



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2020; 8(4): 1962-1964

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Received: 13-05-2020

Accepted: 16-06-2020

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Management of major pests infesting rice (*Oryza sativa* L.) using botanicals

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Abstract

The field experiment on 'Management of major pests infesting rice (*Oryza sativa* L.) using botanicals' was conducted during *kharif* season of 2018 at Agronomy farm, College of Agriculture, Dapoli. Three sprays of botanicals were undertaken against yellow stem borer, blue beetle and leaf folder at 15 days interval. The results for yellow stem borer revealed that the Azadirachtin 10000 ppm (1%) @ 3 ml/liter was found to be most effective which recorded (2.57%) dead hearts per hill compared to untreated control (8.87%). For blue beetle, nirgudi leaf extract (10%) @ 100 g/liter was found most effective treatment which recorded (2.46%) infested leaves per hill compared to untreated control (7.67%). For leaf folder Azadirachtin 10000 ppm (1%) @ 3 ml/liter was found most effective treatment which recorded (5.35%) infested leaves per hill compared to untreated control (12.99%).

Keywords: Botanicals, rice blue beetle, rice leaf folder, rice stem borer

Introduction

Rice (*Oryza sativa* L.) is the staple food for one third world's population and occupies almost one fifth of the total land area covered under cereals. In India, the total area under rice is 430.94 million hectares with an annual production of 110.15 million tonnes with yield of 2550 Kg ha⁻¹ [1]. Over 1400 insect species attack standing and stored rice in the world and near about 100 species of insect pests cause economic damage to rice crop at various stages of its growth. The management of insect pests and pathogens is one of the most challenging jobs in tropical and sub-tropical agriculture [2]. Hence, nonchemical, biological pest management is to be encourage for the conservation of natural enemies of pests and minimizing the use of chemical pesticides for maintaining the balance of nature. Insecticidal activities of some promising plant *viz.*, neem (*Azadirachta indica*), nirgudi (*Vitex negundo*), pongamia (*Pongamia pinnata*), custard apple (*Annona squamosa*) are well documented in pest management. All parts of the neem tree possess insecticidal activity. The repellent and antifeedant effects of neem have been reported against a wide range of insect pests including locust, rice plant hopper, leaf folder and caterpillar. The botanicals are using in proportion e.g. Dashparni ark for biorational management of different pest. Hence, the present investigation was carried out on 'Management of major pests infesting rice (*Oryza sativa* L.) using botanicals' with a view to test the effect of botanicals against yellow stem borer, blue beetle and leaf folder.

Materials and Methods

The experiment was conducted at Agronomy farm, College of Agriculture, Dapoli during Kharif 2018. Seven treatments *viz.*, T₁.Azadirachtin 10000 ppm (1%) @ 3 ml l⁻¹, T₂.Neem (*Azadirachta indica*) oil (1%) @ 10 ml l⁻¹, T₃.Karanj (*Pongamia pinnata*) oil (1%) @ 10 ml l⁻¹, T₄.Ritha (*Sapindus mukorossi*) powder extract (5%) @ 50 g l⁻¹, T₅ Custard apple (*Annona squamosa*) leaf extract (10%) @ 100 g l⁻¹, T₆.Nirgudi (*Vitex negundo*) leaf extract (10%) @ 100 g l⁻¹, T₇.Control (Without spray) with three replications were conducted in randomized block designed. Five hills per treatment were selected randomly for recording observations per plot. The total number of tillers per hill and number of dead hearts/white ear heads per hill was counted for stem borer. Total number of leaves per hill and infested leaves per hill was counted for blue beetle and leaf folder and percent infestation was calculated by corrected mortality formula.

Pre-treatment observations were recorded 24 hrs. before first spray. Spraying was done after commencement of pest infestation by knapsack sprayer. Three sprays were taken at 15 days interval. The observations were recorded at 7th and 14th day after each spray. The data thus obtained was subjected to appropriate transformation and was analyzed statistically.

Results and Discussion

The results depicted in table 1 regarding overall mean of botanicals three sprays against yellow stem borer revealed that the treatment T₁ Azadirachtin 10000 ppm (1%) @ 3 ml/liter was found to be most effective treatment which recorded (2.57%) dead hearts per hill and was at par with the T₆ nirgudi leaf extract (10%) @ 100 g/liter (2.62%), T₂ Neem oil (1%) @ 10 ml/liter (3.04%) and T₄ ritha powder extract (5%) @ 50 g/liter (3.18%). The next best treatment was T₃ Karanj oil (1%) @ 10 ml/liter recorded (3.57%) dead hearts per hill and found at par with the T₅ Custard apple leaf extract (10%) @ 100 g/liter (3.64%). The maximum (8.87%) dead hearts were observed in untreated control. The results of the present investigations are in accordance with the findings of that Karanj cake @ 2.5 t/ha applied to crop reduced damage per cent with (5.6 DH%), 6.8 (WEH%) due to stem borer at 60 DAT [3]. The numerically least damage and higher yield was noted for monocrotophos 36 WSC followed by neem

seed kernel extract (NSKE) @ 5 per cent, neem leaf extract- 2 per cent, neem oil-2 per cent, karanj seed kernel extract (KSKE) @ 5 per cent and *Vitex negundo* extract in ascending order [4].

The results regarding overall mean of botanicals three sprays against blue beetle infesting rice revealed that the treatment T₆ Nirgudi leaf extract (10%) @ 100 g/liter was found to be most effective treatment which recorded (2.28%) infested leaves per hill and was at par with the T₁ Azadirachtin 10000 ppm (1%) @ 3 ml/liter (2.46%), T₄ Ritha powder extract (5%) @ 50g/liter (2.70%) and T₅ Custard apple leaf extract (10%) @ 100 g/liter (2.84%). The next best treatments in order of efficacy were T₂ Neem oil (1%) @ 10 ml/liter (3.04%) and T₃ Karanj oil (1%) @ 10 ml/liter (3.11%) and both these treatments were at par with each other. The maximum (7.67%) infested leaves were observed in untreated control. The results of the earlier workers are more or less similar with the present findings. the neem extract was one of the promising leaf extracts for insect control at the present time [5]. These products did not leave harmful residue with lower toxicity to mammals, reported that among all the treatments, Profenophos 50EC @ 2 ml/l was found to be significantly superior over rest of the treatments by reducing the leaf damage to (65.83%) over untreated control and was on par with *Vitex negundo* leaf extract @ 5 percent by reducing the leaf damage (65%) [6].

Table 1: Efficacy of different botanicals against yellow stem borer, blue beetle and leaf folder infesting rice

Treatment	Dead hearts (%) by yellow stem borer		Infested leaves (%) by blue beetle		Infested leaves (%) by Leaf folder	
	Pre count	Overall mean	Pre count	Overall mean	Pre count	Overall mean
T ₁ Azadirachtin 10000 ppm (1%) @ 3 ml l ⁻¹	5.60 (13.68) *	2.57 (8.78)	4.04 (11.54) *	2.46 (8.92)	11.02 (19.38) *	5.35 (12.89)
T ₂ Neem (<i>Azadirachta indica</i>) oil (1%) @ 10 ml l ⁻¹	5.53 (13.59)	3.04 (10.16)	4.16 (11.73)	3.04 (10.01)	11.13 (19.49)	5.76 (14.14)
T ₃ Karanj (<i>Pongamia pinnata</i>) oil (1%) @ 10 ml l ⁻¹	5.54 (13.58)	3.57 (10.73)	4.25 (11.88)	3.11 (10.76)	11.50 (19.81)	6.35 (14.23)
T ₄ Ritha (<i>Sapindus mukorossi</i>) powder extract (5%) @ 50 g l ⁻¹	5.84 (13.94)	3.18 (9.98)	4.06 (11.59)	2.70 (9.37)	11.52 (19.83)	6.52 (14.45)
T ₅ Custard apple (<i>Annona squamosa</i>) leaf extract (10%) @ 100 g l ⁻¹	5.51 (13.57)	3.64 (10.86)	4.12 (11.60)	2.84 (9.62)	11.67 (19.96)	6.59 (17.85)
T ₆ Nirgudi (<i>Vitex negundo</i>) leaf extract 10% @ 100 g l ⁻¹	5.59 (13.67)	2.62 (8.89)	4.01 (11.46)	2.28 (8.58)	11.24 (19.56)	5.59 (13.18)
Control (Without spray)	5.95 (14.12)	8.87 (17.2)	4.65 (12.33)	7.67 (16.03)	11.75 (20.04)	12.99 (20.86)
SE (m±)	0.50	0.51	0.88	0.41	0.45	0.48
CD at 05%	NS	1.59	NS	1.28	NS	1.48

The results regarding overall mean of botanicals three sprays against leaf folder infesting rice revealed that the T₁ Azadirachtin 10000 ppm (1%) @ 3 ml/liter was found to be most effective treatment which recorded (5.35%) infested leaves per hill and was at par with the treatment T₆ Nirgudi leaf extract (10%) @ 100 g/liter (5.59%), T₂ Neem oil (1%) @ 10 ml/liter (5.76%) and treatment T₃ Karanj oil (1%) @ 10 ml/liter (6.35%). The next best treatment was T₄ Ritha powder extract (5%) @ 50g/liter which recorded 6.52 per cent infested leaves per hill and was at par with the T₅ Custard apple leaf extract (10%) @ 100 g/liter (6.59%). The maximum (12.99%) infested leaves were observed in untreated control. The results of the present findings are corroborative with the findings of neem-based preparation like NSKE (5%) was found to act as an effective antifeedant in rice against leaf folder (*C. medinalis*) [7].

Conclusion

On the basis of the results of the present investigation, it can be concluded that among the botanicals, Azadirachtin 10000 ppm (1%) @ 3 ml/liter and nirgudi leaf extract (10%) @ 100 g/liter were found to be the best treatments for the management of stem borer, blue beetle and leaf folder infesting *Kharif* rice. Use of botanicals for the management of pests infesting rice are eco-friendly and economically viable for the farmers.

Acknowledgements

The authors would like to express their gratitude to the Department of Agricultural Entomology, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli for the support of labour, experimental land and research facilities.

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