The Role of Plants in Nitrogen Retention in Disturbed Forests: Carbon Providers or Nitrogen Sequestrants? (S07-hart175835-Oral)

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Abstract:

Current forest N cycling models suggest that uptake of N by recolonizing plants following forest disturbance is a major mechanism of N retention. However, plant removal terminates plant N uptake from and C input to the soil simultaneously. Cessation of labile-C inputs should reduce microbial demand for N, thus increasing N loss. We investigated the relative importance of these two mechanisms of N retention in situ in four contrasting forest ecosystems along a latitudinal productivity gradient in Central Oregon. Experimental units consisted of root-trenched microplots that prevented plant N uptake. To one set of microplots, we added C that approximated the quality and quantity of C input from fine-root turnover in that ecosystem. We prevented all C inputs to another set of microplots by excluding litterfall. Adjacent undisturbed control plots were open to both plant N uptake and C inputs. N loss was measured for seven years using ion exchange resins. Our results suggest that: 1) direct plant uptake of N and plant-induced microbial assimilation of N are both important mechanisms promoting N retention in forest ecosystems; and 2) both N retention mechanisms scale with ecosystem NPP.

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