



## B4.4

## After tropical forest, replantation of rubber trees and cocoa: Garden of eden or of chemical inputs?

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**Abstract:** Smallholders in humid tropical zones have often preferred to extend their plantations by clearing primary or secondary tropical forest rather than attempt replanting. The two main advantages procured by tropical forest—low 'land rent' and substantial 'forest rent'—are verified in Indonesia and Côte d'Ivoire, in cocoa and rubber. The two rents logically tend to become reversed as the cycle proceeds. This reversal may create conditions that are more favorable for replanting, possibly through a land market. The technical, economic and social factors of the decision to replant or not to replant and then possible determinants in the 'monoculture/agroforestry' dualism are reviewed succinctly. Monoculture is a migrant's strategy and agroforestry that of autochthons or long-established migrants. From a technical point of view, agroforestry emerges as one of the conditions of sustainability in humid tropical zones and in particular for replanting. However, we are far from having seen the end of monoculture with inputs, especially with regard to replanting. From a social point of view, land conflicts which coincide with the replanting phase deserve a great attention as well as great cautiousness on behalf of policy makers.

Smallholders in humid tropical zones have often preferred to extend their plantations by clearing primary and secondary tropical forests rather than attempt replanting. The two main advantages procured by tropical forest are 'low land rent' at the beginning of the adoption of a tree crop and great technical and economic advantages provided by very substantial 'forest rent'. This model based on migrations and deforestation can be called *model 1* and it is assumed here that this model 1 has been dominant in the tropical history of tree crops.

However, there are some exceptions and among them a *model 2* based on complex agroforestry strategies. Here, the main cultivated tree is intercropped with a number of other trees, either planted or spontaneously regrown from the root system or from seeds after the forest clearing. At the end of their life span, these plantations may have a structure similar to an old secondary forest. In other words, this agroforestry strategy rebuilds a 'forest rent' or an 'agroforestry rent' which seems to makes replanting much easier compared to monoculture (Ruf 1995, Penot 1998). Thus, after a

first cycle of the agroforestry system created after primary forest clearing, smallholders may cut it down and start a second cycle. This is a sort of replanting and an alternative to forest clearing.

The planting of a tree crop after grassland such as *Imperata cylindrica* and *Chrolomaena odorata* involves technical changes and inventions with regard to the plantation techniques used after the clearing of forest. Innovation is called for to counter the effects of the disappearance of 'forest rent'. Even if in this case there is no felling prior to the perennial crop, 'planting after grassland' has common features with replanting in the strictest sense. This is also a form of *replantation* which is called here *model 3* but it is assumed that it has been scarcely applied until recent years.

### 1. Pioneer fronts and the development of tree crops at the expense of forest

The 'differential forest rent' applied to tree crops is the difference in production and investment costs between a tonne of the commodity produced in a farm established just after a forest was cleared and a tonne of the same commodity produced by replanting on fallow land or after felling of the first plantation (Ruf 1987, 1995). The difference is often positive and helps to explain why model 1 has often been dominant in tree crop history. However this 'forest rent' interferes with a number of other factors which may lead to an evolution towards the other models.

#### *Appraisal of the forest rent on cocoa farming in Côte d'Ivoire*

Differential forest rent appears in land prices in Côte d'Ivoire. This is one of the ways of demonstrating its strong existence in the case of cocoa farming in Côte d'Ivoire and it explains why the model 1 has been dominant in that country, at least until recent years (Table 1). However, this rent was also enhanced by the Ivoirian land tenure policy, with the 1963 rule that 'the land belongs to he who farms it'. This bill has never been promulgated but is always applied in practice, giving a considerable advantage to migrants. By definition and according to the objectives of the government of Côte d'Ivoire, the rule tends to weaken landholding rent and hence the cost of