National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: IMPA2 provides nonhost resistance against rice sheath blight caused by Rhizoctonia solani
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Venue	: LS Seminar Hall
Date and Time	: 06 May 2024 (16:30)
Abstract	: Rice sheath blight caused by Rhizoctonia solani AG-1 IA (R. solani) is one of the most devastating necrotrophic diseases with a wide host range. It poses a major threat to global rice production. There has been no fully resistant rice cultivar nor any effective control measures of it. Here, we have isolated an EMS-generated Arabidopsis mutant (Col-0 background) that is susceptible to R. solani and named rss1 (R. solani susceptible). Bulked segregant analysis led us to identify a single recessive gene mapped to the lower arm of Chromosome 4 between JAERI18 and Ch4_9.18 (844.6 Kb). NGS data of the bulked susceptible population aligned to the reference genome (TAIR10) delineated nonsynonymous mutation P65S in the mapped region. Further, T-DNA insertion lines screening showed correlated disease phenotype in SALK_099707 (At4g16143) with rss1. We found that rss1 negatively regulates photosynthetic pigment biosynthesis whereas defense responses viz HR, ROS, callose deposition, and cell death enhanced upon R. solani infection. In addition, a gradual decrease in PR1 gene expression by 3 dpi upon infection revealed that RSS1 positively regulates early SA-mediated resistance. Meanwhile, increased expression of PDF1.2 by 3 dpi supports switching from SA-mediated defense to JA-mediated defense, leading to the necrotrophic mode of infection at a later phase. Enhanced expression of ATG8a in rss1 supported autophagic cell death. Altogether, our results demonstrate that IMPA2 provides NHR against R. solani in Col-0 that evokes SA-mediated early immunity with boulevard for potential biotechnological application. Keywords: Ethyl methane sulphonate, IMPA2; Iinfection cushion; Nonhost resistance; Necrotroph; Rhizoctonia solani; Sheath blight