Productivity and profitability of citrus nursery operation in Abia State, Nigeria

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ABSTRACT

The aim of this study was to provide insight on productivity and profitability of citrus nursery operation in Abia State, Nigeria. Data such as socio-economic features of the nursery operators, quantities and prices of inputs and outputs of their operation were obtained through multi-stage sampling techniques from 54 citrus nursery operators. Costs and returns analysis, productivity models and multiple regression analysis were used to analyze the data from the survey. It was shown that majority of the operators were male with average age of 47.98years, year of education of 11.35years and household size of 5 persons. The variable cost of nursery operation was 92.84% of the total cost (₦637,117.56) while the fixed cost was 7.16% of the total cost. The revenue from the sales of citrus seedlings was ₦1,140,856.69 therefore the gross and net margin of the ventures were₦503,739.13 and ₦454,580.08 respectively. In addition, rate of return on investment was 66.24%. The total factor cost and value of citrus output was ₦686,276.63 and ₦1,140,856.69 respectively hence the productivity index of citrus nursery production was 1.66. Results of the regression indicated that costs of labor and planting materials had negative significant while household size, years of experience and access to credit had positive significant effects on the profitability. In conclusion, Citrus nursery operation is dominated by middle - aged, educated, experience with moderate household size. It has good return on investment (ROI) with productivity above unity but high costs of labor and planting materials reduces profitability while household size, years of experience and access to credit enhanced profitability. It was recommended that youth education about gains of citrus nursery production business should be advocated considering its viability and profitability to reduce unemployment and government should prioritized extension of necessary assistance such as inputs subsidy and access to credit to the nursery operators.

INTRODUCTION

After its introduction to Nigeria in the colonial era, *Citrus Spp* has become a major crop planted in the country especially in areas that lie within latitude $6^oN - 9^oN$. Nigeria is ranked as the 9th World best producer with annual production stand at 105 million metric tons (Ortese *et. al.,* 2012). *Citrus Spp* is the most widely grown fruits in the country receiving top research priority at the National Horticultural Research Institute for over two decades (Olife *et. al.,* 2015).

Williams-Woodward (2005) defined nursery as a place where seedlings are raised temporarily under intensive management before it was transplanted into the field open. It was also explained to be a branch of science that deals that covers growing of flowers (floriculture), fruits and vegetables (horticulture) and forest tress (forestry). It is noteworthy that tree crops can be sown direct into the field; however, raising seedlings in the nursery provides a vital role in the establishment of plantation and/or renewed natural forest. Therefore, contribution of nursery industry to the forestry, vegetable, fruit, landscape, cut-flowers and horticulture in provision of billions of seedlings plants every year cannot be over-emphasized.

From literature, profitability and productivity of agricultural farms are two seemingly related but distinct concepts. Ismam *et. al.,* (2011) inferred that a more productive business typically translated to be more profitable, and a faster in productivity means faster growth in profitability. However, such relationship between productivity and profitability is non-linear and it is cumbersome to decompose changes in profitability to changes in productivity and efficiency. In all, the viability of a farm enterprise is often measured through concepts of productivity and profitability by providing insights into the different aspects of farm performance (Ha *et. al.,* 2001).

The viability of a farm enterprise, citrus nursery operation inclusive, is often influenced by certain factors such as aged operator, poor land tenure system, insufficient years of farming experience and lack of access to credit tend to have negative effects on productivity and profitability of such enterprise (Obasi, *et. al.* 2008). In addition to this, problems of production inefficiency could be attributed to low input technologies, lack of knowledge of high input technologies, poor farm management skills, poor extension services, unavailability and high cost of inputs (Obasi, 2007).

The plant nursery subsector is seriously bedevilled with poor access to a range of important inputs such as investment capital, technical support, market information and links that are essential for enhanced productivity and profitability. This is because the operators are not always considered as farmers when loans are being granted thereby hindering their production and further development. Most nursery owners commit little or no financial resources to the operation because they take it as temporary and part – time job to source additional income to the family, Sodeeq *et. al.* (*2016*) inferred that participants in the nursery operations have other economic engagement to derive major sources of their income than selling of seedlings. In furthermore to this, it is equally disturbing that in-spite of human and material resources devoted to Nigerian agricultural sector, productive efficiency of most farmers has not gone above 60% with consequential effects on the profitability of the sector. This is in no exception to the productivity of citrus nursery operators (Obasi, Henri-Ukoha, Ukewuihe and Chidiebere-Mark, (2008). Previous studies on efficiency of resource utilization and productivity conducted by Moses & Adebayo, (2006) and Oluwatosin, (2006), both observed wide gaps in the levels of productivity of most farmers in comparison with the optimum level which is a clear indication that there is existence of ample opportunities for the farmers to increase their productivity and profitability provided that necessary conditions and inputs are accessible in a timely manner.

A number of available literatures had only dealt with studies of nursery establishment with primary focus on its environmental protection benefits, conservation and sustainability of landscaping and urban forestry around the residential areas (Clamp, 1995 and Joshi, 1999; Olife *et. al.,* 2015; Ortese *et. al.,* 2012; Sodeeq, *et. al.,* 2016). All these studies failed to provide necessary awareness and sensitization for people in seeing the prospects and hidden opportunities in the enterprise. Such revelation is necessary to relieve the pressure on the government to provide jobs

to the teeming unemployed individuals through awareness creation on how people could become self-employed in the enterprise.

National Bureau of Statistics (NBS), (2011) had earlier noticed with dismay the increasing trend of disinterest scenario in agriculture among emerging younger generation whose preference is white collar jobs in the urban areas with resultant effects on increasing rural – urban migration, urban slums, high unemployment rate and worrisome high poverty levels in the urban areas. This is because most migrated youths remained unemployed in the urban labor market and were not even interest in taking up jobs in the agricultural sector. It is obvious that this ugly situation could be reverted provided that economic potentials of engaging in the agricultural enterprises especially private nursery operation could be revealed to the teeming youth and they were equally encouraged to embark upon the ventures in the cities as illustrated by Muhammad-Lawal *et. al,* 2012. Such information became pertinent which many urban residents can use as a useful guide for their economic empowerment.

More so, the operations of private commercial nurseries have existed for a while in Nigeria and their economic impacts on the people are expected to be highlighted in numerous literatures. This becomes pertinent amidst of prevailing unemployment situation and the need to improve the environmental outlook of the study area. More importantly, in-depth study of the productivity and profitability of citrus nursery operation and its influencing factors is worthwhile for help the policymakers in closing the gap in profit making decisions that have been guided by profitability and productivity only thereby formulating policies that are in tandem with the empirical knowledge.

Acknowledging the fact that no previous study has dwelled on *Citrus Spp* nursery operation, this study serves as important empirical literature for researchers whose interest is to dwell in these areas where no existing researches have been carried out earlier. In addition, it serves as a guiding document for participants in the horticultural and forestry subsector in taking a well-informed decision while planning on investments in plant nursery enterprise through insight it provided into economics of citrus nursery production for increased awareness and knowledge for people about the hidden opportunities available in the citrus nursery operation in Nigeria.

OBJECTIVES OF THE STUDY

The general objective is to analyse the Productivity and Profitability of Citrus Nursery Operation in Abia State, Nigeria. The specific objectives are to:

i.   describe the socio – economic features of small - scale citrus nursery operators in the study area;
ii. estimate the cost and return of small-scale citrus nursery production;
iii. estimate the productivity index of small-scale citrus nursery production and
iv. isolate the factors influencing profitability of small-scale citrus nursery production.

Review of Literature on profitability of nursery operation in Nigeria

Several literatures that understudy the economics of plant nursery operation highlighted its profitability. According to Mailuma *et al.* (2006), the business of tree seedling production in nurseries was profitable as the revenue on sales was ₦277,108 on the nursery plot size of 0.2ha. The net margin realised was ₦277,108 per annum. Ornament, shade, fruit and forest seedlings constituted 25%, 21%, 18% and 12% respectively of the retuned from sales. They concluded that the enterprise is profitable and has significant prospects of yielding economic returns to the operators and also provide much needed environmental benefits. Fakayode *et. al.* (2008) showed that the ornamental plants nursery business operators incurred ₦26,264.7 per hectare as average total variable cost and labor is shown to constitute the bulk of variable costs indicating that the operation is labor intensive and requires high amount to procure labor. The return from sales was ₦210,871.3 and margin after deduction of variable costs was ₦184,606.6. This signified that on the enterprise is viable. Similar studies such as Tee and Labo (2010) indicated that that the rate of return on ornamental/forest nursery enterprises in Makurdi, Benue State was between ₦36,250 and ₦900,000 which

indicated that the investment (RORI) was profitable which portrayed good economic returns. Emokaro *et. al.* (2013) indicated that the estimated variable cost on production incurred per hectare was ₦255,923.40 and gross revenue from sales was ₦383,756.80/ha. It was therefore indicated that gross margin of ₦127, 833.40/ha was obtained and return to operators' labor and management was estimated to be ₦79,370.20/ ha. Fakayode *et. al.* (2008) equally buttressed the fact that labor constituted the bulk of variable cost which is indicative of the fact that ornamental plants production is labor intensive. Larinde and Santhus (2014) showed a similar result that the total cost of establishing a small-scale nursery was around ₦133, 850 which excluded cost of water supply and labor and profit of ₦123,000 per annum was obtained which gave rate of return of 355.56%. Muhammad-Lawal *et. al.* (2014) in their own study estimated that variable costs of production incurred was ₦93, 291.9 and they obtained average gross revenue of ₦312,887.2. This gave gross margin of ₦219,595.4 and it is conclusive that returns to farmers labor and management was ₦174,974.7/ha, this implies that floricultural plant production is profitable in the study area. Olaleye *et. al.* (2015) as well showed that value of the sales of horticultural gardens was ₦40,005,000 while annual expenditure bill was ₦15,000,000 recorded, implying that gross income of ₦44, 335,000, net profit of ₦29,455,000:00 and return on investment of 95.34%.

In establishing the factors determining the profitability of nursery practices in Nigeria, a number of authors had done substantiate work in this regard. Enesi *et. al.* (2016) showed that experience, gender, religion, age, marital status, occupational status, ethnicity and educational status were positive significant factors influencing the value of receipt from private nursery enterprise. However, the farm size was significant but has a negative relationship with receipt from this enterprise. They attributed this to small land requirement for nursery operation. Though, land is important for nursery operation but the size of the land may not necessarily improve receipt from nursery. Fakayode *et. al.* (2008) indicated that manure and labor were statistically significant at 5 per cent level implying that the two variables have significant influence on receipts from ornamental plants nursery business but fertilizer and type of education were statistically insignificant at 5 per cent level implying that the two variables do not impact significantly on the receipts from the nursery business. The insignificance of the fertilizer variable may be because the ornamental plants nursery operators usually apply small, less than recommended amount of fertilizer to their plants. In the analysis of Ornamental plant production in Edo State, Emokaro (2014) showed that cost of irrigation, agro-chemicals and planting materials were found to be positive and significant, demonstrating that they had positive effects on profit accruing from ornamental plants production in the study area.

MATERIALS AND METHODS

Study area

The Study was conducted in Abia State, Nigeria. The State was carved out of Imo State on 27th August, 1991 located in the South East Agro-ecological Zone. The state lies within the Longitudes 7º 00′ and 8º 00′ East and Latitudes 4º 45′ and 6º 17′ North occupying about 6,320Km². Geographically, it is bounded to the North and North-East by Anambra, Enugu, and Ebonyi State, West by Imo State, East and South-East by Cross Rivers and Akw-Ibom States and South by Rivers State. In the census of 2006, the population of Abia State was 2,845,380 people with population density of 450 persons/Km². The State has seventeen (17) LGAs sub-divided into 3 agricultural zones namely Abia Central (Umuahia), Abia North (Ohafia) and Abia South (Aba). The State has two distinct seasons of the dry season, which between November to March and the wet season between April to October (NPC, 2006) and the annual rainfall ranges between climax at 1700 mm with daily temperature varying between 22.4ºC and 31.90ºC. The location of the State in the tropical rainforest favored the luxuriant growth of trees particularly abundance production of citrus species.

SAMPLING TECHNIQUE

This study involved the nursery operators of *Citrus Spp* in the Abia Sate, Nigeria. It employed the use multi-stage sampling technique to the select respondents for the study. First stage involved the purposive selection of one Local Government Area (LGAs) from each of the three Agricultural zones in Abia State and the selected

LGAs are IsialaNgwa South LGA in Abia Central; Arochukwu LGA in Abia North and Obi Ngwa LGA in Abia South Agricultural zones. These LGAs were purposively selected because there was large presence of nursery farm operations in the areas. Second stage also used purposive selection of one major urban city in each of the selected LGAs in Abia State due to the fact that plant nursery businesses were usually concentrated in urban areas. A list of all small scale nursery operators was collected from the officials of the association of nursery operators in Abia State to form sampling frame for the study and the benchmark used to select a nursery operators was that the operator should possess at between less than or equal to 5ha of nursery plot. Third stage involved proportionate to size sampling to select a total of 60 citrus nursery operators in the State. This sampling was paramount because of the uneven distribution of nursery operators in the three agricultural zones of the State. According to Nwosu *et. al.*, (2017), the formula for proportionate to size is given as:

$n_i = N_i/ N * X$

where: n_i is sample size of the citrus nursery operators in each selected LGA; N_i is sampling frame of the citrus nursery operators in each selected LGA; N is the pooled sampling frame for the study and X is the total number of respondents intended to be surveyed in the study i.e 60 respondents. However, three respondents failed to provide consistent information hence they were discarded before data analysis. The breakdown of the sampling procedure was done as below in Table 1:

Table 1: Breakdown of the selected small scale citrus nursery operators in the study area

Zone	LGA	Selected Cities	Sample frame	Sample size
Abia Central	IsialaNgwa South	Omoba	35	24
Abia North	Arochukwu	Eziama	25	17
Abia South	Obi Ngwa	Mgboko	27	19
			87	60

METHOD OF DATA COLLECTION

Data collected for this study were obtained from primary sources, which involved well-structured questionnaire and interview schedule of the nursery operators consisting of information on the socio-economic characteristics of the nursery operators such as age, sex, educational status, household size and years of production experience. Data were also collected on their production activities in terms of categories of seedlings produced in the nurseries, quantity of inputs used, quantity of output produced, their prices and costs of labor, other variable inputs and depreciation of fixed assets among others.

Validity and reliability of data collection instrument

Validity of an questionnaire was done using content and face validity by experts agricultural economists to check if the stated questions could provide information to achieve the objectives of the study. In addition, the reliability of the data collection instruments was achieved by subjecting thepilot questionnaire administered on two different occassions to Guthman Split-Half Coefficient of unequal length to measure the internal consistency and the relability score of 0.988 obtained showedthat the data collecton instrument were reliable.

METHOD OF DATA ANALYSIS

Data collected were analyzed using descriptive statistics such as mean, frequency distribution and percentages, costs and returns analysis, productivity index and ordinary least square multiple regression analysis to achieve the

objectives of the study. The explanation of the analytical techniques used to achieve the objectives of the study is as follows:

i. Costs and return Analysis of small scale citrus nursery production

According to Enete and Okon, (2009), costs and return of an enterprise is specified as:

$$TR = P_q Q \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 1$$
$$TVC = \sum P_x X_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 2$$
$$TFC = \sum Z_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 3$$
$$TC = \sum P_x X_i + \sum Z_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 4$$
$$GM = P_q Q - \sum P_i X_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 5$$
$$\pi = GM - \sum Z_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 6$$

The profitability ratio of the small – scale citrus nursery operation was estimated as Return on Investment which defined the ratio of profit or loss on an investment relative to the amount of investment (Abdulhamid, 2016).

$$ROI = \frac{\pi}{TC} \; X \; 100\% \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 7$$

Where, $\pi =$ net farm income
ROI = Return on Investment (%)
P_q = unit price of citrus seedling sold in the market (₦/Kg)
TR = Total return of citrus seedlings (₦)
TVC = Total Variable Cost which comprised of expenses (direct and imputed) on seed/seedling, weeding, fertilizer, agrochemicals and labor, and other expenses excluding the non-paid family labor.
TFC = Total Fixed Cost in ₦
P_x = unit price of farm variable inputs used in the citrus nursery production in ₦
X_i= Quantity of farm variable inputs used (kg).
Z_i= Sum total of the deprecation value of the fixed assets (₦)
Q = Quantity of citrus seedling sold (Kg).

ii. Productivity Index of small-scale citrus nursery production

This was achieved using Total factor productivity (TFP) estimate which is the ratio of Value of Total Output produced to Value of Total Inputs used in the nursery operation (Olayide & Heady, 1980).

$$TFP = \left(\frac{TVP}{TC}\right) \text{--} \quad 9$$
$$but \; TVP = P_y * Q \text{--} \quad 10$$
$$TC = TVC + TFC \text{--} \quad 11$$

Where; TFP = Total factor productivity,
TVP = Total Value Product in (₦),
TC = Total Cost (₦),
TVC = Total variable cost (₦),
TFC = Total Fixed Cost (₦),
P_y= Unit Price of Output (₦), and
Q = Total Output of citrus nursery operator (kg).

iii. Factors influencing the profitability of small-scale citrus nursery production

Ordinary Least Square Regression expressed in four functional forms of linear, exponential, semi-log and double-log were tried and the model with best fit was taken as the lead equation. These four functional forms of the profitability of small-scale citrus nursery production in the area model were explicitly expressed as:

Linear: $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_9X_9 + \varepsilon$ ……………   12
Exponential: $LogY = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_9X_9 + \varepsilon$ …………   13
Semi-log: $Y = b_0 + b_1LogX_1 + b_2LogX_2 + b_3LogX_3 + \ldots + b_9LogX_9 + \varepsilon$ … 14
Cobb-Douglas: $LogY = b_0 + b_1LogX_1 + b_2LogX_2 + \ldots + b_9LogX_9 + \varepsilon$ …   15

Where:
Y = Profitability ratio given as return on investment (ROI) in eq. 7
X_1 = Age of nursery operator (years)
X_2 = Labor cost used in nursery operator's activities (₦)
X_3 = Cost of planting materials (₦)
X_4 = Household size (number of persons living in the house)
X_5 = Educational status (no of years spent in school)
X_6 = Depreciation of fixed items plus interest on borrowed capital (₦)
X_7 = Years of experience (years)
X_8 = Farmers access to credit (dummy variable; yes = 1; no = 0)
X_9 = Cost of rent on farmland (₦)
ε = stochastic/well behaved error term.
where b_0, b_1-b_8 are estimated coefficients, X_1-X_9 are as defined expressed.

RESULTS AND DISCUSSION

The socio-economic characteristics of the citrus nursery operators presented in Table 2 showed that the mean age in the study area was 47.98 years. Nursery operators were mostly male as 79.63% of them were male. About 55.56% of nursery operators had attained secondary education with mean year of education of 11.35 years. About 59.26% of the nursery operators had between 4-6 persons in their household with mean household size of 5 persons per household size. About 42.59% of the nursery operators had between 11 – 20 years of experience with mean year of experience of 19.72 years of experience. About 53.70% of the nursery operators were members of cooperative organization. About 29.63% of them used borrowed funds such as cooperatives, credit from friends, commercial banks and microfinance banks and BOA (Bank of Agriculture). About 64.81% and 29.63% of the nursery operators acquired their nursery plots through rent and leased respectively.

Table 2: Socio – economic features of small - scale citrus nursery operators in the study area

Socio-economic Characteristics	Frequency	Percentages	Mean
Age (years)			
28 – 37	16	29.63	47.98
38 – 47	11	20.37	
48 – 57	15	27.78	
58 – 67	8	14.81	
68 – 77	4	7.41	
Gender			
Male	43	79.63	
Female	11	20.37	
Level of Education (years)			
1 – 6 (Primary education)	11	20.37	11.35
7 – 12 (Secondary education)	30	55.56	
13 – 17 (Post-secondary education)	11	20.37	
≥ 18 (Postgraduate education)	2	3.7	
Household size (no of persons)			
1 – 3	4	7.41	5
4 – 6	32	59.26	
7-9	18	33.33	
Years of Experience (years)			

1 – 10	16	29.63	19.72
11 – 20	23	42.59	
21 – 30	9	16.67	
31 – 40	4	7.41	
41 – 50	2	3.7	
Membership of Cooperative			
Yes	29	53.7	
No	25	46.3	
Source of Capital			
Personal savings	38	70.37	
Friends/Relatives	4	7.41	
Co-operatives	5	9.26	
Bank of Agric (BOA)	2	3.7	
Commercial Bank	3	5.56	
Microfinance Bank	2	3.7	
Mode of land acquisition			
Inheritance/Owned	3	5.56	
Lease	16	29.63	
Rented	35	64.81	

Source: Field Survey, 2022

As indicated in the results that the enterprise is dominated by individuals in productive age category. This finding is similar to that of Fakayode *et. al.* (2008); Enesi *et. al.* (2016) & Larinde & Santus (2014). The nursery operation is also male dominated who could supply the high physical labor requirement involved in nursery operation. High educational level indicated that attainment of formal education in different degrees of education would enhance the ability of the respondent to easily understand technical operation involve in nurseries production. Equally, large household size has positive indication that most of the farm hands (labor force) can be sourced within the household thus reducing cost of hiring labor for their operations as consistent with the findings of Larinde & Santus (2014). Good years of experience is also a good signal that more experienced farmer could predict the future outcome of production with some probability by considering performance of past years as argued by Enesi *et. al.* (2016). The involvement of operators in cooperative society would enable them to pool resources such as finance, labor and other essential facilities together for sharing amongst themselves. Majority of them that seeks external funding indicated limited funds to finance nursery production since personal savings are often meager to establish a large scale nursery business because of the huge capital requirement involved. Most enterprise accessibility to rented and leased plots helped them to ensure close proximity with potential consumers who lived mostly in government reservation areas and private estates in the urban settlements of the study area.

Table 3: Costs and Return of small scale citrus nursery production

Items	Unit	Qty	Unit price (₦)	Value in ₦	% of TC
Sweet orange	*stand	1518.52	141.67	215,123.46	31.35
Tangerine	-do-	374.07	91.48	34,220.85	4.99
Lemon	-do-	206.48	55.56	11,471.19	1.67
Grape	-do-	145.00	124.07	17,990.74	2.62
Lime	-do-	354.63	91.67	32,507.72	4.74
Cost of Seeds purchased				311,313.96	45.36
Hired labor	Mandays	1.61	2,194.44	3,535.49	
Family labor	Mandays	2.31	1,029.63	2,383.40	
Cost of Labor @ 12 months				71,026.75	10.35
Polythene bags and Plastic pots	Bundles	34.96	6,000.00	209,777.78	30.57
Fertilizer	Bag	4.61	6,450.00	29,741.67	4.33
Pesticides	Sachets	8.32	1,833.33	15,257.41	2.22
Total Variable Cost (TVC)				637,117.56	92.84
Transportation cost	Naira			22,797.69	3.32

Interest on loan	Naira			4,882.22	0.71
Total depreciation on fixed assets	Naira			10,571.74	1.54
Annual rent on Nursery plot	Naira			10,907.41	1.59
Total Fixed Cost (TFC)				49,159.05	7.16
Total Cost (TC)				686,276.61	100.00
Sweet orange	*stand	916.67	828.70	759,645.06	
Tangerine	-do-	187.78	883.33	165,870.37	
Lemon	-do-	115.83	388.89	45,046.30	
Grape	-do-	76.06	750.93	57,112.09	
Lime	-do-	192.50	587.96	113,182.87	
Value of Citrus seedling sold				1,140,856.69	
Total Revenue (TR)				1,140,856.69	
Gross Margin = TR – TVC				503,739.13	
Net Margin = GM – TFC				454,580.08	
Operating return = TVC/TR				0.56	
Gross ratio = TC/TR				0.60	
Fixed ratio = TFC/TR				0.04	
ROI = NM/TC*100%				66.24	

Source: Field Survey Data, 2021
*stand indicates seedling stand nurtured.
All estimationsare based per annum
ROI = Return on Investment

From Table 3, it was indicated that variable cost was 92.84% of the total cost (₦637,117.56) comprising the cost of citrus seed purchased (45.36%) of the total cost), cost of labor used (10.35%), polythene bags and plastic pots used (30.57%), fertilizer (4.33%), and pesticides (2.22%). The fixed cost was 7.16% of the total cost comprising of transportation cost (3.32%), interest on loan (0.71%) and depreciation cost on fixed assets (1.54%). The total revenue from the sales of citrus seedlings was ₦1,140,856.69 and this implies that gross margin of the ventures was ₦503,739.13 and net margin was ₦454,580.08. Operating returns was estimated to be 0.56 which implies that 56% of the total revenue paid for the variable costs of the nursery operation which is a good indication of profitability of the nursery operation and rate of return on investment was 66.24% showed that an average nursery operator earned 66.24% profit on cost of investment in the business. The gross ratio of 0.60 implies that total cost was about 60% of the total revenue from the nursery operation. It suggested that gross ratio less than unity (1) are desirable for any viable enterprise and the fixed ratio of 0.04 indicated that 4% of the total revenue was expended on fixed assets of the enterprise. Major expenses were on cost of acquiring citrus seed stocks to be nursed into seedlings and packaging materials such as polythene bags and plastic pots and thus huge amount of capital is not required to be invested into the fixed assets before starting the enterprise hence it is a desirable business at small scale of operation. This finding is similar with that of Enesi *et. al.* (2016) that obtained a value of 1.356 as the ratio of discounted benefit to discounted cost in their analysis of economic evaluation of nursery operation in Oyo State and they concluded that the enterprise is profitable.

Table 4 showed that the cost of seed purchased was ₦311,213.96, labor used was ₦71,026.75, polythene and plastic pots was ₦209,777.78, fertilizer was ₦29,741.67. Others include pesticides, transportation, interest on borrowed capital, depreciation of fixed assets and rent on nursery plot which were valued as ₦15,252.41, ₦22,797.69, ₦4882.22, ₦10,571.74 and ₦10,907.41 respectively. From these estimations, the total factor cost was given as the sum of all these farm inputs and it was calculated to be ₦686,276.63 and the value of citrus seedlings output was ₦1,140,856.69. From this result, the productivity index of citrus nursery production was estimated to be 1.66 which is greater than 1 implying their productivity was high. This is consistent with Obasi *et. al.* (2013) that obtained productivity index of 2.53; this implies that value of output from citrus nursery production could compensate favorably for the required factor inputs used in the operation.

Table 4: Productivity index of small scale citrus nursery production

Items	Value in ₦
Seeds purchased	311,313.96
Labor	71,026.75
Polythene bags and plastic pots	209,777.78
Fertilizer	29,741.67
Pesticides	15,257.41
Transportation cost	22,797.69
Interest on loan	4,882.22
Total depreciation on fixed assets	10,571.74
Annual rent on Nursery plot	10,907.41
Total Factor Cost (TFC)	686,276.63
Value of Citrus seedling sold = TVP	1,140,856.69
Productivity index = TVP/TFC	1.66

Source: Computed from the field data, 2021
All estimations are based per annum

In determining the factors that influence the profitability of small scale citrus nursery production, Factors such as age, labor cost, cost of planting materials, household size, educational status, depreciation cost, years of experience, access to credit, rent on nursery plots were run against the return on investment from nursery operation and subjected to multiple regression analysis, the linear, exponential, semi log and Cobb-Douglas functional forms of the production function were tried using Ordinary Least Square Technique and the result presented in Table 5. Among the four functional forms: the double log is the one with the highest R^2 value (0.655), highest F-value (23.024) which test the goodness of fit of the overall model, highest number of significant explanatory variables and consistency of the signs with apriori expectations i.e 5 variables were significant out of the 8 included variables. Hence, the double – log functional form was selected as the lead equation. The result shows that the estimated coefficient of multiple determinations (R^2) indicates that the postulated regressors (i.e included variables in the model) explained 65.5% in the variation of the independent variable (i.e return of investment of citrus nursery production).

Table 5: Regression result of factors influencing profitability of small scale citrus nursery operation

Variables	Linear	Exponential	Semi-log	Double – log (L)
Age of nursery operator	-25813.08	-1000629	-0.027	0.341
	(-1.16)	(-0.718)	(-1.335)	(0.345)
Labor Cost used	7000.38	286689	0.003	-0.176
	(-6.294)**	(2.019)*	(2.730)**	(-3.746)**
Cost of planting materials	3.084	527223.5	1.23e-05	-0.931
	(-1.204)	(3.036)**	(5.294)**	(-7.540)**
Household size	-51996.25	-929644	-0.238	1.677
	(-0.758)	(-1.817)	(-3.831)**	(4.612)**
Educational status	-38326.29	-37568.3	0.204	0.051
	(-0.219)	(-0.188)	(-1.28)	(0.356)
Depreciation of fixed assets	-3.298	-192158	1.46E-06	-0.108
	(-2.395)**	(-1.035)	(-1.168)	(-0.819)
Years of experience	-50990.54	-805438	-0.092	1.182
	(-2.891)**	(-2.341)**	(-0.748)	(4.836)**
Access to credit	-187701.4	-4213557	11.848	7.077
	(-0.122)	(-0.701)	(-1.492)	(8.656)**
Rent on nursery plots	316310.7	373197.8	-0.233	-0.229
	(-0.907)	(-0.884)	(-0.735)	(-0.763)
R-squared	0.497	0.287	0.605	0.655
Adjusted R-squared	0.456	0.228	0.573	0.627
S.E. of regression	1425538	1706651	1.294	1.213
F-statistic	12.124	4.875	18.799	23.024
Standard error	212.1841	118.32084	208.4231	91.0456

Source: Field Survey Data, 2021.
** = significant @ 1%, * = significant @ 5%
t- values are figures in parentheses.   L = Lead equation

The F-statistics of 23.024 is greater than F-tab of 2.82 at 1%, this indicated that significance of R^2 and it was concluded that double-log functional form has the goodness of fits in explaining the influence of these factors on return of investment. From the results presented in Table 4, only costs of labor and planting materials were negative significant coefficients while household size, years of experience and access to credit had positive significant coefficients.

Regression results indicated that a unit increase in the costs of labor and planting materials tend to reduce the return on investment on citrus nursery production. This formed the reason that made most of the operators to engage family labor which is cheaper and readily accessible to them. They use hired labor to perform tedious activities which are occasional in nature. Fakayode *et. al.* (2008) obtained a similar result in their work that high cost of labor might reduce the profitability of the nursery enterprises. In addition, the cost of acquiring planting materials is a major cost component of total cost which invariably means that a high cost of purchasing seed stocks which raise the cost of production which could reduce the return on investment particularly in an event of loss sales and poor pricing of citrus seedlings.

However, larger household sized operators engaged their family members in the nursery operators than smaller household farmers which could reduce the cost of labor to a very significant extent. Experience in nursery operation makes for good production, marketing and managerial skills leading to higher profit. Nursery production is a very sensitive activity that involved the learning of improved production techniques to raise their seedlings through seeds, budding, grafting and some other methods with comes with frequent practice of similar tasks over a length of years. It is reported by Enesi *et. al.* (2016) that experience makes an individual get used to frequently done activities and improve the receipt from such activities. Access to credit improve the scale of operation by acquiring modern equipment such as sprinklers, mowers and sprayers so as to increase output and ultimately increase return on investment of the citrus nursery operation in the area.

CONCLUSION AND RECOMMENDATION

Citrus nursery operation is dominated by middle - aged, educated, experience with moderate household size. Majority of them rented the nursery plots they used and finance their enterprise with personal savings. The citrus nursery production was profitable with high return on investment and productivity index. High costs of labor and planting materials had negative implication on the profitability of the enterprise while nursery operators with experience, large household size and access to credit are in better position to earn good returns from nursery operation.

Necessary provision and assistance should be given by the government to the nursery operators in the State. Such supports include allocation of land at affordable prices in strategic locations in the cities and provision of soft loans at reduced interest rate to help the nursery operators to acquire necessary equipment in their operations. Nursery operators mobilize themselves into viable cooperatives so that they can gain from the use of pooled resources and finances in cooperatives. More so, there is need to educate of youths and others alike as regards the gains derivable from nursery production business especially considering its viability and profitability to reduce unemployment of youth in the study area.

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