

# AN INVESTIGATION INTO DISEASE PROBLEMS OF KHASIA PAAN (*PIPER BETLE*) IN THE SYLHET REGION

A. Ahmed<sup>1</sup>, J. Ahmed<sup>1</sup>, T. Chakrabarty<sup>1</sup>, \*A. Muqit<sup>2</sup> and M. Asad-ud-doullah<sup>2</sup>

<sup>1</sup>MS Student, Department of Plant Pathology and Seed Science, Sylhet Agricultural University, Sylhet, Bangladesh. <sup>2</sup>Professor Department of Plant Pathology and Seed Science Sylhet Agricultural University, Sylhet, Bangladesh.

\*Corresponding author, email: muqit.ppath@sau.ac.bd

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## ABSTRACT

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Survey on the diseases of Khasia paan in Khasia Punji and farmer's field of Goabari and Mokampunji under Jaintapur area was conducted during November 2020 to January 2021. Four diseases viz. leaf spot, anthracnose, wilt, and foot and root rot were found to be prevalent where, leaf spot and anthracnose were found to be the most prevalent. Three pathogens, *Rhizoctonia*, *Colletotrichum* and *Pythium* were identified from the disease samples collected from the survey area. Disease incidence varied from 15 to 19% in different punji and farmer's field. In Goabari

farmers's field disease incidence varied from, 17 to 20% while in Mokam Punji it varied from 15 to 16%. Disease incidence was comparatively higher in the month of November which declined gradually thereafter and it was lowest in January. Disease severity on the other hand also varied significantly in different months of the year. In early winter (November) disease severity was comparatively higher while in January it was very low. Both in Goabari and Mokam punji disease severity varied from 7 to 23%.

Key word: Khasia pan, Piper betle, leaf spot, anthracnose, wilt, foot and root rot

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## INTRODUCTION

The betel leaf (*Piper betle* L.) popularly known as 'Paan' is a perennial climber cultivated largely for its leaves, which are used along with betel nut as a masticator. Betel vine is largely grown in India, Bangladesh, Srilanka, Malaysia and to some extent of Singapore, Thailand, Burma (Myanmar), Indonesia, Philippines, Nepal, Bhutan, Pakistan and Papua New Guinea. Betel vine cultivation is a century old tradition in Bangladesh. Total area and production of betel leaf in Bangladesh was 58,819 acres and 2, 14, 252 metric tons, respectively during 2016-2017 (BBS 2018). The important betel leaf (Paan) producing districts are Rajshahi, Khulna, Barishal, Chattogram, Sylhet, Mymensingh, Chuadanga, Meherpur, Cox's Bazar, Kushtia, Jashore, etc. It is an important cash crop of Bangladesh. It has large domestic market. Hardly any market is seen where it is not sold. Significant quantity of betel leaf is exported to Europe and many other countries. Therefore, any matter of concern regarding

the crop should get prime attention because a large number of peoples are involved with this enterprise.

Betel vine belongs to the family Piperaceae that comprises of 100 varieties of which 40 are encountered in India and 30 in West Bengal and Bangladesh (Guha 1997, Samanta 1994). Its cultivation is highly intensive and particularly suited to small holdings. Usually it is cultivated under a shaded environment called baroj (betel vine garden). Information on the diseases of paan in Bangladesh appears to be limited with the reports by Anonymous (1973), Alamgir (1985), Hossain *et al.* (1986), Jalil (1986), Chowdhury (1988), Faruk (2003), and Jesmin (2006). The moist humid shaded conditions of "paan" gardens (Baroj) favour betel vine growth but also serve as an optimal condition for different diseases. Many diseases are reported to affect betel vine. Mostly these are fungal diseases. The most important diseases are foot and root rot (*Sclerotium rolfsii*), anthracnose (*Colletotrichum capsici*), Curvularia leaf spot (*Curvularia geniculata*) and leaf

blight (*Phytophthora* sp.) which are very much prevalent in baroj (BARI 2011, Huq 2011, Goswami *et al.* 2002). Foot rot is characterized by rotting of the roots and vines near soil line and other diseases mainly infect leaves. Usually small spots are found in the leaves with or without yellow halo. Sometimes entire leaf is rotten. Leaf spot is highly contagious. For that reason, sellers are always busy in sorting out infected ones. If they don't do it their entire lot is infected within very short time. In Bangladesh no virus disease of betel vine is reported but such diseases are reported from India (Kumari *et al.* 2015). Among these diseases, foot rot and leaf blight caused severe damage in the baroj especially in the older ones during summer culminating huge crop loss and sometimes whole boroj is destroyed.

There is another system of cultivation where betel vines are planted near big trees so that they can creep on those trees. These are called GachPaan (tree betel vine). These types are different from those that are cultivated under baroj system. This is widely cultivated in the Kamalganj area of Moulvibazar district especially in the Khasiapunji (where ethnic Khasias live). Recently there is an outbreak of disease in Khasiapaan which is causing severe economic loss to the farmers (personal communication: KARITAS). This problem needs to be urgently addressed because many farmers rely on the income from this crop. Therefore, considering the facts stated above the present investigation was made to survey betel vine plantations for assessing the present status of disease and also to isolate, identify, and characterize the causal organisms.

#### MATERIALS AND METHODS

Survey was conducted in the farmer's field, KhasiaPunji in Jaintapur, Kamalganj and Srimangal during November 2020 to January 2021. One farmer's field at Goabari, jaintapur was visited six times to record the disease progress. Disease incidence and severity was measured in the betelvine plantation. Disease samples were collected and brought to the Plant Pathology laboratory of Sylhet Agricultural University for identification and culturing the associated pathogens. Disease incidence and severity was calculated according to Johnston and Booth (1983)

$$\text{Disease incidence (\%)} = \frac{\text{No. of plants infected}}{\text{No. of plants observed}} \times 100$$

$$\text{Disease severity (\%)} = \frac{\text{Area of infected tissue}}{\text{Total area of tissue observed}} \times 100$$

Tissues plating methods was done to grow the pathogens and were cultured in commercially available PDA (Potato Dextrose Agar) medium. Pathogens were isolated from infected sample and were identified consulting standard literature. The collected data were computed and analyzed statistically using "R" software package.

### RESULTS AND DISCUSSION

#### Diseases recorded

The diseases observed in the betelvine field were leaf spot, anthracnose, wilt, and foot and root rot (Table 1). Among these leaf spot and anthracnose were most prevalent while others were very few or absent. These diseases were earlier reported by many scientists (Goswami *et al.* 2002, Huq 2011, Jesmin 2006). Leaf spots sometimes coalesced to produce bigger lesion or blight symptoms on the other hand anthracnose was characterized by yellow halo surrounding the black spot (Plate 1) and the associated pathogens identified in the laboratory were *Rhizoctonia* sp., *Colletotrichum* sp. and *Pythium* sp. (Plate 2).

The diseases observed in the present investigation were also reported by many authors (Akhter *et al.* 2010, Goswami *et al.* 2002, Chakrabarty 2018). Results of the present study indicated that the type of disease were very much similar both in boroj cultivation and tree supported Khasia paan.

#### Distribution of the diseases

Distribution of different diseases across the locations and their variations in incidence was significantly varied in most of the cases (Table 2). Leaf spot and anthracnose disease were most prevalent disease followed by foot and root rot and wilt. Disease incidence did not vary significantly across the locations though the trend was similar in all the locations. Wilt as well as foot and root rot diseases were caused by soil borne pathogens. Low moisture during survey period might be the reason for the low incidence. Jahan *et al.* (2016) conducted a survey on foot and root rot of betelvine in six upazila of Kushtia district during July to October. They observed that

disease incidence varied from 24 to 58%. This indicated the foot and root rot was higher during high temperature and moisture. Leaf spot and anthracnose on the other hand were caused by foliar pathogen which mainly depended on airborne inoculum present in the nearby vegetation which might cause higher incidence. However, much investigation was needed in this regard.

### Disease occurrence over the locations

There was a significant difference in disease incidence in over the locations (Figure 1). Disease incidence varied from 15 to 19%. The highest disease incidence

was observed in Kamalganj (19%) and the lowest in Mokam punji (15%).Goabari had similar incidence while Srimangal and Mokam punji had low disease incidence. Khasia paan - raised on support plant were also varied and the nature of support plant, their concentration, management practice and age of the plant played important role in disease occurrence. In Mokam punji, the farmers removed the diseased leaves frequently that might be one of the reasons for low disease incidence.

Table 1. Betelvine diseases identified in the farmer’s field and different Khasia Punji.

Sl. No.	Name of the disease	Causal agent	Disease Symptom
1.	Leaf spot/blight	<i>Phytophthora</i> , <i>Alternaria</i> , <i>Curvularia</i>	Small black spots were found scattered in the leaf surface and sometimes the edges were blighted
2.	Anthracnose	<i>Colletotrichum piperis</i>	Small black spots surrounded by yellow halo was found in the leaf
3.	Wilt	<i>Fusarium</i> spp.	The vine was wilted
4.	Foot and root rot	<i>Phytophthora parasitica</i> , <i>Sclerotium rolfsii</i> , <i>Pythium piperinum</i>	Below ground stem become black and rotten. Initially vines become pale and later on wither

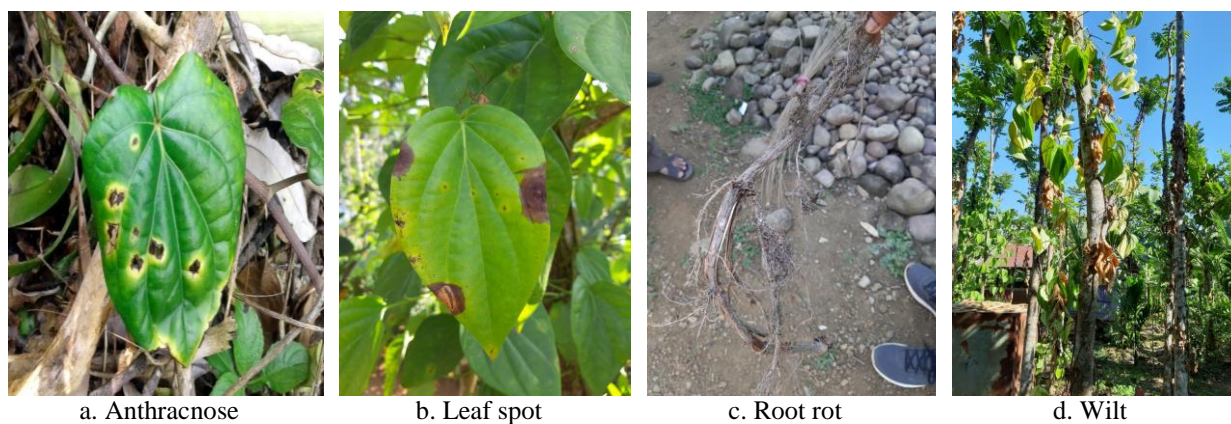


Plate 1. Betelvine diseases observed in the field during the survey.



a. *Rhizoctonia*



b. *Colletotrichum*



c. *Pythium*

Plate 2. Pathogens identified from disease samples of betel vine

Table 2. Distribution of betelvine diseases in different locations.

Name of disease	Disease incidence (%) in different locations			
	Goabari	Mokam Punji	Kamal ganj	Srimangal
Leaf spot	10.0 a (3.15)	8.0 a (2.76)	7.0 a (2.64)	10.0 a (3.15)
Anthrachnose	7.0 ab (2.63)	5.0 ab (2.23)	6.5a (2.53)	6.0 b (2.45)
Wilt	5.0 b (2.17)	4.0 b (1.95)	2.0 b (1.41)	2.0 c (1.41)
Foot and root rot	7.5 ab (2.73)	4.0 b (1.97)	5.0 a (2.20)	5.0 b (2.23)

Figures in the parenthesis are transformed values (square root). Figures with the same letter are not significantly different at 5% level.

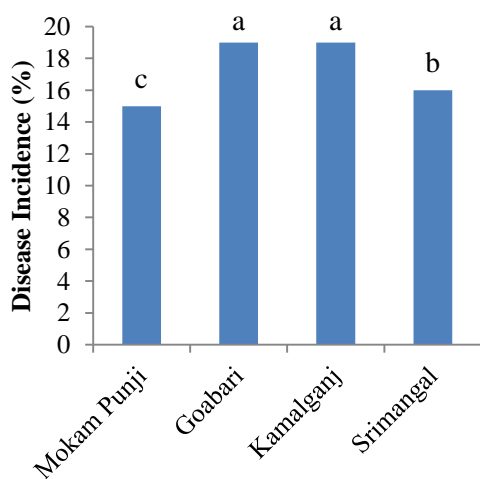


Figure 1. Betelvine disease incidence in surveyed area.

### Disease progress

The incidence of betel leaf diseases in the farmer's field of Goabari and Mokam Punji in Jaintapur area varied sharply with the months of the year (Figure 2). Disease incidence was found to be highest in November (20%) and the lowest in January (17%) both in Goabari and Mokam Punji areas of Jaintapur.

The severity of betel vine diseases varied significantly in different months of the year (Figure 3). It varied from 9 to 21% at Mokam Punji and at Goabari it varied from 7 to 23%. In November disease severity was around 20% while in January it was around 7 to 8%. Low temperature at that period might be responsible for lower severity.

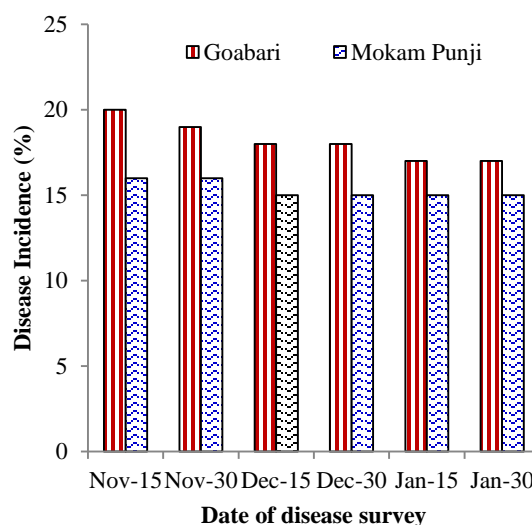


Figure 2. Betelvine disease incidence in farmer's field at Goabari and Mokam Punji, Jaintapur in different months of the year.

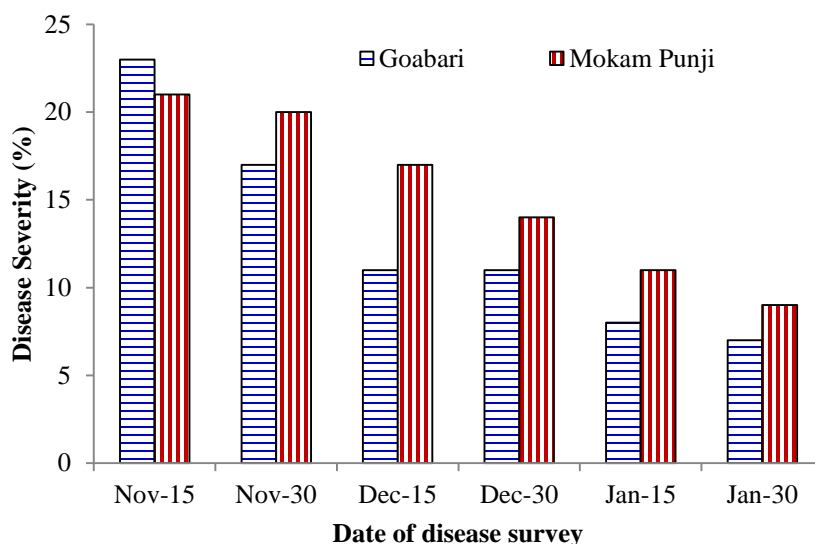


Figure 3. Betelvine disease severity at Goabari, and Mokam Punji, Jaintapur during different months of the year

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