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STUDIES ON FUNGAL DISEASES OF EGGPLANT IN RELATION TO STATISTICAL ANALYSIS AND MAKING OF A DISEASE CALENDAR

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Abstract

Brinjal is consumed enormously in India. Bareilly City is sandwiched between two rivers and has tarai climate. Therefore it is prime location of marketing neighboring cities. Bareilly is situated at foothills of Himalaya where generally the climate is moderate, humid and cloudy. Different atmospheric factors viz. T.max., T.min., Relative humidity and Rainfall play important role in development of fungal diseases on Brinjal. Five Fungi were encountered during the cropping year on Brinjal viz. *Fusasium solani, Helminthosporium spiciferum, Choanephora cucurbitarum, Curvularia lunata, Trichothecium roseum.* The growth of these fungi was found luxurious especially from October to November, and Feb. to April. Fruit spoilage was maximum from August to January; the reason may be high humidity, high temperature, and less rainfall.

Keywords: Brinjal, Atmospheric factors, *Solanum melongena* L., Bareilly, Fungi

Introduction

As most of the population of India is vegetarian, the consumption of various vegetables is enormous here. Of all the vegetables consumed in this country, the Brinjal constitute the bulk of it due to its cheaper rate and easy availability. With increasing pressure of population the prime need of our nation is to improve the vegetables production. Brinjal plants are grown throughout India, including Bareilly and are known with different local names in different parts of India. It is also known as Eggfruit, Aubergine and Guinea squash. It belongs to family Solanaceae and has been cultivated since remote antiquity for its fleshy fruits.

Bareilly being situated at foothills of Himalaya in between river NAKATIA in North and RAMGANGA in south, it has pleasant tarai climate with a prolonged winter season varying from 4-5 months. Due to its unique situation sandwiched between plains on one side and hills on other side, it is prime centre of marketing of vegetables. Due to Kumaon and Garhwal hills as its neighboring area, market of Bareilly fulfills the need of these regions and even metropolis like Lucknow and Delhi.

Material and Methods

The intensity and extent of host parasite interaction is markedly affected by environmental factors viz. temperature, relative humidity and rainfall where they directly or indirectly determine almost all the events of pathogenesis. Life cycles, survival of pathogens, establishment of infection, host parasite relation, symptoms and development of disease, spread and recurrence of diseases are governed by the environmental conditions. Even after the establishment of infection sudden change in the environment affects the disease processes either positively or negatively.

[2]Dingar, S. M. and Singh, M in 1985 studied the role of weather in development of leaf spot disease of Brinjal. [5]Sokhi et al. studied some fungal Problems in India on Brinjal in 1990. [4]Prasad, M. N. and Roy, A. K. Studied in 1979, the effect of temperature and humidity on fungal deterioration of eggplant. Some physiological studies were carried out by [3]Mandhare, V. K. in 1997 on wilt pathogen of eggplant. [1]Pandey and Pandey (2001) reported the fungal diseases of Brinjal in Bareilly and found that *Fusarium* is best controlled by the use of Bavistin and Mancozeb.

Bareilly is situated in foothills of Himalayas on 28.10º and 28.54º latitude and 75.58º and 79.47º longitude. The area of Bareilly is about 4120 km2, spreading about 150 km in length towards north-south and 90 km in width towards east-west. According to agricultural survey the average rainfall is about 40-60 cm/yr while the average temperature varies from 6.90ºC to 37.3ºC. The normal weather is highly erratic as it is radially affected by disturbances taking place in Himalayan range. Generally the climate is moderate, humid and cloudy. The winter season is specified by thick covering of fogs over the crops. The fluctuation in the environmental conditions is the most single significant abiotic factor governing the initiation, development and spread of disease on Brinjal. Study was conducted in different localities of Bareilly. Sites were selected on the basis of types of soil, cropping pattern and distance from the centre of city. Sample were brought to lab and sorted out for various visible diseases viz. leaf, fruit and stem diseases. The authenticity of pathogen was established through

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Koch's postulates. PDA culture medium was used for present investigation.

Observation

Meteorological data were collected from the climatology Department of IVRI, Izzatnagar, Bareilly, which indicates that there is much variation in the temperature, relative humidity and rainfall during various months of year.Average Temp. Max. was found to be varying between 20.3 to 38.2ºC, however maximum temperature for a day recorded was up to 45-47 in summer. Average Temp. Min. was recorded varying between 7.8 to 26.2ºC while dropped to as low as 3ºC.Average relative humidity recorded was 29.5% for May and 87.3% for August but for one or two weeks it was found to be around 98% in August last. Average Rainfall recorded was 44.37 cm and rainfall was maximum in July and August and Minimum in Nov., Dec. and January. However up to 40-60 cm rainfall has been observed in this area. Similarly December last to mid January, conditions again become adverse for the growth of fungi because of low temp, low relative humidity and low rainfall. It is therefore obvious that the best period for the growth was October to November and February to April.

During present investigation 5 spp. of Parasitic Fungi were recorded during the survey of different fields and markets for brinjal. These are as follows:

1. Fusarium solani was recorded from fruits causing fruit rot from August to December.

2. Helminthosporium spiciferum was present on leaves causing leaf spot from March to August.

3. Choanephora cucurbitarum was present on leaves, flowers and fruits from Aug to Nov. & Feb. to April.

4. Curvularia lunata was present on leaves from September to December & Feb to April.

5. Trichothecium roseum was found on leaves in only two months i.e. March & August.

So far as fruit spoilage was concerned it was observed to be maximum from August to January, the reason may be high humidity and favourable temperature. While considering correlation of different fungi with the abiotic factors viz. Temperature, Relative Humidity and Rainfall, many significant and non-significant values were noted, which were tested at 5% level and 1% level.

For T.max, *Choanephora cucurbitarum* was found to be non-significant. Similar results were also noted with *Curvularia lunata* and *Fusarium solani* where values were non-significant. *Trichothecium roseum* showed positive response but non-significant while in case of *Helminthosporium spiciferum* correlation was positive and significant.

For T.min, *Choanephora cucurbitarum*, *Trichothecium roseum* were non significant and positive while *Helminthosporium spiciferum* was significant and positive. As far as *Curvularia lunata* and *Fusarium solani* were concerned, the effects were negative and non-significant.

For Relative Humidity, *Choanephora cucurbitarum*, *Trichothecium roseum*, *Curvularia lunata*, and *Fusarium solani* were non-significant and positive while *Helminthosporium spiciferum* was negative and non-significant.

For Rainfall, *Choanephora cucurbitarum*, *Trichothecium roseum* and *Helminthosporium spiciferum* were positive and non-significant while *Curvularia lunata* and *Fusarium solani* were negative and non-significant.

Discussion

Number of fields were surveyed and 5 parasitic spp. were recorded in cropping year. These 5 fungi belong to different class of fungi, but mainly Deuteromycetes. A disease calendar was made on the basis of fungi obtained.

Helminthosporium spiciferum was found from March to August and its frequency was high in April and May when temp was high while Relative Humidity and rainfall were less. *Fusarium solani* was found from August to December but significant in October, Nov. and December, when temperature was found to be low with high Relative humidity and very low rainfall. *Curvularia lunata* was confined from September to Dec, and Feb. to April, but reached to its maximum in November last to December when temperature was high a little with scanty rainfall and high Relative Humidity. *Choanephora cucurbitarum* was found from August to November and Feb. to April. Its frequency was similar in almost all the months, when temperature was low to moderate with heavy rainfall and maximum Relative Humidity i.e. 87.3%. *Trichothecium roseum* was found at a particular time i.e. in August when Temp., Relative Humidity and Rainfall were high and in March when temp., & Relative Humidity were less and rainfall was absent. Therefore it may be concluded that this fungus probably does not prefer to grow neither in extreme winter season nor in extreme summer season. Above data suggests that from April last to June Last the days are not congenial for the luxuriant growth of parasitic fungi as temperature remained high and low relative humidity accompanied with more or less or no rainfall. Similarly, December last to mid January conditions again become adverse for the growth of fungi because of low temp, low relative humidity and low rainfall.

It is therefore obvious that the best period for the growth of fungi was October to November and February to April. So far as fruit spoilage was concerned it was observed to be maximum from

August to January, the reason may be high humidity and favorable temperature.

Table 1. Monthly occurrence of parasitic Fungi on *Solanum melongena* L. in relation to atmospheric factors(completely randomized design)

Month	Tmin.	Tmax.	R. H.	Rainfall	*Fusarium. solani*	*Helminthosporium spiciferum*	*Choanephora cucurbitarum*	*Curvularia lunata*	*Trichothecium roseum*
July	26.2	33.3	76.8	19.39	+	+	-	-	-
August	25.7	33.4	87.3	9.55	+	+	++	-	+++
September	24.3	32.33	78.6	11.18	+	-	+++	++	-
October	19.4	31.86	62.4	-	++	-	++	++	-
November	12.1	27.33	62.6	0.10	++	-	+++	++	-
December	9.2	23.5	64	0.75	+++	-	-	+++	-
January	7.8	20.3	82	0.20	-	-	-	-	-
February	10.8	23.6	73.4	1.30	+	-	++	++	-
March	16.4	28.7	53.2	-	+	+	++	++	+++
April	18.2	36.5	35	1.06	-	++	+	+	-
May	24.2	38.2	29.5	-	-	++	-	-	-
June	26.1	36.2	63.6	0.84	++	-	-	-	-

Table 2. Correlation of parasitic fungi with different atmospheric factors

Atmospheric factors	Fungi *Choanephora cucurbitarun*	*Trichothecium roseum*	*Curvularia lunata*	*Fusariun solani*	*Helminthosporium spiciferum*
T max.	-0.081ns	0.325ns	-0.490ns	-0.557ns	0.725**
T min.	0.061ns	0.185ns	-0.515ns	-0.309ns	0.855**
RH	0.488ns	0.271ns	0.173ns	0.247ns	-0.361ns
Rainfall	0.136ns	0.216ns	-0.469ns	-0.278ns	0.360ns

** Significant at 5% level, * Significant at 1% level, ns = non-significant

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