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Biogeochemische Hotspots im Boden

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Titel

Intraspecific diversity of the rhizodeposition of *Lupinus angustifolius* L. regarding the phosphorus mobilization in the soil

Abstract

The cropping of lupines (*Lupinus* spp.) for protein production is rising worldwide. The growth of lupines is often limited by P deficiency, caused by low P bioavailability in soils. The rhizodeposition is a leading control of the P mobilization in the soil, i.e. especially by the release of phosphatases and organic acids. In the present study 20 genotypes of *L. angustifolius* (19 accessions from different geographic origins and the cultivar Boruta) were tested on their molecular-chemical composition of the rhizodeposition in P-deficiency by pyrolysis-field ionisation mass spectrometry (Py-FIMS) and on the phosphatase and β -glucosidase activities in the rhizosphere soil.

The intraspecific diversity of the composition of the rhizodeposits was especially large for the relative abundance of carbohydrates and in this way in a specific impact on the microbial activity in the rhizosphere by selective promotion under some genotypes by easily available C sources for the microbial rhizosphere community. This was confirmed by a large variation in the thermal stability of the rhizodeposits of different genotypes, a varying pH level in identical cultivation conditions and in varying activities of alkaline and acid phosphomonoesterases and β -glucosidase in the rhizosphere. Furthermore, the data revealed a strong variation in the release of alkaloids into the rhizosphere during the growth with a further impact on the microbial activity. In conclusion, the use of the quality of the rhizodeposition as an indicator of the potential for P mobilization in P-deficient soils highlighted a broad intraspecific diversity within *L. angustifolius*. This is a promising basis for a selection of highly P efficient genotypes within this species for further breeding strategies of productive cultivars.