Journal of Economics and Sustainable Development www.iiste.org
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.2, No.11&12, 2011

Economic Analysis of Land Allocation Use and Intensification among Arable Crop Farmers in Uruan Local Government Area of Akwa-Ibom State, Nigeria

Edet Joshua Udoh[1] Sunday Brownson Akpan[2]* Edidiong Raphael Effiong[1]

1. Department of Agricultural Economics and Extension, University of Uyo, P.M.B. 1017, Uyo Akwa Ibom State, Nigeria.
2. Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Abia state, P.M. B. 7267, Umuahia, Abia State Nigeria.

* E-mail of the corresponding author: sundayakpan10@yahoo.com

Abstract

This study investigates the agricultural land allocation pattern and the level of land use intensification among farming household heads in Uruan local government area of Akwa Ibom state in the southern Nigeria. Two - stage random sampling technique was used to select 240 farming household heads. Structured questionnaire was used to collect primary data from sample farming household heads in the study area. Combination of analytical tools including descriptive Statistics, Herfindahl index, Crop Diversification index, and Ordinary Least Squares technique were used to analyze the specific objectives. Analysis of socio economic characteristics reveal that majority of farming household heads were males, learned and have moderate family size as well as small farm land. The result also reveals that agricultural land in the area was mostly acquired through inheritance and outright purchase. Analysis of crop combination shows that pumpkin, maize cassava and white yam was the most prefer crop combination in the study area. An average Herfindal index of 0.641 and land intensification index of 0.8654 were obtained among respondents. Also, a negative relationship was discovered between land intensification index and farm size in the study area. The study therefore suggests for provisions of improved seed varieties and other inputs to farming household heads by the Akwa Ibom state government. Also, state government should intensify effort to reclaimed less productive land and developed Fadama projects in the state to reduce the menace of land use intensification among farming household heads in the area.

Keywords: Land, Allocation, Crop, Farmers, Intensification, Resource, Akwa Ibom, Nigeria.

1. Introduction

In Nigeria, the demand for agricultural produce is continuously rising due to the geometric rise in population; this has resulted in the intensification of cultivable land in an attempt to increase agricultural productivity (Akinbile and Adekunle, 2000). Nigeria like most developing countries is an agrarian society where vast percentage of the population is involved in several agricultural activities. The rural population in the country represents a strong and virile productive force in subsistence agriculture. They play an important role in the management of land, agricultural forestry and water resource (Ifaturoti, 1996). Agricultural production in the developing economies depends on land use intensity and resource allocation (Raufus, 2010). Efficient land utilization and management practices ensure achievement of farm level objectives in term of economic viability, food security and risk aversion (Pinstrup *et al.*, 1995; Krusemen *et al*, 1996; and Udoh *et al*, 2002). With the ever-increasing Nigeria's population, the pressure on land has become so prominent that land which was initially regarded as a free-gift of nature tends to be most highly priced factor of production (Gomez, 1993). The alternative features to this, are the intensive use of the few

plots of land which usually would result in land nutrient exhaustion or degradation, low yield restricted farms and continuous poverty following low productivity.

In recognition of the important of land as a farm resource, most agricultural policies and programmes in Nigeria were aimed at improving accessibility to fertile land by farmers through provision of irrigated lands, land reclamation and development of Fadamas. For instance, the River Basin Development Authority was mandated to increase land size in the country through extensive irrigation programme. The on-going Fadama development programme in the country is an attempt to increase crop productivity through improvement in marginal or less productive lands. Thus the availability and productivity as well as utilization of land have become priority objectives of most recent agricultural policy in the country.

The accessibility of most agricultural lands especially in the southern part of the country depends largely on land tenure system and the extent of competition by non-agricultural land uses (Udoh 2000). Land as a factor of production is a critical input in agricultural production. The criticality is imposed by its availability, accessibility, quantity and quality. In Nigeria's agriculture, the quality factor stands out as a major determinant of land productivity. This is due to the problems associated with sourcing artificial amendments that can improve the productivity of land especially by majority poor subsistent farmers that dominate the arable crop production landscape (Raufus, 2010).

In Akwa Ibom state (which is located at the southern part of Nigeria); the increasing menace of erosion has imposed a serious constraint on land availability. The consequences are low productivity, increasing soil degradation and agricultural land fragmentation as well as land use intensification. Engelhard (1994) noted that the loss of biodiversity, climate change and land degradation are closely linked, and that the immediate causes are population pressure, poverty and the poor performance of extensive agriculture. The increasing demand of agricultural commodities generated from an increase in population in the state and various agricultural programmes and policies intended to boost arable crop production are incentives for farmers to increase agricultural production in the state. These benefits prompted many arable crop farmers to intensify the frequency of cropping in the state. Crops combination among arable crop farmers has drastically changed in attempts to maximize land use and reduced risks and uncertainties in production. However, increase in land use intensity without corresponding plans to supplement the soil with sustainable nutrients could be detrimental to the national policy on self food sufficiency in the long run. Also, loss of biodiversity and ecosystem functioning could be another consequences of irrational use of agricultural land (Geist *et al.*, 2005). On the other hand, increase land intensity without adequate attempt to restore depleted soil nutrients or adoption of appropriate soil management technique might result in soil degradation problems such as erosion, decline soil fertility among others. If this continues, the land productivity will decrease and this could negate the overall policy thrust of the agricultural sector.

Kolawole, (1991); Lawal, (2001); Adewumi and Omotesho, (2002); Raufu (2010); Ogundari (2010) and Lawal *et al.*, (2010) provided evidences of increasing change in cropping pattern (i.e. decreasing index of crop diversification) and land use intensification indices among arable crop farmers in Nigeria. Reid *et al.*, (2006) asserted that although, estimates of the effects of land degradation on food production are rare, it had been realized that the problem often leads to drastic reduction in agricultural production by necessitating the use of higher level of inputs to maintain yields, temporary or permanent abandonment of plots and conversion of land to lower value uses.

Thus, given the present population growth trend in Nigeria, the issue on increasing land fragmentation and deteriorating soil fertility especially in Akwa-Ibom state; it is imperative to analyze issues surrounding land use and determine land-use indices, such as land use pattern, allocation and intensification threshold in a typified erosion prone farming communities of Akwa Ibom state. The need to assess the land use intensification indices of arable crop farmers in the state will provide policy makers with reliable tools to formulate appropriate policy framework that might reduce the consequences derivable from agricultural land intensification. It is even more important now that the federal government of Nigeria is focusing on agriculture as a potential source of non oil revenue to the country. Hence, the study was specifically designed to determine the socio-economic characteristics of farming household heads in Uruan local

government area of Akwa Ibom state; investigate the agricultural land allocation pattern and intensification as well as determine the relationship between farm size and land use intensity in the study area.

2. Research Methodology

2.1 Study area, Sampling Procedure and Sampling Size: The study was conducted in Uruan Local Government Area in Akwa Ibom State, Nigeria. Akwa Ibom state is one of the states in the South-South region of Nigeria. It is a Niger delta state that is very rich in crude oil deposit. The state is located in the rain forest belt and is prone to oil spillage, acid rain and increasing ocean encroachment. Uruan is one of the local government areas in the state that is noted for arable crop farming and fishing activities. The population of the local government is about 118,300; out of which 62,897 are males and 55,403 are females (NPC, 2006). Farming activities in Uruan local government area are organized in subsistence levels. Some of the common food crops grown in the area are cassava, plantain, yam, cocoyam, maize, banana and palm fruits. A two-stage random sampling procedure was used in selecting the respondents. A total of 240 arable crop farming households were used for data collection in the study. A structured questionnaire was administered to respondents and complemented by personal interviewed to ensure the consistency and accuracy of data collected.

2.2 Analytical Techniques: Descriptive statistics consisting of percentages and frequency tables were used to analyze the socio-economic characteristic of respondents. Herfidahl index was estimated and used to analyze the land used pattern in the study area. The index was estimated for categories of farmers ranging from mono cropping, two-crop combination, three crop combination etc. Mathematically it is express as shown below;

$$CDI_i = \sum_{i=1}^{n} P_i^2 \quad \text{..... (1)}$$

Where = CDI_i is the crop diversification index and P_i = Proportion of net income from ith crop.

Crop diversification index value approaching 1.0 indicates that household's specializes or concentrates on farming activities and mono-cropping pattern; whereas smaller values reflect increasing diversification, multi-cropping pattern and stability of income and sustainability of land use pattern (Spio, 1996 and Udoh, 2000).

To estimate land used intensification index in the study area, the Ruthenberg -Value was specify and estimated following the work of Raufus (2010). The value shows if the length of fallow period may be adequate for soils to restore natural fertility. Mathematically the value is expressed as shown below;

$$R - Value = \frac{C}{c} + F \quad \text{..... (2)}$$

Where; C = Number of cropping years. This was obtained as the average number of years a land was used before fallow. F = Number of fallow years. This was obtained as average number of years a land was allowed to fallow before further cultivation. R – Value = 1 for permanent cultivation. The value lies between 0 and 1; the further the value is from unity the more the likelihood that fallow would be adequate to restore natural fertility and improve sustainability (Udoh, 2000).

To determine the relationship between land use intensity and farm size in the study area, an elasticity of land use intensity was modeled and estimated following the empirical works of Cornia, (1985), and Raufus, (2010). The model is shown below;

$$InLui = f(LnFMS) \quad \text{..... (3)}$$

Where Lui is land use intensity, and FMS is the farm size. The relationship is expressed in logarithm, where the coefficient represents elasticity of FMS with respect to LUI.

3. Results and Discussion

3.1 Socio-Economic Characteristic of Farming household heads in Uruan area of Akwa Ibom state in Southern part of Nigeria: The socio-economic characteristics of arable crop farming household heads are shown in Table1. The results reveal that household heads were dominated by male folks in the study area. The result is as expected, because male culturally in this part of the country dominate decision making of

the family. About Eighty three percent of crop farming household heads fell within the age bracket of 20 and 60 years with an average age of about 49 years. This implies that, most crop farming household heads in the study area are actively involved in farming activities.

The findings also reveal that most crop farming household heads in Uruan were married (30%) and about (25%) were divorced while (25%) were widowed. Also, majority (37.50%) of household heads had household size range of 6 to 10 members and an average household size of 8 members was obtain among respondents. The results might point to the fact that most farming household heads in the study area used the proceeds from farming to complement the non-farming income of their families and employ relatively large and affordable family labour in arable crop production.

In addition, majority of crop farming household heads have at least 10 years of formal education with an average of 8 years for all respondents. The result implies that there is high probability of innovation adoption and diffusion among crop farming household heads in Akwa Ibom state. Around 27.50% of respondents made between ₦50 000 and ₦90 000 per annum with an average of about ₦70 000 per annum; while 35% made between N90 001 and ₦300 000 per annum with an average of about of ₦250 000/annum. About 12.50% of crop farming household heads made more than ₦500 000.00/annum with an average of ₦470 000.00/annum. This means that crop farming activities is profitable in Akwa Ibom state. Furthermore, the result shows that majority of crop farming household heads in the state (about 83.33%) have farming experience greater than 5 years. With an average farming experience of about 10 years, it means that farming business is a well established venture in the study area with vast potentials for increase private investment.

About 93.75% of crop farming household heads have farm size that is between 0.1 ha to 1.0 ha. The mean farm size for all the respondents stood at 0.85ha. The result could be linked to the continuous subsistence nature of cultivation of arable crop enterprises in the state imposed by increasing land fragmentation and urbanization. The finding consolidates the research report by Nwachukwu and Onyenwaku (2007).

3.2 Analysis of Land Acquisition Methods

Table 2 reveals that five major types of land ownership were observed in the study area. About 57.93% of farming household heads sample acquired farm land through inheritance; 24.39% of farming household heads acquired land through outright purchase. This provides property right to the farmers who are at liberty to observe longer fallow periods and less land use intensity. Only 7.31% of respondents acquired land through lease, which imposes limited right on farmers, thus such land might be put to less productive use than it should. In essence limited right on land resource causes hectares of land to be multi cropped each year. This also led to increase in the rate of land degradation, especially when no standard practice of land management is carried out. Under such condition, farmers would observe short or no fallow periods to enable them consolidate their land rent. Fourteen (14) farming household heads acquired farm land through Gift and Pledge. The results show that farming household heads in the study area acquire land mostly through inheritance and outright purchase.

3.3 Analysis of crop combination by farming household heads in Uruan area of Akwa Ibom state

Table 3 shows the pattern of crop combination of farming household heads in Uruan area of Akwa Ibom State. The result reveals that majority of household heads (12.50%) prefer fluted pumpkin (PUM), cassava (CAS), maize (MZE) and white yam (YAM) combinations. Also, about (11.67%) of the farming household heads have preference for fluted pumpkin (PUM), waterleaf and maize (MZE) combinations. From the combination pattern of crops, it is clear that cassava is the major arable crop prefer by farming household heads in Uruan area of Akwa Ibom state in Nigeria. Another important crops identify from the combinations are the fluted pumpkin, white yam, maize, melon and garden egg. Palm oil fruit was the list prefer crop among farming household heads in the study area. This could be attributed to the insufficient

land and long gestation period require for the harvest of Palm oil fruit. Since most rural farmers are poor they cannot afford to maintain plantation of oil palms fruit.

3.4 Nature of Agricultural land Allocation Pattern in the study area

Table 4 reveals that farming household heads in Uruan area adopt different agricultural diversification strategies to fully utilize highly fragmented agricultural land and thus attempt to reduce risks and uncertainties in their operations. The strategies include mono cropping and up to seven crop combinations in one piece of land. The sample household heads cultivated three crops as sole enterprises and seven crops as mixed enterprises during data collection period. The result shows that majority of farming household heads planted more than 5 crops in their farm land. This clearly shows the intensity of land scarcity in the study area. The finding also indicates that farming household heads that combine crops made more monthly farm income and non-farm income than those that specialized on mono-cropping. The result attests to the increasing crop diversification tendencies among farming household heads in the study area. This condition could be linked to risky nature of arable crop production in Uruan area of the state.

3.5 Herfidahl index of crop combination among farming household heads in Uruan area

Table 5 shows the Herfidahl indices for categories of farming household heads adopting various crop combinations, ranging from mono cropping to seven crop combinations. For the four and five-crop combination category, the average Herfidahl -index was 0.604 and 0.535 respectively. The result however, shows that as the number of crop combination decreases, the Herfidahl-index increases and would become one for sole cropping implying specialization. But on the average, the Herfidahl-index for all samples farming household heads was 0.641. This implies that there is less farming specialization among farming household heads in Uruan local government area of Akwa Ibom state. This means that farming household heads undertook one form of cropping diversification or the other to avoid risks and uncertainty of low yields among other reasons.

3.6 Land intensification indices for farming household heads in Uruan Local Government Area

Ruthenberg- value was estimated for each farming household head. The Ruthenberg -value shows the land use intensity (intensification index) for each farming household head. The result of land intensification index reported in Table 6 shows a distribution that is highly skewed. This means that most farming household heads in Uruan area of Akwa Ibom state in the southern Nigeria have high land intensification index; while few farmers have low land intensification index. For instance, only 5 percent of farming household heads had land intensification index less than or equal to 0.5; whereas about 62.5 percent of farming household heads had land intensification indices almost at unity. The findings reveal an average Rothenberg- value of 0.8654 and the minimum as well as the maximum values of 0.49 and 1.00 respectively. This implies that, average farming household head in Uruan local government area in Akwa Ibom state cultivate crops almost on continuous basis. This finding could be explained by the constraints imposed by excessive land fragmentation and the relative scarcity of fertile land in the study area. Farmers face with this limitation has no option than to adopt continuous cropping which is usually accompanied by soil degradation and poor yields. Depending on the agronomic practices adopted by the farming household heads in the study area, the land use may be unsustainable or may not.

3.7 Elasticity of land use intensity among farming household heads in Uruan area

To determine the relationship between land use intensity and farm size among farming household heads in Uruan local government area; elasticity of land use intensity was model and estimated following the empirical work of Cornia (1985). The result of the estimation is shown in Table 7; and the diagnostic statistics indicate appropriateness of the specify model. The empirical result reveals that farm size has a

significant negative relationship with land use intensity in the study area. This means that land use intensity increases with the decreasing farm size. The elasticity value of farm size with respect to land use intensification is negative and inelastic (-0.087) implying that an increase in land use intensity in the study area occurred as a result of scarcity of agricultural land. The result could be further explained by constraints imposed on land availability due to excessive land fragmentation in the study area. Similar results have been reported by Raufu (2010) in western Nigeria.

4. Conclusion

The study discovers that majority of farming household heads in Uruan area of Akwa Ibom state in southern Nigeria are male and are of average age of 49 years. They have an average farming experience of about 10 years, implying that farming enterprise is an established business in the area. The findings also reveal that most of them are learned and made quite reasonable monthly farm income in addition to possessing farm land that is reasonably small or less than one hectare. The result also shows that farming household heads in the study area acquire land mostly through inheritance and outright purchase. In addition, the findings reveal that majority of household heads prefer fluted pumpkin, cassava, maize and white yam combinations. It was clear that cassava was the major arable crop prefer by farming household heads in Uruan area of Akwa Ibom state in Nigeria. Further analyses reveal that farming household heads in Uruan area adopted different agricultural diversification strategies to fully utilized highly fragmented agricultural land and thus attempt to reduce risks and uncertainties in their operations. An average Herfidahl-index for all samples farming household heads was 0.641. This implies that most household heads in Uruan area practiced mixed crop farming. Also, the findings reveal an average Rothenberg- value of 0.865 which implies that, average farming household head in Uruan local government area in Akwa Ibom state cultivate crops almost on continuous basis. In addition, the empirical result further reveals that farm size has a significant negative relationship with land use intensity in the study area.

In order to improve on the nature of agricultural land allocation and cropping pattern, the study advocated for the following recommendations; Government of Akwa Ibom State should intensify effort to provide adequate and accessible inputs such as improve seeds, herbicide, farm implements and fertilizers to food crop farming household heads (active farmers). The inputs should be provided at subsidized rates to encourage their usage, since most of the farming household heads are poor. These might help to increase yield, reduce risk and help to minimize the tendency of increase land use intensification in the area. Activities of agricultural extension services in Akwa Ibom State should be intensify and re-directed to focus more on demonstration of appropriate crop combinations technique in the State. To achieve this, Focus group discussion, seminars, workshops and farm demonstrations should be organized for farming household heads. Through these channels, farmers would be aware of the danger of increase land use intensification and made attempts to adopt appropriate strategies to amend the soil. Special attention should be given to fertilizer procurement and distribution to arable crop farmers in Akwa Ibom State. Increase fertilizer use might reduce the menace of increase land use intensification through increase in output. Also, government of Akwa Ibom State should embark on land reclamation and development of fadama land areas in the State. Increase in agricultural land area would reduce the intensity of land use and help sustained soil fertility for a longer time.

REFERENCES

[1] Adewumi, M. O. and Omotesho A. O. (2002), “An Analysis of Production Objectives of Small Scale Rural Farming Households in Kwara State, *Nigeria” J. Rural Dev., 25: 201-211.*

[2] Akinbile, M., Adekunle, A. (2000). Land Administration in Nigeria: case studies of implementation of land use decree (Act) in Ogun Ondo and Oyo State of Nig. *Agricultural Administration 17 (1): 21-31.*

[3] Cornia, G. A. (1995). Farm size, farm yield and agricultural production function: an analysis for fifteenth developing countries. World Dev., 13: 513-534.

[4] Engelhard, B. M. (1994). Land Tenure and land Administration in Nigeria and the Cameroons, London, H. M. Stationery office, 420p.
[5] Geist H, Lambin E, McConnell W, Alves D. (2005). Causes, Trajectories and Syndromes of Land Use/Cover Change, UPDATE Newsletter of the International Human Dimensions Programme on Global Environmental Change, 03/2005, pp. 6-7.
[6] Gomez, A. A. (1993). The slopping lands of the Philippines. SEARCA, Philippines (Mimeo). Ifaturoti, B. S. (1996): The need for land Reform in Nigeria: Ibid, 8441-453.
[7] Kolawole A . (1991). Economics and management of the Fadama in Northern Nigeria partial Wetlands in Dryland: The Agro Ecology of Savanna Systems in Africa Drylands Programme, IIED. London.
[8] Krusemen GH, Ruben H. R, Keulen N.V. Kuyvenhoen (1996), "Analytical Framework for Disentangling the Concept of Sustainable Land Use" Agric. Syst. 50(2): 191 – 207.
[9] Lawal, A. F., O. A. Omotesho, and M. O. Adewumi (2010). Land use pattern and sustainability of food crop production in the *fadama* of Southern Guinea Savanna of Nigeria. *African Journal of Agricultural Research, Vol. 5(3) pp. 178-187.*
[10] Lawal A. F. (2001), "Socio-Economic Effects of Flood Disaster on the Riparian Communities around Jebba and Shiroro Dams in Niger State, Nigeria". Paper Presented at the 19th Annual Conference of Agricultural Society of Nigeria held at Badeggi.
[11] National population commission (2006), national census data for Nigeria.
[12] Ogundari, K. (2010), Crop diversification and the technical efficiency of smallholder farms in Nigeria.
[13] Pinstrup–Anderson, P. and R. Pandya-Lorch, (1994), Alleviating poverty, intensifying Agriculture, and effectively managing natural resources. *Food, Agriculture and Environment discussion paper 1 pp. 1-18.*
[14] Raufu, M. O. (2010), Pattern of Land use among selected crop farmers in Osun State. Research Journal of Soil and water management 1 (1): 1-4.
[15] Reid, R. S,. T. P. Tomich,. J. C. Xu, H. Geist and A. S. Mather (2006). Linking Land – change Science and Policy: Current Lesson and Future Integration. In Land Use and Land cover change. Local Processes and Global impact, Lambin, E. F. and H. J. Geist (Eds.) Springer, Berhin, ISBN: 354032201, Pp: 1- 222.
[16] Ruthenberg, H., 1980, Farming System in the tropics. Clarendon Press, Oxford.
[17] Spio K. C. (1996), "Inter-Cropping-the Hidden Revolution: A Solution to Land Scarcity and Household Food Security" In Conference Issue: Paper presented at the 3rd Annual Conference of the Agricultural Economic Association of South Africa, Agrekon 35(4): 266 – 270.
[18] Udoh, E. J. (2000). Land Management and Resource use Efficiency among farmers in South-Eastern Nigeria. Ph.D Thesis University of Ibadan, Ibadan, Nigeria.
[19] Udoh, E. J., Akintola, J. O. (2002). Land Management and Resource-use Efficiency among Farmers in South eastern Nigeia. El-shaddai Global ventures Ltd, Ibadan: ix, 2, 5-8.

Table 1: Characteristics of arable crop farming households in the Southern region of Nigeria.

Characteristics	**Freq.**	**%**	**Characteristics**	**Freq.**	**%**
Gender composition of Farmers			Age of Respondents (Year)		
Male	162	67.50	21-30	12	5.00
Female	78	32.50	31-40	30	12.50
Total	**240**	100.00	41-50	48	20.00
			51-60	102	42.50
Marital Status of Respondents			61-70	48	20.00
Single	48	20.00	**Total**	**240**	**100.00**
Married	72	30.00			
Divorce	60	25.00	Household Size of Respondents		
Widowed	60	25.00	0-5	60	25.00
Total	**240**	**100.00**	6-10	90	37.50
			11-15	42	17.50
Educational Status (yrs)			> 15	48	20.00
No Schooling	18	7.50	**Total**	**240**	**100.00**
Primary School	54	22.50			
Secondary School	90	37.50	Primary Occupation of Respondents		
Tertiary	78	32.50	Farming	138	57.50
Total	**240**	**100.00**	Fish farming	0	0.00
			Trading	24	10.00
Annual Income (₦)			Civil Servant	72	30.00
50,000-90,000	66	27.50	Others	6	2.50
90,001-300,000	84	35.00	**Total**	**240**	**100.00**
300,001-500,000	60	25.00			
>500,000	30	12.50	Farming Experience in (yr)		
Total	**240**	**100.00**	< 1	10	4.17
			1 − 5	30	12.50
			> 5	200	83.33
Farm Size of Respondents (ha)			**Total**	**240**	**100.00**
< 0.1	35	14.58			
0.1 − 1.0	190	79.17			
> 1.0	15	6.25			
Total	**240**	**100.00**			

Source: Field Survey, 2011

Table 2: Distribution of farming household heads according to the mode of farm land acquisition**.**

Mode of acquisition	**Frequency**	**Total land size (Ha)**	**Percentage %**
Inheritance	190	121.01	57.93
Purchase	80	57.58	24.39
Gift	20	11.44	6.10
Lease	24	20.16	7.31
Pledge	14	8.40	4.27
Total	**328***	**218.59**	**100**

Source: *Field Survey 2011, asterisk means multiple counts of respondents.*

Table 3: Distribution of farming household heads according to crop combinations

Types of crop combination	**Frequency**	**Percentage**
CYAM-YAM-SYAM-CAS-PUM	48	6.67
PUM-WLEAF-OKR-MZE-PEPER	36	5.00
WYAM-CAS-CYAM-PUM	72	10.00
PUM-CAS-MZE-YAM	90	12.50
CYAM-SYAM-YAM	42	5.83
PLANTAIN-BAN-CAS	60	8.33
CAS-MZE-MEL	42	5.83
YAM-CAS-MEL	48	6.67
PUM-CAS-OKR	18	2.50
CAS-SYAM-CYAM	66	9.17
OIL PALM-CAS	24	3.33
GEGG-PINEAPPLE	12	1.67
PUM-WATERLEAF-MZE	84	11.67
PUM-MZE-PEPPER	78	10.83
Total	***720****	***100.00***

Source: *Field Survey 2011, * Multiple count of crops combination.* ***Note:*** *CYAM = Cocoyam; WYAM= Water yam; SYAM = Sweet yam; CAS = Cassava; PUM = Fluted Pumpkin; WLEAF = Waterleaf; OKR = Okra; MZE = Maize; YAM = White yam; BAN = Banana; MEL = Melon; and GEGG = Garden egg.*

Table 4: Distribution of income and area cultivated to various crop combinations

Enterprise	No. of farming household head	Mean area of land	Mean monthly farm income (₦)	Min. monthly farm income (₦)	Max. monthly farm income (₦)	Mean monthly non- farm income (₦)
Mono-cropping	6	0.430	17 250.5	7 250.00	20 250.00	5 000.00
Two crop-combination	12	0.355	32 777.5	8 567.00	49 000.00	10 375.00
Three crop-combination	48	1.163	68 162.5	9 364.00	137 000.00	15 525.00
Four crop-combination	42	0.835	75 775.0	8 235.00	155 000.00	35 985.44
Five crop-combination	60	1.655	93 902.8	4 560.00	184 400.00	40 150.00
> 5 crop-combination	72	1.808	118 484.3	10 000.00	277 300.00	70 000.00

Source: Computed by authors from analysis data.

Table 5: Herfidahl index of crop combination for farming household heads in Uruan Local Government Area

Cropping pattern	Mean Herfidahl index	SD	Min. Value	Max. Value
Sole cropping	1.000	1.000	1.00	1.00
Two Crop-combination	0.967	0.225	0.65	0.90
Three crop-combination	0.736	0.199	0.43	0.86
Four crop-combination	0.604	0.265	0.29	0.71
Five crop combination	0.535	0.232	0.29	0.68
> Five crop combination	0.402	0.168	0.43	0.41
Whole Farm	0.641	0.217	0.26	0.70

Source: Computed by authors from the analysis data based.

Table 6: Land intensification indices for farming household heads in Uruan Local Government Area

Intensification index range	Frequency	Percentage
0.41 – 0.50	12	5.00
0.51 – 0.60	24	10.00
0.61 – 0.70	24	10.00
0.71 – 0.80	24	10.00
0.81 – 0.90	6	2.50
0.91 – 1.00	150	65.20
Mean = 0.8654; Minimum = 0.490; Maximum = 1.00		

Source: Computed by authors from estimated indices.

Table 7: Elasticity of land use intensity in the study area.

Variable	Coefficient	Standard error	t – value
Constant	-0.031	0.010	-3.003***
Ln Farm Size	-0.087	0.030	-2.945***
R^2	0.219		
F – Statistic	2.293**		

Note: ** and *** represent 5%, 1% significance levels respectively. Variables are as defined in equation (3).