

Development of transgenic rice plants tolerant to abiotic stress

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Abiotic stress is the primary cause of crop loss worldwide, reducing average yields for most major crop plants by more than 50%. In order to produce stress tolerance plants, we have isolated several genes that are either involved in signaling regulatory pathways, or that encode enzymes present in pathways leading to the synthesis of functional protectants, or that encode stress-tolerance-conferring proteins. Based on the characterization of those identified genes, transgenic plants overexpressing them have been generated. First, low-temperature and/or dehydration-responsive genes (*OsDhn1*, *SodCc1*, *OsAPXa*, *Oslti32*, *OsFNR1*, and *OsGF14-C*) isolated from either cold-treated flowers or seed-coats were introduced into rice plants via *Agrobacterium tumefaciens*. under maize ubiquitin promoter. Hygromycin selected transgenic plants were generated and their stress tolerance was examined. Some of those transgenic plants showed changed tolerance to various abiotic stress. Phenotype of the transgenic plants were similar to that of wild type except a little delayed pollen development. These transgenic plants are being evaluated at different development stage and crossed each other for the gene pyramiding. Second, transcription factors homologous to CBF/DREB1 have been cloned and their expression pattern was characterized. *OsDREB1A* was induced only by low temperature, whereas *OsDREB1E* was induced by low temperature and drought. These genes were constructed into binary vectors for rice transformation as well. Third, two stress-inducible expression system have been established; *OsPOX1* promoter for flower-preferential cold-responsive expression and *OsDhn1* promoter for drought-responsive expression. Analysis of transgenic plants as well as vector construction will be discussed at the meeting.

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