



Study of agriculturally important crop diseases from Baramati Tehsil of Pune district, Maharashtra, India

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Abstract

The present investigation is focused on the study of agriculturally important crop diseases from the Baramati Tehsil in the Pune District, Maharashtra, India. Most diseases causing agent observed during our study included *Synchytrium endobioticum*, *Plasmopara viticola*, *Albugo candida*, *Guignardia citicarpa*, *Plasmodiophora brassica*, *Physoderma maydis*, *Personospora effusa*, *Synchytrium endobioticum*, *Plasmopara viticola*, *Albugo candida*, *Guignardia citicarpa*, *Plasmodiophora brassica*, *Physoderma Phytophthora infestans*, *Pythium aphanidermatum*, *Sclerospora graminicola*, *Oidium lycopersicum*, *Podospora xantii*, *Erysiphae polygoni*, *Ustilaginodea virens*, *Phomopsis vexans*, *Claviceps fusiformis*, *Fusarium oxysporum*, *Colletotricum dematium*, *Gramini tritici*, *Neovossia indica*, *Ustilago tritici*, *Sphacelotheca sorghi*, *Tolyposporium ehrenbergii*, *Ustilago scitaminea*, *Ustilago maydis*, *Sphacelotheca reliana*, *Uromyces fabae*, *Cercospora arechidicola*, *Collectotricum capsici*, *Collectotricum falcatum*, *Alternaria solani*, *Elsinoe ampelina*, *Alternaria porri*, *Sclerotinia sclerotiorum* etc. *Mastigomycetes* (22.5%), *Ascomycetes* (37.5%), *Basidiomycetes* (25%), and *Deuteromycetes* (15%) species were observed throughout the investigation. During the investigation, the largest percentage of Powdery mildew, Wilt illnesses from the sub-division *Ascomycetes*, and the lowest percentage of Rot diseases from the sub-division *Deuteromycetes* were reported.

Keywords: disease, host and pathogen

Introduction

India's agro-climatic diversity includes tropical, subtropical, and temperate climate zones with temperatures, humidity, and rainfall ranging from average to high. For pests and pathogens, tropical and subtropical climates are ideal for growth development. The majority of the world's fruits, vegetables, cereals, pulses, oil seed crop, and fiber crop are grown in India, but diseases has restricted growth, (Pawar *et al.*, 2010) [11]. Different types of crop diseases in agriculture fields, according to Pandey *et al.* (2017) [1] includes black spot, leaf spot, powdery mildew, rust, smut, downy mildew, and others. Sugarcane diseases are major source of crop loss around the world. More than 125 sugar beet diseases caused by fungi, bacteria, viruses, and nematodes have been reported from around the world. A smut of sugarcane has been reported for the first time by Butler (1906) [5].

Major tropical fruit crop growers are in Asia and the Pacific. Mango, pineapple, papaya, grapes, avocado, and banana are the most popular fruits, but diseases are limiting fruit production. Banana (*Musa* spp.) is one of the most important fruit crops and most common fruits consumed around the world, but Anthracnose caused by *Colletotricum* spp. is a worldwide problem (Ball *et al.*, 2017). The late blight potatoes, which are caused by the fungus *Phytophthora infestans*, are an example of the enormous effect that diseases can have on the course of human history. According to Coates *et al.*, (1967) *Vitis vinifera* or common grape vine is a *Vitis* species native to one of the world's most widely grown horticultural crops powdery mildew is one of India's most damaging grape diseases. The diseases cause leaf curling and senescence, stem weakening, and bud sprouting inhibition in the majority of grapes (leaves, fruits,

and flowers), resulting in significant economic losses (Fry 2008) [8]. Little leaf Brinjal, late blight of tomato, powdery mildew of crucifers, powdery mildew mango, and citrus canker have all been observed in horticulture.

The floriculture industry is one of the most important commercial trades in horticulture and agriculture (Hampson *et al.*, 1984) Marigold, roses, tuberose, and other flowers are grown in India. These crops are getting infected with a variety of diseases, including marigold leaf spot and flower blight. Baker's most important worldwide diseases are gerbera powdery mildew, *Alternaria* leaf spot, and Rose black spot, all caused by *Diplocarpon rosae*. Rouse (1984) is reported susceptible to fungal diseases such as dieback, powdery mildew, rust, stem, blight, *Alternaria* leaf spot, and black spot.

According to Ashwin (2017) [2], wild relative crop diseases in India are diverse and widely distributed. About 166 native cultivated plant species and over 320 wild relatives are housed in the Indian gene center. Onions and sunflowers have powdery mildew. Savary *et al.* (2006) [13] identified leaf spot on groundnuts, as well as yellow and leaf rust, crown rust diseases, and leaf blight.

According to Bhaskaran *et al.* (1974) [4], certain plants are easily distinguishable based on the host's specific symptoms. Crop losses due to pathogen, abiotic, and biotic are direct and indirect losses between 20% and 40%, according to Dhama *et al.* (2015) [7]. These losses represent the true costs of crop losses to customers, public health, communities, environments, economic fabrics, and farmers. Plant diseases have a thousand-year history in India, with the Vedic era being the first to recognize that diseases are caused by microbes. Surapal's book "Vrikshayurveda" from

ancient India included details on plant diseases. He separated the plants into two groups: internal and external. As the world's population and food requirement is increasing day-by-day, the most agricultural research focuses on crop productivity. Hairy *et al.* (2011) ^[9] primarily concerned with preventing crop yield losses caused by biological and non-biological factors. This is due to dwindling natural resources available to agriculture, such as water, farmland, soil, and biodiversity (Jeffeies *et al.*, 1990).

Plant diseases are critical to research because of various types of losses may occur in the field, in storage, or at any point between sowing and harvesting. Direct monetary loss and material loss are caused by the diseases.

In this connection, the present attempt was undertaken to investigate the plant diseases in crop fields of Baramati region.

The survey study has been done on important agricultural crop diseases from Baramati area. Disease detection is based on the texture, color and shapes of the leaf show several advantages over flower and fruits. The crops were affected by different diseases. The major diseases caused by various pathogens. The symptoms have been observed and compared the diseases.

Infected plant samples of leaves, fruits, and twigs have been collected for the morphological character. Collected plant samples were brought to laboratory for identification of pathogen with the help of microscope. Fungal identification was carried out on the basis of characterization of colonies and has also been examined under compound microscope with 40x magnification.

A survey has been conducted to report the diseases incidence in our region during the September-2020 to February-2021 to identify photographs of crop diseases. All photographs were taken during a field visits.

Materials and Methods



Plate 1

Table 1: Fungal Diseases, Host, and Causal organism

Sr. No	Name of Disease	Name of the host plant	Name of the causal organism	Subdivision	
1.	Wart disease of Potato	<i>Solanum tuberosum</i> L	<i>Synchytrium endobioticum</i>	Mastigomycetes	
2.	Downy mildew of Grapes	<i>Vitis vinifera</i> L	<i>Plasmopara viticola</i>		
3.	White rust of Crucifers	<i>Brassica olerassica</i> L	<i>Albugo candida</i>		
4.	Club root of crucifers	<i>Brassica Lolerassica</i> L	<i>Plasmodiophora brassica</i>		
5.	Brown spot of Zea maize	<i>Zea mays</i> L	<i>Physodenma maydis</i>		
6.	Downy mildew of Spinach	<i>Spinacia oleracea</i> L	<i>Personospora effuse</i>		
7.	Late blight of Potato	<i>Solanum tuberosum</i> L	<i>Phytophthora infestance</i>		
8.	Rhizome rot of Turmeric	<i>Curcuma longa</i> L	<i>Pythium aphanidermatum</i>		
9.	Downy mildew of Bajra	<i>Pennisetum glaucum</i> L	<i>Sclerospora graminicola</i>		
10.	Powdery mildew of Bhendi	<i>Leveillula taurica</i> L	<i>Oidium lycopersicum</i>		
11.	Powdery mildew of Bottle guard	<i>Lagenaria siceraria</i> L	<i>Podospora xantii</i>		
12.	Leaf spot of Lemon	<i>Citrus lemon</i> L	<i>Guignardia citicarpa</i>		
13.	Powdery mildew of Cucumber	<i>Erysiphe cichoracearum</i> L	<i>Erysiphae polygoni</i>		
14.	Powdery mildew of Grapes	<i>Vitis vinifera</i> L	<i>Uncinula nector</i>		
15.	Powdery mildew of Mango	<i>Magnifera indica</i> L	<i>Oidium magniferae</i>		
16.	Powdery mildew of Caster	<i>Ricinus communis</i> L	<i>Podospora xantii</i>		
17.	False head smut of Maize	<i>Zea mays</i> L	<i>Ustilaginodea virens</i>		Ascomycetes
18.	Leaf spot of Brinjal	<i>Solanum melongena</i> L	<i>Phomosis vexans</i>		
19.	Ergot of Bajra	<i>Pennisetum glaucum</i> L	<i>Claviceps fusiformis</i>		
20.	Wilt diseases of Gram	<i>Cicer arientinum</i> L	<i>Fusarium oxysporum</i>	Basidiomycetes	
21.	Wilt disease of Ground	<i>Arachis hypogea</i> L	<i>Fusarium oxysporum</i>		
22.	Wilt disease of Banana	<i>Musa acuminata</i> L	<i>Fusarium oxysporum</i>		
23.	Anthracoise of Chilli	<i>Capssicum annum</i>	<i>Colletrochum capsici</i>		
24.	Anthracoise of Groundnut	<i>Arachis hypogea</i> L	<i>Colletotricum dematium</i>		
25.	Black rot of wheat	<i>Triticum aestivum</i> L	<i>Gramini tritici</i>		
26.	Karnel bunt of Wheat	<i>Triticum aestivum</i> L	<i>Neovossia indica</i>		
27.	Loose smut of wheat	<i>Triticum aestivum</i> L	<i>Ustilago tritici</i>		
28.	Grain smut of Jowar	<i>Sorgum vulgare</i> L	<i>Sphacelotheca sorghi</i>		
29.	Long smut of Jowar	<i>Sorgum vulgare</i> L	<i>Tolyposporium ehrenbergii</i>		
30.	Smut disease of Sugarcane	<i>Saccharum officinarum</i> L	<i>Ustilago scitaminea</i>		
31.	Smut disease of Maize	<i>Zea mays</i> L	<i>Ustilago maydis</i>		
32.	Head smut of Jowar	<i>Sorgum vulgare</i> L	<i>Sphacelotheca reliana</i>		
33.	Rust disease of Sugarcane	<i>Saccharum officinarum</i> L	<i>Puccinia erianthi</i>		
34.	Rust of Lentil	<i>Lens culinary</i> L	<i>Uromyces fabae</i>		
35.	Tikka diseases of Groundnut	<i>Arachis hypogea</i> L	<i>Cercospora arachidicola</i>		
36.	Red rot of sugarcane	<i>Saccharum officinarum</i> L	<i>Collectotrichum falcatum</i>		
37.	Early blight of Tomato	<i>Leveillula taurica</i> L	<i>Alternaria solani</i>		
38.	Anthracoise of Grapes	<i>Vitis vinifera</i> L	<i>Elsinoe ampelina</i>		
39.	Purple blotch of Onion	<i>Allium cepa</i> L	<i>Alternaria porri</i>		Deuteromycetes
40.	Sclerotia stalk of sunflower	<i>Helianthus annus</i> L	<i>Sclerotinisa sclerotiorum</i>		

Results and Discussion

The present study was done on agriculturally important crop diseases from Baramati Tehsil of District Pune, Maharashtra, India. In the study a total 40 crop diseases were found which includes namely Wart diseases of Potato, Downy mildew of Grapes, White rust of Crucifers, Leaf spot of Lemon, Club root of Crucifers, Brown spot of *Zea mays*, Downy mildew of Spinach, Late blight of Potato, Rhizome rot of Turmeric, Downy mildew of Bajra, Powdery mildew of Tomato, Powdery mildew of Bottle guard, Powdery mildew of Cucumber, Powdery mildew of Grapes, Powdery mildew of Mango, Powdery mildew of Caster, False head smut of Maize, Leaf spot of Brinjal, Ergot of Bajra, Wit disease of Gram, Wilt disease of Groundnut, Wit disease of Banana, Anthracnose of Groundnut, Black rot of Wheat, Kernel bunt of Wheat, Loose smut of Wheat, Grain smut of Jowar, Long smut of Jowar, Smut disease of Sugarcane, Smut disease of Maize, Head smut of Jowar, Rust disease of Sugarcane, Tikka diseases of Groundnut, Anthracnose of Chilli, Red rot of Sugarcane, Early blight of Tomato, Anthracnose of Grapes, Purple blotch of Onion, Sclerotina stalk rot of Sunflower. (Table No.1)

Most diseases causing agent observed during our study included *Synchytrium endobioticum*, *Plasmopara viticola*, *Albugo candida*, *Guignardia citicarpa*, *Plasmodiophora brassica*, *Physodenma maydis*, *Personospora effusa*, *Phytophthora infestance*, *Pythium aphanidermatum*, *Sclerospora graminicola*, *Oidium lycopersicum*, *Podospora xantii*, *Erysiphae polygoni*, *Ustilaginodea virens*, *Phomosis vexans*, *Claviceps fusiformis*, *Fusarium oxysporum*, *Colletotricum dematium*, *Gramini tritici*, *Neovossia indica*, *Ustilago tritici*, *Sphacelotheca sorghi*, *Tolyposporium ehrenbergii*, *Ustilago scitaminea*, *Ustilago maydis*, *Sphacelotheca reliana*, *Uromyces fabae*, *Cercospora arechidicola*, *Collectotricum capsici*, *Collectotricum falcatum*, *Alternaria solani*, *Elsinoe ampelina*, *Alternaria porri*, *Sclerotinisa sclerotiorum*. During the investigation period, the percent contribution species belong to Mastigomycetes (22.5%), Ascomycetes (37.5%), Basidiomycetes (25%), and Deuteromycetes (15%) species were found. During the study highest % of Powdery mildew, Wilt diseases member of Ascomycetes and lowest % of Rot diseases member of Deuteromycetes were observed. Powdery mildew, Wilt diseases, Anthracnose

diseases of fungi is dominant in Baramati Tehsil region of Pune, Maharashtra.

Conclusion

In the study area, maximum pathological fungal diversity was found. The fungal population was observed mostly in the monsoon season as the soil moisture was high. In the present study, crop diseases of the different field were studied for screening and detecting of pathological fungal diversity. The result obtained clearly indicate that species reported belongs to 9 Species of Mastigomycetes, 15 Species of Ascomycetes, 10 Species of Basidiomycetes, 6 Species of Deuteromycetes.

The fungal population in agriculture field was found to be regulated by many factors like various intrinsic and extrinsic factor, the water content in grains, storage, temperature, humidity, vegetation organic and inorganic material, soil type and humidity.

A total of 40 species of crop diseases were identified and photographed. The current study focused on infected plants and their management for their future use. This detailed information will aid economics, sociology, ecology, agricultural field understanding the mechanism of plant disease epidemics. The study is an effort to understand the necessities for crop disease management. It will not only help in increasing agriculture productivity and food quality.

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