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Variation in vegetable production among urban farmers in Ilorin, Kwara state, Nigeria

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Abstract

Urban agriculture in Nigerian cities has contributed immensely to provision of fresh vegetables and the overall food security in the urban space. Though this vegetable production takes place throughout the year, resource utilization that contributes to productivity among the various groups of urban cultivators is improperly understood. This paper addresses this issue in Ilorin, focusing on seventy farmers drawn from the two major groups of cultivators; Fadama and Okiti. Data were gathered through the use of focus group discussion (FGD), non participant observation, and questionnaire survey. Tabulation, percentages and trend description were employed in data analysis. Multiple Regression Analysis isolated utilization of pump machine, harvest from vegetable plots, utilization of modern input and type of labour used as the determinants of efficiency with a total percentage contribution of 89.6 to land-use, the major resource. Among the major findings is that the operational scale of Fadama cultivators is larger with a corresponding increase in profit compared to Okiti cultivators. It is also discovered that although the two systems are faced with similar constraints of environmental and inaccessibility to input problems, there exist some fundamental differences based on scale and production efficiency. Some solutions proffered to the identified problem include the recognition and integration of urban farmers into urban land use structure so that they can form cooperatives through which they can access productive inputs.

Keywords: Resource-use, Urban vegetable farming, Okiti, Fadama, Ilorin

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1. Introduction

The global concentration of urban population is ever-increasing due to migration from rural areas and natural increase among urban residents. In fact, for the first time, population projection classified half the world's population as living in urban areas (Simon, 2007). To sustain the urban processes, people will require food. In many developing countries of Asia and Africa however, structural and policy failure provoke widespread poverty which has undermined the capacity of the people to earn tangible income enough to access adequate nutrition (Obadan, 2002). This is particularly true in the case of Nigeria with an estimated 81.2 % of poor people (Ijaiya, 2008) suffering from various manifestations of poverty including declining quantity and quality of food and vegetables. Worse still, owing to several socioeconomic and environmental factors, the rain-dependent rural system of agriculture can not continuously provide requisite food and vegetables all year round. The above constraints coupled with the serious need to ensure food sufficiency and earn extra income by low-income urban peasants make agricultural activities in the urban space a necessity. This is usually carried out on vacant land, uncompleted buildings and strips of land along major and minor rivers that traverses urban settlement. It can be either wet/ dry season or all season farming.

Farming practices in closely settled peri-urban zone have attracted some research attentions. Mortimore (1993) conducted a study of Kano close settled zone between 1964 and 1986. Guyer (1997) also carried out an extensive work on Idere, a small Yoruba town about 60 km from Ibadan. Friedberg (2001)'s work focused on two communities, Sakaby and Dogona that are peri-urban villages in Burkina Faso. These and several others reiterated the importance of farming and gardening to urban markets, urban population and to farmers on these peri-urban zones. However, the varied production in farming activities (most especially, vegetable) in Ilorin has not been given adequate attention despite the enormous contribution of this sub-sector to both the diet and the socioeconomic development of urban population. This apathy until recently is obvious both in academic and policy formulation. Indeed, Friedberg (2001) has challenged this political-ecological constructs that view natural resources for agriculture as only rural as an evident "rural-bias" (Friedberg, 2001:349). It is against this backdrop that this study examines the differences in Pattern and volume of production among vegetable cultivators in Ilorin, Kwara state.

The objectives set out in this study are to: (1) analyze the factors that determines the efficiency of resource use by farmers, (2) evaluate the pattern of productivity among farmers, and, (3) to examine the problems of urban vegetable farming towards suggesting recommendations that will assist urban farmers and agencies saddled with urban resource management. A resource is a naturally exploitable material that a society perceives as being useful to its economic and material well-being (Getis et al., 1998). Which can be renewable or non renewable. To Adedayo (2006), resources are those material and social tangible and intangible assets required by human societies for survival, growth and development. He however broadened this concept to capture ecological and non-ecological resources.

The availability of natural resources according to Getis et al. (1998) is a function of the physical characteristics of the resources themselves and human economic and technological advancements. Types of resources adopted in this study include natural and man-made. For agricultural practices of any sort, fertile soil and water are of unrivalled importance, and, also in modern agriculture, farm inputs like fertilizers and

herbicides. In urban environments where vegetable production is practiced, constant supply of water is required, which is usually done through irrigation.

Irrigation involves the conveyance of water from a source of supply to an area of land where it is needed for the cultivation of crops (Jackson and Jackson, 1996). Irrigation is important for sustenance of agricultural practices across many cultures. Irrigation farming is in fact one of the most productive forms of agriculture (Crump, 1991; Cunningham and Saigo 1995). According to Crump, the world's irrigated cropland already produce 40 percent of total global crop yield and it was expected that as at 2000 A.D, 400 million hectares of land would have been irrigated world wide (Crump, 1991:148). There is no way urban agriculture (particularly vegetable farming) could have been sustainable without irrigation. Urban agriculture as conceptualized by Mougeot (1994) is "an industry located within (intra-urban) or on the fringe (peri-urban) of town, a city or a metropolis, which grows and raises, processes and distributes a diversity of crop and animal food and non food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area. Vegetable production is a component of urban agriculture that is intensive in land use and this is the focus of this paper".

Urban agriculture as conceptualized in this study therefore, is farming activities practiced in open spaces in cities and towns either in wet or dry (or both season) to supply food to urban residents and income for the crop growers. Urban vegetable farming is done in both wet and dry seasons with each season requiring different resources. Understanding the seasonal variation is required for sustaining urban agriculture in the study area.

2. The study area

Ilorin, the study area lies approximately on latitudes 8° 30' N and 8° 32' N and longitudes 4° 35' and 4° 37' E. It is the capital of Kwara State and the most urbanized centre of the state (Oyebanji, 2000). Ilorin metropolis comprises three local government areas (LGAs): Ilorin east, Ilorin west and Ilorin south LGAs with about twenty political wards. The 2006 population census gave a population figure of 777,667 people (Federal Republic of Nigeria, 2007). The physical characteristics of Ilorin make urban vegetable farming a viable enterprise. For instance the relief is characterized by both high and low grounds ranging between 250m to 400m above sea level. While the highest ground is Sobi Hill located northward, the lowest grounds are along the river valleys of Asa and Oyun. The area is underlain by crystalline rocks of the Precambrian age. The rock types include granite, biotite, gneiss, schist etc resulting in ferruginous tropical soils

The vegetation of Ilorin comprises the southern guinea savanna and the derived savanna. The rainy season usually starts around April lasting till September while the dry season is usually between November and March, with a mean annual rainfall of 1250 mm. The convectional type of rainfall usually lasts for about 25-40 minutes and fall for approximately 60% during the night-time and 40% at day time. The annual mean temperature is 26.8% (Oyegun, undated). The drainage pattern principally is made up of river Asa, the major one that traverses the built up area and river Oyun, the largest but outside the densely settled part of the

metropolis. Other smaller river includes Aluko, Okun, Amule, Atikeke, Agba and Alalubosa. It is along the banks of these rivers that both dry and all-season urban vegetable farming is carried out by the two categories of vegetable cultivators.

3. Methodology of study

Data for this study were primarily sourced using a combination of focus group discussion, (FGD) non-participant observation and questionnaire survey. The FGDs were conducted based on the scale of production. There are two major scales: Okiti and Fadama. Consequently, separate Focus Group Discussions were conducted for “Okiti” and “Fadama” vegetables farmers.

To select respondents for the survey, stratified sampling technique was adopted. A pre survey reconnaissance was conducted to ascertain the areas of dry-season and all-season productions. This encompassed taking the population of farmers in each area. Initially 85 respondents were selected but by the end of the survey, 15 farmers had abandoned their farm plots. Thus, this study comprises 70 urban vegetable farmers from various points and areas in Ilorin. To select respondents, the list of the farmers compiled based on their location of farm plots in each designated areas were consulted and every fourth farmer was systematically selected for the survey. In whole, 55 respondents were selected from “Fadama” while 30 respondents were from Okiti. However due to some factors (reported later in the body of the work) 15 farmers could not complete the survey. In the end 40 were analyzed from fadama while 30 respondents were investigated from Okiti. Data were collected four times during the survey. Data collected were analyzed in percentile and averages. Regression analysis was employed to establish empirical relationship between the factors that affect resource use and productivity in urban agriculture.

4. Results and discussion

This study reports an analysis of the two groups of urban vegetable farmers in Ilorin. These are the small-scale groups designated as OKITI farmers (adopting the local Yoruba name which vegetable gardens at river sides are known) while the medium-scale groups are referred to as FADAMA farmers (adopting the general Hausa name for irrigated farming carried out on hydromorphic soils or lands close to river beds). Results and discussion are presented under spatial (locational) and demographic attributes of the vegetable farmers; differences in structure and productivity of the two groups; and factors that determine resource-use and differences in production among the two groups of urban vegetable farmers. Throughout the work, urban farmers and urban vegetable gardeners are used interchangeably and they refer to the same.

4.1. Locational characteristics of farmers

The location of urban vegetable farmers is determined by the availability of farm plots close to river banks on which dry season farming is dependent. Due to socio economic inaccessibility and land ownership pattern,

not all areas bordering river banks are used for urban farming purposes. Thus eight areas with a relatively stable pattern of vegetable gardening were selected. This is presented vis a vis the rivers on which it is done.

Table 1. Locational attributes of vegetable farmers in Ilorin

Scale	Location	River channels	No of respondents
Medium-scale (FADAMA)	Amilegbe	Asa	10
	Unity	Asa	10
	Aduralere- Juma	Asa	10
	Oyun Area	Oyun	10
Small-scale (OKITI)	Kuntu/Isale-Aluko	Aluko	10
	Okelele	Abata	5
	Saw mill	Odo-okun	8
	Odota	Odota	7

Source: Authors' field survey

As revealed in Table 1, fadama farmers were selected from Amilegbe, Unity, Aduralere-Juma and Oyun areas. The Okiti farmers were selected from Isale-Aluko, Agbo-oba, Saw mill and Alapata. The river channels occupied by the fadama farmers are longer and wider than those occupied by the Okiti farmers, and this among other factors account for the concentration of more farmers along these river banks. For instance, Asa is the major river that drains Ilorin while other rivers are its tributaries and distributaries.

4.2. Social and demographic characteristics of urban vegetable farmers

Urban farmers are mostly adults. It is only in the "Fadama" that two men less than twenty years were sampled. Farmers of above sixty-one years are also few. Generally, it can be concluded that urban farmers are human resources in the active, productive age. As revealed by the gender categories in Table 2(b). Male are generally more. However, among the "Okiti" farmers, female percentage is 26.7% which is considerably higher than 7.5% in the "Fadama". Table 2(c) displays the tribal composition. By comparison Yoruba are more in aggregate percentage, followed by Hausa migrant farmers.

However, in the "Fadama" group, Hausa are more than the settled Yorubas by 32.5%. The Ebiras are few in both categories with a total of 6 from the 70 respondents. Table 2(d) presents the highest educational

qualification of urban vegetable farmers. There were a higher percentage of “Okiti” farmers without formal education, 73.3% of these farmers compared with 7.5% from “fadama” categories. 25 or 62.5% of the ‘fadama’ farmers have acquired primary education. Also ‘fadama’ farmers who have acquired secondary education are also higher and the only 3 urban farmers with tertiary education (precisely, ordinary national diploma) are “fadama” farmers. Due to impact of education in human and social capital, one can be tempted to conclude that “fadama” farmers are more “progressive” than “Okiti” farmers. Subsequent analysis of productivity and resource-use will however, throw more light on this assumption.

Table 2(a). Age of Urban Vegetables Farmers

Categories (Years)	OKITI		FADAMA	
	Freq.	%	Freq.	%
1-20	0	0	2	7.5
21-40	18	60	24	60
41-60	8	26.7	11	27.5
Above 61	4	13.3	2	5
Total	30	100	40	100

Table 2(b). Gender categories of respondents

Categories	OKITI		FADAMA	
	Freq.	%	Freq.	%
Male	4	13.3	37	92.5
Female	26	86.7	3	7.5
Total	30	100	40	100

Table 2(c). Tribal characteristics of urban vegetable farmers

Categories	OKITI		FADAMA	
	Freq.	%	Freq.	%
Hausa	0	0	25	62.5
Ebira	0	0	3	7.5
Yoruba	30	100	12	30
Total	30	100	40	100

Table 2(d). Educational characteristics of urban vegetable farmers

Categories	OKITI		FADAMA	
	Freq.	%	Freq.	%
No formal education	28	93.3	3	7.5
Primary education	2	6.7	25	62.5
Secondary education	0	00	9	22.5
Tertiary education	0	0	3	7.5
Total	30	100	40	100

Source: Authors' field survey

4.3. Resource-use and production differential among urban vegetable cultivators in Ilorin

To evaluate the factors that determine efficient use of resources in urban farming, a multiple regression analysis was used. The formula for regression analysis is $Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n + e$. For this equation, the variables are: Y= Size of farmland.

x_1 = Harvest from farmland (number of vegetable baskets harvest per month)

x_2 = Number of years in farming

x_3 = Utilization of modern inputs (fertilizer, pesticides etc)

x_4 = Types and intensity of environmental disturbance (soil infertility, polluted/inadequate water ,attack by pests etc).

x_5 = Varieties of vegetables/crops planted

x_6 = Types of labour used

x_7 = Utilization of pump-machine.

The analysis is presented in Table 3(a).

Table 3(a). Stepwise regression table for resource-use in urban vegetable farming

	B	Standard Coefficient	T	Sig.
Constant	5.931	-		000
Utilization of pump machine	-2.091	-.473	5.447	000
Harvest from farm	1.121E.02	.262	3.185	002
Utilization of modern inputs	-.741	-.152	2.946	004
Type of labour used	.607	.166	2.843	006

Source: Computer output of field survey

The equation for the analysis is $5.939 - 2.091x_3 + 1.121E-62x_4 - .741x_2 + .607x_1 + .951$.

After the analysis four variables entered while the remaining three were excluded at 5% probability level. The variables that entered into the equations were utilization of pump-machine, harvest from farm, utilization of modern inputs, and, type of labour used. All these variables jointly account for R value of 0.946 with an R square of 0.896 in the variance associated with the size of farm as a measure of resource-use. The interpretation of this is that given a unit reduction in the utilization of pump-machine, a negative effect in resource use is observed. Also a reduction in the level of modern input (fertilizers, insecticide, herbicides) Reduce the efficiency of resource-use. However, there is an observed increase in efficiency of land-use as the harvest increases. Type of labour used also has a positive correlation of 0.607 in the variance observed for resource-use. Given the moderate t ratio of the predictors and the significant level between 0.002-0.006, it appears the predictors are very stable and have invaluable impact on the dependent variable. Among all the "Okiti" and few "Fadama" farmers, pump-machine is not used. This means inefficiency in land and water resource compared to if pump-machines were used. As observed among the "Okiti" farmers, manual wetting with various containers wasted a lot of water, so only the vegetables within 15-20 meters to the river banks were efficiently watered. Apart from that, wetting which is done only in the morning and evening take disproportionate higher labour time. This is also applicable to the "fadama" farmers

Utilization of modern input is also another factor of significance. Due to increased cost and unavailability, most of the "Okiti" farmers hardly make use of fertilizer and other chemicals that could enhance the efficient use of land. Also some "Fadama" farmers always abandon their vegetable plots when the vegetables begin to wilt and turn yellowish-brown due to inaccessibility to chemical fertilizer. This indicates waste of labour, time, energy, and resources. Unfortunately, animal dung is also not easily obtainable although few of them use poultry and domestic wastes and ash as substitutes for chemical fertilizer.

Harvest from farm plots, measured by baskets of vegetable harvested also impacted on resource-use. Generally, Amaranthus, Okro, Tussa Jute (*Ewedu* or *Ayoyo*) leaves and Sesame (*Eeku* or *Karkashe*) leaves are common to all farmers. Among the "fadama" farmers, maize, lettuce, carrots, tomatoes and garden eggs are added to the first three. It appears that with increase in harvest, there is a maximization of resource-use because of the profit associated with the sale of the vegetables and crops. With regard to type of labour used the combination of family and hired labour for most of the farm operations have positive influence on resource-use. For most of the "Okiti" farmers, the absence of family labour would have put extra cost on them. Even, the "Fadama" farmers, due to average size of less than 2.5 acres can not solely rely on family labour because of competition with weeds and attack from pests that will affect the vegetables. From indications, resources needed for urban vegetable farming are both natural and man-made. The natural resources are land and water while human resources consist of physical; and technological resources. The requisite human resources are the labour and entrepreneurial abilities while the technological resources include pump-machine, farm inputs and improved seedlings. The regression analysis presented above captured the factors that affect yield. However, the productivity of the two urban farming types (Okiti and fadama) is concealed. In order to bring out this spatial concealment, the numbers of baskets of some vegetable were analyzed. This was used as the surrogate of productivity of both "fadama" and "Okiti" farmers. These values were generated by finding the mean of total baskets harvested per month. The formula

is: $\sum \frac{x}{n}$, where x is the aggregate baskets harvested per month while n is the number of farmers in each category. Table 3(b) presents the analysis and presentation of Spinach.

Table 3(b). Production differentials in urban vegetable farming

MONTHS	SPINACH		OKRO		TUSSA JUTE		SESAME		MAIZE (cobs)	
	FDM	OKT	FDM	OKT	FDM	OKT	FDM	OKT	FDM	OKT
OCT	21	-	15	-	3	-	3	-	-	-
NOV	60	-	27	-	7	-	4	-	-	-
DEC	85	135	58	-	12	9	5	9	-	-
JAN	102	370	61	-	14	14	7	14	-	-
FEB	115	600	65	45	21	26	10	21	-	1,200
MAR	136	950	79	88	24	32	13	35	-	1,800
APR	100	870	50	65	22	28	15	27	-	2,200
MAY	86	600	46	58	19	12	10	9	-	1,05
JUN	62	250	45	45	18	11	10	6	-	82
JUL	40	101	39	-	10	-	7	-	-	-
AUG	33	-	32	-	4	-	5	-	-	-
SEP	28	-	18	-	5	-	4	-	-	-

Source: Authors' field survey

N.B Values are based on harvest as supplied by farmers for 2008. A basket used as standard for the harvest has a circumference of 63 inches, base of 50 inches, height of 15 inches and a gross weight of 55 kilogram's when full

A closer scrutiny of the productivity (Table 3b) reveals the differences in output, hence, the likelihood of profits of the two groups. The Fadama farmers invest more and consequently reap more profits. Compared to the Okiti, the Fadama farmers appear successful. Infact, at the outset of the rainy season, the seasonal migrant farmers usually return home richer. Many of them usually buy motorcycles; a few of them purchase cars while a lot of them return to invest the proceeds on farming at their rural origins. Contrarily, the Okiti farmers, most of who are women, till the soil year round and could barely satisfy their basic needs.

Analysis of harvest of Amaranthus and other vegetables are lower than that of "fadama". This apparently is because "Okiti" farmers produce all year round but on a small-scale while the "fadama" farmers produce vegetables only during the dry season but on a fairly larger scale. However, there is a general decrease in production for the two groups as the rain increases.

5. Constraints to urban vegetable farming in Ilorin

Having analyzed resource-use and production differentials among urban vegetable farmers, it will be instructive to state some challenges faced by urban vegetable farming towards recommending workable

solutions. A major bottleneck is unavailability of inputs, particularly, fertilizer. The official sale of fertilizer by government is usually done during the rainy season but not in the dry season when urban vegetable farming is at its peak. This means the urban vegetable farmers will not have access to this requisite input. Since most of these farmers are low income earners and can not afford to stockpile fertilizer against the dry season, they must rely on fertilizer middlemen or their agents who sometimes sell at cut-throat prices. Pump-machine is a technological resource without which irrigation for any meaningful productivity can be carried out. And for these Ilorin urban vegetable farmers, it is quite formidable.

Most of the farmers (especially the "Okiti") were without pump-machine. This deficiency has a negative impact on their productivity and resource-use potentials. Even some "fadama" farmers who hire pump-machine usually fuel the machine and pay between ₦800-₦1000.00 to water an acre of vegetable plot. Environmental constraints are another group of vexing problems. For instance pollution of Asa River as a result of improper disposal of industrial, commercial and domestic wastes undermines the quality and quantity of water used in irrigating the fields. This could have grave health implications for the consumers of these vegetables. Goat and sheep also constitute serious environmental nuisance to the farmers. These livestock not only ravage the vegetables thereby reducing the quality and quantity of harvests, they distract farmer's attention and valuable labour time is spent chasing the animals off the fields.

Government's neglect is another problem. Most of the urban vegetable farmers complained of policy makers's indifference to their plights. The "Okiti" farmers claimed that no government extension agent have ever visited them; although the "fadama" farmers claimed that they have been visited on a few occasions by officials of ministry of agriculture. On the last occasion, they were allocated some bags of Christalizer super fertilizer which had to be mixed with ten kilogrammes of urea before application to the soil. The purpose was to experiment the potential of these christalizer super fertilizer. Due to ignorance or perhaps misconception, the farmers applied the christalizer directly to their plants. There was no obvious change and the farmers abandoned the remaining bags. In another twist, the few men women Okiti farmers around Kuntu and Isale-Aluko areas even ventured to form political support groups to win government's favour, after the elections they were abandoned.

To surmount these problems the following recommendations are proffered. A major step will be recognition of the urban vegetable farming enterprise in urban land-use planning and policies. This will help the current apathy facing this practice. Afterwards, urban farmers can be encouraged to form cooperative societies to suit their peculiar needs. Such cooperatives can be formed along, scale, tribal, spatial proximity or any other appropriate criteria. This should also take cognizance of the migrant Hausa farmers who constitute the largest of the "fadama" farmers. Once these cooperatives are formed, pump-machines, fertilizers and other incentives can be conveniently sourced or channeled to these urban farmers. Perhaps, the farmers has a matter of necessity are to be educated on pollution reduction measures and efficiency in resource utilization to enhance the resilience of urban agriculture for sustainable urban environment development. Most importantly, the peculiarity of urban agriculture has to be appreciated. It is the major source of dry season fresh maiz (corns) and vegetables for the urban population. As such, fertilizers, water pumps and other resource input should be adequately provided. This will complement rain-dependent rural production and enhance food security of the nation.

6. Summary and conclusion

This paper addresses vegetable gardening, an important component of urban agriculture in Ilorin, Kwara state Nigeria. Data were obtained through questionnaire survey, FGD and non participant observation methods. Seventy urban vegetable farmers representative of the two major groups; Okiti and Fadama, were involved. Analysis of data was through trend description, percentiles and averages. Multiple regression analysis was employed to isolate the factors that contribute to efficient resource-use and productivity. Factors that determine the efficient use of resources were utilization of pump machine, harvest from vegetable plots, utilization of modern inputs, and types of labour used. All these variables jointly account for 89.6% of the variance associated with the size of vegetable plots.

Generally speaking, the Okiti system comprises mostly (indigenous Yoruba) women who, due to several factors operate on a small-scale while the Fadama system is a medium-scale enterprise dominated by male (migrant Hausa) farmers. Based on the present study, Fadama cultivators have high harvest than Okiti farmers. The proffered solutions if implemented will go a long way in ensuring sustainable provision of food for the urban population while also alleviating poverty particularly among the Okiti women farmers.

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