

Development of Salt Tolerant Indica Rice by Over-expression of different Stress Resistant Genes to Attain Food Security

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Abstract—Salinity is one of the major abiotic factors limiting crop production in the world. Development of salt tolerant crop specially rice is, therefore is a significant research objective in agricultural biotechnology. An important requirement for crop improvement is the introduction of new genetic material in to the cultivated lines via single/ multiple genes, through genetic engineering approaches. In this research we were able to establish an efficient *Agrobacterium* mediated transformation method in different Indica rice (*Oryza sativa* L.). The *Agrobacterium tumefaciens* strain, EHA101 and LBA 4404 harboring the binary vector pIG121Hm/Km/katE, pIG121/PsCBL and PsCIPK were used for the transformation of BR-5, Kasalath, Kataribhog, BRI Dhan49, Pajam and Chinigura. The vector contains β -glucuronidase (*GUS*) gene as a reporter gene and hygromycin resistance (*HPT*) as well as kanamycin resistance gene (*NPTII*) as selection genes in the T-DNA region. Total genomic DNA was isolated from the transgenic plants and presence of the transgenes were confirmed by PCR and Southernblot analysis and expression of *katE* gene was detected by RT-PCR. Catalase activity of transgenic T1 plants are about 1.5 to 2.5 fold higher level than those of nontransgenic plants. Landraces Indica rice Kasalath and kataribhog were able to grow for more than 20 days in the presence of 250 mM sodium chloride and produced seeds for more than three months in the presence of 100 mM sodium chloride. On the contrary wild rice plants could not survive even for 10 days in the presence of 50 mM sodium chloride. Moreover, the transformed plants, either with PsCBL or PsCIPK gene, having no significant varietal differences were survived at 150 mM NaCl stress up to 20 days without showing any severe growth retardation while non-transformed plants were bleached and eventually died. Introduction of a single gene significantly improved the salt tolerance of Indica rice. By this way this report relates the application of genetic engineering for abiotic stress improvement to bring food security in Bangladesh.

Keywords: Rice (*Oryza sativa* L), Transformation, *Agrobacterium tumefaciens*, Salinity, T-DNA, Stress.