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THE EFFECT OF NITRATE IONS ON LEAF PHOTOSYNTHETIC TISSUE OF DIFFERENT POPLAR CLONES

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1. INTRODUCTION

High adaptability on different habitat conditions, as well as a fast growth, make black poplar (*Populus nigra* L.) a suitable species for recultivation and phytoremediation of habitats that are, because of their poor conditions, unfavorable for plant growth (1, 2). Proceeding from the well known effect of nitrogen on structural and physiological plant characteristics (3), it seemed interesting to examine the possibilities of phytoremediation of nitrates using poplars.

2. MATERIAL AND METHODS

The experiment was conducted in water culture with different concetrations of NO_3^- ions, with the aim to examine the effect of those ions on structural and physiological leaf characteristics of different black poplar clones. One-year old, mature woody cuttings of four clones were cultivated during seven weeks in 1/4 standard Hoagland solution.

After seven weeks and formation of roots, plants were treated with different concentrations of nitrate ions (3 times higher concentration than in Hoagland solution – N+, and 1/5 of concentration in Hoagland solution – N-). For the analysis of morpho-anatomical characteristics, six completely developed leaves were taken by each clone.

Cross sections were made, using cryostat, from the parts of the leaves between the third and the fourth lateral vein. Microscopic measurements of leaf thickness and photosynthetic tissue characteristics were made using Image analysing system Motic 2.0.

The analysis of photosynthetic tissue included: mesophyll thickness, palisade and spongy tissue thickness, and the cross section area of

palisade and spongy tissue cells. Data were statistically processed using Statistica for Windows 5.0 program.

3. RESULTS AND DISCUSSION

The leaf thickness of the control samples was not significantly different between the clones. The change of the nitrate concentration induced an increase in leaf thickness in all samples, except for the clone M1 in N+ condition. Highly statisticaly significant increase of leaf thickness, compared to the control samples, was noticed for clones 102/81 (17.4%) and M1 (13.1%), in N- conditions.

A similar trend was also noticed for the mesophyll thickness. A higher percentage of mesophyll, in conditions with lower nitrate concentrations, was recorded for all clones, except for 53/86. The lack of interclonal variability of control samples was also recorded for the thickness of palisade and spongy tissue.

The significant increase of the thickness of those tissues was noticed at lower nitrate concentration for clone 102/81, and for spongy tissue thickness of clone M1. Clones M1 and Pe 19/66 had higher percentage of mesophyll in N- conditions due to the thickness of spongy tissue, while for the clone 102/81 it was due to the palisade tissue thickness.

Poor interclonal differences were recorded for cross section areas of palisade and spongy cells. Significantly the smallest area of palisade cells, in control conditions, had only clone Pe 19/66. Different nitrate concentrations induced an increase of cross section areas of palisade and spongy cells.

Lower nitrate concentration coused higher increase of cell cross section areas for all examined clones. Under those conditions, highly significant increase of spongy cells occured for all examined clones, and of palisade cells for clones 102/81 and Pe 19/66.

4. CONCLUSION

In regard to the examined characteristics, clone 53/86 could be singled out by its stability, as a potentially good genotype in remediation of grounds rich in nitrate ions.

5. REFERENCES

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