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## Resource Use in Abaca (*Musa textilis*): A Versatile Smallholder Fiber Crop from the Philippines

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### Abstract

Abaca is economically important for the Philippines. Its fibre is highly demanded by the pulp and paper industry as it is an important resource for specialty papers, e.g. tea bag papers. Currently, Catanduanes Island of the Philippines is the world's largest producer of abaca fibres, being an important smallholders' income source. Traditionally, they grow abaca as a cash crop in secondary forest areas of mountainous regions throughout humid areas of the Philippines. Farmers maintain fields over decades without application of any external inputs. Little is known on the impact of that on soil fertility and nutrient balances in abaca cropping. We hypothesized that the traditional way of harvesting leads to a concentration of nutrients close to the tuxying place within a field, whereas areas distant to it deplete in nutrients. This study aimed to (i) assess the impact of the abaca harvesting on soil nutrient availability, (ii) appraise the spatial distribution of the nutrients along the slope in abaca cropping systems, and (iii) provide understanding of the dynamics and loss of nutrients due to harvesting and handling of crop residues after fibre extraction. Therefore, we determined the aboveground biomass of abaca at three positions along the slope at two typical abaca field on Cantanduanes Island. We analysed pseudostem, leaf and fibre samples for nitrogen, phosphorus, potassium and carbon content at the same positions. These results were combined with nutrient analysis of the soil, litter and natural vegetation of the monitored plots of each field site. Furthermore, we measured photosynthetically active radiation and soil cover at each plot. Results show that the amount of nutrients in the cropping system strongly depended on the field management. Especially the amount of phosphorus in the cropping systems was highly impacted by the crop waste treatment ( $P = 0.0009$ ,  $\alpha=0.05$ ). Nutrient distribution shows a high heterogeneity within fields at the level of the soil, litter, natural vegetation and abaca. However, no apparent trend in the nutrient distribution along the hill slope was found, suggesting erosion and leaching was minimised due to the abundance of natural vegetation providing enough soil cover (85-98 %) in combination with the broadleaved abaca.

**Keywords:** Fibre yield, minor crop, *Musa textilis*, nutrients, resource use, smallholder