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ANTHRACNOSE AND LEAF SPOT DISEASES OF *ALOE VERA* L. FROM BANGLADESH

ANITA RANI SHUTRODHAR[1] AND SHAMIM SHAMSI*

Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh

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Abstract

Characteristic symptoms of anthracnose and leaf spot were recorded from diseased leaf samples of *Aloe vera* L. A total of 8 fungal species, namely *Alternaria pluriseptata* (Karst. & Har.) Jorstad, *Aspergillus flavus* Link, *Aspergillus niger* Van Tieghem, *Cladosporium oxysporum* Berk. & Curt., *Colletotrichum gloeosporioides* (Penz.) Sacc., *Nigrospora oryzae* (Berk. & Br.) Petch, *Penicillium* sp. and *Pestalotiopsis guepinii* (Desm.) Stay. were found to be associated with healthy and diseased leaf samples. In addition to above 8 fungi, *Curvularia brachyospora* Boedijn, *Epicoccum purpurascens* Ehrenb. ex Schlecht and *Sclerotium* sp. were also associated with diseased leaf samples of the plant. The prevalence of the fungi ranged 1.43 - 13.35% on healthy leaves and 1.43 - 62.16% on infected leaves. The frequency of *C. gloeosporioides* was the maximum and that of *Aspergillus* and *Penicillium* was the lowest. Pathogenicity test revealed that *C. gloeosporioides* causes anthracnose and *E. purpurascens* and *P. guepinii* cause leaf spots of *A. vera.*

Introduction

Aloe vera L. a member of the family Liliaceae is a popular plant species in Bangladesh. There are about four hundred species of *Aloe*. Plants are grown in yards or in pots throughout the country for their ethnobotanical values. The plant is native to the Arabian Peninsula. The species are widely naturalized all over the world, occurring in temperate and tropical regions. It is a very short-stemmed, frequently suckering plant, forming in dense clusters. Plants grow 60 - 100 cm tall, some times with white fleck or spot on leaves. Plant is succulent with fleshy green leaves. The margin of the leaves are serrated and has small teeth, tip is pinkish. Flowers are yellow, grow on cymose recemes. *Aloe* leaves are filled with gel and the gel is the most important component of the plant and has great medicinal value. The plant has been described as wonder-plant. The *Aloe vera* contains amino acids, anthraquinones, enzymes, lignin, minerals, mono- and polysaccharides, salicylic acid, saponins, sterols and vitamins[(1-2)]. Many herbal drugs and drinks have been formulated from *Aloe* leaves for the maintenance of good health. In cosmetic industries *Aloe* leaves are processed into gel and used in the production of soap

*Author for correspondence: <Prof.shamsi@gmail.com>. [1]A part of M.S. thesis of first author (ARS).

for bathing, shampoo, hair wash, tooth paste and body creams. Furthermore, *A. vera* gel has been reported to be very effective for the treatment of sore and wounds, skin cancer, skin disease, cold and cough, asthma, ulcer, diabetes, constipation, pile and fungal infection[3-5].

Reports from different countries reveal that information about disease problems of *Aloe* is scanty[6-7]. In Bangladesh, disease problems of the plant is not available. However, personal observations indicate that sometimes, the leaves of the plant are infected with white flecks or spots. Severe infection of anthracnose and leaf spot is being noticed on this plants in Dhaka city since 2007. Present investigation was undertaken to identify diseases of *Aloe* plant with their causal agents occur in Bangladesh.

Materials and Methods

A total of 30 diseased and healthy samples of *Aloe vera* were collected from Farmgate, Gulshan, Mirpur, Mohakhali and Botanic Garden of Dhaka University Campus during February, 2010 to April, 2011. Symptoms of the disease were recorded. The fungi associated with the healthy as well as infected leaf samples were isolated on potato dextrose agar (PDA) medium following tissue planting method. The leaf samples were cut into small pieces (2^2 mm) with a sterilized scalpel from each sample. The inocula were surface sterilized by dipping in 10% Clorox for 3 minutes and rinsed in sterilized distilled water for 3 times. The surface sterilized inocula were placed in Petri plates containing sterilized PDA medium, with 3 inocula per plate and incubated for 5 - 7 days at 25 ± 2ºC.

The fungi isolated from the inocula were identified based on their morphological characteristics using appropriate key books[8-12].

Identified fungi were purified and their pathogenicity was examineded by inoculating fresh healthy leaves of *Aloe* plant. Healthy seedling of *Aloe* plant was transplanted in pots (30 cm diam) containing sterilized soil with three seedlings per pot and allowed to grow for one month in net house provided necessary water and nutrients. Healthy leaves of the seedlings were washed with sterilized distilled water and then surface sterilized with 10% Chlorox and again washed with sterilized distilled water. Pricked and unpricked leaves were inoculated. Surface sterilized leaves were pricked with sterilized needle. For inoculation 5 mm (diam) mycelial block cut from young PDA culture of each test fungus were placed on both pricked and unpricked leaves and wrapped with surface sterilized polythene paper. Leaves under control received only fresh PDA block without fungal inoculum. Three leaves were inoculated for each treatment and for each fungus. The inoculated plants were placed in a clean bench following completely randomized design.

The plants were examined daily and continued for 10 days to record the development of symptoms. Symptom produced on artificial inoculated leaves were recorded and compared with those observed on naturally inoculated leaves. The fungi

were reisolated from the inoculated leaves of *A. vera* on PDA medium to fulfill Koch's postulates.

All diseased specimens and associated causal fungi were preserved in the Herbarium, Mycology and Plant Pathology Division, Department of Botany, University of Dhaka, Bangladesh.

Results and Discussion

Aloe plants were found to be infected with severe leaf spot and anthracnose symptoms under natural and inoculated conditions. The symptoms appeared on the leaves, as dark brown spots and the leaves become dried. Spots were subcircular 2 - 6 mm in diameter. In severe case infection started from the leaf edge and the affected leaves shrinked and dried from the tip.

A total of 11 species of fungi were isolated and they were associated with diseased samples. *Curvularia brachyospora*, *E. purpurascens* and *Sclerotium* sp. were not associated with healthy leaf samples. The prevalence of the fungi ranged 1.43 - 13.35% on healthy leaves and 1.43 - 62.16% on infected leaves. In case of infected leaves, the frequency of *Colletotrichum gloeosporioide* was the maximum and that of *Aspergillus niger* and *Penicillium* sp. was the minimum (Table 1).

In India *Colletotrichum gloeosporioide, Fusarium solani* (Mart.) Sacc., *Pestalotiopsis versicolor* (Speg.) Stay., *Phoma sorghina* (Sacc.) Boerma, Dovenbosch & Vankest and *Uromyces aloes* (Cks.) P. Magn have been recorded from infected leaves of *Aloe* species[13].

The results of pathogenicity test revealed that *C. gloeosporioides, E. purpurascens* and *P. guepini*i were capable of causing characteristic symptoms on inoculated leaves (Figs 1a-g and 2a-f). The disease symptoms produced by the fungi were similar to those which were observed in naturally infected plants. Plants inoculated with pure PDA (control) and without pricking did not produce any symptom. It indicates that the test fungi *C. gloeosporioides, E. purpurascens* and *P. guepini*i were capable of causing infection on pricked leaves only. The inoculated fungi were also re-isolated from the symptoms successfully.

The finding reveals that *A. pluriseptata*, *A. flavus, A. niger*, *C. oxysporum*., *C. gloeosporioide, C. brachyospora*, *E. purpurascens*, *N. oryzae*, *Penicillium* sp. and *P. guepinii*. and *Sclerotium* sp. are associated with *Aloe vera* leaves. Among them *E. purpurascens* and *P. guepini*i are responsible for leaf spots and *C. gloeosporioide* caused anthracnose of *A. vera* plant. This is the first report on pathogenic potentiality of *E. purpurascens* and *P. guepini*i on the plant. At the same time this is the first report of diseases of *Aloe vera* and its causal agents from Bangladesh.

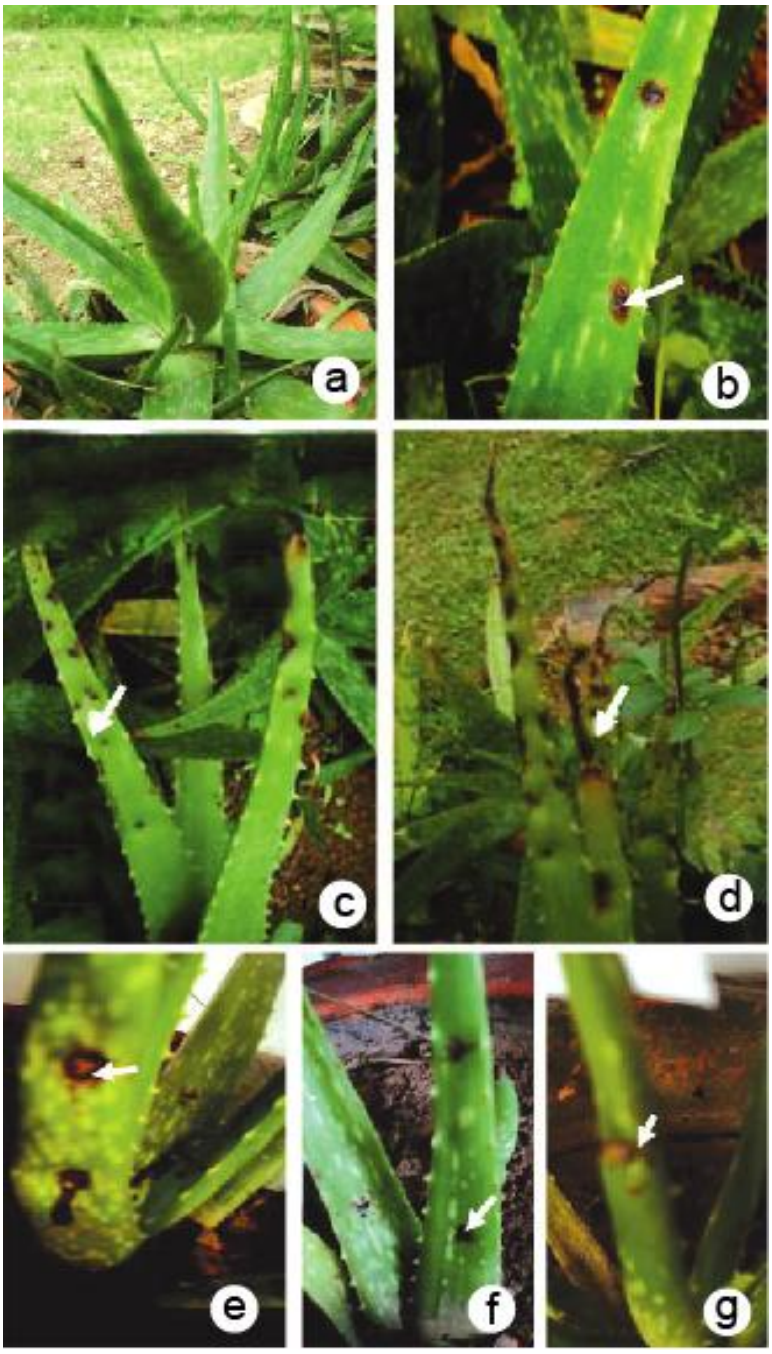

Fig. 1a - g. *Aloe vera* plant. a. Healthy plant. b. Leaf spot. c-d. Anthracnose (natural infection). Symptom produced by: e. *Colletotrichum gloeosporioides*, f. *Epicoccum purpurascens* and g. *Pestalotiopsis guepinii*.

Table 1. Frequency percentage of association of fungi with healthy and infected leaves of *Aloe vera*.

Name of fungi	Healthy leaves	Infected leaves
Alternaria pluriseptata	2.38	5.72
Aspergillus fluvus	1.43	1.43
Aspergillus niger	1.43	1.43
Cladosporium oxysporum	1.43	6.19
Colletotrichum gloeosporioide	13.5	62.16
Curvularia brachyospora	-	6.19
Epicoccum purpurascens	-	21.5
Nigrospora oryzae	1.91	2.86
Penicillium sp.	2.00	2.38
Pestalotiopsis guepinii	3.33	14.62
Sclerotium sp.	-	2.86

- = No fungal growth.

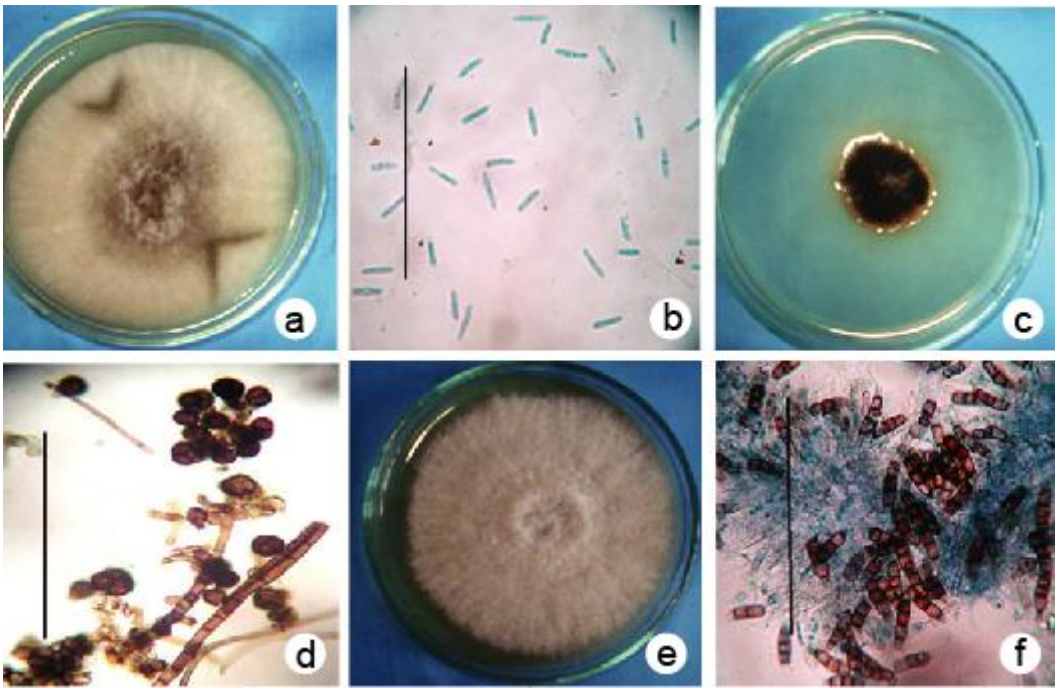

Fig. 2a - f: Culture plate and conidia of *Colletotrichum gloeosporioides*. c, d. Culture plate and sporodochiun of *E. purpurascens*. e, f. Culture plate and acervuli of *P. guepinii* (Bars = 50 μm).

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