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Evaluation of a Study Site for sustainable Yield Increase in Northern Vietnam

Bachelor Thesis im Studiengang Agrarwissenschaften
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Funded by the Eiselen Foundation

Hohenheim, 23.09.2009

Firstly, augerings helped to create an overview map and check homogeneity. In the field colour, structure, texture by hand, biological activity, rootability and boundaries were identified. Here already, differences in soil colours and structure between upper and downer slope were observed. Furthermore inclination and exposition were measured. Subsequently, the site was described and characterized by digging and analysing soil of three representative profiles. Profile descriptions were carried out according to the Field Guide (Jahn et al. 2006). The soils were then classified as cutanic Lixisol (profile 1), Regosol calcaric (profile 2) and haplic Luvisol (profile 3) via the WRB (2006).

In laboratory experiments, the bulk density, pH values, electrical conductivities, water-soluble cations, texture, potential CEC, exchangeable cations, available potassium and phosphate and weatherable minerals were determined. The total pore volume was calculated via bulk density, base saturations as well as S-values were also calculated. Because the soils of profile 2 and 3 were containing calcium carbonate, the exchangeable calcium was calculated with the difference of potential CEC and the sum of exchangeable potassium, magnesium and sodium.

PH values were higher in carbonate containing profiles 2 and 3 located on the upper slope resulting in base saturations of 100%. In profile 1 base saturations were below 100%. The bulk density was lower in upper profiles because of aggregate stabilizing carbonates and higher organic matter content. In profile 1 organic matter was partly eroded. On the downer slope erosion was more powerful due to the higher velocity of running off water. This resulted in already mentioned less organic matter and higher stage of weathering and even compaction in profile 1.

So the first scientific question could be negated: <u>The soils were not homogenous</u>.

Fertility was determined by measuring the amounts of exchangeable cations, plant-available potassium and phosphate and evaluation of available and stock nitrogen in the ERS. The ERS was identified as deep with the “Praktikumsanleitung” for all profiles.

Exchangeable potassium was found as medium to high contents because of fertilizing with potassium chloride. Exchangeable calcium was overall evaluated as very high and medium, respectively in profile 1. Exchangeable magnesium was generally evaluated as medium, except 1.1 where it was low. Available potassium was identified as very high in the ERS of profile 1 and 3 and high in profile 2. Available phosphate lacked and was evaluated for the ERS as low despite of fertilizing with superphosphate (**Error! Reference source not found.**). Due to fertilizing with nitrogen (**Error! Reference source not found.**) stock and available nitrogen was evaluated for all ERS as medium to elevated for stock, and medium for available nitrogen, despite of low organic matter contents, especially in profile 1 (slightly humous). For profile 2 and 3 the evaluation was humous.

All in all the second scientific question can be answered with: <u>Yes, the soil´s fertility is acceptable but lack of phosphate and magnesium should be compensated.</u>

To relate to the third scientific question, <u>soil cover, delivering of phosphate and magnesium as well as the input of organic matter should be assured</u>. From the recommendations several suggestions for possible melioration procedures were given. The aim was to increase the yield sustainably for developing a soil- and nature-gentle insurance of food. As Hudson stated (1981), methods of mulching were cost- and labour-extensive and you easily get a well-fitting seed-bed in combination with soil covers and re-replacement of nutrients to the soil due to intercrops like legumes. Together with minimal tillage it would provide a sustainably stabile and fertile soil. Phosphate and magnesium have to be fertilized in the mentioned ways.