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Research Article

Relationship between Canopy Sizes and Shapes and the Productivity and Yield of Coconut (*Cocos nucifera* L.) Varieties in Nigeria

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ABSTRACT

Coconut varieties typically exhibit different crown canopy shapes and sizes. Three canopy shapes were identified in the coconut hybrid seed garden of the Nigerian Institute for Oil Palm Research (NIFOR), Benin City, Nigeria. The crown canopy size and shape could influence the photosynthetic efficiency of a crop, hence its productivity and yield. Given the differential productivity and nut yield of the varieties, we attempted to establish the relationship between crown canopy size and shape to the productivity of the different coconut varieties. Coconut seed nut yield records from the coconut hybrid seed garden was related to the crown canopy shape and sizes of the varieties. About 59% of each class of tall and 83.70% to 89.19% of the dwarf palms produced matured fruits during the period of observation. The least mean nut yield was found among coconut with vertical canopy shape of every coconut varieties considered, while the highest mean nut yield was found in the semi spherical canopy shape of all the coconut varieties evaluated, except in the yellow dwarf. The result indicates that although there is no statistical difference in the yield of the various canopy shapes, the semi spherical canopy seem to produce more nuts than coconut with other canopy shapes. In all cases the Tall coconut were more susceptible to lethal yellowing infection.

INTRODUCTION

The coconut (*Cocos nucifera L.*) is a monoecious perennial tree crop with a single meristem, belonging to the tribe cocoideae in the family Palmae. The roots are adventitious; it has pinnate leaves and produces fibrous fruits (Child 1994).

The origin of coconut has been identified to be in the Malay States, the Philippine Islands, the South Sea Islands, India and Ceylon (Anonymous, 1991).

In Africa, the northern limits are located on the West Coast in Cape Verde (15^{o}N) and on the east, Djibouti (11.5^{o}N) with isolated coconut palms found in the far north on the Red Sea and up to 24^{o}N. The Southern limits in Africa is located at 15^{o}S on the West Coast and the Zambezi river (19^{o}S), on the east and also found farther south in Port Dauphin in Madagascar at 25^{o}S (Child, 1974).

In Nigeria, the coconut palm is found mostly in the Southern states and in some marginal areas up to 10^{o}N. The largest coconut palm plantation is found in the Badagry local government area of Lagos State located in the South West of Nigeria.

The first coconut plantation in Nigeria was established in 1876 by the Roman Catholic Mission in Badagry, Lagos State, and a good number of palms are found along the beach while most are found as home stead palms. It can also be found along banks of small streams and stagnant pools of water in some northern states (Akpan 1989). The farthest distance from the sea shore with yielding coconut in Nigeria is about 1,400 kilometres which are to be found in the palace of the Emir of Dutse and other places in Jigawa State of Northern Nigeria (I. B. Omamor personal communication).

The productivity of the coconut is limited naturally as it can hardly sustain up to 260 mature nuts per palm per annum in Nigeria. This has been a source of concern as the copra is needed for vegetable oil for both industrial and domestic uses, and also for other food supplements. The natural location of the embryo within the copra further minimizes the seed production potential.

There have been concerns over declining yields of the copra globally. The International Plant Genetic Resources Institute in the Manual on Standardized Research Techniques in Coconut breeding (1999) reported the yield of copra in 1976 to be 710kg per hectare, which became 430kg per hectare in 1984 and was recorded as 400kg per hectare in 1992.

This steady decline in the productivity of the Coconut palm may be attributed to genetic resources, soil nutrient depletion, age, and the alternate yielding years in older coconut plantation, pest and diseases and agronomic management.

It was generally believed that breeding for narrow canopy ideotypes in tree crops, especially palms, can increase the production through increase in plant population per hectare. This hypothesis did not consider the root area coverage, neither was the yield per unit area based on canopy size calculated.

The aim of this study is to determine how the canopy size and shape influences nut yield in the coconut, and whether the varieties also influences the production in the various canopy sizes and shape.

MATERIALS AND METHODS

The experiment was carried out in the ten (10) hectare coconut seed garden planted in 1987 at a density of 204 per hectare located in the Nigerian Institute for Oil Palm Research, (NIFOR) Benin City in Nigeria. This field was planted in 1987 with a row of tall to two rows of dwarf palms. No fertilizer was applied from the time it was planted in 1987 to the time of this experiment in year 2000.

The coconut palms were numbered and their varieties identified. The general shape of the canopy of the palms was subjectively described and classified into vertical (acute angle of leaf insertion), Semi-spherical (nearly right angle of leaf insertion) and spherical (obtuse angle of leaf insertion). In terms of colour (as coconut is botanically classified by colour and height), the dwarfs were classified as red, yellow and green while the tall was classified as yellowish green, red and green. The field was also scored for palms symptoms like traces of the Lethal Yellowing Disease (LYD) infection, and these were identified as “Diseased” while those that y showed the advanced stage of the LY Disease infection were identified as “Infected”.

Of the one thousand four hundred and fifty-eight (1,458) palms surviving in the seed garden at the time of this study, only six hundred and seven (607) coconut palms produced mature fruits during the full year of study.

RESULTS

Of the coconut palms studied 74.7% yielded during the year.

Table 1: Production and LYD Infection by Colour (in %)

	GYT	GT	RD	GD	YD
No. classified	194.	156	111	135	217
Productive	57.73	57.69	89.19	83.70	
Nos Diseased	24.74	23.72	7.21	14.81	
LYD Infected	17.53	18.59	3.60	0.0001	0.0000

Table II: Mean Yield of Various Canopy in Varieties

Variety	Canopy shape	Mean nut yield (no of nuts per palm)
GYT	Vertical	33.9
GT	Vertical	42.2
RD	Vertical	55.7
GD	Vertical	43.4
YD	Vertical	46.4
GYT	Semi Spherical	46.5
GT	Semi Spherical	47.3
RD	Semi Spherical	62.3
GD	Semi Spherical	54.1
YD	Semi Spherical	59.2
GYT	Spherical	34.9
GT	Spherical	43.3
RD	Spherical	60.0
GD	Spherical	54.1
YD	Spherical	52.3

GYT = Green Yellow Tall GT = Green Tall RD = Red Dwarf

GD = Green Dwarf YD = Yellow Dwarf

DISCUSSION

The nuts are better subtended in palms with the semi-spherical canopy. The angle of insertion of leaf axils of palms with vertical shaped canopy is acute and allows water to be retained. This often leads to loss of inflorescence due to rot. With poor support the maturing fruits are susceptible to pre-mature nut fall. Also the wide angle of the spherical shape canopy does not give support to the developing inflorescence leading to greater drooping of the nuts before maturity especially in a climatic condition of long dry spell.The Tall varieties succumbed more to LYD than the Dwarfs. This portends erosion of the Tall variety due to LYD.

REFERENCES

Akpan, E. E. J. (1998). Evaluation of Dwarf coconut (Cocos nucifera Linn.) Genotypes within the Nigerian coconut germplasm Bank. International conference on Palms and Pam Products. Benin City. Nigeria.

Anonymous (1991)

Been, B. O. (1998). The Coconut Industry in Jamaica In: International Cashew and Coconut conferences 1997 Dar. Es Salaam Pp33 – 35.

Child, R. (1994) Coconuts 2nd Edition, Longman, London.

Gethi, J. G., and Malinga, W. K. (1998). Kenya Coconuts: Past, Present and future. In: International Cashew and Coconut conference 1997 Dar es Salaam Pp 28-32.

Magat, S. S. (1994). Field notes on an update of coconut Fertilizer use, efficiency and Productivity of SCFDP Farms. Phil. J. of Coconut Studies 19: 14 – 24.

Magat, S. S. and Agustin Y.T.V. (1998). The Philippine Coconut Industry In: International Cashew and Coconut Conference 1997 Dar es Salaam. Pp 21 - 27.

Omamor, I. B. (2002) Personal communications.

Yussuf, C. H., H. A. Hassan, I. K. Mbarouk, N. A. Khalfan and S. H. Ali (1998). Status of Coconut Industry in Zanzibar in International Cashew and coconut conference. (Editor: C. P. topper, P. D. S. Caligri, a. K. Kullaya, S. H. Shomari, L. J. Kasuga, P. A. L. Masawe and A. A. Mpunami) Bio Hybrids International Ltd. ReadingUK.