# Dendrometrical characterization of a common Plant species (*Anogeissus leiocarpa* (DC.) Guill. & Perr.) in Pendjari Biosphere Reserve and in a surrounding land use area (Benin-West Africa).

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## Introduction

In Western and Eastern Africa, *Anogeissus leiocarpa* population dynamic at forest borders in northern Guinea and Sudanian zones was slightly documented (Poilecot *et al.*, 1991). Certainly, protected areas are important for the biodiversity conservation (IUCN, 1994). Since the species is more used for firewood in the Pendjari Biosphere Reserve (PBR) peripheral, do the status of the *A. leiocarpa* population change from the reserve to the land use area? The present study aims to assess and compare dendrometrical characteristics of the species between protected and land use areas.

## Methods

- ❖ Prospecting plant formation in the land use area and use of the PBR vegetation map.
- ❖ Establishment of 15 and 10 plots (30 m x 30 m) in: (i) Mosaic Forest; (ii) Savannah stands of the PBR; (iii) and Riparian Forest surrounding land use area.
- ❖ Dendrometrical data collection on *A. leiocarpa* such as *: (i)* Diameter (d) of individuals that dbh ≥10 cm; (ii) Basal Area (G); (iii) Height (H); (iv) Size class distribution of diameter and height; (v) and Densities by size class.
- ❖ Comparative analyses of the PBR and land use area by diameter, basal area, height and density using both parametric and nonparametric tests (t of Student and test of Man-Whitnay) respectively.
- ❖ Analysis of the Size class distributions of diameter with: (i) the median dbh (Jayaraman, 1999); (ii) and the coefficient of Skewness (Feely *et al*., 2007).
- ❖ Statistical analyses were performed using Minitab 13.2 software.

## Study area

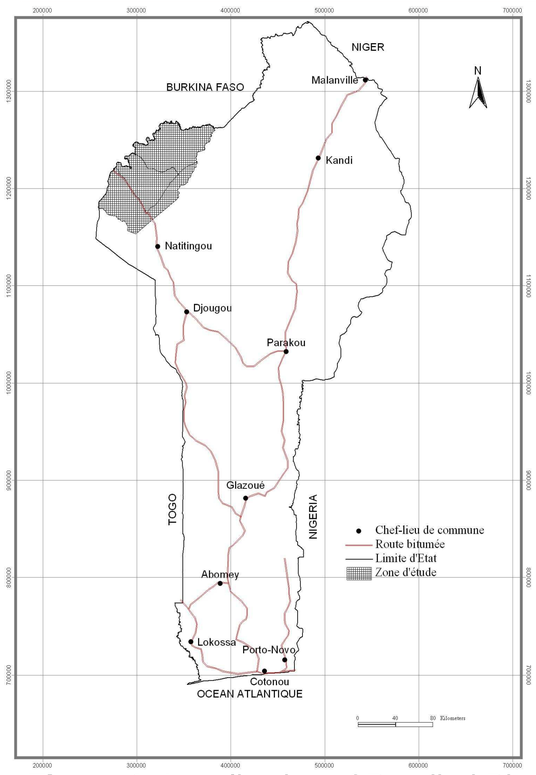


**Figure 1:** Localization of Pendjari Biosphere Reserve and Peripheral

- ❖ Pendjari Biosphere Reserve and Peripheral Townships of Tanguieta and Materi land use areas were prospected (Fig. 1).
- ❖ These occurred at North-Western Benin (10°30'-11°30'North, 0°50'-2°00'East).
- ❖Climate is sudanian at a unimodal rainfall pattern with 1100 mm of rain. Rainy season starts in April- May followed by a long dry season from November to March.
- ❖ Vegetation highlights *Combretum, Terminalia* (Combretaceae) and *Acacia* (Mimosaceae) on deeper soils.
- ❖ In Woodlands, *Anogeissus leiocarpa* and *Afzelia africana* dominate non-flooded soils and *Pseudocedrela kotschyi* on periodically flooded soils.

## Results

### *1. Comparative Diameters class distribution (Park versus land use area)*

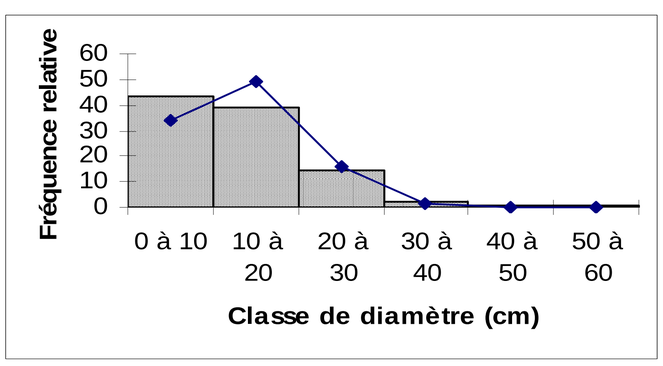


**Figure 2**: Diameter class distribution adjusted at normal curve in Park

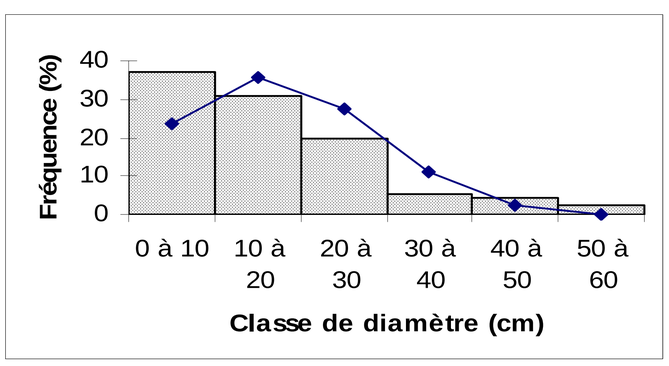


**Figure 3**: Diameter class distribution adjusted at normal curve in land use

### *2. Comparative size class distributions: Median dbh and coefficients of Skewness of diameter*

**Table 1:** Median dbh and coefficients of Skewness of diameter class distribution of *Anogeissus leiocarpa* in the Pendjari Biosphere Reserve and its land use area.

| Coefficients / Area | Median dbh (cm) | ß1 |
|---|---|---|
| Reserve | 11,70 | 0,73 |
| Land use area | 14,09 | 0,48 |

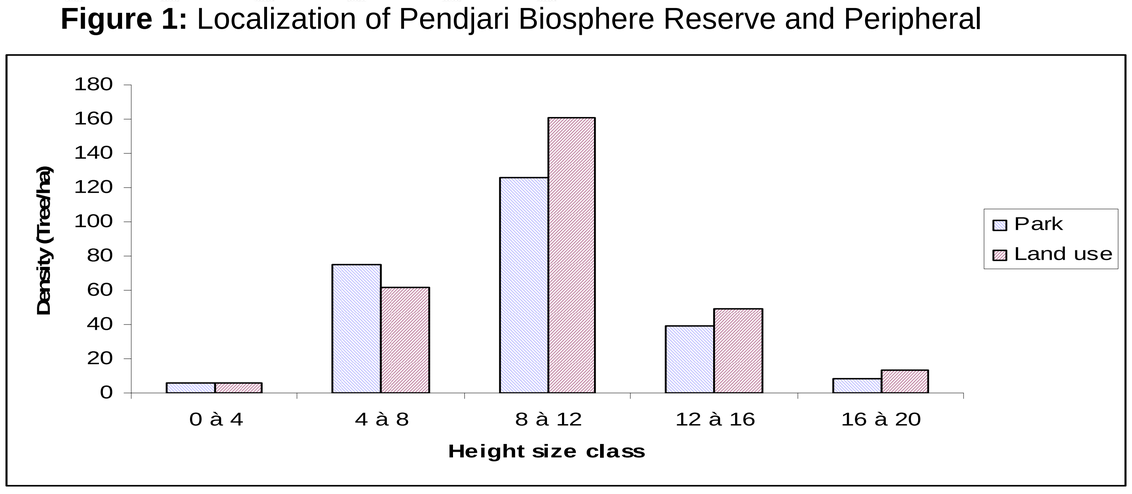


**Figure 4**: Height class distribution of *Anogeissus leiocarpa* in Park and in land use

### *3. Comparative other dendrometrical parameters (Reserve versus land use areas)*

**Table 2:** *Anogeissus leiocarpa* dendrometrical parameters (Mean ± standard error); ***: p<0.001; *: p<0.05; NS: non significant.

| Parameters / Area | D (cm) | G ($m^2$/ha) | H (m) | $D_1$ (stem/ha) | $D_2$ (stem/ha) |
|---|---|---|---|---|---|
| Reserve | 17,82 ± 3,06 | 9,71± 5,64 | 9,46 ± 3,21 | 230,30 ±185,33 | 274,74 ± 74 |
| Land use area | 22,39 ± 5,55 | 9,49 ± 4,18 | 10,03 ± 3,22 | 104,76 ± 78,79 | 176,19 ± 53, 45 |
| Significance | *** | NS | NS | * | * |

**Photo 1:** *Anogeissus leiocarpa* in Riparian forest in land use area

**Photo 2:** Stand of *Anogeissus leiocarpa* in mosaic savannah–forest in Pendjari Biosphere Reserve

## Discussion

- ❖ The size class distribution of diameter showed important number of individuals in the small class diameter (Fig. 1 & 2) of both the PBR and land use areas. However, bigger diameter classes from 30 cm to 60 cm have expressed an important number in the peripheral (Riparian forest habitat) than in the Reserve (Mosaic savannah – forest). This result corroborates findings of Hennenberg *et al*, (2005) in which *A. leiocarpa* occurred in savannahs (with more small size class) and in forests (with more individuals of big size class).
- ❖ The use of *A. leiocarpa* as firewood is reducing Riparian forest sizes, which are mostly represent a sacrifice site for certain human populations. While Riparian forest habitats are conserved, individuals of woodlands are more cut for the fire in land use area.
- ❖ The height class (8–12 m) showed the high density of individuals in both areas (Fig. 3). But the bigger density in the land use areas compared to the Park is consistent with the presence of big individuals in those areas.
- ❖ The median dbh is higher in land use area than in the Reserve (Table 1), indicating important bigger diameter individuals of land use areas compared to the Reserve. *A. leiocarpa* population is younger in Reserve than in land use area. The positives values of Skewness' coefficient in both areas indicate a positive asymmetry of the diameter class distributions.

## Conclusion

- ❖***Anogeissus leiocarpa* would be threatened in the peripheral while the population is apparently healthy in the Reserve.**
- ❖**But the traditional practices appeared to be favourable for the presence of bigger diameter individuals in riparian forests.**
- ❖**These individuals can assume the seed production and the regeneration of young stand.**

## References

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