



Evaluation of Some Plant Indigenous Materials Against *Oxya hyla hyla* (Serville) (Orthoptera: Acrididae) on Rice in Cachar District of Assam

KEYWORDS

Effectiveness, *Oxya hyla hyla*, Plant extract, Paddy.

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ABSTRACT Bio- efficacy of four different plants viz., *Ageratum conyzoides* Linn, *Alstonia scholaris* (L.) R.Br, *Citrus grandis* (L.) Osbeck and *Eupatorium odoratum* Linn extracts was evaluated against *Oxya hyla hyla* (Serville) (Orthoptera: Acrididae) on rice in cultivars' field at Cachar District during 2012. Two (Methanol and Petroleum ether) solvents were used for preparation of the extracts. Among the two solvent extracts tested methanolic extract of *A. scholaris*, *C. grandis* and *E. odoratum* with 1.5% concentration showed cent per cent mortality of the pest species at 1DAT. At 3DAT and 5DAT, *E. odoratum* (1.0%) gave highest mortality of the pest species. At 7DAT *E. odoratum* (1.5%) also afforded highest mortality. No phytotoxic effect was noticed during the investigation period. In petroleum ether extract, *E. odoratum* (1.5%) showed highest mortality (ranged from 75.0- 100.0 %) of the pest species at all the DAT. ANOVA was employed which indicated significantly different performance among the treatments by both the extracts at all the DAT over control.

Introduction

Rice is an important crop grown in large areas (426 lakh hectares) in India (Suresh Chand and Muraliranjan, 1999). Crop losses due to pest are a serious problem resulting in reduced production (Kiruba et al., 2006). Grasshoppers are one of the conspicuous insect pest in agricultural field, dry grassland and desert areas (Muralidharan et al., 2007). Among them small rice grasshopper *Oxya hyla hyla* (Orthoptera: Acrididae) is considered as serious pest of rice which cause economic damage to rice crop (Das and Ray, 2012). *O. hyla hyla* (Serville) is distributed through out north- eastern India as a major pest of rice (*Oryza sativa*) (Mamgar and Kharbuli, 2001). The use of chemical pesticides in Asian agriculture has seen a sharp increase in recent years particularly in India (Anonymous, 2005). The continuous and injudicious use of chemicals in India and other Asian countries has resulted in several implications (Armes et al., 1997, Kranthi et al., 1997). Therefore, there is an urgent need of achieving sustainable food production through the use of eco- friendly pest management techniques (Dhaliwal and Arora, 2006). Naturally occurring insecticides of plant origin have been used by man for protecting crops since very early times (Poonia and Bhati, 2009). The main objective of the plant extracts is to control the pest populations without disturbing or damaging the natural environment (Suryakala et al., 2007). Hence the present study was undertaken to test the efficacy of some plant indigenous materials against *O. hyla hyla* in Cachar District of Assam, North-East India as it is a major insect- pest of paddy in this region.

Materials and Methods

For the bio- efficacy of plant extracts four plants viz- *Ageratum conyzoides*, *Alstonia scholaris*, *Citrus grandis* and *Eupatorium odoratum* were selected. Leaves of all plants were collected, air dried and grinded. Grinded leaves were extracted by Soxhlet apparatus using Methanol (b p 65°C) and Petroleum ether (b p 35°- 60°C) as solvents for 48 hrs. From the extract desired (1.0% and 1.5%) concentrations were prepared. Three replications were followed in a Randomized Block Design (RBD). Control (water spray) was also run against the treatment. Observations were made after 1st, 3rd, 5th and 7th day of treatment in the field and per cent mortality were calculated by using Abbott's formula (1925).

Results and Discussion

a) Bio- efficacy of Methanol extract

Out of four indigenous plant extract evaluated against *O. hyla hyla* it was seen that all the higher concentrations (1.5%) of *A. scholaris*, *C. grandis* and *E. odoratum* afforded cent percent mortality only after 1st day of treatment followed by *A. conyzoides* which gave 88.89% mortality of pest species by both the treatments (Table 1).

Results and Discussion

a) Bio- efficacy of Methanol extract

On 3 DAT it was observed that a mixture of performances were recorded as highest mortality (97.22%) was afforded by *A. conyzoides* and *E. odoratum* with 1.5% and 1.0% concentrations, respectively. The lowest (80.55%) mortality of the pest was shown by *C. grandis* with its lower concentration (1.0%) (Table 1). Whereas after 5th and 7th DATs the peak mortality of the pest species was shown by *E. odoratum* with its lower (1.0%). Lowest per cent mortality was shown by *A. scholaris* plant extract with 1.0%

Methanol extract*		Petroleum ether extract*							
Plant extracts	Conc. (%)	1 DAT	3 DAT	5 DAT	7 DAT	1 DAT	3 DAT	5 DAT	7 DAT
<i>Ageratum conyzoides</i> Linn.	1%	88.89 c (71.72)	94.44 a (78.77)	69.69 c (56.75)	60.96 c (51.45)	88.89 c (74.09)	88.89 ab (74.38)	59.59 e (50.56)	57.95 bc (49.59)
	1.5%	88.89 c (78.23)	97.22 a (84.38)	86.53 a (72.15)	66.96 b (54.92)	96.29 ab (83.48)	94.44 a (81.96)	73.06 b (58.77)	75.97 as (61.38)
<i>Alstonia scholaris</i> (L.) R.Br	1%	92.59 ab (80.61)	83.33 bcd (66.34)	62.96 d (53.56)	51.95 d (46.09)	77.78 d (62.32)	80.55 d (68.23)	66.52 cd (55.20)	33.93 d (35.47)
	1.5%	100 a (90.00)	88.89 bc (78.23)	86.53 a (72.64)	66.96 b (55.37)	100 a (90.00)	94.44 a (81.96)	49.73 f (45.20)	54.95 c (47.98)

Citrus grandis (L.) Osbeck	1%	92.59 ab (76.97)	80.55 e (68.23)	66.32 c (54.52)	57.95 c (49.59)	81.48 d (65.20)	63.89 e (53.23)	62.96 de (52.79)	36.44 d (36.33)
	1.5%	100 a (90.00)	86.11 bc (71.96)	69.69 c (56.75)	63.96 b (53.84)	88.89 c (74.09)	86.11 bc (68.30)	69.69 c (56.75)	54.95 c (47.81)
Eupatorium odoratum Linn	1%	96.29 ab (83.48)	97.22 a (84.38)	89.89 a (74.86)	72.97 a (59.97)	92.59 ab (76.97)	83.33 c (70.19)	59.83 e (51.67)	60.77 b (51.65)
	1.5%	100 a (90.00)	94.44 a (81.96)	79.79 b (68.68)	75.97 a (61.38)	100 a (90.00)	94.44 a (78.77)	83.16 a (69.92)	75.97 a (61.69)
Control	Water Spray	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)	0.0 (0.01)
CD at 1%		9.14*	7.45*	6.92*	9.05*	10.55*	10.46*	7.23*	9.76*
CD at 5%		5.17*	4.21*	3.91*	5.12*	5.97*	5.92*	4.09*	5.52*

Table 1: Efficacy of some plant extracts with methanol and petroleum ether solvent against *O. hyla hyla* during 2012.

Note: *= Average of three replications, DAT= Days After Treatment, *= Significant ($p < 0.05$), values following the same letter are not significantly different by DMRT, Figures in parentheses are average of transformed values = $\arcsin(\sqrt{\text{Percentage}})$

concentration at 5 DAT and 7 DAT (Table 1). No mortality of the pest species was recorded in control treatment.

b) Bio- efficacy of Petroleum ether extract

In petroleum ether extract *E. odoratum* and *A. scholaris* with 1.5% concentration showed cent percent mortality of the pest species (Table 1). At 3DAT, *A. conyzoides*, *A. scholaris* and *E. odoratum* showed highest (94.44%) mortality of the pest species with 1.5% concentration whereas the lowest (63.89%) was afforded by *C. grandis* with 1.0% concentration. At 5DAT and 7DAT, *E. odoratum* with higher concentration (1.5%) gave highest mortality is as 83.16% and 75.97%, respectively, of the pest species and lowest (49.73% and 33.93%) mortality was shown by both the concentrations of *A. scholaris*. No mortality of pest species was recorded from control plot.

ANOVA was employed to test the bio- efficacy of all the treatments, which indicated that all the plant extracts of both the solvents showed significantly different performances at all the DAT with all the treated concentrations.

The aforesaid results reveal that out of four indigenous plant extracts with two solvents, methanol proved to be the best against the *O. hyla hyla* species. Among the tested plant extracts, *E. odoratum* showed better performance followed by *A. conyzoides* over other plant extracts as their residual life persists up to a week with a satisfaction of results. The present study is not in full agreement with

the investigation of Marngar, 2007 although the tested species of plant was different. The second better performance showed by *A. conyzoides* which afforded more than 60.0% mortality of *Oxya* species after a week corroborates the findings of Marngar and Kharbuli, 2001, Marngar et al., 2002 and 2003. Bhathal et al., 1994 also reported high insecticidal potentiality of *A. conyzoides* against *Lipaphis erysimi*. Moderate performance of insecticidal activity showed by *C. grandis* against the test species was more or less in conformity with the findings of Sujatha et al., 1988, who has investigated against mosquito larva and recorded the same trend of performances.

Study reveals that almost all the plant extracts with both the solvents showed very satisfactory performance against *O. hyla hyla* in the rice field. No phytotoxic effect was observed due to plant extract treatment. All the treatments with both the solvents proved to be significantly different ($p < 0.05$). It may be mentioned that these entire flora are grown naturally in agro- ecological zones of Barak valley of Assam. However, in view of the performance of the plant extract *E. odoratum* (1.5%) may be recommended to use against *O. hyla hyla* species in agro- climatic conditions of Cachar District of Assam.

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