

## **A Comparative Study of Some Selected Agricultural Crops in the North Central Geopolitical Zone (NCGZ) of Nigeria**

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### **ABSTRACT**

*Comparison of the production quantities and the land areas allotted of selected crops in the North Central Geopolitical Zone (NCGZ) of Nigeria is the major concern of this study. Randomized complete block design used to analyse the secondary data collected for the study shows that both the production quantities and the areas of land allotted to the selected crops differ. The production quantities and land areas allotted indicate decreasing trend and their rate of increase, in some states where it exist, are low. The researcher, therefore, recommend, among others, more concerted efforts in agriculture by all stakeholders in the sector.*

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**Keywords and Phrases:** *Agriculture, food, economy, Gross Domestic Product (GDP), crop quantities, land area, ANOVA, trend.*

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### **1.0 Introduction**

Nigeria is one of the countries in the World that is blessed with both human and material resources UKAID (2012). In terms of human resources, Nigeria has an estimated population of about 163 million people NBS (2012) that are engaged in agricultural and non-agricultural activities. It occupies an estimated land mass of 92.4 million hectare that has tremendous potentials for crop production. Out of the total and mass, the arable land area was 79 million hectare (Federal Ministry and Natural Resources, FMANR (2010) and out of the 79 million hectares, only about 32 million hectare is usually cultivated FMANR (2010) living an excess of about 47 million hectare uncultivated. This implies that land availability is not a major limiting factor in agricultural development but despite the available land and human resources, Nigeria is one of the poorest countries in the world that is battling with food security even when high percentage of her population is said to be engaged in agriculture. As a country, Nigeria is neither in the front row of food producing nor exporting countries of the world Muhammad and Atte (2006).

Nigeria agriculture is characterized by considerable regional and crop diversity. Analysis of this sector, particularly the food sub-sector, is fraught with serious data problems. However, the available statistics provide a broad overview of development in agriculture upon which we can make some broad generalizations about its role in economic development and structural change in Nigeria. Adewuyi (2002) noted that in the 1960s, agricultural sector was the most important in terms of contributions to domestic production, employment and foreign exchange earnings. The situation remained almost the same three decades later with the exception that it is no longer the principal foreign exchange earner, a role now being played

by oil. The sector remained stagnant during the oil boom decade of the 1970s, and this accounted largely for the declining share of its contributions. The trend in the share of agriculture in the GDP shows a substantial variation and long-term decline from 60% in the early 1960s through 48.8% in the 1970s and 22.2% in the 1980s. Unstable and often inappropriate economic policies (of pricing, trade and exchange rate), the relative neglect of the sector and the negative impact of oil boom were also important factors responsible for the decline in its contributions. On its diversity, Nigerian agriculture features tree and food crops, forestry, livestock and fisheries. In 1993 at 1984 constant factor cost, crops (the major source of food) accounted for about 30% of the Gross Domestic Products (GDP), livestock about 5%, forestry and wildlife about 1.3% and fisheries accounted 1.2%.

In most of the surveys and censuses conducted by the National Bureau of Statistics, which is the major producer of agricultural statistics in Nigeria, crops and livestock are always considered husbandry simultaneously. A separate discussion of livestock will involve duplication of some aspects of the survey and censuses designed quantity and quality of inputs in agriculture in developing countries as well as the need to increase access to resources of Finance these inputs. However, it is also possible to increase output even given current levels and quality of inputs by increasing overall economic efficiency of farmers Bravo-Ureta and Pinheiro (1997). The concept of efficiency is critical in developing country's agriculture. Given the level and quality of inputs available, how well farmers are able to utilize these inputs is an important determinant of the quantity of output they are able to produce. Recent measurement of farmer efficiency has been based on the seminal paper by Farrell (2007), who decomposed economic into its technical and allocative components.

Nigeria is comprised of 36 states and the federal capital territory (Abuja), which are further categorized into six geopolitical zones namely the Southwest, Southeast, Southsouth, Northcentral, Northwest, Northeast zones. The Northwest zone with a population of 36 million, contains the highest proportion of Nigerians with 25 percent, while the Southeast is the least populated with 9.7 percent. The country also has a very diverse agro ecology characterized by numerous farming systems including Pastoral, Agro-pastoral (millet/sorghum), Irrigated, Cereal-root crop mix, Highland temperate mix, Root crop, Tree crop, and Coastal artesian fishing FAO (2001). In addition, as many as seven major agro ecological zones exist within Nigeria's geographical confines. These zones cut across the six geopolitical zones and include:

- The mangrove swamp, which characterizes the coastal areas of the delta region, and is not widely cultivated except for swamp rice and fish.
- The tropical rain forest made up of the eastern, central, and western rain forest in the states of Ogun, Ondo, Oyo, Edo, Ekiti, Imo, Anambra, and Cross River. Common crops in this zone include cocoa, kolanuts, palm produce and timber. Root crops such as cassava, yams, and potatoes are also extensively cultivated.
- The savannah zone comprising the middle belt region including Kwara, Benue, Niger, Adamawa and Taraba States. Main crops are cereals, roots, tubers, cotton and groundnuts.
- The guinea savannah zone comprising the southern parts of Sokoto, Kaduna, Katsina, Bauchi, and Borno states. Main crops are groundnuts, cotton, sorghum, millet and rice.
- The dry savannah which covers the northern parts of Kano, Bauchi, and Borno states with the most common crops being groundnuts, sorghum millet, cowpeas, livestock, Adejoh (2009).

Nobody can gainsay the fact that agriculture needs to be developed in Nigeria to any possible level in view of food insecurity high level of unemployment in the presence of abundance human and material potentials in this country.

This study is focused on the comparison of the production quantities and the area of land allotted to guinea corn, groundnuts, cowpea and maize as well as their production trends in the states of North Central Geopolitical Zone (NCGZ) of Nigeria.

The sector summarily needs to be transformed. Transformation of agriculture is facilitated by researchers on various segments of the sector.

## **2.0 Agricultural Transformation for the Expansion of Nigeria Economic Base**

The call for the diversification of Nigerian economy had been in the lips of many well meaning citizens of this country and had been the main topic or formed part of many research endeavours, which include that of Francisco and Markus (2011). The call is still on-going and becoming even more reasonable in view of the fluctuating price of oil in the world market which has since the last quarter of 2013 been of great concern to all oil-economic-dependent nations of which Nigeria is one. Nigeria, like many other countries affected by the dwindling oil price has reduced the price at local level and this has impact on the Gross Domestic Product (GDP).

It now goes without saying that further delay over developing agricultural sector to the level where it can be competing with oil towards contribution to GDP might be dangerous to the economy of Nigeria. It will not be out of place or an abnormality if agriculture is developed to the extent that its contribution to GDP becomes greater than that of oil. The fact that agricultural sector is more viable than oil as Tukura (2005) stated would be more understood when the contribution of agriculture to GDP vies favourably with oil. That situation would also assert Nigeria's shift from age-long monocultural economy to multicultural economy.

It is widely believed that agricultural sector is one of the Nigeria's potential sources of revenue that is still underdeveloped and unexplored. The sector offers potentials for employment generation, food security and poverty reduction (Abone 2002). These potentials had, however, remained untapped and this has led to the dwindling performance of the sector both domestically and internationally.

## **3.0 Data Collection and Analysis**

The data for this study is a secondary data collected from the National Bureau of Statistics. It comprises the quantity produced and area of land planted of guinea corn, groundnut, cowpea and maize within the six states and Abuja capital territory that make up the Northcentral zone of Nigeria in the period 1998 to 2012.

In order to determine whether there are differences in the quantities produced of the crops and the areas of land allotted to those crops understudy in the North Central Geopolitical Zone (NCGZ) of Nigeria, Complete Randomized Block Design (CRBD) is found relevant. The model for the statistical technique, (CRBD), is given by

$$Y_{ij} = \mu + \tau_i + \beta_j + \varepsilon_{ij}$$

Where  $i = 1, 2, \dots, t$

$j = 1, 2, \dots, b$

The research hypotheses for the study are hereby tested using the CRBD model given above.

For the hypotheses:

**H<sub>0</sub>:** There is no significant difference in the mean production quantities of the crops across the states.

**H<sub>1</sub>:** There is significant difference in the mean production quantities of the crops across the states.

These hypothesis H<sub>0</sub> and H<sub>1</sub>, are taken care of by the result of the analysis of Table 1 shown in Table 3.

It is clear from Table 3 that H<sub>0</sub> is rejected and this implies that there is significant difference in the mean production quantities of the crops across the states.

Similarly, tables 2 and 4 are used to test the hypotheses:

**H<sub>0</sub>:** There is no significant difference in the land area allotted for the production of the crops under study in the NCGZ.

**H<sub>1</sub>:** There is significant difference in the land area allotted for the production of the crops under study in the NCGZ.

From table 4, it is also clear that H<sub>0</sub> is rejected and this implies that there is significant difference in the land area allotted for the production of the crops under study.

From the trend of production quantities and land areas allotted for cops, some of the crops have decreasing rate and the rate at which the land areas allotted for some crops in some states are also decreasing.

**Table 1: Production Quantity of Guineacorn, Groundnut, Cowpea, Maize versus the 6 States + FCT That Made up the NCGZ**

	GUINEACORN	GROUNDNUT	COWPEA	MAIZE	Total
1.	2615945	4982221	658675	208968300	217225141
2.	905992	170992	784843	368482200	370884027
3.	1228196	538562	270480	149442600	151479838
4.	2033181	1540593	102927	172504140	176180841
5.	7384258	5914864	3760310	690625200	707684632
6.	3565296	969942	586942	612334900	617457080
7.	179317	106650	53848	4577920	4917735
Total	17912185	14763824	6218025	2206935260	2245829294

*Source: Computed from Appendix 1*

**Table 2: Area Planted of Guineacorn, Groundnut, Cowpea and Maize versus the 6 States + FCT that Made Up the NCGZ**

	<b>GUINEACORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>	<b>TOTAL</b>
1	1546690	2660400	704250	1577780	6,489,120
2	742330	544200	658540	2390340	4,325,410
3	4192760	448748	259340	1091860	5,992,708
4.	9721650	1240890	1242490	1264780	13,469810
5	8140320	4076040	2331740	5161270	19,709,370
6	2050120	889150	717990	2976460	6,633,720
7	823980	56480	33410	162440	1,076,310
Total	27,217,850	9,915,908	5,947,760	14,614,930	57,696,448

*Source: Computed from Appendix 2*

**Table 3: Two-way Analysis of Variance (ANOVA) Table from Table 1**

<b>Source</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
States	6	1.00005E+11	16667457533	1.04	0.431
Crops	3	5.15596E+11	1.7865E+11	10.75	0.000
Error	18	2.87753E+11	15986279156		
Total	27	9.03354E11			

**Table 4: Two-way Analysis of Variance (ANOVA) Table from Table 2**

<b>Source</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
States	6	59063185	9843864	3.33	0.022
Crop-Area	3	36559021	12186340	4.13	0.022
Error	18	53163433	2953524		
Total	27	148785639			

#### **Trend of Production Qty of Groundnut**

##### **BENUE**

	$Y_t = 362.9 - 391071t$	
Forecast	2016	300.314
	2020	284.671
	2023	272.939

##### **KOGI**

	$Y_t = 13.8 + 4.20t$	
Forecast	2016	81.0
	2020	97.8
	2023	110.4

**KWARA**

	$Y_t = 5.4 + 3.81t$	
Forecast	2016	66.324
	2020	81.552
	2023	92.974

**NASARAWA**

	$Y_t = 58.5 + 6.36t$	
Forecast	2016	160.314
	2020	185.771
	2023	204.864

**NIGER**

	$Y_t = 343.5 + 6.34t$	
Forecast	2016	444.914
	2020	470.271
	2023	489.289

**PLATEAU**

	$Y_t = 80.3 - 1.95357t$	
Forecast	2016	49.0381
	2020	41.2238
	2023	35.3631

**FCT.**

	$Y_t = -5.79 + 1.61t$	
Forecast	2016	19.9238
	2020	26.3524
	2023	31.1738

**Trend of Land Area of Groundnut In**

**BENUE**

	$Y_t = 219.5 - 5.29286t$	
Forecast	2016	134.857
	2020	113.686
	2023	97.807

**KOGI**

	$Y_t = 3.9 + 4.05t$	
Forecast	2016	68.733
	2020	84.933
	2023	97.083

**KWARA**

	$Y_t = 433.3 - 19.6964t$	
Forecast	2016	118.162
	2020	39.376
	2023	19.713

## NASARAWA

	$Y_t = 87.72 - 3.5821t$	
Forecast	2016	30.4095
	2020	16.0810
	2023	5.3345

## NIGER

	$Y_t = 17.4 + 5.90t$	
Forecast	2016	77.0
	2020	100.6
	2023	118.3

## PLATEAU

	$Y_t = 62.4 + 2.53t$	
Forecast	2016	102.895
	2020	113.016
	2023	120.595

## FCT

	$Y_t = - 3.32 + 1.01t$	
Forecast	2016	
	2020	
	2023	

### 4.0 Conclusion

This study finds that there exists significant difference in the production quantities and the land area allotted to crops among the crops under study, in the North Central Geopolitical Zone (NCGZ) of Nigeria. Production quantities and land areas allotted to some crops in some states show decreasing trend. In some states where both the production quantities and the land areas allotted to crops are increasing, the trends show low rate of increase.

### 5.0 Recommendation

The researcher recommends more concerted efforts to agriculture in the NCGZ of Nigeria so as to reduce the level of food insecurity in the country. Stakeholders in agriculture sector should take special note of the decreasing trend of both production quantities and land area allotted to crop production in Benue State which is said to be "The Food Basket of the Nation".

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**APPENDIX 1****Distribution of Production Quantity ('000 Mt) of Crops****(A) BENUE STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	164	336	20	117
1999	158	331	20	130
2000	189	343	22	134
2001	193	347	21	136
2002	192	348	22	135
2003	193	359	22	135
2004	191	352	21	133
2005	192	359	22	135
2006	189	356	22	135
2007	144	353	23	136
2008	146	280	25	138
2009	172	296	26	139
2010	172	309	54	170
2011	201	402	28	166
2012	102	202	329	150

*Source: MBS/FMARD***(B) KOGI STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	61	32	22	201
1999	71	34	22	189
2000	80	40	32	252
2001	45	41	32	246
2002	43	36	33	234
2003	50	36	30	241
2004	51	33	32	250
2005	52	39	31	255
2006	51	36	31	249
2007	51	36	32	250
2008	46	37	23	198
2009	46	27	23	212
2010	54	28	31	261
2011	107	78	54	376
2012	98	178	356	272

*Source: MBS/FMARD*

- (C) **KWARA STATE**  
 (D) **NASARAWA STATE**

(E) **NIGER STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	681	329	210	345
1999	537	224	323	348
2000	769	350	252	824
2001	553	431	250	300
2002	369	531	235	369
2003	654	459	241	540
2004	465	301	276	337
2005	362	308	278	339
2006	366	337	281	327
2007	422	397	297	322
2008	321	512	254	466
2009	321	524	260	512
2010	678	546	341	629
2011	485	433	50	661
2012	400	231	152	587

*Source: MBS/FMARD*

(F) **PLATEAU STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	368	82	34	286
1999	253	90	43	474
2000	203	100	30	459
2001	207	90	35	354
2002	200	70	31	382
2003	203	55	37	352
2004	189	42	16	298
2005	204	42	17	369
2006	198	46	24	340
2007	201	53	29	357
2008	227	42	59	370
2009	269	46	60	389
2010	318	68	78	478
2011	385	21	15	643
2012	368	123	78	572

*Source: MBS/FMARD*

**(G) FCT**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	7	1	1	5
1999	5	1	1	5
2000	8	1	1	11
2001	5	1	1	4
2002	4	1	1	5
2003	6	1	1	7
2004	4	1	1	4
2005	4	1	1	4
2006	4	1	1	4
2007	5	1	1	12
2008	9	26	3	19
2009	8	17	3	21
2010	6	17	4	39
2011	52	8	11	43
2012	53	28	25	45

*Source: MBS/FMARD*

**APPENDIX 2****Distribution of Area ('000 Ha) of Land Planted of Crops****(A) BENUE STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	113	201	29	36
1999	111	199	26	98
2000	108	197	27	109
2001	110	199	26	102
2002	110	199	28	104
2003	110	199	26	104
2004	110	199	27	104
2005	110	199	26	104
2006	109	196	26	104
2007	109	160	26	104
2008	120	162	41	102
2009	126	181	42	102
2010	98	33	277	103
2011	93	135	277	112
2012	375	199	48	250

*Source: MBS/FMARD*

**(B) KOGI STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	62	24	25	146

1999	64	25	32	159
2000	41	30	35	149
2001	45	28	36	142
2002	42	24	34	137
2003	45	22	32	130
2004	44	20	34	129
2005	44	20	35	132
2006	44	21	34	131
2007	44	21	35	131
2008	29	31	26	103
2009	29	29	26	105
2010	30	32	30	143
2011	92	108	292	331
2012	87	110	295	312

*Source: MBS/FMARD*

**(C) KWARA STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	84	18	16	60
1999	80	21	13	63
2000	80	17	6	52
2001	69	14	3	58
2002	50	3	3	58
2003	40	7	7	64
2004	33	8	8	60
2005	31	10	1	51
2006	48	9	5	46
2007	48	8	6	48
2008	44	10	4	103
2009	42	10	10	132
2010	43	31	84	138
2011	90	141	86	72
2012	96	140	86	86

*Source: MBS/FMARD*

**(D) NASARAWA STATE**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	125	69	67	62
1999	131	70	67	64
2000	132	85	69	74
2001	86	95	72	59
2002	86	78	70	72
2003	82	78	70	56
2004	83	63	89	54
2005	85	64	89	57

2006	88	73	89	69
2007	86	83	96	71
2008	84	52	55	70
2009	113	77	59	73
2010	107	86	67	109
2011	107	133	140	185
2012	109	134	141	188

*Source: MBS/FMARD*

**(E) NIGER STATE**

YEAR	GUINEA CORN	GROUNDNUT	COWPEA	MAIZE
1998	674	329	165	247
1999	511	236	220	307
2000	640	291	145	433
2001	553	488	152	299
2002	729	469	196	321
2003	594	471	155	450
2004	483	238	134	311
2005	495	244	137	320
2006	481	210	152	320
2007	510	216	157	316
2008	502	214	163	305
2009	542	235	173	309
2010	566	262	198	339
2011	433	85	89	416
2012	424	85	93	467

*Source: MBS/FMARD*

**(F) PLATEAU STATE**

YEAR	GUINEA CORN	GROUNDNUT	COWPEA	MAIZE
1998	213	79	68	158
1999	148	87	71	236
2000	111	100	62	218
2001	115	90	55	186
2002	113	70	46	180
2003	123	54	53	172
2004	103	42	25	136
2005	104	40	24	160
2006	110	45	34	156
2007	112	47	34	161
2008	120	35	51	238
2009	122	56	52	230
2010	148	62	60	249
2011	204	39	40	259
2012	203	40	41	242

**Source: MBS/FMARD**

**(G) FCT**

<b>YEAR</b>	<b>GUINEA CORN</b>	<b>GROUNDNUT</b>	<b>COWPEA</b>	<b>MAIZE</b>
1998	9	1	1	4
1999	7	1	1	5
2000	8	1	1	7
2001	7	1	1	5
2002	10	2	1	5
2003	84	2	1	7
2004	7	2	1	5
2005	7	8	1	5
2006	7	1	1	5
2007	7	1	1	6
2008	4	3	3	5
2009	4	13	3	27
2010	4	14	4	29

**Source: MBS/FMARD**