

Fungal Diseases of Vegetables grown in Greenhouse

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Manuscript details:

Available online on
<http://www.ijlsci.in>

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:

Chaudhuri Sanchita, Pius Jessy, Naik Vishwesh and Gaikwad Sneha (2016) Fungal Diseases of Vegetables grown in Greenhouse, Int. J. of. Life Sciences, Special Issue, A7: 74-76.

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ABSTRACT

Warm, humid greenhouse environment favours a number of plant pathogens that can infect various plant parts. The disease can be soil/peat born, air born or water born. The aim of this paper is to give an overview of fungal diseases commonly observed on the vegetables grown in Greenhouse of RamnarainRuia College. In protected cultivation optimal conditions for growing vegetables in soil and soilless method need to be maintained. However improper maintenance stimulates the activity of pathogens. The diseases observed include Powdery mildew, Downy mildew, Damping-off, Tikka disease and fruit rot. This paper also gives organic control measures for the same.

Key words: Fungal diseases, Greenhouse, vegetables

INTRODUCTION

With the exponential growth in population, global warming resulting erratic changes in climatic conditions and ever increasing need for food (Anirudh Garg and Rekha Balodi, 2014) as well as demand for seasonal crops throughout the year has led to cropping up of greenhouses. A greenhouse has the capability to meet the demand for increased production of food, avail seasonal crops throughout the year under protected and controlled environment. Thus growing crops in greenhouses is the need of the hour.

Greenhouses are designed to protect crops from many adverse conditions, however it is impossible to exclude several pathogens and pests (Kharwar, 2014; Colucci and Holmes, 2010, Lim *et al.*, 2004; Stallknecht and Schulz-Schaeffer, 1993; Subrahmanyam *et al.*, 1985). Air borne and soil-borne pathogens enter through the doorway, ventilator and also adhere to footwear and machinery, aquatic fungi through irrigation water, insects that enter the greenhouse can transmit viruses and can carry and spread bacteria and fungi as well. Once inside a greenhouse, pathogens are difficult to eradicate. Moreover high humidity level in a greenhouse is an open invitation to fungal infections. This calls for constant monitoring and efficient pest and disease management.

MATERIALS AND METHODS

Studies were carried out to identify and control the fungi associated with the vegetables grown in greenhouse. The leaves of the infected plants were collected from the greenhouse and were thoroughly inspected for disease symptoms to identify the pathogen. The general health of the infected plant was also monitored.

Organic fungicides like Neem oil(1%) and / Tobacco decoction was sprayed on the plants to check the infection. A fungicide was prepared by mixing clove oil, black pepper, *Aloe vera* gel and basil to successfully fight downy mildew.

RESULTS AND DISCUSSION

Here we record the observations made pertaining to the various fungal diseases encountered while growing vegetables in greenhouse and shade net house in the College premise under a skill based B.Voc course-

Green house Management recognised by UGC and University of Mumbai. All the infected materials are preserved in the department.

Fungal diseases like Powdery mildew on *Arachis hypogaea*(*Oidium*sp.), Downy mildew of *Trichosanthus cucumerina*(*Pseudoperenospora* sp.),Tikka disease/ leaf spot disease of *Arachis hypogaea*(*Cercospora arachidicola*, *C. personata*), late blight of *Lycopersicon esculentum* fruit (*Phytophthora* sp.) and damping-off of *Amarathus* seedlings (*Pythium* sp.)(Fig.1)were observed.

Powdery Mildew of *Arachis hypogaea*:

Causative agent -*Oidium arachidis*. The infected leaves developed pale white spots on the under surface of the leaf, at the on set of the disease. Later the spots were visible on the upper surface of the leaf. The spots later became larger and whiter. These spots covered the upper surfaces of leaflets and superficial sporulating fungal growth gave them a powdery white appearance (Fig.1). The center of the spots later became brown and necrotic.



Powdery mildew on Groundnut leaf *Oidium*sp.



Downy mildew in Snake gourd leaf *Pseudoperenosporasp*



Damping -off of Amaranthus seedling *Pythium* sp.



Early leaf spot Disease of Groundnut leaf *Cercospora arachidicola*



Late leaf spot Disease of Groundnut leaf *Cercospora personata*



Fruit rot of Tomato *Phytophthora* sp.

Fig. 1 : Fungal Diseases observed in the greenhouse grown vegetables

Downy mildew of *Trichosanthus cucumerina*:
Causative organism-*Pseudoperonospora sp.* Typical symptoms consist of chlorotic lesions on upper leaf surfaces and premature defoliation. Sporulation was observed on the lower leaf surface. The infected leaves in severe cases appear burnt and skeletonised.

Tikka disease/ leaf spot disease of *Arachis hypogaea*:

Causative organism-*Cercospora arachidicola*. Early leaf spot showed brown lesions (spots) that were surrounded by a yellow halo. Early leaf spot was found as early as 30 days after planting. Tufts of silvery, hair-like spores on the top of the leaf could be seen with the help of a good magnifying glass.

Late leaf spot of *Arachis hypogaea*:

Causative organism- *Cercospora personata*. Late leaf spot disease showed circular and darker spots than early spot disease with or without yellow halo.

Late blight of *Lycopersicon esculentum* fruit:

Causative organism- *Phytophthora sp.* The fruits were brown blighted also turned greasy and oilivaceous brown.

Damping-off of *Amarathus* seedlings :

Causative organism- *Pythium sp.* Seedlings are attacked by the pathogen. Affected roots showed a glassy rot and light brown colour at the level of the collar

Organic control measures:

In the present study 1% Neem oil when sprayed, spread of the fungal disease was controlled. This could be probably due to the protective coating on the leaf surface that blocked the germination of the spore. This was effective against powdery mildew. Tobacco decoction was not as effective as neem oil against fungal pathogen, but was very effective against insect pests. However, it was effective in controlling fruit rot of tomato. A fungicide that was prepared by mixing clove oil, black pepper, *Aloe vera* gel and basil leaf extract was used successfully to fight downy mildew.

In order to control the fungal infection the following precautions were taken and this resulted in reduction of the infection. i) The infected plants were sprayed with organic fungicide ii) Highly infected plants were uprooted and destroyed iii) The hinges, the doors and the tools used in the greenhouse were thoroughly

cleaned and disinfected iv) The humidity of the greenhouse was controlled by increasing the time interval between the two consecutive sprays of the foggers v) Number of people entering the greenhouse on regular basis were restricted.

CONCLUSION

Greenhouse could be susceptible to fungal attack if proper hygiene is not maintained. Many a times the doors, the tools and implements used or unregulated visitors in the greenhouse attribute to the fungal attack. Use of organic fungicides showed that to some extent they can control the pathogen which could be due to its antifungal potential which inhibits fungal mycelial growth or spore germination.

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