC-EC) and 6 (quinal. Gr - X - Gr) were the most effective showing infestation of 0.16, 0.21 and 0.24 per cent respectively and were on par (Table I). Treatment 5 (quinal. EC-EC-EC) and treatment 7 Dursban EC had infestations of 1.89 and 2.22 per cent and were on par to each other. The untreated control recorded a damage of 4.86 per cent which was on par to treatment 4 (quinal. X-Gr-EC) with 4.90 per cent damage and the latter treatment recorded the maximum incidence.

At 50 DAT, the gall midge infestation increased and the treatment receiving granules of quinalphos at 30 DAT (quinal. Gr-Gr-EC) was more effective (0.87 per cent) followed by treatment 4 (quinal. X-Gr-EC) with incidence of 1.05 per cent but however, on par with treatments 3 (quinal. Gr-EC-EC) and 5 (quinal. EC-EC-EC). Treatment 6 (quinal. Gr-X-Gr) which did not receive any insecticidal treatment at 30 DAT recorded a damage of 9.26 per cent while control registered 13.41 per cent damage and these two were on par along with Dursban EC.

It was evident that quinalphos Gr. treatment at 30 DAT was most effective

followed by its spray treatment. Studies conducted under All India Co-ordinated Rice Improvement Project also revealed that quinalphos Gr. were very effective against gall midge at Tenali (Ansn. 1970).

**Stem borer :** In 30 DAT count, though infestation was moderate, the treatments 2 (quinal. Gr-Gr-EC), 3 (quinal. Gr-EC-EC) and 6 (quinal. Gr-X-Gr) were effective with lowest infestation of 0.5 to 1.5 per cent and were on par (Table I). Next to granular formulation of Ekalux the EC formulation in treatment 5 (quinal. EC-EC-EC) was effective with 2.17 per cent damage. Treatment 4 (quinal. X-Gr-EC) in which no application was given at 10 DAT recorded 15.87 per cent and control had a maximum infestation of 16.27 per cent.

In 50 DAT count, the infestation was low and all treatments of quinal recorded a damage less than 3 per cent except treatment 6 (quinal. Gr-X-Gr) which recorded a damage of 4.83 per cent.

Sathpathy (1972) also reported good control of stem borer by quinalphos Gr. with less than 3 per cent infestation (dead hearts) as against 31.82 per cent in the untreated control.

Counts taken for white ear heads, just before harvest revealed that treatment 6 (quinal. Gr-X-Gr) and treatment 2 (quinal. Gr-Gr-EC) were most effective with 0.88 and 1.11 per cent damage respectively and were superior than other treatments. Treatments 5

TABLE I. Chemical control of rice gall midge, stem borer and leaf folder. Experiment I — Rajendranagar

Treatment	Dosage (a.i. / ha) (Days after planting)					Gall midge (% of galled tillers)		Stem borer (Dead heart %)		Leaf folder (% infestation)		Grain yield (kg / ha)
	10	30	55	30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT	
Control	—	—	—	4.86 (13.82)	13.41 (21.55)	16.27 (24.55)	7.29 (15.57)	6.96 (14.75)	3.24 (11.50)	1571		
Quinalphos Gr / EC	1.5 kg	1.5 kg	250ml	0.16 (5.70)	0.87 (5.70)	1.11 (8.57)	0.75 (5.70)	1.11 (5.70)	1.43 (8.10)	3257		
Quinalphos Gr / EC	1.5 kg	250 ml	250 ml	0.21 (5.70)	3.29 (10.37)	0.97 (7.50)	2.12 (8.10)	3.24 (10.38)	1.72 (10.00)	2678		
Quinalphos Gr / EC	—	1.5 kg	250 ml	4.90 (14.20)	1.05 (5.70)	15.87 (24.18)	0.97 (5.70)	2.24 (8.58)	1.85 (10.00)	1780		
Quinalphos EC	250 ml	250 ml	250 ml	1.89 (10.00)	3.34 (10.00)	2.17 (10.00)	2.90 (10.00)	2.16 (8.58)	1.91 (9.90)	2373		
Quinalphos Gr.	1.5 kg	—	1.5 kg	0.24 (5.70)	9.26 (17.65)	0.97 (8.10)	4.83 (12.90)	0.88 (5.70)	0.09 (5.70)	2678		
Dursban EC	0.2 kg	0.2 kg	0.2 kg	2.22 (10.37)	7.22 (15.30)	6.73 (16.13)	3.77 (11.47)	4.76 (12.55)	0.67 (8.10)	2073		
Dursban Gr	0.5 kg	0.5 kg	0.5 kg	3.08 (11.50)	4.40 (12.20)	2.00 (12.55)	2.00 (8.10)	3.15 (10.00)	1.35 (8.10)	2318		
S. E.				0.324	3.089	0.553	0.321	0.480	0.347	75		
C. D. (P=0.05)				0.673	6.425	1.150	0.667	0.998	0.721	156		

Figures in parentheses are transformed values

(quinal. EC-EC-EC) and 4 (quinal. X-Gr-EC) were next in efficacy with infestation of 2.16 and 2.24 per cent respectively. Dursban EC recorded high infestation (4.76 per cent) while there was 6.96 per cent infestation in control.

**Leaf folder :** Infestation of leaf folder was negligible. However, among the combinations tested, treatment 6 (quinal. Gr-X-Gr) was the most effective (Table I). Treatments 7 (Dursban EC), 8 (Dursban Gr), and 2 (quinal. Gr-Gr-EC) were on par and recorded infestations of 0.67, 1.35 and 1.43 per cent respectively while control recorded the maximum infestation (3.24 per cent). Results of a trial carried out at Rajendranagar and Warangal by AICRIP during *Kharif*, 1969 showed that Cytrolane was the most effective treatment against leaf folder followed by Ekalux, Birlane and Dursban (Anon., 1969).

**Yield :** Treatment 2 (quinal. Gr-Gr-EC) recorded a maximum yield of 3,257 kg/ha and was significantly superior to rest of the treatments, while treatment 3 (quinal. Gr-EC-EC) and treatment 6 (quinal. Gr-X-Gr) were the next with 2,678 kg/ha (Table I). Treatment 5 (quinal. EC-EC-EC) and 8 (Dursban Gr) were on par with each other with 2,378 and 2,318 kg/ha, respectively. Treatment 4 (quinal. X-Gr-EC) which did not receive any insecticidal application at 10 DAT recorded a low yield of 1,780 kg/ha which showed that early dead heart and silver shoot damage resulted in loss. The control treatment recorded a very low yield of only 1,571 kg/ha.

It is evident from Table I, that treatment 2 (quinal. Gr-Gr-EC) had 28 per cent increase in yield over control. Treatments 3 (quinal. Gr-EC-Gr) and 6 (quinal. Gr-X-Gr) were the next with 70.42 per cent increase in yield. Treatment 4 (quinal. X-Gr-EC) in which no insecticidal application was given at 10 DAT had only 13.31 per cent increase over control.

#### Experiment II - Warangal:

Both the formulations of quinalphos gave good control of the pests studied. The protection effected by the granules was particularly spectacular and by far the best. This is again manifested in the yield.

#### Gall midge

Data collected at 30 DAT (Table II) clearly indicated that quinalphos Gr. at 1.5 kg a.i./ha was the most outstanding treatment with a minimum of 0.88 per cent gall formation. Quinal. EC at 250 ml a.i./ha recording an infestation of 1.57 per cent was superior to Dursban granules (2.48 per cent) and these three treatments were on par with each other. Quinal. EC at 125 ml a.i./ha which recorded 3.28 per cent damage was on par with 250 ml a.i./ha, Endrin at 300 ml a.i./ha with an infestation of 9.64 per cent was the least effective being next to control which recorded 12.70 per cent damage.

Data collected at 50 DAT (Table II) revealed that quinalphos Gr. at 1.5 kg a.i./ha was the most effective treatment for control of gall midge with an

TABLE II. Chemical control of rice gall midge, stem borer and leaf folder. Experiment II — Warangal

Treatment	Dosage (a. i. / ha) at 10, 30 and 55 DAT	Call midge (% of galled tillers)		Stem borer Dead heart (%)		(white ear (%))	Leaf folder (% infesta- tion)	Grain yield (kg / ha)
		30 DAT	50 DAT	30 DAT	50 DAT			
Control	—	12.70 (20.90)	37.36 (37.63)	5.94 (15.28)	14.68 (22.40)	7.20 (15.30)	3.89 (12.90)	694
Quinalphos EC	125 ml	3.28 (10.75)	5.70 (13.88)	2.16 (10.38)	3.88 (11.50)	2.89 (10.00)	0.73 (8.10)	918
Quinalphos EC	250 ml	1.37 (6.90)	2.48 (9.05)	1.53 (9.05)	2.67 (9.05)	1.22 (5.70)	0.16 (5.70)	1700
Parathion EC	175 ml	7.28 (16.13)	12.42 (20.70)	4.65 (13.83)	9.99 (18.15)	6.52 (14.88)	3.28 (11.50)	894
Parathion EC	250 ml	5.23 (13.23)	7.61 (16.13)	2.61 (11.13)	4.87 (12.90)	4.45 (11.85)	3.28 (10.00)	1231
Quinalphos Gr	0.75 kg.	4.18 (11.50)	3.28 (10.75)	1.05 (8.10)	1.71 (7.50)	3.90 (11.50)	3.36 (11.50)	1581
Quinalphos Gr	1.50 kg.	0.88 (5.70)	1.41 (6.30)	0.12 (5.70)	0.83 (5.70)	2.17 (8.58)	1.16 (8.10)	2031
Endrin EC	300 ml	9.64 (18.15)	19.70 (26.40)	4.00 (13.26)	8.78 (17.40)	4.75 (12.90)	1.35 (9.05)	763
Dursban EC	0.2 kg.	6.26 (14.48)	9.77 (18.10)	3.41 (11.85)	5.97 (14.20)	6.03 (14.20)	2.09 (10.00)	869
Dursban Gr	0.5 kg	2.48 (9.05)	4.00 (11.50)	1.51 (9.05)	3.00 (10.00)	3.70 (11.13)	2.99 (11.85)	1512
S. E.		1.927	0.567	0.634	0.456	0.350	0.281	40
C. D.		2.950	1.162	1.299	0.934	0.717	0.576	82

Figures in parentheses are transformed values

average infestation of 1.41 per cent followed by quinal. EC at 250 ml a.i./ha recording 2.48 per cent infestation. Parathion at 125 ml a.i./ha recorded an infestation of 12.42 per cent and was superior to endrin at 300 ml a.i./ha which had gall midge damage of 19.70 per cent. The control recorded the highest infestation of 37.36 per cent.

Results from the trials conducted by AICRIP at Aduthurai during *Kharif* 1971 revealed that quinalphos EC was best for the control of gall midge (Anonymous, 1971). This was also confirmed later by Sathpathy (1972).

**Stem borer :** Counts taken at 30 DAT for dead hearts revealed that quinalphos Gr. at 1.5 kg a.i./ha recorded a minimum infestation (0.12 per cent) and was superior to all the other treatments (Table II), while the same formulation at 0.75 kg a.i./ha recorded 1.05 per cent damage. However, this latter treatment was on par with Dursban granules at 0.5 kg a.i./ha with infestation of 1.5 per cent and at 250 ml a.i./ha with 1.53 per cent. Quinalphos at 125 ml a.i./ha recorded 2.16 per cent damage and was on par with parathion at 250 ml a.i./ha. Parathion at 125 ml a.i./ha was the least effective with an average damage of 4.65 per cent while control registered a maximum of 5.94 per cent damage.

The second count taken at 50 DAT had more or less similar pattern of control. Quinalphos granules at 1.5 kg a.i./ha was the most effec-

tive and registered a minimum damage of 0.83 per cent while at 0.75 kg a.i./ha it recorded 1.71 per cent infestation. Quinalphos at 250 ml a.i./ha with infestation of 2.67 per cent was slightly superior to Dursban granules which recorded 3.00 per cent infestation. Quinalphos at 125 ml a.i./ha recording 3.88 per cent damage and parathion at 250 ml a.i./ha with 4.87 per cent damage were also effective. Dursban EC at 0.2 kg a.i./ha was superior to Endrin with infestations of 5.97 per cent and 8.78 per cent respectively. Parathion at 125 ml a.i./ha was again the least effective treatment with an average infestation of 9.99 per cent being only next to control which recorded 14.68 per cent damage. Pathak (1971) reported very good control of stem borer at early stage by quinalphos Gr. at 1.0 kg/ha in trials conducted at IRRI.

The white ear damage count recorded just before harvest while revealing a maximum average incidence of 7.25 per cent in the control, gave the best stem borer control by quinalphos at 250 ml. The granule at 1.5 kg and EC at 125 ml a.i./ha with infestations of 2.17 per cent and 2.89 per cent were the next best treatments. Dursban granules at 0.5 kg a.i./ha and quinalphos Gr. 0.75 kg a.i./ha were also effective in lowering white earhead damage with infestations of 3.70 per cent and 3.90 per cent respectively and were on a par with parathion at 250 ml a.i./ha with 4.45 per cent damage and endrin 300 ml a.i./ha recording 4.75 per cent damage gave more or less same degree of control.

**Leaf folder :** Infestation by this pest was negligible during *Kharif* 1972. However, quinalphos at 250 ml a.i./ha with an infestation of 0.16 per cent recorded the best control (Table II), while quinalphos Gr. at 1.5 kg a.i./ha recorded an infestation of 1.16 per cent.

**Yield :** Significant differences were observed among different treatments in the yield. Quinalphos Gr. at 1.5 kg a.i./ha recorded the highest yield of 2,031 kg/ha and was superior to all the treatments. The EC at 250 ml a.i./ha gave the next highest yield of 1,700 kg/ha (Table II). Quinalphos Gr. at 0.75 kg a.i./ha with an yield of 1,581 kg/ha and Dursban granules with an yield of 1,512 kg/ha were on par with each other. Parathion at 250 ml a.i./ha recorded an yield of 1,231 kg/ha which was superior to that of quinal-EC at 125 ml a.i./ha (918 kg/ha). The control recorded the lowest yield of 694 kg/ha. In general the yields have been very low in this experiment due to scarcity of irrigation water at certain periods of the crop growth.

## REFERENCES

- ANONYMOUS. 1969. New Insecticidal Trial. Progress Report, All India Coordinated Rice Improvement Project, ICAR, (Kharif, 1969). 3:12, 1-12.8.
- 1970. New Insecticidal Trial. Progress Report, All India Coordinated Rice Improvement Project ICAR, (Kharif, 1970). 3:13, 1-13.15.
- 1971. Trial for Chemical control of leaf folder. Progress Report, All India Coordinated Rice Improvement Project, ICAR, (Kharif, 1971). 3:9, 42-9.51.
- 1971. Current Insect problems and activities in - Indonesia (1968-69). Proceedings of International Rice Research Conference, I.R.P.I., April, 19-23, 1971.
- Pathak, M.D. 1971. Effectiveness of Birlane, Dursban and SD-6626 used at different rates. Abstract: Insecticidal control of common Insect pests of Rice plant. July-Nov., 1968.
- Sathpathy, J.M. 1972. Rice pests and their control. Proceedings of Entomology Group Meetings, March 27-31, 1972, p4.