Agriculture in Amazonia

Amazonia: Agriculture and Land Use Research, edited by a geographer with a good grasp of the broad range of issues involved, is the proceedings of a conference held at the Centro Internacional de Agricultura Tropical in Cali, Colombia in April 1980. The paperback volume is organized into three sections. The first deals with reports from representatives of various countries with territories in the basin, for each country an overview of the environment, research objectives, and agricultural development efforts is provided. The second section of the book contains technical discussions of soils and the potential of various crops. The final part is an illuminating presentation of forest retort- rific and agroforestry efforts in Amazonia and other tropical lands. The country reports section makes slow and choppy reading at times, and is occasionally repetitive, but two themes stand out. First, the Amazon is generally a poor piece of real estate. In neither the Bolivian, Peruvian, Ecuadorian, Colombian, Venezuelan, or Brazilian Amazon do naturally fertile soils cover more than 10 percent of the area involved. In the Peruvian Amazon, for example, only three percent of the territory is considered suitable for annual crop production. Second, governments are clearly increasingly aware of the constraints to agricultural development of Amazonia and are taking incremental measures to spur research and promote ecologically-viable crops. Venezuela's first caution in considering its Amazonian territory exemplifies the wisdom of careful study prior to development.

In the Technical Reports section, the essay by Costambe and Sanzaran summarizes many of the obstacles to agricultural development of Amazonia. Four-fifths of the soils suffer from strongly acid conditions where a pH of 5.2 or less prevails. Furthermore, three-quarters of the land suffers from toxic levels of aluminum. Traditional shifting cultivation systems have contributed to these drawbacks by superimposing on the nutrientrich subsoils generated by burns and then clearing a fresh patch of forest when crop yields slip due to declining soil fertility. The build-up of weed and pest populations, Cochrane and Sanchiz, describe potential cropping systems developed in the Peruvian Amazon that employ fertilizers profitably.

Although there are doubtless less favorable situations where fertilizers can be utilized economically in the Amazon, such as near urban centers, it would be a mistake to assume that all are not suitable to do is make fertilizers available so that food production is boosted in the region. Fertilizers are extremely expensive in Amazonia, partly because they have to be transported from distant factories. Since the region is a net food importer, annual food crops could be grown on a much larger scale on the floodplains of the Orinoco rivers to feed the burgeoning cities. Alluvial soils of such white-water rivers as the Amazon are rejuvenated each year by floods and thereby require little or no fertilization if any fertilization to achieve high yields. To reduce the acidity of upland soils for perennial crops, the extensive deposits of limonite in Amazonia could be mined to provide lime.

Acreage expansion for export crops requires fertiliser as a feedstock, usually natural gas or petroleum, and other nutrients such as phosphorus and potash need large amounts of energy to mine and transport. Fertilizer prices are expected to increase sharply, and other strategies for boosting crop production barely touched are worth exploring. Crop breeders, for example, could profitably devote more attention to plants that promote nitrogen fixing and symbiotic and associative bacteria and
encourage the development of particularly efficient root-VA mycorrhizal relationships. Another method of reducing the need for commercial fertilizer mentioned in the book is the use of mulches. An additional benefit of a layer of plant material on the soil surface is that it helps conserve moisture. But two all crops benefit from mulches in the rainy season rice can suffer from increased damage due to fungal and bacterial diseases if organic matter is deposited around the base of the plants. Furthermore, mulches require time and land to produce. In the Brazilian Amazon, the only crop that I am aware of that regularly receives a mulch dressing is black pepper. Farmers at To-com-Api place rice hulls around the base of the plants to restrict weed development and to conserve moisture during the dry season.

The chapter by Schiller and Salati touches on an important potential problem: the increase of atmospheric carbon dioxide. The burning of tropical forests will undoubtedly accelerate this trend; the Amazon forest alone contains twenty percent of the carbon locked up in the global biomass. The ultimate outcome of this trend is still disputed, but climatic patterns over wide zones are likely to be disrupted. Temperate zone people thus have a stake in the future of this tropical region.

The papers by Toledo and Serrão, Alvim, Hada, Peck, Valencia, and Bishop focus on the prospects for perennial crops in the Amazon, with particular emphasis on agro-forestry schemes. Rubbers, cascas, African oil palm, and Brazil nut are among various tree crops that may undergo extensive testing and planting in the region. Food crops can be planted while the trees are becoming established, or in some cases, intercropped with mature trees. The integration of agroforestry and animal production systems such as cattle pasture sown in rubber and African oil plantations, receives attention by several authors. Multiple cropping with trees and other crops is ecologically and economically sound; farmers are less prone to catastrophic crop failures. The second natural obstacle to the agricultural development of the Amazon: the confined land tenure system. Few bankers issue agriculture loans to people without titles to their land and only a small fraction of farmers in Amazonia have secure titles to their properties. Most small-scale cultivators do not have any documents for their land, while large landholders often dispute their rights to the land with other settlers. False titles abound. The paucity of cadastral surveys and the issuing of illegitimate land titles needs to be accelerated to provide a more favorable environment for the diversification of agricultural development projects.

Given the heterogeneous nature of Amazonian ecosystems, agricultural technologies will have to be tailored to local conditions. Research incentives within the region thus need to be strengthened. Unfortunately, sporadic budgets and frequent changes in public leadership often undercut efforts to develop farming strategies for the region. Sustained support by national governments is therefore necessary if agricultural research is to bear fruit.

Although the book is marred by numerous misprints, several grammatical errors, some one sentence paragraphs, and a lack of an index, it will prove most useful to development planners and research institutes working on tropical agriculture. The book summarizes the current knowledge about agriculture in Amazonia, identifies priorities for research, and wisely calls for the establishment of parks and Indian reservations. The volume is a valuable addition to the growing literature on Amazonia.

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