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## Detection of *Curvularia* Species on Boro Rice Seeds of Dinajpur

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**Abstract:** *Curvularia* species causing black kernel of rice have been tested in 150 samples of three varieties of boro rice seed. Five species of *Curvularia*, viz. *Curvularia geniculata*, *Curvularia oryzae*, *Curvularia lunata*, *Curvularia eragrostidis* and *Curvularia intermedia* have been detected. The seed infection was higher in case of *Curvularia lunata* (5.5%) than other species. Species were detected by studying the growth habit of fungus on seeds, shape, diagnostic characters and appearance of conidia under compound microscope.

**Key words:** *Curvularia*, Boro rice, Conidia

### Introduction

A number of *Curvularia* species have been reported as causal agents of leaf spots, leaf blights, kernel rot, root rot, seedling blights, grain discoloration, grain lesions and grain deformation (Benoit and Mathur, 1970). Twelve species of *Curvularia* viz *C. eragrostidis*, *C. intermedia*, *C. siddiquii*, *C. oryzae*, *C. lunata*, *C. pallescens*, *C. trifolii*, *C. clavata*, *C. geniculata*, *C. inequalis*, *C. uncinata* and *C. cymbopogonis* have been detected from rice seed (Benoit and Mathur, 1970). *Curvularia lunata* is a seed-borne pathogen of rice (Parimelazhagan and Francis, 1999) and it can cause leaf blight (Kim and Lee, 1998). *Curvularia protuberata* is a new seed-borne pathogen and it can cause germination failure and is an associated microorganism of spotting of rice grain (Sisterna and Dal Bello, 1998). Knowledge on the association of fungi with rice seed is important for controlling seed-borne diseases and producing high quality healthy seeds. species and determine the association of *Curvularia*, the pathogen occurring on boro rice seeds in northern district of Bangladesh is the aim of project.

### Materials and Methods

150 seed samples of three varieties of boro rice namely BR 1 (V<sub>1</sub>), BR 26 (V<sub>2</sub>) and BR 28 (V<sub>3</sub>) were chosen and collected from of Dinajpur district (Sador, Birgonj, Chirirbandor, Birol and Shetabgonj) and tested by blotter method based on 400 seeds of each sample during the period of 1998-99. The seeds were incubated on moist blotter at day temperature under alternating cycles of 12h defused daylight near glass windows and 12h natural darkness for a period of 8 days. Prevalence of fungal species and their morphological

studies and have been done based on the nature of conidiophore, the arrangement of conidia on conidiophores and the shape, size and colour of the conidia.

### Results

**Habit characters of *Curvularia* on Rice:** The characteristic used in the identification of different species of *Curvularia* are tabulated in Table 1, while details on the morphology of conidia under compound microscope are summarized in Table. The descriptions are made on the basis of colonies on seed, after 8 days of plating.

The species observed were *C. geniculata*, *C. oryzae*, *C. lunata*, *C. eragrostidis*, *C. intermedia*. The infection percentages varied from 0.0-6.2. *Curvularia lunata* had a most predominant infection of 5.5, followed by *Curvularia oryzae* 3.7, *Curvularia geniculata* 3.0, *Curvularia eragrostidis* 2.6 and *Curvularia intermedia* 0.6 the least occurring fungus. The range of seed infection slightly varied from 3.5 to 4.5% place to place and 3.3 to 4.3% variety to variety.

### Discussion

Consulting the relevant literatures identified the *Curvularia* species. The recorded species were difficult be distinguished from each other because of more or less similar characteristics. Moreover the arrangement of conidia on conidiophore of the *Curvularia geniculata*, *Curvularia eragrostidis*, *Curvularia intermedia* are acropleurogenous types where the appearance of conidia was broad in the middle. The median septum of *Curvularia eragrostidis* and *Curvularia intermedia* are thick whilst in *Curvularia geniculata* have bigger cell in the middle of the conidial body. Compound microscope observation result revealed that in *Curvularia eragrostidis* the

Table 1: Characters of *Curvularis* species on rice seed under stereomicroscope-Blotter test

Species	Arrangement of conidia on conidiophore	Shape of conidia	Characters of conidia	Appearance of conidia
<i>Curvularia geniculata</i>	Acropleurogenous	Geniculate or Straight and Acute tip	Black, geniculate or straight and fusiform, Bigger cells median in the body of the conidia	Broad in the middle
<i>Curvularia oryzae</i>	Mostly single	Straight or Pyriform	Black, straight, oval to pyriform, thick septa towards the end of cell	Small, Broad towards the basal end
<i>Curvularia lunata</i>	Acropleurogenous or acrogenous	Cured or more or less straight	Black, curved, curvature at the bigger cell towards the apical cell	Small, Broad towards the aical tip
<i>Curvularia eragrostidis</i>	Acropleurogenous	Straight and Barrel or Ellipsoid	Black, thick median septa	Small, Broad in the Middle
<i>Curvularia intermedia</i>	Acropleurogenous	Curved and Ellipsoid	Black, thick median septa	Small, Broad in the middle

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Table 2: Conidial structure under compound microscope

Species	Number of speta	Shape of conidia	Colour of conidia	Specific diagnostic characters	Size of conidian on (Avr.)	Size of conidia in culture(Avr.)
<i>Curvularia geniculata</i>	4	Geniculate or straight and darker Than the other cells	Black to dark brown, middle cell darker than the other cells	Geniculate and fusiform shape, 4 septate	25 x 11 $\mu$	30 x 12 $\mu$
<i>Curvularia oryzae</i>	3	Straight or pyriform	Black to dark brown, central cells concolourous, end cell Subhyaline	Second cell from base largest and third septa from base darkest	32 x 15 $\mu$	30 x 18 $\mu$
<i>Curvularia lunata</i>	3	Curved or more or less straight	Black to dark brown, third cell from base Darkest, end cells Subhyaline	Third cell from the base largest and darkest, curved mostly	25 x 10 $\mu$	30 x 12 $\mu$
<i>Curvularia eragrostidis</i>	3	Straight and barrel or ellipsoid	Black to dark brown, end cells subhyaline	Thick median septum and very dark	25 x 14 $\mu$	25 x 15 $\mu$
<i>Curvularia intermedia</i>	3	Ellipsoidal or broadly fusiform slightly curved	Black to dark brown, cells subhyaline	Thick median septum at the widest part, curved unequal sided	35 x 15 $\mu$	35 x 15 $\mu$

Table 3: Frequency of seed infection of different locations on different rice varieties

Variety	Location					Mean
	L1 (% Infection)	L2 (% Infection)	L3 (% Infection)	L4 (% Infection)	L5 (% Infection)	
V1 (BR 1)	3.2	3.5	2.4	3.6	3.8	3.3
V2 (BR 26)	4.1	3.3	4.5	4.0	2.4	3.6
V3 (BR 28)	3.2	4.3	3.6	6.0	4.3	4.2
Mean	3.5	3.7	3.5	4.5	4.4	

Legends: Sador = L1, Birgonj=L2, Chiribandor = L3, Birol = L4 and Shetabgonj = L5

Table 4: Frequency of seed infection of *Curvularia* species on different rice varieties

Variety	<i>Curvularia</i>				
	<i>Curvularia geniculata</i> (%) Infection	<i>Curvularia oryzae</i> (%) Infection	<i>Curvularia lunata</i> (%) Infection	<i>Curvularia eragrostidis</i> (%) Infection	<i>Curvularia intermedia</i> (%) Infection
V1 (BR 1)	2.0	3.4	5.3	2.1	1.0
V2 (BR 26)	3.2	4.0	6.2	2.5	0.9
V3 (BR 28)	3.8	3.6	4.9	3.2	0.0
Mean	3.1	3.7	5.5	2.6	0.6

conidia were mostly straight whilst and in *Curvularia intermedia* were curved (Table 1).

The conidia of *Curvularia lunata* were more easily distinguished from others because the conidia in this case were mostly curved, curvature at the bigger cell towards the tip and third cell from the base were bigger and darker than other end cells with rounded tips.

*Curvularia oryzae* have mostly pyriform conidia and arranged on conidiophore singly. Moreover the second cell from the base was found larger and the third septum from the base was darker (Table 2). The above taxonomic studies of different species of *Curvularia* supported by the Subramanian (1953), Ellis (1966), Boedijn (1933) and Sivanesan (1987). Their identifications were mainly based on cultural studies. In routine health testing of rice seed, the same criteria as employed for rice in the identification of the different species were opened by Benoit and Mathur (1970). The colour of the conidia was mostly black which was not helpful for identification (Table 2).

The result showed that the range of infection percent of locations and varieties were not much higher (Table 3, 4) probably because of present less inoculum potential and cultivation of tolerant cultivars against *Curvularia*.

The present investigation provides the information on the occurrence and distribution of the above five species of *Curvularia*. The information is important in respect of breeding

programme and planning for disease management. Further investigation regarding *Curvularia* species on rice seeds is required for more species suggested on different varieties of rice in different districts of Bangladesh.

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