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SEASONAL ACTIVITY AND CONTROL OF RICE ROOT APHID, *RHOPALOSIPHUM REFIABDOMINALIS* (SOS) (APHIDIDAE : HEMIPTERA) IN UPLAND PADDY

R.N. Barwal*, N.S.A. Thakur and N.S. Rao
ICAR Research Complex for NEH Region,
Umroi Road, Barapani, Meghalaya-793103, India

Rice-root aphid, Rhopalosiphum rufiabdominalis (Sos.) and field sparrow, Passer montanus Lin. Were identified as major pests of upland paddy in Meghalaya (Barwal, 1985) An experiment, therefore, was conducted to study their seasonal incidence. Losses caused to the crop and suitable management practices.

Study on the seasonal activity of the pests, aphid parasites, aphid dispersing agents and effectiveness of insecticides against them, was undertaken. Rice, variety 'Ngoba' was sown in site by dibbling the seeds in the terraced upland farm of the Division of Entomology, ICAR Research complex for NEH Region, Barapani (Mahalaya)

Incidence of the rice-root apid, its parasites and the dispersing agents was recorded by uprooting 10 hills of paddy, randomly from each plot at 3 month stage of the crop. The hills were uprooted very carefully without disturbing the soil around it. The soil was then removed to count the number of adult aphids and the aphid colonies. The aphid colonies in a hill clump were further identified for insect and nematode parasitisation. Also, occurrence of dispersing agents viz., ants and termite in each colony were recorded. Similarly observations on the mortality f aphids were recorded in the insecticide treated plots. In order to assess the bird damage, rice panicles of 10 hills in each plot were protected by covering them with punched tissue papers at the milky stage of the grains. Thus, bird protected and unprotected rice hills and the rice yield was expressed as kg ha-1.

Different formulations of insecticides were evaluated for efficacy against the rice-root aphid and for safety to its natural enemies. T he experiment was laid out in randomized block and seasonal activities of pests, parasites, aphid dispersing agents and the effectiveness of insecticides were analyses accordingly.

In addition to the readable, acidic and phosphorus fixing drawbacks of upland soils, the problems of rice-root aphid, R. rufiabdominalis at the rice-root aphid, R. rufiabdominalis at the rice root-zone and the field sparrow, P. montanus at the milky stage of rice panicles had been identified in upland terraces (Barwal, 1994). The aphid had also been recorded by Verma et. Al (1995) as a pest of wheat and also it was found to colonise in cotton (Stoetzel and Miller, 1996)

Seasonal incidence

The activity of rice-root aphid was found maximum in 1 May sown paddy when 19 adults and 4.22 aphid colonies were recorded in 10 hills (Table 1). Activities of its insect and nematode parasites viz., Aphelinus sp and the Hexamermis sp respectively, increased progressively in different dates of sowings from April to June. However, in the case of 1 July sown paddy, there was decrease in the incidence of rice-root aphid and its parasites. The activities of aphid dispersing agents viz., ants (Tetramorium bicarinatum Nyl., Pachycondylla sp and Components sp) and termite, Pericapritermes

sp were found maximum in 1 May to 1 June sowings and decreased in the latter sowings. Mite, Uroovovella marginata (Koch.) was also found associated with the aphid and its dispersing agent in the rice root-zone. It indicated that in early sown paddy rice-root aphid infestation remained low as a result of its poor initial population and comparatively low temperature in April. The optimum range of temperature for the population growth of this aphid was 20-25°C (Tsai and Ying Hong, 1998). On the other hand monsoon rains were responsible for the decreased activity of the dispersing agents in the latter sowings that affected adversely the dispersal of this aphid from hill to hill. Maximum rice yield was recorded in April sown paddy under protected conditions (Table 1).

Effectiveness of insecticides

There is no information, so far, on the evaluation of insecticides or any other pest management practice against rice-root aphid and the field sparrow. Among these granular formulations of insecticides, carbofuran and phorate had been recommended widely as soil insecticides (Barwal, 1995; Barwal; 1996 and Barwal, 2000). Adverse effect of these insecticides to upland rice crop was, therefore, attributed to the toxicity of these insecticides to the parasite, Aphelinus sp of rice-root aphid. However, parasitisation of rice-root aphid was higher than control in the case of untreated plots (Table 2).

Among five systemic insecticides, phosphamidon, monocrotophos, formation and thiometon were found significantly superior in effectiveness, whereas among the five contract insecticides, endosulfan only was found effective against this aphid. Safety of these insecticides to the parasite of rice-root aphid was reflected in the yield of inside grown upland paddy (Table 3). Endosulfan has already been recognized as a safe and effective insecticide. Systemic insecticides, however, when sprayed at the basal portion of the rice hill, reached up to the rice-root aphid through systemic action and the parasite escaped from coming into direct contact of these insecticides.

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Table 1. Seasonal activity of rice-root aphid, their parasites and dispersing agents in directly sown upland paddy.

Date of Sowing	Aphids 10 hills				Dispersing agents		Rice yield	
	Unparasitised		Parasitised colonies		infested hills (%)		(kg / ha)	
	Adults	colonies	Insects	Nematode	Ants	termites	Bird Protected	Bird damaged
1 April	6.22	2.33	1.56	0.33	0.00	0.00	6500a	457(92.97)*
15 April	4.11	1.00	2.56	0.56	0.00	1.11	6700a	501 (92.52)
1 May	19.000	4.22	3.33	0.67	11.11	7.78	4400b	864 (80.36)
15 May	10.44	1.83	2.78	1.89	12.22	10.00	3600bc	786 (78.17)
1 June	9.89	2.67	3.67	1.33	10.00	11.11	4100b	2016 (50.83)
15 June	18.33	2.44	4.33	1.33	2.22	0.00	3500bc	2564 (26.74)
July	6.44	1.33	1.89	0.89	0.00	0.00	3000c	2481 (17.30)

*Figures in the parentheses denote percent bird damage.

Table 2. Evaluation of granular insecticides for effectiveness against rice-root aphid

Insecticide (1.0 kg a.i./ha)	Aphids		Aphid colonies		Rice yield (kg/ha)
	Adults	Nymphs	Unparasitised	Parasitised	
Carbofuran-3G	2.81	8.42	5.50	1.83	1700 ab
Phorate-10G	2.22	6.80	4.17	1.83	1233b
Diazinon-10G	2.93	9.31	6.17	1.83	1367 ab
Aldicarb-10G	3.30	6.55	2.50	1.17	2233b
Quinalphos-5G	2.24	6.15	3.17	2.17	1267ab
Thiometon-5G	2.10	5.84	3.17	3.17	1467 ab
Control	2.10	6.66	2.17	2.50	2500a

Aphids are x + 1 and aphid colonies are x + 0.5 transformation.

Table 3. Evaluation of spray formulations of insecticides against rice-root aphid.

Insecticide (0.05% Conc.)	Aphids		Aphid colonies		Rice yield (kg ha^{-1})
	Adults	Nymphs	Unparasitised	Parasitised	
Carbary1-50 WP	3.01b	7.36c	2.17	2.17	2167 ab
BDC-50 WP	2.32b	7.00bc	1.83	1.17	2008 ab
Endosulfan-35 EC	1.00a	1.24a	0.50	1.33	2333a
Malathion-50 EC	1.91ab	4.52b	1.50	1.83	1600b
Quinalphos-25 EC	3.03b	6.92bc	2.83	2.83	1667b
Dimethoate-30 EC	2.41b	6.14b	2.17	2.17	2060ab
Phosphamidon 85EC	1.00a	1.00a	0.50	1.17	2566a
Monocrotophos 36EC	1.00a	2.19ab	0.50	0.83	2508a
Formothion-25 EC	1.00a	1.00a	0.50	0.83	2588a
Thiometon-25EC	1.00a	1.00a	0.50	0.50	2667a
Control	2.46b	7.66c	2.50	1.50	1767b