



Responses of belowground carbon allocation dynamics to extended shading in mountain grassland

Michael Bahn (1), Fernando A. Lattanzi (2), Roland Hasibeder (1), Birgit Wild (3), Marianne Koranda (3), Valentina Danese (1), Nicolas Brüggemann (4), Michael Schmitt (1), Rolf Siegwolf (5), and Andreas Richter (3)

(1) Institute of Ecology, University of Innsbruck, Innsbruck, Austria, (2) Technische Universität München, Freising-Weihenstephan, Germany, (3) Department of Terrestrial Ecosystem Research, University of Vienna, Vienna, Austria,

(4) Institute of Bio- and Geosciences, Forschungszentrum Jülich, Jülich, Germany, (5) Paul Scherrer Institute, Villigen PSI, Switzerland

Carbon (C) allocation strongly influences plant and soil processes. Short-term C allocation dynamics in ecosystems and their responses to environmental changes are still poorly understood. Using *in situ* $^{13}\text{CO}_2$ pulse labeling, we studied the effects of one week of shading on the transfer of recent photoassimilates between sugars and starch of above- and belowground plant organs and to soil microbial communities of a mountain meadow. C allocation to roots and microbial communities was rapid. Shading strongly reduced sucrose and starch concentrations in shoots, but not roots, and affected tracer dynamics in sucrose and starch of shoots, but not roots: recent C was slowly incorporated into root starch irrespective of the shading treatment. Shading reduced leaf respiration more strongly than root respiration. It caused no reduction in the amount of ^{13}C incorporated into fungi and gram-negative bacteria, but increased its residence time. These findings suggest that, under interrupted C supply, belowground C allocation (as reflected by the amount of tracer allocated to root starch, soil microbial communities and belowground respiration) was maintained at the expense of aboveground C status, and that C source strength may affect the turnover of recent plant-derived C in soil microbial communities. (Reference: Bahn et al. 2013. *New Phytologist* 198:116–126)