Enzyme activity in relation to total k, ca, mg, fe, cu and zn in the oil palm rhizosphere of riauâ€™S peatlands, Indonesia

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Abstrak

Enzyme activity can be used as a peat decomposition indicator in the oil palm rhizosphere of peatlands. Oil palm plantation management requires fertilization in the rhizosphere to provide nutrients for oil palm growth. The state of total nutrient in the rhizosphere can influence enzyme activity. This research aimed to study enzyme activity in relationship to nutrients in the oil palm rhizosphere of peatlands. Using the explorative method in Riauâ€™s tropical peatlands, an oil palm plantation was chosen as a location for the main sites, and a degraded forest as well as a shrubland were chosen as comparison sites. In the oil palm plantation, peat samples were taken from peats adhering to oil palm roots at the peat depths of 0â€’25 and 25â€’50 cm and at distances of 0â€’1, 1â€’2, 2â€’3, and 3â€’4 m from the trees. In the degraded forest and shrub, t samples were taken from selected plant roots at the depths of 0-25 and 25-50 cm. The triplicate peat samples were then composited for an analysis of enzyme activity and total nutrient content. Results showed that enzyme (urease, phosphatase, Î²-glucosidase, and laccase) activity in the oil palm rhizosphere decreased as the distance from trees and the depth of rhizosphere increased. The decline in enzyme activity was caused by a low peat pH and an increased water content as well as organic carbon content. Enzyme activity increased with increasing oil palm age and ash content. Total K and Zn contents showed no correlation with enzyme activities. However, total Ca and Mg contents showed positive correlation only with Î²-glucosidase activity. Total Fe and Cu contents showed significantly negative correlation with enzyme activities (urease, phosphatase, Î²-glucosidase, and laccase). Enzyme activity in the rhizosphere of the degraded forest and shrubs were mostly lower than in the oil palm rhizosphere.