COLD-INDUCED CHANGES OF TRANSCRIPT PROFILES CORRELATED TO SUCROSE METABOLISM IN SUGAR BEET

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Many studies showed that plants have inducible and multilevel networks of cold response and acclimation. However little is still known in sugar beet, a crop of relevant economic importance in Europe. Cold modulation of expression of several key genes involved in sucrose metabolism was investigated in cultivars adapted to different climatic areas: the autumnal cv. Franca and the spring cv. Bianca. The cold-induced transcriptional profiles were compared in order to extend our knowledge of low temperature adaptation mechanism, especially in relation to sucrose metabolism because of its economic importance. Real-time PCR analysis of the temporal expression of 12 genes involved in sucrose quality and yield during and after stress condition came after an accurate ESTs research and analysis in BVGI (Beta vulgaris Gene Index) and a reference gene selection in order to normalize the Ct raw data. 24 DAP plantlets grown in hydroponic culture were stressed for different hours (from 3 hrs up to 8 hrs) at different temperatures (4°C, 0°C and -2°C).

The results highlight that the turning point in transcriptional changes was the exposure of the young plantlets at 4°C chilling temperature, as showed by the induction of fructose 1,6 biphosphatase in root tightly linked to “hardening” exposition.

In addition, an organ-specific variability and stress-modulated transcription of some genes analyzed (SBSS and SPS) was recorded and the response of the different cultivars was showed.

The cold responsive genes identified can provide the bases to improve cold tolerance in sugar beet during the developmental phase.