

Ponniah_Abstract

Biotic Stress Session 2024 ISRFG

Understanding blast resistance through overexpression of the *Pita-2* gene in rice

Sathish Ponniah¹, Reghan Mutethia¹ and Yulin Jia²

¹University of Arkansas at Pine Bluff, Pine Bluff, AR71601

²USDA ARS Dale Bumpers National Rice Research Center, Stuttgart, AR72160

Email: ponniahs@uapb.edu

Rice blast disease caused by the fungus *Magnaporthe oryzae* is the most severe fungal disease affecting global rice output by 10% to 30% per year. The development of resistant varieties has been demonstrated to be the most low-cost, effective strategy to control the disease. Resistance genes (*R*) harbor tremendous allelic diversity, constituting a robust immune system effective against microbial pathogens. Once the rice is attacked, the recognition receptors on the cell surface specifically recognize pathogen-associated molecule patterns (PAMPs) and active defense response by cell wall modification and expression of a defense-related protein in a host cell called PAMPs triggered immunity (PTI). *R* genes in rice, including *Pi-ta*, *Pita-2*, and *Ptr*, confer resistance to a wide range of blast races including IB-49 except the race IB-33. A candidate for *R* gene (LOC_Os12g18374) nearby *Pi-ta* named *Pita-2* was identified on rice chromosome 12. The study aimed to overexpress the *Pita-2* gene in the rice-Nipponbare cultivar to determine if enhanced resistance can occur in transgenics expressing *Pita-2*. The rice calli developed from seeds were infected with *Agrobacterium tumefaciens* strain EHA105 containing the *Pita-2* gene. The presence of the *Pita-2* gene in T₁ plants was determined with gene-specific and hygromycin primers. Disease reactions of the confirmed T₁ plants were evaluated with the blast races IB-49 and IB-33. The role of *Pita-2* for rice blast resistance will be presented.

Keywords: *Ptr*, *Pi-ta*, *Pita-2*, rice blast, resistance genes