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Rice blast (*Magnaporthe oryzae*)

Causal agent: Fungus



Fig 1. Conidia of *Magnaporthe oryzae*

Source: Prof Nick Talbot, TSL

Favourable conditions for disease development

- The disease occurs under long periods of free moisture which leads to continuous leaf wetness (>10 hours) and a high relative humidity (RH>90%). The optimum temperature range for infection is 25-28°C.
- Under favorable conditions, the infection process starts when fungal spores land on the leaf surface. The fungus penetrates into plant cells and multiplies by drawing nutrients from the plant.
- After about a week, the fungus has fully colonized the plant cells and produces aerial spores to enable it initiate a new cycle of infection. The spores are spread by water or wind splashes to the neighbouring plants and starts a new cycle of infection.
- The fungus remain in rice straw and stubble becomes source of inoculum in the subsequent seasons.
- Disease occurrence is also favoured by high planting density and poor drainage in paddy rice.
- Excessive use of nitrogenous fertilisers increases the plants susceptibility to the disease.

Geographical Distribution

- In all the rice growing regions in East Africa.

Crop losses and associated damage

- Yield losses of 70-100% have been reported under epidemic conditions.
- Symptoms differ based on the infected plant infected as follows:

Leaf blast: Diamond or spindle-shaped lesions with gray centers surrounded by a red or brown margin Lesions may enlarge and coalesce.

Neck blast: Black or brown rot on the neck of the panicle. The panicles above are unfilled and turn white.

Node blast: Black-brown lesions on the node. This causes the culm to break leading to death of the plant.

Collar blast: Brown rot at the junction of the leaf blade and sheath.

Panicle blast: The panicle turn brown-white.



Fig 2. Leaf blast

Source: Prof. Nick Talbot, TSL



Fig 3. Neck blast

Source: Lanoiselet, et al. (2015), NDP14V2



Fig 4. Node blast (Left) and Panicle blast (Right)
Source: Lanoiselet, et al. (2015), NDP14V2

Contact experts: Mutiga, S. (Mutiga@uark.edu), Mwongera, D; Kirigua, V; Otipa, M; Kimani, J; V. Mugambi, C; Ngari, B; Ochieng, V; Wasike, V; Wandera, F, Wasilwa, L; Too, A; Nyongesa. O. (IRRI); Zhou, B (IRRI); Mitchell, T. (OSU); Wang, G. L (OSU); Were, V. (TSL); Ouedraogo, I. (INERA); Rotich, F. (UoEm); Correll, J. C. (UARK) and Talbot, N. J. (TSL). *E-Guide for Rice Production in East Africa (2019)*

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Management Strategies

1. Cultural Control methods

- Plant certified seeds.
- Avoid excessive use of nitrogenous fertilisers. Use fertiliser at recommended rates:
 - Basal (NPK 17:17:17, 125 kg/ha)
 - Tillering (AS, 100 kg/ha)
 - Panicle initiation (AS, 100 kg/ha)
- Improve content of silicon in the soil by application of silicon at a rate of 1000 Si Kg/ha. Silicon strengthens the plant cell wall which is a natural barrier that protects plants from attack by disease causing agents.
- Ensure there is optimal application of water. Water stressed rice plants are more susceptible to rice blast infection.
 - Intercrop rice blast susceptible varieties with tolerant varieties to reduce disease pressure.
 - Practice crop rotation with non-host crops to break the disease cycle.
 - Plant early to avoid late season high disease pressure.
 - Plant each variety at recommended spacing to avoid dense crop canopy. (Refer to agronomic practices factsheet).

2. Resistant cultivars

- Use tolerant varieties such as NERICAs (1, 4, 10 & 11), BW 196, IR 2793-80-1.

3. Biological control

- If available, use antagonistic biocontrol agents such as *Trichoderma* spp (such as Trianum P[®], Rootgard[®]) *Pseudomonas fluorescens* (such as Brochure B 1.75 WP[®]) for seed dressing.

4. Chemical control

- Spray at maximum tillering and at panicle initiation using Carbendazim (such as Chariot 500 SC[®] at a rate of 100mls/20l) Carbendazim and Prodigione (such as Megaprode Lock 52.5[®] at a rate of 15mls/20l), Trifloxystrobin and Tebuconazole (such as. Nativo[®]) at a rate of 5-10ml/20l.
- When using chemicals wear protective clothing and avoid contaminating the environment. Follow the manufacturers instructions on the label and ensure pre-harvest interval is observed.

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