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Key words : AtNDPK gene, tall fescue, environmental stress, agrobacterium, transgenic plant

Introduction NDP kinases (NDPKs) are multifunctional proteins that regulate a variety of eukaryotic cellular activities, including cell proliferation, development, and differentiation. Arabidopsis NDPK2 (AtNDPK2) is a key signaling component that regulates cellular redox state and is known to enhance multiple stress tolerance when over-expressed in Arabidopsis plant. SWPA2 promoter had previously been found to encode an anionic POD which was highly expressed in response to oxidative stress.

Materials and methods The expression vector, pSN-H was used for genetic transformation of tall fescue. Genomic DNA was extracted from tall fescue plants. After acclimatization in green house conditions, transgenic and control plants were transferred to a GMO isolated field. During summer in both 2006 and 2007, field-grown control and SN-transgenic tall fescue plants were naturally subjected to various environmental stresses including high temperature, water logging, and severe drought.

Results and discussion Genomic DNA PCR and Southern blot analysis confirmed the incorporation of AtNDPK into the tall fescue genome. Under field condition, SN-transgenic tall fescue plants performed better than the control plants exposed to all the environmental stresses. These results suggest that the response of SN-transgenic tall fescue plants may be due to induction of other stress responsive genes. An interesting result was observed in our investigation. We found that under normal growing condition the SWPA2::AtNDPK2 overexpressing transgenic tall fescue plants showed vigorous healthy growth activity compared to the control plants at 4 months after sowing.

Conclusions AtNDPK2 gene was introduced into tall fescue plants and Genomic DNA PCR and Southern blot analysis confirmed the incorporation of AtNDPK2 into the tall fescue genome. Under field condition, transgenic tall fescue plants showed better performance than the control plants exposed to environmental stresses including high temperature, water logging and severe drought stress.

Reference

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