



Diversity & seasonal incidence of mulberry insect pests from Ahmednagar (M.S) India

Popat P Pathare, Chandrashekhar J Hiware*

Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Abstract

Mulberry plant (*Morus* spp.) is important sole food for mulberry silkworm (*Bombyx mori* L.). Mulberry plants play unique role in silk productions but many insect pests are attacking on mulberry plant and they adversely affect on plant which result in deteriorations of quality and productions of leaves. The present study was conducted during April-2015 to March 2017 from different fields of Mulberry crop from Ahmednagar district. The result shows that, different insect pests are damaging the Mulberry crop from the study area which causes heavy economical loss to sericulturists. Pest found on the mulberry crop from study area are Bihar hairy caterpillar, Leaf roller, Wingless grasshopper, Thrips, Mealy bug, Read hairy caterpillar, Tree hopper. The present study is carried out to know diversity of mulberry insect pests & seasonal incidence, nature of damage, symptoms of insect pests of mulberry in fields from various sites in Ahmednagar district of Maharashtra state, India. The results of the field study revealed that the incidence of Bihar hairy caterpillar started from August to January where as it was occurred in all the fields of mulberry garden it indicate that the Bihar hairy caterpillar is major insect pest of mulberry garden in study area.

Keywords: *Bombyx mori* l, diversity, insect pests, mulberry, silkworm ahmednagar district etc

Introduction

The productions of mulberry leaves play a key role in sericulture industry because silkworm larva feeds Mulberry leaves and convert leaves protein into silk protein but Mulberry plant leaves are infested by a number of pests, which affected silkworm health and quantity, quality cocoon resulting in economic loss of sericulture industry. The important use of mulberry leaf is rearing of the silk worms for production of silk (Dev Kishan Jat, K. K. Singh, S. K. Mehta and D. K. Rana). The present study is carried out to find out diversity of mulberry insect pests & seasonal incidence, nature of damage, symptoms of insect pests of mulberry i.e. Bihar hairy caterpillar, Leaf roller, Wingless grasshopper, Thrips, Mealy bug, Read hairy caterpillar, Tree hopper in fields from various sites in Ahmednagar district of Maharashtra state, India. The diseases and pest cause around 12-25% leaf yield loss either by depletion in nutritive value or defoliations (N. Vijaya Kumari. 2014) [1]. Such pest infected leaves are fed by silkworm larva there growth stunted. Increase productions of pure natural silk to adapted advance technology for management of seasonal incidence of mulberry pest. About 300 insect and non-insect species of pests are known to occur on mulberry (Kotikal YK. 1982) [2]. Most of insect caterpillar feed on the bark inside the vessels; insect pest is regularly occurring throughout the year and causing serious damage to plant, due to the continuing incidence of pest population has confronted sericulturist with two major problems: decrease in silk production and threat of environmental pollution on the other (Singh R.N. and K.C. Mandal, N. Kumar, S.S. Sinha, 1990) [3]. The eggs lay by female insect in under loose bark or crack and cervices of branches such infected laves are cause serious damage to silkworm. The majority of the farmers faced the problem of lack of knowledge regarding controlling

of pest and disease of on the field of mulberry crop (G.B. Malathesh, M. Shivamurthy, B.S. Lakshman Reddy & M.S. Jyothi. 2009) [4]. Mulberry is affected by a number of sucking pests such as scale insects, leafhoppers, bugs, thrip and whitefly. A serious disease results in a leaf loss up to 30%. Adoption of IPM in three southern sericulture states, mulberry plantation led to 67% pest suppression and 62% disease loss (D. Gangopadhyay 2008) [5]. Thrips and whitefly, broad mite is one of the serious sucking pests on mulberry leaf (Monchan Maketon, Patricia Orosz-Coghdan, Tittanon Sinparasent. 2008) [6]. Insect pest causes serious damage to mulberry, they are transmits of some diseases infection to silkworm. The various uses of silkworm by products such as silk fibre, faecal matters and pupa have been used since long time by the mankind. All aspects of silkworm depend upon the state of health of the worms (Rohit Kumar Verma, Md. Imtiyaz Aslam, Richa Roy and S. P. Roy 2013) [18]. The pests of mulberry are classified as defoliators (leaves eating pests), sucking pests (plant sap suckers), stem borers. The leaf eating insect pest caterpillars are voracious feeder they feed tremendous amount of tender mulberry leaf, sucking pest are continues suck the plant sap so plant cause very serious damage to leaf production. Among these, Mealy bugs, whiteflies, Jassids, Thrips, are causing considerable damage to mulberry depending on the season, region and mulberry varieties (Madhuri Thinnaluri, Bhaskar, R.N., Mahesh and T.K. Narayanaswamy 2014) [7]. The main insect order known to be the pest of mulberry in order of largest number of species attacks the mulberry plant are Lepidoptera, Hemiptera, Coleoptera, Thysanoptera, Orthoptera, and Isoptera besides the same acarids and molluscan species (Sengupta K, Kumar P, Baig M, Govindaish M. 1990) [8]. Defoliating insects are common in all agricultural ecosystems, feeding on different

agricultural host plant (Sunil B. Avhad and Chandrashekar J. Hiware, 2013.)^[9] The farmers of Ahmednagar are not aware for information's regarding mulberry insect pest and their seasonal influences. Hence the present investigation was carried out to generate information on the diversity and abundance of insect pests infesting mulberry garden associated mulberry cultivated area from Ahmednagar district, Maharashtra State causing damage to mulberry plant which cause economic loss to the sericulture industry from Study area.

Materials and Methods

After complete survey of the Ahmednagar district, some of the field was selected for collections of insect pest. The field were from different tehsils of Ahmednagar district Viz. Shevgaon (Mungi), Sangamner (Chincpur), Rahata (Loni Bu), Parner (Chombut), Rahuri (Taklimia), Shrigonda (Anandwadi), Shirampur (Bhor). Figure no-1 shows the insect pests collected by visiting each mulberry garden for 3 seasonal cycles from April-2015 to March 2017, with periodic monthly visit.

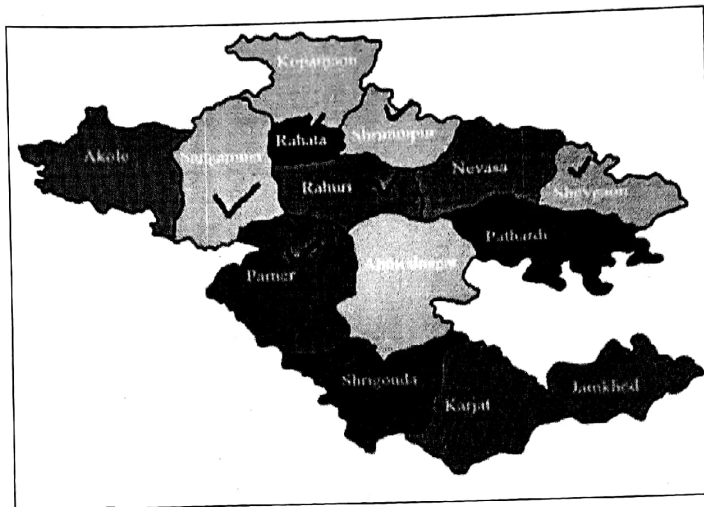


Fig1: Mulberry Insect pest collections area from Ahmednagar districts (M.S) India shown a map.

Pest collecting methods

Insect pest were collected from mulberry garden in study area of Ahmednagar district (M.S), by using standard insect collection method/techniques of (Donald JB, Dwight MD, Charles AT *et al.* 1981)^[16].

Insect pest identifications

All insect pest specimens were identified with the help available literature of Zoological survey of India Entomology Section, Pune division. (M.S).

Results

Seasonal Incidence of Mulberry Insect Pest

1. Bihar hairy caterpillar. (*Spilosoma Obliqua* Walke 1855)

Habitat and Locations from study area- These insect pests are found in all mulberry gardens from Ahmednagar district. (M.S) India

Nature of damage and symptom

Damage: The young caterpillar of Bihar hairy caterpillar is voracious feeder they feed tender leaf of host plant in continuously.

Symptom: The infected plant branches clearly show absence of leaf.

Seasonal Incidence: Pest generally found in August to January.

2. Leaf roller. *Diphris Pulverulentalis* Hamson

Habitat and Locations from study area: Pests are found in all mulberry gardens from Ahmednagar district. (M.S.) India.

Nature of damage and symptom

Damage: The caterpillar folds the leaf and makes a roll like structure. Such infested leaves are not used for silkworm feeding. Larva of pest feeds tremendous leaves of mulberry.

Symptom: The infected plant branches clearly show leaf is rolled.

Seasonal Incidence: Mainly found in March to September.

3. Wingless Grasshopper. (*Phaulacridium vittatum*)

Habitat and Locations from study area: Pests are found in 4 mulberry gardens from Ahmednagar district. (M. S.) India.

Nature of damage and symptom

Damage: The Grasshopper feeds continuously on mulberry leaves. Such infected mulberry plant reduces leaf production.

Symptom: The infected plant branches without leaf.

Seasonal Incidence: Mainly found in End of June to September.

4. Thrips *Pseudodendrothrips*

Habitat and Locations from study area: Pests are found in 3 mulberry gardens from Ahmednagar district. (M. S.) India.

Nature of damage and symptom

Damage: The Thrips affect the leaves of mulberry shoot. Such infected mulberry plant reduces leaves productions.

Symptom: The infected plant branches show less amount of leaf.

Seasonal Incidence: Mostly found into March to June end.

5. Mealy bug *Maconel Iicoccus*

Habitat and Locations from study area: Pests are found in 5 mulberry gardens from Ahmednagar district. (M. S.) India.

Nature of damage and symptom

Damage: The adult suck cell sap from leaves of mulberry. Infected mulberry plant affects leaves productions.

Symptom: The infected plant branches show less leaves productions.

Seasonal Incidence: Mostly found into March to May end (Mostly in summer seasons)

6. Red hairy caterpillar (*Amsacta albistriga* Walker)

Habitat and locations from study area: Pests are found in 5 mulberry gardens from Ahmednagar district. (M. S.) India.

Nature of damage and symptom

Damage: The Young caterpillar is fed the tender leaves of mulberry. The Illinstars 'larva are very danger for plant they fed continuously leaf. Infected mulberry plant affects leaves productions.

Symptom: The infected plant branches show less leaves productions.

Seasonal Incidence: Mostly found into August to September end (Mostly in rainy seasons)

7. Tree hopper *Oxyrachis tarandus* Fabricius

Habitat and Locations from study area: Pests are found in 6 mulberry gardens from Ahmednagar district. (M. S.) India.

Nature of damage and symptom

Damage: The adult suck cell sap from leaves of mulberry.

Infected mulberry plant affects leaves productions.

Symptom: The infected plant branches without leaf or leaf productions are very less.

Seasonal Incidence: Found thought the year (Occurrences all seasons)

Conclusion

The present survey shows diversity and seasonal incidence of insect pests of mulberry garden from various sites in Ahmednagar district, Maharashtra during April-2015 to March 2017. The occurrence of insect pests from various sites shows that, the incidence of 07 different insect pests recorded and are the namely Viz. Bihar hairy caterpillar, Leaf roller, Wingless grasshopper, Thrips, Mealy bug, Red hairy caterpillar and Tree hoppers species. In Shevgaon Bihar hairy caterpillar, Leaf roller, wingless grasshopper, Mealy bug, Red hairy caterpillar and Tree hopper are recorded, but no occurrence of Trips. In Sangamner Bihar hairy caterpillar, Leaf roller, wingless grasshopper, Trips and Tree hopper pest are recorded in Sangamner no occurrence of Mealy bug and read hairy caterpillar. In Rahata Bihar hairy caterpillar, Leaf roller, Trips, Mealy bugs, and read hairy caterpillar insect pest are found in Rahata but wingless grasshopper, Tree hopper are not recorded. In Parner and Rahuri shows same species occurrence Bihar hairy caterpillar, Leaf roller, Wingless grasshopper, Mealy bug, Red hairy caterpillar and Tree hoppers but Trips are not found in both the tahsil. In Shrigonda Bihar hairy caterpillar, Leaf roller, Trips, Read hairy caterpillar, and Tree hopper, are recorded Wingless grasshopper, Mealy bug such insect pest absent in shrigonda region during present survey. Shrirampur region show Bihar hairy caterpillar, Leaf roller, Mealy bug and Tree hopper are found. But Wingless grasshopper, Trips, and Read hairy caterpillar are not recorded. Finally the present survey shows diversity and seasonal incidence of Bihar hairy caterpillar, Leaf roller, is found all site of mulberry garden in Ahmednagar district.

Table 1: Incidence of mulberry insect pest in different filed from Ahmednagar district. (Occurrence of Pest on Field from Tehsil)

Sr. No.	Mulberry Insect Pest	Name of tehsil with village name						
		Shevgaon (Mungi)	Sangamner (Chinepur)	Rahata (Loni Bu)	Parner (Chombut)	Rahuri (Taklimia)	Shrigonda (Ananawadi)	Shrirampur (Bhor)
1.	Bihar hairy caterpillar.	+	+	+	+	+	+	+
2.	Leaf roller	+	+	+	+	+	+	+
3.	Wingless grasshopper	+	+	-	+	+	-	-
4.	Thrips	-	+	+	-	-	+	-
5.	Mealy bug	+	-	+	+	+	-	+
6.	Read hairy caterpillar	+	-	+	+	+	+	-
7.	Tree hopper	+	+	-	+	+	+	+

+ = Pest are occurred - = Pest not occurred

Discussion

The production of appreciable quantity of quality mulberry leaf is often hampered by insect pests belonging to large number of insect orders (Sunil B. Avhad and Chandrashekar J. Hiware, 2013.)^[9] The incidence of mealy bug (19.21 %), Thrips (17.18 %), whitefly (12.62 %), Jassids (9.08 %) and scale insects (8.24%), (Anusha, H. G. and Bhaskar, R. N.

2015). similar results are found in present study. The Bihar Hairy Caterpillar is damage the mulberry leaves which is bad for silkworm consumption and finally silk productions. Thrips Pseudodendrothrips mori Niwa is one of the important sap sucking insect pests of mulberry, belonging to the order Thysanoptera: Family Triptidae. The estimated leaf loss due to this pest is about 40- 50 % of the total leaf produced. (A.

Mahadeva.2011) Mulberry, *Morus* spp is infested by a number of insect pests among these *Maconelllicoccus hirsutus* a pest which is responsible for the highest damage to mulberry plants (Jagadish Naik M, Samba Naik, Palaindira P. 2013) [12]. Mulberry, *Morus* spp is infested by a number of insect pests among these "*Eupterotemollifera alker*" a polyphagous pest which is responsible for the highest damage to mulberry plants (S. K. Gangwar. 2012) [10]. Some of sucking pests of mulberry viz. pink mealy bug, thrips, spiraling whitefly, etc. have been developed resistance against the available pesticides and because more dangers for mulberry (Mude Jagadish Naik and Angothu Samba Naik. 2015) [11]. The changing scenario in mulberry poses newer threats with pests like mealy bugs becoming serious and regular. In the recent years serious damage to mulberry by tukra has been reported in rain fed sericulture tract of Karnataka and Andhrapradesh (Samba Naik. A, Suresh.B, Ravi babu. B, M. Jagadish Naik. 2013) [13]. Pink mealy bug it is major pest of mulberry which is hard to kill pest. This pest is highly prevalent in tropical regions and has wide host range, which deteriorates leaf quality and quantity resulting in cocoon crop loss (N. Vijaya Kumari. 2014) [1].

Acknowledgements

The authors are thankful to the all the farmer from Ahmednagar districts for their cooperation during this study, Department of Sericulture Ahmednagar, and to the Head, Department of zoology, Dr. Babasaheb Ambedkar Marathwada university Aurangabad (M.S) India, for providing laboratory and library facilities during these research work. ZSI Entomology Section, Pune division for providing literature of insect pest identification.

References

- Vijaya Kumari N. Ecofriendly Technologies for Disease and Pest Management in Mulberry -A Review, (IOSR Journal of Agriculture and Veterinary Science. 2014; (7)2:1-6.
- Kotikal YK. Studies on the pest of mulberry, *Morus alba* L. with special reference to the black headed hairy caterpillar, *Spilosoma obliqua* Walker (Lepidopter: Arctiidae). M.Sc. (Agricul) Thesis, UAS, Bangalore, 1982, 37-38.
- Singh RN Mandal KC, Kumar N, Sinha SS. Insecticides resistance challenge to pest management in tasar culture Indian silk, 1990; 29:23-24.
- Malathesh GB, Shivamurthy M, Lakshman BS Reddy Jyothi MS. Constraints encountered by Farmers in selected Farming system in eastern dry zone of Karnataka. Mysore Journal of Agri. Sci. 2009; 43(4):772-778.
- Gangopadhyay D. Sericulture Industry in India- A Review, India, Science and technology: for Rural India & inclusive growth, 2008.
- Monchan Maketon, Patricia Orosz-Coghdan, Tittanon Sinparasent. Evaluation of metarhizium anisplia (Deuteromycota: Hyphomycetes) for control of broad mite Polyphagotarsnemus Latus (Acarin-Tarasonemidae) in mulberry. Erp Appl. Acarol, 2008; 46:157-167.
- Madhuri Thinnaluri, Bhaskar, RN, Mahesh TK. Narayanaswamy. Effect of Plant Products on Morphological Parameters of Tukra Affected Mulberry Leaves International Journal of Scientific and Research Publications, 2014; 4(8).
- Sengupta K, Kumar P, Baig M, Govindaish M. Handbook on pest and disease control of mulberry and silkworm.UNESCAP-United Nations Economic and Social Commission for Asia and the Pacific, Bangkok, 1990, 88.
- Sunil B, Avhad Chandrashekar J. Hiware. Mulberry Defoliators: Distribution and Occurrence from Aurangabad (M.S.) India, (Journal of Entomology and Zoology Studies). 2013; 1(4):1-6.
- Gangwar SK. Experimental Study to Find the Effect of Different Neem (*Azadirachta indica*) based Products against Moringa hairy Caterpillar (*Eupterotemollifera* Walker.), Bulletin of Environment, Pharmacology and Life Sciences. 2012; 1(8):35-38.
- Mude Jagadish Naik, Angothu Samba Naik. Impact of Botanical Extracts on Histopathology of Silkworm (*Bombyx mori* L.), (Journal of Experimental Biology and Agricultural Sciences, 2015; 3:3.
- Samba Naik A, Suresh B, Ravi babu B, Jagadish Naik M. Impact of Botanical Extracts on the Incidence of Major Pest (tukra) in Mulberry leaves on Carbohydrate metabolism in Silkworm, *Bombyx Mori* L. (Bulletin of Environment, Pharmacology and Life Sciences). 2013; 2(11):110-114.
- Jagadish Naik M, Samba Naik, Palaindira P. Effect of Neem seed kernel extract on the incidence of major pest (tukra) in mulberry leaves on excretory products in Silkworm, *Bombyx mori* L. (Journal of Entomology and Zoology Studies). 2013; 1(5):65-68.
- Mahadevay. Influence of Thrips (*Pseudodendrothrips Mori*) Infestation on the Biochemical Constituents and Photosynthetic Pigments of Mulberry (*Morus Spp*) Leaves (International Journal of plant, animal & environmental sciences), 2011; (1)3
- Anusha HG, Bhaskar RN. Sucking pests of mulberry, a review paper IOSR Journal of Agriculture and Veterinary Science. 2015; 8(8):01-03.
- Donald JB, Dwight MD, Charles AT. Collecting, preserving and studying insects, In "An Introduction to the Study of Insects" CBS College Publishing. Dryden Press, USA, 1981, 710-753.
- Dev Kishan Jat KK. Singh SK. Mehta DK. Rana. Effect of Growing Conditions and Time of Planting on the Rooting In Stem Cutting Of Mulberry (*Morus Alba* L.) Under Sub Tropical Valley Condition Of Himalaya Region.The Bioscan. 2017; 12(1):511-514.
- Rohit Kumar Verma Md. Imtiyaz Aslam, Richa Roy SP. Effect Of Polymeric Nanoparticle "Pnipam" (Poly-N-Isopropyl Acryamide) On The Microbial Infestations O Tasar Silkworm, The Bioscan. 2013; 8(3):993-996.