CURRENT STATUS OF ANTHRACNOSE (FRUIT-ROT AND DIE-BACK) DISEASE IN FIVE BLOCKS OF CHILLI GROWING AREAS OF GHAZIABAD DISTRICT (U.P.) INDIA

M. Javed[1*], M.U. Charaya[2], P. Sinha[3]

Author's Affiliation
[1]Monad University, Hapur, (U.P.),
India- 245101.
[2]C.C.S. University, Meerut (U.P.),
India-250004.
[3]Division of mycology and Plant
Pathology, IARI, (New Delhi),
India- 110012.

*Corresponding Author:
Dr. Muhammad Javed,
Professor and Head,
Department of Microbiology,
Monad University, Hapur (U.P.),
India- 245101.
Email:
mjaved72@gmail.com

Abstract

Fruit rot caused by *Colletotrichum capsici* (Syd.) Butler and Bisby, is responsible for considerably yield loss (10-60%) in Chillies. Ripe fruit rot is very conspicuous and causes severe damage in the field as well as in storage and transport. The pathogen is prevalent in most Chilli growing areas of India. Two years survey (2016-2017) in five blocks of Ghaziabad district (U.P.) showed that the disease appeared during July and by November the whole crop is damaged. Symptoms appear mostly on ripened fruit is characterized by circular and sunken spots with black margins. Disease incidence varied from 3.6 to 23% when plants are counted. Disease incidence 4.5 to 26% and severity varied from 1 to 4.7 (grade 0=no infection, 1=1-10%, 2=11-25%, 3=26-50%, 4=51-70% and 5=71-100% area of fruit infections). "Power model" was able to explain the relationship between incidence and severity on fruits which is given by disease severity = 0.2174X (Disease incidence) 2.1152.

Keywords: Anthracnose, Prevalence, Incidence and severity SPSS Power model Chillies.

INTRODUCTION

Anthracnose (Fruit -rot and Die-back) caused by *Colletotrichum capsici* (Syd.) Butler& Bisby is responsible for considerable damage (from 10 to 60%) to the Chilli (*Capsicum annuum*) crop throughout India (Sydow and Mc.Rai, 1929, Chawdhary, 1957, Bansal and Grover, 1969). Ripe fruit- rot and Die- back is very conspicuous and causes severe damage to mature fruits in the field as well as in storage and transport. The pathogen is prevalent in most of the Chilli-growing areas of India (Rai and Chauhan, 1966, Bansal and Grover, 1969, Raut and Rath, 1972; Saha and Singh, 1988; Kumar et al, 2000; Gupta and Paul, 2002) including Hapur (Distt. Ghaziabad) where crop was found to be severely damaged by *Colletotrichum capsici* (Charaya and Javed, 1997) Previous workers (Kaur et al. 1989; Datar and Manale, 1989) have reported meterological parameters related to disease expression of Anthracnose of Chillies. The present paper deals a survey in five major chilli- growing blocks of Ghaziabad district (U.P.) to find out prevalence, incidence and severity of chilli fruit loss.

MATERIAL AND METHODS

A survey was conducting in five major chilli-growing blocks of Ghaziabad district (Viz. Hapur, Simbhauli, Dhaulana, Rajapur an Bhojpur) U.P. during 2016 and 2017 for prevalence, incidence and severity of Colletotrichum fruit rot on Local- hybrid Delhi- Hot, Local- Kiran and Hapur Local varieties of Chillies being cultivated in these area. Five fields were selected randomly in each block in each field approximately 25 sq. meter areas was marked for study. Prevalence incidence and severity of the disease were recorded at monthly intervals starting from the first weak of July to November in both the years of study.

PREVALENCE

The Line transect method was used to assess the prevalence of infected plants in the field. A measuring tape 15 meter long was put across the crop in the given field and the numbers of healthy and diseased plants touching the tape were recorded. In each field, the tape was placed randomly at least 10 times. The areas of the field were also measured and the numbers of plants in the respective fields were estimated by extrapolating the values obtaining by multiplying mean number of plants touching the tape when put across the width of the field with that put across the length of the field.

DISEASE INCIDENCE (DIF) and SEVERITY (SIF)

The incidence of the disease was expressed as percentage of the fruit affected. Fifty diseased plants were selected randomly in each field and the total number of healthy and diseased fruits was counted on each plant. The mean percentage of disease fruits was taken as an estimate of disease incidence the severity of the disease was calculated from observation on 100 ripe fruits per field. The seventy was expressed as Grade, 0-5 (Grade 0=no infection, 1=1-10%; 2=11-25%; 3=-26-50%; 4=51-70% an 5=71-100% area of fruit damaged) the severity of infection SIF was calculated by using the following formula-

$$SIF = \frac{O(X_0) + 1(X_1) + 2(X_2) + 3(X_3) + 4(X_4) + 5(X_5)}{100}$$

Where – X_0, X_1, X_2, X_3, X_4 and X_5 represent the number of fruits falling under Grade 0,1,2,3,4 and 5 respectively.

Table 1: The Intensity of *Colletotrichum* Fruit-rot on Chillies in different blocks of District Ghaziabad

2016

BLOCKS	PREVELENCE/DISEASE INCIDENCE ON PLANTS					DISEASE INCIDENCE ON FRUITS(DIF)					SEVERITY OF INFECTION ON FRUITS (SIF)				
	JULY	AUG	SEPT	OCT	NOV	JULY	AUG	SEPT	OCT	NOV	JULY	AUG	SEPT	OCT	NOV
HAPUR	9.4	10.8	10.06	14.2	22.8	12.5	14.6	15.1	17.2	25.6	1.85	2.76	3.93	4.16	4.62
SIMBHOULI	6.4	8.7	9.80	10.2	14.2	7.6	11.2	11.8	12.6	17.0	1.38	2.16	3.62	3.80	4.10
DHAULANA	5.6	6.6	8.90	9.5	10.8	6.5	8.2	10.0	10.6	12.6	1.08	1.18	1.40	3.50	3.66
BHOJPUR	8.4	10.2	12.6	13.7	17.6	10.6	13.8	14.2	15.8	18.6	1.68	2.55	3.80	4.34	4.51
RAJAPUR	7.6	9.6	10.40	11.5	15.4	9.2	10.6	12.2	13.8	17.8	1.52	2.40	3.68	3.70	4.16

2017

BLOCKS	PREVELENCE/DISEASE INCIDENCE ON PLANTS					DISEASE INCIDENCE ON FRUITS(DIF)					SEVERITY OF INFECTION ON FRUITS(SIF)				
	JULY	AUG	SEPT	OCT	NOV	JULY	AUG	SEPT	OCT	NOV	JULY	AUG	SEPT	OCT	NOV
HAPUR	7.9	9.8	10.8	12.2	13.6	8.7	12.5	13.4	13.80	22.7	2.12	3.48	3.86	3.91	4.54
SIMBHOULI	6.8	7.9	8.90	10.2	12.6	7.0	10.6	11.2	13.40	15.2	1.44	2.22	3.58	4.25	4.72
DHAULANA	3.6	4.2	5.05	6.4	18.4	4.5	5.5	6.8	7.06	9.2	1.36	1.68	3.25	3.6	3.65
BHOJPUR	7.5	8.4	9.90	10.5	13.4	8.2	11.2	11.7	13.60	21.7	1.80	2.56	3.46	3.75	3.90
RAJAPUR	3.7	6.4	7.60	9.4	10.4	6.2	8.5	9.2	11.50	14.6	2.83	2.23	3.48	3.92	4.60

RESULTS AND DISCUSSION

As perusal of table 1 reveals that the prevalence of the disease on Chilli plants ranged from 8.4 to 22.8. The incidence of the disease on fruit ranged from 9.2 to 25.6, thus the lower limit of 10% as suggested by earlier workers, is further lowered slightly by 0.8% Even then in broader terms, the losses to fruits lie within the range suggested by earlier workers (Bansal and Grover 1669; Gupta and Garg, 2002 and Singh et al. 2003).

As analysis was made to find out the variations in Prevalence disease incidence on fruits and seventy of infection on fruits at maturity the results are presented in the Table-2

Table 2:

Parameters	2016			2017		
	$\overline{X}$	σ	C.V.	$\overline{X}$	σ	C.V.
Prevalence	16.16	3.98	24.76	11.68	1.99	17.07
DIF	18.3	4.21	23.04	16.68	4.97	29.84
SIF	4.21	0.34	8.17	4.26	0.41	9.67

As is evident from the table about the coefficient of variations was very high in the case of prevalence and DIF but it was very low in the case of SIF. It may be concluded there may be sufficient variations in the occurrence of the fruit rot on plants or fruits from block to block, but once again number of fruits are infected the variations in severity are much, less.

Analysis of the data using "SPSS" 9.0 revealed that anthracnose incidence on plants shows similar type of disease progress in both the years. However the incidence was relatively high during 2016 and it was more severe on fruits. The relationship between the incidence and severity on fruits have been established. A "Power model" (Gregory 1966) has been found to explain the variations in both the years. During 2016, the model $Y=2.174x^{2.1152}$ ($R2^2=0.867$) could explain the relationship between fruit not seventy (U) and incidence on fruits (x) similarly for2017 the model fitted was $Y=2.1558X^{1.2322}$ ($R2=0.91$).
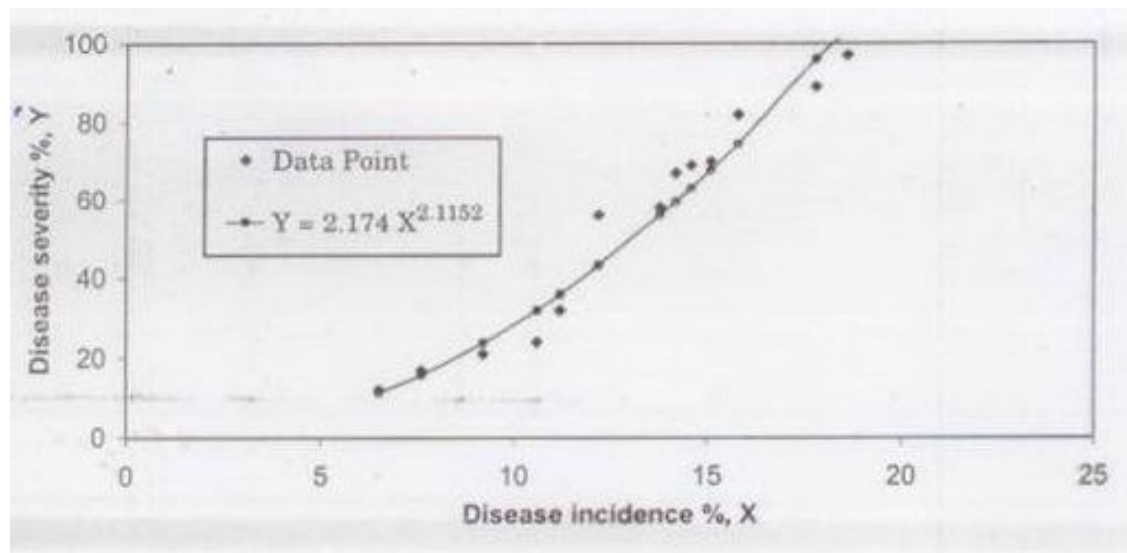
Graph 1: Relationship between *Colletotrichum* fruit rot incidence and severity in chilli fruits during 2016.
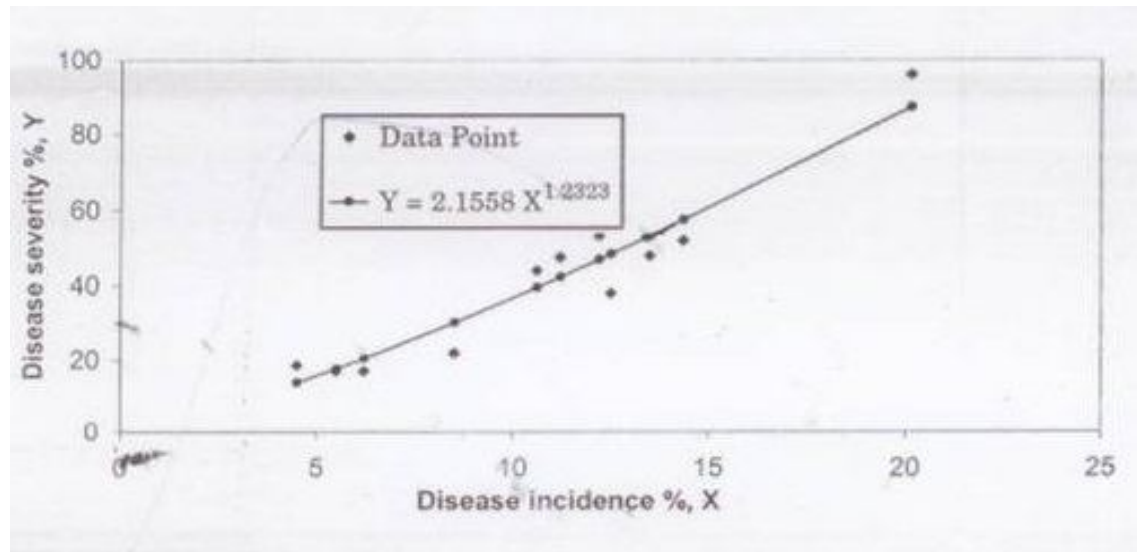
Graph 2: Relationship between *Colletotrichum* fruit rot incidence and severity in chilli fruits during 2017

This assumption is justified by the result of the present investigation. At Hapur, Chilli is grown at large scale and has been under cultivation for long. On the other land at Dhaulana cultivation of Chilli has begun relatively recently and the preparation of area devoted to Chilli is much less as compared to Hapur. This might explain much greater intensity of fruit not of Chillies at Hapur as compared to Dhaulana.

It would not be appropriate of the variation in disease intensity of fruit rot in Chillies to the above discussed factors. Only disease can be affected by the growth of the crop and its physiological status: both being influenced by environmental factors (Mc. Cartney, 1997) an understanding of the interaction between pathogen, crop and environmental factors can lead to more effective control of the disease. Further studies on long term bases on and the above "Power model" with Metrological relationship only would provide better understanding the insight into the situation".

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