

Regeneration of Soil Fertility through Reforestation?

Studies on P-availability on deforested and forested sites on Leyte, Philippines.

*This work was financially supported by the
Eiselen Foundation, Ulm.*

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Summary

The plant availability of phosphorous (P) poses the main restriction for soil fertility and agricultural use on most tropical and subtropical soils. Thus, P-availability is to be considered for the evaluation of soil degradation along with land use. In this study the P availability of soils under secondary forest, palm plantation and of a re-forested site were determined at Leyte, Philippines.

It is assumed that there is a certain relation between the availability of phosphate in the soil and the soil content of organic Carbon (C_{org}). Besides others one model to explain this finding is that C_{org} can build coatings on mineral surfaces thus preventing the fixation of P to the mineral phase.

The aim of this study was: a. to test if the C_{org} content controls P availability b. if the correlation between C_{org} and P availability is caused by the surface coverage of the soil minerals with C_{org} and c. if differences in P availability can be explained by land use.

The analyses I conducted included the determination of plant available and oxalate/ascorbic acid extractable P, dissolved organic carbon (DOC), total organic carbon (C_{org}), oxalate/ascorbic acid aluminum and iron contents, pH and the determination of the specific surface area of the minerals and the extent of C_{org} -coatings on the minerals through BET-analysis.

The correlation between C_{org} content and P availability could be clearly confirmed for the soils examined. In contrast, the explanation for this correlation by C-coating of the soil minerals could not be definitely proven. The land use, i.e. the vegetation and management measures applied to the area, mainly explains the availability of P in the soil. The sequence of P availability was palm plantation > secondary forest > re-forested sites. Concerning P-availability, re-forestation of degraded soils did not cause the rehabilitation of soil quality.