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Ammonium versus Nitrate Nutrition of *Zea mays* and *Lupinus albus:*

Effect on root-derived CO_2 Efflux

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Nitrogen assimilation is among the most energy-intensive processes in plants, requiring the transfer of two electrons per NO_3^- converted to NO_2^-, six electrons per NO_2^- converted to NH_4^+, and two electrons and one ATP per NH_4^+ converted to glutamate. Depending on the species, NO_3^- could be reduced both, in shoots and roots of plants. In illuminated shoots nitrate reduction is fed exclusively by reducing equivalents coming directly from photosynthetic processes. However, in roots and during darkness, reducing equivalents are generated by oxidation of carbohydrates, resulting in additional CO_2 release from roots of plants growing with nitrate. We hypothesized that feeding plants with NH_4^+ will reduce root-derived CO_2 efflux from soil compared to the plants fertilezed with NO_3^-.

Two species were chosen: *Zea may*, which reduce$s$ half of NO_3^-in shoots and half in roots and *Lupinus albus*, reducing the major part of $NO3^-$in roots. Two nitrogen treatments were applied: each species grown on nitrate and ammonium fertilizer. Nitrification inhibitor was used to prevent microbial conversion of $NH_4^+$to $NO3^-$in soil. Pulse labeling of plants in $^{14}CO_2$atmospherewas applied to quantify the effect of both fertilizers on recently (^{14}C) and total assimilated C. Total CO_2 and $^{14}CO_2$ was continuously monitored one week after the pulse labeling. It was shown that fertilization with NH_4^+ may reduce the CO_2 efflux from soil compared to the plants fertilized with NO_3^- however, the effect was species depending. Recently assimilated C (^{14}C) in CO_2 efflux was more strongly affected by the type of N fertilization compared to the total CO_2.