

Pacific Pests, Pathogens and Weeds - Online edition

Rice blast (252)

Common Name

Rice blast

Scientific Name

Magnaporthe oryzae. Previously, *Magnaporthe grisea*. *Pyricularia oryzae* is the asexual name.

Distribution

Asia, Africa, North, South and Central America, the Caribbean, Europe, Oceania. Over 85 countries have reported this disease. It is recorded from Australia, Fiji, Federated States of Micronesia, and New Caledonia.

Hosts

Rice and a number of wild grasses.

Symptoms & Life Cycle

Oval or diamond-shaped spots (5-15 mm long and 3-5 mm wide) with dark borders occur on the leaves (Photo 1). Often, the spots have yellow haloes. Spots develop quickly under moist conditions and produce large numbers of spores on both sides of the leaves. As they age, the spots become longer, the centres turn whitish-grey and the borders become wider and red-brown. The spots join together and the leaves die. Severely infected fields have a scorched appearance.

Spores from the leaves infect the leaf sheath, stem and panicle and cause rots. There are several different types of rot: (i) collar rot appears at the junction of the leaf base and leaf sheath; this can kill the leaf; (ii) neck rot (also called 'rotten neck') appears on the stem below the panicles (the flower heads) and can destroy the stem or result in pale-coloured grains that are partly filled, known as 'whiteheads'; (iii) panicle rot occurs on the branches of the panicle so that it appears brown or black; (iv) node rot (slightly swollen parts of the stem where the leaves and tillers develop) occurs on the stem below the panicles, the rots become black-brown and dry and, if the stem breaks, the plant dies (Photo 2).

The disease is particularly serious in areas of frequent and prolonged showers and temperatures in the range of 24-28°C. This is because the leaves need to be wet for 6-8 hours for spore germination. High humidity, close to 100%, is needed for infection and spore formation. In upland areas, conditions are favourable to the disease because differences between day and night temperatures cause dew to form on the leaves and the overall temperatures are cooler. By contrast, in lowland tropical areas, leaf infection is less, but blast is still serious in seedling nurseries and on panicles.

Spread occurs in irrigation water. Spores are spread short and long distances on air currents and wind. Survival between crops is in straw and stubble, in or on seed, volunteer rice plants, and alternative hosts, mostly grass species.

Impact

Blast is a major disease of rice caused by a fungus. It attacks leaves, stems and flowers, killing plants up to tillering or reducing grain yield and quality on plants that reach maturity. One estimate puts the loss as the equivalent of feeding 60 million people with rice a year. However, impact varies greatly with cropping system, varieties and management practices. Where rice is grown throughout the year, spores are always present giving the potential for major epidemics. By contrast, the impact is less where rice is rotated with root crops, or intercropped with non-hosts, such as sorghum, maize, cassava and vegetables.

Detection & inspection

Look for the oval or diamond-shaped spots with white centres and dark borders on the leaves; these are distinctive and a characteristic of the disease. Look for rots on the stems, especially at the nodes, and flower heads.



Photo 1. Diamond-shaped spots on the leaves of rice leaves caused by blast, *Magnaporthe oryzae*.



Photo 2. Infections at the nodes of stems below the neck, caused by blast, *Magnaporthe oryzae*. The infections occur beneath the flower head and can lead to death of the stem.

Management

An IPM approach is needed to manage this serious disease. It is controlled by using tolerant or resistant varieties, dividing nitrogen fertilizer into several splits, avoiding water stressed plants, eliminating crop residues and by applying seed treatments if fungicides are affordable and available.

CULTURAL CONTROL

Although the main method of blast control is the use of resistant varieties, nevertheless, cultural practices help to lessen the disease impact and should always be considered.

Before planting:

- Where it is possible to alter the planting date, select a time to avoid flowering coinciding with periods of high humidity, which favours blast disease.
- Ideally, neighbouring farmers should plant at the same time to avoid spread of blast from older infected crops to those that are younger.

During growth:

Avoid any cultural practices that weakens the plants and makes them more susceptible to blast:

- Divide nitrogen applications into two or three splits, rather than applying it all at once.
- Use acceptable plant spacing so that air flows through the crop, and the sun can penetrate the crop to dry the leaves and stems. Transplant seedlings rather than broadcast the seed.
- Avoid water stress, or extended drain periods. Flood the field as often as possible.

After harvest:

- Collect and burn or bury the remains of the crop, including the stubble as soon as possible after harvest.
- Do not plant another crop while the last crop is still in the ground, otherwise spores will easily spread from the old crop to the younger one (see Before planting, above).

RESISTANT VARIETIES

Varieties have been bred that are resistant to the disease, but there is always the possibility that they will succumb to new strains of the fungus.

CHEMICAL CONTROL

Although fungicides are available for controlling blast, expense and availability are major issues for smallholders, and they are rarely used. If required and affordable, use the products mentioned below for seed treatments. They are usually applied at the heading stage.

Seed treatments for upland rice.

- Treat seed with fungicide, 1-2 days before sowing, to reduce seed-borne infections of blast. Use protectants, e.g., captan or mancozeb, or systemic products, e.g., pyroquilon, azoles and strobilurins.
- Check the registration of these products and their availability.

*When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. **Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticide to use should always be sought from local agricultural authorities.***

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Information from BugwoodWiki (2014) *Magnaporthe oryzae*. (https://wiki.bugwood.org/Magnaporthe_oryzae); and Blast (various articles). Rice Knowledge Bank. IRRI. (<http://www.knowledgebank.irri.org/search-results?gsquery=blast>); and Meng Q *et al.* (2019) Proteomics of rice - *Magnaporthe oryzae* interaction: what have we learned so far? *Front. Plant Sci* 29. (<https://www.frontiersin.org/articles/10.3389/fpls.2019.01383/full>); and (with Photo 2) CAB International (2019) *Invasive Species Compendium*. (<https://www.cabi.org/isc/datasheet/46103>); and from TeBeest DOC (2012) Rice blast. The Health Instructor. (<https://www.apsnet.org/edcenter/diseasediagnosis/fungalasco/pdlessons/Pages/RiceBlast.aspx>). Photo 1 IRRI Rice Knowledge Bank.

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