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CROSS INFECTIVITY OF *PHYTOPHTHORA* SP. CAUSING LEAF FALL DISEASE OF NUTMEG (*Myristica fragrans* Houtt.)

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Abstract: Nutmeg trees are proned to various fungal diseases. Recently, a leaf fall disease caused by *Phytophthora* sp. has become a serious problem in Kerala, during South - West monsoon period resulting in poor crop stand and yield. Cross inoculation study was carried out to find out the infectivity of other *Phytophthora* spp. *viz. P. palmivora* of coconut and cocoa, *P. meadii* of arecanut rubber, cardamom and vanilla, *P. capsici* of black pepper, *P. colocasiae* of *Colocasia* and *P. citrophthora* of *Citrus* on nutmeg. The study revealed that, nutmeg is a host of *P. meadii* of vanilla and *P. citrophthora* of *Citrus* and non host of *P. palmivora*, *P. capsici, P. meadii* of arecanut, rubber and cardamom and *P. colocasiae.*

Keywords: *Cross infectivity, leaf fall disease, nutmeg, Phytophthora.*

Introduction

Nutmeg, is one of the highly prized spices known since antiquity for its aromatic and curative properties and plays a significant role in India's agricultural export. Nutmeg trees are prone to various fungal diseases. Recently, a leaf fall disease caused by *Phytophthora* sp. has become a serious problem in Kerala during South West monsoon period. The first authentic report of leaf fall of nutmeg due to *Phytophthora* sp. was in 2012 from Keala (Mathew and Beena, 2012). A severe outbreak of this disease has been reported from Ernakulam, Thrissur, Idukki and Kottayam districts in 2013 (Mathew and Miniraj, 2013). The causal organism, *Phytophthora* is a serious pathogen causing diseases in several economically important spices and plantation crops in Kerala *viz.* black pepper, cardamom, vanilla, rubber, cocoa, coconut and arecanut leading to heavy yield loss or death of the plants. The present study was taken up to find out whether nutmeg is a host of other *Phytophthora* spp. such as, *P. palmivora* of coconut and cocoa, *P. meadii* of arecanut rubber, cardamom and vanilla, *P. capsici* of black pepper, *P. colocasiae* of *Colocasia* and *P. citrophthora* of *Citrus*.

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Materials and methods

Various *Phytophthora* spp. *viz. P. palmivora* of coconut and cocoa, *P. meadii* of arecanut, rubber, cardamom and vanilla and *P.capsici* of black pepper, *P. colocasiae* of *Colocasia* and *P. citrophthora* of *Citrus*, were inoculated on the leaves of nutmeg seedlings to find out their infectivity on this host. Inoculated plants were kept under humid condition for a period of one month for symptom development.

Result and discussion

Among the different species of *Phytophthora* tested, only *P. meadii* of vanilla and *P. citrophthora* of *Citrus* produced characteristic symptoms on nutmeg leaves (Fig. 1). Symptom appeared as dark brown water soaked lesion on the midrib of the leaves at two days after inoculation, which enlarged and spread along the lateral veins to leaf lamina resulted in blighting which is the typical symptoms that observed with the nutmeg leaf fall pathogen, indicating the infectivity of *P. meadii* of vanilla and *P. citrophthora* of *Citrus* on nutmeg. Except *P. meadii* of rubber, other *Phytophthora* sp. *viz. P. meadii* of arecanut and cardamom, *P. palmivora* of coconut and cocoa, *P. capsici* of black pepper and *P. colocasiae* of *Colocasia* developed necrotic spots ranged from 0.1 to 1 cm size at 4-5 DAI showing hypersensitive reaction and *P. meadii* of rubber did not show any symptom (Table 1). Thus the study indicated that, nutmeg is a host of *P. meadii* of vanilla and *P. citrophthora* of *Citrus* and non hosts of *P. palmivora*, *P. capsici, P. colocasiae* and *P. meadii* of arecanut, rubber and cardamom. Mammootty *et al*. (1988) observed positive reaction on cross inoculation with isolates of *Phytophthora* from six different hosts like cocoa, black pepper, arecanut, coconut, rubber and cardamom and the symptoms produced on the respective hosts by different isolates were more or less identical. Prem (1995) observed infection of *P. palmivora* of cocoa on coconut and rubber and not in arecanut.

Fig 1. Symptoms on cross infectivity of various *Phytophthora* spp. on nutmeg

P. palmivora of coconut *P. palmivora* of cocoa *P. capsici* of black pepper

P. meadii of rubber

P. meadii of arecanut

P. meadii of vanilla

P. colocasiae of *Colocasia*

P. citrophthora of citrus

Table 1. Cross infectivity of various *Phytophthora* spp. on nutmeg

Pathogen	Host	Symptoms on nutmeg leaves	Days to initial infection	Lesion size (cm)
P. palmivora	Coconut	Black necrotic spot on inoculated area – Hypersensitive reaction	5	0.1-1
P. palmivora	Cocoa	Small dark brown necrotic spot on inoculated area – Hypersensitive reaction	4	0.1-0.5
P. meadii	Arecanut	Small black necrotic spot with yellow halo – Hypersensitive reaction	4	0.5-1
P. meadii	Rubber	No symptom	0	0
P. meadii	Cardamom	Small dark brown necrotic spot on inoculated area – Hypersensitive reaction	4	0.1-0.5
P. meadii	Vanilla	Dark brown water soaked lesion on the midrib of the leaves, spread to leaf lamina resulted in blighting – characteristic symptom of *Phytophthora* on nutmeg	2	Full leaf

P. capsici	Black pepper	Small brown necrotic spot with yellow halo – Hyper sensitive reaction	5	0.5-1
P. colocasiae	*Colocasia*	Small dark brown necrotic spot on inoculated area – Hyper sensitive reaction	5	0.1-0.5
P. citrophthora	*Citrus*	Dark brown water soaked lesion on the midrib of the leaves, spread to leaf lamina resulted in blighting - characteristic symptom of *Phytophthora* on nutmeg	2	Full leaf
Phytophthora sp. (Control)	Nutmeg	Dark brown water soaked lesion on the midrib of the leaves, spread to leaf lamina resulted in blighting	1	Full leaf

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