



Comparative study between transgenic and non-transgenic soybean lines proved transgenic lines to be more drought tolerant

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Summary

Transgenic soybean, containing a L- Δ^1 -Pyrroline-5-carboxylate reductase (*P5CR*) gene in sense or antisense orientation, was compared with untransformed control soybean while subjected to drought stress, through evaluation of physiological techniques. The significant higher relative water content (RWC) of the sense plants, especially after 8 days stress, coincides with much higher free proline levels compared to control and antisense plants. It was implied that some of this free proline might be a result of protein degradation and therefore proline dehydrogenase (PDH) enzyme analysis was performed. PDH activity was highest in the antisense plants, followed by control plants and least the sense plants. This confirmed that some free proline measured in antisense plants were degradation products. In the sense plants, the initial changes after the drought stress were largely due to a rise in reducing sugars. In the antisense plants the first reaction was an increase in sucrose. The fructose and glucose levels were highest in the sense plants at 4 and 6 dwv. Molecular analysis of transgenic plants confirms the presence of between one and five copies of the *P5CR* gene in the test plants. The sense plants behaved more tolerant to the drought stress and experienced the highest RWC, highest free proline levels, higher or similar *P5CR* but lower PDH enzyme activity compared to antisense and control plants. These results justify the hypothesis that the sense transgenic plants reacted more drought tolerant than the control and antisense plants.

Abbreviations: DW: dry weight; dwv: days without water; OPPP: oxidative pentose phosphate pathway; *P5CR*: L- Δ^1 -Pyrroline-5-carboxylate reductase; *P5CR*-IHSP construct: L- Δ^1 -Pyrroline-5-carboxylate reductase gene linked to an inducible heat shock promoter; PDH: proline dehydrogenase; RWC: relative water content; TW: turgor weight