GERF Bulletin of Biosciences 2016
ISSN: 2229-6433 June, 7(1):6-9

Case Report

Seasonal dynamics of mango hoppers and their management under subtropics

Gundappa*[1], Tarun Adak[2] and P K Shukla[3]

[1,3] Division of Crop Protection, Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow-226101, Uttar Pradesh, India
[2] Division of Crop Production, Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow-226101, Uttar Pradesh, India

Open Access

Received: 21 April 2016
Accepted: 09 May 2016
Published Online: 30 June 2016

Citation:

Gundappa, Adak T and Shukla PK. Seasonal dynamics of mango hoppers and their management under subtropics. GERF Bull Biosc. June. 2016; 7(1):6-9.

Conflict of Interests:

The authors declare no conflict of interests.

***Corresponding author:**

Gundappa
gundu6100@gmail.com

Abstract

Hopper is a serious pest of mango and in cases of severe infestation cause failure of good crop. Large number of nymphs and adults puncture and suck the sap of tender parts of panicles, inflorescence, leaves and fruit. It results into weakening of inflorescence and affects fruit set and their drop. They also damage the crop by excreting sweet sticky substances which facilitates the development of sooty mold, a fungus, which affects photosynthesis activity of leaf. Based on the study farmers are advised to take up timely management with recommended practices to reduce the loss.

Key words: Mango, Hopper, Seasonal incidence, management

Introduction

Mango is an important economic fruit crop and is being affected by number of insect pest and diseases, which in turn reduces its production and productivity. Among biotic factors, insect pests affects considerably to the mango crop by feeding on all parts of the plant. The mango crop is attacked by about 492 species of insects, 17 species of mites and 26 species of nematodes in the world level. Of these, 188 species have been reported from India (1). Among them hoppers are very serious and three species of mango hoppers are causing considerable yield loss up to 60 per cent (2). Among the hoppers infesting on mango Amritodus *atkinsoni* mainly inhabits the trunk region and new vegetative flush while two *Idioscopus* species, *Viz.*, *I. clypealis* and *I. nitidulus* infests during flowering season (3). Hoppers lay egg singly on floral shoots, buds and tender leaves which hatch in a week. After hatching, large number of nymphs and adults puncture and suck the sap of tender parts such as panicles, inflorescence, leaves and fruit, resulting into weakening of inflorescence and which ultimately affects fruit set. Heavy puncturing and continuous draining of the sap may cause curling and drying of

inflorescence. They also damage the crop by excreting honey dew which facilitates the development of sooty mold, a fungus, which affects photosynthesis activity of leaf. If the timely interventions are not taken, the quality of the fruit is affected and may cause considerable yield loss (4).

Materials and Methods

The present study was undertaken in mango orchards of CISH, Rehmankhera farm Lucknow, Uttar Pradesh for three seasons. Mango orchards with *cv. Dashehari* trees of 20-35 years old planted with spacing of 10 m × 10 m were selected for this study. Data on the hoppers occurrence on mango leaves/panicle/trunk were recorded on weekly basis from five randomly selected trees and expressed as number of hopper per sweep or per panicle. Mean population of hopper per standard meteorological week was taken into consideration for the further analysis. Daily weather data of temperature (maximum and minimum), relative humidity (morning and evening), rainfall, wind speed, bright sunshine hours and evaporation rates were recorded in the Agromet Observatory located within the experimental site.

Results and discussion

Population dynamics of hoppers

Mango hoppers population observed at CISH, Rehmankhera farm found to be significantly different among different standard meteorological weeks (SMW) within a given year. Moreover, the hopper dynamics was observed to be significantly varied across the seasons (Fig 1). The highest population of hopper was observed during 10th to 22nd SMW in each season during vegetative as well as reproductive phase. Lower populations (0.69 to 1.15 hoppers panicles^{-1}) were recorded during 2011-12 as compared to next seasons. However, highest population was observed in 2013-14 as 1.32 to 4.03 hoppers panicles^{-1}. It was inferred from the study that mango hopper population emergence was coincided with the emergence of panicles, and it has also been observed that the population of hoppers migrated from trunk to upper canopy. However, higher population i.e. 1.8, 2.42 and 2.83 hoppers sweep^{-1} on trunk i.e. *Amritodus atkinsoni* was observed during 34th to 49th SMW at 2011-12, 2012-13 and 2013-14 respectively, although considerable variations was recorded in hopper population on trunk across seasons. It has been observed that hoppers hide on trunk during off season (Fig. 2)

Seasonal incidence of mango hoppers

The study revealed that peak population of hopper was during 10th to 22nd SMW in each season during vegetative as well as reproductive phase. It was observed from the study that mango hopper population emergence was coincided with the emergence of inflorescence and it has also been observed that the population of hoppers migrated from trunk to upper canopy as inflorescence emergence increases. It was observed that hoppers hide on trunk during off season. The hopper populations were increased gradually and attained a peak level and thereafter decreased down to a certain level. From this it is concluded that panicle emergence is the critical period in mango where hopper cause severe damage. In general hoppers remain active throughout the year in cracks and crevices of mango trunk, but they are recorded on twigs, when young leaves and inflorescence are available (5, 3). However, Srivastava and Butani (6) reported that hoppers have two or more broods in a year with two peak periods i.e. spring generation in February to April and summer generation from June to August. Patel et al., (7) reported that population of *A. atkinsoni* starts increasing with the beginning of the flowering season in the month of January to June and adults population build up was seen from March onwards and a gradual fall from July onwards was observed. Similarly in this study peak occurrence of the population was between second week of March to last week of May. However, in this study two distinct peaks were observed between reproductive stage (inflorescence emergence, flowering, fruit set and fruit development) and an initiation to next season vegetative growth.

Hopper population in relation to weather

Hopper population with maximum temperature and sunshine hours were found to be correlated significantly and positively and were found significantly negative correlation with minimum and maximum relative humidity. Based on 22 mango cv. *Dashehari* orchards located in 5 different blocks of Lucknow district, Shukla et al. (8) observed that the peak mango hopper was during 2nd and 3rd week of April, when average minimum and maximum temperatures ranged between 22.1 to 32.4 °C with relative humidity between 28.3 to 66.5 %.

Management

Farmers are practicing indiscriminate use of insecticides for management of this pest. This leads to the problem of insecticide resistance, resurgence and residue. To get more profit, sustainable and need based interventions are required. In order to manage mango hopper population below economic injury levels, farmers are advised to take up first spray with insecticide imidacloprid @ 0.3 ml per liter of water along with sticker (1 ml /liter of water) when the hopper population is more than 5 per panicle during inflorescence emergence stage. Second spray may be taken

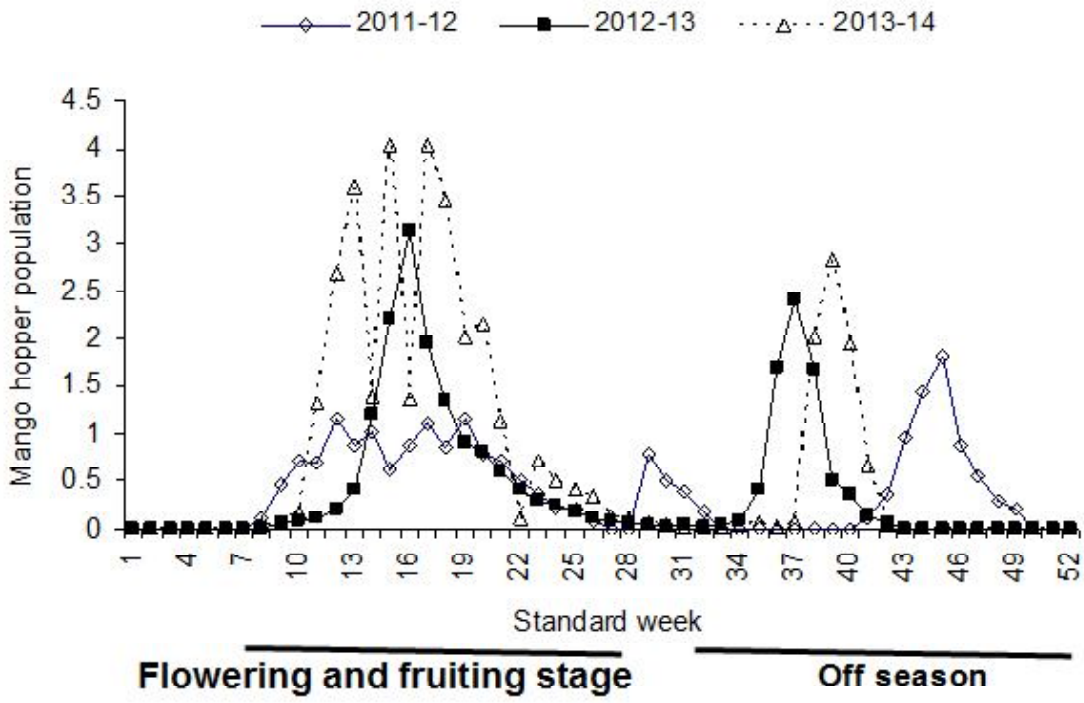

Fig 1: Population dynamics of mango hopper across the seasons

Fig 2: Hopper infestation on different part of mango. A- On trunk, B- On leaf, C- On inflorescence, D- On fruit

after fruit set with insecticide thiamethoxam @ 0.3 g per liter of water along with sticker (1 ml /liter of water). Farmers are advised not to take up any insecticide spray when crop is in full bloom which may affect the pollinator population.

Conclusion

Weather plays pivotal role on spatial and temporal variation of mango hopper population dynamics. In India, Uttar Pradesh being one of the major mango growing states and Malihabad belt of the state is popularly known for variety *Dashehari*. The population dynamics of mango hopper were studied over different seasons and locations.It was revealed from survey of 22 mango orchards located in 5 different blocks of Lucknow district that the peak mango hopper was observed during 2nd and 3rd week of April.

Author contributions

Dr. Gundappa designed the study, collected data, performed the experiments, Collected data from different experimental sites, analysed the data and wrote the manuscript. Dr. P K Shukla designed the study, Collected data from different experimental sites, analysed the data, and wrote the manuscript. Dr. Tarun Adak analysed the data and wrote the manuscript. All authors read and approved the final manuscript.

Acknowledgements

Authors are thankful to the Director, CISH, Lucknow for providing facilities for carrying out the work. Thanks are also due to Indian Council of Agricultural Research, New Delhi for providing financial assistance under National Initiative of Climate Resilient Agriculture (NICRA) Project entitled, "Understanding the changes in host pest interactions and dynamics in mango under climate change scenario", which facilitated carry out this study.

References

1. Kumar D, Ray C, Yazdani SS, Hamid SF, Khan ZR. Effect of some insecticides against mango hopper *I. clypealis* L. Indian J Pl Protn. 1985; 4: 217-219.
2. Tandon PL, Verghese A. World list of insect, mite and other pests of mango. Technical Document No. 5, IIHR, Banglore 1985.
3. Gundappa, Kamala Jayanthi PD, Verghese A. Migratory behaviour of mango hopper, *Idioscopus* spp. In relation to host plant flowering phenology: A synchronous shift. An Int J Life Sci.: The Bioscan. 2014; 9 (2): 639-641.
4. Rajkumar B, Gundappa, Khan RM, Kumar HK. Integrated pest management for enhancing quality production of subtropical fruits under high density planting with canopy modification. In: Singh VK, Ravishankar H editors. Canopy management and high density planting in subtropical fruit crops. CISH, Lucknow,2013. p. 269.
5. Talpur MA, Khuhro RD, Nizamani I. A Phenological relationship between mango hoppers *Idioscopus* spp. and mango inflorescence/fruit. Pakistan J Appl Sci. 2002; 2: 355-536.
6. Srivastava RP, Butani DK .Mango hopper menace. Entomologist Newsletter. 1972; 2(2): 10-11.
7. Patel JR, Shekh AM, Ratanpara HC. Seasonal incidence and effect of minimum temperature and vapour pressure on the population of mango hoppers in middle Gujarat. Gujarat Agric Univ Res J. 1994; 20:5-8.
8. Shukla RP, Shukla PK, Varma S, Rajkumar B, Gundappa, Adak T. Population dynamics of major insect pests of mango and their natural enemies in relation to weather. *In*: *Proceedings of International Conference on "Impact of Technological Tools on Food Security under Global Warming Scenario*", held during May 11-12, 2013 at Meerut, Uttar Pradesh, India, 3013.p 28.