

Enhanced resistance to rice sheath blight by green-tissue specific expression of rice Oxalate oxidase gene

Kutubuddin Ali Molla¹, Subhasis Karmakar¹, Palas K. Chanda², Karabi Datta¹ and Swapan K. Datta¹

¹Plant Molecular Biology and Biotechnology Laboratory, Department of Botany, University of Calcutta, India

²Centre for Diabetes Research, The Methodist Hospital Research Institute, USA

Rice sheath blight (ShB), caused by necrotrophic fungus *Rhizoctonia solani*, is one of the most devastating and intractable diseases that renders intensified reduction in rice productivity worldwide. For sheath blight resistance, the paper reports the generation of transgenic rice lines overexpressing rice oxalate oxidase4 (Osoxo4) gene in green-tissue specific manner to breakdown oxalic acid, the pathogenesis factor secreted by *R. solani*. Integration of the gene was confirmed by southern hybridization and transcript level of Osoxo4 was measured by quantitative real time PCR. The transgenic plants showed higher enzyme activity of OxO than that of nontransgenic control plant which has been visualized by histochemical assays and in SDS-PAGE. Transgenic rice leaves were more tolerant to exogenous OA than that of control rice leaves. Transgenic plants showed other defence related genes (Phenylalanine ammonia lyase and pathogenesis related (PR) gene) expression in a higher level in response to pathogen infection. More importantly the transgenic plants exhibited durable and significantly enhanced resistance to *R. solani*. The overexpression of Osoxo4 in rice did not show any detrimental phenotypic and agronomic effect. Our findings indicate that rice oxalate oxidase can be effectively utilized in plant genetic manipulation for sheath blight resistance as well as may be for resistance to other diseases caused by necrotrophic fungi specially those that secrete OA.

Biography

Kutubuddin Ali Molla has completed his Master of Science degree from University of Calcutta, India and registered for PhD in the same university. He is now doing research in a CSIR (Council of Scientific and Industrial Research, Govt. of India) project entitled "Development of transgenic rice plants for sheath blight resistance".

kutubjoy@gmail.com