

OCCURRENCE OF LEAF SPOT DISEASE IN *HEVEA BRASILIENSIS* (RUBBER TREE)ARIHARAN VN^{1*}, MEENA DEVI VN², NAGENDRA PRASAD P¹, PARAMESWARAN NK¹

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ABSTRACT

Objective: To report the Occurrences of new fungal disease in the leaf of *Hevea brasiliensis* in the rubber estates of Kanyakumari Districts.

Methods: The leaves samples were collected, washed with distilled water. The infected portions were cut into pieces with sterilized gel puncher. The leaf pieces were placed on the standard nutrient agar plate and incubated at 37°C for 24 hrs. Many small colonies appeared on the margin of the leaves. These colonies were isolated and inoculated into the nutrient broth for subculture. The subcultures were taken and streaked into a potato dextrose agar plates and incubated at 37°C for 72 hrs. The fungi from the pure colony were taken and stained with safranin solution which was subjected for microscopic observation.

Results: Based on the observation of the morphological characters, two organisms were identified in the agar culture plate. Based on the staining, conidiophore, conidiospore, and the arrangement of the spore, the organisms are identified as *Aspergillus niger*, *Penicillium chrysogenum*.

Conclusion: Leaf spot disease is an airborne disease, there is a possibility of becoming an epidemic disease in due course. Further work is needed to find out antimicrobial agent which inhibit the growth of the organisms of leaf spot disease occurs in this crop. Preventive measures can be taken to control the disease at the earliest possible to avoid the economic loss and enhance the environmental condition

Keywords: Rubber tree, Leaf spot disease, Secondary infection, *Aspergillus niger*, *Penicillium chrysogenum*.

INTRODUCTION

The main source for high-quality natural rubber is from *Hevea brasiliensis*. It is a perennial tree that can have 50 years of commercial life. It has a distinctive juvenile stage in which the growth and developmental pattern is quite distinct from that of adult trees [1]. Since the beginning of the last century, there have been numerous attempts to cultivate this tree in plantations throughout the tropics. Nowadays, the plantation of the rubber tree is around all over countries in the world [2]. Many species of fungi have been known to attack rubber trees. The most prevalent ones are the species of *Botryodiloida elactica* and *Botryodiloida theobromae*, *Colletotrichum heveae* (leaf spot), *Fomes lamarckii* (brown root rot), *Gloeosporium heveae* (die-back), *Oidium heveae* (powdery mildew), *Pellicularia salmonicolor* (pink diseases), *Phytophthora palmifera* (causing fruit rot, leaf - fall, black and die thread, and die-back), *Polystichus occidentalis* and *Polystichus personii* (white spongy rot), *Sphaerella heveae* (rim bright), *Sphaerostilbe repens* (red rot), and *Ustilina maxima* (charcoal rot). It is also attacked by Bacteria's [3].

The genus *Hevea* belongs to the family Euphorbiaceae [4]. *H. brasiliensis* is a tall tree native to the Amazon basin that may reach heights of more than 20 m within a forest, with a trunk of up to more than 50 cm in diameter [5]. This is commonly known as rubber in Tamil, English, and Malayalam [6]. The rubber tree begins to produce fruit at 4 years of age. Tapping begins when trees are 5-8 years old, depending on the area, and increases every year until a maximum at about 20 years, then yield sustained for 40-50 years or more. Rubber is produced year round, with great fluctuations month to month. Rubber is produced year round, with great fluctuations month to month [7]. The previous study was about the bacterial blight caused by *Xanthomonas campestris*. At the beginning stage of the infection, yellow leaf spot appeared in the middle of the leaves. The leaf brown spot disease is a secondary infection seen in and around the bacterial blight infected area. The brown leaf spot disease is produced by the fungi *Aspergillus niger* and *Penicillium*

chrysogenum. *A. niger* is asexual saprophytic fungus that normally grows on dead leaves [3]. *P. chrysogenum* is a species of fungus belongs to the family Trichocomaceae, which also grows on the necrotic spots of the leaves [5]. It is usually reproduced by forming dry chains of spores from brush shaped conidiospores. The conidia are blue to blue-green, and the mold sometimes exudes a yellow pigment [8,9]. In this study, the identification, characterization of the fungi which cause the brown leaf spot on *H. brasiliensis* was enumerated.

METHODS

The leaves samples were collected from the affected trees of plantations at the Noorul Islam University campus Kumaracoil, Kanyakumari District in Tamilnadu. The leaves were washed with distilled water. From the surfaced sterilized leaves, the infected portions were cut into a small round piece with the help of well-sterilized gel puncher. The leaf pieces were placed on the standard nutrient agar plate. It was incubated at 37°C for 24 hrs. After incubation, many small colonies appeared on the margin of the cut pieces of the leaves. These colonies were again isolated and inoculated into the nutrient broth for subculture. The subcultures were taken and streaked into a potato dextrose agar plates for pure culture and incubated at 37°C for 72 hrs. Then, the fungi from the pure colony were taken and stained with safranin solution which was subjected for microscopic observation.

RESULT AND DISCUSSION

The normal leaves and the infected leaves were shown in the Figs. 1 and 2. The infected leaf portions were cut into small pieces and put on the agar plate and incubated for 48 hrs. The fungal mat appeared on the margins of the segmented leaf (Plate 1). The subculture was done in potato dextrose agar medium to identify the fungal organism. The microscopic slides were prepared by the standard stain safranin and observed under the compound microscope.



Fig. 1: Normal leaf



Fig. 2: Infected leaves

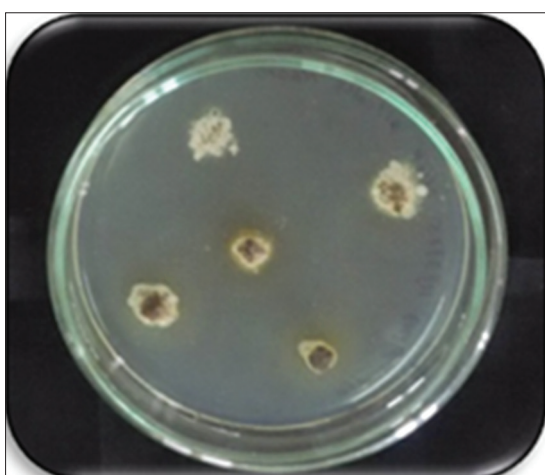
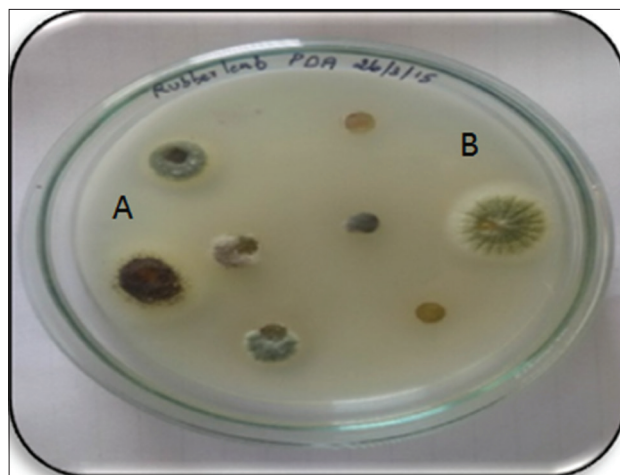
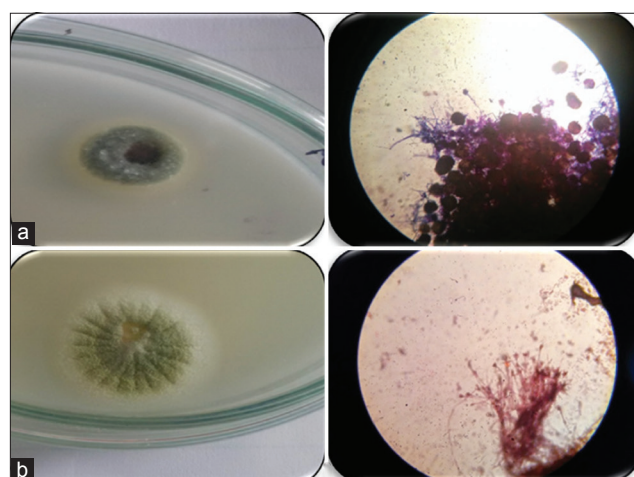


Plate 1: Culture plate showing fungal mat isolated and cultured from the infected leaf

Based on the observation of the morphological characters, two organisms were identified in the agar culture plate. Based on the staining, conidiophore, conidiospore, and the arrangement of the spore, the organisms are identified as: (A) *A. niger*, (B) *P. chrysogenum* (Plate 2). The fungus, which produces a dark-gray colony with many numbers of sporangia are identified as *A. niger* and the greenish white colony as

Plate 2: Culture plate showing both *Aspergillus* and *Penicillium* fungal mat, (a) *Aspergillus niger*, (b) *Penicillium chrysogenum*Plate 3: Culture plate showing *Aspergillus* and *Penicillium* fungal mat, (a) *Aspergillus niger*, (b) *Penicillium chrysogenum*

P. chrysogenum (Plate 3). The primary infection [9] on the leaves of rubber by *Xanthomonas comprestis* caused bacterial blight disease and in that zone by the secondary infection of the fungi *A. niger* and *P. chrysogenum* produce leaf spot diseases as a necrotic spot. In earlier reports revealed that a number of diseases were caused by different groups of fungi. As far as the authors aware that this is the first report about the occurrence of this fungal disease in the Southern district of Kerala and Tamil Nadu.

CONCLUSION

The leaf spot disease is caused by the secondary infection of the common saprophytic fungi of *A. niger* and *P. chrysogenum*. In an infected leaf, nearly 50% of the surface area is affected. It automatically reduces the photosynthetic area of the plant. As the diseases advance the leaves wither off intern, it affects the physiological activity of the plant. The yield potential of the rubber trees will be affected because of the bacterial and fungal diseases. As this leaf spot disease is an airborne disease, there is a possibility of becoming an epidemic disease in due course. Further work is needed to find out antimicrobial agent which inhibit the growth of the organisms of leaf spot disease occurs in this crop. So, preventive measures can be taken to control the disease at the earliest possible to avoid the economic loss and enhance the environmental condition.

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