The Role of Efflux in Nutrient Uptake by Intact Tree Roots. (S07-kulpa171912-Poster)

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Abstract:

Experiments designed to measure nutrient uptake by roots often instead show net nutrient efflux. The purpose of this experiment was to quantify and distinguish rates of Ca uptake and efflux in excavated intact loblolly pine (Pinus taeda) roots. Sr can be used as a surrogate for Ca, so we substituted Sr for Ca in nutrient solutions 5 and 10 times the ambient soil concentrations of the site at the Calhoun Experimental Forest, SC. Ca and Sr concentrations in bulk solution from 10 roots were measured for 4 time intervals (1, 3, 18, 25 hours) over a 47-hr period. While root Ca efflux was not significantly greater (at alpha=.05) than detected control activity, Sr uptake was significantly greater than controls across all time intervals. Roots incurred the greatest average rates of positive or negative uptake during the 1-hour interval, with rates of Sr uptake from 3301 to 53121 umol/hr/mmroot and of Ca flux from -327 to 157 umol/hr/mmroot. Roots were scanned and analyzed with Delta-T Scan. Net uptake (after 22 hrs) was most highly correlated (5x r2=.8258, 10x r2=.9009) with root average diameter. Results of a later experiment conducted over shorter time intervals are also discussed.

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