Abstract

Raffinose series oligosaccharides (RFOs= α-1,6-galaktosyl$_n$-sach; $1 \leq n <$ c. 7) represent a prominent part of soluble saccharide content in mature conifer seeds. RFOs are considered to act as the multifunctional components in plants, but their precise functions in specific physiological processes remain contentious. The present study focuses on the metabolism and role of RFOs in somatic embryogenesis in two conifer species- *Picea abies* and hybrid fir (*Abies alba* x *numidica*). Three basic approaches were set for achieving spruce somatic embryos (SE) with diverse levels of RFOs: a) culture cultivation with exogenous RFOs, b) culture cultivation with precursors of RFOs synthesis and the last 3) culture exposition to variegated postmaturation treatments inducing RFOs synthesis (desiccation/cold stress). Parallel combinations of stresses led to the highest RFOs levels in SE. These findings associate the RFOs levels in spruce SE with protective function within desiccation state. The final levels of RFOs in the spruce SE were also regulated by endogenous levels of myo-inositol. RFOs were rapidly degraded by SE within early phases of germination independently of the initial level of RFOs. No dramatic decrease in embryo germination was found in embryos with decreased RFOs degradation achieved by treatment with Deoxygalactonojirimicin- the specific inhibitor of α-galactosidases. Results did not support the idea the higher the initial RFOs levels, the better the course of SE germination. In fir somatic embryogenesis, the soluble saccharide spectrum dynamics differed from the spruce one. The main difference was in the timing of RFOs accumulation. The fir embryogenic culture cumulated the RFOs in high levels since the beginning of maturation phase and the levels as well as the dynamics of the other soluble saccharides were dependent on the saccharide type (maltose or sucrose) in the maturation media. Maltose supported the cumulation of RFOs over the maturation phase and sucrose during postmaturation treatment. In conclusion for different conifer species no common characteristics of RFOs profiles and conditions and factors controling RFOs accumulation as well as simple relationship between RFOs level and germination efficiency can be found.