

False Smut

An Emerging Disease of Rice

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Introduction

Rice is widely consumed as a staple food in India. It is the most important grain regarding its human nutrition and caloric intake, so rice security is an important factor in determining social and political stability apart from economic stability. Apart from the major

diseases of rice such as blast, brown spot, sheath blight, bacterial leaf blight, and tungro, minor diseases like sheath rot, bakanae, and false smut have emerged as major problems now due to the impact of climate change.

False Smut

Rice False smut, also known as pseudo smut or green smut, is caused by the fungus *Ustilaginoidea virens* in rice-growing regions of India. The occurrence of false smut has been recorded in almost all rice-producing states of India and was categorized as a minor disease back in time. However, the disease has emerged

as an increasing concern for rice production since the widespread cultivation of hybrid rice, heavy application of nitrogenous fertilizer and pesticides, and the impact of climate change make it an emerging disease. It can cause up to 49% yield loss.

Symptoms and pest identification

False smut can easily be identified in the field due to its peculiar symptoms. The pathogen infects rice flowers and, later on, transforms the grains into smut balls. The smut balls appear flattened and yellowish in color. On attaining maturity, the false smut balls are filled with the chlamyospore, and its color changes to green

or greenish black and finally changes to dark black in color with a roughened surface. Its symptoms are seen only after the flowering. It drastically affects the quality and yield due to the partial or complete replacement of kernels with smut balls.



Fig. 1. False smut field symptoms: a. Initial discoloration; b. On maturity

(Fig. Source: <http://www.knowledgebank.irri.org/training/fact-sheets/pest-management/diseases/item/false-smut>)

Favourable conditions: The presence of rainfall and high relative humidity (>90%) with a temperature between 25°C and 30°C favors the disease incidence. Soil with a high nitrogen content during the flowering stage also favors disease development.

Pathogen: False smut is caused by the fungus *Ustilaginoidea virens*, which produces both sexual ascospores as well as asexual chlamydospores during its life cycle. Sclerotia are also formed in the smut balls, on the colony surfaces, especially in later autumn, with a temperature difference between the day and night. Chlamydospores are spherical to elliptical, and their size is approx. 3-5 x 4-6 µm. Radial hyphae give rise to chlamydospores on sterigmata laterally, and the spores thus formed are smaller, paler, and almost smooth.

Management: Reduction in disease severity depends on the integrated management approach followed. It starts with the selection of healthy seeds free from smut balls for sowing. As already discussed above, nitrogen

favors the disease, so we must avoid excess nitrogenous fertilizer application. Early transplanted rice shows a higher incidence of disease as compared to late planting. Planning the sowing date and heading period so that flowering does not overlap with the rainy season will help prevent serious damage. To control false smut, the widely used fungicide is Propiconazole (tilt) 25 EC (0.1%). In addition, other fungicides, including copper oxychloride (Blitox) 50 WP (0.3%), hexaconazole, azoxystrobin, and tebuconazole, are also reported to be effective. Apart from chemical treatment, various plant-based products or botanicals, such as leaf extracts and plant oils, could also be used to control rice false smut. Raji et al. (2016) studied plant extracts in vitro against the rice false smut pathogen, which was considerably inhibited by bulb extracts of garlic (*Allium sativum*), rhizome extracts of turmeric (*Curcuma longa*), leaf extracts of lantana (*Lantana camara*), and Bael (*Aegle marmelos*).

Conclusion

The emergence of this minor disease as a major disease is of great concern due to the significance of rice in Indian food. This altered status could be caused by a variety of circumstances, such as increased production of high-yielding rice varieties and cultivation of varieties devoid of resistance to major pests, which provide rapid multiplication of pests;

imbalanced application of chemical fertilizers, particularly nitrogenous fertilizers; non-judicious application of chemical pesticides, which leads to resistance development; and, most importantly, changes in climatic conditions. So, an integrated approach to managing this disease is a new concern for most of us.

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