

TOWARDS ESTABLISHING AGROFORESTRY RESEARCH PRIORITIES FOR CENTRAL AMAZONIA

Johannes van Leeuwen¹

Agroforestry can be an "alternative" to deforestation, when it mimics the forest with high biomass, a permanent, dense root net, and a permanent canopy.

THE DIFFICULTY OF DEFINING PRIORITIES

It is very difficult to decide on agroforestry research priorities. There are several hundred species of potential interest, which can be combined in a multitude of systems; while research funds are extremely limited. In addition, research decisions will often have long lasting consequences, as field experiments with perennials need to be accompanied during many years, if not decades. New agricultural techniques are only of interest if the farmers are willing to adopt them. This paper analyses which forms of agroforestry may be of interest to them.

SHIFTING CULTIVATION

Smallholders have fields with annual crops, often also a home-garden, and sometimes pasture and cattle. Forests are cut yearly as fields for annual cropping have to be renewed continuously. The main annual crop is generally cassava (*Manihot esculenta*), grown for subsistence and frequently the most important source of cash. The fundamental question is how to reduce this need for new land, in other words, how to decrease the farmer's dependence on annual crops.

CAN TREES SUBSTITUTE CASSAVA AS A SUBSISTENCE CROP?

In the late seventies researchers at INPA launched the concept of the "food forest" (Arckoll 1982) as an alternative to slash-and-burn agriculture. It should produce "all of a family's starch, most protein, vitamins and minerals from tree fruits and associated animals" (Clement 1986). The Pejibaye palm (*Bactris gasipaes*) was expected to become an important food forest species, but presented severe fruit abortion when planted in higher density (Clement 1990 pers. comm., Arckoll 1990 pers. comm.). Other problems are the acceptability of fundamental changes in food habits and the impact of fruit processing on the farmer's labor calendar. The food forest constitutes a fascinating scientific challenge, but should not be a high priority, as it is improbable that it will lead to important land-use changes within a foreseeable future.

TREES TO SUBSTITUTE CASSAVA AS A CASH CROP

Less ambitious is the substitution of cassava as a cash crop by tree products. Production of perishable fruit,

however, is only of interest close to urban centers. Products from the interior (nuts, oils, gums, honey, etc.) should store and transport well under relatively primitive circumstances, have a good price and need little or no fertilization. The search for new species is urgent, while the development of village level technology of (pre)processing to obtain storable products can be decisive in determining success.

Planting trees for timber production is of interest in the floodlands (*várzea*) (Alencar 1989 pers. comm., Van Tommen 1990 pers. comm.). Research on timber tree planting by farmers has not yet started, but deserves high priority.

HOME-GARDENS

Serious attention should be given to the study of home-garden management. Can home-gardens be expanded? Can their management techniques (use of old cassava fields, combination of different species, sequential planting, and gradual renewal) be used in new plantings?

ANNUAL CROPPING AND PASTURES

Possible agroforestry techniques to improve the sustainability of annual cropping are planted fallow and alley cropping. For pasture the use of woody species for soil-fertility improvement, protein-rich fodder, fodder for the dry period and shade can be important. These forms of agricultural intensification are of special interest in areas with reduced land availability (colonization areas in Pará and Rondônia). It is here that they should be studied primarily. Once concrete technologies acceptable to the farmer are available, these can be tried elsewhere.

RESEARCH METHODOLOGY

Even after careful selection, numerous species and species combinations will be of potential interest. The traditional scientific approach is to choose one system and to study it in a replicated field experiment. In this way very few systems can be studied and large amounts of time and money may be invested in systems which later prove to be irrelevant. Researchers will often do better not to replicate, but to try as many different systems as possible. A new species combination will often not develop as expected. In these cases, management should adapt to the new situation, for instance, by removing a species which proves to be undesirable. Trials should be designed and executed in close collaboration with farmers.

¹Instituto Nacional de Pesquisas da Amazônia/ INPA-DCA