

Effects of variation in nitrogen nutrition on growth of poplar (*Populus trichocarpa*) clones

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Abstract

Green cuttings of six balsam poplar clones were cultivated in a hydroponic medium in a growth chamber under controlled conditions. The nitrogen nutrition was varied with regard to concentration, nature of N-source and nitrate/ammonium ratio. Production of biomass, pH changes in the rhizosphere and the consumption of nitrate and ammonium were investigated. Balsam poplar is sensitive to NH_4^+ . The plants grew best without or at low NH_4^+ concentrations. In NH_4^+ -only nutrient solution (1.8 mM) the plants died within 3–6 weeks, dependent on the clone. In the nutrient solution, pH shifts were found to be correlated with variation in the use of the two N sources. We exclude acidification of the rhizosphere as sole reason for plant death.

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Nitrate Uptake and Reduction of Aseptically Cultivated Spruce Seedlings, *Picea abies* (L.) Karst.

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ABSTRACT

Spruce (*Picea abies* (L.) Karst.) seedlings were aseptically cultivated and the effects of different N-nutrition on net uptake and reduction of nitrate were investigated. The characteristics of nitrate uptake were calculated, K_s as 0.2 mol m^{-3} and V_{max} as $18 \mu\text{mol g}^{-1} \text{ d}^{-1}$.

Low pH, NH_4^+ and Al^{3+} in the medium caused a decrease in nitrate uptake rate. An *in vivo* assay was set up which allowed the measurement of NRA in both roots and needles of spruce seedlings. The *in vivo* nitrate reductase activity was repressed by ammonium and stimulated by nitrate. Nitrate reduction was similar to nitrate uptake, negatively affected by low pH and ammonium. Therefore, a limited N-supply to spruce seemed to occur when pH was low in the rhizosphere combined with the presence of Al^{3+} and NH_4^+ .

Key words: Spruce, nitrate uptake, nitrate reduction.
