Enhanced Tolerance to Osmotic Stress in Transgenic Tobacco Plants Overexpressing a Translationally Controlled Tumor Protein (TCTP)

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In response to numerous environmental stresses, plants activate a complex series of responses that lead to important changes in gene expression. A gene encoding a translationally controlled tumor protein (TCTP) has been reported to be induced by abiotic and biotic stresses in different organisms. TCTP is present in all eukaryotes and is apparently involved in multiple seemingly unrelated cellular processes. In plants, however, the available information about TCTPs is very scarce. Here, we examined the osmotic stress tolerance of transgenic tobacco plants overexpressing a TCTP from tomato. For that, the root of wild-type (wt) and transgenic plants submitted to osmotic stress were measured. For the abiotic stress assays, wt and transgenic plants seeds were germinated in culture medium containing mannitol (at 100, 150 and 200 mM) and maintained in a climatic chamber (22°C). In the untreated control group, the primary root lengths of the TCTP-overexpressing transgenic plants were 1.3-fold higher than those of wt plants. A 2.6-fold and 3.3-fold increase in root length was observed in the transgenic plants compared to wt at 100 and 150 mM mannitol, respectively. At 200 mM mannitol, the wt seeds did not germinate while all the transgenic seeds germinated. In transgenic plants, TCTP relative expression was 86-fold higher than wt. These results indicate an improved osmotic stress tolerance of the transgenic plants due to TCTP overexpression, and suggest that this protein may play a role in plant response to abiotic stresses. However, further studies are necessary to elucidate its functional contribution.

Key words: TCTP, osmotic stress, transgenic tobacco, mannitol
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