



REGULAR ARTICLE

DISEASE CALENDAR OF SOME PARASITIC FUNGI ON *CAPSICUM FRUTESCENS* IN DISTRICT SHAHJAHANPUR

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SUMMARY

India is the second largest producer of vegetables next only to china. The prime need of our nation is to improve the vegetables, as most of the population of INDIA is vegetarian. Shimla Chilli is one of the major crops, consumed in this country due to its cheaper rate. Several diseases pose a great threat to the cultivation of *Capsicum frutescens*. These diseases not only reduce the yield of fruits but also deteriorate the quality of fruits. Out of these diseases, fungal diseases are very much hazardous to *Capsicum frutescens* in this region. During investigation 6 spp. of fungi were recorded on *Capsicum frutescens* after the survey of different fields and markets in Shahjahanpur. These were viz. *Alternaria alternata*, *Alternaria solani*, *Curvularia lunata*, *Choanephora cucurbitarum*, *Cladosporium oxysporum* and *Drechslera tetramera*. Therefore in the present investigation a disease calendar was prepared to understand the epidemiology of parasitic fungal diseases in Shahjahanpur District. It was found during the study that last week of October to mid December was the best period for the luxuriant growth of parasitic fungi on *Capsicum frutescens* in District Shahjahanpur, due to low temperature, high humidity and less rainfall.

Key words: Shahjahanpur, Fungal diseases, *Capsicum frutescens*, Disease calendar, Shimla chilli

Adarsh Pandey. Disease Calendar of some Parasitic Fungi on *Capsicum frutescens* in District Shahjahanpur. J Phytol 2/9 (2010) 09-13.

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1. Introduction

India is a vast country bestowed with varied agroclimatic conditions. This makes it possible to grow a wide range of vegetable crops round the year in one or the other part of the country. Nearly sixty different vegetables are grown in India. The major vegetables are Solanaceous crops, Cucurbitaceous crops, root vegetables, leguminous vegetables and Leaf vegetables. India is the second largest producer of vegetables in the world next only to china.

Capsicum frutescens is an annual plant of about 2-3ft. height having spreading branches with white flowers and berry fruits. The cultivated chilli is unquestionably of South American origin. In India chilli was introduced by the Portuguese, during 17th century in Goa. It is cultivated throughout the India in the tropical and subtropical climates. Nowadays 4.6 million acres of red peppers are grown annually and one-quarter population of world uses it daily, primarily for culinary purposes. The *Capsicum*

frutescens is a biennial and perennial, shrubby and tall growing plant with large and broad leaves and flowers have greenish corolla, white with green throat and are in extra axillary cyme clusters. It is a cross pollinated vegetable. The fruit is berry, which is ovoid to ellipsoid that measures about 7.5-12.5 cm. and weighs 100-150gms. It requires temperature between 25-30°C, but it should be not less than 15°C. Sowing period of different varieties in this area is August and transplanting is made in early September. This is a winter season crop. It's important hybrid varieties are Bharat, Mahabharat, Nath Heera, Green Gold, Indira, 1058, 1145, 1090, 1021, Nutan, Kohinnor, Diamond etc. A red sweet or hot pepper often contains as much 10 times more vitamins A and double the vitamin E compared to an immature green pepper.

Red chilies contain high amounts of vitamin C and carotene (provitamin A). Yellow and especially green chilies (which

are essentially unripe fruit) contain a considerably lower amount of both substances. In addition, peppers are a good source of most B vitamins and vitamin B₆ in particular. Their high vitamin C content can also substantially increase the uptake of non-heme iron from other ingredients in a meal, such as beans and grains. They are also high in fibre and low in calories. Chillies are low in sodium and cholesterol free. The fruit contains 0.1-1.5% capsaicin which has been found to be digestive by increasing stomach acid production. This substance also stimulates the circulation and alters temperature regulation. The fruit is also anti hemorrhoid, antirheumatic, antiseptic and carminative. The pungent fringed peppers are important in the tropics as gastrointestinal detoxicant and food preservatives. When applied on skin it desensitizes nerve endings and has been used as a local anesthetic. The sap of the plant can cause skin blister for the red pepper burns in the mouth or on the skin. The milk is the best remedy. Shimla chillies contain Folic acid which control metabolism. Capsaicin also known as hinders cholesterol.

It cuts cholesterol levels and reduces the risk of the internal blood clots that trigger heart attacks. It lowers cholesterol and works against arthritis and rheumatism. Capsaicin relieves arthritic symptoms and improves joint flexibility. Capsaicin in chilies has been found to inhibit chemically induced carcinogenesis and mutagenesis in various animal models and cell culture systems.

2. Material and Methods

Shahjahanpur is a District of the Bareilly region. Shahjahanpur is situated in the Tarai belt of Uttar Pradesh state of India. The District of Shahjahanpur is sandwiched between river Garrah in West and Khannaut, the attached river of Garrah, in East. District shahjahanpur is situated in south east of Rohilkhand division and was established in 1813. Before that Shahjahanpur was a part of District Bareilly. Geographically it is situated at 27.35° N latitude and 79.37° E longitude. Geographical area of Shahjahanpur is 4575 sq.kilometer. This is an agricultural based District of Uttar Pradesh, India.

Area	4575 sq.km
Average rainfall--	165mm
Average Temperature	36°c
Average Humidity	48%
Normal weather	Summar, Rainy and winter.

The present study was conducted in different localities of the district Shahjahanpur. The sites were selected on the basis of types of soil, cropping pattern and

distance from the centre of the city. Shahjahanpur is belonging to subtropical region having normal weather conditions.

Locality	Situation
1. Tahsil- Sadar	10-30 km East-South of Shahjahanpur
2. Tahsil- Jalalabad	30-45 km South of shahjahanpur
3. Tahsil- Tilhar	25-55 km West of shahjahanpur
4. Tahsil- Powayan	28-60 km North of shahjahanpur

Meteorological Data were noted from the weather Department of Indian Institute of Cane Research, Shahjahanpur. There is much variation in the Temperature, Relative Humidity and Rainfall. Average maximum temperature was found to be varying between 21.3-42.3°C however, maximum temperature for a day was recorded up to 45-47°C in summer. Average Minimum Temperature was varied from 6.3 - 26.2°C while on some day dropped to low as 4°C. Average Related Humidity recorded was ranged widely between 43.2 - 82.0. The maximum Rainfall was recorded in the months of August and minimum in January.

Samples were collected from the four different localities in sterilized polythene bags. Visits were made to all selected sites every fortnight for various visible fungal diseases. For identification of diseases the temporary and permanent slides were prepared. The authenticity of pathogen was established through Koch's postulates. Different culture media were utilized viz. potato dextrose agar, czapek - dox agar and peptone -dextrose-rose-bengal agar. Very often it was PDA media which was utilized as it melts completely at boiling temperature and solidifies when cooled to about 45°C. For

isolation, serial dilution, pour plate methods were used. For this the smaller spots were carefully taken out from surface sterilized diseased leaves with 1% of HgCl₂ while in case of bigger spots only a part from peripheral region was taken out. These inoculums were then transferred to sterilized distilled water kept in 100 cc glass flasks. About 15 cc of prepared medium at about 35°C to 45°C were then poured in the above Petri dishes. 1 cc of these spore suspensions was then transferred to sterilized Petri dishes in aseptic conditions. Dishes were allowed to cool down and solidified and transferred to incubator and were kept for 10 days at ±25°C.

3. Observation and Discussion

During the present investigation, 6 spp. of fungi were recorded from *Capsicum frutescens* in a survey of the fields and markets in Shahjahanpur District.

These are as follows:

1. *Alternaria alternata*
2. *Alternaria solani*
3. *Curoularia lunata*
4. *Choanephora cucurbitarum*
5. *Cladosporium oxysporum*
6. *Drechslera tetramera*

Table 1: Monthly Occurrence of Parasitic fungi on *Capsicum frutescens* in relation to atmospheric factors

Month	Temp Min.	Temp Max.	R.H.	Rainfall	Alternaria alternata	A. solani	C. lunata	C. Cucurbitarum	C. oxysorum	Drechslera tetramera
July	22.65	35.42	68.32	221.7	-	-	-	-	-	-
August	23.46	33.53	80.54	343.4	+	-	-	-	-	+
Sep	22.54	32.65	80.23	265.5	+	+	-	+	+	+
Oct	16.52	31.85	68.24	260.0	++	+	+	++	+	+
Nov	10.84	28.32	72.20	11.8	++	+++	++	++	++	-
Dec	6.35	23.41	72.03	5.04	++	++	+	++	+++	-
Jan09	9.30	21.30	82.0	0.00	+++	++	-	-	+++	-
Feb	11.02	25.00	68.35	1.80	+++	++	-	-	+++	-
March	14.90	30.90	60.42	6.40	+++	+++	+	-	+++	+
April	21.40	37.75	39.00	16.20	+++	+++	++	++	++	+++
May	24.60	37.80	46.03	22.20	+++	+++	+	-	+	++
June	26.20	42.33	43.21	70.60	-	-	-	-	-	-

Alternaria alternata was found to be associated with entire plant parts. It caused disease on stem, leaves, fruits, flower, bud and seeds. It was found throughout the year in moderate to severe form. Its frequency was much higher from November to mid December.²Dingar and Singh (1985) have been reported that *Alternaria alternata* reached to its peak during the last week of October and first week of November.⁶Shukla and Singh (1986) also have been reported that *Alternaria alternata* appeared on Aubergine the first of July and infection increased up to November, and decreased with the lowering of Temperature and relative humidity up to December.*Alternaria solani* was associated with whole plant parts. It caused disease on leaves, stem and fruit. It was found throughout the year in moderate to severe form. Its frequency was much higher in November and March to May. *Curvularia lunata* was associated with the whole plant parts. It caused disease on the leaves, stem, fruits and flowers. The fungus caused Leaf Blight and Fruit rot individually. It was reported from last week of October to first week of December, and then again from March to April.³Gupta and Madan (1982) reported some parasitic fungi on Solanaceous plants from North India. *Choanephora cucurbitarium* was present on the leaves, flower buds and fruits. Leaves and fruits were equally affected by black color sporangia on their surfaces. It was abundantly present during October,

November and first week of December, while in the rest period it was not recorded either from the field or market. It was most frequent in November. ⁴Oikava et al. (1986) worked on *Choanephora* rot of garden pea and controlled the pathogen *in vitro*. *Cladosporium oxysporum* was found on the both leaves and fruits. This fungus was found to be parasitizing on leaves, fruits and stem. Its frequency was high in November and December. ⁵Pandey and Pandey (2001) reported some parasitic fungi from Eggplant in Bareilly district of Rohilkhand region. *Drechslera tetramera* was found only on the leaves. This fungus caused Leaf Blight and appeared in definite period of the year i.e. from March to May and again in September, October and first week of November. ¹Pandey and Hussain (2010) studied the antagonistic profiling of two species of Trichoderma against *Drechslera tetramera* on shimla chilli and study revealed that *Trichoderma viride* and *Trichoderma harzianum* were almost equally effective against *Drechslera tetramera* growth *in vitro*.

It may be concluded from the above discussion that a period from May last week to September last week is not congenial for the growth of parasitic Fungi on *Capsicum frutescens*. However, a period o from last week of October to mid December was the best period for the luxuriant growth of parasitic fungi on *Capsicum frutescens* in District Shahjahanpur. This may be attributed to low temperature, high humidity and less rainfall.

Table 2: Month wise occurrence and intensity of the Pathogenic species and disease Calendar for Shahjahanpur District on *Capsicum frutescens*

SN	Pathogens	Month											
		July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1.	<i>Alternaria alternata</i>	-	-	-	+	+++	+++	-	+	+	+	-	-
2.	<i>Alternaria solani</i>	-	-	+	+	+++	++	+	+	++	+++	+++	-
3.	<i>Curvularia lunata</i>	-	-	-	+	+++	++	-	-	++	+++	-	-
4.	<i>Choanephora cucurbitarium</i>	-	-	+	++	+++	+	-	-	-	-	-	-
5.	<i>Cladosporium oxysporum</i>	-	-	+	+	+++	+++	-	-	-	-	-	-
6.	<i>Drechslera tetramera</i>	-	-	++	++	+	-	-	-	+	+++	++	-

Number of "+" shows the level of intensity

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