Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(5): 1121-1123

Received: 13-07-2020
Accepted: 15-08-2020

AY Munj
Jr. Entomologist, Regional Fruit Research Station, Vengurle Maharashtra, India

Kamala Jyanthi
Principal Scientist, Indian Institute of Horticultural Research, Bengaluru, Karnataka, India

Anamika Kar
Jr. Entomologist, Bidhan Chandra Krishi Vishwa Vidyalaya, Mohanpur, West Bengal, India

Poonam Srivastava
Sr. Entomologist, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India

JK Bana
Jr. Entomologist, Agricultural Experiment Station, Paria, Gujarat, India

RV Datkhile
Jr. Entomologist, Mahatma Phule Krishi Vidyapeeth, Rahuri Maharashtra, India

Corresponding Author:
AY Munj
Jr. Entomologist, Regional Fruit Research Station, Vengurle Maharashtra, India

Management of mango hopper

AY Munj, Kamala Jyanthi, Anamika Kar, Poonam Srivastava, JK Bana and RV Datkhile

Abstract
Mango (*Mangifera indica* L.) is an important fruit crop grown in different parts of India. Mango hopper is a major pest of mango causing severe yield losses. Three species of mango hopper *viz*., *Idioscopus nitidulus*, *I. clypealis* and *Amritodus atkinsoni* are commonly found all over India. As the losses due to mango hopper could be as high as 60-70 percent in the absence of control measures, many insecticides have been recommended world-wide to control the pest. Different agricultural universities have developed their own schedule for the management of mango hopper. Also, efforts have been made under the All India Coordinated Research Project on Fruits to manage the mango hopper with the minimum use of insecticides.

A comparative study of the existing university recommendation and AICRP recommendation for the management of mango hopper was carried out at six different research institutes (agricultural universities) located in different states of India under the All India Coordinated Research Project on Fruits during 2015-16 to 2017-18. The results revealed that, the university recommendation was the most effective at Bengaluru, Pantnagar, Paria and Vengurla, whereas, the AICRP recommendation was the most effective at Mohanpur and Rahuri.

Keywords: Mango hopper, management, insecticides, *Idioscopus nitidulus*

Introduction
Mango (*Mangifera india* L.), is an important fruit crop grown in different parts of India. It is infested by many insect and non-insect pests [1]. More than 50 insect pests have been recorded causing damage to mango crop [2]. Mango hopper is a major pest of mango found in all mango growing areas. Three species of mango hoppers viz., *Idioscopus nitidulus*, *I. clypealis* and *Amritodus atkinsoni* are commonly found all over India [3], with *I. nitidulus* being predominant in the Konkan region of Maharashtra [4].

The intensity of mango hopper is severe during the period of vegetative flush and flowering [5]. Both nymphs and adults cause damage to all tender parts of mango. They suck cell sap from tender foliage, inflorescence and small fruits. Plant parts become weak and ultimately affects on yield [6]. About 60 percent of fruit yield losses have been recorded due to mango hopper [7].

Many synthetic insecticides having different mode of actions have been recommended so far by different scientists for the management of mango hopper [8-14]. However, a module based study is lacking. Therefore, the present study was conducted to compare the existing recommendations of different agricultural universities with the AICRP recommendation at six different research institutes located in different states of India under All India Coordinated Research Project on Fruits during 2015-16 to 2017-18.

Materials and Methods
The research trials were conducted under All India Coordinated Research Project on Fruits at IIHR-Bengaluru (Karnataka), BCKV-Mohanpur (West Bengal), CISH-Lucknow (Uttar Pradesh), GBPUAT-Pantnagar (Uttarakhand), AES-Paria (Gujarat), MPKV-Rahuri (Maharashtra) and RFRS-Vengurle (Maharashtra) during 2015-16 to 2017-18. The experiments were conducted in paired 't' test with two treatments.

Treatment details

Module 1	:	First spray of spinosad 45 SL @ 0.004% at panicle emergence stage followed by second spray 21 days after first spray with thiamethoxam 25 WG @ 0.008% and third need based spray of neemazal 10000 ppm @ 3ml/l - with the treatment being common to all centers.
Module 2	:	As per respective university recommendation
A) Bengaluru	:	First spray of lambda cyhalothrin 5 EC @ 1ml/l followed by second spray of acephate 75 SP @ 1.5g/l as and when required
B) Mohanpur	:	First spray of acephate 75 WP @ 0.04% at panicle emergence stage followed by second spray 21 days after first spray with imidacloprid 17.8 SL @ 0.005% and third need based spray of neemazal 10000 ppm @ 3 ml/lit. of water
C) Pantnagar	:	First spray of imidacloprid 17.8 SL @ 0.005% at panicle emergence stage followed by second spray 21 days after first spray with thiamethoxam 25 WG @ 0.008%
D) Paria	:	First spray of imidacloprid 17.8 SL @ 0.005% at panicle emergence stage followed by second need based spray of deltamethrin 2.8 EC @ 0.00075% and third need based spray of thiamethoxam 25 WG @ 0.008%.
E) Rahuri	:	First spray of cypermethrin 25 EC @ 0.075% at panicle emergence stage followed by second spray 21 days after first spray with chlorpyriphos 20 EC @ 0.05% and third need-based spray of imidacloprid 17.8 SL @ 0.005%.
F) Vengurle	:	First spray at vegetative flush stage with deltamethrin 2.8 EC @ 0.0025%, second spray at bud burst stage with lambda cyhalothrin 5 EC @ 0.003%, third spray before flower opening stage with imidacloprid 17.8 SL @ 0.005%, fourth spray 15 days after 3rd spray with thiamethoxam 25 WG @ 0.005% and fifth spray 15 days after 4th spray with dimethoate 30 EC @ 0.05%.

Table 1: Comparison of AICRP module and university recommendation for management of mango hopper (Pooled data of 2015-16, 2016-17 and 2017-18)

Sr. No.	Treatment	No. of hoppers/panicle 7 days after last spray at					
		Bengaluru	Mohanpur	Pantnagar	Paria	Rahuri	Vengurle
1	Module 1	0.45 (1.21)*	1.67 (1.47)	0.86 (1.36)	2.94 (1.98)	0.92 (1.38)	1.04 (1.42)
2	Module 2	0.17 (1.08)	1.85 (1.53)	0.13 (1.06)	1.89 (1.70)	2.52 (1.87)	0.07 (1.03)
	Significance at P= 0.05 %	Sig.	NS	Sig.	Sig.	Sig.	Sig.

*Figures in parenthesis are square root transformed values

Table 2: Yield data recorded in different modules (Pooled data of 2015-16, 2016-17 and 2017-18)

Sr. No.	Treatment	Yield kg/tree					
		Bengaluru	Mohanpur	Pantnagar	Paria	Rahuri	Vengurle
1	Module 1	118.79	215.58	48.18	49.74	**100.00**	29.35
2	Module 2	117.13	213.31	48.34	54.93	81.70	35.71
	Significance at P= 0.05 %	NS	NS	NS	Sig.	Sig.	Sig.

Table 3: B:C ratio recorded in different modules (Pooled- 2015-16, 2016-17 and 2017-18)

Sr. No.	Treatment	Bengaluru	Mohanpur	Pantnagar	Paria	Rahuri	Vengurle
1	Module 1	16.84	2.12	1.37	3.13	10.06	2.11
2	Module 2	27.30	2.11	1.73	4.97	7.22	2.47

Results and Discussion

The pooled data (2015-16 to 2017-18) recorded on the hopper population per panicle under different treatments at different centers is presented in table 1. The hopper data recorded 7 days after the last spray revealed that, the existing recommendation of respective universities (module 2) was the most effective for management of mango hopper at Bengaluru (0.17 hoppers/panicle), Pantnagar (0.13 hoppers/panicle), Paria (1.89 hoppers/panicle) and Vengurle (0.07 hoppers/panicle) and was significantly superior to module 1. However, the AICRP module (module 1) was found to be the most effective at Mohanpur (1.67 hoppers/panicle) and was significantly superior to module 2 at Rahuri (0.92 hoppers/panicle), but at par at Mohanpur.

The yield data recorded at different centers is presented in table 2. The data show that module 2 recorded the maximum yield at Pantnagar (48.34 kg/tree), Paria (54.93 kg/tree) and Vengurle (35.71 kg/tree). Module 2 was significantly superior to module 1 at Paria and Vengurle but was at par with module 1 at Pantnagar. Module 1 recorded the maximum yield (118.79, 215.58 and 100.00 kg/tree) at Bengaluru, Mohanpur and Rahuri, respectively, and was significantly superior to module 2 at Rahuri, but was at par with module 2 at Bengaluru and Mohanpur.

The B:C ratio recorded under the two different modules at different centers is presented in table 3. The data revealed that at Bengaluru, Pantnagar, Paria and Vengurle the B:C ratio was more under module 2 (27.30, 1.73, 4.97 and 2.47, respectively) as compared to module 1 (16.84, 1.37, 3.13 and 2.11, respectively). Whereas, at Rahuri the B:C ratio was more in module 1 (10.06) as compared to module 2 (7.22). The B:C ratio at the Mohanpur center was more under module 1 (2.12) and less equal under module 2 (2.11).

The above results indicate that for the management of mango hopper module 2 was effective at Bengaluru, Pantnagar, Paria and Vengurle, whereas, module 1 was effective at Rahuri. Both modules were found to be equally effective at Mohanpur.

These results are in confirmation with a study by Ray [15]. They reported the module consisting of first spray of 0.004 percent spinosad at panicle emergence stage, followed by second spray of 0.008 percent thiamethoxam 21 days after first spray and third need based spray of 10,000 ppm neemazol, as the most effective treatment for the management

of mango hopper.

Also, Munj [16] reported similar results. They conducted the management trial with only one insecticide spray, two insecticide sprays and three insecticide sprays and found out that the module consisting of three sprays of insecticides (first with imidacloprid 17.8 SL @ 0.005 percent at panicle emergence stage, second with quinalphos 25 EC @ 0.05 percent 21 days after first spray and third with thiamethoxam 25 WG @ 0.005 percent 15 days after second spray) as the most effective treatment for management of mango hopper.

Conclusion

Based on the B:C ratio recorded under different modules, it can be concluded that module 1 (First spray of spinosad 45 SL @ 0.004% at panicle emergence stage followed by second spray 21 days after first spray with thiamethoxam 25 WG @ 0.008% and third need-based spray of neemazal 10000 ppm @ 3ml/l) was effective at Rahuri; while module 2 was effective at Bengaluru (first spray of lambda cyhalothrin 5 EC @ 1ml/l, followed by second spray of acephate 75 SP @ 1.5g/l as and when required), Pantnagar (first spray of imidacloprid 17.8 SL @ 0.005% at panicle emergence stage followed by second spray 21 days after first spray with thiamethoxam 25 WG @ 0.008%), Paria (first spray of imidacloprid 17.8 SL @ 0.005% at panicle emergence stage followed by second need-based spray of deltamethrin 2.8 EC @ 0.00075% and third need-based spray of thiamethoxam 25 WG @ 0.008%) and Vengurle (first spray at vegetative flush stage with deltamethrin 2.8 EC @ 0.0025%, second spray at bud burst stage with lambda cyhalothrin 5 EC @ 0.003%, third spray before flower opening stage with imidacloprid 17.8 SL @ 0.005%, fourth spray 15 days after 3rd spray with thiamethoxam 25 WG @ 0.005% and fifth spray 15 days after 4th spray with dimethoate 30 EC @ 0.05%).

Acknowledgement

This work was carried out with financial support from the Indian Council of Agricultural Research (ICAR) and the collaborative organizations (SAUs/ICAR Institutes) under the ICAR-All India Coordinated Research Project (AICRP) on Fruits. The authors wish to acknowledge the support of the ICAR and the collaborative organizations in providing the requisite research facilities.

References

1. Chavan SA, Dalvi MB, Munj AY, Patil PD, Salvi BR. Mango Plant Protection, Ed. 1, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli 2009, 1-2.
2. Butani DK. Save your crop from insect pests. Indian Horticulture. 1962; 6(1):6-7.
3. Rahman SK, Kuldeep MA. Mango hoppers: Bio ecology and management- A review. Agricultural Reviews. 2007; 28:49-55.
4. Godase SK, Patil PD, Bhole SR. Evaluation of some synthetic pyrethroides against hopper complex of mango, *Mangifera indica* L. Pestology. 2001; 25(4):29-30.
5. Munj AY, Sawant BN, Raut RA, Dheware RM, Salvi BR. Evaluation of insecticides for management of mango hopper, *Idiscopus niveosparsus* Leth. Journal of Entomology and Zoology Studies. 2018; 6(6):950-952.
6. Munj AY, Sawant BN, Malshe KV, Dheware RM, Narangalkar AL. Survey of important foliage pests of mango from South Konkan region of Maharashtra. Journal of Entomology and Zoology Studies. 2019; 7(1):684-686.
7. Kumar D, Roy CS, Yazdani SS, Hamid SF, Khan ZR. Effect of some insecticides against hopper complex on mango. Pesticides. 1985; 19(11):42-43.
8. Godase SK, Bhole SR, Shivpuje PR, Patil BP. Assessment of yield loss in mango due to mango hopper (*I. niveosparsus*). Indian Journal of Agriculture Sciences. 2004; 74(7):370-372.
9. Singh M, Gupta D, Gupta R. Incidence and control of mango leaf hoppers in the lower hills of Himachal Pradesh. Pest Management and Economic Zoology. 2006; 14(1, 2):49-54
10. Shukla RP. Strategies of integrated insect pest management in mango- Global scenario. Presented in: Global Conference on Augmenting Production and Utilization of Mango: Biotic and Abiotic Stresses. 21-24 June, 2011 at CISH, Lucknow, 2011, 113.
11. Ghosh SK. Sustainable management of mango hopper (*A. atkinsoni* and *I. niveosparsus*) by using insect growth regulator, buprofezin 25 SC. Uttar Pradesh Journal of Zoology. 2013; 33(2):119-128.
12. Ramesh Babu S, Virendra Singh. Bioefficacy of Tolfenpyrad 15 EC against hopper complex in mango. *Pest* Management in Horticulture Ecosystems. 2014; 20(1):22-25.
13. Thiruveni T, Ganesh Kumar M, Kuttalam S. Field evaluation of a new indigenous thiamethoxam 25% WG formulation against mango hopper. Pestology. 2014; 38(4):76-78.
14. Munj AY, Sawant BN, Raut RA, Dheware RM, Salvi BR. Evaluation of insecticides for management of mango hopper, *Idiscopus niveosparsus* Leth. Journal of Entomology and Zoology Studies. 2018; 6(6):950-952.
15. Ray SN, Shah T, Nithya C. Field efficacy of pest management modules against mango hopper on Langra mango in zone III of Bihar. Annals of Plant Protection Science. 2014; 22(1):10-13.
16. Munj AY, Halgekar NY, Salvi BR. Effective management module to minimize the crop loss in Alphonso mango due to mango hopper. Environment and Ecology. 2015; 33(4B):1969-1971.