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Arabidopsis *ABF3* gene regulation in drought, cold and oxidative stress tolerant in Lettuce (*Lactuca sativa* L.)

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Objectives

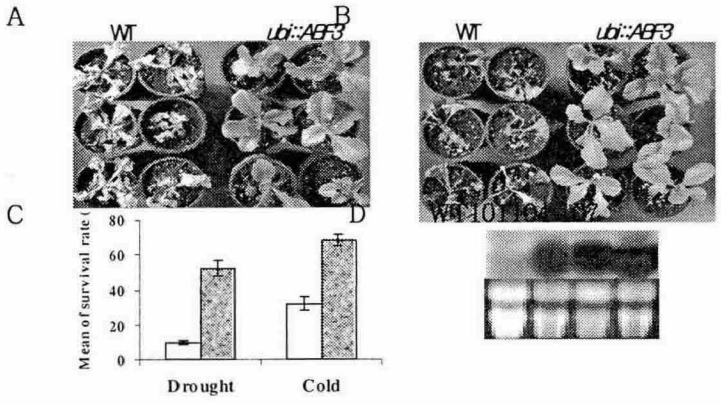
We are interested in improving the drought, cold and oxidative stress tolerance of lettuce plants by introducing *ABF3* gene, since lettuce is generally considered a drought and cold sensitive plant. Therefore, we transformed lettuce cotyledon explants via *Agrobacterium tumefaciens* with the *ABF3* gene and determined the transgene transmission to T_1 plants.

Materials and Methods

1. Materials: Lettuce (*Lactuca sativa* L.) cv. Chongchima's (leaf type) cotyledon explants were used. *Agrobacterium* strain EHA 105/ pCUM-VB3 carried out *ABF3* as a target gene, *gfpgus* as a reporter gene and *hph* as a selectable marker gene.
2. Methods: PCR, Southern and Northern analysis. Drought, cold and oxidative stress tolerance tests.

Results and discussion

Transgenic plants showing *in vitro* resistance to 20 and 25 mg/L hygromycin. The gene transformation efficient was 10.8%. Those transgenic plants exhibited normal growth in terms of phenotype and yield of seeds. And the transgene segregation ratio to T_1 progenies was 3:1 in the eight lines and 1:1 in the only one line (semidominant). Each leaves of putative transformants showed GUS activity except for semidominant plants. PCR and Southern blot analyses showed that the transgene was stably integrated in the lettuce genome. Northern blot analyses confirmed *ABF3* transgene expression. The transgenic plants were more tolerant to drought, cold and oxidative stresses than wild-type plants. The results indicate that overexpression of Arabidopsis *ABF3* can significantly improve drought and cold tolerance of lettuce plants, indicating that ABF3 is functional in lettuce.



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