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SURVEY, IDENTIFICATION AND MANAGEMENT OF MAJOR DISEASES OF LATKAN IN SOME SELECTED AREAS OF BANGLADESH

M. N. ISLAM[1], M. I. FARUK[2], N. AKTER[3] AND M. M. KARIM[4]

Abstract

Latkan (*Baccaurea* sp.), an underutilized minor fruit has drawn popularity because of its nutritional value in Bangladesh. Its cultivation, therefore, is gaining momentum . So, a survey on the health status and prevalence of diseases on Latkan was carried out at Shibpur upazilla of Narsingdi and Valuka upazilla of Mymensingh district during the cropping season 2019-2020. Growers of Latkan in the two Upazillas were interviewed to know about the occurrence of diseases of latkan and their management. Infected leaves, twigs and fruits were collected, and the pathogens were isolated and identified in the Plant Pathology Laboratory of BARI, Gazipur. Three diseases were identified viz. (i) gray leaf blight caused by *Pestalotiopsis* sp., (ii) die-back caused by *Diplodia* sp. and (iii) anthracnose caused by *Colletotrichum* sp. The prevalence of the diseases varied for location, age of the orchards and type of the disease. Anthracnose predominated in the old orchards compare to gray leaf blight and die-back. Field experiment was conducted for chemical management of anthracnose indicated that Tilt (Propiconazole @ 0.5ml/L) and Autostin (Carbendazim @ 1g/L) were effective measures to control the disease.

Keywords: Latkan, survey, disease, management.

Introduction

Latkan or Burmese grape (*Baccaurea*sp.) is one of the most popular and commercially important minor fruit crops of Bangladesh. It is evergreen, slow growing, dioecious, short to medium height, shade loving plant species with enormous nutritional value belonging to Euphorbiaceae family. The tree shows a good example for the fruits which grows directly from the main trunk (Hagens, 2000). It is an important unexploited fruit plant native to tropical and subtropical Southeast Asian region, which grows as wild as well as under farming, mainly in Nepal, India, Myanmar, Bangladesh, South China, Indochina, Thailand, Malaysia, Srilanka and some regions of Indonesia (Morton, 1987; Maniruzzaman, 1988; Subhadrabandhu, 2001). In recent time, latkan is commercially cultivated in some part of Bangladesh and has become popular among the people because of its excellent taste, vitamin and market value. It is a mild acidic fruit and mainly consumed as fresh.

[1]Scientific Officer, [2]Principal Scientific Officer, [4]Senior Scientific Officer, Plant Pathology Division, BARI, Gazipur, [3]Assistant Professor, Department of Plant Pathology, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh.

Among underutilized fruit crops, burmese grape is becoming a very potential fruit crop grown mostly in homestead condition in the region of Narsingdi, Mymensingh, Gazipur, Tangail, Sylhet, Dhaka, Chittagong hill tracts (Bhowmick, 2010). It flowers during summer month and fruits are matured during rainy season. Latkans have various uses such as seeds as dyeing agent (Raghavan and Ramjan, 2018), leaves, fruits, seeds, and stem bark for varied therapeutic potential the fruit as antiviral and antioxidant source and the stem bark of the plant was reported to have diuretic activity (Hasan *et al.*, 2009). It contains potassium twice as much as in bananas. So, the health benefits of latkan are significant. However, there are some diseases generally that affect the latkan such as- Anthracnose (*Colletotrichum* sp.), Leaf blight, Bacterial leaf spot, Black rot (*Guignardia bidwellii*), Scab (*Venturia inaequalis*), Mould rot (*Botrytis cinerea*), Foot rot (*Cylindrocarpon* sp.) and Dieback which threaten latkan production as well as income of the farmers (Karim *et al.*, 2010 and Hasan *et al.*, 2009). Hence, a keen observation on latkan is essential for generating details information on disease status and their management. Therefore, the present investigation was designed to assess the diseases of latkan and to find out the proper control measure of major diseases of latkan.

Materials and Methods

The field survey programs were conducted in two upazilla namely Shibpur of Narsingdi and Valuka of Mymensingh district during the cropping season 2019-2020. In each upazilla, 10 different latkan fruit orchards were surveyed and samples were collected based on visual symptoms. The symptoms of the disease were recorded according to description of Amador (2002), Ferguson (2002) and Reddy and Murthi (1990). Identification of all the fungal diseases was finally confirmed by isolation and identification of the associated fungal organism. Mass group of farmer's interaction was taken to know the detail scenario about the diseases of latkan by using questionnaire on disease problems, age of garden, intercultural operations, and management practices adopted by the latkan farmers.

Infected fruits as well as diseased plants parts of latkan were collected from the survey area and brought into the Plant Pathology Laboratory, Bangladesh Agricultural Research Institute for isolation and identification of causal organism. Pieces of the diseased sample of latkan were sterilized in 10% chlorox for 2-3 minutes, followed by several rinses with sterile distilled water. The samples were then placed separately on the blotter paper, water agar and potato dextrose agar (PDA) Petri plates and incubated at 25±1^{o}C for 5-12 days. After incubation, the vegetative and reproductive structures of fungi grew out of the inocula were examined under stereo as well as compound microscope. To prove that Koch's postulates were true, pathogenicity test was conducted on symptomless leaves and fruits of latkan.

An experiment with four different fungicides was conducted under natural infection condition in the established orchard of Horticulture Research Center, BARI, Gazipur during 2020-21for the management of anthracnose disease of latkan. The experiment was laid out in randomized complete block design with 3 replications. Each plant was considered as a replication. The treatments were T_1 = Autostin(Carbendazim) @1g/L, T_2 = Secure (Fenamidone + Mancozeb 600WG) @ 2g/L water, T_3 =Dithane M-45 (Mancozeb80%) @ 2g/L water, T_4 = Tilt (Propiconazole) @ 0.5ml/L water, and T_5 = Control. The spraying was started with the initiation of anthracnose disease on the latkan plants and a total of three sprays were done at an interval of 10-12 days. Data were recorded on the incidence of fruit rot disease of latkan and the percent data were transformed and analyzed statistically using 'R' program and the means were separated by least significance difference (LSD) test.

Results and Discussion

Outcome of questionnaire: Farmer's interaction by using questionnaire was the basis of details information on latkan cultivation and their disease management. The response of 50 latkan growers of Shibpur of Narsingdi and Valuka of Mymensingh districts respectively possessing 9-10 years old orchard were almost similar (Table 1). They rarely practiced disease management of latkan though there were fruit dropping and twig dying.

Table 1. Outcome of the questionnaire from both Narsingdi and Mymensingh districts

Parameters	Survey results of Shibpur, Narsingdi	Survey results of Valuka, Mymensingh
Number of farmers interviewed	50	50
Major diseases of latkan	Not specific, claims for fruit dropping, twig dying and fruit rot	Not specific, only claim for fruit dropping due to drought and dieback
Age of garden	Most of the gardens average age 10-11 years	Most of the gardens average age 8-9 years
Intercultural operation	Not practiced regularly	Not practiced regularly
Management option	Practice but little	Rarely practice

Isolation and Identification of the pathogens: From the survey area, three different diseases were identified from latkan fruit, leaves and twigs of the collected samples. The diseases were (i) Gray leaf blight (ii) Die-back and (iii) Anthracnose. Based on disease symptoms and morphological characteristics of the pathogens viz. mycelium coloration or pigmentation, presence or absence of septa,

spore morphology etc., the diseases and pathogens were identified as gray leaf blight (*Pestalotiopsis* sp.), die-back (*Diplodia* sp.) and anthracnose (*Colletotrichum* sp.). The symptoms of the diseases recorded were as follows.

Gray leaf blight (*Pestalotiopsis* sp.): The symptoms started from tip of the leaf as light brown to dark brown necrosis that advanced towards both the margins of the leaf leading to complete necrosis of the affected leaves that dried up subsequently. Death of leaves on new shoots and a foliar blight were also observed. Some of the affected leaves showed sun scorched symptom.

Fig. 1. Leaf blight symptoms

Fig. 2. Conidia of *Pestalotiopsis* sp.

Die-back (*Diplodia* sp.): Die-back was characterized by progressive dying of twigs, and branches, starting at the tips that usually caused slower development and hindered uniformity throughout the crown. The tree in the dieback stage, however, showed localized symptoms such as apparently healthy twigs and branches adjacent to dead or dying twigs and branches that initiated at the top of a plant and progressed downward.

Fig. 3. Dieback symptoms

Fig. 4. Conidia of *Diplodia* sp.

Anthracnose (*Colletotrichum* sp.): Fruit infections were characterized by dark, brown to black, water-soaked spots or sunken lesions on green and ripe fruit that covered with spore masses. Large circular brown spots were formed around the damaged or punctured skin of the fruit. The spots darkened with age and centre started sunken with dark brown margins. In severe cases, the spots were eventually developed cankers on twigs and stems.

Fig. 5. Anthracnose symptoms

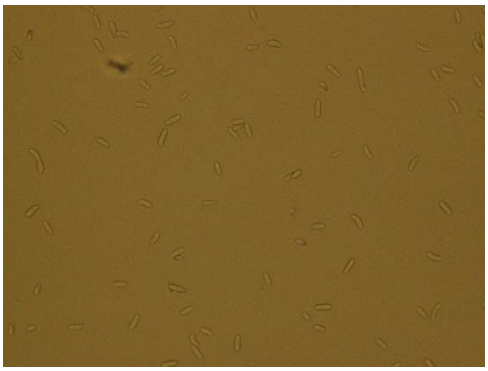

Fig. 6. Conidia of *Colletotrichum* sp.

Disease severity in Shibpur of Narsingdi district

The prevalence of diseases of latkan in Shibpur upazila of Narsingdi district was more in the old orchards as compared to that in the new orchards (Table 2). From the survey, it was found that (4%) and (15%) plants were infected with *Pestalotiopsis* sp. in new and old orchards, respectively. Similarly, only (5%) latkan plants of new orchards showed die-back disease symptom while (23%) infection was found in old orchards. On the other hand, the prevalence of anthracnose disease was lower (12%) in new orchards while (27%) in old orchards (Table2).

Table 2. Disease severity of latkan plant in Shibpur of Narshingdi district

Name of the disease	Causal organism	Percent Infection	
		New orchards	Old orchards
Gray leaf blight	*Pestalotiopsis* sp.	04	15
Die-back	*Diplodia* sp.	05	23
Anthracnose	*Colletotrichum* sp.	12	27

Disease severity in Valuka of Mymensingh district

The incidence of latkan diseases was higher in the old orchards of Valuka upazila under Mymensingh district in general (Table 3). From the survey it was found that (3%) plants of latkan in new orchards were infected with *Pestalotiopsis* sp. while (9%) infection was observed in the old orchards. Die-back disease prevalence was

(5%) and (14%) in new and old orchards, respectively. The incidence of anthracnose disease was higher (20%) in old orchards and lower (10%) in new orchards of Valuka upazila under Mymensingh district (Table 3).

Table 3. Disease severity of latkan plant in Valuka of Mymensingh district

Name of the disease	Causal organism	Percent Infection	
		New orchards	Old orchards
Gray leaf blight	*Pestalotiopsis* sp.	03	09
Die-back	*Diplodia* sp.	05	14
Anthracnose	*Colletotrichum* sp.	10	20

Efficacy of fungicides against anthracnose disease of latkan

The incidence of anthracnose disease of latkan was significantly (p = 0.05%) reduced by all the tested fungicides compared to control (Table 4). Among the fungicides, Tilt 250EC (Propiconazole) showed the lowest anthracnose disease incidence (4.67%) followed by Autostin (Carbendazim) treatment where the anthracnose disease incidence was (6.67%) (Table 4). The fungicides Secure (Fenamidone + Mancozeb 600WG) and Dithane M-45 (Mancozeb 80%) also gave significantly lower anthracnose disease incidence of (9.33%) and (9.67%), respectively. The highest anthracnose disease incidence of (37.67%) was recorded from the unsprayed control treatment. The maximum reduction (87.60%) of anthracnose disease incidence of latkan was recorded in case of Tilt 250EC (Propiconazole) followed by Autostin (Carbendazim) treatment where the reduction of anthracnose disease incidence was (82.29%) compared to unsprayed control. Besides, the fungicides Secure (Fenamidone + Mancozeb 600WG) and Dithane M-45 (Mancozeb 80%) reduced the anthracnose disease of latkan over control by (75.23%) and (74.33%), respectively (Table 4).

Table 4. Effect of fungicides on the incidence of anthracnose disease of latkan

Treatments	Anthracnose disease incidence (%)	Disease decreased over control (%)
T_1= Autostin (Carbendazim)	6.67 c(14.93)	82.29
T_2= Secure (Fenamidone + Mancozeb600WG)	9.33 b(17.75)	75.23
T_3= Dithane M-45 (Mancozeb 80%)	9.67 b(18.10)	74.33
T_4 = Tilt (Propiconazole)	4.67 d(12.47)	87.60
T_5= Control	37.67 a(37.85)	-
LSD (P = 0.05)	1.845	-

The anthracnose disease (Colletotrichum sp.) was considered as one of the ten most notorious pathogens in the world, causing heavy crop losses worldwide

(Dean *et al*., 2012). The highest incidence (12% and 27%) in Narsingdi and (10% and 20%) in Mymensingh of anthracnose disease on latkan were observed during the survey. In a similar survey on mango, Onyeani and Amusa (2015) showed that 60% of mango trees surveyed were found to be infected with anthracnose and over 34% of fruits produced on those trees were severely infected with the disease incidence (45.90%) and severity (38.10%) of anthracnose. Anthracnose disease of latkan was a burning issue to the agriculturists as well as latkan farmers and effective control measure was not available in the country. A combination of the different strategies like chemical control, biological control, physical control and intrinsic resistance was recommended for managing the disease (Agrios, 2005). The chemical fungicides generally recommended for controlling anthracnose disease were based on copper compounds, Carbendazim, dithiocarbamates, benzimidazole and triazole compounds (Waller, 1992). Present findings agreed partially with the findings of Leroux and Gredt (1974), Pandey (1988), Oh and Kang (2002) and Everett *et al*. (2005) who found that Carbendazim (Derosal) gave better control of anthracnose disease of fruits caused by *C. gloeosporioides*.

Conclusion

Three different diseases viz. gray leaf blight, die-back and anthracnose diseases were identified from latkan leaves, twigs and fruits plant samples collected from Shibpur of Narsingdi and Valuka of Mymensingh district. Among these diseases anthracnose was predominant in both the locations. The management study revealed that Tilt (Propiconazole) and Autostin (Carbendazim) is found effectively controlled the anthracnose disease of latkan in the orchards.

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