

제 3부 - 육종과 생명공학 기술의 산업화

Plant Biotechnology in the 21st Century in Japan

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The first generation of plant biotechnology of late 20th century in Japan mainly focused on micro-propagation as new agricultural practices, protoplast fusion as a new tool for plant breeding and the production of useful compounds using plant cell culture systems. The combination of plant tissue culture technique with molecular biology during the 1980's led to the development of transgenic plants, GMO. During the past a decade rapid progress has been made in the GMO research in Japan. One of major challenges of plant biotechnology in the 21st century is to develop gene engineering crops in relation to productivity, resistance to environmental stresses and nutritional quality of fruits, tubers, roots or grains. Exploitation of genetically modified functional rice grains accumulating coenzyme Q10, human interferon-or allergen-specific T cell epitope peptides for the control of IgE-mediated allergic diseases has a positive impact on human health. Phytoremediation plants which assimilate nitrogen dioxide or degrade dioxin have been developed in Japan. Now plant biotechnology is promising approach which contributes to human welfare by improvement of human health. Horticultural approach to improve characteristics of ornamental flowers is an attractive target of plant biotechnology. Last year many researchers engaged in plant biotechnology enthused about the birth of Blue Rose and celebrated it. In this presentation, the achievement of metabolic engineering of flower color in Japan and its potential for phytomonitoring will be evaluated.

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Analysis of key metabolic enzyme genes regulating rice carbon metabolism

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Cytosolic fructose 1,6-bisphosphatase (cFBPase) plays as a first valve that makes hexose-phosphates from triose-phosphates in the cytosol in higher plants. Rice appeared to contain two cFBPases, OscFBP1 and OscFBP2, and analyses of gene expression, promoter::GUS transgenic plants and OscFBP1 mutants indicated that OscFBP1 plays a major role in the sucrose synthesis in rice leaves. Hexokinase (HXK) is a dual-function enzyme that both phosphorylates hexose to form hexose 6-phosphate and plays an important role in sugar sensing and signaling. We analyzed rice sequence databases and isolated ten rice hexokinase DNAs, OsHXX1 (*Oryza sativa* Hexokinase 1) through OsHXX10. With the exception of the single-exon gene OsHXX1, the OsHXXs all have a