PA-59

Rare cold inducible 2 protein CsRCI2E and CsRCI2F have different characteristics under abiotic stresses in *Camelina sativa* L.

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[Introduction]

Camelina sativa L. is a potential bioenergy crop that suitable for biodiesel production because of high amount of unsaturated fatty acid in seeds and short life cycle about 90 days. To product stable bioenergy from Camelina, understanding abiotic stress tolerance mechanism is necessary. Rare cold inducible 2 (RCI2) proteins are known to be localized at plasma membrane (PM), and it is greatly induced by abiotic stress such as cold, salt, and drought stress then contribute stress tolerance increment. However, there are still remained questions of individual function of each RCI2 family members. In this study, we characterized transcriptional changes of *CsRCI2s* genes and compared translational changes of CsRCI2E and CsRCI2F proteins under different acclimation level of NaCl stress.

[Materials and Methods]

One-week-old Camelina seedlings are grown on hydroponics and treated with abiotic stress such as 150 mM NaCl, cold at 2°C, 300 mM mannitol for drought stress for 24 h. Then, total RNA of each samples were collected and used for cDNA synthesis for qRT-PCR. To analyze translational changes of CsRCI2E and CsRCI2F, PM proteins were collected from one-week-old Camelina treated with 0, 50, 100, 150, and 300 mM NaCl for 24 h none-acclimation, 7 days short acclimation, and 7 days acclimation. Western-blot analysis was carried out using antibodies of CsRCI2E and CsRCI2F.

[Results and Discussions]

8 members of CsRCI2 proteins have two trans membrane domain and can be divide into no-tail type (A/B/C/H) and tail type (D/E/F/G) when predict protein structure by Raptor X server. In result of qRT-PCR, transcription level of *CsRCI2A/B/E/G/H* were dramatically increased, but slight changes were observed in *CsRCI2D/F* under coldat 2°C for 24 h. However, transcription of *CsRCI2A/E/G/H* was increased by NaCl treatment, and, only *CsRCI2A* and *CsRCI2H* showed increased transcription under mannitol treatment. These results indicate that each *CsRCI2s* have different characteristics of transcription by various type of abiotic stress. Protein accumulation of CsRCI2E was greatly increased by none-acclimation, short acclimation, and acclimation under various NaCl concentrations, however, CsRCI2F increased only at 50 mM with none-acclimation and decreased by short-term acclimation at 150 mM over time. However, accumulation level of CsRCI2F was increased under NaCl acclimation. This result suggest that accumulation of CsRCI2E is more significantly increased than CsRCI2F under sudden exposure or high concentration of NaCl. In conclusion, expression properties of CsRCI2E and CsRCI2F are depend on type or intensity of abiotic stress, thus, function of these proteins might be different under normal or stressed condition.

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