Leaf Rot of Cashew Caused by *Cylindrocladium quinquiseptatum*, Boedijin and Reitsma

Y. R. SARMA, K. K. N. NAMBIAR* and R. N. BRAHMA*
Central Plantation Crops Research Institute
Regional Station, Calicut–673 012
Kerala, India

Abstract

Leaf rot of cashew caused by *C. quinquiseptatum* was noticed both in plains as well as in hilly tracts of Cannanore and Calicut districts of Kerala during August-October period. Among the 19 hosts belonging to 8 families, 13 hosts belonging to 7 families were found to be infective. The isolates of *C. quinquiseptatum* from cashew, clove and eucalyptus are cross inoculable. This fungus is recorded on cashew for the first time in India.

Introduction

Cashew (*Anacardium occidentale* L.) one of the most important commercial tree crops grown both on the plains as well as on the hilly tracts in Kerala. The disease problems of cashew in India were recently reviewed (Nambiar, 1978). Leaf spot disease caused by *Phyllosticta anacardii* (Early and Punithalingam, 1972), anthracnose disease caused by *Colletotrichum gleosporoides* Penz., (Sujan Singh et al., 1967) and *Phytophthora nicotianae* var. *nicotianae* (Thankamma, 1974) are some of the important foliar diseases recorded on cashew. The leaf rot disease of cashew in the hilly tract of Anamanjalamkaya near Kasaragod was noticed. The disease was also noticed on the plains both in Cannanore and Calicut districts of Kerala.

Materials and Methods

Clean infected leaves collected from the field were washed thoroughly under running tap water, later with sterile water and incubated in humid chambers to induce sporulation. Sporulating masses were touched with the tip of sterile needle and streaked on plane agar. Later the germinating spores were picked up with a sterile loop and cultured on potato sucrose agar (PSA) and oats agar (OA) media. Spore germination studies were conducted with distilled water and cashew leaf leachate as the germinating medium. The slides with spore drops were incubated in humid petri plates at 26–28 °C.

*Central Plantation Crops Research Institute, Kasaragod-670 124, Kerala, India.

Pathogenicity tests were conducted under field conditions by applying spore suspensions on the lower surface of the leaves of test plants and the branches were covered with polythene bags to ensure high humidity. In another set, spore suspension was applied on upper surface also. This procedure was also followed for host range studies. Cross inoculation studies with *C. quinquiseptatum* isolates from cashew, clove and eucalyptus were conducted by applying spore suspension on the lower side of the leaves of the test hosts and kept in humid petriplates incubated at 26–28 °C.

Results and Discussion

The disease started appearing during August-September period and was seen upto October when temperatures were 25–28 °C. Initially the symptoms appeared as minute light olive coloured necrotic spots on the lower surface of the leaves. Later well discernible brownish lesions enlarged rapidly and adjacent lesions coalesced forming necrotic patches. Often the lesions on the margin coalesced exhibiting symptoms of marginal necrosis, which progressed inwards (Fig. 1). Tender twigs also showed dark lesions. Infected leaves dropped off causing moderate to severe defoliation. The examination of fallen leaves showed cream to light greyish coloured sporulating masses of the fungus on the lower side. The spread of the disease was rapid when intermittent showers occurred probably due to rain splashing aiding in spore dispersal.

The fungus grew well and sporulated abundantly on potato sucrose agar medium. A mature colony of 6–8 days showed distinct narrow light coloured zones alternating with brownish coloured zones. Secretion of a brown pigment was noticed both on solid and liquid media. Sclerotia with dark brown thick walled cells were noticed in older cultures. Conidiophores appeared on lower surface of the leaves either alone or in groups. The conidiophores were straight, septate, measuring 132–244 μ in height and 4.7 to 7.14 μ in width. The primary branches measure 13.0–23.8 x 2.3 – 4.7 μ and secondary branches 9.5–19.0 x 2.3 – 4.7 μ. Tertiary branches were not noticed. Each bracnh had 2–4 phialides measuring 9.5–16.6 x 2.3–4.7 μ giving off conidia. The conidiphore axis ends in a sterile thread measuring 120 – 300 μ with a terminal club shaped structure measuring 4.0–5.7 μ in width. The conidia appeared in masses glued together measuring 52.1–110.8 x 4.7–7.2 μ. The mature spores were consistently five septate although 3–4 septate immature conidia were also noticed.

Spore germination was noticed both from terminal and inter-calary cells (Fig. 2). Spore germination was noticed within hours in cashew leaf leachate medium as against 7–8 hr in distilled water. Germination was 86 per cent in the former and 39 per cent in the latter by 12 hrs. However, it

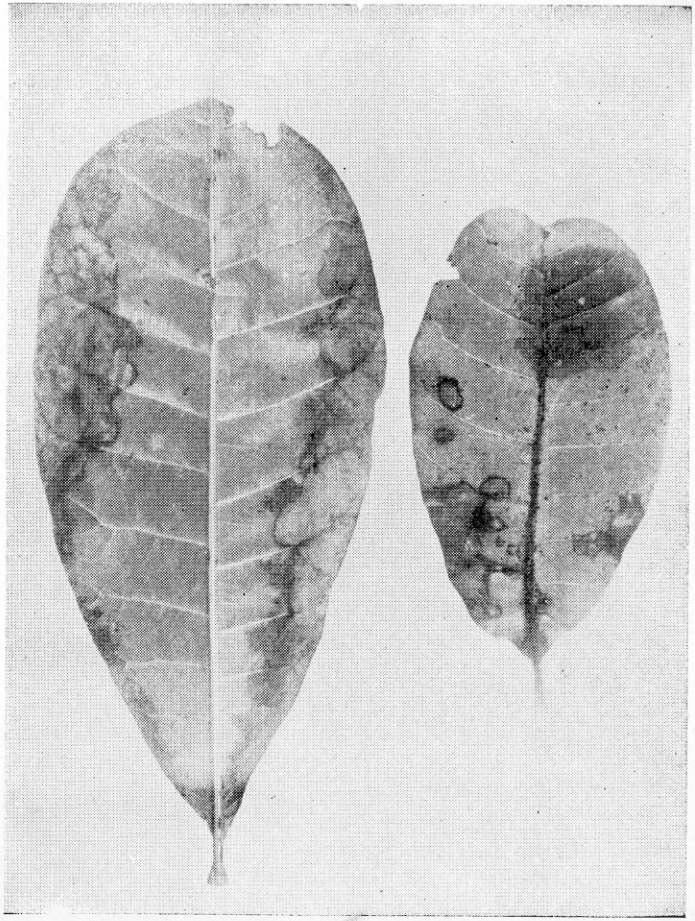

Fig. 1. *Cylindrocladium* infected Cashew leaves.

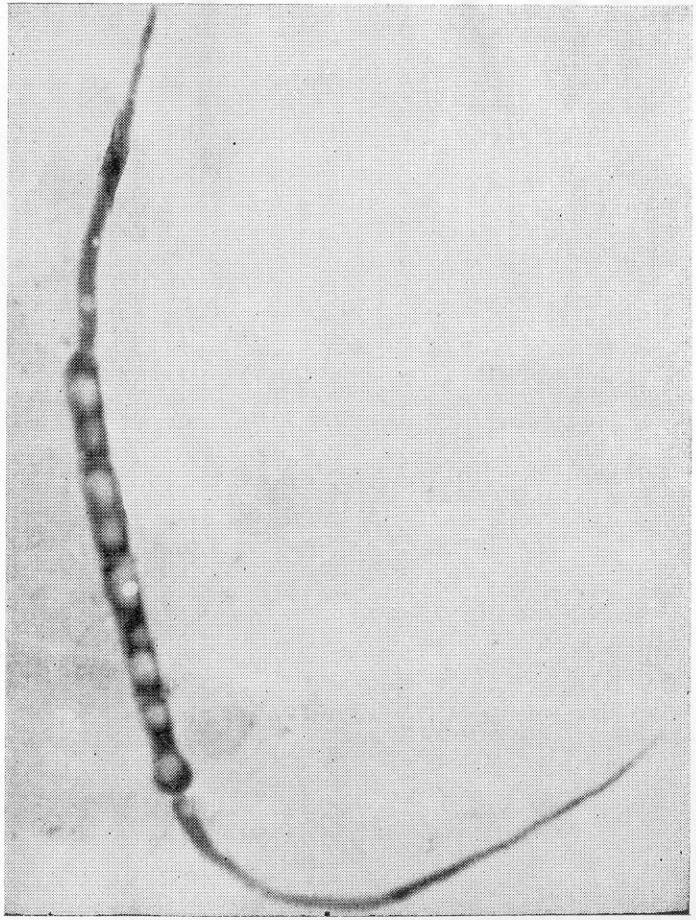

Fig. 2. *Cylindrocladium* — polar germination of spore.

increased to 97 per cent and 93 per cent respectively by 24 hrs. Early germination in the leaf leachate indicates the presence of a water soluble substance on the host surface stimulatory to germination and might play an important role in host parasite interactions.

TABLE 1. **Host Range of** *Cylindrocladium quinquiseptatum* **Development.**

S.No.	Host	Symptom	
		Leaf rot	*Leaf spot*
1.	*Anacardium occidentale*	+	+
2.	*Mangifera indica*	+	+
3.	*Theobroma cacao*	—	+
4.	*Eucalyptus grandis*	+	+
5.	*Eugenia caryophyllus*	+	+
6.	*Dolichos lablab*	—	+
7.	*Desmodium utilissimum*	—	+
8.	*Vigna unguiculata*	—	—
9.	*Stizolobium niveum*	—	—
10.	*Manihot utilissima*	—	+
11.	*Ipomea batata*	—	—
12.	*Piper nigrum*	—	+
13.	*Piper longum*	—	+
14.	*Zingiber officinale*	—	+
15.	*Curcuma longa*	—	+
16.	*Elettaria cardamomum*	—	+
17.	*Aframomum melegueta*	—	—
18.	*Brachiaria ruzziensis*	—	—
19.	*Tripsacum laxum*	—	—

+ Pathogenicity positive; — Pathogenicity negative

In the case of cashew and mango the leaves showed initial necrotic spots by 48 hrs. Younger leaves were more susceptible than mature ones. Inoculation on the lower surface induced lesions which enlarged subsequently. However, when the spore suspension was applied on the upper surface of the leaf, the lesions were small and necrotic and did not enlarge. Among the 19 hosts tested belonging to 8 families, 13 hosts belong to 7 families were found to be susceptible (Table 1). Out of these 13 hosts, mango, clove and eucalyptus exhibited leaf rot and leaf spot symptoms, whereas the rest of the hosts showed only necrotic spots of 1–2 mm size which did not enlarge further. Cross inoculation tests on excised leaves with isolates from cashew, clove and eucalyptus were positive. The enlargement of lesions was rapid on the leaves of cashew, clove and eucalyptus when inoculated with isolates from cashew and clove. However, the enlargement of lesions was slow on these hosts when the isolates from eucalyputs were used. From the perusal of the literature it was found that there was a close morphological similarity among these isolates. This finding is of considerable significance from the epidemiological point of view.

Boedijin and Reitsma (1950) reported *C. quinquiseptstum* on leaves of clove seedlings at Tzimas near Bogor. In India this fungus has been recorded on *Eucalyptus grandis* and 12 other species of eucalyptus (Seghal, Nair and Jagadeesh, 1975) and also on clove (Sarma and Nambiar, 1978). *Calonectria quinquiseptata*, the perfect stage of the pathogen has been reported on eucalyptus in Brazil (Figueiredo and Namekata, 1967). However, the authors did not notice the perfect state either on cashew or clove. This is the first record of *C. quinquiseptatum* on cashew in India.

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