



RICE BROWN SPOT: A PERIL TO THE FARMERS

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INTRODUCTION

Rice (*Oryza sativa* L.) is the second most important agricultural cereal crop, supplying over half of the world's population. Rice is infected by many devastating diseases which are caused by a wide range of phytopathogens which include fungi, bacteria, phytoplasma and virus resulting in an annual yield loss of about 16%. Among them, brown spot disease of rice incited by *Bipolaris oryzae* (Teleomorph: *Cochliobolus miyabeanus*) causes yield loss of up to 90% or even 100% at severe conditions. This pathogen was one of the responsible for the great Bengal famine which occurred in 1942-1943. During that period, rice crops were severely infected with the brown spot disease which resulted in the yield loss of more than 90%. Due to this, rice grain production declined and millions of people died due to starvation. This disease can be controlled by the integrated disease management approach.

Name of the disease: Rice brown spot

Causative agent: *Bipolaris oryzae*

Systematic position

Domain: Eukarya

Kingdom: Fungi

Phylum: Ascomycota

Class: Dothideomycete

Order: Pleosporales

Family: Pleosporaceae

Genus: *Cochliobolus*

Species: *C. miyabeanus*

SYMPTOMATOLOGY

1. Leaf symptoms

Infected leaves show dark brown coloured circular to oval shaped spots with greyish brown center. At severe conditions, several spots coalesce causing leaf necrosis.

2. Grain symptoms

In grains, it occurs as complex disease-causing grain discolouration symptoms along with other pathogens viz., *Fusarium moniliforme*, *Magnaporthe grisea*, *Curvularia lunata*, *Sarocladium spp.*



Leaf symptom

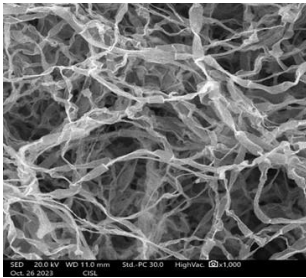


Grain symptom

PATHOGEN MORPHOLOGY

The pathogen possesses both sexual and asexual stages. The sexual (teleomorphic) stage of the pathogen (*Cochliobolus miyabeanus*) produces ascospores as sexual

spores which are filiform in shape. Eight ascospores are produced in asci in flask like sexual fruiting body called perithecium. The asexual (anamorphic) stage of the pathogen (*Bipolaris oryzae*) produces conidia as asexual spores which are ellipsoidal, curved, bulged at middle having tapering ends with bipolar germination of mycelium. The mycelium is septate and coloured. Conidiophores are brown, straight, cylindrical, and multi-septate. The conidia are produced in a flask shaped asexual fruiting body called as pycnidium.



Scanning electron microscopic image of the mycelium of *Bipolaris oryzae*

MODE OF SPREAD AND SURVIVAL

Bipolaris oryzae is an externally seed borne pathogen which survives on seed coat. The pathogen also survives in the alternate hosts and the spores of the pathogen spreads through wind (Anemochory).

EPIDEMIOLOGY

Temperature with 20-30°C with >85% relative humidity is conducive for the development of disease. Also, deficiency in minerals such as Nitrogen, Phosphorous, Potassium, Silicon, Manganese favours the disease development.

IDM PACKAGE

The integrated disease management approach for the disease management includes:

a) Cultural methods

1. Crop rotation with non-host crops.
2. Growing resistant cultivars – ADT 44, PY 4, CORH 1.
3. Timely sowing- Disease escape (Klenducity).
4. Removal of alternate hosts like *Leersia hexandra*, *Echinochloa colonum*.

b) Biological methods

1. Seed treatment with the fungal bio control agent *Trichoderma viridae* @ 4g/kg of seeds or with the bacterial bio control agent *Fluorescent pseudomonads* @ 10g/kg of seeds.
2. Foliar spray with 10% fluorescent pseudomonads or 10% *Bacillus subtilis*.

c) Chemical methods

1. Seed treatment with carbendazim 2g/kg of or thiram 4g/kg of seeds.
2. Spraying Copper oxychloride @0.1% at 15 days interval or mancozeb 2g/l at 15 days interval.