

SwarnaJayanti Fellow's multipronged strategy to enhance fungal disease tolerance in rice may ensure food security

Globally, significant amount of rice production is lost due to various fungal diseases. Sheath blight disease caused by a fungal pathogen *Rhizoctonia solani* results in yield loss of up to 70 percent.

A multipronged approach to enhance tolerance of rice to sheath blight diseases may soon be on the way. These include developing newer rice varieties with overexpression of antifungal protein, suppression of pathogenicity genes as well as gene editing.

At present the disease is mostly controlled by excessive use of fungicides. Besides increasing the cost of rice cultivation the fungicide residues downgrades the rice in the international market, because of its adverse health and environmental impact.

Dr. Gopaljee Jha, Scientist, National Institute Of Plant Genome Research, New Delhi, a recipient of this year's SwarnaJayanti Fellowship of the Department of Science & Technology (DST) will be working on understanding the mechanisms by which pathogens cause the disease leading to a multipronged strategy to enhance sheath blight disease tolerance in rice so that the plants can defend themselves.



Dr Jha proposes to work on multiple routes to develop newer rice varieties that have enhanced tolerance to sheath blight disease. One aspect of the project is to develop sheath blight tolerant rice through overexpression of a patent protected variant of Bg_9562 antifungal protein. He also plans to develop transgenic rice lines that express siRNA or Small interfering RNA (which is an RNA molecule that interferes with expression of specific genes) and help suppress pathogenicity determinants of *R. solani*. It is envisaged that suppression of the pathogenicity genes will prevent the pathogen to establish disease. Further, attempts will be made to synthesize dsRNA or double-strand RNA (which is a signal for gene-specific silencing of expression) to be used as spray to downregulate the expression of these pathogenicity genes. Additionally, Dr Jha endeavors to edit some of the host susceptibility factors to knock-down their expression to impart sheath blight disease tolerance.

Besides infecting rice, *R. solani* is known to adversely affect various other economically important crops. Suitable control measures for *R. solani* will help sustainable rice cultivation and also ensure food security by preventing damages caused by the pathogen to other crops.

For more details Dr. Gopaljee Jha (jmsgopal@nipgr.ac.in) can be contacted.