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Thema
Kommission III: Bodenbiologie und Bodenökologie

Biogeochemische Hotspots im Boden

Autoren
C. Baum[1], K. U. Eckhardt[1], D. Prüfer[2], F. Eickmeyer[3], P. Leinweber[1]
[1]University of Rostock, Soil Science, Rostock; [2]Westphalian Wilhelms-University of Münster, Institute of Plant Biology and Biotechnology, Münster; [3]ESKUSA GmbH, Parkstetten

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 ß-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 ß-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.