



Original Research Article

Incidence of major Foliar Fungal diseases of Mulberry during different Seasons in relation to Weather Parameters

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A B S T R A C T

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Kanakapura is one of the most important and leading taluks in Bangalore Rural District of Karnataka State practicing Sericulture. A two year (July 1995 to June 1997) intensive survey for the incidence of three major foliar fungal diseases of mulberry (leaf spot caused by *Cercospora moricola*, rust caused by *Peridospora mori* and powdery mildew caused by *Phyllactina corylea*) in twenty villages was undertaken at monthly intervals. The meteorological data during the survey period were also recorded simultaneously. The incidence of leaf spot was found to be maximum in the months of November, while it was minimum in the month of May. Incidence of leaf rust was maximum in the months of November and June, while it was minimum in the months of February and May. Incidence of powdery mildew was maximum during July to November, while it was minimum from the month of December up to April. Relative humidity for leaf spot, rainfall for leaf rust, maximum temperature and rainfall for powdery mildew had significant negative relationship with the incidence, whereas temperature and rainfall for leaf spot, temperature and relative humidity for powdery mildew showed non-significant negative relationship.

Introduction

Assessment of the incidence and intensity of disease in agricultural crops, is essential to avoid economic loss (Gunashakaran and Govindaiah, 1993). Mulberry is affected by leaf spot, rust and powdery mildew diseases during different seasons. These disease causes 10-30 percent loss in leaf yield in terms of destruction of leaf lamina, immature leaf fall and depletion in nutritive value (Sastry, 1994; Sundareswaran *et al.*, 1988; Sengupta, *et*

al., 1990). The incidence of these diseases depends upon many factors like season, temperature, humidity and mulberry varieties (Krishnaprasad and Siddaramaiah, 1979; Sikdar and Krishna Swami, 1980; Sukumar, 1980; Sukumar and Ramalingam, 1990).

Leaf spot disease caused by the fungal *Cercospora moricola* is one of the most destructive diseases of mulberry resulting

in an extensive damage by reducing the nutritive value of leaf and yield (Siddaramaiah et al., 1978). It causes 10-15% leaf yield loss during July-December. Rust is another important fungal disease of mulberry caused by *Peridiospora mori* resulting in 10-30% leaf yield loss particularly of mature leaves. Powdery mildew disease also caused by a fungus *phyllostictia corylea* has been reported to occur during September to March in tropical region (Krishnaprasad and Siddaramaiah, 1979). Of the three pathogens, the powdery mildew and rust causing fungi being "biotrophs" cause heavy damage to the crop. Hence an attempt was made to survey these important disease on mulberry (M5 variety) in Kanakapura Taluk for a period of two years.

Materials and Methods

The incidence of leaf spot, rust and powdery mildew diseases in 20 villages of Kanakapura taluk, Bangalore District of Karnataka state was surveyed for two years (July 1995 to June 1997) at monthly intervals by fixed plot method (Chandrakala, 1995). The villages selected for survey were : Harihara, Bhoovahally, Kadahally, Murlethimmana doddi, Boregowdanadoddi, Sathanur, Sasalapura, Dhalimba, kabbalu, kalegowdanadoddi, Thotahally, Nayakanahally, Doddaalahally, Krishnaiahna doddi, Settekere doddi, Subkere, Chatra, Thungani, Hanumanahally and Harohally.

In each village, four mulberry gardens (M5 or Kanva2 variety) were chosen (1 gunta standard = 1089 sq.ft.) and in each mulberry garden, five micro plots were prepared (four in corners and one in the middle of the garden). Twenty plants were randomly selected in each micro plot for

observation of disease incidence (20x5=100 plants garden). The incidence of disease was calculated by using the following formula:

$$\text{Percentage of disease incidence (PDI)} = \frac{\text{Total No. of Infected plants}}{\text{Total No. of plants}} \times 100$$

Atmospheric conditions (i.e. temperature, rainfall and relative humidity) that existed during the course of survey was also recorded simultaneously, to correlate their influence on the incidence of foliar fungal diseases. The data obtained were statistically analyzed using 'F' test (Asthana and Srivastava, 1967).

Results and Discussion

The notable findings observed in the field survey are incorporated in Figures 1 to 9 . The results indicated that the weather data when the leaf spot disease incidence was maximum (28.88%) i.e., in the month of September 1995 was as follows: maximum temperature = 30°C, minimum temperature = 22° C, rainfall = 24mm, relative humidity = 63%. Similarly the weather data for the month of November 1996 (24.05%) was as follows : maximum temperature = 29°C, minimum temperature = 31°C, minimum temperature = 19° C, rainfall = 0 mm, relative humidity = 46%. Similarly, in the month of May 1997 when the disease was at its lowest expression (7.24%) the weather data was follows: maximum temperature = 34° C, minimum temperature = 24° C, rainfall = 12 mm, relative humidity = 50% (Figure 1-3).

The weather data when the leaf rust disease incidence was maximum (35.91%) in the month of November 1995 was as follows : maximum temperature = 34° C, minimum temperature = 25° C, rainfall =

9mm, relative humidity = 49%. Similarly, the weather data for the month of June 1997 (28.53%) was as follows : maximum temperature = 31°, minimum temperature = 22° C, rainfall = 11mm, relative humidity = 51% in the month of February 1996, when the disease incidence was less (3.34%), the weather data was as follows : maximum temperature = 34° C, minimum temperature = 24° C, rainfall = 0mm, relative humidity = 48%. Similarly, in the month of May 1997, when the disease was at its lowest expression (13.35% 0, the weather data was as follows ; maximum temperature = 32° C, minimum temperature = 21° C, rainfall = 12mm, relative humidity = 50% (Figure 4-6).

The weather data when the powdery mildew disease incidence was maximum (12.5%) i.e., in the month of July 1995 was as follows : maximum temperature = 31° C, minimum temperature = 23° C, rainfall = 10 mm, relative humidity = 54%. Similarly, the weather data for the month of July 1996 (17.20%) was: maximum temperature = 31°C , minimum temperature = 21°C, rainfall = 17mmm, relative humidity = 44%.

In the month of May 1996, when the disease incidence was minimum (0.68%), the weather data was as follows : maximum temperature = 36°C, minimum temperature = 34°C, minimum temperature = 24° C, rainfall = 12mm, relative humidity = 50% (Figure 7-9).

The correlation coefficients between the incidence of leaf spot, rust and powdery mildew disease and the physical factors of the environment viz., temperature (maximum and minimum), rainfall and relative humidity are presented in Table 1. Relative humidity had significant

negative relationship with the incidence of leaf spot where as, there was non-significant negative relationship between incidence and temperature and rainfall. Rainfall had significant negative relationship with the incidence of leaf rust disease, where as there was non-significant negative relationship between the incidence and temperature and relative humidity. Maximum temperature and rainfall had significant negative relationship with the incidence of powdery mildew disease.

Among the three major foliar fungal diseases the mulberry the incidence of leaf spot disease usually commenced during early monsoon season i.e., June, July and reached peak in September and November while it was minimum in the month of November and June, while it was minimum during July to June.

The Powdery mildew disease was maximum during July to November, While it was minimum during December to April. Earlier workers observed that in Karnataka state, leaf spot disease usually commenced during early monsoon season i.e., June- July and reached peak in September, October which later gradually decreased December onwards and prevailed up to January (Patel and Kamat, 1949). Leaf rust disease is one of the major fungal disease of mulberry. The occurrence was severe during November to January and gradually disappeared during March (Gunashakaran and Govindaiah, 1993). In Bangalore, Kolar and Tumkur districts, the occurrence of leaf rust disease was less severe (5-10%) in Bangalore during January and February months and in Kolar and Tumkur during February (Chandrakala,1995).

Table.1 Correlation coefficient for incidence of leaf spot, rust and powdery mildew diseases with weather factors on mulberry during the survey period (July 1995- June 1997)

	Maximum temperature	Minimum temperature	Rainfall	Relative humidity
Incidence of leaf spot disease (%)	-0.4076	-0.1414	0.1499	-0.4076
Incidence of rust disease (%)	-0.2949	0.2546	0.5164*	-0.2949
Incidence of Powdery mildew disease (%)	-0.4821*	0.373	4869*	-0.4821*

*---- Significant at 0.1 level * * --- Significant at 0.001 level

Powdery mildew is a common and destructive disease of mulberry. It was prevalent during the winter months i.e. from November to February, reducing both the quantity and quality of mulberry leaves (Noamani *et al.*, 1970). Occurrence of mildew in Kolar district was noticed from July to February with the incidence ranging from 0.7% to 7.5% and peak was in December (Benchamin *et al.*, 1997).

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