Strategy for improving Cashew plantations (*Anacardium occidentale* L.) in southern Senegal

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INTRODUCTION

Cashew tree (*Anacardium occidentale* L.) is a species found in some agro-systems in Senegal and provides many goods and services to local communities. However, the main interest lies in nuts production with global commercial value. Nonetheless, productions recorded at national level are relatively weak (542 kg ha-^{1}) (Samb et al., 2018) ; hence, the interest of improving knowledge on the production potential of plantations in a context of climate change.

OBJECTIVES

The objective of this study was to select the best performing cashew trees in Kolda, Sédhiou and Ziguinchor plantations based on production criteria, health and quality of nuts in order to put in place improved plant material and adapted to current needs of the international market.

MATERIAL ET METHODS

552 potentially candidate trees (PCT) in Kolda (134), Sedhiou (234) and Ziguinchor (151) were identified using a participatory approach. Their dendrometric characteristics (diameter at 1.3 m, height, number of branches), foliage (length, width, shape), floral (number of male flowers, hermaphrodites, season and number of flowering), production parameters (length , width, thickness, shape, weight) and quality of nuts (graining, almond yield, KOR) were evaluated

Figure 1: characterization of PCT

Data analysis

ANOVA by the R software using the generalized linear model. the following statistical model was used: $Y_{ij} = \mu + Z_i + Z{:}V_{ij} + e_{ij}$

- Y_{ij} : the variable
- μ: the mean
- Z_i : zone effect
- $Z{:}V_{ij}$: random effect village, zones
- e_{ij} : residual error

An ascending hierarchical classification of Ward was performed and supplemented by a principal component analysis. Correlations between variables were established

RESULTS

Class I contains 18.64% of PCT, 95% of which are from Kolda. Class II comprises 32.2% of the PCT, all of them originating from Ziguinchor. Class III constitutes 49.15% of PCT of which 87.93 are located in Sedhiou.

Class I is characterized by their production (18 kg / tree) while class II is distinguished by the quality of nuts: a perfect graining (77 nuts / kg), walnut weight (12.87g), a KOR (62 lbs).

Results show a significant but negative correlation between number of nuts / kg and nut production (r = -0.74) of PCT

Table 1: Characteristics of different classes from the dendrogram

Characteristics	I	II	III
Diameter (cm)	29,01±1,79	25,50±2,07	26,23±1,99
Heigth (m)	6,94± 0,24	6,67±0,28	6,51± 0,27
Crown (m)	10,94± 0,40	12,85±0,46	11,32±0,45
Number scaffold branches	2,60±0,20	2,85±0,23	3,16±0,22
Port	2,46±0,17	5,45±0,24	5,27±0,23
Leaf length (cm)	10,22±0,18	13,02±0,21	11,46±0,20
Leaf width (cm)	6,37±0,14	7,20±0,16	6.95±0,15
Leaves shape	1,13± 0,09	2,15±0,10	1,93± 0,10
Phenology	1,45±0,05	1,07±0,06	1,20±0,06
Number of production / year	2,30±0,07	2,27±0,08	2,53±0,08
fruit color	1,37±0,09	1,60±0,10	1,67±0,10
Nut thick (mm)	13,94± 0,35	15,72± 0,40	16,48±0,39
Nut width (mm)	18,69± 0,37	20,70±0,43	20,25±0,42
Nut length (mm)	27,86±0,45	31,50±0,52	32,51±0,50
Nut shape	1,07± 0,04	1,17±0,05	1,11± 0,04
Nut color	1,33±0,06	1,27±0,07	1,16±0,06
Deseases	0,15±0,04	0,07±0,05	0,11±0,04
Number of nuts / kg	220,92±5,63	77,87±6,49	149,02±6,26
Nut weight (g)	3,88±0,15	12,87±0,17	6,04±0,16
Waste weight (g)	0,09±0,05	0,12±0,05	0,13±0,05
Almond weight (g)	2,28±0,13	8,87±0,15	3,62±0,14
Shell weight (g)	0,81±0,13	2,90±0,14	1,32±0,14
Production 2016 (kg)	10,30±1,08	8,82±1,24	7,04±1,19
Production 2017 (kg)	26,03±2.27	14,67±2,62	12,51±2,53
Mean production (kg)	18,15±1.44	11,62±1,65	9,67±1,59
Kernel Out-turn ratio (lbs)	53,56±1.11	62,65±1,28	55,60±1,23
Almond yields (%)	30,17±0.62	35,37±0,71	31,37±0,69

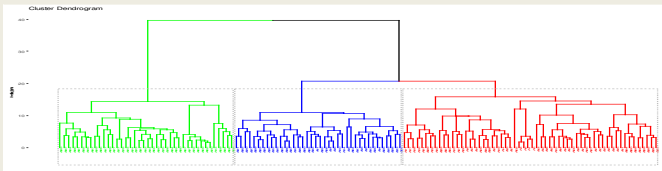

Figure 2: Ascending hierarchical classification of PCT identified in three different zones of Senegal based on the study of agro-morphological and technological characteristics

Table 2: Classification and highlighting of the most productive PCT

Classes	PCT
I	A464- A369- A364- A363- A360- A358- A359-A333- A334- A335- A336- A337- A338- A331- A330- A322- A324- A325- A312- A313- A315- A317
II	A373- A375- A376- A377- A378- A381- A386- 387- A389- A392- A412- A414- A416- A417- A422- A424- A429- A430- A459- A460- A462- A463- A466- A467- A468- A469- A470- A471- A472- A473- A474- A477- A479- A480- A481- A484- A486- A487
III	A1- A3- A5- A6- A14- A16- A24- A25- A26- A27- A28- A29- A32- A33- A34- A35- A36- A38- A51- A53- A54- A55- A57- A58- A61- A82- A83- A84- **A91**- A93- A94- A95- A97- A98- **A110**- **A111**- A112-A114-**A115**- **A116**- **A117**- **A118**- **A119**- A120- A121- A124- A125- A126- A127- A129- A130- **A131**- **A132**- **A133**- **A213**- **A229**- A277- A332- A351- A353- **A384**- **A386**- A423

DISCUSSION & CONCLUSION

The study shed light on the existence of variability in nut production and quality, an indication of the potential of the genetic base (Chipojola et al., 2009). To improve productivity of species, two populations are offered to planters. One population of elite trees (ET) characterized by their nuts yield located in Kolda and one population characterized by their nuts size found in Ziguinchor. They meet the current needs of the international market.

Acknowledgements

Cashew planters from study areas

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4th World Congress on Agroforestry

20-22 May 2019

Le Corum Conference Centre Montpellier, France

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