Molecular Breeding R.G., BioGreen 21 Program, RDA (Ramada Plaza Jeju, November 2-3, 2005)

과제 일련번호: 20

Transgenic medicinal plants with enhanced tolerance to various stresses and functional properties for human healths

Jung Dae Lim, Deok Chun Yang[1], Song Joong Yun[2], Ill Min Chung[3], Chang Yeon Yu*

College of Agriculture and Life Science, Kangwon National University, Chunchon 200-701; [1]College of Life Science, Kyung Hee University, Yongin 449-701; [2]Faculty of Biological Research Science, Chonbuk National University Chonju 561-765; [3]College of Life and Environment Science, Konkuk University, Seoul 143-701

(*cyyu@kangwon.ac.kr)

Plants are under many stresses from the environment and cannot escape from biotic and abiotic stress factors such as extreme temperatures, high light intensities, drought, UV radiation, heavy metals, and pathogen attack. Therefore, these various environmental stresses provide obstacles for the cultivation of plants. Plants have developed an substantial method to defend themselves from these attacks by producing secondary metabolites. Secondary plant metabolites are being produced by many plants that are products of specialized biosynthetic pathways (Marrs, 1996). Plants produce antimicrobial chemicals known as phytoalexins to fight pathogens, such as viruses, bacteria and fungi. Most phytoalexins are phenolic phenylpropanoides that are products of the shikimic acid pathway. Thus, Information on the RS gene expression at the oriental medicinal plant using gene transformation will be useful in terms of the dual roles of resveratrol forming stilbene as a phytoalexin for plant health, as well as a phytochemical for human health. As part of a study of the metabolic engineering using gene transformation of cDNA fragment RS3 (AF227963, *Arachis hypogaea*) among PKS in medicinal plant *Rehmannia glutinosa* L. and identified gene structure, expression pattern, gene expression mechanisms using bioinformatics tools and the characterized its reaction product using NMR, MS, and HPLC. Also its biological effects were tested, and concluded that could be useful as a phytoalexin for plant health, as well as a phytochemical for human health. Transgenic plants were highly resistant to *Fusarium oxysporum* infection. The results indicate that the ectopic expression of AhRS3 in *R. glutinosa* results in the production of R-gluc and resveratrol at hundreds of times higher levels than in peanut seed. The increased production of resveratrol compounds from *R. glutinosa*, which show diverse benefits in human and plant health, could provide a new opportunity for the improvement of *R. glutinosa* products.

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† 주관과제명 (과제책임자): 특용작물의 내재해성, 기능성 유전자개발, 형질전환 및 실용화 연구 (강원대학교 유창연)

‡ 총연구기간 (년차): 2002년 - 2006년 (4년차)