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Edaphic and Topographic Factors Explaining *Canavalia brasiliensis* Production in the Nicaraguan Hillsides

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Abstract

In smallholder farming systems of the Nicaraguan hillsides, intensification of land use resulted in soil nutrient depletion and a decrease in agricultural productivity. Nitrogen (N) is considered as the most limiting nutrient in the traditional maize-bean-livestock system. Furthermore, farmers lack forage of good quality for their livestock especially in the dry season. We are testing the hypothesis that the underutilised and drought tolerant cover legume *Canavalia brasiliensis* (canavalia) can be introduced into the traditional mixed system to overcome productivity decline. To test the performance (dry matter production, symbiotic N₂ fixation) of canavalia on farm, we implemented field trials on six farms located at different altitudes across the landscape. Three fields were located in the bottom of the valley, two at a medium level and one on the top of a hill. On each field, twelve 100 m² plots were established. Chemical and physical soil properties were assessed at 0–10 cm depth, and topographic characteristics were defined for each plot. Soil profiles were described for groups of plots with common properties, including canavalia root mapping. Farmer's individual management per site (tillage and fertilisation) completed the data set. During two consecutive years, canavalia was cut four months after planting. The above ground biomass production varied between 0 and 5700 kg dry matter/ha. Canavalia fixed between 8 and 70 kg N/ha, with on average 62 % of N derived from the atmosphere. Unconstrained multidimensional scaling was used to structure the data set and determine gradients of soil properties between the plots. Multivariate multiple regression was applied to detect significant topographic and edaphic factors explaining above ground biomass production of canavalia, as well as the effects of soil properties on N uptake and N fixation by the legume. Final results will be available by October 2009.

Keywords: *Canavalia brasiliensis*, edaphic factors, multivariate analysis, Nicaraguan hillsides, on-farm trial, topography