

Sucking pests of mulberry: A review paper

Anusha, H. G. and Bhaskar, R. N.

Department of Sericulture, UAS GKVK, Bengaluru-65

Abstract: Mulberry crop is considered as only food for the silkworm, *Bombyx mori* L. which is commercially exploited. It is a perennial, evergreen, luxuriant crop cultivated in all types of soils, both under rainfed and irrigated conditions. The crop is prone to depredation of diverse organisms, because of its fast growth and green foliage throughout the year, in varying proportions either for space, food or both. So far, over 300 insect and non-insect species of pests are known to infest mulberry in varying intensities during different stages of the crop and seasons. The major insect orders known to be the pest of mulberry in order of largest number of species attacks the mulberry are Lepidoptera, Hemiptera, Coleoptera, Thysanoptera, Orthoptera and Isoptera besides the Acarids and Molluscan. The pests which are infesting mulberry are categorized into sap suckers, defoliators and root feeders. The sucking pest includes mealybug, thrips, spiraling whitefly, leaf hoppers, jassids and scale insects which cause damage to mulberry crop. Most of the sap sucking insects, such as adult leaf hoppers, aphids or thrips cause minimal direct tissue destruction. These insects use a specialized mouth part, the stylet, to locate, penetrate and drain sap from the phloem sieve elements of the plants vascular tissue.

Key words: mulberry pests, crop loss, seasonal incidence, symptoms,

I. Introduction

Mulberry (*Morus spp.*) is a perennial, deep rooted, fast growing and high biomass producing foliage plant. It forms the basic food for the silkworm, *Bombyx mori* L. The quality of mulberry leaf is influenced by several factors such as variety, agronomic practices and abiotic components (Krishnaswami et al. 1970). In spite of all these factors, sometimes, the nutritive values are degraded due to diseases and pest damage. Since mulberry leaf is available throughout the year, it makes the plant prone to various diseases and pests. About 300 insect and non insect species of pests are known to occur on mulberry. Among the pests few are sap suckers and defoliators .

Sucking pests of mulberry is classified as major and minor based on the incidence of pest. Major sucking pests includes mealy bug, thrips and spiraling whitefly and minor includes the jassids, scale insects and non insect pest is mite. Most of the sap sucking insects, such as adult leaf hoppers, aphids and thrips cause minimal direct tissue destruction. These insects use a specialized mouth part, the stylet, to locate, penetrate and drain sap from the phloem sieve elements of the plants vascular tissue. Heavy infestation caused by them leads to shortages of photosynthesis and thus severely reduce the growth potential of the plant. Govindaiah et al. (2005) reported the incidence of mealy bug (19.21 %), thrips (17.18 %), whitefly (12.62 %), jassids (9.08 %) and scale insects (8.24%).

Mealy bug: The mealy bug is considered as an important cosmopolitan sucking pest and regular in occurrence. This pest is highly prevalent in tropical regions and has a wide range of alternate hosts including ornamental, timber and wild plants. This insect is prevalent as polyphagous. Two species of mealy bug infest the mulberry i.e. Pink mealy bug and papaya mealy bug. The infesting stages are both nymph and adult.

Pink mealy bug: It is native to southern Asia and has spread to other parts of the world like Africa and more recently to North America and Caribbean, (Kairo et al., 2000). In India, the occurrence of this pest was reported in Murshidabad district of West Bengal (Mukerji, 1899).

Crop loss and seasonal incidence: Satyaprasad *et al.* (2000) reported that, mealy bug incidence caused an estimated loss in leaf yield of 4500 Kg/ha/yr (34.24%) and more than 30% which sometimes reaches upto 50% reported by (Vijaya Kumari, 2014). Pink mealy bug caused damage to the mulberry crop **throughout the year** which was ranged from 0.79 to 11.69 per cent and severity was found to be maximum during July to August (Benjamin et al., 1997). High incidence of pink mealybug was noticed in **March** and reduced in **August**, the least was in **December** (Hemalatha and Shree, 2008).

Symptom: Immature and mature mealy bugs are found in clusters on the stalks under overlapping leaf sheath, below the node and spread up and down to the other internodes and buds. The damage mainly occurs by sucking cell sap, depriving plants of essential nutrients, which may lead to stunting, yellowing, and thin canes. The

thickened leaves turn dark colour, on severe infestation it leads to short intermodal distance and appears like bunched top so this disease is also called as tukra disease. During later stage of infestation, sooty mould development takes place due to excretion of honey dew secretion of mealy bug (Govindaiah et al., 2005).

Thrips: *Pseudodendrothrips mori* was found to be most dominant species in different parts of world. Thrips is considered as a highly oligophagous pest and native of northern hemisphere. Thrips has become a dominant and regular pest of mulberry. About 21 species (46.67%) of thrips are identified as pest of agricultural crops. Devaiah and Kotikal (1983) reported the incidence of thrips on mulberry in Karnataka.

Crop loss and seasonal incidence: High rainfall and humidity were not favorable for thrips resulting in low peaks of thrips population on mulberry (Venugopalapillai and Krishnaswamy 1980). *P. mori* cause loss in the leaf area and leaf weight resulting in yield reduction to the tune of 20-50 per cent (Muthuswami et al., 2010). The estimated leaf loss due to this pest is about 40–50 % of the total leaf produced (Mahadeva, 2011).

Symptom: It feeds on fully expanded leaves and young tissue in the bud. Thrips causes a damage on a single leaf blade by using their mouth parts, rasp the epidermis on the ventral side. During laceration, they secrete saliva, which coagulates the sap. Leaf forms boat shape and severe infestation leads to chlorosis. Infested leaves dry out and have a stippled or silver flecked appearance. Small brownish specks of excrement are usually noticed on the underside of the leaves. The nymphs and adults of the mulberry thrips lacerate the tissue and suck the oozing cell sap from the upper and lower surfaces of the leaves. So, the usual evaporation process of the leaves is quickened, especially during high temperature seasons, by additional evaporation through these wounds (Mahadeva and shree, 2014).

Spiraling whitefly: Spiralling white fly *Aleurodicus dispersus* Russel was considered as a minor pest in mulberry because its occurrence was occasional and damage was less. But in recent days it has become a major pest causing extensive damage to mulberry in south India. In West Bengal *Dialeuropora decempuncta* and *Aleuroclava pentatuberculata* are the major types of white flies which are reported in 1999. Recently, during 2011 severe outbreak of *D. decempuncta* was reported on mulberry from Wayanad district of Kerala (Josepha et al., 2011). However, during routine survey on insect pests of mulberry, since 2009, the severe infestation of mulberry gardens with *D. decempuncta* in Mandya and Mysore districts was confirmed. *Aleurodicus dispersus* is native to the Caribbean islands and Central America.

Crop loss and seasonal incidence: The whiteflies are present throughout the year in south India, with high populations in summer (March—June) and low in winter (October—January) (Vijaya Kumari, 2011). The whitefly infestation was seen from February to August (peak) and October to December coinciding with a prolonged dry spell followed by hot humid weather. (Bandopadhyay and Santhakumar, 2000). In the hot spot areas of Mysore and Mandya districts, the incidence ranged from 20 to even above 85% (Narendra Kumar et al., 2013). Due to whitefly infestation, crop loss in mulberry silkworm rearing was upto 5 kg cocoons/ 100 dfl (disease free layings) (Yumnam Debaraj et al., 2013).

Symptoms: Adults and nymphs of the whitefly remain in colonies under the surface of leaves. The copious white, waxy, flocculants, material secreted by all the stages of pest is readily spread by wind, causing nuisance (Kumashiro et al., 1983). Spiralling whiteflies feed on plants by sucking plant sap/juices from the phloem through a slender stylet, it results in curling, chlorosis, defoliation and stunted growth. The honey dew excreted by these insects will fall on the upper surface of the lower leaves which becomes a medium for developing “sooty mould” fungus, *Capmodium sp.* This in turn, interferes with photosynthetic process by not allowing enough light to reach the cytochrome tissues of the leaves. The sooty mold may also increase thermal absorption and raise leaf temperature, thus in turn reduces leaf efficiency and leads to further deterioration in the nutritional quality (Bryne et al., 1990).

II. Conclusion

The review revealed that, the sucking pests are more serious and cause injury to apical portion which not only prevent the further growth but also deteriorate the biochemical constituents of leaf which in turn affects the production of good quality of raw silk. Since sucking pests cause severe damage to crop, there is a necessary to adopt proper management practices at the right time during the mulberry crop production.

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