



University of Hohenheim

Faculty of Agricultural Sciences

Institute of Agricultural Sciences in the Tropics

(Hans-Ruthenberg-Institute)

First examiner: Prof. Dr. Georg Cadisch

Second examiner: Prof. Dr. Reinhard Böcker

Supervised by: Dr. Thomas Hilger and Sahrah Fischer

**Soil macronutrient availability in farmer's fields along the
north-western slope of Mt Elgon, Uganda**

This study was supported financially by Foundation fiat panis

Master Thesis submitted by:

Sebastian Michael Pochert

Matriculation No. 599760

Master of Science in Agricultural Biology

November, 2017

Abstract

The field research for this Master's thesis was conducted on the northwest slope of Mt Elgon in the Kapchorwa district of Eastern Uganda. It investigates the concentration distribution of soil properties in arable land of smallholders. Three aspects are analyzed: (i) How does altitude affect the measured properties? (ii) What influence do different crop systems (multi-crop, intercrop, monocrop) have? (iii) What impact does the distance between the homestead and the fields have?

Soil samples were taken from 45 farmers—from 2-3 fields each—amounting to a total of 129 fields extending over an altitude gradient of 1200 to 2400 masl. Additionally, the distance and position of the fields to the homestead was measured. It was recorded which cultivation system was used on the respective fields. Differences were made between monocrop, intercrop and multi-crop systems. All soil samples were tested for nitrogen (N), phosphorus (P), potassium (K), carbon (C), pH and C / N ratio. The results were used to construct a statistical linear model.

The linear model shows that all measured soil properties are significantly influenced by altitude. The concentrations for K and P are represented by a hump shaped curve with maximum at 1800 masl. The concentration of C and N in the soil increases exponentially with altitude. The cultivation system has an effect on the concentration of N and C in the soil and on C / N and pH. The multi-crop systems were significantly different from monocrop and intercrop systems regarding C and N. Intercrop and monocrop systems could not be differentiated significantly. The distance of a field from the homestead was found to only have an effect on the concentration of K, which is lower for the fields furthest from the homestead. However, no clear statement could be made about the correlation due to the biased distribution.