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Sheath Blight Disease: A Major Disease Of Rice *(Oryza Sativa* L.*)*

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Abstract

Rice (*Oryza sativa* L.) is one of the most important crops in the world, providing a staple food for nearly half of the global population and is considered the second most important cereal crop, following wheat, as a main food for the population. Rice sheath blight is a major disease after blast and is a soil-borne disease that infects rice at the late tillering stage observing a water line structure. This disease has become a major production constraint in Punjab, Haryana, Eastern and Uttar Pradesh etc. Sheath blight disease is caused by *Rhizoctonia solani AG1-IA*. Rice sheath blight develops into a major production-limiting disease in an alarmingly short time. In fact, the disease has become the most important rice disease in the southern rice producing areas of the United States over the last 10 years. Yield losses are large as 50% occured in susceptible cultivars when all the leaf sheath and leaf blades are infected. Lesions can be found on young rice leaf at late tillering stage under favorable conditions. These lesions appear 0.5-3 cm below the leaf collar as circular, oblong or ellipsoid, water-soaked spots about 1 cm long. They enlarge approximately to 1 cm in width and 2-3 cm in length. Under favorable microclimate conditions of low sunlight, humidity near 95% and high temperature (approx. 30^0c) infection spread rapidly by means runner hyphae to upper part of plants. Some enzyme like *chitinase* and *β-1,3-glucanase* who can inhibit the growth of *Rhizoctonia solani* and prevent its colonization in the host plant by degrading its cell wall. However, these two genes function in the same pattern. Therefore, when the transgenic plants overexpressing *chitinase* lose their resistance to any species of *R. solani*, those transgenic plants overexpressing *β-1,3-glucanase* will also lose their resistance to the same species.

Keywords: Rice, Sheath Blight, *Rhizoctonia solani*, Chitinase, β-1, 3-glucanase.

Biological control approaches for plant protection: a need for today and tomorrow

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Abstract

When it comes to managing plant diseases and insect pests, biological control is thought to be a possible substitute for pesticides and plant resistance. However, support for this approach will require a deeper comprehension of how biological control interacts with society and the environment. Pesticide use on a variety of crops, such as the cereals, pulses, fruits, and vegetables etc. that consumers eat as well as in and around their homes, is worrying consumers more and more. Neonicotinoids and other broad-spectrum pesticides' effects on pollinators and other beneficial organisms are equally concerning as their harmful effects on human health and the environment. Biological control is gaining popularity among growers, professionals, and farmers these days due to its advantages, which include less dependence on pesticides, a lower risk of pesticide resistance developing, flexibility in the use of personal protective equipment, shorter (or no) restricted entry intervals, and the benefit to one's reputation for being an environmentally conscious and sustainable individual. The adoption of biocontrol methods which includes use of biological control agents (BCAs) like *Trichoderma* spp., *Pseudomonas fluorescens*, *Beauveria bassiana, Verticillium lecanii, Bacillus thuringiensis* etc. and neem based products, conservation and mas culturing of existing natural enemies (as predators and parasitoids) like *Trichogramma* spp., *Encarsia formosa*, Braconid wasps, ladybird beetles, lacewings, praying mantids etc., introduction of new natural enemies, use of different types of traps like sticky traps, pheromone traps, fruit fly traps, light traps etc. and trap crops like marigold, alfalfa, rose, mustard, sesbania etc., has enough potential to manage plant diseases and insect pests in crops can significantly boost crop production.

Key words: biological control, BCAs, insect pests, natural enemies, plant diseases, traps.