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Management of mango leaf hopper, *Amritodes atkinsoni* Leth on mango in Saran district (Bihar)

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Abstract
On farm trial was conducted during 2019 and 2020 at Saran district on management of mango leaf hopper, *Amritodes atkinsoni* Leth on mango cultivar "Malda". The two technologies was test on farmer's mango orchard. First spray of acephat 75% SP was done at early stages of panicle formation and second spray after fruit set i.e. Technology I and another technology II was done spray of imidacloprid 17.8 SL at similar trend of technology I. The result of two years pooled data revealed that technology II proved the most effective treatment against mango leaf hopper in which lowest population (0.84) was recorded as compared to other technology I (1.33) and farmer's practices (1.96). The significantly maximum fruit yield was recorded in technology II (172.17 kg/plant) in compared to farmer's practices (119.67 kg/plant). The impact of treatments showed that mean net return and benefit cost ratio was also higher in technology II in compared to farmer's practices which was Rs.5706.68/tree, 4.76:1, Rs. 3736.98/tree, 3.44:1, respectively.

Keywords: Mango leaf hopper, management, mango, yield

Introduction

Mango, *Mangifera indica* L. (Family: Anacardiaceae), known as "The King of Fruits" is an important commercial crop found in all tropical and subtropical regions of the world. Approximately 400 insect pests have been found to be associated with mango crop all over the world, 260 insect and mites have been found in India, out of which 30 species are capable of causing severe yield losses. Among all the pests, mango hopper (Homoptera: Cicadelidae) is a severe and major pest of economic importance at flowering and fruiting stages. Three species of mango leaf hoppers, *Amritodes atkinsoni*, *Idioscopus clypealis and Idioscopus nitidulus* remain active throughout the year and damage each crop stage from emergence of new flush to fruiting stages (Gundappa *et al.*, 2014, Turkhade *et al.*, 2015 and Bana *et al.*, 2016)[3, 7, 1] and cause up to 100 per cent yield losses. The leaf hoppers cause a loss of 20-100 per cent of inflorescences. Both nymphs and adults of leaf hoppers suck the sap from the young leaves, tender shoots, inflorescences, panicles; branches and rachis of the young fruits which causes non-setting of flowers and dropping of the immature fruits. Leaf hoppers also excrete huge quantities of honey dew resulting in growth of sooty mould formation, thus affecting the photosynthetic activity of the plant, ultimately in poor fruit set and leads to reduction in yield. Dalvi *et al.* (2010) [2] considered it as major pest of mango, and is directly responsible in reducing the yield qualitatively and quantitatively. Considering the importance and the damage potential of the pest. The present study was carried out to know the technological management of mango leaf hopper on mango.

Materials and Methods

The On Farm trial was conducted in the mango orchard (cv. Malda) of the different eight farmer's villages in Saran district of Bihar during 2019 and 2020. The experiment was carried out in Randomized Block Design with three treatments including control. Uniformly flowering 10 to 12 years old trees was selected for imposing the treatments and the observations were taken on them considering one tree as one replication. Five panicles were randomly selected / tree from all directions of lower part of the tree canopy during panicle initiation stage and tagged for recording observations. Two research technologies were tested with farmer's practices. The first technology option was done i.e. acephate 75% SP (1.5 g per liter of water) and second technology option was done i.e. imidacloprid 17.8 SL (0.3 ml per liter of water) with farmer's practices i.e dimethoate 30 EC (1 ml per liter of water). Two spray of each technology with farmer's practices at the first early stages of panicle formation and second after fruit set.

Spray fluid was prepared by mixing measured quantity of water and insecticides. Twenty litters of spray solution were used per tree. The respective insecticides were applied as a two foliar spray on the tree with the help of tractor mounted power sprayer. Population of mango leaf hoppers (nymphs and adults) were recorded visually on five tagged panicles/tree. Leaf hopper populations were counted before spraying and 3rd days after insecticidal application of each treatment and with the 1st and 2nd spray, respectively.

Results and Discussion

The experiment was conducted during 2019 and 2020 on farmer's mango orchard for management of mango leaf hopper pest of mango. The two years and pooled data were obtained in (Table 1). Analysis of data on mango hopper population recorded (varies from 15.26 to 30.28) before treatments indicated non-significant results suggested that the hopper population was homogeneous. The significantly lowest number of hopper population was recorded after 3 days of first spray showed that technology option II 2.23 hopper/panicle followed by technology option I (2.81) in compression to farmer's practices (4.49) during early stages of panicle formation in 2019.In year 2020 after 3rd days spray i.e lowest in technology option II followed by technology option I and farmer's practices i.e. 2.48, 3.40 and 5.45 population/panicle, respectively.

Similar result was found in second spray during mango fruit set (pea shape) in 2019 and 2020 observed that lowest population of mango leaf hopper in technology option II (spray of imidacloprid 17.8 SL) followed by technology option I (spray of acephate 75%) compared with farmer's practices (spray of dimethoate 30EC) in both years i.e. 0.79, 1.26 and 1.83 and 0.90, 1.40 and 2.10 hopper per panicle, respectively. Overall significantly performance of lowest hopper population was found in technology option II (0.84) followed by technology I (1.33) and farmer's practices (1.96) during second spray of pooled data of 2019 and 2020. Similar result was found Karar, *et al.* (2020) [4], Singh *et al.* (2011) [6] and Patel, *et al.* (2021) [5].

Moreover, highest yield per plant was found in technology option II 211.87 kg in 2019 and 132.47 kg during 2019 and 2020 followed by technology option I 200.39 kg and 114.24 kg in compression to farmer's practices i.e. 163.23 kg and 119.67 kg (Table 1). In table 2 represented economic viability of different technology showed that cost of cultivation (pooled) varies from Rs. 1050 to Rs. 1180 and net return was highest found in technology option II i.e. Rs. 5706.68 followed by technology option I and farmer's practices Rs. 5142.65 and Rs.3736.98, respectively. Benefit cost ratio was also height observed in technology option II 4.76:1 in compression to farmer's practices 3.44:1, respectively. Similar results were recorded by Dalvi *et al.* (2010) [2].

Table 1: Incidence of mango leaf hopper pests in different technology conducted on mango crop during 2019 and 2020

Treatments	Pre treatment population (Average of 5 panicle/plant)			Population (Average of 5 panicle/plant) after 3 days						Yield/plant (kg)		
				1st spray			2nd spray					
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Farmers practice	15.26 (3.57)	30.28 (5.55)	22.77 (4.82)	4.49 (2.23)	5.45 (2.44)	4.97 (2.34)	1.83 (1.52)	2.10 (1.61)	1.96 (1.57)	163.23	76.12	119.67
Technology option I:	16.06 (4.07)	28.65 (5.40)	22.35 (4.78)	2.81 (1.82)	3.40 (1.97)	3.11 (1.90)	1.26 (1.32)	1.40 (1.38)	1.33 (1.35)	200.39	114.24	157.32
Technology option II	18.81 (4.39)	29.13 (5.44)	23.97 (4.95)	2.23 (1.65)	2.48 (1.72)	2.35 (1.69)	0.79 (1.13)	0.90 (1.18)	0.84 (1.16)	211.87	132.47	172.17
SEm±	5.15	3.07	3.03	0.46	0.72	0.50	0.19	0.25	0.20	24.00	15.30	13.11
CD at 5%	NS	NS	NS	1.00	1.55	1.07	0.40	0.53	0.42	51.48	32.82	28.11

Figures in parenthesis are $\sqrt{X+0.5}$, Experiment conducted on 10 to 12 year old mango tree

Table 2: Economic viability of different technology conducted on mango crop during2019 and 2020

Treatments	Gross return (₹/tree)			Cost of cultivation (₹/tree)			Net return (₹/tree)			Benefit Cost ratio		
	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
Farmers practice	6529.25	3044.70	4786.98	1150	950	1050	5379.25	2094.70	3736.98	4.68	2.20	3.44
Technology option I:	8015.75	4569.55	6292.65	1250	1050	1150	6765.75	3519.55	5142.65	5.41	3.35	4.38
Technology option II:	8474.75	5298.60	6886.68	1280	1080	1180	7194.75	4218.60	5706.68	5.62	3.91	4.76

Note: The average sale price of fruit was considered as Rs. 40/kgin both years

Conclusion

On the basis of the results of on farm trials, it may be concluded that technology option II has the potential to protect the mango leaf hopper on mango orchard as well as provide better yield and profit as compared to farmer's practices.

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