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Al Uptake and Physiological characteristics of AIP Transgenic Populus

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Objectives

This study was conducted to assess Al uptake ability and to investigate physiological characteristics of transgenic woody plant with aluminum inducible protein (AIP) gene.

Materials and Methods

1. Material

Wild type (WT) and transgenic plant (*Populus x tomentiglandulosa*), containing aluminum inducible protein gene, were grown under greenhouse condition before three level (0, 0.1, 0.2mM) of Al treatment.

2. Methods

After finishing Al treatment for 60 days, relative growth rate (RGR) of Populus were calculated with the increment of height and root collar diameter from start to final of experiment, and superoxide dismutase (SOD) activity and malondialdehyde (MDA) content were analyzed with their leaves. Al uptake ability of transgenic plant determined in comparison with the patterns of Al accumulation of control plant.

Results and Discussion

Al uptake content of transgenic Populus was higher than that of wild type plant at 0.1mM Al treatment, and both wild type and transgenic Populus showed the highest content in roots and lowest content in leaves at 0.1 mM Al treatment. But with increasing of Al treatment concentration, Al in tissues must have been transported from roots to stems or leaves. Such a pattern change in Al accumulation represented remarkably in tissues of transgenic plant, and it had a deleterious influence on their physiological mechanism at 0.2mM Al treatment.

Excessive Al accumulation in leaves of transgenic plant decreased SOD activity and increased MDA content at 0.2mM treatment because of the damage of protective mechanism against Al toxicity that represented at 0.1mM Al-treated plants. Meanwhile the reduction of initial growth performance by Al toxicity was not found until the termination of this experiment. Even though transgenic plant had an excellent effect for Al uptake at short-term Al exposure, but would be inhibited physiological metabolism by excessive Al accumulation in tissues. Also the increased Al uptake ability of transgenic plant was considered to disappear eventually.