

## Incidence And Intensity Of Powdery Mildew Fungi On The Plants Of Papilionaceae

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**Abstract:** Powdery mildew fungi have been known to cause heavy loss to various crops every year through out India and across the world. Keeping this in view, a thorough survey was carried out in four districts of Kashmir valley, viz. Kupwara, Baramulla, Srinagar and Anantnag in order to assess the incidence and severity of the disease on some plants of family Papilionaceae. It was revealed from the study that the plants such as *Phaseolus aconitifolius*, *Phaseolus aureus*, *Phaseolus vulgaris*, *Pisum sativum* and *Robina pseudoaccacia* showed moderate to mild infection in different localities of Kupwara and Baramulla whereas *P. aconitifolius*, *P. aureus*, *P. vulgaris* and *P. sativum* showed mild infection in different localities of district Kupwara, Baramulla, Srinagar and Anantnag during the study. However, no infection was observed in some areas of the valley on plants of Papilionaceae surveyed during the study. The overall study reveals the need for the management strategies at the early stage before the disease can spread widely.

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**Key words:** Powdery mildew; severity; incidence; Papilionaceae; Kashmir valley.

### 1. Introduction

Powdery mildew is a disease causing significant damage on a variety of cultivated and wild plants across the world as well as in India. They are also known to cause damage on various economically important plants in Kashmir valley as well. Three powdery mildew species, *Erysiphe cichoracearum* D.C., *Sphaerotheca fuliginia* (Schlecht.) Poll. and *Leveillula taurica* (Lev.) Arn. infect various cultivated and wild crops in India and the world wide "(Kennet and Palti, 1984; Amano, 1986; Khan *et al.*, 1970, 1974; Bains *et al.*, 1996; Hussain and Akram, 1997; Pervez and Akram, 2001; Garibaldi *et al.*, 2002)". The powdery mildew fungi are also known to cause a heavy damage to different plants of the family Papilionaceae throughout India "(Shastree *et al.*, 1990; Plenck *et al.*, 1991; Sing *et al.*, 2000)". Some work has been done on the powdery mildew of the family Asteraceae "(Wani, *et al.*, 2003; Mir, *et al.*, 2008)" whereas a little attention has been given to the other families. Therefore, present study entitled, "Incidence and intensity of powdery mildew fungi on the plants of Papilionaceae in some districts of Kashmir valley" was carried out.

### 2. Materials and Methods

To evaluate the incidence and severity of powdery mildew fungi on the plants of

Papilionaceae a survey was carried out in different localities of four districts of Kashmir valley, viz. Kupwara, Baramulla, Srinagar and Anantnag. The samples of plants such as *Phaseolus aconitifolius*, *Phaseolus aureus*, *Phaseolus vulgaris*, *Pisum sativum* and *Robina pseudoaccacia* were collected from different localities of these districts and were brought to the laboratory for further studies. The identification of the causal pathogen was made on the basis of anamorph and teleomorph characteristics. The incidence of disease in each locality on each host was calculated as per the formula given by Johnson and Booth (1983) as:

$$\text{Incidence} = \frac{\text{No of infected plant unit}}{\text{Total no of plant units}} \times 100$$

Severity (intensity) of the disease on different hosts were assessed as per the following scale (0-5 scale), given by (Khan, 1972) as: (-) = No infection i.e., plants without powdery mildew infection; (+) = mild infection (25% infection); (++) = moderate infection, (25-60% infection) and (+++) = heavy infection, (60-100% infection).

### 3. Results and Discussion

A survey was carried out in different localities of district Kupwara, Baramulla,

Srinagar and Anantnag of the Kashmir valley in order to assess the incidence and severity of the disease powdery mildew fungi on some members of the family papilionaceae. The plants which were evaluated for incidence and severity of powdery mildew fungi were as: *Phaseolus aconitifolus*, *Phaseolus aureus*, *Phaseolus vulgaris*, *Pisum sativum* and *Robinia*

*pseudoaccacia*. During the survey moderate to mild infection of the powdery mildew disease was found on the plants of family papilionaceae collected from various localities, however some plants showed high resistance against the fungus in some localities (Table 1,2).

Table 1: Incidence of powdery mildew on Papilionaceae in some localities of district Kupwara and Baramulla of Kashmir valley

Localities	<i>Phaseolus aconitifolus</i>	<i>Phaseolus aureus</i>	<i>Phaseolus vulgaris</i>	<i>Pisum sativum</i>	<i>Robinia pseudoaccacia</i>
Kupwara					
Kupwara	30.50	08.75	10.50	0	45.50
Handwara	10.80	12.00	11.00	08.50	40.00
Langat	0	09.00	15.50	09.00	20.00
Kralgund	11.0	0	0	12.00	18.50
Qalamabad	0	0	0	15.50	0
Mawer	0	0	16.80	0	0
Baramulla					
Baramulla	08.50	0	0	09.50	15.50
Sopore	10.00	0	0	10.50	16.00
Baba-Reshi	12.50	0	0	11.00	12.00
Tangmarg	11.0	07.50	9.50	10.50	09.50
Gulmarg	0	06.80	7.50	0	07.50

Data shows Percent incidence(%)

0 = no infection

Table 2: Incidence of powdery mildew on Papilionaceae in some localities of district Srinagar and Anantnag of Kashmir valley

Localities	<i>Phaseolus aconitifolus</i>	<i>Phaseolus aureus</i>	<i>Phaseolus vulgaris</i>	<i>Pisum sativum</i>	<i>Robinia pseudoaccacia</i>
Srinagar					
Hazratbal	08.00	0	0	06.50	12.50
Nigeen	0	0	06.50	08.00	0
Nishat	09.50	0	0	08.00	0
Shalimar	0	0	10.50	0	0
Harvan	0	0	09.50	0	10.00
Chesmishahi	0	0	0	0	
Anantnag					
Anantnag	0	0	08.50	07.50	08.50
Phalgam	10.50	0	0	10.50	0
Achabal	10.00	09.00	0	10.0	0
Verinag	0	08.50	07.50	0	10.50

\*Data shows Percent incidence(%)

0 = no infection

In district Kupwara, *Robinia pseudoaccacia* showed moderate to mild disease severity and intensity in localities of Kupwara (45.50%), Handwara (40%), Langate (20%) and Kralgund (18.50%) whereas the other plants of the family papilionaceae showed mild disease severity and intensity or were found free from the infection of the powdery mildew (Table 1,3).

Table 3: Severity of powdery mildew on various members of the family Papilionaceae in some localities of district Kupwara and Baramulla of Kashmir valley

Localities	<i>Phaseolus aconitifolis</i>	<i>Phaseolus aureus</i>	<i>Phaseolus vulgaris</i>	<i>Pisum sativum</i>	<i>Robinia pseudoaccacia</i>
Kupwara					
Kupwara	++	+	+	-	++
Handwara	+	+	+	+	++
Langat	-	+	+	+	+
Kralgund	+	-	-	+	+
Qalamabad	-	-	-	+	-
Mawer	-	-	+	-	-
Baramulla					
Baramulla	+	-	-	+	+
Sopore	+	-	-	+	+
Baba-Reshi	+	-	-	+	+
Tangmarg	+	+	+	+	+
Gulmarg	-	+	+	-	+

+++ = Heavy Infection; ++ = Moderate infection; + = Mild infection; - = No infection;

In the district Srinagar and Anantnag, the surveyed plants of family Papilionaceae were generally found free from the disease infection (Table-2,4).

Table 4: Severity of powdery mildew on various members of the family Papilionaceae in some localities of district Srinagar and Anantnag of Kashmir Valley

Localities	<i>Phaseolus aconitifolis</i>	<i>Phaseolus aureus</i>	<i>Phaseolus vulgaris</i>	<i>Pisum sativum</i>	<i>Robinia pseudoaccacia</i>
Srinagar					
Hazratbal	+	-	-	+	+
Nigeen	-	-	+	+	-
Nishat	+	-	-	+	-
Shalimar	-	-	+	-	+
Harvan	-	-	+	-	-
Chesmishahi	-	-	-	-	+
Anantnag					
Anantnag	-	-	+	+	+
Phalgam	+	-	-	+	-
Achabal	+	+	-	+	-
Verinag	-	+	+	+	+

+++ = Heavy Infection; ++ = Moderate infection; + = Mild infection; - = No infection;

In order to establish the identity of species, conidial characteristics (anamorph) were considered instead of cleistothecial (teleomorph) characteristics because the cleistothecia were not found in surveyed plants. The conidial characteristics which were taken in to account for identification of powdery mildew fungi were conidial shape and size, presence or absence of fibrosin bodies, shape of the germ tube and the presence or absence of appressoria (Table 5).

Table 5: Characteristics of powdery mildew fungi causing disease on some members of family Papilionaceae in different localities\* of Kashmir valley

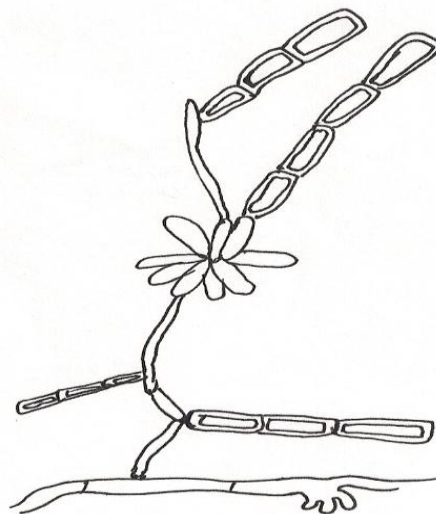
Name of the Host	Characteristics of Pathogen	Conclusion
<i>Phaseolus aconitifolius</i>	Leaves were found infected, conidia varied in size and shape i.e., barrel to spherical, Fibrosin bodies absent, germ tube simple, appressoria well developed.	The characteristics of pathogen shows presence of Erysiphe cichoracearum.
<i>Phaseolus aureus</i>	Leaves shows mild infection, conidia barrel in shape, fibrosin bodies absent, germ tube simple with well developed ,appressoria.	The characteristics of pathogen shows presence of Erysiphe cichoracearum.
<i>Phaseolus vulgaris</i>	Leaves showed mild infection, conidia barrel to spherical in shape, fibrosin bodies absent, germ tube simple with well developed, appressoria.	The characteristics of pathogen showed presence of Erysiphe cichoracearum.
<i>Pisum sativum</i>	Leaves showed mild infection, conidia barrel to spherical in shape, fibrosin bodies absent, germ tube simple with well developed, appressoria.	The characteristics of pathogen showed presence of Erysiphe cichoracearum.
<i>Robina pseudoaccacia</i>	Leaves showed mild infection, conidia barrel to spherical in shape, fibrosin bodies absent, germ tube simple with well developed, appressoria.	The characteristics of pathogen showed presence of Erysiphe cichoracearum.

\* Kupwara, Handwara, Langate, Kralgund, Qalambad, Baramulla, Sopore, Baba-Reshi, Tangmarg, Gulmarg, Hazratbal, Nigeen, Nishat, Shalimar, Harvan, Chesmashahi, Anantnag, Pahalgam, Achabal, Verinag

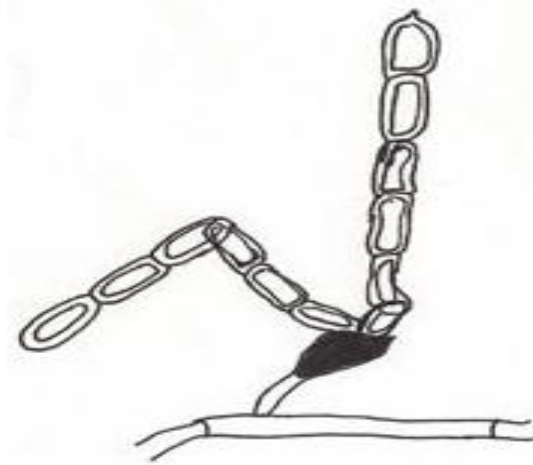
The microscopic study reveals that the conidia were generally barrel to spherical in shape, fibrosin bodies were absent in conidia assessed from all plants, germ tube were simple with well developed appressoria (Fig.1).

Figure1 : *Erysiphe cichoracearum*

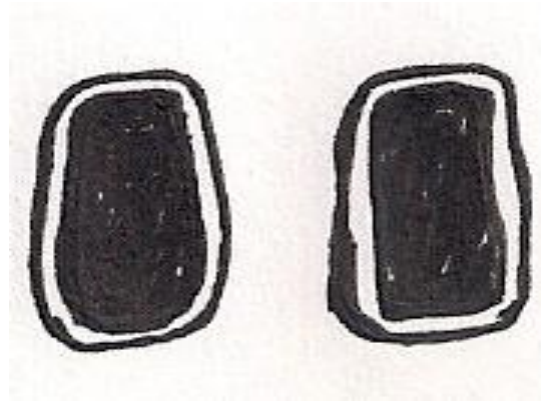
- A) Mycellium with appressorium
- B) Conidiophores
- C) Conidia
- D) Germinating conidia



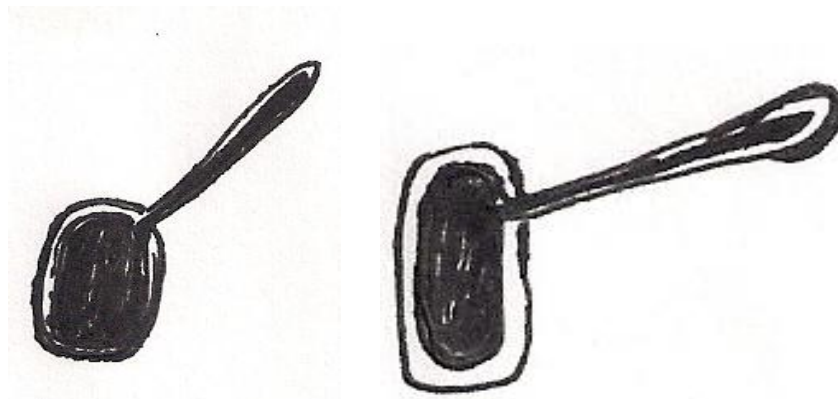
A) Mycellium with appressorium



B) Conidiophores



C) Conidia



D) Germinating conidia

Thus, these characteristics indicate that *Erysiphe cichoracearum* is the common pathogen causing powdery mildew disease in plants of family papilionaceae in the Kashmir valley.

In district Srinagar, *Robina pseudoaccacia* showed mild disease severity in locality Hazratbal (12.50%) and Chesmashahi (10.00%), *Phaseolus vulgaris* in Shalimar (10.50%) Harvan (09.50%) and Nigeen (06.50%), *P. sativum* in Nigeen and Nishat (08.00%), and Hazratbal (16.50%), *Phaseolus aconitifolius* in the locality of Nishat (9.50%) and Hazratbal (8.00%), whereas *Phaseolus aureus* was found highly resistant to the disease to the disease powdery mildew. In district Anantnag *Pisum sativum* showed mild disease severity and intensity in the all localities surveyed during the study, Pahalgam (10.50%), Achabal (10.00%), Verinag (10.00%) and Anantnag (07.50%) where as the other plants were found generally resistant to the disease. These observations are in accordance with that of “( Saluja and Bhide, 1962., Eshad, 1975., El-Kazzaz et.al., 1990., Wani, et.al., 2003)”.

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