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TEMPORAL IMPLICATION OF RAINFALL PATTERN ON COCOA AND PALM KARNEL VARIABILITY IN RAINFOREST BELT OF NIGERIA

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ABSTRACT

Cocoa and palm karnel are cash crops that account for about 95 percent of tree crops in Ondo State with varying degree of annual production pattern. The paper examined the variation in annual production of both crops over twelve(12) years of consideration. Available data were subjected to descriptive and correlation analyses. Results indicated that both crops account for 95 percent of tree crops production in the State. The average increase rate of the examined crops were 6.44 and 5.9 percents. Correlation coefficient were higher between rainfall and palm karnel than cocoa. Hybrid palm fruit need to be developed using climatic variables especially those that directly influence palm fruit yield through government agencies, and institutions with the support of agro-based companies to avoid further low production and importation in future.

Keywords: Agro-based, hybrid, rainforest, tonne, variation

INTRODUCTION

Cocoa and palm tree exist together in plantation in rainforest belt in Southwest Nigeria. In subsistence even commercial plantation, both are inseparable. Therefore, geographical distribution of cocoa coincide with oil palm. Oil Palm(e*laeis guneensis*) is a tree crop produce in equatorial and tropical regions of the world. Before, Nigeria had been regarded as the leading producer in the early 60's. The Oil Palm tree is one of the greatest economic assets a nation or state has, provided its relevance and potentials are fully harnessed. Palm products include Palm Oil, Kernel, cake, wine and broom. Palm kernel nut has both local and international markets value. Its geographical location and production spread through rain forest region in southern Nigeria especially in around Ondo, Edo, Ekiti, Anambra, Cross River, Oyo, Abia, and Enugu. Between 1960 and 1966 Nigeria ,with a annual production of palm kernels averaging over 400,000 metric tons, was far and away the leading world producer, supplying 50% of total world consumption.(Oladiran, 2000). Both cocoa and palm tree naturally co-exist together especially in cocoa plantation or separately. Palm tree grow and develop within cocoa plantation either advertently or inadvertently, precisely within native cocoa plantation.

Cocoa (*theobroma cacao)* belongs to Steruliacaea and genus theobroma family. It was introduced to West Africa from Brazil(South America) precisely from Fernando Po into Nigeria in1874 by one Squiss Bamengo,a chief of the Niger Delta(Adegeye, 1996). It was first planted in Delta region and then spreads northward to its suitable cocoa belt of Western Nigeria. Five years later it was taken to the then Gold Coast, the present day Ghana in 1879.Cocoa was first planted into the Western region in 1890 (Oyekale, *et al.,* 2009). It gained prominence rapidly in Nigeria to the extent that Nigeria happened to be the second largest producer globally by 1965. Before the emergence of black gold (crude oil) in Nigeria, both cocoa, palm oil were the leading cash and export crops from Southwest Nigeria, except Lagos. Cocoa and palm producing States are Ondo, Oyo, Osun, Ekiti, Ogun, and

others such as Edo, Cross River and Akwa Ibom (Adegeye, 1996) stated that over 50% of the total quantity of cocoa produced for export or utilized locally per annum are from Ondo State. Even within Ondo State, cocoa production is not equally produced among the existing regions(Akure, Owo, Ondo, Akoko and Okitipupa).

In Ondo State,Idanre,Ondo West and Akure South local government have been leading in cocoa production since 2005-2007.(Ogubodede *et al.,* 2010). At independence, Nigeria was second only to Ghana as world producer,-reaching peak production in 1970,beginning a decline that continued until 1982,when it was only 80% of it 1960 level and 64% of 1970 level. Despite this fall in production, Nigeria is among the leading group of world producers(Cote D'voire, 25%; Brazil, 22%; Ghana,10%; Nigeria, 8%; Cameroon, 6.7%) with 130,000 metric tons of cocoa (86.66%) of its total production exported in 1982.(Oladiran, 2000). Cocoa processing is currently expanding in Nigeria. About 80-85 percents of Nigeria's cocoa is exported as raw beans, mostly to the European Countries, where they are then processed into cocoa butter, paste, and liquor (75 percent) and powder (25 percent). North America and Europe consume 86 per cent of cocoa based products and between them, they produce 14 per cent of the World cocoa; whereas Africa and Asia produce 86 per cent of the raw beans, but consume just 14 per cent of cocoa based products.(Owofemi,2010.). Nigeria is the third largest in terms of cocoa production in Africa, producing about 12 percent of the total World production behind Cote d'voire (35) percent and Ghana (13) percent and being the fourth largest producer Worldwide after Cote D'voire, Indonesia and Ghana.

Study Area

Ondo State was created in 1976 and has eighteen(18) Local Government Areas as at today. With regards to the area coverage, Ondo State ranked 25th after Ogun State in Nigeria with total land area of about 15,500km.National Population commission put the State population to be 3,441,024 persons as at 2006 population census. Generally, Ondo State is characterized by abundant rainfall with tropical pattern of climate. (Oyakale, 2009). The rainy season normally commenced from April to October with double maxima rainfall and slight dry season between November and March. Ondo State characterized by highly laterized, sand/laterized and dark loamy soils. The dominant economic activities within the State is mainly agriculture but predominantly of cocoa and palm fruit as cash crops. And Idanre, Ondo West, Akure South, Ile-Oluji/Okeigbo are the leading producers of cocoa in Ondo State (Ogunbodede, *et al.,* 2010). The State is also an oil producing State.

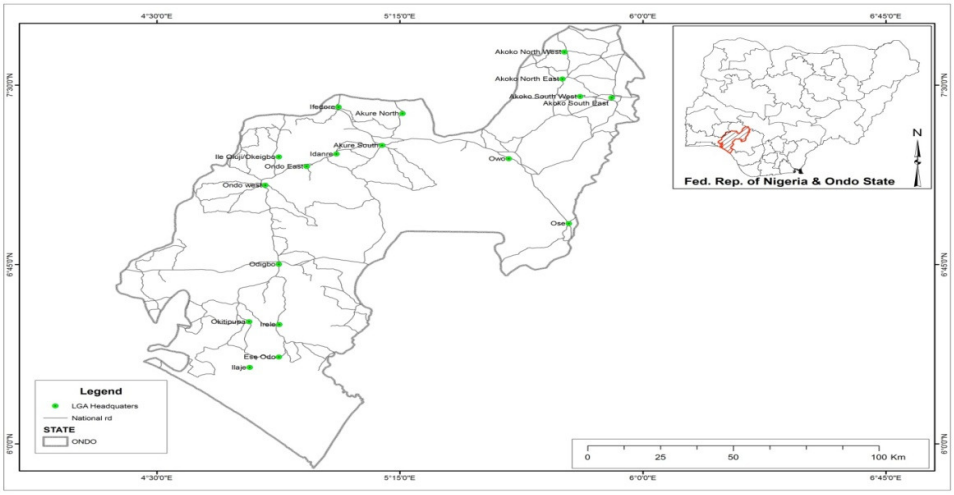

Figure 1. Ondo State map showing L.G.A/cocoa & palm distribution belt

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MATERIALS AND METHODS

This study used secondary data of annual production of cocoa, palm kernel and distribution of rainfall across the State from Ondo State Ministry of Agriculture, Akure. Descriptive analysis were applied for the description of variation in annual production of each crop as well as rainfall distribution across the State. Annual variation trend pattern in terms of percentage of the examined crops were correlated with rainfall. The results were indicated with bar chart and scattered diagrams.

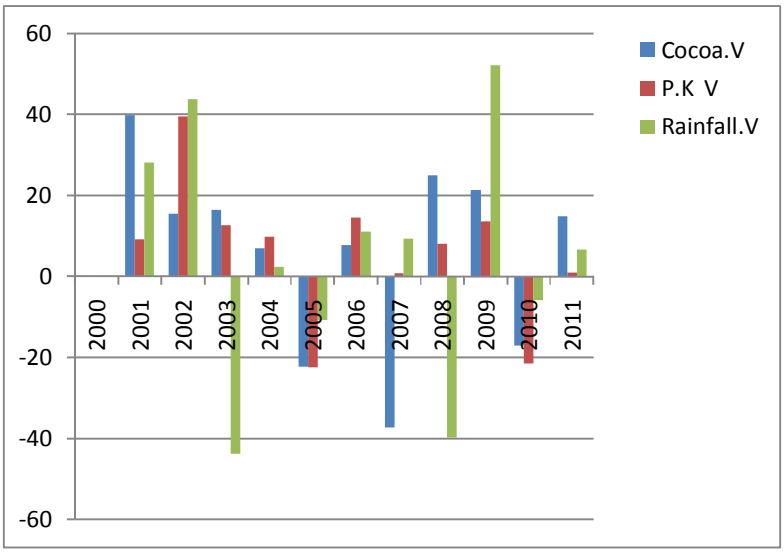
RESULTS AND DISCUSSION

Table 1.VariationTrend in Cocoa and Palm Karnel Production in Metric Tonnes

Year	Cocoa	% V	P. Kernel	% V	Rainfall	%V
2000	24,047	0	5,531	0	1,183.03	0
2001	45,875	39.78	6,095	9.25	1,646.23	28.14
2002	54,219	15.39	10,086	39.57	2,368.39	43.87
2003	64,906	16.47	11,542	12.61	1,328.55	-43.90
2004	69,822	7.04	12,802	9.84	1,359.40	2.32
2005	57,076	-22.33	10,452	-22.48	1,504.78	-10.69
2006	61,835	7.69	12,227	14.52	1,671.18	11.06
2007	45,023	-37.34	12,332	0.81	1,827.80	9.37
2008	60,039	25.01	13,407	7.99	1,100	-39.82
2009	76,399	21.41	15,499	13.52	1,673.46	52.13
2010	65,224	-17.13	12,746	-21.59	1,575.35	-5.86
2011	76,558	14.87	12,856	0.86	1,685.45	6.70
Total	**701,023**	**70.84**	**135,575**	**64.9**	**33,101.77**	**53.32**
Total Av	**58,390.75**	**6.44**	**11,297.92**	**5.9**	**2,758.48**	**4.44**

Source: Ondo State Ministry of Agriculture,2011

Figure 2. Average variation of cocoa, palm karnel and rainfall distribution



Source: Fieldwork,2012

Correlation Analysis of Crops with Rainfall

Cocoa : r = 0.763**

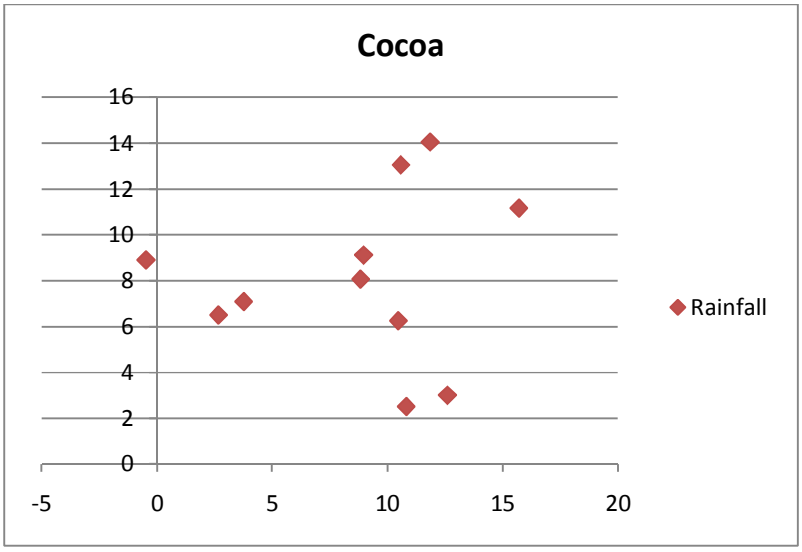
P. karnel: r = 0.871**

Regression Analysis of Crops on Rainfall

Cocoa: y = 7.35 + 0.21x

P.Karnel: y = 7.79 + 0.12x

Figure 3. Scattergram of rainfall on cocoa



Source: Fieldwork, 2012

Figure 4. Scatter diagram of rainfall on palm karnel

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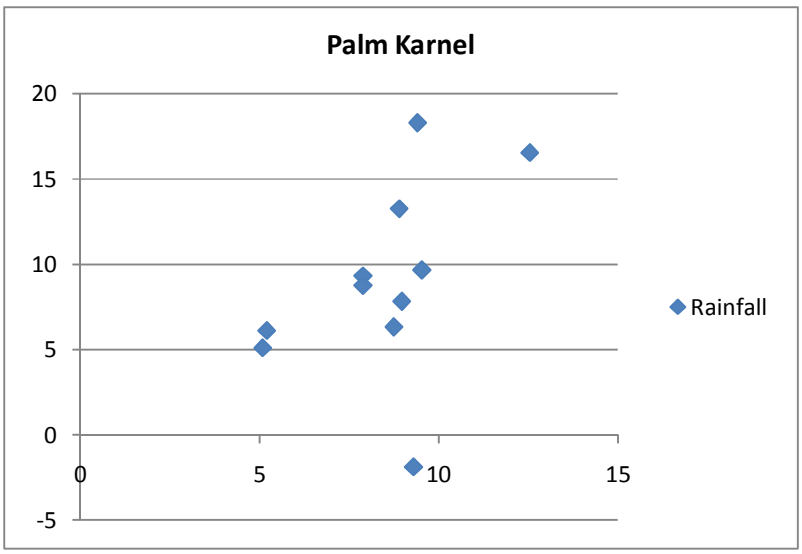

Source: Fieldwork, 2012

Results from correlation analysis indicates perfect, positive and high relationship between rainfall trend, distributional pattern and cocoa and palm tree but higher in palm tree than cocoa @ 0.05 significant level. Line graph revealed the annual trend pattern of variation in percentage of the examined crops. Annual pattern of cocoa accounts for 6.44 percent and palm kernel 5.9 percent. Percentage variation in cocoa and palm kernel, were ranged from -17.13 to 39.78 percent and -21.59 to 39.57 percent respectively. Over twelve (12) years of observation, cocoa production ranged from 24,047 to 76,558 and palm kernel, 6,090 to 15,499 metric tonnes. Reduction in cocoa production occurred in 2005 (18.25%), 2007 (21.19%), and 2009 (27.25) while palm kernel 2005 (22.48%), and 2010 (21.59%). An average rate of increase in cocoa, palm kernel and rainfall are 6.44, 5.9 and 4.4 with average production of 58, 418.58, 11,297.08 and, 2,758.48 respectively, from 2000 to 2011.

Cocoa is the most widely produced tree crop in Ondo State with 80.69% average value while its rate of appreciation over twelve years of observation is 6.44%.The state is the leading producer of cocoa and her annual production account for more than half of the whole country production.(Afolayan and Ajibade, 2012).Palm Kernel is in second position with average value of 15.61% and increase rate of 5.9%.

Negative variation may be attributed to unfavourable or shortage of rainfall distribution. Cocoa is highly sensitive to changes in climatic parameters especially rainfall, temperature and humidity. The effects of weather can either lead to increased metabolism, and disease incidence in field environment (Justina & Emaku, 2007). Thus, to improve the production of any cocoa and palm karnel, there is need to understand the average weather conditions of such area, whereby climatic parameters such as temperature, rainfall, humidity as well as sunshine hours affect the agricultural output of the rainforest and tropical regions. Ayoade (2004) emphasized that daily, seasonal, or annual variations in the values of the climatic element are of greater importance in determining the efficiency of crop growth.

RECOMMENDATION

The rate of population growth is not in line with the production of agricultural production. If care is not taken, in the next few years to come, to supplement the insufficient palm karnel, mostly rain-fed crops may involve importation from countries already served as importers to Nigeria in the early 60's and 70's. Ondo State is characterized by about four functioning cocoa processing industries in Akure,

Ile-Oluji and Ondo town precisely. Also to boost the production of palm karnel, processing factories in relation to palm fruit products need to be established either by government or private organizations like cocoa firms. Hybrid palm fruit need to be developed using climatic variables especially those that directly influence palm fruit yield through government agencies, and institutions with the support of agro-based companies to avoid further low production and importation in future.

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