



ECONOMICS OF ORNAMENTAL PLANT PRODUCTION IN JOS METROPOLIS OF PLATEAU STATE, NIGERIA

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ABSTRACT

The study analysed the economics of ornamental plant production in Jos Metropolis of Plateau State, Nigeria. A multi-stage sampling technique was used to select 270 ornamental farmers. Data were collected using questionnaire and analyzed using both descriptive and inferential statistics. The study revealed that the mean age of ornamental farmers was 37 years. Also, most (91.9%) and (92.2%) of the respondents were males and married with an average household size of 5 persons. The result showed that the ornamental farmers had average ornamental experience of 8 years. Furthermore, the result showed that mean annual income of ornamental was ₦39,203.70. The result also showed that 30.7% of the ornamental farmers had formal education and 35.9% had horticulture as their primary occupation. The results further revealed that 28.0% had passion and love for nature while, 29.9% had availability of seedlings/flowers in the study area that leads to expansion of ornamental business. Furthermore, the result revealed that 29.2% had planned very well in meeting customer demands and 33.0% of the ornamental farmers had acquired seedling skills while 29.9% had undertaken planting training. Also, ornamental plant serve as source of fruits and food for humans and animals ($\bar{X} = 3.87$), ornamental plants such as trees provides fresh air to the environment ($\bar{X} = 3.69$), ornamental plants are used for medicinal purposes ($\bar{X} = 3.68$). Probit results, showed that education level, age and training were found significant ($p \leq 0.05$) while, skills, length of experience and household size were found significant ($p \leq 0.01$) and sex was found significant ($p \leq 0.001$) with Psuedo R^2 0.1815. The tobit regression result revealed that price, sales and experience were found to be significant ($P < 0.05$). The major constraints to ornamental production were low demand/poor patronage (77.8%), poor maintenance (76.7%), inadequate government support (75.6%) and pest and diseases (73.0%). The study concluded that, production ornamental was economical and productive in the study area as majority of the ornamental farmers expands their business due availability of seedlings/flowers, tools and equipment's. The study recommends that facility assistance in form of credit package, or start up loan should be made available to farmers by agricultural financial agencies and NGO's to enable floriculturists increase their scale of production and populace should also be stimulated to increase their flower consumption pattern through proper awareness.

Keywords: Ornamental, Floriculture, Florist, Insurgency

INTRODUCTION

Ornamental plant sector gained a commercial importance at the beginning of the 20th century, especially after World War II, it developed as a significant branch of commercial activities first in developed countries (the Netherlands, the U.S.A. and in Japan), and later in some developing countries (Colombia, Kenya and Israel) (Torun, 2016). Global ornamental production and consumption has overcome serious challenges in the past 20 years (Darras, 2020). The EU holds the first place in cut flower and ornamental pot-plant sales with 31.0% of



the global value, with China and USA in second and third place at 18.6% and 12.5%, respectively (Eurostat, 2017). Within the EU, in the year 2016, the Netherlands had the most cut flower and ornamental pot-plant sales, with France and Italy being second and third (Eurostat, 2017). Cut flower and ornamental pot-plant sales in the EU from 2006 to 2016 increased by 7% (approximately 1.4 billion euros), indicating a slow but steady increase, which was not dependent on the global economic status (Eurostat, 2017). On the contrary, the number of cut flower producers in the USA was reduced significantly during the years from 2007 to 2015 (Darras, 2020). These reductions recorded by the US department of Agriculture (USDA) reached 30% (USDA, 2016), indicating that cut flower production has been shifted to new worldwide players such as China (Eurostat, 2018). In 2017, China came second in cut flowers and pot-plant sales. The USA, Japan, Brazil, Colombia, Canada, Ecuador, and Kenya completed the top-10 list of production countries in 2017 (Eurostat, 2018). Kenya came first in pot-plant and cut flower imports to the EU, holding a share of 27.5%. Ethiopia, Ecuador, Colombia, Israel, USA, Costa Rica, China, and Uganda complete the top-10 list of countries exporting floricultural products to the EU (Eurostat, 2018). Nonetheless, the consumption of cut flowers and pot plants was higher in the EU, USA, and Japan (Xia *et al.*, 2016). The world trading system is now based on three marketing channels that connect production with major consumption spots. The three channels are Europe, Africa, South-North America, and Asia Pacific (Eurostat, 2018). Within the Europe Africa channel, products imported to Europe from Kenya, Ethiopia, and Uganda increased by up to 40% (Eurostat, 2018).

Floriculture/ornamental farming as a unit of the agricultural sector, it plays a very important role in income generation to the farmers (Nigeria Economic summit group, 2019). The industry has potentials for generating employment for both rural and urban dwellers directly or indirectly (Usman, Abiola, Adesope and Adeoye *et al.*, 2021). The direct jobs include those for skilled labour like researchers, teachers, greenhouse managers and nursery managers among others. While the indirect jobs include those of factories that produce chemicals and machineries for the production and processing of floricultural produce (Acquaah, 2014). The aesthetic value of floriculture could be noticed in public places such as botanical gardens, arboreta, and parks for public admiration (Muhammad-Lawal *et al.*, Adenuga, Olatinwo, and Saadu, 2019). Socially, the poinsettias flowers are associated with Yuletide period, rose are associated with valentine period and lilies are associated with Easter period (Acquaah, 2014). Its role in food and nutrition cannot be overemphasised. This is because floricultural plant such as cauliflower serves as food (Muhammad-Lawal, *et al.*, 2019).

In view of the increasing number of personal houses and corporate organisations' buildings in Nigeria, the investment in floricultural enterprise has become quite relevant in today's business environment (Fagbayide and Jolasun, 2021). This is because floricultural plants have great role in enhancing the beauty and attractiveness of such buildings (Chukwuma, 2021). Floriculture has however remained a lowly recognized enterprise in Nigeria in spite of the inherent unique potentials of the industry in transforming a nation's economy. The industry has received very little attention in the nation's plan for agricultural development (Oseni, 2014). This may however be attributed to inadequate awareness of the profitability potential of the enterprise as well as insufficient knowledge of the most important issues that affect returns to floricultural plant production. This study aimed to examine the economics of floricultural/ornamental plant production in Jos metropolis of Plateau State. The study was conducted to investigate the economics of ornamental plant production in Jos Metropolis, Plateau State, Nigeria, describe the socio-economic characteristics of ornamental plants producers, investigate if ornamental plant farmers maximize profits in ornamental plants

production, identify the opportunities in partaking in ornamental plants production and identify the existing challenges in the ornamental plants production in Jos Metropolis.

MATERIALS AND METHODS

The Study Area

Jos North LGA is strategically situated in the middle of the country Nigeria, bordered by Jos south, Jos east, Bassa and Riyom LGA. Jos north LGA is also a boarder to Bauchi and Kaduna States. The study area lies within latitude 9°30" 5" N-9° 39" 00" N and longitude 8° 19"00" E-8° 32" 5" E. The Jos-North LGA comprises the Berom, Anaguta and Afizere, while the Jos-South comprises mainly the Berom people. The other tribes are migrants from different parts of the country including the Yorubas, the Hausas, the Igbos and the Bajjus who came as traders, miners, civil servants and missionaries. The climate is characterized by two seasons: rainy (April-October) and dry (November-March). It is marked by appreciable rainfall and relative humidity, the peak of which is between the months of July and August. The average temperature ranges from 26.7°C (80°F) to 12.8°C (55°F) in the dry season (Geology and Mining Department, University of Jos, Jos, Nigeria).

Jos north is under Plateau north senatorial district with a population of about 426,300 (National Population Commission (NPC) and National Bureau of Statistics (NBS) (2023). It occupies a total land area of 291 square kilometres and has a tropical climate with two major seasons, the rainy and the dry. Jos north LGA comprises of different tribes namely Berom, Afizere, Anaguta, Hausa, Mwagawul, Goemai, Taroh, Pan, Igbos Yoruba's, and many other tribes who are resident in the area but came from different parts of the country.

The choice of Jos metropolis for this research is based on the number of ornamental plant producers operating in the metropolis. The favourable climate in this region makes it a good choice of study given that irrigation farming is carried out extensively during dry season. Also, the Agricultural Services and Training Centre (ASTC) located in the study area provides improved seedlings and trainings to farmers, this makes the area a good choice of study as farmers operating in the area can have the capacity to optimize the available advantages in the location.

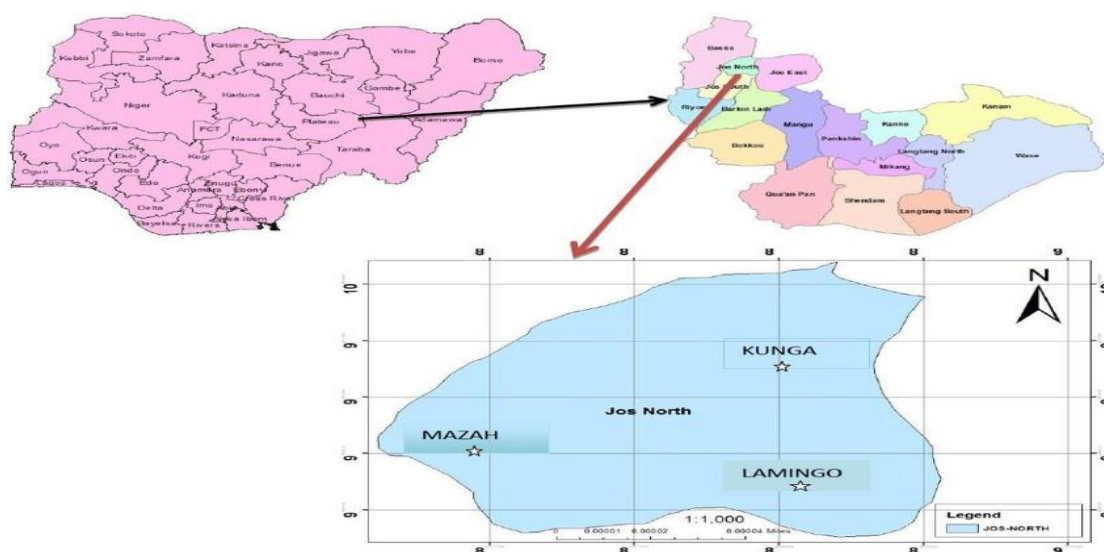


Figure 1: Map of Plateau State showing the study area (Jos North LGA)
Source: Research gate (2021)

Sampling Techniques and Sample Size

Multistage sampling was adopted using three stages of random sampling based on the categorized structure of natural clusters within the population. According to Soemarwoto *et al.* (2015), clusters are natural groupings of people for example, electoral wards, general practices, schools, or households. A different type of cluster is randomly sampled at each stage, with the clusters nested within each other at successive stages. The final stage of sampling involved choosing a random sample of people in the clusters selected at the penultimate stage. The first stage was involving the six LGAs that make up the metropolis that is Jos south, Jos north, Jos east, Bassa, Riyom and Barkin Ladi were the samples population. Because the map covers the entire location, 50% of the samples were drawn from Jos north and Jos south. This is because they are the largest LGAs in Jos metropolis. Meanwhile, the rest of the 50% was drawn from each of the four remaining LGAs. This is due to the small size of the LGAs that comprise the metropolis.

Table 1: Sampling Procedure and Sample size

S/N	LGAs	Sample Proportion
1	Jos South	70
2	Jos North	70
3	Jos East	33
4	Bassa	33
5	Riyom	33
6	Barkin Ladi	33
Total		272

Reconnaissance Survey, (2023)

Method of Data Collection

The study used questionnaire to collect information from the selected ornamental farmers in the study area. The questionnaire was constructed into sections; Section “A” contained items that captured the socio – economic characteristics of the respondents such as age, sex, level of education among others; section “B” captured economic benefits of ornamental plants production to the respondents; section “C” consist of questions on entrepreneurship opportunities for those partaking in ornamental plant production in study area; section “D” focused on the ecological benefits of ornamental production on the environment, beauty of the land scape, wind shield, fresh air among others; and section “E” comprises of questions on the production constraints associated with ornamental plant production. The questionnaire is an open ended and were distributed to the respondents with the assistance of trained enumerator. The questionnaires were administered to the respondents who were affected by the insurgency in the study area.

Methods of Data Analysis

The data were edited for accuracy, consistency and completeness. The data were coded to enable the responses to be statistically analyzed. The analysis of the data requires a number of closely related operations such as the establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences with the use of statistical software namely; Statistical package for social sciences (IBM SPSS Version 20.0) and STATA version 14.



Descriptive statistics

Descriptive statistics was employed to describe the demographic distributions of the respondents and the rate of responses of the respondents on various questions in the questionnaire. In this case, data were analyzed using simple percentages and frequency counts. Inferential statistics

In order to examine the relationship between variables and answer the research questions of this study, the inferential statistical techniques of tobit regression model and probit model regression analysis was used.

RESULTS AND DISCUSSION

Quantitative Socio-economic Characteristic of Ornamental Farmers

The result in Table 2 shows the descriptive statistics of socio – economic characteristics of the ornamental farmers in the study area. The result revealed the minimum, maximum and mean ages of the respondents in study were 23, 72, and 37.7 years respectively with a standard error of 9.7379. This implies the ornamental farmers were in their productive age and are more likely to participate in all farming activities in order to achieve and become financially independent. Abbas *et al.* (2020) reported in their study that proportions of 40.00% were within the age bracket of 20-30 years. The result further shows 23.33 % of them were within 31-50 years. The implication of this finding was that those floriculturists were young and middle aged. Young persons were strong, agile and willing to take risk. The report corroborates with finding of the Manzoor, Shahid and Baluch (2021) which says that young people can take risk in anticipation of high return.

Ephraim and Abubakar (2018) reported that (38.0%) of respondents were between 26 and 35 years old which implies that respondents were in active stage. Muhammad-Lawal *et al.* (2019) observed that most of the respondents were within the age range of 26-40 which implies that floricultural plant production in the study Area is mainly in the hands of youth. The result in Table 2 also shows minimum, maximum and mean of the household size of the ornamental farmers in the study area were 2.0, 20.0 and 5.0 respectively with a standard error of 3.2684.

The result in Table 2 also shows minimum, maximum and mean of the ornamental experience of the farmers were 1.0, 30.0 and 8.2 respectively with a standard error of 5.5472. average year of experience of 13 years in the business. This is an indication that the respondents were literate and have been long in the business. The combination of education and experience could make the producer to be efficient in managing the business which could lead to increase in productivity, resulting in increase in income (Ahmadu and Oyoboh, 2017). Furthermore, the result showed minimum, maximum and mean incomes of the ornamental farmers were ₦10000.0, ₦87000.0 and ₦39203.704 respectively, with a standard error of ₦17953.6574. This corroborate with the findings of Sudhagar and Phil (2013) which reported that mean annual income of ornamental farmer's in Kaduna State was ₦165,000.00 implying that farmer's obtain a reasonable annual income in ornamental production business.

Table 2: Quantitative Socio-Economic Characteristics of Ornamental Farmers in the Study Area (n=270)

Variable	Min.	Max.	Mean	Std. Error
Age (Yrs)	23.0	72.0	37.793	9.7379
Household size (No. of Members)	.0	20.0	5.904	3.2684
Ornamentals experience (Yrs)	1.0	30.0	8.289	5.5472
Income Generation (₦)	10000.0	87000.0	39203.704	17953.6574

Source: Field Survey, 2023

Sex of the Respondents

Sex refers to the biological form of human being a male or female, it's a factor of socio-economic characteristics which points out the sex group which involve in ornamental farming. Figure 2 showed that most (91.9%) of the respondents were male while the females constitute 8.1%. Thus, male headed households engage in farming more than female headed households. Abbas *et al.* (2020) stated that male respondents constitute 90.00% while proportions of 10.00% were females. The possible explanation for this finding might not be unconnected to the socio-cultural set-up of the people in the area where men were the breadwinners of the households while female were home makers.

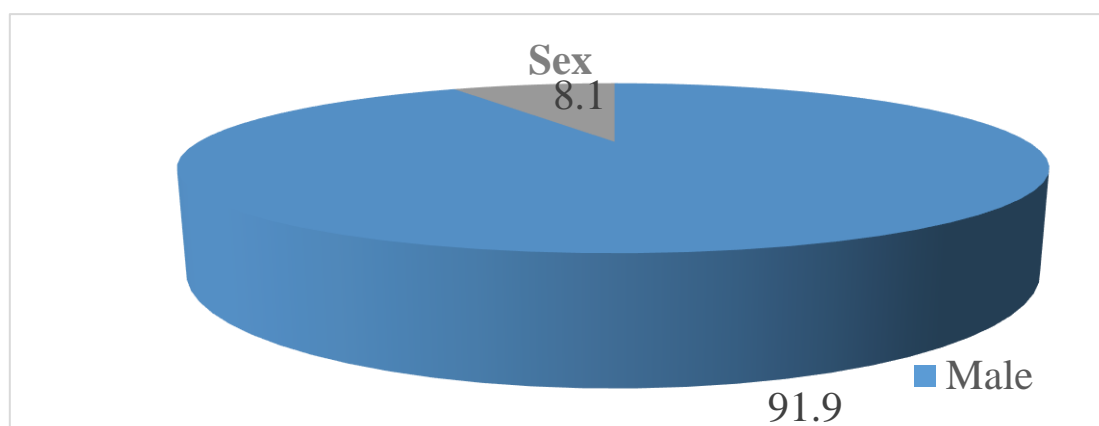


Figure 2: Distribution of Respondents according Sex

Source: Field Survey, 2023

Marital Status

Marital status is an important socio-economic factor of ornamental farmers. Figure 3 also shows that most (92.2%) of the ornamental farmers were married and 5.6% were single while 1.9% were widows. This shows that married people dominate most of the ornamental production activities in the study area. This may also be as a result of high labour requirement in agricultural production. This result agrees with Pandit, Pandit, Joshi and Tiwari *et al.* (2018) who revealed that majority (65.00%) of the respondents were married, 35.00% were single. It was earlier observed that early marriage is common in this part of the country which means that household heads will require more to take care of their dependents.

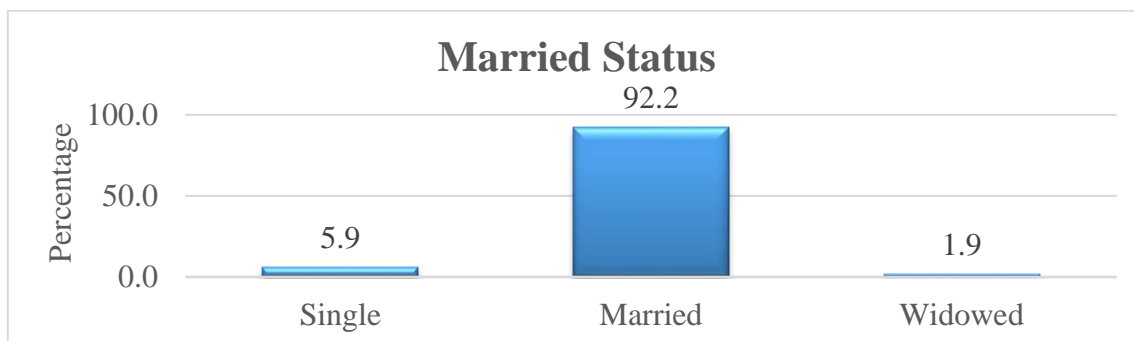


Figure 3: Distribution of Respondents according Marital Status

Source: Field Survey, 2023

Educational Level

The results in Table 3 revealed that 25.6% of the respondents had B.Sc./HND, while 23.7% had ND/NCE, about 30.7% had secondary education, and 11.1% had primary education and only 8.9% had non-formal education. The finding implies that majority of the respondents were literate which can help them in carrying out their agricultural activities. Education has an important role in ornamental farming especially when farmers are trained on a particular aspect and put it into practice. Muhammad-Lawal *et al.* (2019) mentioned that almost all the respondents had tertiary education indicating that floricultural plant producers in the study area are educated.

Table 3: Distribution of Respondents According to Educational Level

Education	Frequency	Percentage
Primary education	30	11.1
Secondary education	83	30.7
ND/NCE	64	23.7
B.Sc./HND	69	25.6
Non-formal education	24	8.9
Total	270	100.0

Source: Field Survey, 2023

Occupation of the Respondents

This is a socio-economic factor which shows the type of job which the ornamental farmers were engaged with in the study area. The result in Table 4 shows that 35.9% of the respondents were horticulturalist as their primary occupation. Only 22.2% were civil servant. Furthermore, 21.5% of them were engage in farming business. Also, 20.0% of the respondents were engaged into trading of ornamental seedlings, flower pots, polythene bags etc. This implies that horticulturist was the major occupation of most of the household heads in the study area.

Mailumo *et al.* (2018) mentioned in their study that 46.0% of the respondents had no other alternative job than seedling nurseries operation, they depend solely on nurseries enterprise for their income, while 53% of the respondents engaged in nursery enterprise had alternative jobs; either working as a civil servants or trading.

Table 4: Distribution of Respondents According to Occupation

Occupation	Frequency	Percentage
Civil Service	60	22.2
Trader	55	20.0
Farming	58	21.5
Horticulturist	97	35.9
Total	270	100.0

Source: Field Survey, 2023

Profit Maximization on Ornamental Production

The tobit regression result revealed that price, sales and experience were found to be significant ($P < 0.05$) also confirmed that a unit decrease in price lead to decrease on profit maximization of ornamental farmers by -.0001716. Accordingly, it is reasonable that the higher the gained profit, the greater the likelihood of farmers' overall satisfaction with ornamental production. Sales of ornamental plants enhance economic impact provides opportunities to increase net farm income and gain a sustainable competitive advantage this confirmed that a unit decrease in ornamental production other variables remain constant led to decrease in the income of the farmer by -.0001328. The result further revealed that experience was significant ($P < 0.05$), this indicates that the more experienced ornamental farmers generate more income through quality services of customer's demand. This result is in agreement with Aydoğdu and Yildizogullari (2021) tobit model estimation results, as income and education level increase, flower expenditure increases. According to the marginal impact values, when the income category rises by one level, flower expenditure increases by 19.93. The number of flowers that consumers receive throughout the year has been analyzed by negative binomial counting data regression, observed that the number of flowers received by the participant is higher in females than in males, less in unemployed than in employees, and more in married than unmarried. Age, education level, and income level do not affect the number of flowers that the consumer received

Table 5: Tobit Regression on Profit Maximization

Variable	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]
Price	-.0001716	.0000789	-2.17	0.031**	-.000327
Plants	.0954044	.0905329	1.05	0.293 ^{NS}	-.082854
Sales	-.0001328	.0000812	-1.64	0.103**	-.0002927
Cost	-.0000147	.0001089	-0.14	0.893 ^{NS}	-.0002291
Experience	-.009999	.0273379	-0.37	0.715**	-.0638271
Loses	-.000059	.0001679	-0.35	0.726 ^{NS}	-.0003895
Cons	3.695082	.7930022	4.66	0.000***	2.133668
Sigma	2.362152	.1274235			2.111256
Log likelihood	-521.50243				
Pseudo R ²	0.092				

Source: Field Survey, 2023 Note: ** and *** denote significant at 5%, 1% levels, respectively.

Opportunities in Partaking Ornamental Plants Production

The result on probit regression revealed that estimated coefficients in Table 6 imply that, except International customers, expansion, demand, economy, and customers Demand any other independent variable were not significant in entrepreneurial opportunities partaking in ornamental production. However, length of experience was significant ($P < 0.001$) this implies that as ornamental farmers experience increases the more experience they become and this will enhance great opportunities to take rational decision-making in the production. While, skills were significant ($p < 0.001$) implying that as the ornamental farmers gain more skills in the production which will enhance good productivity as well as good management practices. The result also revealed that sex was found to be positive and significant ($p < 0.01$) implying that majority of the ornamental farmers were males; this is due to socio-cultural values and culture as well as the difficulty in the routine management practices. Furthermore, age coefficient was found to be negative but significant ($p < 0.05$) implying that majority of the ornamental farmers were in their active stage and can withstand all tedious activities in ornamental production therefore, they can be able to produce more quality flowers to the needs and satisfaction of the customers.

Aydoğdu and Yildizogullari (2021) mentioned that number of flowers given is less in females than in males, more in those who are married than in those who are not married, and in those who are not working, less than in those who work. The number of flowers given does not differ in terms of age, education level, and income level. Jennifer (2019) observed that the number of flowers received by the participant is higher in females than in males, less in unemployed than in employees, and more in married than unmarried. Age, education level, and income level do not affect the number of flowers that the consumer receives.

Table 6: Probit regression on Entrepreneurial Opportunities

Variable	Coef.	Std. Err.	Z	P> t	[95% Conf. Interval]
IN customers	-.0411602	.0643154	-0.64	0.522 ^{NS}	-.1672162
Expansion	-.0273796	.2640818	-0.10	0.917 ^{NS}	-.5449705
Demand	-.0278158	.0490437	-0.57	0.571 ^{NS}	-.1239397
Motivation	.1108002	.0945585	1.17	0.241 ^{NS}	-.074531
Education	-.0797382	.0389481	-2.05	0.041**	-.1560752
Age	-.3648077	.2169764	-1.68	0.093**	-.7900737
Training	.0657713	.0991217	0.66	0.507**	-.1285037
Skills	.0109245	.087567	0.12	0.901***	-.1607037
Length Exp.	.1016802	.0339263	3.00	0.003***	.0351858
Economy	.2193299	.2282896	0.96	0.337 ^{NS}	-.2281094
Customers D	.0144922	.0167378	0.87	0.387 ^{NS}	-.0183132
Household	-.1517204	.0460291	-3.30	0.001***	-.2419359
Sex	.7947785	.5254689	1.51	0.130*	-.2351216
Constant	-.5632435	.8591665	-0.66	0.512***	-2.247179
Log likelihood	-104.6725				
Pseudo R ²	0.1815				

Note: *, ** and *** denote significant at 10%, 5% and 1% levels, respectively.

Source: Field Survey, 2023

Challenges Farmers Faced in Ornamental Plants Production

Table 7 shows the constraints faced by ornamental producers. The result revealed that majority (77.8%) of the ornamental farmers confirmed that low demand/poor patronage was the main constraint faced in the study area. Similarly, 76.7% of the respondents indicated that there was poor maintenance. Furthermore, the results revealed that majority (75.6%) of the ornamental farmers mentioned that there was inadequate government support. Also, the result showed that majority (73.0%) of the ornamental farmers stated that there was inadequate capital and Pest and diseases respectively while majority (67.0% and 61.9%) of the farmers mentioned there were water shortage and poor land space respectively in the study area. Fakayode *et al.* (2020) reported that problems facing floriculture business were Water scarcity, lack of permanent site for production, inadequate fund, low demand especially in dry season, pest and disease, labour scarcity, scarcity of planting materials, theft, lack of awareness. Also, Akintoye *et al.* (2019) reported that major problems faced by ornamental farmers were water scarcity, inadequate land, insufficient fund, pests and diseases.

Ephraim and Abubakar (2018) opined that major problems faced by ornamental farmers were inadequate finance (40%), transportation (9%), pest and diseases (10%), inadequate water supply (30%) and shortage of propagules (11%). Although from the economic evaluation the nursery business seemed viable, all nurseries within the study area reported inadequate finance problems as one of the major constraints followed by transportation of seedlings to customers poses a major setback due to lack of vehicles especially when large quantities of seedlings were ordered. Well water serves as the main source of water used by the nursery operators. This was usually sufficient during the rainy season but poses huge problems during the dry season especially since there was no adequate water supply system in the state.

Table 7: Challenges affecting Ornamental plants production (n=270)

Challenges	Frequency	Percentage
Low demand/Poor patronage	210	77.8
Poor maintenance	207	76.7
Inadequate government support	204	75.6
Inadequate capital	197	73.0
Pest and diseases	197	73.0
Water shortage	181	67.0
Poor land space	167	61.9

Source: Field Survey, 2023

CONCLUSION AND RECOMMENDATIONS

Based, on the results of this study, it was concluded that respondents had benefitted from ornamental plants production due to availability of seedlings/flowers and access to availability of tools and equipment's were among factors that lead to expansion of ornamental production in the study area. Respondents undertake training on planting, technology, marketing and pest control in the study area. Furthermore, ornamental plant had significant purpose as it serves as source of fruits and food for humans and animals and fresh air to the environment, for medicinal purposes and provides landscape beautification to the environment. The study recommends that facility assistance in form of credit package, or start up loan should be made available to farmers by the Financial Institution to enable the floriculturists to increase their scale of production for enhancement of livelihood and economic development. Government should allocate land for ornamental plant production practice in form of



“horticulture village”. And this will also solve the problem of water scarcity during dry season because the florists will be able to sink well or borehole.

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