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Studies on the occurrence and severity of leaf blight of jackfruit (*Artocarpus heterophyllus* Lam.) caused by *Botryodiplodia theobromae* Pat.

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Leaf blight of jackfruit (*Artocarpus heterophyllus* Lam.) caused by *Botryodiplodia theobromae* Pat. was recorded from Chittagong University campus in 2001. Pathogenicity test indicated that the fungus was capable of causing infection on detached healthy leaves and blight developed was similar to those observed on the leaves affected under natural conditions. Symptoms started to develop from tip of the leaf blade both on the dorsal and ventral side. At early stage of infection, infected portion turned yellow and finally brown in colour surrounded by yellow margin. Small dot like black pycnidia were found scattered on the dry rotted areas of affected leaves. Leaves of all ages were found to be susceptible to the pathogen but in general young leaves were found more susceptible than either middle or mature ones. The severity of the disease was measured in different locations of Chittagong University Campus. The highest average infected area per leaf (8.75%) and average disease index (18.69%) was recorded from South Residential Area while the highest number of infected leaf (48%) was recorded from Botanical Garden.

Key words : Jackfruit, Leaf blight, *Botryodiplodia theobromae*

INTRODUCTION

Jackfruit tree (*Artocarpus heterophyllus* Lam.), locally known as *Kanthal*, is an indigenous fruit and timber yielding tree species of Bangladesh. It is also grown in sub-tropical regions of India, Indonesia, Malaysia, Srilanka, Myanmar, Brazil etc. The tree yields quality timber which is used mainly for furniture making. The green fruits and matured seeds are used as vegetables and the ripen pericarp is taken as delicious food. It is considered as a suitable plant for social forestry, community forestry and agroforestry practices due to its manifold uses.

Leaf spot diseases caused by *Chaetopyrena hesperidum* (Srivastava, 1974), *Cercospora mehran* (Rao and Subhendar, 1979), *Botryodiplodia theobromae* (Rao and Deshmukh, 1986) are reported from different parts of the world. Seed rot caused by *B. theobromae* (Manoherchary *et al.*, 1979) die-back caused by *B. theobromae* (Mohiuddin, 1980) are also reported. The occurrence and severity of leaf spot disease of Jackfruit caused by *Colletotrichum gloeosporioides* Penz. in Bangladesh was studied by Basak *et al.* (1990). Batista and Vital (1954) isolated *Marassonina artocarpi* forming light brown marginal lesions on jackfruit leaves. As far as it is known, no work has been done on the leaf blight of jackfruit in Bangladesh. In 2001, a severe leaf blight disease of jackfruit has been reported to occur in different locations of Chittagong University campus and the present research programme has been undertaken to study the occurrence and the severity of leaf blight of jackfruit.

MATERIALS AND METHODS

Survey of disease

An intensive survey was carried out to study the symptoms of the disease and to determine the severity of the disease in different locations of Chittagong University Campus. The selected

locations were South Residential Area, Shah Amanat Hall Park, Rail Station Area, Botanical Garden and North Residential Area. Four trees were selected from each location. From each tree ten twigs were collected randomly. To determine the percentage of infected leaves per tree, the number of infected leaves per twig was counted. The percentage of infected area per leaf was also determined through visual observation to find out the disease index. Five scales were used to evaluate the disease index. These were : 1 = healthy leaves ; 2 = leaves with 1-10% area infected ; 3 = leaves with 11-25% area infected ; 4 = leaves with 26-50% area infected ; 5 = above 50% area of leaf infected.

The severity of disease was determined by following the formula :

$$\text{Leaf infection (\%)} = \frac{\text{Total number of leaves infected / twigs}}{\text{Total number of leaves / tree (ten twigs)} \times \text{Maximum rating}} \times 100$$

$$\text{Disease index (\%)} = \frac{\text{Sum of all numerical ratings/ tree (ten twigs)}}{\text{Total number of leaves / tree (ten twigs)} \times \text{Maximum rating}} \times 100$$

Collection of diseased samples and Isolation of organism (s)

All types of infected leaves were collected from different locations of Chittagong University Campus. Before collection of the samples, the symptoms of the disease were observed throughly. The samples were collected in polythene bags and brought to the laboratory for isolation of associated organism(s) and were kept in refrigerator. After taking photographs the infected leaves were preserved as herbarium for future study.

Pathogenicity test

The pathogenicity test of the fungus was carried out on detached healthy leaves in the laboratory. Pricked and unpricked leaves were inoculated with 4-day old mycelial culture grown in Potato-Dextrose-Agar (PDA) medium. Each leaf was inoculated at six different points. In the controlled set only PDA block was used. In all cases, in inoculated leaves were covered with moist perforated polythene bags. The inoculated leaves were slightly sprayed with sterile water at every 24 h. Before inoculation, the leaves were surface sterilized by wiping with cotton soaked in methylated spirit and then thoroughly washed with sterile water. Symptoms produced after 7 days were compared with those occurred under natural conditions and the pathogen was re-isolated from the artificially inoculated leaves.

Influence of host grades (ages) on infection

The influence of leaf age on the infection by this pathogen was tested by inoculating both pricked and unpricked healthy leaves of three different ages *viz.* mature, middle aged and young. For each grade, five leaves were taken, the method of inoculation was the same as described before.

RESULTS

Symptoms of the disease

The symptoms of leaf blight of jackfruit were observed during May-June, 2001. Symptoms were found to start from tip portion of the leaf blade and gradually cover the entire leaf blade both on the dorsal and ventral side. At early stage of infection, infected portion turned yellow and finally brown in colour surrounded by yellow margin. After about 9-10 days of infection numerous black dot like fruit body i.e. pycnidia were observed on the dorsal side of the infected leaves.

Pathogenicity of *B. theobromae*

B. theobromae produced typical symptoms of leaf blight of jackfruit during pathogenicity test. The sign of infection was found to start after five days in inoculation. The highest percentage of infection was observed when pricked leaves were inoculated with mycelial blocks. Very low percentage on infection was obtained from inoculation of unpricked leaves.

Identification of the fungus

The fungus was indentified as *Botryodiplodia theobromae* Pat.

Infection on different types of leaves (ages)

The infection of *B. theobromae* was highly influenced by leaf age. Leaves of all ages were found susceptible to the fungus but in general young leaves were found more susceptible than eigher middle-aged or mature ones. Average percentage of infection was maximum on young leaves followed by middle-aged leaves. But mature leaves show poor infection.

Severity of the disease

The severity of the leaf blight disease was measured at five different locations of Chittagong University Campus. The highest leaf infection (%) was recorded at Botanical Garden area (48%) followed by Rail Station Area (44.80%), South Residential Area (42.59%), Shah Amanat Hall Park (41.64%) and North Residential Area (39.50%) [Table 1]. The highest average infected area per leaf (%) was recorded from South Residential area (8.75%) followed by Saha Amanat Hall Park (6.85%), Rail Station Area (6.10%), North Residential Area (5.75%) and Botanical Garden (4.40%) [Table 1]. The highest average disease index (%) was obtained from South Residential Area (18.69%) followed by Saha Amanat Hall Park (15.61%), North Residential Area (14.97%), Rail Station Area (14.51%) and Botanical Garden (11.74%) [Table 2].

Table 1 : Average percentage of leaves infection and average infected area per leaf at different locations of Chittagong University campus observed during May-June, 2001.

Location	Agerage leaf infection (%)	Average infected area per leaf (%)
South Residential Area	42.59	8.75
Shah Amanat Hall Park	41.64	6.85
Rail Station Area	44.80	6.10
Botanical Garden	48.00	4.40
North Residential Area	39.50	5.75

Table 2 : Mean disease index (%) of leaf blight disease of jackfruit obtained from different trees of above five-mentioned locations during May-June, 2001.

Location	Disease index (%)				Mean disease index (%)
	Tree	Tree	Tree	Tree	
South Residential Area	12.73	24.87	17.06	20.10	18.69
Shah Amanat Hall Park	14.57	12.99	18.33	16.53	15.61
Rail Station Area	9.60	17.04	13.86	17.53	14.51
Botanical Garden	9.84	14.40	12.40	10.32	11.74
North Residential Area	13.73	13.33	14.27	18.53	14.97

DISCUSSION

Not much work on disease has been done in different jackfruit growing countries of the world. A few diseases of jackfruit are reported and there is no report on the leaf blight. Pathogenicity test and re-isolation conducted during the present study confirmed that *B. theobromae* was responsible for leaf blight of jackfruit. This disease is reported for the first time from Bangladesh. *B. theobromae*, the causal organism of leaf spot of jackfruit, was reported by Rao and Deshmukh (1986) from India. This fungus was also reported to cause seed rot (Manoherchary *et al.*, 1979) and die-back (Mohiuddinn, 1980) of jackfruit. A number of other diseases were reported to occur on jackfruit. Reddy (1970) observed fruit rot of *Artocarpus communis* and *A. mariannensis* caused by *Phytophthora palmivora*. *Rhizopus artocarpi* attacked the male inflorescence and young fruits of jackfruit (McMillan, 1975). Wadia and Monoherchary (1981), Mohanty and Patnaik (1973) and Venkata Krishniah (1956) isolated *R. artocarpi* from fruit rot of jackfruit. *B. theobromae* has also been reported to cause die-back of many different forest and fruit plants (Sharma and Sankaran, 1988 ; Small, 1922 ; Costantin, 1929 ; Ragab *et al.*, 1971).

It was observed from the present study that the disease was severe in different jackfruit planted areas of Chittagong University Campus. The highest leaf infection (%) was found at Botanical Garden (48%) while the highest average infected area per leaf (%) was recorded at South Residential area (8.75%) followed by other locations. It was also found from the study that the average disease index (%) obtained from different trees of five mentioned locations also varied. The highest disease index (18.69%) was recorded from South Residential area. But Basak *et al.* (1990) working with the severity of leaf spot of jackfruit caused by *Colletotrichum gloeosporioides* Penz.in Chittagong

University campus reported that the disease was more severe in young plants, on lower canopy of older plants and on plants growing at foothill.

The present study indicated that the leaf blight of jackfruit was a severe disease. damages of considerable portion of leaf blade, an important food producing organ of plant. So it is necessary to develop immediate control measure and experiments are in progress in the laboratory in this regards.

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