

SOMATIC EMBRYOGENESIS IN *PICEA ABIES* (NORWAY SPRUCE) AND *PICEA RUBENS* (RED SPRUCE): GROWTH RATES AND POLYAMINES

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Zygotic embryos of Norway spruce (*Picea abies*) and red spruce (*Picea rubens*) were used to initiate embryogenic cultures on proliferation medium (PM). The tissues were either subcultured bi-weekly on PM in order to maintain early stage proembryos or grown on maturation medium (MM) to develop fully mature embryos. Whereas proembryogenic calli growing on PM more than doubled in fresh weight during the two week subculture period, the calli containing maturing embryos on MM grew only 10% per two weeks following an initial burst of growth after transfer to MM. Analysis of polyamines in calli grown on these two media for a 12 day period showed that: 1) Putrescine and spermidine levels were always higher in cultures grown on PM as compared to those on MM; 2) Spermidine levels declined with time in calli of both species grown on MM; 3) Spermine was present in minute quantities and showed only a small change with time. Arginine decarboxylase (ADC) was found to be the major putrescine biosynthetic enzyme in both species. Ornithine decarboxylase was barely detectable. Difluoromethylornithine had little effect on polyamine content. Difluoromethylarginine inhibited putrescine in calli of both the species grown on PM as well as MM. An inverse relationship was observed between polyamine levels and ADC activity for tissues growing on MM. In order to further understand the biochemistry of developing embryos without any interference from the surrounding tissues, eight-week-old embryos were collected and compared with calli growing on PM and MM for polyamine levels and ADC activities. The results indicate that the embryos had, in general, much higher polyamine levels and ADC activity compared to the callus.