Characterization of shea tree and maize agroforestry parklands in northern Benin

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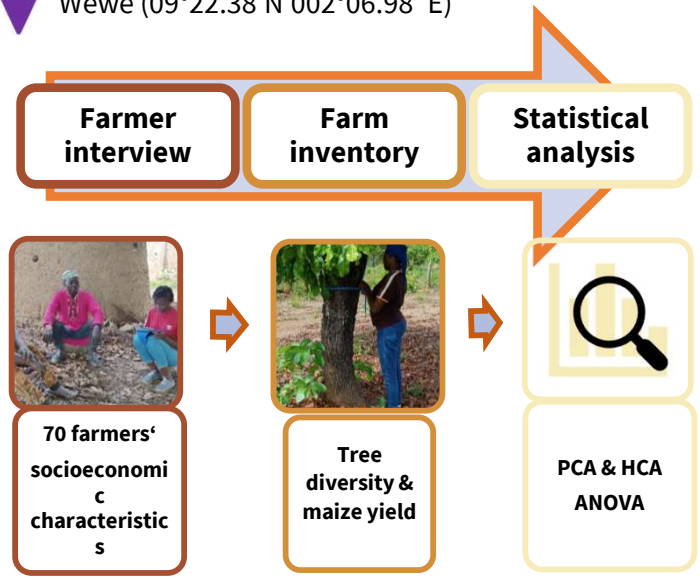
Introduction

In northern Benin maize (*Zea mays* L.) is an important staple crop grown in association with scattered shea trees (*Vitellaria paradoxa* C. F. Gaertn, Fig. 1). The performance of these shea-maize agroforestry parklands depends on different management strategies such as input use, tree structure, and species composition. This study aims to characterize maize agroforestry parklands to formulate sustainable management strategies.

Figure 1. Maize stand in shea tree agroforestry parkland systems of Benin.

Materials and Methods

Boukoussera (09°06.25'N 002°31.79'E)
Wewe (09°22.38'N 002°06.98' E)



Results & Discussion

Using 19 variables for the HCA led to segregation of maize-shea agroforestry into 3 groups. Most farms were classified into Group 1 (13 farms), followed by Group 2 (16 farms) and Group 3 (41 farms).

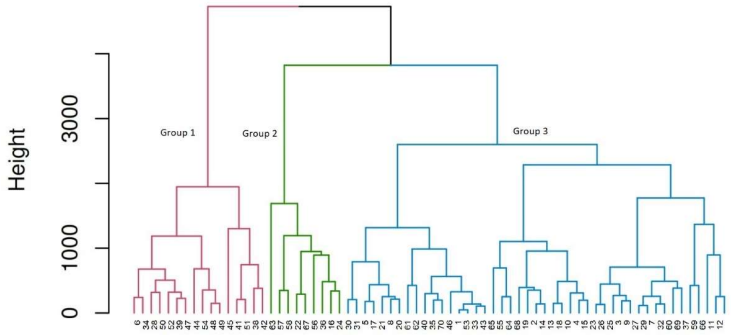


Figure 2. Hierarchical clustering of shea-maize agro-forestry parklands in Benin.

- Average tropical livestock units (TLUs) of parklands in Group 1 and 2 was 30-times lower than of parklands in Group 3. This is because the majority of farmers classified in Group 3 were Fulani whose livelihoods solely depend on farming (Table 1, Fig. 2).
- Application of mineral fertilizers in Group 1 parklands was 488% and 884% higher than in Group 2 and 3, respectively. Consequently, grain yields in parklands of Groups 2 and 3 were 49% and 22%, respectively, lower than in Group 1 parklands.
- Average tree density and richness in Group 1 and 2 parklands were 3 and 2-fold, respectively, lower than in parklands of Group 3.

Table 1. Comparison of three shea-maize agroforestry parklands in Benin.

	Groups			SEM
	1	2	3	
Tropical livestock unit (TLU)	0.0 c	0.4 b	11.9 a	1.2
Herbicide (l ha^{-1})	0.4 b	2.8 a	1.4 ab	0.2
Fertilizer (kg ha^{-1})	312 a	53.1 b	31.7 b	20.2
Grain yield (kg ha^{-1})	3728.0 a	1911.0 b	2925.0 b	110.8
Tree density (no. ha^{-1})	5.9 b	4.0 b	13.2 a	1.4
Tree richness (no.)	4.8 b	3.0 b	7.3 a	0.4

Means along the same rows with different alphabets are significantly different at ($p < 0.05$). SEM demotes the overall standard error of the mean.

Conclusions

There is a large variability among shea-maize agroforestry parklands in northern Benin hence policies to promote sustainable intensification must be targeted according to each group's needs.

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