

Abstract

TTL3 gene was identified by forward screening of genes involved in lateral root development in *Arabidopsis thaliana* based on its expression pattern. *TTL3* belongs to the *TTL* (*TETRATRICOPEPTIDE-REPEAT THIOREDOXIN-LIKE*) gene family. The diploma thesis is aimed on characterisation of changes in *TTL1*, *TTL3* a *TTL4* promotor activities in response to external conditions (availability of nitrogen or phosphorus) that affect root growth. Obtained data should elucidate possible relation among *TTL* gene expression activities, root growth rate, and apical meristem activity.

Nitrogen or phosphorus deficiency triggered changes in root growth and root system morphology of experimental plants. Short-term nitrogen deficiency stimulated root growth. Short-term phosphorus deficiency induced gradual growth cessation in main root and long laterals. Long-term deficiency reduced root growth of both N-deficient and P-deficient plants compared to control. The root system size of N-deficient and P-deficient plant was almost similar.

Determination of promotor activity using β -glucuronidase reporter gene showed changes in expression activity and its localization in response to root growth intensity. *TTL4* gene promotor activity was the most responsive. Its activity was generally higher in slowly growing roots, particularly under phosphorus deficiency. *TTL3* a *TTL1* showed similar trends, but less pronounced. Observed changes in promotor activities seem to correlate with growth rate intensity or extent of root tissue differentiation, rather than with direct response to nitrogen or phosphorus availability.

Changes of *TTL* promotor activities in response to root growth rate may indicate involvement of *TTL* genes in phytohormonal regulation of root meristem activity.