Geophysical Research Abstracts
Vol. 19, EGU2017-16266, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Rhizodeposition flux of competitive versus conservative graminoid: contribution of exudates and root lysates as affected by N loading

Eva Kastovska, Keith Edwards, and Hana Santruckova

University of South Bohemia, Faculty of Science, Department of Ecosystem Biology, Branišovská 1760, České Budějovice 370 05, Czech Republic (ekastovska@prf.jcu.cz))

Carbon allocation pattern represents the plant strategy for growth and nutrient capture. Plants exhibit high plasticity in their allocation pattern and belowground C partitioning in response to changes in the availability of nutrients limiting their production, namely nitrogen (N). Any shift in the belowground C fluxes and partitioning between root production, exudation and other rhizodeposits could affect the soil microbial activity and soil organic matter turnover.
We studied the influence of N availability on plant allocation patterns with emphasis on belowground C fluxes of two wetland graminoids, the competitive Glyceria maxima and the conservative Carex acuta. Plants were grown in pots under two levels of N availability. We combined pulse-labeling of plants with $13CO_2$ to track recent assimilates with estimation of the root death rate calculated from the difference between gross and net root growth rates for assessing the rhizodeposition flux to soil, and the contribution of root exudates and lysates from root turnover.
We found that higher N supply enhanced root biomass and, subsequently, the total rhizodeposition. Both species shifted partitioning of belowground C towards higher mass-specific root production and turnover, with lower investments into root exudation. Therefore, the rhizodeposition flux was enriched in root-derived lysates over soluble exudates. Root exudates accounted for 50-70% of the rhizodeposition flux in conditions of low N availability, while it was only 20-40% under high N availability. The N fertilization induced changes in belowground C fluxes were species-specific, with more pronounced changes in the conservative Carex than the competitive Glyceria.
In summary, soil N loading enhanced total C rhizodeposition and, simultaneously, the proportion of predominantly more complex root lysates over soluble root exudates, with potential implications for soil organic matter dynamics. Our results further stress the importance of species-specific responses to N loading in predicting total rhizodeposition flux and changes in its quality.