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Incidence of *Psyllobora bisoctonotata* (Mulsant) on powdery mildew of *Dalbergia sissoo* and *Xanthium strumarium*

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Abstract
Powdery mildew is a widely distributed and more destructive disease in nature. One of the common strategy for treating this disease is the chemical control. One cannot rely on chemical control permanently as it is not environmentally friendly. Nature has solved this problem by providing biocontrol agents. During routine survey of powdery mildew disease from Satara District, M.S, India. Mycophagous behavior *Psyllobora bisoctonotata* on *Dalbergia sisso* and *Xanthium strumarium* has been reported in natural conditions. The bionomics of *P.bisoctonotata* with powdery mildew has been discussed in this paper. Larval stages of *P.bisoctonotata* are voracious feeders of anamorph of powdery mildew disease than that of adults. Increase in natural population of said insect may help in reduction of anamorphs of powdery mildew. This will undoubtedly prevent the spread of disease.

Keywords: Bionomics, *Dalbergia sisso*, *Psyllobora bisoctonotata***,** mycophagy, *Xanthium strumarium*

Introduction
Powdery mildews, obligate biotrophic fungus belonging to the family - Erysiphaceae (Ascomycota: Erysiphales), are a very damaging disease that affect hundreds of plant species globally. Losses in economic yield as a result of powdery mildew infection were reported in various crops within several families including, Asteraceae, Malvaceae, Cucurbitaceae, Verbenaceae, Solanaceae and Leguminosae, besides many cereals and fruit trees (Hasan, 1974, Amano, 1986, English-Loeb *et al*., 2007, Khodaparast and Abbasi, 2009) [1, 2, 3, 5].

Application of synthetic fungicides is the only means of control practiced, though studies in this field have proved that most of the powdery mildew diseases on important crops had already conferred resistance to the majority of these chemicals (Omer, 1972; McGrath, 2001) [8, 9]. Moreover, a high cost of chemical control reported from elsewhere (Raja, 2010) [10], besides the various drawbacks of chemicals on the environment and beneficial organisms (Sutherland *et al*., 2010) [12], may put several questions on the significance of this approach. However, numerous mycophagous insects and mites, and mycotoxicant fungi seem to offer promising potential to combat powdery mildews as biocontrol agents (Sutherland and Parrella, 2006; English-Loeb *et al*., 2007; Sutherland and Parrella, 2009; Raja, 2010) [2, 10, 13, 14, 15, 16].

The predacious insects of family–Coccinellidae order–Coleoptera are commonly known as ladybird beetles. The family name comes from its type genus, Coccinella. Most of them have bright shining colors with a pattern of spots or patches against a contrasting background. Numerous species of Coccinellids are predators and biological control agents of hemipteran pests such as aphids, mealy bugs and scale insects, as well as thrips (Thysonoptera) and mites (Acarina) in all parts of the world (Hawkeswood, 1987 and Majerus, 1994**)** [4, 7]. The family Coccinellidae comprises 5,200 described species worldwide. The Coccinellid fauna of the Indian subcontinent is rich and diverse, but remains very poorly studied as compared to those from other zoogeographical regions of the world (Krisnakumar, and Maheswari, 2002) [6]. The objective of this study is to investigate the feeding behavior of *P.bisoctonotata* on anamorph stages of powdery mildew disease of *Dalbergia sisso* and *Xanthium strumarium*.

Material and method
During the field work an insect feeding on anamorphs of powdery mildew infected leaves was observed. The specimens were reared in the laboratory and identity was confirmed by using standard literature and expert entomologists. The feeding behavior and life cycle of this insect was studied with the help of DEC 2000 eyepiece camera capturing Image pro Ver. 6.0. Various life cycle stages of insect were photographed using stereo binocular microscope.

Observations
In the months of September and October (2023) population of *P.bisoctonotata* was found to be abundant as the disease was also found in an epidemic proportion almost infecting every leaf. As disease disappeared the insect population also disappeared. This clearly indicates the definite correlation between fungal pathogen and mycophagous insect. The feeding behavior of larvae and adults was observed throughout the day but more specific to morning and evening hours of the day. However to protect from heat and temperature of sun both use to hide on lower surface of leaf. The larval stages are found to more voracious feeder than adults.

Bionomics of *P. bisoctonotata*
Eggs: The eggs were observed to be laid in batches on the under and upper surfaces of leaves of *D. sissoo* and *X. strumarium* Freshly laid eggs are elongate, oval, white, shining and firmly glued to each other with a range of the hatching percentage was observed to be 100%. The eggs became blackish gray before hatching (Fig.1a)

Larvae: There are four instars and it is blackish grey in colour with black dots and hairs on whole body. The larva becomes fully matured in twenty days. The full grown larva actively feeding on disease as compared to rest of the instar (Fig.1 b, c).

Pupa: As and when these grubs were fully grown these moulted into pupae which were blackish grey with dark spots and hairs all over the body, and two yellow spots on the fourth segment of abdomen dorsally (Fig.1 d).

Adults: Body convex, oval, and cream or yellowish in colour basally, each marked with eight black spots, on an average adults were found to be between 5 and12 per plant with the later instars grubs being more abundant on the older/matured leaves which are often heavily infested with the fungi. The longevity of adults was noticed about a month (Fig.1 e, f).

Result and discussion

The mycophagous behavior of different Coccinellidae is reported by many workers (Patankar, *et.al* 2009, Thite *et.al* 2013) [10, 17]. *P.bisoctonotata* belongs to family – Coccilinidae and shows mycophagous behavior on powdery mildew disease of *D. sissoo* and *X. strumarium*. Mature grubs and prepupal stages show maximum mycophagy (Fig.1 a, c). The conidial mass around these stages has been cleared off by grubs. The adults show comparatively little less mycophagous behavior. Adults were seen on the all parts of the plants while grubs were gathered on the leaves affected with powdery mildew disease. Mycophagous behavior of *P.bisoctonotata* on powdery mildew of *D. sissoo* and *X. strumarium* may lead to its utilization as a biocontrol agent of powdery mildew disease.

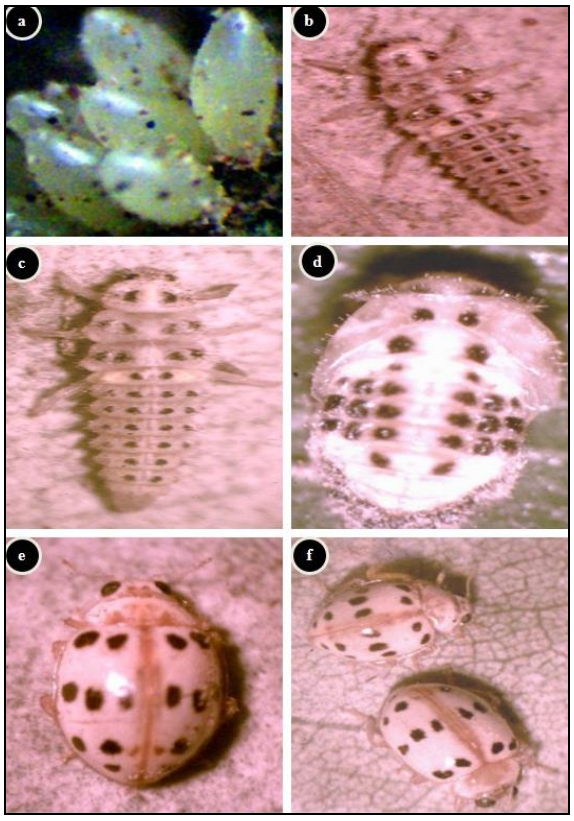

Fig 1: Bionomics of *Psyllobora bisctonata* **a**- eggs, **b**- full grown larva, **c**- pre-pupation larva, **d**- pupa, **e**- adult, **f**- male and female

Conclusion

The current findings revealed the presence of *P. bisoctonotata* as an important mycophagous insect among the beneficial fauna. The species is expected to be more abundant in cooler areas with extended winter season, where high incidences of powdery mildews occur for longer periods. Therefore, additional investigations are required to cover the various aspects of this insect, and to evaluate its potential role in combating the disease. Since powdery mildew control is completely dependent on chemical fungicides, despite its economic burden and numerous disadvantages, the results may enhance a new trend in disease management through biological control and other ecologically sound components.

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References

1 Amano K. Host range and geographical distribution of the powdery mildew fungi. Japan Scientific Societies Press, Tokyo, Japan, 1986, 741.
2 English-Loeb G, Norton AP, Gadoury D, Seem R, Wilcox W. Biological control of grape powdery mildew using mycophagous mites. Plant Dis,2007:91(4):421–429.
3 Hasan S. Host specialization of powdery mildew, *Erysiphe cichoracearum*, from *Chondrilla juncea*. Austr. J. Agric. Res,1974:25(3):459–465.
4 Hawkeswood T. Beetles of Australia. Augus and Robertson, Sydney, Australia, 1987.
5 Khodaparast SA, Abbasi M. Species, host range and geographical distribution of powdery mildew fungi (Ascomycota: Erysiphales) in Iran. *Mycotaxon*,2009:108:213–216.
6 Krisnakumar R, Maheswari P. Coccinellid predators on powdery mildew of mulberry. Insect Environment,2002:8:3:133-134.
7 Majerus MEN. Ladybirds. Harper Collins London, 1994, 359.
8 McGrath MT. Fungicide resistance in cucurbit powdery mildew: experiences and challenges. Plant Dis,2001:85:236–245.
9 Omer MEH. Chemical control of powdery mildews of cucumber and okra in the *Sudan.* Exp. Agric,1972:8:265–270.
10 Patankar NV, Mittal V, Kumar R, Ramanmurthy VV. Can *Psyllobora bisoctonotata* and *Illeis cincta* (Coccinellidae: Coleoptera) be advocated for biological control of powdery mildews? Indian Journal of Agricultural Sciences,2009:79(6):488-490.
11 Raja SA. Management of powdery mildew, *Phyllactinia corylea* (Pers.) Karst of Mulberry (*Morus* sp.) using chosen biocontrol agents. J. Biopesticides,2010:3(2):483–486.
12 Sutherland AM, Gubler WD, Parrella MP. Effect of fungicides on a mycophagous coccinellid may represent integration failure in disease management. Biol. Control,2010:54(3):292–299.
13 Sutherland AM, Parrella MP. Quantification of powdery mildew consumption by a native coccinellid:

Implications for biological control. Proceedings of the Fifth California Conference on Biological Control (CCBC V), 25-27 July 2006, the Mission Inn, Riverside, California, USA, 2006, 188–192.
14 Sutherland AM, Parrella MP. Biology and co-occurrence of *Psyllobora vigintimaculata* taedata (Coleoptera: Coccinellidae) and powdery mildews in an urban landscape of California. Annals of the Entomological Society of America,2009:102(3):484-491.
15 Sutherland AM, Parrella MP. Mycophagy in Coccinellidae: review and synthesis. Biol. Control,2009:51(2):284–293.
16 Sutherland AM, Parrella MP. Mycophagy in Coccinellidae: review and synthesis. *Biol. Control*,2009:51(2):284–293.
17 Thite SV, YR Chavan, VT Aparadh, Kore BA. Incidence of *Illeis cincta* (Fabricius) on Powdery Mildew of *Dalbergia sissoo* and *Xanthium strumarium*. Inter. J. Adv. Res.,2013:1(5):20-23.