



Tropentag, October 11-13, 2006, Bonn

“Prosperity and Poverty in a Globalised World—
Challenges for Agricultural Research”

Assessment of an Improved Fallow Agroforestry System in the Peruvian Amazon through Modelling Approach

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Abstract

As traditional slash-and-burn systems with prolonged fallow periods are no longer feasible in most parts of the tropics, improved agroforestry systems have high potential to increase the productivity of farming systems and sustain continuous crop production. Our objective was to assess biophysical and economic performance of planted leguminous tree fallow (using *Inga edulis*) compared to traditional slash-and-burn farming system, practised by farmers on fields infested with noxious weedy grass *Imperata brasiliensis* around the city of Pucallpa, Peru. The evaluation consists of two parts. An existing agroforestry model SCUAF was used to predict biophysical factors, such as changes in soil characteristics and farm outputs (crop and tree yield). While a cost-benefit analysis spreadsheet, which uses the output from SCUAF and economic data on input/output levels and prices, calculates economic performance of the systems. The Inga fallow system can provide improvements to a range of soil biophysical measures (C, N, P content). This enables higher levels of farm outputs to be achieved (higher cassava yields). However, for smallholders the improved system must be more economically profitable than the existing one. At prices currently encountered, the Inga fallow system is more profitable than the *Imperata* fallow system only in long term. The time taken for the smallholders to convert from the current system to the new system is important. In adopting the Inga fallow system, smallholders will incur lower profits in the first years, and it will take approximately ten years for smallholders to begin making a profit above that achievable with the *Imperata* fallow system. Unless smallholders are capable of accepting the lower profitability in the first years, or there is some government assistance, or a kind of incentive, they are less likely to adopt the new system.

Keywords: Cost-benefit analysis, *Imperata brasiliensis*, improved fallow, *Inga edulis*, SCUAF, slash-and-burn