



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(2): 274-278

© 2018 JEZS

Received: 19-01-2018

Accepted: 22-02-2018

JK Bana

Agriculture Experimental
Station, Paria ASPEE College of
Horticulture & Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Sushil Kumar

Agriculture Experimental
Station, Paria ASPEE College of
Horticulture & Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Hemant Sharma

Agriculture Experimental
Station, Paria ASPEE College of
Horticulture & Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Correspondence**JK Bana**

Agriculture Experimental
Station, Paria ASPEE College of
Horticulture & Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Diversity and nature of damage of mango insect-pests in south Gujarat ecosystem

JK Bana, Sushil Kumar and Hemant Sharma

Abstract

Mango, *Mangifera indica* L is one of the most important fruit crops grown in southern Gujarat wherein large area is under Alphonso and other mid late varieties cultivation. An experiment was conducted out during 2013-17 to assess the diversity and nature of damage of major or minor insect pests occurring on Mango. During roving survey, major insect-pests of mango observed were hoppers, thrips and fruit fly whereas; fourteen other pests of either minor or sporadic importance have been recorded and identified. Four species of mango hoppers were recorded during the investigation wherein *Amritodus atkinsoni* remained most active during post monsoonic period particularly in adult stage on cracks and crevices of tree trunk while, *Idioscopus clypealis* and *I. nitidulus* were the dominating species during full bloom period (January to March). *Amrasca splendens* was also active during marble and stone sized fruit stage of the crop (March–April). Likewise, four species of thrips viz; *Rhipiphorothrips cruentatus*, *Exothrips hemavarna*, *Haplothrips ganglbaueri* and *Scirtothrips dorsalis* remained more active during vegetative (new flush) and flowering cum fruit setting stages. Fruit fly species viz. *Bactrocera dorsalis*, *B. correcta* and *B. zonata* were observed feeding on fruits during April–July. Rest of the recorded pest species was at minor/sporadic levels and their infestations varied among different areas and regions of south Gujarat.

Keywords: Diversity, ecosystem, fruit flies, hoppers, mango, survey, thrips

Introduction

Mango, *Mangifera indica* L. (Anacardiaceae) is an important fruit crop grown in tropical as well as subtropical regions of India. In Gujarat, 150 thousands hectare area is under mango plantation with 1.21 million tonnes production and 8.13 t/ha productivity^[8]. More than 300 species of insect-pest attacked on vegetative and reproductive phases of the mango crop in the world level^[18]. Of which 188 species have been reported from India^[20]. Among the insect-pests, mango hoppers are major, serious and wide-spread throughout the year in south Gujarat mango ecosystem. Hoppers species viz., *Amritodus atkinsoni* (Lethierry), *Idioscopus clypealis* (Lethierry) and *Idioscopus nitidulus* (Walker) remains active and damage each crop stage of mango from emergence of new flush to flowering cum fruit setting stages^[4, 11] and causes up to 100 per cent losses. Both nymph and adult hoppers are observed sucking cell sap from young leaves, tender shoots, inflorescences or panicles and rachis of the young fruits which results in non-setting of flowers and dropping of immature fruits. Hoppers also excretes huge quantities of honey dew results in sooty mould formation, thus affects the photosynthesis of the plant. Other than hopper, thrips are major yield limiting factors in south Gujarat and elsewhere^[2, 5, 12]. It is a polyphagous, cryptic mannered pest having short life cycle, high mobility towards development of insecticide resistance and infest a wide variety of host plants^[6, 13]. Nymph and adult thrips suck cell sap from tender leaves, shoots, inflorescence and fruits of the mango which results in silvery shine with leaf edges, curling upwards, stunted growth, discoloration of buds and panicles, malformed, premature drops and bronzing of the fruit surface with feeding scars on fruits, thus adversely affects the quality of the marketable produce. Fruit flies, *Bactrocera dorsalis* (Hendel), *B. zonata* (Saunders) and *B. correcta* (Bezzi) are considered to be major bottleneck in economical mango production^[3, 22]. It assumes great significance as a quarantine pest. During ripening stage of mango, female fruit fly lays eggs in the fruit skin with the help of ovipositor and after hatching, the maggots start feeding inside the fruit pulp and causes internal discoloration, emits off flavours, pulp rotting and fruit drop and lastly, pupates in the soil. It causes up to 80 per cent yield loss in mango^[21] and total Rs 29, 460 million annual losses in mango, guava, citrus and sapota^[14].

Patel *et al.* [17], reported that fruit flies cause up to 40 per cent yield loss in heavy rainfall zone of south Gujarat Other pests *viz.*, shoot borer, leaf webber, stem borer, mealy bug, leaf gall midge, leaf damaging insect (ash grey beetle and leaf miner), scale insect, mite, red ants, hairy caterpillar, bark eating caterpillar, semi-looper and fruit borer are recorded as a minor or sporadic pest of mango [7, 17, 19, 23]. The present study provides essential information for understanding the diversity of insect pests associated with mango crop in south Gujarat mango and will also provide appropriate management strategies under prevailing climatic conditions.

Materials and Methods

Roving surveys were carried out at standard week wise in different mango growing villages of south Gujarat for assessing the diversity and nature of damage of mango pest. Major and minor pests were recorded in four directions *viz.*, north, south, east and west direction on randomly selected twigs or panicle on each randomly selected tree at eight different crop stages *i.e.* vegetative, emergence of new flush, inflorescence, full bloom, pin head, pea, marble and full grown fruit stage on lower canopy of the tree by visual count method without disturbing the relevant plant part. In vegetative stage, three sweeps were done on the selected tree trunk with polythene cover to collect surviving hopper population on trunk. Thrips populations were recorded by tapping the inflorescence on a simple white paper [15].

Results and Discussion

During the study periods, seventeen insect pests were recorded in south Gujarat mango ecosystem. Detailed report on pests, status and their damage are given below (Table 1 and Fig. 1). Mango hoppers were observed throughout the year in mango ecosystem except during rainy months, wherein population on twig or trunk was very low or nil. Mostly, hopper population associated with new flush and flowering stage of the plants and attained peak activity during flowering cum fruit setting stage of the crop and thereafter, population started declining gradually. Two peaks were recorded during the study periods. First was observed on new mango flush (Nov.-Dec.) and another was during flowering cum fruit setting stage (Jan.-April). Thrips were also recorded as a major pest and yield limiting factor in south Gujarat and elsewhere [2]. Four species of thrips *viz.*; *Rhipiphorothrips cruentatus* Hood, *Exothrips hemavarna* Ramakrishna & Margabandhu, *Haplothrips ganglbaueri* (Schmutz) and *Scirtothrips dorsalis* Hood remained more active during vegetative (new flush) and flowering cum fruit setting stages (February-March). Fruit flies were observed as major pest and recorded throughout the investigation period, wherein maximum catches were observed during April-July using methyl eugenol impregnated fruit fly trap which coincided with fruiting and harvesting stages of the crop [3].

Other than major pests, fruit borer was also recorded during May-July during the study periods. Three species *viz.*, *Deanolis spp.*, *Conogethes punctiferalis* (Guenee) and *Citripestis eutrapphera* (Meyrick) were observed in

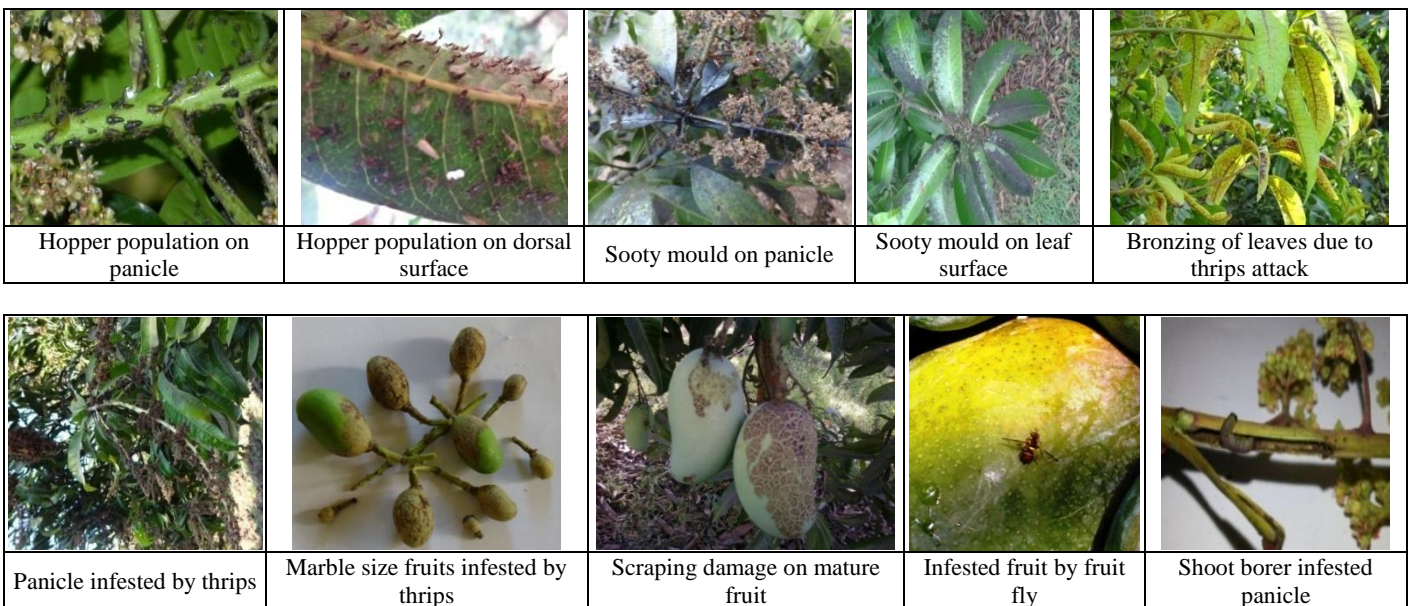
south Gujarat. *C. eutrapphera* is a new indigenous restricted mango fruit borer species and found causing extensive damage to immature fruits [1]. In mainland, this pest incidence was reported from coastal region of Tamil Nadu and mango growing areas of Karnataka [9]. The infested fruits made bored holes filled with frass and adjacent fruits of mango were often found blackened around the bored area. The damage was more common where two or more fruits touched each other. Leaf gall midge, *Procontarinia matteiana* Kieffer & Cecconi recorded more or less throughout the year (Table 1) showing initiation of gall formation in new flush leading to defoliation of the leaf biomass and reduction of the photosynthetic activities [16]. Mango leaf webber, *Orthaga* spp. remained a minor pest and was responsible for low productivity due to webbed and dried leaves. In south Gujarat, its active period was observed during June-December and Feb.-April. Kannan and Rao [10], support the present findings and reported that peak incidence was observed during first fortnight of November in Andhra Pradesh situations.

The mango leaf miner, *Acrocercops syngamma* (Meyrick) caused damage to newly emerged flushes wherein minute caterpillars excavated under the dorsal side of top leaves which showed grayish white epidermis symptoms. Shoot borer, *Chlumetia transversa* Walker attacked on new shoot of mango during October-February. Verghese and Devi [23] fully support the present finding and reported that peak infestation in September-November under Karnataka conditions. The mite, *Aceria mangiferae* Sayed active period was December-April under field condition. Mango mealy bug, *Drosicha mangiferae* Green was the minor pest of mango orchards in south Gujarat. The nymphs and females of this bug sucked sap from inflorescence, tender leaves, shoots and fruit. Infested plants were affected by the sooty mould. Severe infestation affected the fruit set and caused fruit drop. The mango stem borer, *Batocera rufomaculata* De Geer, was increasingly becoming a menace in mango orchards. It was very serious in Alphonso cultivar, especially rejuvenated orchard in south Gujarat. It was also observed in old neglected orchards where branches intermingled with each other restricting the penetration of light. In south Gujarat, its main active period was December-April *i.e.*, pre-bloom period. Affected trees became unproductive due to drying of branches and die-back. The grub of stem borer remained inside the stem and fed on tissues and made galleries therein. Rest of the minor/sporadic pest details are given in table 1 and Fig. 1. In conclusion, the present study showed that mango hoppers and thrips are major pest of mango in south Gujarat ecosystem during vegetative (new flush) and flowering cum fruit setting stages of the plant while maximum fruit flies catches during April-July which coincided with fruiting and harvesting stages of the crop. Rest of the recorded pest species was at minor/sporadic levels and their infestations. This survey will help in timely providing relevant information to the farming community and scientific fraternity so as to devise suitable management practices at appropriate time.

Table 1: Diversity of insect-pests, status and nature of damage on mango during 2013-17

S. No.	Name of the pest/scientific name	Active period	Plant parts/crop stage damaged	Status
Major pests				
1.	Mango hoppers			
(a)	<i>Amritodus atkinsoni</i>	Sep.-Nov.	New flush and flowering stage	+++
(b)	<i>Idioscopus clypealis</i>	Dec.- April		
(c)	<i>I. nitidulus</i>			
(d)	<i>Amrasca splendens</i>	March-April		
2.	Thrips			
(a)	<i>Exothrips hemavarna</i>	Nov.-Dec./ Feb.- March	New flush and flowering stage	+++
(b)	<i>Haplthrips ganglbaueri</i>			
(c)	<i>Scirtothrips dorsalis</i>			
(d)	<i>Rhipiphorothrips cruentatus</i>			
3.	Fruit flies			
(a)	<i>Bactrocera dorsalis</i>	April-July	Fruits	+++
(b)	<i>B. correcta</i>			
(c)	<i>B. zonata</i>			
Minor/sporadic pests				
4.	Shoot borer, <i>Chlumetia transversa</i>	Oct. -Feb.	New shoot	+
5.	Midges			
(a)	Leaf gall midge, <i>Protocontarinia matteiana</i>	Throughout year	Leaf/vegetative stage	++
(b)	Blossom midge, <i>Erosimya indica</i>	Jan.-March	Panicle	
6.	Leaf damaging insects			
(a)	Ash grey beetle, <i>Myllocerus spp.</i>	Sept.-Nov.	Leaf and nursery	+
7.	Leaf miner, <i>Acrocercops syngamma</i>	Sept.-Nov. March-April	Leaf damage	+
8.	Stem borer, <i>Batocera rufomaculata</i>	Dec.-April	Tree trunk	+
9.	Scale insects, <i>Aspidiotus destructor</i>	Mar.-June	Leaf	+
10.	Leaf webber, <i>Orthaga spp.</i>	June-Dec. and Feb.-April	Leaf	+
11.	Mealy bug, <i>Drosicha mangiferae</i>	April to June	Twig and fruit	+
12.	Mite			
(a)	<i>Oligonychus mangiferae</i>	Dec.-April	Bud and flush	+
(b)	<i>Aceria mangiferae</i>			
13.	Red ant, <i>Oecophylla smaragdina</i>	Feb.-May	Twig and fruit	+
14.	Hairy caterpillar (Unidentified sp.)	Oct.-Dec.	Defoliation	+
15.	Bark eating caterpillar <i>Inderbela spp.</i>	Oct.-Dec.	Larva makes webs and making zigzag galleries	+
16.	Semilooper, <i>Achaea janata</i>	Nov.- March	Inflorescence	+
17.	Fruit borer			
(a)	<i>Deanolis spp.</i>	May- July	Fruit	+
(b)	<i>Citripestis eutrappera</i>			
(c)	<i>Conogethes punctiferalis</i>			

*+++ = High population/major pest, ++ = Moderate population, + = Low population/minor pests



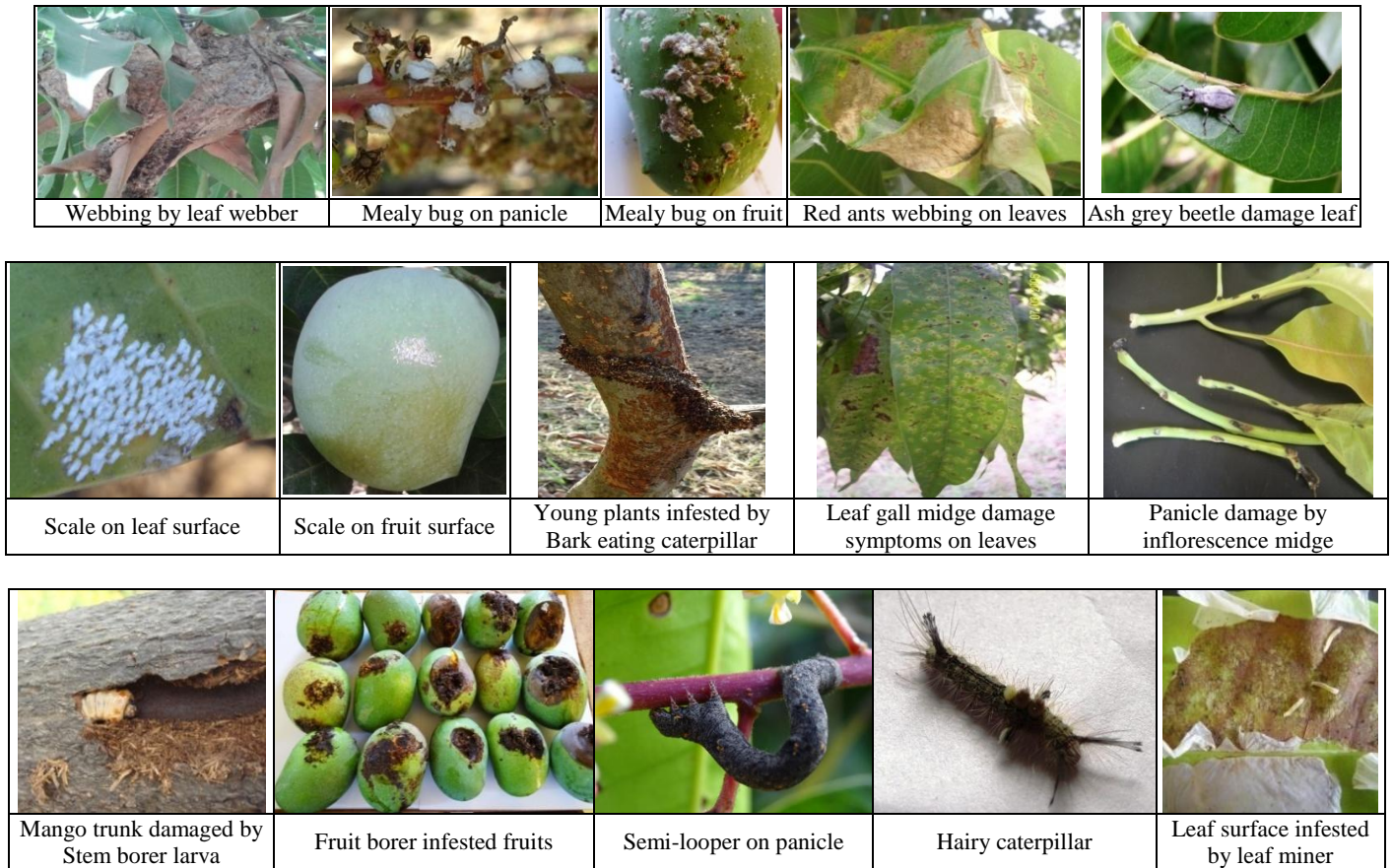


Fig 1: Major and minor insect pests and nature of damage on mango during 2013-17

Acknowledgement

Authors are thankful to Navsari Agricultural University, Navsari, Gujarat 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 project entitled “Understanding of the changes in host pest interactions and dynamics in mango under climate scenario” which facilitated to carry out this study. Authors are also thankful to Dr. Gundappa, Scientist, ICAR-CISH, Lucknow and Dr. Jaipal Singh Choudhary, ICAR-RCER, Ranchi for identification of different pest species.

References

- Anonymous. National Innovations in Climate Resilient Agriculture (NICRA). Research Highlights. 2016, 51.
- Bana JK, Ghoghari PD, Kalaria GB, Saxena SP, Shah NI. Efficacy of IPM Modules against Mango Hopper Complex. *Indian Journal of Entomology*. 2015; 77:320-322.
- Bana JK, Sharma H, Kumar Sushil, Singh P. Impact of weather parameters on population dynamics of oriental fruit fly, *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) under south Gujarat mango ecosystem. *Journal of Agrometeorology*. 2017; 19:78-80.
- Bana JK, Singh P, Makwana Amit. Influence of abiotic factors and crop stages on population dynamics of hoppers, *Idioscopus* spp. in Mango ecosystem. *Annals of Plant Protection Sciences*. 2016; 24:286-289.
- CABI. Crop Protection Compendium: Global Module. CABI Publishing, Wallingford, UK, 2003.
- Global Pest and Disease Database (GPDD). Report on GPDD Pest ID 1276 *Scirtothrips dorsalis* – Animal and Plant Health Inspection Service (APHIS). 2011, 1-15.
- Gundappa, Rajkumar B, Srivastava K, Singh S. Rearing of mango stem borer, *Batocera rufomaculata* De Geer (Coleoptera: Cerambycidae) on artificial diet. *Pest Management in Horticultural Ecosystems*. 2015; 21:219-220.
- Indian Horticulture Database. National Horticulture Board (eds M Saxena and Gandhi). 2014; 99.
- Jayanthi PDK, Verghese A, Shashank PR, and Kempraj V. Spread of indigenous restricted fruit borer, *Citripestis eutraptera* (Meyrick) (Lepidoptera: Pyralidae) in mango: Time for domestic quarantine regulatory reforms. *Pest Management in Horticultural Ecosystems*. 2014; 20:227-230.
- Kannan M. Rao NV. Ecological studies on mango leaf webber (*Orthaga exvinacea* Hamp.) in Andhra Pradesh as a basis for IPM. *International Journal of Agricultural Sciences*. 2006; 2:308-311.
- Kumar S, Desai HR, Patel ZP, Bhatt BK. Impact of climatic variability and crop phenology in abundance of mango hopper. *International conference: Changing scenario of pest problems in Agri-Horti ecosystem and their management held at MPUAT, Udaipur*. 2014, 114-128.
- Kumar S, Patel CB, Bhatt RI, Rai AB. Population dynamics and insecticidal management of the mango thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) in South Gujarat. *Pest Management and Economic Zoology*. 1994; 2:59-62.
- Kumar Vivek, Dakshina RS, Garima K, Mckenzie CL, Osborne LS. New tropical fruit hosts of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) and its relative abundance on them in south Florida. *Florida*

- Entomologist. 2012; 95:205-207.
14. Mumford John D. Management of fruit flies in India (Diptera: Tephritidae) Funding application and project memorandum. Department of International development (DFID), UK. 2001, 1-95.
 15. NICRA team of Mango Pest Surveillance. Manual for mango pest surveillance. Jointly published by NCIPM, New Delhi, ICAR-RCER, RC, Ranchi, ICRIDA, Hyderabad and Central Institute for Subtropical Horticulture, Lucknow. 2011, 23-24.
 16. Patel AT, Kumar Sushil, Chavan SM. Screening of mango cultivars against leaf gall midge. Crop Improvement. 2011; 38:99-101.
 17. Patel KB, Saxena SP, Patel KM. Fluctuation of fruit fly oriented damage in mango in relation to major abiotic factors. Hort Flora Research Spectrum. 2013; 2:197-201.
 18. Pena JE, Mohyuddin AI, Wysoki M. A review of the pest management situation in mango agro ecosystem. Phytoparasitica. 1998; 26:1-20.
 19. Reddy DS. Relative incidence of leaf webber, *Orthaga exvinacea* Hamp. on varieties and hybrids of mango (*Mangifera indica* L.). Pest Management in Horticultural Ecosystem. 2013; 19:234-236.
 20. Tandon PL, Verghese A. World list of insect, mite and other pests of mango, IIHR, Bangalore. 1985, 5-22.
 21. Verghese A, Jayanthi PDK. Integrated pest management in fruits. In: Pest Management in Horticultural Ecosystems, (Parvatha Reddy, P., Verghese, A., Krishna Kumar, N.K. Eds.), Capital Publishing Company, New Delhi. 2001, 1-23.
 22. Verghese A, Nagaraju DK, Madhura HS, Jayanthi PDK, Devi KS. Wind speed as an independent variables to forecast the trap catch of the fruit fly (*Bactrocera dorsalis*). Indian Journal of Agricultural Sciences. 2006; 76:172-5.
 23. Verghese Devi. Seasonality and sampling of the mango shoot borer, *Chlumetia transversa* Walker (Lepidoptera: Noctuidae) Pest Management in Horticultural Ecosystems. 1998; 4:16-20.