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Retranslocation, Plant, and Soil Recovery of Nitrogen-15 Applied to Bareroot Black Walnut Seedlings

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Abstract: Although retranslocation or nitrogen (N) derived from plants (NDFP) may account for more than 50% of the annual N demand in new growth of conifer seedlings, the proportional contribution of NDFP vs. current uptake or N derived from fertilizer (NDF) in new growth of hardwood seedlings is relatively unknown. The current uptake was labeled with ammonium sulfate [$(^{15}\text{NH}_4)_2\text{SO}_4$] at the rate of $1.56 \text{ g N plant}^{-1}$ and reared for 90 days in sand culture under greenhouse conditions, and NDFP vs. NDF was quantified in new growth of half-sib bareroot black walnut (*Juglans nigra* L.) seedlings. Nitrogen derived from plants accounted for 68 to 83% of the total N demand in new shoot growth of black walnut seedlings vs. NDF (17 to 32%). Recovered applied fertilizer was 43% in soil and 9% in plants. The greater proportion of NDFP in new growth demonstrates the importance of retranslocation in meeting early N demand of transplanted black walnut seedlings.

Keywords: Black walnut, fertilizer recovery, growth, nitrogen, retranslocation, stable isotope

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