OsMYB16, a Novel MYB-Related Transcription Factor, Response ABA signaling and Salinity Stress Causes Delayed Senescence

Da-Yea Park1* and Nam-Chon Paek1

1Department of Plant Science, Plant Genomics and Breeding Institute, and Research Institute for Agriculture and Life Sciences, Seoul National University, Seoul 151–921, Korea.

[Introduction]
MYB-related transcription factor plays important roles in not only plant growth and developments but also abiotic stress response. Functions of OsMYB16 do not well identified as a senescence and stress responsive gene. In this study, we figure out the function of OsMYB16 as a positive regulator for dark induced senescence and an ABA response gene.

[Materials and Methods]
For dark induced senescence, plants grown for 1 month under LD were transferred to darkness at 28°C for 5 days. The changes of detached leaf color with chlorophyll quantification, and ion leakage. Total RNA was isolated from the rice leaves using RNA kit (TaKaRa, Dalian, China) according to the manufacturer’s instructions. A five folds dilution of the resultant first strand cDNA was used as template for PCR. Quantitative real-time PCR (qRT-PCR) was performed according to described previously. The rice Ubiquitin 5 was used as the endogenous control for data normalization, and each analysis was repeated at three times. For salinity stress test, OsMYB16 knock out mutant and WT grew in natural long day condition for 2 weeks. The plants were treated high salinity stress with 200mM NaCl for 5 days, and then recovered with fresh water for 5days.

[Results and Discussions]
In natural field, OsMYB16 expression rises up during vegetative phase, however, the gene expression declined the initiation point of the reproductive phase. Even there is no significant differences in the natural senescence, OsMYB16 knock out plants shows stay green under dark induced senescence. In various hormone treatments, OsMYB16 expression is up-regulated by ABA. Moreover, under ABA treatments, ABA signaling genes in osmyb16 are dropped significantly. As another effect of ABA, stress regulation, OsMYB16 gene expression level was highly induced by high salinity, dehydration and mannitol, related with osmotic stress. The OsMYB16 knock out mutant, osmyb16, in Oryza sativa has salinity stress sensitive phenotype. Transcriptions of ABA signaling genes in osmyb16 were changed under stress condition. ABA early response genes, such as OsLEA3, OsRAB21, OsRAB16C, OsRAB16D, and late response genes, OsPP2C and OsRK1, decreased under salinity stress. In this regard, these results suggested that OsMYB16 effects on senescence and salinity stress response mechanism by regulating ABA signaling.

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*Corresponding author: Tel. +82–02–880–4553, E-mail, ncpaek@snu.ac.kr