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Field evaluation of efficacy of some botanical dust against rice bug (*Leptocorisa oratorius* Fabr.)

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A B S T R A C T

Efficacy of neem (*Azadirachta indica* A.Jass), soap nut (*Sapindus trifoliatus* L.) and their formulations and Malathion as standard insecticide were evaluated against the rice bug (*Leptocorisa oratorius* Fabr.) during 2000-2001 on the basis of per cent reduction under field condition. The per cent reduction in number of rice bug adults due to neem seed kernel powder, neem seed kernel powder + multani powder, multani powder, neem leaf powder, neem leaf powder + multani powder, neem leaf powder + ash, soap nut kernel powder, soap nut kernel powder + multani powder tested as dust were found to be 24.44, 14.78, 5.65, 17.06, 11.88, 6.54, 18.18 and 15.01 respectively for exposure period of ten days. The order of efficacy of the botanicals and their formulations were malathion followed by neem seed kernel powder, soap nut kernel powder, neem leaf powder, neem seed kernel powder + multani powder, soap nut kernel powder + multani powder, neem leaf powder + multani powder, neem leaf powder + ash, multani powder for the exposure period of 3, 7 and 10 days respectively.

Keywords: Neem seed kernel, neem leaf, soapnut, dust, malathion, multani powder and rice bug

Introduction

The use of insecticides of plant origin as protectants are particularly very helpful for their degree of tolerance to mammals. Use of synthetic insecticides for control of pests has resulted into number of problems such as development of pest resistance to insecticides, pest resurgence, health hazards besides environmental pollution. The research in the use of these plant origin compounds are comparatively less toxic, safer, biodegradable and ecologically compatible without posing environmental pollution problem. Hence, they may prove to be more useful in the Integrated Pest Management Programme. About 2400 plant species reportedly possess pest control properties (Ahmed 1988). Neem, *Azadirachta indica* and Soapnut, *Sapindus trifoliatus* L. are already well known due to their insecticidal property. In India itself, it has been tested against more than 100 species including important pests of Agriculture (Singh *et.al.*1988).The evaluation revealed that these had varied effects on insects. These effect includ repellency, deterence against feeding and oviposition, insect growth regulatory (IGR), physiological, sterilant, ovicidal activity, besides systemic action. *Leptocorisa oratorius* Fobr. is one of the major insect pest of rice in Assam. It has been reported to cause damage to as many as 90 per cent of rice grains and make them remain unfilled in Pupua, New Guinea (Sands 1977).The bug infestation varies from 10 to 30 per cent grains in panicles in Assam (Anon 1975). In non flooded field, the bug becomes most destructive and may cause 100 per cent loss to the rice crop in some occasions in Indonesia (Dresner 1955). Application of synthetic pesticides at this stage of crop growth may lead to the problem of residue in the grain. Hence use of botanicals can be better choice in managing the pests. Hence a few of such products has been taken up for field level evaluation against rice bug.

Materials and Methods

The experiment was laid out in the Instructional-Cum-Research (ICR) farm, Assam Agricultural University, Jorhat. A rectangular piece of medium land measuring 600 sq.m (15mx40m) was selected for the experiment. The experiment was carried out during the *kharif* season of 2000 and 2001. Rice variety 'Luit' was selected for conducting the experiment under field condition. A Randomized Block Design with three replications was laid out for the experiment in field. The gross area measuring 600 sq.m was divided into 3 replications and each relpication was further sub- divided into 30 equal plot size of 12 sq.m (3m x4m). For reference letter keys were used as notations to designate streatment factors and numerical subcripts to indicate each factor. The treatments were**:** T1= Neem seed kernel powder (NSKP); T2 = Neem seed kernel powder (NSKP) and Multani powder (MP) (80:20); T3= MP; T4= Neem leaf powder (NLP); T5= NLP and MP(80:20); T6= NLP and Ash rice husk (80:20); T7= Soapnut kernel powder (SKP); T8= SKP and MP (80:20); T9= Malathion (5% dust) and T10= Control.

The matured neem leaf, kernel of neem (*Azadirecta indica*) and soapnut (*Sapindus trifoliatus*) were collected locally and were shade dried and ground into fine powder. The Powdered materials were sieved through 60 mesh sieve. Natural clay (Multani powder) used as diluent, was obtained from the local market and ground into fine powder. Malathion 5% Dust, a standard insecticide, was supplied by M/S Cyanamid India Ltd. 25 days old rice seedlings were transplanted in the main field by following good agronomic practices. At the flowering stage (50%) of the rice crop a pre-count of adult bug was taken.For that ten rice hills were considered randomly from each plot.Then dusting of the botanicals and malathion were carried out by duster. During the dusting operation special care was taken to maintain the evenness of dusting in each plot. The observation on the reduction of insects was recorded after 1, 3, 7 and 10 days of dusting. A series of control were also maintained.

The experimental data were converted into corrected percentage mortality (Abbott 1925).Then the corrected percentage mortality was transformed into angular value and statistically analysed. The level of significant in differences amongst treatments were ascertained by Duncan's Multiple Range Test (DMRT).

Result and discussion

The results obtained from field evaluation of neem (*Azadirachta indica*), Soapnut (*Sapindus trifoliatus*), their formulations and malathion 5% dust (as check) for different exposure periods against rice bug (*Leptocorisa oratorius* Fabr.) are presented in the Table 1. The botanicals viz. neem (*A. indica*) , soapnut (*S. trifoliatus*) , their formulations and malathion were evaluated for exposure period of 1, 3, 7 and 10 days against adults of rice bug (*Leptocorisa oratorius*). Significance of difference of means were ascertained by Duncan, Multiple Range Test (DMRT).

The data on mean percent reduction of rice-bug population recorded one day after dusting are presented in Table-1. The analysis of variance showed that the treatments were not significant at 5 per cent probability level indicating that the application of botanicals and their formulations were not effective on per cent reduction of rice-bug where as malathion showed 28.85 per cent mean reduction which is statistically significant. The data on the mean per cent reduction of rice-bug population after three days of dusting along with their respective CD values are presented in Table-1. While comparing the significance of difference among the treatment means at 5 per

cent level of probability by DMRT, the data reveals that malathion differed significantly from other botanicals and their formulations. The highest per cent reduction was recorded in malathion (50.22) followed by neem seed kernel powder (17.24), soapnut kernel powder (17.12), neem leaf powder (15.67) , neem seed kernel powder + multani powder (13.82), soapnut kernel powder + multani powder (13.50), neem leaf powder + multani powder (10.36), neem leaf powder + ash (5.76) and multani powder (5.43). The per cent reduction of rice bug population after seven days of dusting is shown in the Table1.

The analysis of variance showed that all the insecticidal treatment has considerable effect on the reduction of the rice bug population recorded at seven days after dusting.

Among the botanicals and their formulations the lowest per cent reduction (5.62) was recorded in treatment with multany powder which though, was statistically at par with other botanicals and their formulations. But neem seed kernel powder accelerated the reduction to 23.66 where as soapnut kernel powder and neem leaf powder showed 17.78 and 16.35 per cent reduction, respectively which differs non significantly with one another. The data on the mean per cent reduction of rice bug population and their respective CD values after ten days of dusting are presented in Table 1. While comparing the significance of difference among the treatment means at 5 per cent level of probability by DMRT the Table-1 reveals that malathion (5% dust) differes significantly from other test botanicals and their formulations.The highest per cent reduction was recorded in malathion 64.07 followed by neem seed kernel powder (24.44), soapnut kernel powder (18.18), neem leaf powder (17.06), neem seed kernel powder + multani powder (14.78), soapnut kernel powder + multani powder (14.78), neem leaf powder + multani powder (11.88), neem leaf powder + ash (6.54) and multany powder (5.65). From the experimental data it was observed that the reduction percentage due to neem and it formulations was less as compared to malathion which might be due to the fact that synthetic chemical was more poisonous and warded off the insect fast. Though botanicals had less killing effect, those were eco-friendly and had the antifeedant and repellent actions too. Pradhan *et al.* (1963) highlighted extra-ordinary gustatory repellent properties of neem seed kernel against desert and migratory locusts.

The experimental data revealed that neem seed kernel powder was supperior over soapnut kernel powder on the per cent reduction of rice bug. The per cent reduction of rice bug due to the application of neem seed kernel and soapnut kernel powder were 17.24 and 17.12 respectively for exposure period of 3 days and 23.66 and 17.78 for exposure period of 7 days and 24.33 and 18.18 for the exposure period of 10 days. Similar trend was found by Boruah (1999) in his study of contact posion test against rice bug (*Leptocorisa oratorius).* The data also (Table-1) revealed that the per cent reduction due to neem seed kernel powder were 17.24, 23.66 and 24.44 for the exposure period of 3, 7 and 10 days respectivily. However, neem seed kernel powder had a effect on the reduction of rice bug for different exposure period. Jotwani and Srivastava (1981) had tested neem seed granule in small scale field trials and found a highly promising effect against the surghum and maize stem borer (*Chilo partellus*). The order of efficacy of the botanicals and their formulations was found to be malathion > neem seed kernel powder > soapnut kernel powder > neem leaf powder > neem seed kernel powder + multani powder > soapnut kernel powder + multani

powder > neem leaf powder + multani powder > neem leaf powder + ash > multani powder for exposure period of 3, 7 and 10 days.

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Table 1.
Per cent reduction of rice bug population due to insecticidal effect of the botanicals and their formulations as dust

Treatments	**Exposure period (days)**			
	1	3	7	10
NSKP	6.795 (14.62)	17.24 (23.46)b	23.66 (27.49)b	24.44 (27.87)b
NSKP + MP	11.93 (16.69)	13.82 (20.13) bcd	14.02 (20.45) bcd	14.78 (20.92)bcd
MP	1.05 (4.04)	5.43 (11.23) bcd	5.26 (11.53) bcd	5.65 (11.71)bcd
NLP	13.98 (20.57)	15.67 (22.39) bcd	16.35 (23.16)bcd	17.00 (23.61)bcd
NLP + MP	8.85 (14.13)	10.36 (18.39) bcd	11.46 (19.45) bcd	11.88 (19.77)bcd
NLP + ASH	5.19 (9.13)	5.76 (13.09) bcd	6.54 (14.05) bcd	6.54 (14.05)bcd
SKP	12.30 (18.62)	17.12 (23.86)bc	17.78 (24.27)bc	18.18 (24.60)bc
SKP + MP	4.78 (9.27)	13.50 (19.22) bcd	13.87 (20.05) bcd	15.01 (20.02)bcd
Malathion	28.85 (32.17)	50.22 (45.11)a	53.92 (47.15)a	64.07 (57.78)a
Control	0.005 (0.418)	0.005 (0.418)	0.005 (0.418)	0.005 (0.418)
SEd. ±	-	(8.54)	(9.08)	(11.11)
CD (5%)	NS	(17.94)	(19.08)	(23.34)

Data represented are based on 3 replications each with 10 insects; Figure within parentheses are Arcsine value;
Mean within Columns separated by Duncans Multiple Range Test, P 5%. Mean followed by the same letter are not significantly different.
(Note: NSKP= Neem Seed Kernel Powder, MP= Multani Powder, NLP = Neem Leaf Powder, SKP= Soapnut Kernel Powder)