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Studies on Colletotrichum Infection in Safed Musli Cultivation

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Abstract

Chlorophytum borivilianum Santapau and Fernandes is one of the most important medicinal plants. Dried roots of *Chlorophytum* are popularly known as Safed musli which is utilized as herbal medicine belonging to the Liliaceae family. Cultivation of Safed musli crops in the Marathwada and Vidarbha regions of Maharashtra, India, was surveyed and found heavy infection on foliage parts in 2007. In early stage of the disease development minute, pin-head, circular, reddish-brown-, lesions appeared on the leaves, further from longitudinal streaks development along the midrib veins and at the margins of the infected leaves were observed. All the infected leaves were dried prematurely, and infected plants were unable to produce healthy rhizomes, that are widely used for medicinal purposes. This infection occurs in beginning of the wet season during August and September. Among the different diseases of *Chlorophytum borivilianum*, leaf blight is the most severe and is responsible for 30 per cent yield loss. With this in mind, the present investigation was under-taken to identify the pathogen and study its pathogenicity.

Keywords: Leaf Blight, *Chlorophytum borivilianum*, *Colletotrichum*, pathogenicity.

Introduction

Chlorophytum borivilianum belongs to the Liliaceae family. In India, dried rhizomes are popularly known as Safed musli. In literature of Ayurveda, Safed musli is well-known as 'Divya Aushad,' which has tremendous importance as essential ingredient in the preparation of different medicines. 3500 ton is the annual demand for *Chlorophytum borivilianum* in India but its supply is only 500-600 ton (Kothari and Singh, 2003). The plant thrive in their natural environment, and owing to its increasing demand worldwide, it has been used excessively, and pushed this species in to the threatened category which is at risk of extinction. *Chlorophytum borivilianum* has recognized as the sixth most important herb to be protected and promoted by the medicinal plant board of India. To bring Safed musli under cultivation throughout India, the government of India is also extending subsidies to farmers for the cultivation of this herb through the National Horticultural Board (Murlidharan, 2004).

Origin and Distribution:

Chlorophytum borivilianum Santapau and Fernandes is one of the most important medicinal plants. Dried rhizomes are popularly known as Safed musli which is utilized as herbal medicine belonging to the Liliaceae family. Throughout the world, 300 species of musli are on record. *Chlorophytum borivilianum* is mainly distributed in Southern Rajasthan, North Gujarat and Western Madhya Pradesh (Maiti and Geetha, 2005). Thirteen species of *Chlorophytum* have been documented in India. All of these species are known to vary in their appearance, and native *Chlorophytum* species, including *borivilianum* are often sold as 'Safed musli' in drug market of the India. Among these, *Chlorophytum borivilianum* produces the highest yield and saponin content (Shariff and Chennaveeraiah, 1972). Other important native species of *Chlorophytum* included are *C. breviscapum*, *C. tuberosum*, *C. laxum*, and *C. arundinaceum*.

Leaf Blight disease:

The cultivation of Safed musli plants in Lucknow, Uttar Pradesh, Pantnagar, Uttarakhand and adjacent areas in northern parts of India was badly influenced by leaf blight ailment in 2003 and 2004. In early stage of the disease development minute, pin-head, circular, reddish-brown-, lesions appeared on the leaves, further from longitudinal streaks development along the midrib veins and at the margins of the infected leaves were observed. All the infected leaves were dried prematurely, and infected plants were unable to produce healthy rhizomes, that are widely used for medicinal purposes. This infection occurs in beginning of the wet season during August and September. Among the different diseases of *Chlorophytum borivilianum*, leaf blight caused by *Colletotrichum capsici* is very severe and is responsible for a 30 per cent yield loss (Sattar et. al., 2006). With this in mind, the present investigation was under-taken to identify the pathogen and study its pathogenicity.

Materials and Methodology:

Collection of Plant material:

Healthy and infected leaves of Safed musli were collected at random in August and September 2007. Leaves were collected from the field in polythene bags according to the method described by Mukadam and Gangawane (1982). The leaves were brought to the laboratory and kept in plastic trays at room temperature until further study.

Isolation and Purification of Pathogen:

Blight-infected leaves were collected from different fields of Safed musli from Marathwada, Parbhani, Barad, Bhogaon, Dahegaon, and Vidarbha regions, Khamkheda, Nimbora, Paturdi, Neknampur, and Bordi areas of Maharashtra in August 2007. Infected leaves were surface sterilized with 0.1 % sodium hypochlorite and cut into small pieces. These pieces were inoculated on potato-dextrose agar (PDA) medium under sterilized conditions in Petri plates according to the method described by Verma and Sharma (2008). The plates were incubated for eight days at 27 °c for the growth and development of fungal pathogens. After three consecutive transfers on fresh PDA media, the isolates were purified according to the method of Goh (1999) using the single spore isolation method. The purified isolates were maintained on fresh Czpeak-Dox Agar medium and used for further studies.

Identification of Pathogen:

The isolated fungal pathogen was identified based on the culture characteristics, morphological characteristics, and fungal reproductive structures. The reproductive structures were observed under a microscope and identified using standard literature (Alexopolous, 1996; Barnett, 1970 and Mukadam, 1997).

Pathogenicity Test:

The pathogenicity test was performed using the simple detached leaf technique as described by Mayee and Mundhe (1978). Well unfolded leaves were surface sterilized by using 70 % absolute alcohol and washed three times with sterile distilled water. Surface sterilized leaves were then placed in Petri-plates on moist filter paper in such a way that the upper side of the leaf was exposed for inoculation. With the help of a brush, a conidial suspension was applied to the leaves and the inoculated leaves were kept at room temperature for 15 days in incubator. Periodical watering was performed to maintain wetness and turgidity during the development of disease symptoms. The disease symptoms were initiated after five days and up to 15 days. The disease symptoms were completely developed by producing typical leaf blight symptoms caused by *Colletotrichum capsici* (Syd.). This pathogen was re-isolated from the inoculated leaves, which, also showed similar symptoms up on inoculation.

Result:

Isolation, Purification and Pathogenicity of *Colletotrichum capsici*:

The blight-infected leaves were then collected. Young and necrotic lesions were transferred on-to Czpeak-Dox-Agar, yielding *Colletotrichum species*. The fungus initially showed, white mycelial growth, which turned reddish-brown owing to profuse sporulation 5-7 days after inoculation. The Acervuli were in large number of globose to saucer-shaped associated with numerous dark brown setae. The conidiophores were hyaline, simple, and short. Aseptate, uninucleate, fusiform, sickle-shaped, and single-celled conidia were recorded. Based on these morphological features, the fungus was identified as *Colletotrichum capsici* (Plate I).



The pathogenicity test showed symptoms identical to those found occurring naturally. The symptoms were initiated five days after inoculation. The lesions were spread length-wise and often coalesced to form long necrotic streaks, after twelve days of inoculation, resulting in typical symptoms of leaf blight. *C. capsici* was re-isolated from the inoculated plant leaves and observed for confirmation. The symptoms and culture characteristics were identical to those of the earlier observations, as the symptoms were observed initially. In early stage of the disease development minute, pin-head, circular, reddish-brown-, lesions appeared on the leaves, further from longitudinal streaks development along the midrib veins and at the margins of the infected leaves.

Conclusion:

The causal organism of Leaf blight disease in *Chlorophytum borivilianum* is *Colletotrichum capsici*.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Disclosure:

No potential conflicts of interests in this regards.

Data Availability:

All relevant data is within the paper and its supporting information is filed.

Ethics:

The study was approved by the RRC Committee of SRTM University, Nanded.

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References:

1. Alexopolous, C. J. (1996). Introduction to Mycology, John Wiley and Sons, Inc. Publication, New York Winchester, Brisbane, Toronto and Singapur.
2. Barnett, H. L. (1970). Illustrated genera of fungi imperfecti. Buress Publication.
3. Goh, T. K. (1999). Single spore isolation using a handmade glass needle. *Fungal diversity*. 2: 47-63.
4. Kothari, S. K. and Singh, K. (2003). Production technique for the cultivation of safed musli (*Chlorophytum borivilianum*). *J. Horti. Sci. Biotech*. 78 (2): 261-264.
5. Maiti, S. and Geetha, K. A. (2005). Characterization, genetic diversity and cultivation of *Chlorophytum borivilianum* - an important medicinal plant of India. *Pl. Genetic Res. Charact. and Utiliz.* 3(2): 264-272.
6. Mayee, C. D. and Mundhe, P. N. (1978). A modified detached leaf technic for laboratory development of ground nut rust. *Ind. Phytopath.* 32: 467.
7. Mukadam, D. S. (1997). The illustrated kingdom of fungi, Aksharganga Prakashan, 24 Pannalal Nagar, Aurangabad.
8. Mukadam, D. S. and Gangawane, L. V. (1982). Methods in experimental plant pathology. Marathwada University publication, Aurangabad.
9. Murlidharan (2004). Indian variant of Viagra. People's Democracy, Weekly organ of the Communist Party of India. 30 (34): 1-2.
10. Sattar, A., Alam, M., Khalia, A., Shukla, R. S. and Khanuja, S. P. S. (2006). First report of leaf blight of *Chlorophytum borivilianum* caused by *Colletotrichum capsici*. *Pl. Path.* 55(2): 301.
11. Shariff, A. and Chennaveeraiah, M. S. (1972). Karyo morphology of four diploid species of *Chlorophytum*. *Nucleus*. 15: 39-45.
12. Verma, Kalp and Sharma, Shyam, Sundar. (2008). Disease survey of Safed musli (*Chlorophytum borivilianum*) in zone IV and V of Rajasthan. *Ind. Phytopath.* 61(2): 277-279.