

Chinese scientists crack Rice Blast Fungus ‘Trojan Horse’ strategy, opening path to RNA-based crop protection

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Chinese scientists have uncovered a previously unknown molecular strategy used by rice blast fungus to attack crops, revealing how the pathogen disables plant immunity through an RNA-based ‘Trojan horse’ mechanism, in a breakthrough that could reshape the future of crop disease management and sustainable agriculture.

The research, led by Sichuan Agricultural University and published in *Nature*, identifies a long non-coding RNA molecule used by the rice blast fungus to infiltrate rice cells and suppress the plant’s immune response, causing significant yield losses in one of the world’s most important staple crops.

Rice Blast: A Major Global Agricultural Threat

Rice blast is among the most destructive crop diseases globally, affecting rice plants by damaging leaves, stems, and grains, and reducing yields by an estimated 10 per cent to 30 per cent annually. The disease carries high strategic importance for China, the world’s largest rice producer, where rice remains a staple food for hundreds of millions of people.

China produced 209.04 million metric tonnes of rice in 2025, underscoring the scale of food security stakes tied to disease resistance breakthroughs.

Discovery of a Molecular ‘Saboteur’ Mechanism

Researchers identified a long non-coding RNA molecule from the fungus, named lnc117761, which acts as a biological infiltrator inside rice cells. Once inside, it binds to a key rice microRNA, miR5827, which normally functions as an immune regulator.

By neutralising this immune “guard”, the fungal RNA effectively disables the plant’s defence system, allowing infection to spread. Scientists described the interaction as a precise molecular-level “attack-defence battle”, where the pathogen actively suppresses host immunity from within.

A Universal Mechanism with Broad Implications

The study found that similar RNA interaction patterns exist across multiple plant and pathogen systems, suggesting that this mechanism may be evolutionarily conserved. This opens the possibility of developing broad-spectrum disease resistance strategies applicable beyond rice, including other staple crops such as wheat.

Toward RNA-Based “Green” Pesticides

Based on this discovery, researchers have developed a synthetic RNA agent designed to enhance plant immunity. Laboratory tests showed that the molecule can reduce fungal infection rates by 30 per cent to 40 per cent in crops including rice and wheat.

Unlike conventional chemical pesticides, RNA-based interventions are being positioned as environmentally safer alternatives, with potential to reduce chemical residue, environmental impact, and resistance buildup in pathogens.

From Discovery to Deployment

The research team has filed a patent for the synthetic RNA agent and is exploring pathways for field application. In parallel, scientists are also working on breeding elite rice varieties with naturally higher expression of miR5827, aiming to strengthen inherent disease resistance through genetic selection.

The discovery marks a significant advancement in plant molecular biology and crop protection science, offering a new direction for sustainable agriculture through RNA-based biopesticides and genetically resilient crop varieties. If successfully commercialised, the technology could reduce dependence on chemical fungicides and enhance global food security under increasing climate and disease pressure.