April 2009 Volume 3 Issue 2

Trade Science Inc.

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 3(2), 2009 [45-48]

Report on blight disease of *Semecarpus kathalekanensis* caused by *Curvularia geniculata*

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Received: 19th Januaey, 2009 ; Accepted: 24th February, 2009

ABSTRACT

The leaves of *Semecarpus kathalekanensis* showing the leaf blight symptoms were collected from the seedling nursery maintained for the reintroduction into the forest. The leaf blight symptom bearing leaves were subjected for standard blotter test for the detection of pathogen. The identified pathogen was confirmed as *Curvularia geniculata* based on the colony and spore characters. The isolated *C.geniculata* spores were subjected to pathogenicity test in the nursery. The pathogenictity result confirms the *C.geniculata* is responsible for blight disease in the nursery of *S.Kathelekanensis*.

KEYWORDS

Semecarpus kathalekanensis;
Blight disease;
Curvularia;
Mycoflora.

INTRODUCTION

One explanation for the extraordinary diversity of tropical forest trees is that density dependent mortality from herbivores or pathogens puts locally rare species at an advantage. Density-dependent mortality of seeds and small seedlings is particularly intense in tropical forests, a major threat for conserving the rare and endangered species. Diseases and insect pests that constitute major biological determinants of forest Productivity, particularly in nurseries[10]. They are responsible for the major losses in nurseries, they cause heavy damage to seedlings and hence reduce both quantity and quality of planting stock the infected seedlings is weakened and unable to withstand the adverse field conditions. A number of plant species in India have been reduced to incredibly small populations due to several reasons. It is feared that without immediate attention, some of the species could be pushed out to extinction. One such plant species, which was discovered, very recently is *Semecarpus kathalekanensis*[3] a critically endangered evergreen tree occurring in fresh water swamps of the central Western Ghats. Ravikanth et al.[4] confirmed the molecular distinction of the *S.kathalekanensis*.

The species is restricted to the unique fresh water swamps of the Central Western Ghats, popularly known as Myristica Swamps. The earlier studies by Vasudeva et al.[5], have shown that, population of this species is highly restricted with low population sizes. A total breeding population of this species is less than one hundred individuals in the natural habitat.

Recovery plan has been under taken very recently

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with the financial assistance by the Department of Science and Technology, New Delhi for its conservation. In this operation seeds were collected and raised at college of forestry, Sirsi, Uttarakannada District. Some of these seedlings of five months old were brought to College of Forestry Ponnampet for introducing in natural fresh water swamps in Kodagu District. Before transplanting, blight disease was observed in about 60 per cent of the seedlings. Since, the species is critically endangered and disease occurrence was more severe, the infested samples sent to Department of Applied Botany, Seed Pathology and Biotechnology, University of Mysore, Mysore for isolation of the causal agent.

The present study was carried out with the following objective, to identify the infected plants in the nursery and to identify the pathogens responsible for the foliar disease.

MATERIALS AND METHODS

Collection of leaves

Leaves were collected from two year old *Semecarpus kathalekanensis* plants, which were maintained in nursery for the purpose of transplanting the seedling into forest, where in symptoms, were observed both in young and matured leaves and those leaves were collected for the experiment purpose (Figures 1- 3).

Identification and pure culturing of pathogen

The leaves showing blight diseases were colleted from forest nursery, cut into small pieces and subjected to the standard blotter test (ISTA, 2005). Five pieces per plate were plated on three layered moistened blotter discs in sterilized perspex plastic plates. Plates were incubated at 25±2^{0}C under alternating cycles of 12/12h of near ultra violet (NUV) light and darkness respectively for seven days. On the eighth day of incubation, the samples were screened under stereo zoom binocular microscope (Leica, Germany). Morphological identification of the pathogens was made as per Mathur and Kongsdal[2]. The single spore of pathogen was cultured on the Potato Dextrose Agar (PDA) media.

Pathogenicity test

The healthy plants of *S.kathelekinesis* that were maintained in the nursery were subjected to pathogenicity test by using the spore suspension of *C.geniculata*. The spore concentration was prepared with 50,000 conidia/ml. The spore concentration was adjusted in haemocytometer by using sterile distilled water. The prepared spore suspension was sprayed on to the leaves of *S.kathelekinesis* (two year old) to reconfirm the symptoms. The symptoms were observed regularly.

Figure 1: The infected and healthy leaves of *Semecarpus kathalekanensis* (Photographs taken from the nursery)

Figure 2: The leaves of *Semecarpus kathalekanensis* showing the varied degree of infection (Photographs taken from the nursery)

Figure 3: Severely infected leaves of *S.kathalekanensis* (Photographs taken from the nursery)

RESULTS

Identification and pure culturing of pathogen

After seven days of incubation, the leaves were screened for the presence of fungi by using stereobinacular. The observation revealed the presence of *Curvularia geniculata* (Tracy and Earle) Boedijin. Curvularia species are fungi belonging to the phylum Ascomycota, which contain most of plant pathogens. The pure culturing of the C. geniculata showed the following characters: Produces dark, straight or flexuous conidiophores, which bear clusters of dark geniculate conidia, arranged acropleurogenously (Figures 4-5). The arrangement of conidia on conidiophores is either in spike or in cluster type. Conidia are smooth, geniculate (knee-like bending), 4 septate, brown to black, the central cell usually darkest and swollen, intermediate cells are brown or dark brown, end cells are sub-hyaline or very pale. Conditions that favor pathogenic activity of Curvularia species are prolonged periods of high heat and drought stress[6].

Pathogenecity test

The Pathogenicity test subjected seedlings of two-year-old S. Kathelekinesis showed the typical symptom of Blight caused by *C.geniculata* (Figure 6). This test confirms that, the *C.geniculata* is the casual organism for blight disease in *S.Kathelekinensis*.

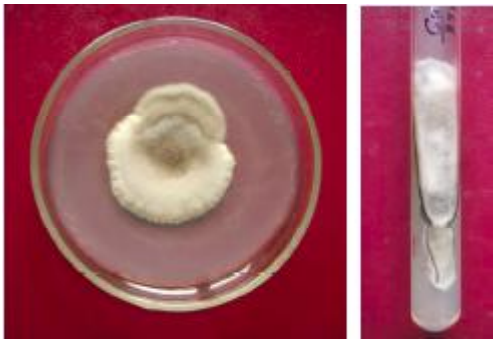

Figure 4: A Plate and tube showing *Curvularia geniculata* a pathogen on PDA media

Figure 5: Colonies (on leaf), Conidial mass and conidium of *C.geniculata* isolated from the infected leaves of *Semicarpus kathelekinensis*

Figure 6: Plants of *Semecarpus kathalekanensis* showing the symptoms in the nursery after spraying

DISCUSSION

In Western Ghats nurseries, large seedling numbers and overcrowding disease occurrence was more prevalent in all the seasons (rainy, winter and summer), which creates the congenial condition to transmission and establishment of the fungal pathogen[8].

Blight disease of *S.kathalekanensis* caused by *Curvularia geniculata* was confirmed by incubating and microbial observation of the leaf; the leaf samples show the various degree of disease incidence. Because Blighting was Severe under high heat and drought stress and involved large patches of extensive dieback along with chlorosis of the leaves. Isolation from diseased tissue revealed spores of Curvularia species that were consistently associated with the disease. The leaf samples show the various degree of disease incidence. The leaf looks like burned on that mycelium of the fungi is with conidia is observed. Moisture and cold condition also favors the sporulation and spread of the disease. The conidia may spread through the wind, water or contact of the leaf.

The variation in the appearance of the symptoms of blight disease was noticed in our experiment. Mohanan et al.[7] showed that incidence of leaf blight is more severe than other plant pathogens. They also reported that, the spread of the foliage infection caused by the most pathogens was low in the nurseries in comparison with blight disease.

In our experiment, incubation of the petriplates containing *C.geniculata* showed maximum growth at 25±2^{0}C. Similar results were observed in Zoysiagrass

by the Roberts and Tredway[9]. They observed that, the foliar blight disease was most active at the temperature of 21^{0}C to 30^{0}C, leaves show varies degrees of infection, initially small, brown spots, followed by irregular blighting patches of different diameter, covering whole leaf of plant. The pathogencity test is done by spraying conidial suspension on the 2-year-old seedlings. Disease symptoms were seen on the leaves after 20-25 days, and control leaves remained symptom less, the same type was observed by Wei et. al.[1] in case of Pestalotiopsis versicolor causing leaf-tip blight on Acacia melanoxylon, where the conidial suspension was sprayed on the 1-year-old leaves and symptoms observed after 13-17 days.

Based on the results obtained in our study confirmed that, *Curvularia geniculata* is the causal organism for the leaf blight of *Semecarpus kathalekanensis*.

REFERENCES

[1] ISTA; International rules for seed testing, Bassersdorf, CH-Switzerland, **(2005)**.

[2] S.B.Mathur, O.Kongsdal; Common laboratory seed health testing methods for detecting fung, International Seed Testing Association, Bassersdorf, CH-Switzerland **(2003)**.

[3] Dasappa, Saminath; A new species of Semecarpus (Anacardiaceae) from the Myristica Swamps of Western Ghats of North Canara, Karnataka, India. Indian Forester. **126**, 78-82 **(2000)**.

[4] G. Ravikanth, R.Vasudeva, R.Umashankar, K.N. Ganeshaiah; Molecular analysis of Semecarpus kathlekanensis (Anacardiaceae) a newly described species from the Myristica swamps of Western Ghats. India, Indian Forester, **130**, 101-104 **(2004)**.

[5] R.Vasudeva, H.B.Raghu, Dasappa, R.Umashankar, K.N.Ganeshaiah, R.Umashankar, K.N.Kaneshaiah, K.S.Bawa; 'Forest genetic resources: status, threats and conservation strategies', Oxford IBH Publishing Company Pvt., Ltd., 211-223 **(2001)**.

[6] J.A.Roberts, L.P.Tredway; Plant Disease, **92(1)**, 173 **(2008)**.

[7] C.Mohanan, N.Ratheesh, Laya P.Nair, K.C.Rajesh Kumar; Working papers of the Finnish Forest Research Institute 11 http://www.metla.fi/julkaisut/workingpapers/2005/mwp011.hmt, **(2005)**.

[8] M.B.Shivanna; Working papers of the Finnish Forest Research Institute 11 http://www.metla.fi/julkaisut/workingpapers/2005/mwp011.hmt, **(2005)**.

[9] J.A.Roberts, L.P.Tredway; A Study of Various Curvularia Isolates Involving Molecular Characterization and Effects on Multiple Cultivars of Zoysiagrass, http://www.explorationsjournal.com/uploads/2007/JosephRoberts, **(2007)**.

[10] T.Bell; Ecology Letters, **9**, 569-574 **(2006)**.

[11] J.G.Wei, X.H.Pan, Q.Q.Li, W.M.Qin, J.N.Chen, Y.Xiong; The British Society of Plant Pathology, **56 (6)**, 348-348 **(2007)**.