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Blast Disease in Rice and its Management

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Abstract

Rice is one of the major food crops in South-Eastern India. Its production was severely affected by certain agro climatic conditions such as biotic and abiotic stresses in crop health. Biotic stress such as fungi, bacteria, nematodes, viruses and non parasitic disorders are involved. Among which the fungal diseases, rice blast is considered one of the most important diseases of rice. Rice blast caused by *Magnaporthe grisea* is turn to be one of the most severe pathogen under change in climatic condition. Asian countries are main rice producer as well as consumer of world 90% production. This disease can be efficiently managed by following management practices *viz*. cultural, biological and chemical methods.

Introduction

Rice (*Oryza sativa*) is one of the most cereal food crops cultivating around the world. India ranks second in rice production after China, and is the largest producer and exporter of rice in the world. Rice blast disease caused by *Magnaporthe oryzae* (anamorph: *Pyricularia oryzae*) is the major constraint in all the rice ecosystems of the country. Disease appears throughout the crop starting from nursery stage to maturity stage and symptoms appear on the leaves and nodes (Seebold *et al.,* 2004). This disease can be managed by the following ecofriendly and fungicides strategies.

Symptoms

The fungus may attack all of the ground portions of rice plant at various stages of growth: the leaf, collar, node, internode, base or neck, and various parts of panicle, and often the sheath of the leaf (Peterson, 1990). Symptoms appear on leaves, nodes, neck of the panicle and grains. Based on the plant parts on which the symptoms appears, blast disease is named as follows.

1. Leaf Blast

• Spindle or eye shaped spots, with grey centre and dark brown margin, are produced on leaf surface.

• Several spots join together on the leaves leading to leaf drying.

• Severely infected field shows a burnt up appearance. Thus it is called blast disease.

2. Nodal Blast

• Necrotic black lesions encircle at nodes resulting in weakening of nodal region.

• All the plant parts above the infected nodes dry up.

3. Neck Blast

• Dark brown to black colored spots appear at the neck region of panicle.

• As a result, transport of nutrients to grains is blocked leading to chaffy grains.

• The ear head breaks at the neck region.

4. Grain Infection

• The grains are also infected. Dark brown spots appear on the grains.

Figure 1: Leaf blast

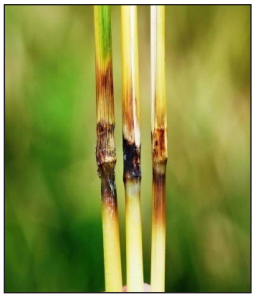

Figure 2: Node blast

Figure 3: Neck blast

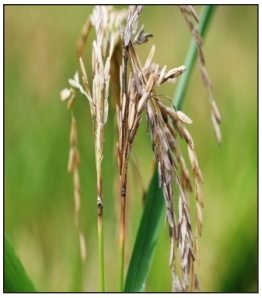

Figure 4: Grain infection

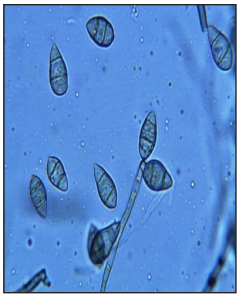

Figure 5: Conidia

Diseases Cycle

The disease spreads primarily through airborne conidia since spores of the fungus present throughout the year. Mycelium and conidia in the infected straw and seeds are major sources of inoculum. Irrigation water may carry the conidia to different fields. The fungus also survives on collateral hosts *viz., Panicum repens, Digitaria marginata, Brachiaria mutica, Leersia hexandra* and *Echinochloa crusgalli.* Spores land on leaves, germinate, penetrate the leaf and the blast lesions are evident within 3 to 4 days of infection (Wilson and Talbot, 2009). Infections from spores arriving from a distance are termed primary infections. Primary infections generally result in a few widely scattered spots on leaves. Spores arising from the primary infections are capable of causing many more infections. This cycling is called secondary spread. Secondary spread is responsible for the severe epidemics of blast in fields and localized areas.

Favourable Conditions

• Application of excessive doses of nitrogenous fertilizers, intermittent drizzles cloudy weather, high relative humidity (93-99%), long dew periods with dew deposition on leaves, low night temperature (below 20 °C) and availability of collateral hosts (Barnwal *et al.,* 2012).

Forecasting

Forecasting for rice blast can be made on the basis of minimum night temperature range of 20-26 °C in association with a high relative humidity of 90 percent and above lasting for a period of a week or more during any of the three susceptible phases of crop growth, *viz*., seedling stage, post transplanting tillering stage and neck emergence stage. In Japan, the first leaf blast forecasting model was developed named as BLAST. Later several other models have also been developed namely, PYRICULARIA, PYRIVIEW, BLASTAM, EPIBLA and PBLAST.

Management

• Use of diseases free seeds from healthy crop.

• Grow resistant to moderately resistant varieties CO47, IR 20, ADT36, ADT39, ASD18 and IR64. Avoid cultivation of highly susceptible varieties *viz.,* IR50 and TKM6 in disease favourable season.

• Remove and destroy the weed hosts in the field bunds and channels.

• Split application of nitrogen and nitrogenous fertilizers.

• Seeds are treated with biocontrol agents such as *Trichoderma viride* @ 4 g kg^{-1} or *Pseudomonas fluorescens* @ 10 g kg^{-1} of seeds.

• Treat the seeds with Captan or Thiram or Carbendazim or Tricyclazole at 2 g kg^{-1}.

• Spray the nursery with carbendazim 500 mg L^{-1} or tricyclazole 300 mg L^{-1}.

• Spray the main field with Edifenphos 500 ml or Carbendazim 500 g or Tricyclazole 500 g or Iprobenphos (IBP) 500 ml ha^{-1}.

Conclusion

Rice blast is one of the most devastating disease among all the cereals, mostly in low and wet area of upland farming situation, caused by *Pyricularia oryzae*. Disease appears throughout the crop starting from nursery stage to maturity stage and symptoms appear on the leaves and nodes. The disease is causing significant reduction in yield of paddy crop. Management through fungicides is one of the most widely used management methods. The above mentioned Integrated Disease Management can be effectively imposed wherever applicable for the management of rice blast diseases. Thus, using minimum dose of appropriate fungicide or bio-agents, alternative to fungicide helps in reducing health hazard by minimizing adverse impact on environment (Ghimire *et al.,* 2017).

References

Barnwal, M.K., Singh, V.K., Sharma, R.B, Singh, B.N., 2012. Field evaluation of rice genotypes for resistance and new fungicides for control of blast (*Pyricularia oryzae*). *Ind. Phytopathol* 65(1):56-59.

Ghimire, P., Gopal, K.C., Shrestha, S.M., Parajuli, G., 2017. Evaluation of Fungicides and Bio-agent against Neck Blast Disease of Rice. *Journal of Plant Pathology & Microbiology* 8, 12.

Peterson, L.G., 1990. Tricyclazole for control of *Pyricularia oryzae* on rice: The relationship of the mode of action and disease occurrence and development. Pest management in rice conference held by the Society of Chemical Industry, London, UK, pp. 122-130.

Seebold, K.W., Datnof, J.L.E., Correa Victoria, F.J., Kucharek, T.A., Snyder, G.H., 2004. Effects of Silicon and fungicides on the control of leaf and neck blast in upland rice. *Plant Dis.* 88, 253-258.

Wilson, R.A., Talbot, N.J., 2009. Under pressure: Investigating the biology of plant infection by *Magnaporthe oryzae*. *Nature Review Microbiol.* 7(3), 185-95.