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MID-TERM REPORT OF THE PROJECT ON:
Combining ecological data and local community participation to set long-term
conservation plans of the dum palm in Benin



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The current report presents the state of the research implemented in the frame of the ongoing project.

A- Methodology used

(i) Assessing the population structure, spatial patterns and threats on the dum palm in its distributional area

Previous fieldwork helped to distinguish four main successive life history stages (Idohou et al. unpublished data) as formerly identified for *Borassus aethiopum* (Barot et al. 2000). These include entire-leafed seedlings bearing only one or two entire leaves (EL-seedling), slit-leafed seedlings bearing at least one slit leaf (SL-seedlings), juveniles, having fan-shaped leaves (stemmed or not stemmed), and adults (reproductive, stemmed and with the same fan-shaped leaves as juveniles). These life cycle stages have been considered in the study. Overall 30 ha-plots of 100 m x 100 m (Djossa et al. 2008) were installed in homogeneous and comparable habitats that were assigned to different land-use types: farmlands and BRP. These land-use types differed according to the level of human pressure. Within each ha-plot, sex of adult individuals, diameter at breast height, total height, and potential damage were collected.

Three randomly established stands were chosen both in farmlands and in the BRP for spatial pattern analyses: 150 x 150 m (stand 1), 200 x 200 m (stand 2) and 400 m x 400 m (stand 3). Different sizes of plots were used, as the spatial pattern of a species' distribution is scale-dependent (Dale 1999). That is, as scale changes, so does the level of resolution, and new spatial patterns emerge (Getis and Franklin 2010). As previously reported (Barot 2003; Kelly et al. 2004), the greater the size plot, the more accurate the spatial pattern assessment. Each plot was subdivided into quadrats of 50 x 50 m (Azihou 2013), delimited by poles that created a grid system used for mapping. Data were collected on the distance of each tree to its neighbours, the azimuth of each tree, and its slope.

1.1.1. Assessing the socioeconomic importance of the dum palm in its distributional area

Semi-structured interview will be done with a total of 150 respondents (of both sexes and of the major sociolinguistic group). Data will be collected on: (i) information concerning the bio data (climatic zone, name, sex, age, ethnic group and main activity), (ii) existence and endogenous designation of each including the name of the species in local language and its explanation (iii) description of the uses of each the species part (root, leaves, fruit, etc.) followed by its uses, the uses, organs and subsequent threats on the species and contribution to household income.

B- Main results obtained

(i) Structural parameters and stand structure of doum palm populations in different land-use types

It comes from the field investigation that significant differences exist in the mean diameter of adult doum palm and density of adult doum palm and seedlings (Table 1; $P < 0.001$) in the different land use types. However, no significant differences were observed for both tree height and density of juveniles ($P > 0.05$). Juveniles were scarce in farmlands and in BRP.

Table 1. Comparison of structural parameters (diameter, height and density) of doum palm between farmlands and BRP. Values are mean numbers of stem per hectare \pm standard deviation (SD).

Land use types	Mean diameter of doum palm (cm)		Mean height of doum palm (m)			Mean density (doum/ha)					
					Adults		Juveniles		Seedlings		
	m	SD	m	SD	m	SD	m	SD	m	SD	
Farmland	22.64 \pm 4.43 ^a		6.85 \pm 2.63 ^a			16.13 \pm 7.26 ^a		2.40 \pm 1.30 ^a		109.30 \pm 104.43 ^a	
BRP	24.29 \pm 4.47 ^b		6.87 \pm 1.98 ^a			39.27 \pm 13.93 ^b		4.53 \pm 1.78 ^a		170.67 \pm 165.59 ^b	
Prob.	0.000***		0.961ns			0.000***		0.317ns		0.000***	

In the same column, numbers with the same letter are not significantly different
m: mean, SD: standard deviation, Protected area
***: significant at $p \leq 0.001$, ns: non-significant

As for the spatial patterns (Figure 1), assessment of univariate point pattern and correlation within palm life stages and between palm and other tree species revealed different scenarios. The pair-correlation function suggested a global random distribution for all palm life stages albeit with a weak aggregation within a 0–10 m radius in farmlands.

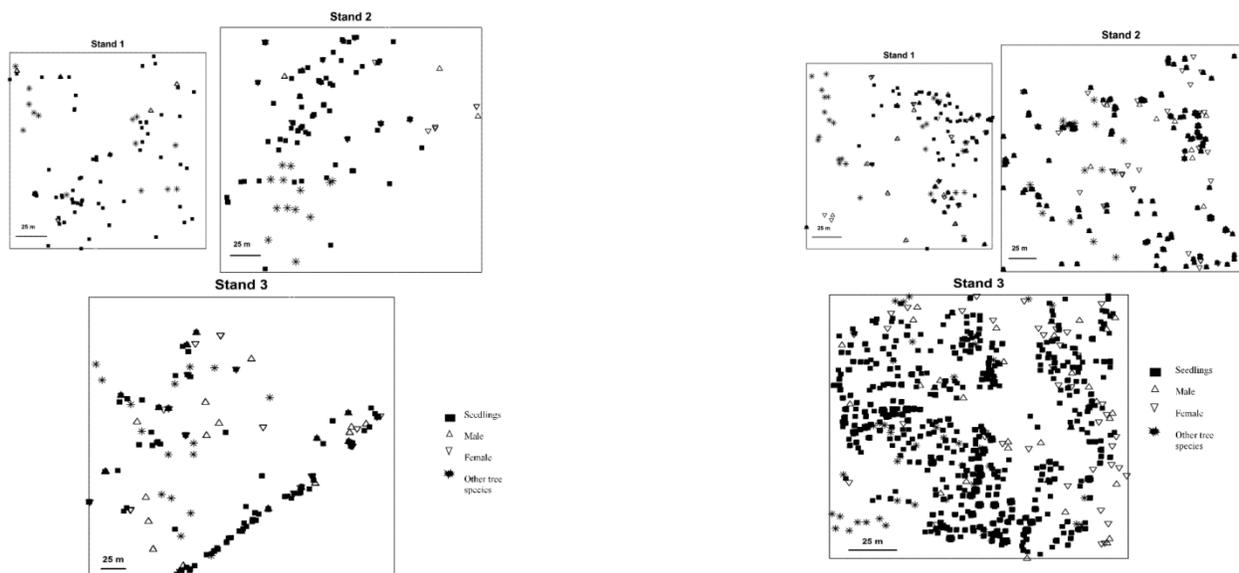


Figure 1. Spatial pattern of life stages of individuals (seedlings, male, female, and other trees) in the three stands of farmlands (left) and protected areas (right)

(ii) Socioeconomic importance of the dum palm in its distributional area

Results from our investigation showed that knowledge of the species differs among the 11 socio-cultural groups (Table 2). The knowledge on the species varies with the integration level of the species and the needs of the local people in the locality. *H. thebaica* is mostly used for handicraft, medicinal purposes and animal feeding (Photo 1). The economic survey showed a relatively short chain including two countries: Benin, Togo, Burkina-Faso and Niger. The gross margin varied between 200 FCFA (i.e. 0.5 USD) at more of 500 FCFA (i.e. 1 USD) for retailers/wholesalers, while the gross margin of collector was under to 500FCFA

Table 2. Local names of *H. thebaica* as revealed by ethnical group

Ethnical group	Local Language	Local name	Local meaning
Berba	Biali	Kwendica, Tcharék	Small tree with hard fruit
Dendi	Dendi	Kangao	Hard fruit smaller than Borassus tree
Djerman	Djerman	Bali, Kongo, Kongou	Trees of handicraft use
Haoussa	Haoussa	Goruba	Multipurpose tree of hard fruit
Kouteba	Kouteni	Abin'binrin, benbenni, benbenmou	Tree with small and circular fruit
Peulh	Peulh	Bali, guéléhi, guéléhou	Multipurpose tree
Yindé	Mermin	Akpin'kpinran, Kak uenda, oublem'bim, oukpendo	Hard fruit



Photo 2: (a) Goats feeding on *H.thebaica* leaves; (b) Hat made from on *H.thebaica* leaves

Germination trials are ongoing and results will be presented in the final report.