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EVALUATION OF FLONICAMID AGAINST RICE EAR HEAD BUG *LEPTOCORISA ACUTA* (THUNBERG)

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ABSTRACT

This study evaluated the efficacy of flonicamid 50%WG (50, 75 and 100 g ai ha^{-1}) along with imidacloprid 17.8SL (25 g ai ha^{-1}), thiamethoxam 25%WG (25 g ai ha^{-1}), chlorpyriphos 19%ME (180 g ai ha^{-1}) and fipronil 5% SC (75 g ai ha^{-1}) against the rice ear head bug *Leptocorisa acuta* (Thunberg) in rice. The results revealed that flonicamid @ 100 g ai/ ha was the most effective (1.0 bugs hill^{-1}) followed by flonicamid @ 75 g (1.13 bugs hill^{-1}). Imidacloprid (1.22 bugs hill^{-1}) was statistically on par with that of flonicamid @ 50 g (1.23 bugs hill^{-1}) and thiamethoxam (1.24 bugs hill^{-1}). The yield and cost-effectiveness were maximum in the flonicamid (48.93 q ha^{-1} @ 100 g) and imidacloprid (B: C; 2.43:1).

Key words: Rice, earhead, *Leptocorisa acuta*, flonicamid, imidacloprid, thiamethoxam, chlorpyriphos, efficacy, yield, benefit: cost ratio

Rice is the most important staple food crop and it is being attacked by >300 arthropod pests but, only about 20 of them cause economic damage (BRRI, 2016 and Sudha et al., 2019). Among the sucking insect pests, brown plant hopper, green leafhopper, and rice ear head bug are the major ones causing economic damage. Rice earhead bug, *Leptocorisa acuta* (Thunberg) (Hemiptera: Alydidae) has been reported all over India (Soumya et al., 2019). Usually both stages of nymphs and adults cause damage during the pre-flowering phase and continue up to the milky stage of the crop (Rao et al., 1995). Under severe cases of damage, the yield may reduce to the extent of 30% (Tiwari et al., 2014). It has been developing resistance to insecticides, and hence need-based use, and newer insecticides having different modes of action should be included. (Sandeep and Raghuraman, 2014). This study evaluated some insecticides to promote their use against the rice ear head bug.

MATERIALS AND METHODS

The study focused on evaluating the efficacy of the pyridine group of insecticide (flonicamid) at different doses along with others. The field experiment was conducted at the Agricultural Research Farm, BHU, Varanasi (25° 16’ 4.3608’’N, 82°59’, 25.7784’’E). Transplanting was done with 21-day old seedlings of a variety “Moti” with spacing of 20x 15 cm and 3x 3 m plots. All recommended agronomic practices were followed. Randomized block design was followed with eight treatments and 3 replications viz., T_1 = flonicamid 50%WG @ 50g ai ha^{-1}; $T_{2 =}$ flonicamid 50%WG @ 75 g ai ha^{-1}; $T_{3 =}$ flonicamid 50%WG @ 100 g ai ha^{-1}; $T_{4 =}$ chlorpyrifos 19%ME @ 180 g ai ha^{-1}; $T_{5 =}$ imidacloprid 17.8%SL @ 25 g ai ha^{-1}; $T_{6 =}$ thiamethoxam 25%WG @ 25 g ai ha^{-1}; $T_{7 =}$ fipronil 5%SC @ 75 g ai ha^{-1} and $T_{8 =}$ water sprayed control. A pneumatic hand sprayer with a spray fluid volume of 500 l ha^{-1} was deployed to impose the given treatments. For the better coverage of pesticide solution on the crop, the soap powder @ 0.2% (200 g/100 lit) is added to the spray fluid. Two sprays were given during 60 (vegetative stage) and 90 days after transplantation (reproductive stage), in evening hours upon the observation of a noticeable number of earhead bugs i.e., ETL @ 1.36 bugs/ earhead. The data in terms of the number/ hill at 1 day before spraying (DBS), and 1st, 3rd, 7th, 10^{th,} and 14th days after spraying (DAS). The species was identified using the characters described by Barrion et al. (1981). The mean values were subjected to ANOVA with SPSS software after square root transformation (Gomez et al., 1984). The grain yield was recorded plot-wise and extrapolated to q ha^{-1} and rhe benefit-cost ratio was also computed.

RESULTS AND DISCUSSION

The results revealed that pretreatment counts of *L. acuta* varied from 3.22 to 3.61 and the differences are statistically non-significant (Table 1). Among the

Table 1. Efficacy of newer insecticides against *Leptocorisa acuta* after 1st and 2nd insecticidal sprays and Benefit: Cost ratio

Treatments	Pre-count	Earhead bugs/ hill after 1st spray					Mean	Pre-count	Earhead bugs/ hill after 2nd spray					Mean	Overall mean	B: C
	1DBS	1DAS	3DAS	7DAS	10DAS	14DAS			1DAS	3DAS	7DAS	10DAS	14DAS			
Flonicamid 50% WG @ 50g ai ha-1	3.38* (2.09) **	1.41 (1.55)	1.24 (1.50)	0.98 (1.41)	1.24 (1.49)	1.37 (1.54)	1.60 (1.45)	3.42* (2.10)**	1.33 (1.53)	1.19 (1.48)	0.95 (1.40)	1.30 (1.52)	1.31 (1.52)	1.58 (1.44)	1.59 (1.45)	2.34
Flonicamid 50% WG @ 75 g ai ha-1	3.40 (2.10)	1.40 (1.55)	1.40 (1.55)	0.96 (1.40)	0.99 (1.41)	1.12 (1.46)	1.55 (1.43)	3.58 (2.14)	1.22 (1.49)	1.16 (1.47)	0.93 (1.39)	0.95 (1.40)	1.15 (1.47)	1.50 (1.41)	1.52 (1.42)	2.21
Flonicamid 50% WG @ 100 g ai ha-1	3.22 (2.06)	1.38 (1.54)	1.13 (1.46)	0.82 (1.35)	0.95 (1.39)	0.97 (1.38)	1.41 (1.38)	3.53 (2.13)	1.16 (1.49)	1.01 (1.42)	0.81 (1.35)	0.85 (1.36)	0.93 (1.39)	1.38 (1.37)	1.39 (1.37)	2.15
Chlorpyrifos 19% ME @ 180 g ai ha-1	3.41 (2.10)	1.76 (1.66)	1.52 (1.59)	1.32 (1.52)	1.12 (1.45)	1.03 (1.43)	1.69 (1.48)	3.53 (2.13)	1.82 (1.68)	1.42 (1.55)	1.19 (1.48)	1.05 (1.43)	0.96 (1.40)	1.66 (1.47)	1.67 (1.47)	2.27
Imidacloprid 17.8% SL @ 25 g ai ha-1	3.45 (2.11)	1.43 (1.56)	1.34 (1.53)	0.97 (1.40)	1.28 (1.51)	1.34 (1.53)	1.64 (1.46)	3.43 (2.11)	1.43 (1.56)	1.15 (1.47)	0.94 (1.39)	1.14 (1.46)	1.17 (1.47)	1.54 (1.43)	1.59 (1.45)	2.43
Thiamethoxam 25% WG @ 25 g ai ha-1	3.29 (2.07)	1.57 (1.60)	1.45 (1.57)	1.21 (1.49)	1.08 (1.44)	0.99 (1.41)	1.60 (1.45)	3.61 (2.15)	1.57 (1.60)	1.43 (1.56)	1.16 (1.47)	0.96 (1.40)	0.95 (1.40)	1.61 (1.45)	1.60 (1.45)	2.26
Fipronil 5% SC @ 75 g ai ha-1	3.30 (2.07)	1.69 (1.64)	1.55 (1.60)	1.13 (1.46)	1.12 (1.45)	1.52 (1.59)	1.72 (1.49)	3.61 (2.15)	1.67 (1.63)	1.32 (1.52)	1.14 (1.46)	1.15 (1.47)	1.33 (1.52)	1.70 (1.48)	1.71 (1.49)	1.91
Control	3.55 (2.13)	3.53 (2.13)	3.47 (2.11)	3.21 (2.05)	3.15 (2.04)	3.53 (2.13)	3.41 (1.98)	3.53 (2.13)	3.33 (2.08)	3.15 (2.04)	3.19 (2.05)	3.13 (2.03)	3.32 (2.08)	3.28 (1.94)	3.34 (1.96)	1.82
CD (p=0.05)	NS	0.02	0.07	0.02	0.11	0.22	-	NS	0.02	0.07	0.05	0.05	0.08	-	-	2.34
SE(±m)	-	0.01	0.02	0.01	0.03	0.07	-	-	0.01	0.02	0.02	0.02	0.03	-	-	2.21

*Mean of three replications; **Figures in parenthesis square root transformed values; DBS- day before spraying; DAS- days after spray; NS- non-significant; B:C- Benefit: Cost ratio.

treatments, flonicamid 50%WG @ 100g ai/ ha (1.11 bugs hill^{-1}) gave maximum reduction in followed by its dose of 75g ai/ ha; and flonicamid @ 50 g ai/ ha was superior (1.25%) over others. These observations corroborate with those of Seni et al. (2019) and Pankaj et al. (2020) that flonicamid @ 50g ai/ ha was the most effective in controlling the sucking pests. Thiamethoxam 25% WG @ 25 g ai/ ha was the next best as observed by Girish and Balikai (2015), Sandeep and Raghuraman (2014) and Rath et al. (2015). Imidacloprid 17.8% SL @ 25g ai/ ha (1.28) also was significant in giving reduction, as observed by Rath et al. (2015); and by Sandeep and Raghuraman, (2014), Ashokappa et al. (2015) and Ghoghari et al. (2019). Chlorpyriphos and fipronil were effective (Mallikarjuna, 2017). Maximum benefit-cost ratio (2.43) was obtained with imidacloprid 17.8%SL @ 25 g ai ha-1 followed by flonicamid 50%WG @ 50 g ai ha^{-1} (2.34); and among different doses of flonicamid 50% WG, 50 g ai ha^{-1} showed very high B: C (2.34) followed by 75 g ai ha^{-1} (2.21) and 100 g ai ha^{-1} (2.15). Rath et al. (2015) observed that imidacloprid17.8% @ 300 g/ ha gave maximum grain yield and thiamethoxam was also effective. Thus, spraying of flonicamid can be recommended against L. acuta in rice.

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