

***Phytophthora* rot - a new disease of vanilla (*Vanilla planifolia* Andrews) in India**

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Abstract

A severe rot disease affecting beans, leaves and stems of *Vanilla planifolia* was observed during the South West monsoon season at Koothattukulam and surrounding areas (Ernakulam District, Kerala, India). The causal organism was identified as *Phytophthora meadii* and its pathogenicity was proved. This is the first report of *Phytophthora* disease of vanilla in India.

Key words : bean rot, *Phytophthora meadii*, vanilla, *Vanilla planifolia*.

Vanilla, a tropical herbaceous perennial orchid, is cultivated for its aromatic spice in many parts of Kerala, India. During the South West monsoon season in 1999, a type of bean rot disease in vanilla was observed in Koothattukulam and surrounding localities in Ernakulam District of Kerala, India, where vanilla is cultivated on a large scale. Subsequently, a survey was carried out in vanilla growing villages around Koothattukulam and Moovattupuzha areas for studying the occurrence and spread of the disease. Severe incidence and spread of the disease was noticed in two plantations. Seven plantations showed mild infection and the remaining areas were free of the disease.

Symptoms and damage

The symptoms of the disease mainly appear as rotting of beans (Fig. 1). Rotting usually begins from the bean tips and extends to the stalk. Rotting starts in individual beans or among all beans in a bunch. In some cases rotting starts from the pedicel region and progresses towards the tip. The infected portions of the beans are water-soaked, soft and dark brown. In moist weather, the affected beans are shed from the vines but in dry weather the rotten beans are shriveled and many remain attached to the bunch. Small dull white coloured pinhead like pustules can be seen on the surface of the infected beans. The fully infected bunches fall off in 10-15 days emitting a

foul smell. In advanced stages, the rotting extends to the leaves and stems also. Leaves and stems may be fully rotten or partially affected.

The plantations in severely infected areas were poorly maintained. The land was flat with poor drainage channels. The vines were over crowded under a thick shade which prevented the free flow of air and sunlight into the garden. There was continuous rainfall for nearly 2 months during May-July in these areas.

Laboratory studies

The scrapings from pinhead like pustules on infected beans showed abundant clusters of sporangia of *Phytophthora* under the microscope. The sporangia were highly caducous, papillate and were characterized by residual globules with a pedicel of intermediate length. The infected tissues when floated in sterile distilled water also produced mycelia and abundant sporangia within 24 h of incubation. Plating of the surface sterilized infected portions of beans, stems and leaves also yielded pure cultures of *Phytophthora* in potato dextrose agar (PDA) as well as in carrot agar (CA) media.

Pathogenicity studies

Beans, stems and leaves from healthy vanilla were inoculated with *Phytophthora* culture obtained in CA medium as well as with the sporangial

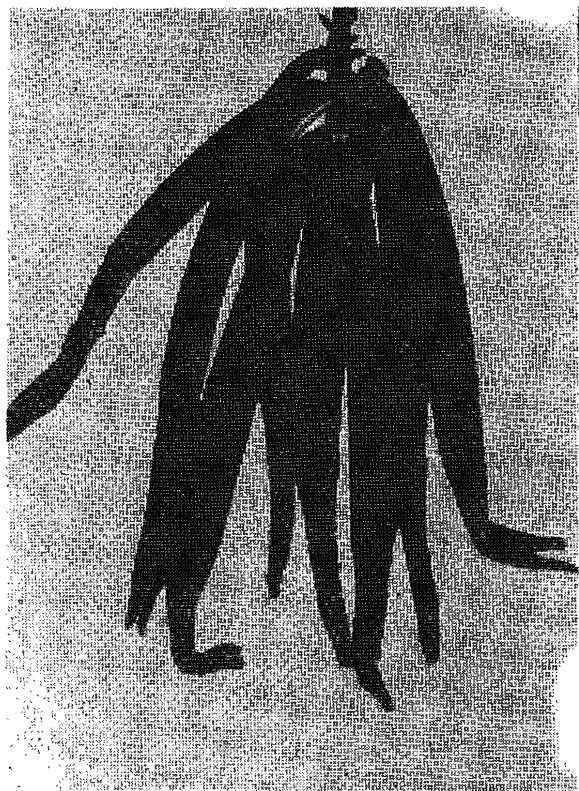


Fig. 1. Vanilla beans infected with *Phytophthora meadii*

clusters obtained from naturally infected beans. Discs (5 mm) of *Phytophthora* pure culture obtained in CA were cut from the periphery of the colony and inoculated on beans, leaves and stems under laboratory conditions of 20–22°C with a relative humidity of 80–90%. Similarly, the pin-head like sporangial clusters obtained from infected beans were also inoculated to beans, leaves and stems of healthy vanilla. The inoculated portions were covered with moist cotton and kept in a polythene bag under laboratory conditions of 20–22°C. Infection started on the inoculated beans, stems and leaves within 5–8 days in the form of rotting. The symptoms formed in the inoculated plant parts were typical of the disease, which was observed in the field. *Phytophthora* was re-isolated from artificially infected plant parts and was brought into culture in CA medium.

Culture characteristics and identification

In CA medium, the colonies were white with uniform cotton wool like aerial mycelium without lobes or striations. Hyphae were almost uniform in size measuring 2.6 µm. Sporangia were ovoid to ellipsoidal, highly caducous, papillate and with

intermediate pedicel length (>5 µm). Swelling was observed at the point of origin of sporangiophore as a typical character. Moreover, the papillate sporangia showed residual globules in the culture. Sporangia measured 39.62 µm × 20.00 µm having a l/b ratio of 1.98. The pedicel length ranged from 5 to 10 µm. Oogonia were not formed in single culture but these were produced within 20–25 days on pairing with cardamom isolate in CA in dark at 20–22°C. On pairing, the sex organs were formed on the distal end of the test isolate. Oogonia were amphigynous, small, double walled and measured 30 µm in diameter. Antheridia were small with a mean length of 10 µm. No chlamydospores were observed in single culture, but scattered intercalary chlamydospores were observed in paired cultures. The pathogen was identified as *Phytophthora meadii* Mc Rae.

Disease management

Spraying of 1% Bordeaux mixture twice and drenching with 0.25% copper oxychloride along with phytosanitation brought the disease under control and further incidence or spread was not observed.

Cornel (1953) reported a similar type of fruit rot disease of vanilla caused by *P. parasitica* Dast. Blight or mildew attack in developing fruits of vanilla caused by *P. jatrophae* Jens. was reported by Bouriquet (1954) from Malagasy Republic and is observed in all vanilla growing regions of the world including Tahiti, Moorea, Tahaa, Raiatea, Huahine in French Polynesia and Puerto Rico.

Three species of *Phytophthora* namely, *P. palmivora*, *P. parasitica* (both A1 & A2 mating types) and *P. capsici* (*P. palmivora* MF 4) were isolated from roots of vanilla by Tsao & Mu (1987) and they concluded that *Phytophthora* spp. are important causal agents of vanilla root rot in French Polynesia.

Incidence of *Phytophthora* infection on shoot tips of vanilla and rarely on stem portions was noticed earlier from some of the vanilla gardens of Idukki and Koothattukulam areas. In cases where *Phytophthora* is involved in shoot tip rot, the spread of the infection usually stops with the damage of the first node. But in the present case, the *Phytophthora* induced rot appears in a severe form and continues to spread to nearby plants. Therefore, timely plant protection measures are to be taken up to restrict the spread of the pathogen.

The incidence of *Phytophthora* as major rot pathogen in vanilla is the first report from India.

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