PREFACE: Rice is one of the leading food crops of the world, an important staple food and cash crop of Pakistan. The rice crop is subjected to more than forty diseases caused by the fungi, bacteria, nematodes and viruses, resulting in the substantial yield losses. The diseases may appear at any growth stage of the rice plant starting right after the seed sown, roots, foliage, stalk, leaf sheath, inflorescence and even the developing grains. Management of diseses need timely identification and adaptation of appropriate control strategy. This brochure provides the information to farmers, students and agriculture extension workers for the identification and management of important diseases of rice in Pakistan.

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Director, NIAB

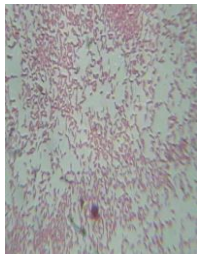
IMPORTANT RICE DISEASES

BACTERIAL LEAF BLIGHT (BLB)

CAUSE: *Xanthomonas oryzae* pv. *oryzae*

SYMPTOMS: The BLB lesion usually starts from the leaf margin near tip. As the disease progresses, the tiny water soaked lesion turns yellow, enlarges in size, develops into an elongated irregular lesion along the leaf margins and midvein. Bacterial ooze consisting of small, yellowish, beads like spherical masses, sometimes observed on the margins or the veins of the freshly infected leaf under moist conditions.

Potential inoculum sources include infected planting material, volunteer rice plants, infected straw or chaff and weed hosts, although the exact role of these sources in nature is poorly understood. Seed transmission is generally thought to occur to a certain extent.


X. oryzae


BLB Symptoms


Bacterial ooze


Wavy leaves margins


BLB patch

CONTROL:

Use seed from disease free crop. Treat the seeds with hot water at 52ºC-54ºC for 20-30 minutes. Grow resistant varieties. If the favorable weather persists and disease is at flare-up stage, it is advisable to withdraw the application of nitrogen fertilizer to minimize the effect of disease on yield. Avoid the flooding from the infected field to healthy field areas. Spray of copper-based fungicides will help in reducing disease. Drain away the water from the fields.

RICE BLAST (RB)

CAUSE: *Pyricularia oryzae*

SYMPTOMS: RB infected leaves showed diamond-shaped or eye-shaped spots with gray to white centers surrouned with brown margins. The spots coalesce resulting a complete drying of the infected leaf. The infected panicle turns white, causing panicle blast and dies before grain filling. The infected node rots causing the death of foliar parts. The disease perpetuates through plant debris lying in the field, seeds and wild grasses.


P. oryzae


Blast symptoms


Panicle blast

CONTROL: Burn and destroy diseased plant debris and stubbles. Cultivation of resistant varieties. Early planting. Seed treatment with suitable fungicide and spray the crop at diease flare up stage. Avoid excessive application of irrigation water and excessive plant population. Control grasses and other weeds.

BROWN SPOT (BS)

CAUSE: *Bipolaris oryzae*

SYMPTOMS: BS appears as small and circular dark brown lesions with gray to whitish centers evenly distributed over the leaf surface. Brownish spots cover the entire seed surface in severe conditions. Diseased seeds and plant debris help the fungus to survive, while air and irrigation water help the fungus for transmitting from diseased to healthy plants.


B. oryzae


BS symptoms

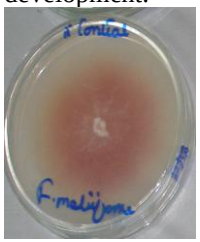

BS Epidemic

CONTROL:. Use resistant varieties and disease free seed. Sanitation and crop rotation. Hot water seed treatment at 54ºC for 10 minutes. Destruction of stubbles and application of suitable foliar fungicides.

BAKANAE DISEASE (BD)

CAUSE: *Fusarium moniliforme*

SYMPTOMS: Seedlings with BD emerge rapidly, remain tender and are significantly taller than non-infected plants. Infected plants produce roots from the upper nodes due to rottening of main roots. In some cases, diseased plants survive until maturity, but are sterile and produce no or empty panicles. BD is a soil borne however, spores are carried through wind and water to the field. High amount of nitrogen and temperature from 30-35ºC favour the disease development.


F. moniliforme


BD symptoms


Upper nodes roots

CONTROL: Use of disease free seeds, resistant varieties and seed treatment with suitable fungicides. Avoid irrigation from infected to healthy field.

GRAIN DISCOLORATION (GD)

CAUSE: *Bipolaris oryzae, Fusarium moniliforme , Alternaria padwickii, Curvularia oryzae, Nigrospors oryzae* and various other organisms

SYMPTOMS: The infection may be external or internal causing discoloration of the glumes, kernels or both. Dark brown or black spots appear on the grains. Under humid conditions, the fungal growth may be prominently seen. The discoloration may be red, yellow, orange, pink or black, depending upon the organism involved and the degree of infection.



CONTROL: Use diseased free seed. Sanitation and crop rotation. Hot water seed treatment at 54°C for 10 minutes or with proper seed dressing fungicides. Proper use of nitrogen fertilizers.

FALSE SMUT (FS)

CAUSE: *Ustilaginoidea virens*

SYMPTOMS: The disease is mostly apparent ON glume showing black, sooty mass of spores. In severe cases, a short beak-like or spur-like outgrowth is produced by the rupturing glumes. Chlamydospores survive for a year or more under normal conditions and have been found to be viable after three (3) years in stored grains.


U. virens


FS symptoms


Sooty mass

CONTROL: Cultivation of resistant varieties. Use of healthy seed. Sowing early maturing varieties. Avoid high rates of nitrogen fertilizer. Avoid winnowing and threshing of diseased crop in field. Treat the seed with suitable fungicides.

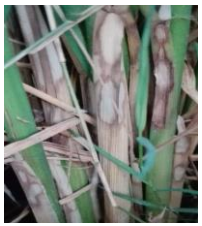
SHEATH BLIGHT (SB)

CAUSE: *Rhizoctonia solani*

SYMPTOMS: Diseased plants shows large, irregularly elongated and snake-skin like lesions on the leaf sheath and center of the lesion becomes bleached with an irregular purple brown border. At severe condition, infected leaves become dry. SB is a soil borne disease, high humidity and temperature favour the disease development.


R. solani


Blighted sheath


SB lesions

CONTROL: Cultivation of resistant varieties. Plant spacing should be optimized. Proper use of nitrogen fertilizers. Sanitation of weeds. Use of preventive and protective spray with suitable fungicides.

SHEATH ROT (SR)

CAUSE: *Sarocladium oryzae*

SYMPTOMS: Lesions appear at flag leaf sheath enclosing young panicles. The spots enlarge and coalesce covering most of the leaf sheath. Panicles remain within the sheath or may partially emerge and tend to rot. Florets turn red-brown to dark brown. High amount of nitrogen, high humidity and dense crop favour the disease.


S. oryzae


SR symptoms


Panicle rot

CONTROL: Use healthy seed and crop rotation. Control of weeds and insect population. Remove the plant debris after harvesting.

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IMPORTANT RICE DISEASES AND THEIR MANAGEMENT



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