



Pathogenesis, Incidence and Severity of some Fungal Crop Diseases in Hamirpur region of Himachal Pradesh

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DOI: <http://dx.doi.org/10.33980/jbcc.2020.v06i02.005>

(Received 19 Sep, 2020; Accepted 26 Nov, 2020; Published 23 Dec, 2020)

ABSTRACT: Crop diseases leads to huge economic losses every year. It is quite effective to assess and identify the crop diseases for developing effective control strategies. The present study was conducted on some fungal crop diseases in Hamirpur, Himachal Pradesh during the years 2018 to 2020. The fungal pathogens were indentified and disease incidence & severity at farmer's field was statistically assessed. A total of twenty five diseases caused to seventeen host crops by twenty four fungal pathogens were reported. Fungal pathogen *Phoma medicaginis* and *Arthrinium sacchari* are being newly reported from Himachal Pradesh. Disease incidence (40.30%) and severity (51.20%) was maximum for *Coccinia grandis* leaf spot disease.

Keywords: Crops; Fungal; Incidence; Pathogen and Severity.

INTRODUCTION: Assessment of crop disease is the basis of epidemiology. It is required for estimating effect of crop disease on yield and disease forecasting. It is pre-required for determining the economic impact of a disease and the benefit of particular control strategy.¹ Crop diseases have negative impact on agricultural productivity.² Every year about sixteen percent of all crops are lost globally due to various diseases.³ These losses can be much higher when pathogens are newly introduced; climate change and when crops are grown as in monoculture. Crop loss assessment is a necessary first step towards the delivery of management tools that will benefit societies, environments, consumers and farmers.⁴ The review of literature revealed that there are a very few detailed studies on fungal crop diseases.⁵⁻³⁷ Thus, a systematic study on pathogen, incidence and severity of some fungal crop diseases in the study area was conducted.

MATERIALS AND METHODS: Hamirpur district of Himachal Pradesh is situated at 76°17'50" to 76°43'42" towards East longitudes and 31°24'48" to 31°53'35" towards North latitudes. The annual temperature ranges between 40°C-3°C. The survey on pathogen, incidence and severity of some fungal crop diseases in the study area was conducted during the period August 2018 to September 2020. Dis-

ease severity is the number of sampling units showing disease divided by the total number of sampling units. Disease incidence is based on the visual symptoms of study material. It is measured by dividing area of diseased portion on sampling unit by total area of sampling unit by percentage.³⁸ During the field survey farmer's assessment survey of crop diseases was conducted in all the six developmental blocks of Hamirpur district namely Nadaun, Bijhari, Bhoranj, Sujampur and Bamson.

RESULTS AND DISCUSSION: Samples of diseased parts were taken at random from the crop field by walking across a diagonal or diamond pattern across the field and taking a sample every ten paces. The disease was identified on the basis of epidemiological characters on host plant parts. Further pathological studies were conducted by isolating crop pathogen on media (PDA) for observing cultural characteristics. Identification of pathogen was authenticated on the basis of morphological and anatomical characters with the help of latest published research, manuals and identification keys. The identity of pathogens was also confirmed at National Center of Fungal Taxonomy (NCFT), New Delhi and identification numbers have been allotted.

Table 1: Fungal disease pathogen, host, incidence and severity of disease.

Sr. No.	Pathogen	Disease/Host	ID No.	Disease Incidence (%age)	Disease intensity/Severity (%age)
1.	<i>Phoma medicaginis</i>	Phoma blight of <i>Vicia faba</i>	9815.20	5.33	13.33
2.	<i>Gilmaniella humicola</i>	Leaf spot (New report) of <i>Solanum melongena</i>	9816.20	4.00	8.77
3.	<i>Arthrinium sacchari</i>	Spoiled fruit (New report) of <i>Solanum melongena</i>	9817.20	1.33	2.22
4.	<i>Phoma exigua</i>	Leaf spot of <i>Allium sativum</i>	9819.20	5.33	8.77
5.	<i>Aspergillus niger</i>	Leaf spot of <i>Pisum sativum</i>	9820.20	3.33	8.77
6.	<i>Aspergillus nidulans</i>	<i>Trigonella foenum-graecum</i>	9821.20	11.33	13.33
7.	<i>Aspergillus flavus</i>	Leaf spot of <i>Vicia faba</i>	9822.20	4.00	6.66
8.	<i>Colletotrichum gloeosporioides</i>	Anthraxnose of <i>Coccinia faba</i>	9823.20	26.66	20.00
9.	<i>Fusarium oxysporum</i>	Fusarium wilt of <i>Lycopersicon esculentum</i>	9824.20	10.00	26.66
10.	<i>Phoma</i>	Twisted leaf disease of <i>Saccharum officinarum</i>	9825.20	1.33	4.44
11.	<i>Rhizoctonia bataticola</i>	Dry root rot of <i>Trigonella foenum-graecum</i>	9826.20	6.00	6.66
12.	<i>Aspergillus sclerotiorum</i>	Leaf spot of <i>Momordica charantia</i>	9851.20	8.00	6.66
13.	<i>Penicillium expansum</i>	Fruit spot of <i>Momordica charantia</i>	9852.20	2.00	2.22
14.	<i>Nigrospora sphaerica</i>	Leaf blight of <i>Luffa aegyptiaca</i>	9853.20	5.33	13.33
15.	<i>Trichoderma harzianum</i>	Necrosis of <i>Capsicum annum</i>	9854.20	4.66	8.88
16.	<i>Aspergillus nidulans</i>	Rot of fruit, wilting of <i>Capsicum annum</i> var. <i>annuum</i>	9855.20	6.00	6.66
17.	<i>Ascochyta fabae</i>	Ascochyta leaf blight of <i>Phaseolus vulgaris</i>	9856.20	11.33	26.66
18.	<i>Trichoderma viride</i>	Leaf spot of <i>Abelmoschus esculentus</i>	9857.20	4.66	8.88
19.	<i>Phoma sorghina</i>	Leaf spot complex of <i>Zea mays</i>	9858.20	26.66	23.33
20.	<i>Cladosporium oxysporum</i>	Leaf spot of <i>Capsicum annum</i>	9859.20	4.66	8.8
21.	<i>Alternaria alternata</i>	Alternaria Leaf spot <i>Lagenaria siceraria</i>	9860.20	13.33	26.66
22.	<i>Phoma glomerata</i>	Phoma Leaf blight of <i>Luffa aegyptiaca</i>	9861.20	11.33	11.11
23.	<i>Cladosporium cladosporioides</i>	Leaf spot of <i>Coccinia grandis</i>	9862.20	40.30	51.20
24.	<i>Fusarium solani</i>	Fusarium Wilt <i>Lagenaria siceraria</i>	9863.20	12.66	19.99
25.	<i>Acremonium strictum</i>	Leaf desiccation and plant death of <i>Colocasia esculenta</i> var. <i>esculenta</i>	9864.20	26.66	37.77

Table 2: Fungal pathogens and their host crop plant.

S. No.	Pathogen	Host
1.	<i>Trichoderma viride</i>	<i>Abelmoschus esculentus</i>
2.	<i>Phoma exigua</i>	<i>Allium sativum</i>
3.	<i>Trichoderma harzianum</i>	<i>Capsicum annum</i>
4.	<i>Cladosporium oxysporum</i>	

5.	<i>Aspergillus nidulans</i>	
6.	<i>Colletotrichum gloeosporioides</i>	<i>Coccinia faba</i>
7.	<i>Cladosporium cladosporioides</i>	<i>Coccinia grandis</i>
8.	<i>Acremonium strictum</i>	<i>Colocasia esculenta</i> var. <i>esculenta</i>
9.	<i>Alternaria alternata</i>	<i>Lagenaria siceraria</i>
10.	<i>Fusarium solani</i>	
11.	<i>Nigrospora sphaerica</i>	<i>Luffa aegyptiaca</i>
12.	<i>Phoma glomerata</i>	
13.	<i>Fusarium oxysporum</i>	<i>Lycopersicon esculentum</i>
14.	<i>Aspergillus sclerotiorum</i>	<i>Momordica charantia</i>
15.	<i>Penicillium expansum</i>	
16.	<i>Ascochyta fabae</i>	<i>Phaseolus vulgaris</i>
17.	<i>Aspergillus niger</i>	<i>Pisum sativum</i>
18.	<i>Phoma</i>	<i>Saccharum officinarum</i>
19.	<i>Gilmaniella humicola</i>	<i>Solanum melongena</i>
20.	<i>Arthrinium sacchari</i>	
21.	<i>Aspergillus nidulans</i>	<i>Trigonella foenum-graecum</i>
22.	<i>Rhizoctonia bataticola</i>	
23.	<i>Phoma medicaginis</i>	<i>Vicia faba</i>
24.	<i>Aspergillus flavus</i>	
25.	<i>Phoma sorghina</i>	

CONCLUSION: A total of twenty five fungal diseases were reported and assessed at Hamirpur district of Himachal Pradesh during 2018 to 2020 (Table 1). These diseases are caused by twenty five pathogens on seventeen hosts (table 2). Among reported crop diseases, most of the diseases were foliar. Disease incidence (40.30%) and severity (51.20%) was maximum in case of leaf spot of *Coccinia grandis* caused by *Cladosporium cladosporioides*.

ACKNOWLEDGEMENT: Authors are thankful to National Center of Fungal Taxonomy (NCFT), New Delhi for identification of pathogenic fungi and Career Point University Hamirpur for providing required laboratory facilities. Special thanks to the farmers of Hamirpur district (HP) for their co-operation during the survey.

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