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Research Paper

Influence of the dynamics of *Albizia adianthifolia* and *Albizia zygia*, two legume tree on the density of lianas during the post-harvest reconstitution in semi-deciduous forest of Côte d'Ivoire

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Abstract

The present study aims at establishing the influence of the dynamics of *Albizia adiathifolia* and *Albizia zygia*, two leguminous trees on the evolution of the density of lianas in the reconstruction of post-harvest plant. Conducted at Oumé central western Côte d'Ivoire semi-deciduous forest area, the objective of this study is to highlight the role of Albizia during the post-harvest recovery from determining their influence on the development of lianas. The floristic inventories and measurements performed in 54 fallows, 1-53 years showed that the densities of lianas and those of Albizia grow proportionately. However, changes in the number of lianas are not influenced by the canopy created by Albizia during their growth.

Key words: Albizia, influence, liana, semi-deciduous forest, Côte d'Ivoire

Introduction

The reconstruction of post-harvest flora of the tropical world has long been followed and described by many authors. In Côte d'Ivoire, this phenomenon has been the subject of numerous studies, including those of AUBEVILLE [1] in the major agro-ecological zones, ALEXANDRE [2] in an area of dense evergreen forest of DEVINEAU [3] in an area of forest-savanna transition and those of ALEXANDRE [4] and GNAHOUA [5] respectively in area of dense evergreen and semi-deciduous forest. However, the natural succession that; these authors described do not always obey to the standard classical model. Moreover, the dynamics induced by the post-harvest reconstitution in the natural flora has many modifications and changes in many parts of said plants. Among the major changes, there is a gradual variation of the diversity and richness of flora. These changes are observable through changes recorded in the physiognomy of vegetation in these successions. The recovery model of post-harvest known plants; list the kind of species like Musanga, Trema, Terminalia ... all tree species. In addition, work on the dynamics of lianas or lianescentes species are rare compared to those relating to the post-harvest reconstitution. While KOUAME [6] found that the post-harvest reconstitution may experience deviations, especially when inextricable network of lianas installs on other components of the flora. Over time, changes occur in the post-harvest flora. These changes are the consequences of climate change and the degradation of existing vegetation. FLORET [7] and GNAHOUA (1997) to this effect, the appearance of new species such as *Chromolaena odorata*, *Solanum verbacifolium Albizia* spp. According to these authors, these species are gradually replacing those first mentioned. In recent models of reconstruction of post-harvest plant, *Chromolaena odorata* is frequently described in the early stages of succession and is presented as inhibiting the development of many sun-loving species among which there are many lianas. Moreover, KOUASSI [8] showed that the development of *Albizia adianthifolia* and *Albizia zygia* inhibits shaded stage, that of *Chromolaena odorata* which promotes the emergence of many sun-loving species.

The present study aims to highlight the influence of the dynamics of *Albizia adianthifolia* and *Albizia zygia* two legume trees of Mimosaceae family on the development of lianas during the reconstruction in post-harvest area of semi-deciduous forest of Côte d'Ivoire. It provides additional methods for analyzing new patterns of recovery to help better understanding of changes and adaptations of the flora in relation to climate change. This influence was measured from changes in densities and average heights of these taxa during the post-harvest reconstitution.

Materials and Methods

The study was conducted in Oumé; semi-deciduous forest of Côte d'Ivoire (Figure 1). This department covers about 2400 km ² and lies between 6 ° and 7 ° N and 5 ° and 6 ° west longitude. The study plots are located on classified forests sites of Téné, Sangoué and the Company Cultures of Côte d'Ivoire (CCIC). These three sites are under the influence of a sub-equatorial climate bimodal 4 seasons: two rainy seasons a large one (March to June) and a little one (September to October) and two dry seasons, a long one (November to February) and a short one, July-August (Anonyme [9]).

The annual rainfall average in the region is about 1215 mm. The rainfall has considerably varied. The vegetation of the area is based on lateritic soils slightly desaturated (MONNIER [10]).

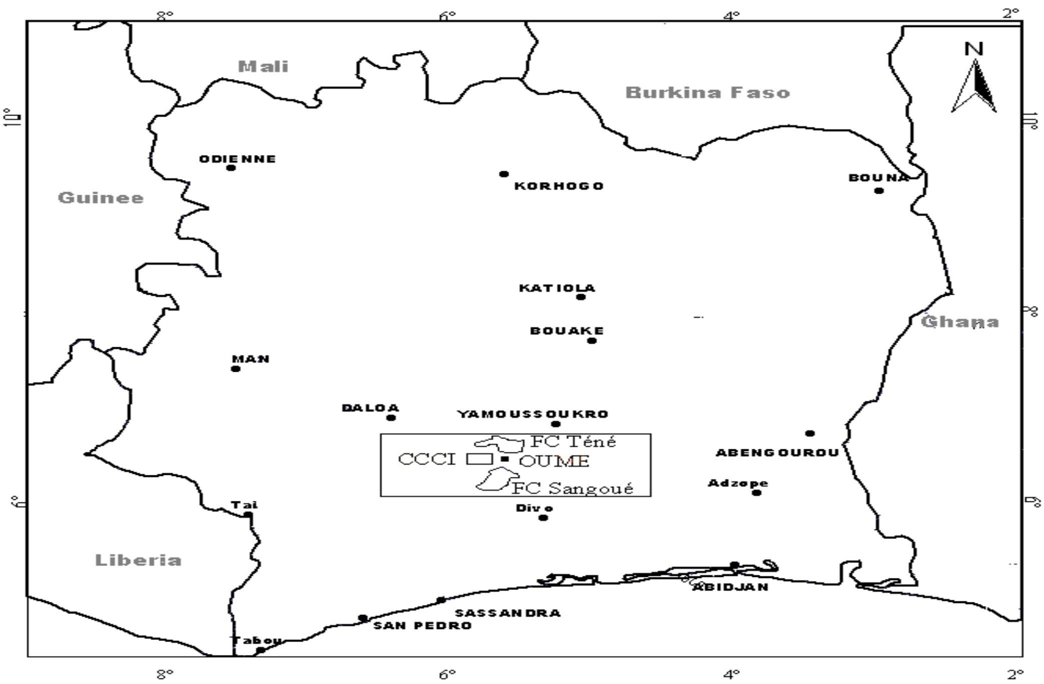

Figure 1: Map of Côte d'Ivoire (MONNIER, 1983)

Description of *Albizia adianthifolia* and *Albizia zygia*

Albizia appears as the remains of semi-humid dense forests (SCHNELL [11]). All species of this genus are deciduous.

Albizia adianthifolia (Schumach) WF Wigth is Sudano-Guinean specie that is present in the gallery forests, at their fring and abandoned fallow on deep soil (ARBONNIER [12]). It is a meandering tree trunk and flattened peak. The bark is brown and superficially cracked. The slice is thin, and exudes a yellowish gum. The leaves are alternate, compound, paripinnate. The petiole is pubescent. The flower has a greenish calyx and white corolla. The fruit is an oblong pod, flat and more or less pubescent membranous. It is brownish at maturity.

Albizia zygia (DC) JF Macbr tree is cylindrical shaft that can reach 1m in diameter. It sometimes shows a slight wheelbase at the base. The top of the tree is spread. The bark is smooth or finely fissured gray brown. The leaves are compound paripinnate. Leaflets increase in size gradually from the base to the top of the blade. The inflorescence is formed spherical heads of flowers arranged in panicles at the ends of shoots. The flowers have white petals and pink stamens. Fruits are pods oblong, flat, glabrous, membranous, dark-brown.

Floristic inventories

Floristic inventories and measurements were performed in 54 fallows; from 1 to 50 years, with *Albizia adianthifolia*, Albizia *zygia* and lianas. These plots were subdivided into units of 50 m X 50 m or, 2500 m². Height, circumference and density of Albizia and lianas were measured during the inventories. However, in selection of heights and circumferences of tree legumes, only stems over 2 m high and more than 20 cm of circumference were taken into account. On the other hand, density estimations have been extended to all stems of tree seedlings stages. Data analysis focused on the correlations between the parameters of Albizia force and density evolution of lianas over time.

Results and discussion

Time of fallows, developments of lianas Albizia densities

The evolution of the densities of Albizia and lianas are highly correlated with threshold 0.001 (Table 1). There is a linear regression (F = 7.704, Pr> F = 0.008) between the correlated parameters. The equation for this regression is of the form: Density of lianas = 1.90687648755355 27.4284532803181 + E-02 * Density of Albizia.

Table 1: Bilateral correlation (density of lianas and evolution of Albizia density)

		Lianas density	Albizia density
density of Lianas	Pearson Correlation	1,000	0,359
	Sig. (2-tailed)	0,000	0,008
	N	54	54
density of Albizia	Pearson Correlation	0,359	1,000
	Sig. (2-tailed)	0,008	0,000
	N	54	54

** Correlation is significant at (0.01) threshold.

Scale: 1/400 000

Region gathering the three study sites

C F = classified forest

Evolution of the density of lianas and average heights of Albizia Albizia zygia adianthifolia and over time

The average heights and densities of Albizia and lianas are not correlated over time (Table 2).

Table 2: Bilateral correlation (Evolution of height average of Albizia and density of lianas)

		Average height.	Density of lianas
Average height	Pearson Correlation	1,000	0,057
	Sig. (2-grade)	0,000	0,685
	N	54	54
Density of lianas	Pearson Correlation	0,057	1,000
	Sig. (2-grade)	0,685	0,000
	N	54	54

Non-significant correlation threshold (0.01)

Influence of the evolution of the density of Albizia on the evolution of the density of lianas

The high correlation between the density of lianas and Albizia shows that the increase stems of Albizia strongly influences the amount of lianas during the post harvest reconstitution. The high number of lianas in plots with high density of Albizia shows that Albizia plays a major role in the development of the lianas. The role of facilitation is that assured by the arborescence timber during the lianas development. This influence is indirectly perceptible and results from the regression of *Chromolaena odorata* bush; regression caused by Albizia canopies. Indeed, during their studies, Kouassi *et al*. (2008) has showed that canopy of Albizia inhibit the growth of *Chromolaena odorata*. In addition, shade formed by *Chromolaena odorata* bush in the early stages of the recovery of the flora; interferes and inhibits the growth of lianas which are generally most heliophilous. However, the development of lianas sometimes requires the presence of support or guardians role played by the Albizia, as soon as their number increases.

DE FORESTA [13] and GNAHOUA (1997) showed that the growth of *Chromolaena odorata* slows and often hinders the emergence of forest species due to its high capacity for regeneration. In contrast, the fact that Albizias are not be thwarted in their evolution by the bush of *Chromolaena odorata,* is one of the consequences of developmental characteristics of these leguminous namely, their rapid growth that allows them to raise very quickly over the barrier erected by the adventitia and their ability to grow from small amount of light in the juvenile stage. In addition, ACHOUNDONG [14] noted that; at the beginning of reconstitution, Albizia with flexible stems weave through the barrier formed by *Chromolaena odorata* using the branches of these taxa as guardians. The reconstitution model of NOBLE and SLATYER [15] based on the biological characteristics of plants installation, growth and survival of species adapted to grow in different environments better explaines the case of interactions Albiazia-liana-Chromolaena.

Evolution of average heights of Albizia and lianas densities over time

The lack of correlation of average heights of Albizia and lianas densities shows that the height growth of Albizia has no discernible influence on the evolution of lianas. These two parameters therefore evolve independently. But the canopy formed by the height growth of Albizia contributes significantly to the inhibition of *Chromolaena odorata* bushes as shown KOUASSI *et al*. (2008). This inhibition facilitates the emergence and germination of many seeds of numerous lianas and lianescent species.

Conclusion

The evolution of the density of lianas is positively influenced by the evolution of *Albizia adianthifolia* and *Albizia zygia* densities during post-harvest reconstitution. This influence is related to the multiplication of Albizia stems that are the supports of lianas in their development. However, the variation in the number of lianas plots does not depend on the height growth of Albizia. But when strong densities of Albizia coincide with average heights inhibitory bush *Chromolaena odorata*, the cumulative effect of the density and average heights is more apparent on the number, shape and size of lianas. The rapid growth of Albizia is a property that can be exploited in breeding fallows programs and degraded environments.

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