Abstract of Ph.D. Dissertation

Rice seed, being the most important cereal crop with well-established agricultural practices for growth, harvest and processing worldwide, shows a great potential for use in large-scale production of high-value-added recombinant proteins. This report describes the stable expression of functionally different two types of recombinant proteins in the staple cereal crop rice. In the first experiment, with the aim of engineering functionally active jelly fig pectin methylesterase (PME) in a well-established expression system, a cDNA fragment encoding PME from jelly fig achene has been introduced in rice plants under the control of the glutelin promoter. Rice plants obtained from the transformed lines inherited the transgene which specifically expressed in rice endosperm. This successful functional expression of this acidic jelly fig PME in rice has significantly broadened its applications in industry. In the second experiment, with a view to upgrade rice protein quality, multiple copies of sesame *Prepro2S* have been introduced in rice plants under the control of seed-specific glutelin promoter. Rice plants obtained from the transformed lines inherited the transgene which specifically expressed in rice endosperm. Transgenic rice eventually will play a major role in the nutrition of human being especially for the vegetarians. This study represents the transition from model plant expression systems, such as tobacco and *Arabidopsis*, to widely cultivated cereal crop rice for expression of recombinant proteins. Thus, I conclude that molecular pharming in rice can be a viable production system for such high-value novel macromolecules.