## Loss of Function of Only One of Two CPR5 Paralogs Causes Resistance Against Rice Yellow Mottle Virus

Authors : Yugander Arra, Florence Auguy, Melissa Stiebner, Sophie Chéron, Michael M. Wudick, Van Schepler-Luu, Sébastien Cunnac, Wolf B. Frommer, Laurence Albar

**Abstract :** Rice yellow mottle virus (RYMV) is one of the most important diseases affecting rice in Africa. The most promising strategy to reduce yield losses is the use of highly resistant varieties. The resistance gene RYMV2 is homolog of the Arabidopsis constitutive expression of pathogenesis related protein-5 (AtCPR5) nucleoporin gene. Resistance alleles are originating from African cultivated rice Oryza glaberrima, rarely cultivated, and are characterized by frameshifts or early stop codons, leading to a non-functional or truncated protein. Rice possesses two paralogs of CPR5 and function of these genes are unclear. Here, we evaluated the role of the two rice candidate nucleoporin paralogs OsCPR5.1 (pathogenesis-related gene 5; RYMV2) and OsCPR5.2 by CRISPR/Cas9 genome editing. Despite striking sequence and structural similarity, only loss-of-function of OsCPR5.1 led to full resistance, while loss-of-function oscpr5.2 mutants remained susceptible. Short N-terminal deletions in OsCPR5.1 also did not lead to resistance. In contrast to Atcpr5 mutants, neither OsCPR5.1 nor OsCPR5.2 knock out mutants showed substantial growth defects. Taken together, the candidate nucleoporin OsCPR5.1, but not its close homolog OsCPR5.2, plays a specific role for the susceptibility to RYMV, possibly by impairing the import of viral RNA or protein into the nucleus. Whereas gene introgression from O. glaberrima to high yielding O. sativa varieties is impaired by strong sterility barriers and the negative impact of linkage drag, genome editing of OsCPR5.1, while maintaining OsCPR5.2 activity, thus provides a promising strategy to generate O. sativa elite lines that are resistant to RYMV.

**Keywords :** CRISPR Cas9, genome editing, knock out mutant, recessive resistance, rice yellow mottle virus **Conference Title :** ICGEPB 2022 : International Conference on Genetic Engineering and Plant Biology **Conference Location :** Rome, Italy

Conference Dates : December 15-16, 2022