Effect of Aluminum on Nitrate Reductase and Photosynthetic Activities in *Quercus serrata* Seedlings

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We investigated the physiological effect of rhizospheric aluminum (Al) on the activities of nitrate reductase and photosynthesis in *Quercus serrata* seedlings. The seedlings were cultured hydroponically in nutrient solution with or without 1 mM AlCl₃ (pH 4.0) for 14 days. After Al treatment for 3 days, the number of primordia of tertiary lateral roots on secondary lateral roots appeared to increase. As a result, the biomass of the roots significantly increased (by 5%) after Al treatment for 14 days. The uptake of NO₃⁻ by the seedlings from the culture medium was stimulated to 125% by Al treatment for 3 days. Al treatments for 7 and 14 days increased the nitrate reductase activities in the roots to 300% and 170%, respectively. Al treatment had no effect on photosynthetic activity or shoot biomass even after 14 days, although the chlorophyll content was slightly increased by Al treatment. These results suggest that the stimulation of root growth by Al might be closely related to metabolic changes including the increase in nitrate reductase activity in the leaves and roots.