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Sooty Mold of Mulberry – First Report from Kashmir

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ABSTRACT

Mulberry (*Morus alba*), is the sole food of *Bombyx mori* L., which produces fabulous silk fiber. The silkworm is reared under domestic conditions based on the quantum of mulberry leaf available with the sericultural farmer. Healthy mulberry leaf contributes an important factor for successful silkworm cocoon crop. Insect pests and diseases of mulberry foliage are one of the main constraints in achieving higher productivity in sericulture industry. Besides, various insect pests and pathogens some new biotic factors have come across the mulberry wealth during the course of pest and disease monitoring/survey in Jammu and Kashmir State. Sooty mold is an *Ascomycete* saprophytic fungi, which has been reported first time from Kashmir on mulberry plantation. The fungus has been observed in valley of Gurez, which is also known as little Kashmir. The most important thing is that the causative agent of sooty mold in the valley is a sap sucking small scale insect *Parthenolecanium corni* Bouche (Hemiptera: Coccidae).

Key Words: Sooty mold, Mulberry, silkworm, pests

INTRODUCTION

Survey is a continuous process for monitoring insect pest and diseases of mulberry and silkworm in sericulture. Mulberry (*Morus alba*), the sole food of *Bombyx mori* L. is primary component to be monitored for its healthiness. Insect pests and diseases are one of the main constraints in achieving higher productivity in sericulture industry. Besides, various insect pests and pathogens some new biotic factors have come across the mulberry wealth during the course of pest and disease monitoring/survey in Jammu and Kashmir State. During the survey it was noticed that Gurez region of Kashmir, has witnessed mulberry wealth but the area is lacking sericulture activities. Gurez is a valley located in the high Himalayas, about 86 kilometers from Bandipore and 123 kilometers from Srinagar in northern Jammu and Kashmir, India, with altitude at about 8,000 feet (2,400 m) above sea level. Due to heavy snowfall in winter, the valley remains cut off for six months of the year.

Baghtor, Dawar and Tarbal areas of Gurez, were found to have a good amount of mulberry confirming the scope for sericulture. Hence, the monitoring of certain insect pests and diseases is very important before drawing any silkworm rearing programme to new region. A black colored fungus was observed for the first time in Tarbal, Kashmir (J&K) associated with mulberry foliage in abundance.

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The fungus was identified as sooty mold (*Capnodium* sp.) belongs to Class: Ascomycetes; Sub-class: Loculo ascomycetidae; Order; Dothideales and Family: Capnodiaceae, and the most affected area was Tarbal, area of Gurez. The leaves were covered with sticky black material, hard to rub off with finger tip.

MATERIALS AND METHODS

The survey was conducted in Baghtor, Dawar, Tulail and Tarbal areas of Gurez Valley. Mulberry plantation was randomly selected for the study. Survey on sooty mold was conducted randomly from the maintained and unmaintained plantations in all the above areas of Gurez region. In maintained mulberry plantations four corner plants and centre of the farm were selected, while as in unmaintained plantations random samples were surveyed by selecting three branches from ten mulberry trees from each village.

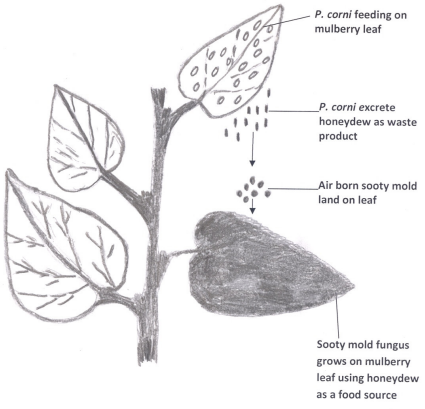
In maintained mulberry farm twenty five mulberry plants were screened from each plot by selecting five from each corner and five from the centre of the each field. From each plant three branches were selected from each plant for observation of sooty mold and recorded and tabulated. The black material collected was identified based on the morphology of the fungus in the laboratory. Its causative agent, damage symptoms were also recorded.

What is Sooty Mold?

Sooty mold is a black, non-parasitic, superficial growth of fungi on plant surfaces. The sooty mold actually results from interaction among sap feeding insects and non – parasitic fungi. The problem of sooty mold occurs widely throughout the world's temperate and tropical region (Scot Nelson 2008). Plants / leaves become blackened and are usually sticky (Fig.1). The fungi involved are saprophytic, *i.e*. they do not invade the plant tissues, but remain on the surface. The mold is difficult to remove and although it is not feeding on the plant, it restricts the light reaching to the leaves, thus reducing photosynthesis process. Sooty molds are *Ascomycete* fungi. Some common genera causing sooty molds are *Capnodium*, *Cladosporium*, *Aureobasidium*, *Antennariella*, *Limacinula* and *Scorias*.

Cause of sooty mould:

Sap sucking insect pests damage the leaf lamina and excretes a sticky material as waste product i.e., honeydew. Honeydew drips on the foliage below, coating mulberry leaves with a sticky, sugary coating. Airborne sooty mold spores land on these mulberry leaves and starts growing. The growth of sooty mold fungus on mulberry leaf surface is regulated by using the honeydew as a food source (Geetha Bai *et al*. 2001; Rajgopal Reddy *et al*. 2001) and turns mulberry leaves black in colour. No infection occurs; these fungi are non-parasitic and non-pathogenic to plants. However, such leaf becomes unfit for silkworm *Bombyx mori* as it shows repellent character.



Source: Concept illustrated by Irfan Illahi

Causative agent under Kashmir conditions: Insect causing sooty mold on mulberry leaves in the surveyed areas of Kashmir, has been identified as *Parthenolecanium corni* Bouche (Hemiptera: Coccidae), (Fig.2) generally known as small scale insects (Fig.3).

Females were observed in abundance, while as males rarely seen. Females mature in spring season, when average daily temperature crosses 14°C. They lay eggs in May – June. Crawlers hatch in June and July, migrate to mulberry leaves and start feeding on them thereby causing damage to leaf lamina.

Damage Symptoms: In mulberry, *P. corni* causes two way damages to the foliage:

Damage caused by *P. corni*: The sap sucking insect pest usually causes local damage to the mulberry leaf. Infested plantations lose leaves and decrease their annual growth, leaf lamina becomes dry and brown pustules are formed on it (fig.4). Where infestation is severe, twig and limb death may occur as feeding scale remove sap from the tree (Fig.5).

Damage caused by *P. corni* excreta: *P. corni* excretes honeydew as waste product after sucking the sap of mulberry leaf, which falls on underneath mulberry leaves and becomes a well medium of sooty mold fungus. As a result mulberry leaves become completely black due to sooty mold reduces leaf photosynthesis and gas exchange and becomes unfit for silkworm consumption (Fig.6).

Identification:

Sooty mold can be completely rubbed off from the leaves or plant surfaces with our finger tips, while as, the black material if cannot rub or wash to reveal green, it may be other than the mold.

Incidence: Lakashmi Reddy *et al*. (2001) has reported the fungus on mulberry from Anantpur district of Andhra Pradesh. Earlier sooty mold was also reported on different horticulture crop plants (David, 2001, David & Regu, 1995). The incidence of sooty mold on mulberry in Gurez (J & K) was recorded 25.47%, hence needs prevention (Table 1).

Prevention: Rajgopal Reddy *et al*. (2003) recommended some chemical insecticides such as Monocrotophos, Chloropyrophos and Nuvan against white fly, the sap feeding insect of mulberry in Andra Pradesh. Keeping in view the hazardous effects of certain chemicals, sooty mold of mulberry should be managed by applying mechanical and cultural methods. Also, it is better to keep the sooty mold causing insects under control and to employ following strategies for eradication of the pest.

- Avoid shady and thickened mulberry plantation.
- Dry weather increase the sooty mold occurrences, spraying of water on mulberry leaves helps to remove the mold.
- Capturing of sap feeding crawlers by thin coating of petroleum jelly around mulberry branches reduces its population density.
- Treatment of household bleaching at 1% concentration to mulberry plants after leaf harvest.

Fig. 1. Mulberry sooty mold under microscope (600 X)

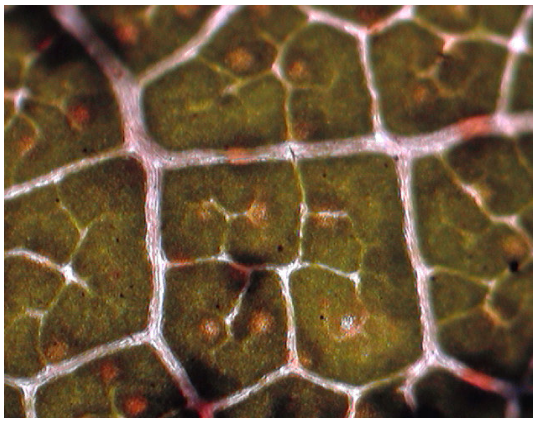


Fig. 4. Damaged mulberry leaf lamina due to *P. corni*

Fig. 2. *P. corni* on mulberry under microscope

Fig. 5. Adult *P. corni* on mulberry twig

Fig. 3. *P. corni* on mulberry leaf

Fig. 6. Mulberry sooty mould

Table 1: Incidence of sooty mold in Gurez area

Sl. No.	Area	No. of Plants observed	No. of plants infested	% Sooty mold
1.	Baghtor	58	14	24.13
2.	Dawar	45	9	20
3.	Tulail	33	11	33.33
4.	Tarbal	21	6	28.57
Total		**157**	**40**	**25.47**

CONCLUSION

Though causative agent of the sooty mold of mulberry in Kashmir is considered as minor pest, but due to climate change there is every apprehension to become it as major pest of mulberry in Kashmir. The present study confirms the sooty mold as a new report on mulberry and hence, needs attention to keep the pest under economic threshold level. More studies are to be taken to work on its bionomics as well as prevalence, severity and distribution of *Parthenolecanium corni* Bouche (Hemiptera: Coccidae) in not only confined to Kashmir region but also entire Jammu and Kashmir sericulture areas.

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