

Public Abstract

First Name:Dung

Middle Name:Thu

Last Name:Pham

Adviser's First Name:Zhanyuan

Adviser's Last Name:Zhang

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SS 2013

Department:Plant, Insect and Microbial Sciences

Degree:MS

Title:CO-ORDINATED EXPRESSION OF *CRTB*, At-VTE3, AND VTE4 TO ENHANCE PRO-VITAMIN A AND VITAMIN E IN TRANSGENIC SOYBEAN

Although soybean is an excellent general nutritional source, it is not very rich in particular vitamins. Moreover, pro-vitamin A (carotenoids) and vitamin E (tocopherols) are essential components in diets for humans and animals. They function as antioxidants and are essential for growth and development, immunity, reproduction and so on. Therefore, the main goal of this study is to enhance economic and nutritional values of soybean by producing soybean seeds with enhanced both pro-vitamin A and vitamin E contents. Additional goal of this study is to ascertain if both of these vitamin contents could be enhanced simultaneously in through complex metabolic engineering employing coordinated transgene expression via FMDV virus 2A system. To this end, three different genes from different sources of bacteria, Arabidopsis and soybean were fused together by 2A sequence from FMDV virus to create a single construct and then transferred to soybean. One transferred soybean plant displayed "golden"-colored seeds. Golden seeds accumulated as high as 128 μ g/g of total carotenoids (95% was pro-vitamin A), approximately 25- fold higher than wild type seeds. By contrast, the amount of tocopherol (vitamin E) decreased in golden seeds which displayed a delay in germination with a decreased rate (50%) and dwarf phenotype at early developmental stage, but showed normal development later. Also, there was a significant change in the fatty acid profile of golden seeds. Therefore, transgenic golden soybean appears to be a good candidate for future study to fully evaluate the correlation of carotenoid, tocopherol and fatty acid biosynthesis.