The Effect of Electric Field on Callus Induction with Rape Hypocotyls

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The influence of electric field treatment on dedifferentiation and calli formation on rape hypocotyls was investigated. Segments, 10 mm long, of the upper part of rape (*Brassica napus* L., cv. GórczaΔski) hypocotyls were stimulated by different combinations of voltage/time (1.5 V/120 h, 3 V/3 h, 10 V/15 min and 30 V/30 s) under *in vitro* conditions. With all electric field treatments, segments oriented with their apical part towards the cathode produced more calli as compared to control (non-treated with electric field). Under opposite orientation slight inhibition of callus growth was observed. As the strongest effect on callus growth was observed after treatment with 30 V/30 s, this electric field treatment was selected for following analyses: the incorporation of [^{14}C]-2,4-D (2,4-dichlorophenoxyacetic acid) and [^{14}C]-BAP (benzylaminopurine) from the culture medium, changes in ACC (1-aminocyclopropane-1-carboxylic acid) level and the redox activity in apical and bottom parts of hypocotyls during 18 d of culture.

In contrast to changes in fresh weight, electric field treatment (30 V/30 s) stimulated a higher accumulation of 2,4-D and BAP in basal parts of hypocotyls than in apical ones. Moreover, orienting the apical part towards the cathode resulted in lower uptake of hormones as compared with the opposite orientation. The ACC concentration increased, especially in the basal parts of hypocotyls, independently on electric field application. However, the highest level was observed after electric field treatment with orientation of the apical part towards the anode. The distribution of oxidative substances (measured as the amount of ferric ions) between the apical and bottom part of hypocotyls was not changed when the apical parts were oriented towards the cathode. Under these conditions a decrease in apical and an increase in basal parts was observed during culture. Opposite orientation influenced the redistribution of oxidative substances from the first day of electric field treatment. Based on these results we suggest that electric field action can be connected with its influence on specific concentration of oxidative substances and hormone distribution in cells.

Key words: Electric Field, Rape, Growth Regulators