

Rice Blast Disease and its integrated management

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I. About the disease

Hindi Name: सहसामारी, झुलसन, प्रधावंदा (Sahasamari, Jhulsan, Pradhawanda)

Odia name: ମହିଷା ରୋଗ (Mahisa roga)

Blast is a major problem in diverse agro-ecological regions of Odisha. The disease causes more than 40% yield loss in all over India. The disease was first reported in China in 1637. Later it was reported in Italy during 1706 by the name 'Brusone' as the affected fields look like burnt appearance. The disease is a major problem in all the rice growing regions of the world. The other names of the disease are "Rice Fever".

II. Disease Symptoms

The symptoms appear first on leaves 4-5 days after a prevailing favorable weather conditions. Infection followed by spore production occurs repeatedly leading to fresh infections and total crop destruction in a short period of time. The disease can be categorized as 1. Leaf Blast; 2. Nodal Blast and 3. Neck blast/Panicle blast based on the tissues affected.

1. Leaf Blast:

- On leaves, the symptoms appear as elliptical with more or less pointed ends resembling a spindle.
- Initially, they appear as small grayish dots of pin-head size that finally enlarge into a spindle-shaped spot about 1 cm in long and 0.5 cm in breadth.
- Such spots have brown margin with as grey centre. When numerous spots occur on leaves and coalase e, resulting in drying and death of the plant.

2. Nodal Blast:

- The pathogen also infects the nodes that turn black and get weakened due to tissue disintegration, resulting in breakage of stem at the nodal region followed by death of all the plant parts.

3. Neck Blast/Panicle Blast:

- The Panicle Blast or neck blast attack results in improper grain filling complete loss of yield.
- Small brown to black spots also may be observed on glumes of the heavily infected panicles.
- Neck blast cause whiteheads or white panicles, similar to stem borer infection.



Leaf blast symptoms



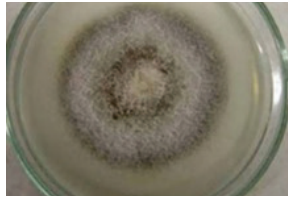
Leaf blast symptoms



Nodal Blast symptoms



Neck Blast/Panicle Blast symptoms



Pure culture of pathogen on PDA



Conidia produced on conidiophore (3 celled, 2 septate)

III. Pathogen

- The disease is caused by a fungal pathogen *Magnaporthe oryzae* (Syn: *P. grisea*) (Sexual stage: *Magnaporthe grisea*).
- It is a deadly pathogen can cause the infection throughout the crop growth stages.
- The pathogen produces enormous amount of spores which will disseminate through wind and cause devastating damage in healthy fields under favorable conditions.
- The pathogen produces hyaline to olivaceous, septate mycelium which is highly branched.
- Conidia are 3 celled, produced in clusters on long, septate, olivaceous slender conidiophores.
- Conidia are pyriform to obclavate or somewhat pear-shaped, attached at the broader base by a hilum.
- The pathogen produces few toxins like α -Picolinic acid, Pyricularin and Pyriculol

IV. Economic thresh hold level (ETL)

Leaf blast: 3-5 lesions/leaf at vegetative stage

Neck blast: 2-5 neck infected plants/m²

V. Critical Stages of Infection

Seedling stage, post transplanting tillering stage and panicle emergence stage

VI. Favorable conditions

- Low night temperatures of 22-28°C.
- High Relative Humidity of More than 95%.
- Dew deposits on leaf surface
- Extended leaf wetness period for more than 10 hours

- Cloudy/drizzling weather.
- High nitrogen in soil (Soil fertility)
- Continuous monocropping of single variety.
- Collateral hosts such as weed hosts like *Panicum repens*, *Digitaria marginata*, *Brachiaria mutica*, *Leersia hexandra*, *Dinebra retroflexa*, *Echinochloa crusgalli*, *Setaria intermedia* and *Stenotaphrum secundatum*.

VII. Management Practices

1. Nursery/seedling stage to transplanting stage

- Follow deep summer ploughing, collect and destroy of crop residues, weed hosts and self-sown plants from previous season.
- Crop rotation should be followed strictly by different variety or different crop.
- Prepare raised nursery beds preferably.
- Use disease free certified seeds for sowing.
 - a. Upland: Phalguni, Sahabhagidhan, Virendra, Vandana, Hazaridhan.
 - b. Irrigated Ecosystem: CR Dhan 601, Chandrama, Abhishek, Ajay, Rajlaxmi.
 - c. Raifed shallow lowland: Reeta, Pooja, Seema, Dharitri.
 - d. Waterlogged medium deep land: Hansaswari, Moti, Kalashree, Gayatri
 - e. Coastal Saline: Luna Suvarna
- Use Resistant varieties for cultivation
- Follow seed treatment with Fungicided like Carbendazim 50% WP @ 2g/kg of seeds or Biocontrol agents like *Pseudomonas fluorescence* 10g/kg of seeds or *Trichoderma viridae* @5-10 g/kg of seeds gives protection.
- Follow seedling root dip (if needed) with *Pseudomonas fluorescence* @5g/lit of water for 20-30 min before transplanting.
- Soil application of neem cake @150kg/ha.

2. Post Transplanting stage

- Apply recommended dose of fertilizers especially nitrogenous fertilizers should be applied in splits (50% as basal dose, 25% in tillering stage and 25% in panicle initiation stage).
- Remove and destroy monocot weeds which acts as collateral hosts.
- Monitor the crop regularly for disease assessment and take up chemical sprays only if the disease crosses ETL.

3. Panicle Initiation to grain maturity stage

- Regular monitoring of the crop.
- Spray biocontrol agents like *Pseudomonas fluorescence* @5g/lit of water if required.
- Spray fungicides only when the disease severity is more.

VIII. List of chemical fungicides approved for management of paddy blast.

Fungicides	Commercial formulations available in market	Dosage/ha			Waiting period from last application to harvest (Days)
		a.i (g)	Formulations (g/ml) %	Dilution in Water (L)	
Carbendazim 50% WP	Bavistin, Benfil, Dazim, Goldstin,Savistin, Carwell,Carzimchem, Avistin, Comman-do, Carry, Conika				
Hexaconazole 5% EC	Contaf, Contaf Plus,Green Taf,Confort Plus,Hexarin Plus,Hexon,Sitara Plus,hex-adhan Plus,	50g	1000mL	500	40
Isoprothiolan 40% EC	Fujione,Paddy Star, Nagasaki, Isocure	300g	750 mL	500	60
Kasugamycin 3% SL	Kasu-B,Bimycin, K-Mycin,Biostadt-Omy-cin	30-50g	1000-1500 mL	500	30
Picoxystrobin 22.52% w/w SC	Galileo, Gladen	150g	600mL	500	12
Tebuconazole 25% WG	Caviet,Tubler Plus+,	187g	750mL	500	10
Tebuconazole 50% + Trifloxystrobin 25% WG	Nativo, Ovitan, Gezeko, Tefloxychem	100+50	200	500	21
Azoxystrobin 18.2% w/w + Difenconazole 11.4% w/w SC	Godiwa Super, Azozole,Azooba,Caristar Top, Azaka Duo, Azodifen, Adrone,	0.3g	1 mL	500	31
Pyraclostrobin 100g/l CS	Seltima, Defender CS, Frivon, Quinon	100	1000	500	18
Carbendazim 12%+ Mancozeb 63% WP	SAAF, Stuff, Kaguya, Carman, SOFT, SAAFilizer, Crossman, Revive, Fussion, Policy,Susafe, Safer,Carzeb, Polestar,Car-wen, Samartha, Kapeni,ESSAF SAF-Cure, Gomeda, Combi Plus, Quit, Mandoz, Companion.	375g	500	500g	72
Kresoxim-methyl 40% + Hexaconazole 8% WG	Ayaan	200 & 40	500	500	22

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