

# Neotropical Ecosystems



**WAVES**

Water Availability, Vulnerability  
of Ecosystems and Society  
in the Northeast of Brazil

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## Primary Productivity in Different Ages of "Capoeira" in Northeast of Amazon an Alternative Method for Biomass Determination.

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### 1 Introduction

The "capoeira" (fallow vegetation) is a common example of modified area in the Amazon, however, it is an efficient structure to recover the potential of agricultural productivity. In this direction, the accompaniment of the primary productivity increment, as well as aerial and underground, in these perturbed ecosystems, become an important mechanism to assist in the understanding of the nutrients and water cycle, such as carbon accumulation. In such case, the objective of this work is to provide an efficient mechanism for accompaniment of primary productivity through Leaf Area Index (LAI) and Root Increment Index (RII) in different age of "capoeira".

This work was developed in an experimental area in the municipal district of Igarapé-Açu (0° 55' - 1°20' S, 47°50' - 47°50' W), where the SHIFT-"capoeira" project (ENV-25) comes accomplishing researches there are approximately six years. Due to the type of earth's use, familiar agriculture, inserting annual cropping and fallow periods, this area presents one mosaic of "capoeira" of different ages and annual cropping. The region presents level relief with soils

of type Ultisols (Kandiudults-USDA-soil taxonomy; REGO et al. 1993). In general the soils of the region are sandy soils (80-90% sand) in the top 10 cm and have increasing clay content of around 30% at between 50 and 100 cm depth. The precipitation regime is approximately 2000-3000 mm per year, with a defined drought station, that is going from July to December, which average rain in this period is 346 mm (DINIZ, 1986); hence the study area lies in the humid tropics.

The leaf area index (LAI) was monthly evaluated not destructively, through of the canopy analyzer apparatus, LAI-2000-Li-Cor. The measurements were carried in parcels for "capoeira" of 6 and 10 years old (average height 3.5 and 6.5m, respectively), and in parcels of in "capoeira" of 1 year old (average height 1.5 m).

The root increment was estimated in the same parcels for LAI study, with ingrowth bags installed in the depths of 0-10, 30, 50, 100, 200, 300, and 400 cm, by help of increment borer. The bags were buried at the beginning of the less rainy and rainy period, in the same hole. Six months after, the bags had been removed and dried. Soil and root inside the bags was weighted, and subsequently washed in

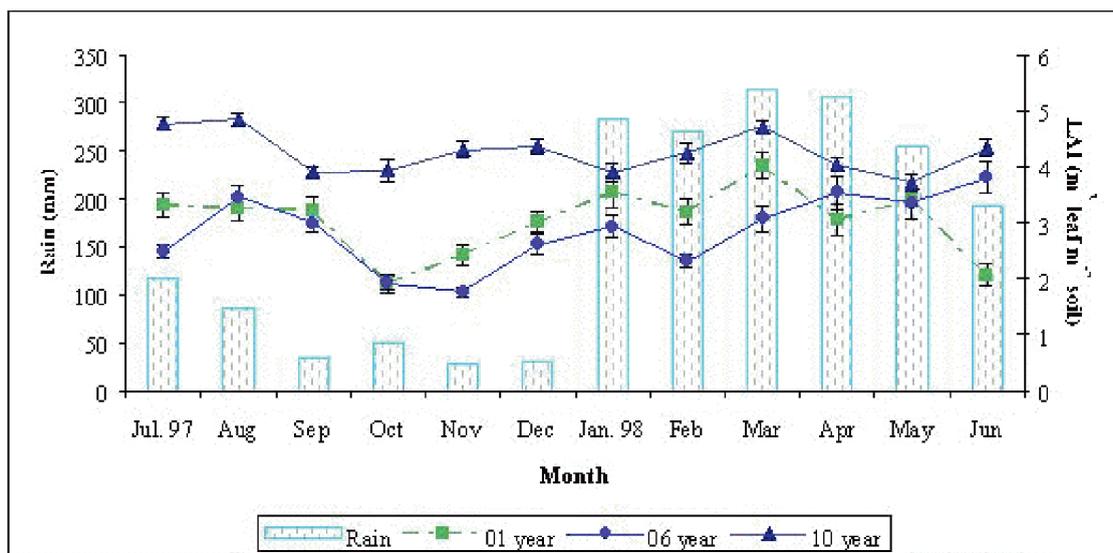


Fig. 1: Monthly leaf area index (LAI) for "capoeira" of 1, 6, and 10 years old in Igarapé-Açu. (average and S.E.).

current water and sieved. The root material was collected and dried. The root increment index (RII) inside of bags was calculated considering:

$$RII = \text{root weight} / \text{soil density inside the bag.}$$

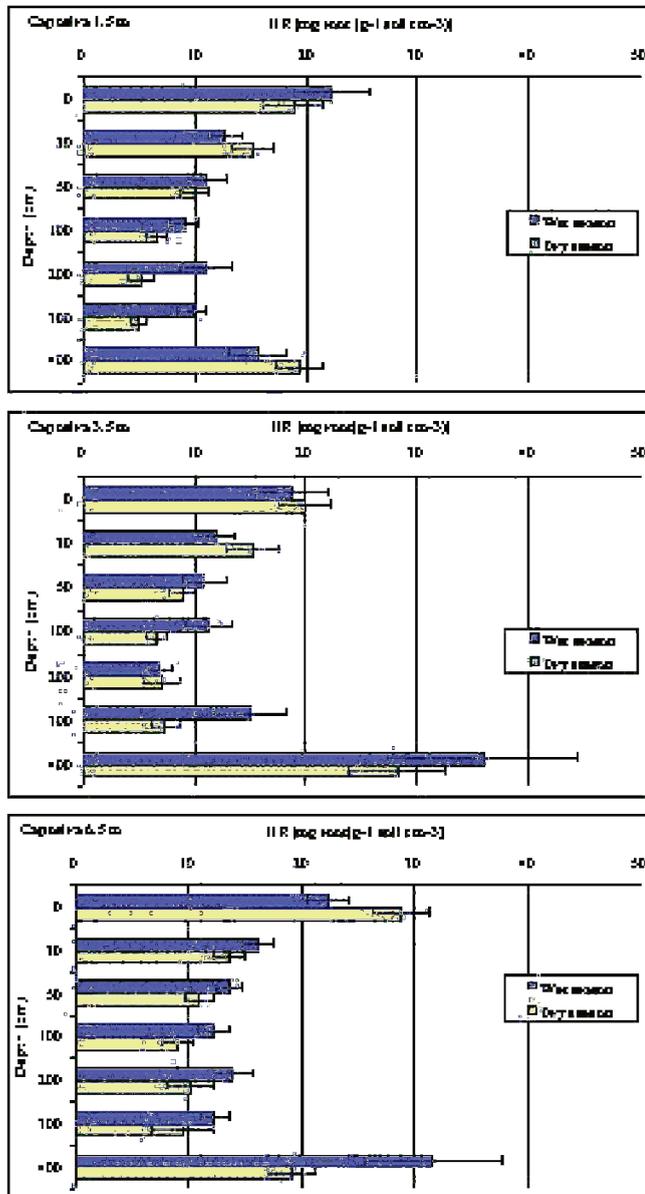


Fig. 2: Root increment index (RII) in dry and wet season in "capoeira" of different weight in Igarapé-Açu. (Average and SE)

Conclusions

## 2 Results

### 2.1 LAI estimate

The data of LAI during one year of measurement (Fig. 1) showed that "capoeira" of 10 years had a greater LAI during all year. However, our hypothesis did not confirm for "capoeira" of 6 and 1 year old, because the "capoeira" of 1 year old had presented some times bigger LAI of than 6 years old. Also, the data showed that the "capoeira" of 1 and 6 years tend to increase LAI (1.40 and 1.53 m<sup>2</sup>/m<sup>2</sup>, respectively) in according with the increase of rains. However, the "capoeira" of 10 years had not exactly presented a severe increase in the same period (0.95 m<sup>2</sup>/m<sup>2</sup>).

### 2.2 RII estimate

The results from RII show that there isn't any clear variation in the root growth between wet and dry season, in the three ages of "capoeira" (Fig. 2). However, the data show, for all the studied ages, existed an intense root growth in depth, mainly in the 4 m, where depth had presented greater root development in the dry season (Fig. 2).

The estimate of LAI by not destructive method with a canopy analyzer and the use of effortless RII methods seems to be a viable option for primary production studies in secondary vegetations, with the characteristics of the evaluated ones in the present study. The results in the analysis of the monthly variation of LAI in the three ages of studied "capoeira", reflect specific features of each vegetation, associates to the history of earth use, where the time in pouso at the moment of the evaluation (related as age of the "capoeira") is not the only factor to differentiate the vegetations. The RII in 400 cm of depth, in all studied "capoeira", suggest mechanisms for water and nutrients access in soil's deep layers, for "capoeira's" species.