

Effect of Blast Disease on Yield-Contributing Characters, and Seed Quality Traits of Aromatic Rice in Bangladesh

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Received date: November 07, 2022, Manuscript No. IPMCR-22-15520; **Editor assigned date:** November 09, 2022, PreQC No. IPMCR-22-15520(PQ); **Reviewed date:** November 18, 2022, QC No IPMCR-22-15520; **Revised date:** November 29, 2022, Manuscript No. IPMCR-22-15520 (R); **Published date:** December 08, 2022, DOI: 10.36648/2471-299X.8.12.3

Citation: Khan A (2022) Effect of Blast Disease on Yield-Contributing Characters, and Seed Quality Traits of Aromatic Rice in Bangladesh. Med Clin Rev Vol. 8 Iss No.12:003.

Description

One of the most destructive diseases that affect rice (*Oryza sativa* L.) worldwide is rice blast (*Pyricularia oryzae* Cavara; synonym *P. grisea* Sacc; teleomorph *Magnaporthe grisea*). It is the most prevalent disease that affects irrigated rice in both subtropical and temperate regions of East Asia. Serious epidemics occur wherever aromatic cultivars are grown, even in less blast-friendly environments like subtropical rain-fed lowland rice areas. During the vegetative stage, the pathogen is most prevalent on leaves, causing leaf blast, or during the reproductive stage, causing node and neck blast on panicle branches. Individual leaves with leaf blast lesions have net photosynthetic rates that are significantly lower than the diseased leaf fraction. The most destructive phase of the disease, neck blast, can occur without severe leaf blast preceding it. Seedlings in the nursery are completely destroyed by blast epidemics and epidemics in the field. In all rice-growing regions of the world, including Bangladesh, outbreaks of this disease are a serious and recurrent issue that is extremely challenging to control. Infection of the panicle results in total yield loss. The severity of yield reduction caused by neck blast infection is twice that of leaf blast. In 1950, susceptible cultivars in India lost 75% of their grain yields, while over 50% of their yields were lost in the Philippines. Because of the poor grain filling on infected panicles, neck blast results in direct yield losses. As a result, neck blast is the blast disease's most severe stage.

Pathogen Transmission from Neck-Blast-Infected Panicle Branches to Seed

In Bangladesh, around 7000 assortments of rice are filled in various pieces of the country. Rice is generally categorized according to its length, thickness, and aroma. Aromatic rice is valued more highly in the rice market than non-aromatic rice due to its distinctive aroma when cooked. It should be noted that Bengalis' social and cultural heritage is closely linked to aromatic rice, which is consumed at various festivals, weddings, and for entertaining guests. Privately, cultivars Kalijira, Sakkorkhara, and BRRI dhan34 have little grain and wonderful

smell. Sweet-smelling rice assortments have involved around 12.5% of complete downpour took care of marsh rice development. Fine rice has a much lower production cost per hectare than coarse rice. The low yield can be attributed to a number of factors, including the variety's low yield potential, tendency to neck blast susceptibility due to high humidity, and low flowering temperature. Due to the favorable conditions during flowering, almost all aromatic rice in Bangladesh's rain-fed low land ecosystem is highly susceptible to neck blast. Although most field research on rice blast disease has been done in tropical and subtropical environments, little is known about how neck blast disease affects aromatic rice grain yield and seed quality in Bangladesh. Additionally, there is still confusion regarding pathogen transmission from neck-blast-infected panicle branches to seed. As a result, the purpose of this study was to investigate the impact that blast disease has on aromatic rice seed quality traits and yield-contributing characteristics in Bangladesh. In addition, this study determined the percentage of blast pathogen transmission from panicles to seeds.

Differences in Agronomic and Quality Traits between Two Conditions

For the purposes of measuring yield characteristics and grain size, one hundred healthy or diseased panicles from each group were randomly separated. During harvesting, the length of the panicles, the percentage of filled and unfilled grains per panicle, and the sterility of the grains were measured. After three days of sun drying, the diseased and healthy panicles' weight, grain length, width, and their ratio, as well as their 1000-grain weight and the corresponding moisture, were measured. The presence of a seed-borne pathogen in both filled and unfilled grains was used to determine the grain quality of the respective varieties' freshly harvested air-dried seeds. The modified blotter method, which did not involve sterilizing the seed surface, was used to determine the presence of fungi that were transmitted by seeds on the seeds. When compared to the grains of healthy panicles, the disease resulted in a weight loss. Taking into account the specific characteristics of rice blast disease, these findings could be explained. During the generative growth stages, most plant

infections are panicle or neck infections, which can result in the plant's neck becoming dead and a grain filling that isn't complete. Genetic variations were most likely to blame for the observed variations in blast infection levels between the tested varieties. The differences in agronomic and quality traits between two conditions (diseased and healthy) could be attributed to the effect of the disease, which reduces the 1000-grain weight and individual panicle weight and increases grain sterility percentages. Since the soil properties, cultural management, and microenvironments were similar in both healthy and diseased panicle cases, the disease had an impact on the grain size as well, but the variety had an impact. However, because the genotype's response to the blast disease

was different from variety to variety, the magnitude of the reduction varied. In some regions of the world, yield losses caused by rice blast that have been documented in the literature exceed 50 percent, and they have been attributed to a variety of factors. Koutroubas and others discovered that blast disease decreased the accumulation and remobilization of pre-anthesis assimilation to rice grains. Due to the fact that they are influenced by both the environment and the severity of the disease, the associations between blast severity and grain yield that have been reported in the literature are rather erratic. Impact is one of the most disastrous and cosmopolitan sickness with extraordinary expected danger for fruitful rice creation, particularly that of sweet-smelling rice.