

Capoeira: Secondary vegetation as an integral part of the agricultural production system (ENV-25/1)

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1 The problem

The municipality of Igarapé Açu is an example of how a long term model of colonization and intensive agricultural exploitation in tropical rain forest regions can provoke substantial alterations in the landscape and its ecological conditions.

The potential vegetation of the region is constituted by tropical rain forest, but today this region has an agricultural landscape and the present vegetation is dominated by a land use system which alternates between secondary vegetation (capoeira) and slash and burn farming. Besides the fields under cultivation, the landscape of Igarapé Açu is characterized basically by capoeiras or younger secondary vegetation. In the rural properties of Igarapé Açu more than half of the area is occupied by capoeiras (up to 4 years of age: 16 %; capoeiras of more than 4 years: 50 %) while the forests (natural and plantations) occupy only 7.5 % of the usable area.

The capoeiras normally are grown during fallow periods of three to seven years in duration or under the best of eight to nine years. The shortness of this fallow is due to the demographic pressure and also in quite significant proportions from factors linked to infra-structure (location of properties close to homes and roads). As a consequence, the natural plant cover and its typical floristic compositions have been gradually substituted by secondary vegetation originating from human activities, which is certainly different from the original vegetation. As time passes, the capoeiras have been cleared many times for the cultivation of the land, causing a progressive diminishing of its vitality.

2 Capoeiras and the production system

Young secondary vegetation is the initial stage of secondary succession which starts from the perturbation of the tropical rain forest. However, due to the agricultural use of the land, the vegetation never reaches the potential final stage of succession once it is an integral part of the production system as fallow vegetation.

Basically, the development of the plant cover of a given area occurs in the following phases: the first cultivation phase is development of the capoeira over a few years (fallow period) then the next cultivation phase is clearing and burning. It is important to note that secondary succession, that is, the regeneration of the capoeira, already begins during the cultivation of manioc, when this crop is weeded for the last time.

The floristic composition of the fallow vegetation is a result of the agricultural use and of the selective effect exercised by the same on the species. The factors acting in this selection are: clearing, burning, stump removal, disking, ploughing, hoeing and eventually the crops cultivated.

In summary, one presumes that, in the agricultural landscape of Igarapé Açu, the secondary vegetation is maintained constantly in the initial phase of secondary succession, therefore allowing

the formation of plant communities that could be considered anthropic communities which have substituted the primary forest and its stages of natural secondary succession.

3 The function of capoeira in the production system

There are two primary functions of capoeira as fallow vegetation: The first is the accumulation of nutrients for the next cultivation phase that will be liberated through burning and the second controls weeds which invaded during the last cultivation phase.

As to the question of their persistence, given the conditions of the municipality of Igarapé Açu, it is difficult to respond about the capacity of the secondary forest to fulfil its functions. At present this is not very clear, however, it is probable that the agricultural production system is suffering, as a whole, from progressive degradation or in other terms, a continual loss in the system's productivity.

4 Regeneration of capoeira

The regeneration of the fallow vegetation, after cultivation, is predominantly vegetative. Practically all of the trees, shrubs, vines, large herbaceous perennials and a majority of the grasses regenerate by sprouting from stumps, roots or rhizomes. Only in the first or second year of fallow do the herbaceous and some grass species regenerate from seeds.

The mechanisms that impede the generative (i.e., by seed) regeneration of the trees and shrubs are mainly the repeated weedings during the cultivation phase. Burning and the activities of phytophagous insects can also be included as impediments. Frequent hoeing eliminates the seedlings of trees and shrubs that have recently germinated, causes an impoverishment of the soil seed bank, and therefore the generative regeneration in the fallow period.

Mechanized preparation of the fields, permanent crops and very short periods of fallow have negative effects on the vegetative regeneration by sprouting and shoots. Disking and ploughing mechanically destroy the root system of the vegetation, and repeated hoeing over a period of years does not allow the root system to survive, as is the case with perennial crops. Very short fallow periods restrict the capoeira from re-establishing itself and as a consequence the woody plants lose, in the medium term, their vitality and with this their capacity of vegetative regeneration.

Of the conventional land use systems in the municipality of Igarapé Açu the maintenance of typical capoeiras is guaranteed only with manual preparation of the fields and the planting of annual crops, followed by fallow periods of approximately 13 to 15 years.