Supplementary Information SI1

Modeling N uptake

We defined the following seven root tip categories ($RTc_{1\ to\ 7}$) for ectomycorrhizal (EM) plants: NM root tips = RT_{NM}, dead root tips = RT_{DR}, *Cenococcum geophilum*-associated root tips = RT_{Cg}, *Tomentella punicea*-associated root tips = RT_{Tp}, *Tuber rufum*-associated root tips = RT_{Tr}, *Tuber* sp.1-associated root tips = RT_{Tsp1}, and *Tuber* sp.2-associated root tips = RT_{Tsp2}. The fraction of root tips colonized by other fungi was < 5% and, therefore, neglected. For non-mycorrhizal (NM) plants two root tip categories were defined: RT_{NM} and RT_{DR}.

^{15}N contents of EM plants

We assumed that the specific N enrichment (measured as ^{15}N atom-%) in a certain root tip category is an indicator for the physiological activity of N metabolism in this root tip category (PA_{RTc}) after correction for the specific ^{15}N enrichment of dead root tips. We calculated for each RTc:

PA_{RTc} = (specific ^{15}N enrichment of RTc) – (specific ^{15}N enrichment of RT_{DR})

The physiological activity of the root tip categories of EM plants was then normalized with respect to that of NM root tips of NM plants, which yields a specific activity coefficient (AC) for each category of root tips:

$AC_c = PA_{RTc} / PA_{RT(NM\ of\ NM\ plants)}$

To calculate the ^{15}N content of EM plants (µg) we used the mean N flux per RT_{NM} of the NM plants (µg RT^{-1} d^{-1}), the duration of the ^{15}N exposure (time d^{-1}), the specific AC_c and the number of root tips in each category (n RTc):

$$\text{Calculated } ^{15}\text{N content of EM plants} = \text{N flux per } RT_{(NM\ of\ NM\ plants)} * \text{time} * \sum_{c=1}^{c=7} AC_c * \text{n RTc}$$

with

N flux per $RT_{(NM\ of\ NM\ plants)}$ = ^{15}N content of NM plants / (number of RT_{NM} of NM plants * time)

^{15}N contents in NM plants

To calculate the ^{15}N content of NM plants (µg) we corrected the measured ^{15}N contents of EM plants (µg) for the different physiological activities of the root tips of EM plants relative to those of NM plants:

Calculated ^{15}N content of NM plants =

measured ^{15}N content of EM plants * $[nRT_{NM\ of\ NM\ plants} * (\sum_{c=1}^{c=7} AC_c * n\ RTc)^{-1}]$