

# Rhizosphere 2004

## – Perspectives and Challenges – A Tribute to Lorenz Hiltner

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## 12.4. Abstracts of poster contributions

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### PATTERN OF CARBON ALLOCATION IN THE RHIZOSPHERE OF RYE GRASS (*LOLIUM PERENNE*) PLANT AFTER DEFOLIATION

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Defoliation have controversial effects on plant-soil C allocation pattern and on the component of the soil food web [1] depending of experimental conditions. The interactions between plant, root exudates and micro-organisms can only be understood in relation to soil fauna activity, indicating that the soil fauna has an important function in regulating rhizosphere microbial processes and therefore significantly affects plant growth [2]. In this context, this work aimed to measure pattern of C allocation to the rhizosphere of ryegrass plant submitted to defoliation under field conditions.

Undisturbed soil monoliths with rye grass plant were excavated from the field trial, 2 and 4 days after defoliation for plant and micro-organisms analyses. Soil food web analyses were performed on soil monoliths excavated six days after defoliation.

Carbon concentration of shoot tissue was significantly decreased whereas carbohydrate concentration of roots tissue was significantly increased by defoliation. Microbial activity (estimated from the short-term utilisation of <sup>14</sup>C glucose by rhizosphere micro-organisms) of adhering soil micro-organisms and catabolic activity of bacteria were not affected. In agreement, the number of bacterivores, known to respond very well to changes in bacterial growth, was not affected by defoliation. The number of herbivores, fungivores and omnivores in defoliated plots was reduced.

Despite increasing C allocation to roots, defoliation did not appear to increase C exudation to the rhizosphere. Instead, effects of defoliation on rhizosphere organisms appeared to be longer-term and mediated by root and mycorrhizal fungal growth.

[1] Mikola J, Yeates W, Wardle AD, Barker GM, Bonner KI (2001) Response of soil food-web structure to defoliation of different plant species combinations in an experimental grassland community. *Soil Biology and Biochemistry*. 33(2), 205-214.

[2] Bonkowski M, Cheng W, Griffiths BS, Alpeh J, Scheu S (2000) Microbial-faunal interactions in the rhizosphere and effects on plant growth. *European Journal of Soil Biology*. 36(3), 135-147.