



How microorganisms affect the rhizosphere extent?

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Improved agricultural production to meet the food demands of an increasing global population is highly dependent on chemical fertilization and other intensive measures. However, as intensive cultivation leads to soil degradation and fertility decrease. It has been stated frequently that organic carbon input by roots into soil strongly accelerates nutrient cycling (Högberg & Read 2006). Therefore the objective of our study is to estimate the effects of the stimulated root exudates on microbial enzymatic nutrient mobilization in the rhizosphere. We hypothesized that artificial exudates stimulate microorganisms for enzyme production, increase their activities, and thus lead to mobilization of nutrients from SOM.

To simulate the exudation of organic substances by roots into the soil – but avoid the release of enzymes by roots – we used 100 mm long Rhizon[®] soil solution samplers (Rhizosphere Research Products, Wageningen) inserted into the center of a soil-filled rhizobox (12 [U+02E3] 2 [U+02E3] 12 cm). Soil zymography which is an in situ method was used in the study to analyze the two-dimensional distribution of enzyme activity in soil.

The results showed that alanine increased β -glucosidase, cellobiohydrolase, phosphatase and sulfatase activities; Methionine stimulates sulfatase activity less than other compounds due to its sulfur content; citric acid and malic acid increase the availability of phosphorus and nitrogen because carbon stimulates the activity of enzymes involved in phosphorus and nitrogen cycles.