

DAMAGE AND DISEASE CAUSED BY HEMIPTERAN PESTS IN MANGIFERA INDICA IN DEHRADUN, UTTARAKHAND

Shayista Yousuf^{*1}, Shahnaz Anjum², Raktim Layek³

*^{1,3}Department of Zoology, ²Department of Botany, School of Life sciences,
BFIT Group of Institutions, HNB Central Garhwal University, Dehradun, Uttarakhand, (India)*

ABSTRACT

Field investigations on Hemipteran pests of Mangifera indica was conducted in Dehradun, Uttarakhand in order to study the damage and disease caused by pests to the host plant. Periodic visits were made to selected mango orchards and collection of interested insect pest species was done. Later on the collected pests were identified and damage and disease caused by them to the host plant was localised. Moreover, the infestation period of pests was also observed during the investigation period.

Key Words: *Damage, Dehradun, Hemiptera, Mangifera indica, Pests.*

1.INTRODUCTION

Mangifera indica commonly known as Mango is referred as “King of Fruits”. It is among the most economically and culturally important tropical fruits, especially in Asia. It was originally found in foothills of the Himalayas in north eastern India, Burma, and Bangladesh and domesticated thousands of years ago (possibly independently in south East Asia). It is now grown in most tropical countries and some subtropical ones. Many cultivars in India have been vegetatively propagated it for hundreds of years. India has been a major mango producer, but as of 2009 China had risen to become the world’s second largest producer, with India’s production representing less than half the world’s total. India and Pakistan are the main suppliers of western Asia. Mango crop accounts for 39% of area under fruit crops in India. It has got highly economic value in horticulture sector of India and is considered as one of the wide spread plants in India. Besides having the high economic value, Mango has got medicinal value too. The ripe fruit has flattening, diuretic and laxative properties. Mango contains a pharmacologically active hydroxylated xanthone c-glycoside known as Mangiferin. It is extracted from mango at high concentrations from the young leaves (172gm/kg). Allergenic Urushiols are present in the fruit peel and can trigger contact dermatitis in sensitized individuals. This reaction is more likely to occur in people who have been exposed to other plants from the Anacardiaceae family, such as poison oak and poison ivy, which are widespread in United States. The mango Triterpene, Lupeol is an effective inhibitor in laboratory models of prostate and skin cancers. An extract of mango branch bark called “Vimang” isolated by Cuban scientists, contain numerous polyphenols with antioxidant

properties invitro and on blood parameters of elderly Humans. In the state of Uttarakhand, the most common varieties of mango cultivated are: Dashehri, Bombay green and Langra etc. The major reason for its low productivity in the state is diverse insect pests of mango plant. Among all the pests of mango, pests of Hemipteran order prove to be most noxious. Varshneya and Rana (2008) reported first appearance of hopper on mango trees in February whereas its peak was noticed in May with increase in maximum and minimum temperature and decrease in relative humidity. Thus, maximum and minimum temperature positively affected the hopper population, whereas relative humidity had negative effect and rainfall had no significant role. Among all the pests of mango, pests of Hemipteran order prove to be most noxious. It was seen that Hemipteran pests mainly damage fruit, inflorescence and leaves which leads to various diseases of the host plant. Uncontrolled check of these pests leads to reduced fruit crop and fruit quality.

II.MATERIALS AND METHODS

Mango is attacked by 188 species of insects, 17 species of mites and 26 species of nematodes (Srivastava, 1998). Of these, mango hopper complex, mealy bug, fruit fly, stone weevil, stem borer, leaf Webber and bark eating caterpillar are major pests, whereas insects- pests which became economically important during the last decade are thrips, midges, shoot borer and fruit borer. In the state of Uttarakhand mainly in area of Dehradun it was found that Hemipteran pests were more noxious to mango plant causing damage to the fruit crop at an increased level.

2.1 Selection of Site

The very first step involved the selection of various observatory sites in Dehradun. Dehradun has general elevation of 450m above sea level. It is between latitudes $29^{\circ} 58' N$ and $31^{\circ} 2' N$ and longitudes $77^{\circ} 34' E$ and $78^{\circ} 18' E$. The latitudinal extent of the region defines its climate. The climate is exclusively classified under humid subtropical climate and is often continental type. For the sake of convenience, three sites within the area were selected in which two orchards were present in Suddhowala, Dehradun and a single orchard in Bhauwala, Dehradun. The plants under observation were kept free from pesticide application. Periodic visits were made to collect the data from leaves, shoots, inflorescences and fruits of mango plant. The attack on different parts of mango were recorded and examined critically.

2.2 Pest Collection

In the selected mango orchards pests of interest were sampled by direct hand picking method or with the help of fine forceps. The collected specimens were preserved in collection jars and later on killed using 90% alcohol in killing jars. Scales and other microscopic insects were viewed by magnifying glass and collected by suitable tools like forceps.

2.3 Field equipments

- Collection jars
- Insect net
- Killing jars

- Forceps
- Insect storage box
- Camera

The present study of work was carried out in the selected orchards (Mango) of above mentioned areas of Dehradun region and was based on primary and secondary data. Primary data has been collected from the field survey, while as secondary data has been collected from the journals, research papers, published thesis and legal authorised records. The study examined the diversity of Hemipteran pests of Mango plant and their mode of damage. In order to evaluate the Hemipteran pests of mango plants in the selected region, three mango orchards were selected for surveillance. The insect pests were caught using the required tools, and transferred to collection jars. Soon after collection, pests were killed by 90% alcohol in killing jars as rapidly as possible. The specimens were later on dried and then identified with the aid of supervisors. The condition of infested plants was critically examined and cause of disease and pest causing the disease were figured out.

III. RESULTS AND DISCUSSIONS

As per the study plan, periodic visits to the selected sites were made and insect pests of interest were collected. After the collection of pests, they were subjected to further steps like identification and preservation. Those specimens represent the total collection made during the investigation period from all the selected sites. The specimens belonging to order Hemiptera only were collected. Later on every specimen was examined and studied properly to know its infestation and disease caused in host plant. It was calculated that **62.50%** of total pests infesting mango plant were Hemipterans.

Following Hemipteran pests were identified to cause diseases in the host plant (*Mangifera indica*):-

- *Helopeltis pernicialis* (Tea mosquito bug)
- *Chrysocoris patricius* (Jewel bug)
- *Aulacaspis tuberculars* (White mango scales)
- *Colgaroides acuminata* (Leaf hopper)
- *Toxoptera odinae* (Aphids)

Table1: List of pests and their period of damage

Name of pest	Effectuated parts	Stage of damage	Feb-March	April-May
Tea mosquito bug	Tender shoots or leaves	Adult	+	-
Jewel bug	Leaves or twigs	Adult	-	++

Scale	Leaf, inflorescence, fruit	Adult/Nymph	++	++
Leaf hopper	leaves	Adult/Nymph	_	++
Aphids	Leaves, fruits and flower buds	Adult/Nymph	++	++

In the given table:



++ indicates maximum observed population during the period

+ indicates lowest observed population

_ indicates no population



Fig.1: Tea mosquito bug

Fig.2: Jewel bug



Fig.3: Mango White Scales

Fig.4: Mango Leaf Hopper



Fig.5: Aphids

Figs. 1,2,3,4,5: Hemipteran pests of Mango in Dehradun, Uttarakhand during investigation period Feb-May 2016

IV.CONCLUSIONS

Mangifera indica commonly known as Mango is the most preferred fruit worldwide. It has very high economic value. In India, mango cultivars produce a diverse number of mango species. India is the second largest producer of mangoes after China and exports a large percentage of mango production to other countries of the world. In total India accounts for 54% of world's overall mango production. Mango is susceptible to various pests including scales, bugs, hoppers, midges, Webbers etc. In present study, the insect pests of order Hemiptera were examined in mango orchards of Dehradun, Uttarakhand. For the sake of convenience, 3 sites were selected and periodic visits were made to collect the pests of interest and study the damage caused by them to the host plant. The pest were collected and investigated causing damage to different parts of plant leading to loss of photosynthetic activity, fruit quality, flower bud malformation etc. Moreover, percentage of yield was also reduced.

4.1 Damage caused by pests belonging to order Hemiptera to the host plant is listed viz:

- Tea mosquito bug was found causing black necrotic lesions on soft leaves, young shoots, flower panicles and developing fruit.
- Jewel bug was found feeding on leaves of mango trees in the study area.
- Mango white scales were seen to suck sap from leaves and fruit. They were also seen feeding on leaves which turn pale green or yellow. Damage on fruit is seen as pink blemishes.
- Flatids both adults and nymphs suck sap from the shoots, flowers and fruit. The pests were often seen along the mid-rib of leaves or on the fruit stalk. Flatids feeding on the fruit stalk may cause sap to flow on to the fruit which may lead to sapburn. Sooty mould and sapburn may affect marketability of fruit.
- Aphids both adults and nymphs pierce plant tissues to feed on plant sap. Their feeding may cause rolling, twisting or bending of leaves. Heavily attacked leaves can turn yellow and eventually wilt. Aphids feeding on

flower buds and fruits may cause malformed flowers and fruits. Aphids excrete a sugary, sticky liquid called honey dew that accumulates on leaves and branches. Sooty moulds grow on honey dew deposits turning leaves and branches black. Heavy coating with honey dew and sooty moulds may reduce photosynthesis, affecting plant growth and yield.

V.ACKNOWLEDGEMENT

The author is thankful to Prof. Dr. Yogesh Yadav, School of Life Sciences, Department of Zoology, BFIT Group of Institutes Dehradun, Uttarakhand, India for providing necessary facilities in the Laboratory. The author wants to convey her deepest sense of gratitude to Shahnaz Anjum, Raktim Layek and all the supporting staff of Zoology department.

REFERENCES

- [1.] Mumford, J.D. (2001). Project memorandum on integrated management of fruit flies in India, Department for International Development.
- [2.] Mukherjee SK. The varieties of mango (*Mangifera indica*) and their classification, 1948.
- [3.] Murugan, and Ramachandran (2001). Biological efficacy of Actara 25 WG insecticide against mango sucking pests. *Pestology*, 25 (9): 39-41.
- [4.] Nachiappan, and Bhaskaran (1984). Quantum of feeding and survival of mango leaf hopper adults on the inflorescence of certain varieties of mango. *Indian J. Agric. Sciences*.
- [5.] NiiN, Watanabe T, Yamaguchi k, Nishimura M, Changes of anatomical features, photosynthesis and ribulosebiphosphate carboxylase-oxygenase content in mango leaves,1995..
- [6.] Ojima M, Kawashima R, Mikoshiba K. Studies on the seed production of soyabean. The ability of photosynthesis in F1 generation. *Crop sciences society Japan*, 1969.
- [7.] Pandey, Patel, Chaudhari, J.R Bhatt, Vadodaria, and A.m Sheikh (2003). Influence of weather parameters on the population dynamics of mango hopper. *J. Agrometeorology*, 5 (1): 51-59.
- [8.] Patel, A.T (2009). Seasonal incidence, varietal screening and chemical control of mango leaf gall midge, *Procontarinia matteiana* Kieffer&Cecconi.
- [9.] Patel, Shekh and Ratanpara (1994). Seasonal incidence and effect of minimum temperature and vapour pressure on the population of mango hopper, *Amritodus atkinsoni* Leth in middle Gujarat. *GAU Res. J.*, 20 (1): 5-8.
- [10.] Patel, Shekh and Ratanpar (1994). Seasonal incidence and effect of minimum temperature and vapour pressure on the population of mango hopper *Amritodus atkinsoni* (Leth.) (Jassidae: Homoptera) in South Gujarat. *Indian. J. Ent.*, 35 (3): 255-257.
- [11.] Patel, R.C. (1973). Studies on control of fruit fly, *D. correctus* Bezzi with use of insecticidal bait impregnated with chemical sex attractant.
- [12.] Patel, Z.P. and Patel, M.R. (2005). Up-date on work done in Integrated Management of fruit flies in India. Presented in workshop at "The Magestic Goa".

- [13.] Pehzman and Radjabi (2002). Study on biology of mango hopper “*Idioscopu sclypealis* Lethieri” (Homoptera: Cicadellidea) in Hormozgan province.
- [14.] Pordesimo, L.O. Namuco, and Mendoza, Jr. 1983. Pathogenic reaction twenty mango cultivars to anthracnose *Diplodia* stem-end rot.
- [15.] Prasad (1957). On the distribution, bionomics and control of mango shoot gall psyllid, *Apsylla cistellata* Buckton.
- [16.] Pushpalatha, Kathirvelu and Nachiappan (2008). Correlation of seasonal incidence of mango hopper (*Amritodus atkinsoni* Leth.) and weather parameters on certain varieties of mango. Indian J. Tropical Biodiversity.
- [17.] Qureshi, Hussain and Siddiqui (1991). Relative preference of mango varieties by *Dacuszonatus* (Saunders) and *D. dorsalis* Hendel. Pak. J. Zoology.
- [18.] Rahman and G.Singh (2004). Population dynamics of mango hopper (*Amritodus atkinsoni*) on “Langra” mango (*Mangifera indica*) and its relationship with abiotic factors. Indian. J. agri. Sciences.
- [19.] Ranjitha, A. R. and Viraktamath, S. (2006). Investigation on the population dynamics of fruit flies in mango orchard at Dharwad, Kanataka. Karnataka J. Agric. Sciences.
- [20.] Rao, Kasi, Padamavathamna, and Rao (1991). Relative susceptibility of different mango varieties to leaf gall fly, *Procontarin iamatteiana*.
- [21.] Rao, R.Y. (1930). Mango hopper problems in South India. Agri. Journal India.
- [22.] Sahoo SK, Jha S. Bioecology of mango fruit borer, *Autocharis albizonalis* Hampson (pyralidae, Lepidoptera). A recent threat to mango growers in west Bengal, India. Acta Horticulture, 2009.
- [23.] Sarwar M, Hamed M, Yousuf M, Hussain M. Surveillance on population dynamics and fruit infestation of Tephritid Fruit flies (Diptera: Tephritidae) in mango orchards of faisalabad, Pakistan. International Journal of scientific Research in environmental sciences, 2014.
- [24.] Sathe TV, Bhoje PM, Desai AS. Harmful scale insects (coccidae:Hemiptera) of mango and their control. Global Journal for research analysis, 2014.
- [25.] Sathe TV, Bhoje PM, Desai AS. Pests of mango at storage and their control, Indian Journal of applied Research, 2014. Singh VK, Rajan S. Changes in photosynthetic rate, specific leaf weight and sugar contents in *Mangifera indica*. Open Horticulture J; 2009.
- [26.] Takayoshi K, Mitsutoshi k, Yutaka A, Shigeta M, Thomas TL. Leaf morphology and photosynthetic adjustments among deciduous broad leaved trees within the vertical canopy profile. Treephysiol, 2001.
- [27.] Tara JS, Gupta M, Shrikhandia P, Bala A, Zaffar N, Sharma S. Record of some hemipteran insect pests of mango from Jammu region of Jammu and kashmir state, International Journal of Interdisciplinary and Multidisciplinary studies (IJIMS), 2014.
- [28.] Yasmin, Asdaque, S.T Nurulain, S.M., Jafri, S.M.H., Jabeen, Khan M.F. and Naqvi (1991). Determination of toxicity of methoprene against *Halysdentatus*.