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Analysis of gender differential in production efficiency and constraints in strawberry (*Fragaria chiloensis*) production in Plateau State, Nigeria

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ABSTRACT

A gender differential issue in relation to farm productivity in subsistence farming has been of special interest from the standpoint of public policy in developing countries. The study attempted to assess gender differential in production efficiency and constraints in strawberry (*Fragaria chiloensis*) production in Plateau State, Nigeria. Primary data were obtained through structured questionnaire in 2018 cropping season. Information collected includes socio-economic characteristics, production, and constraints faced by the farmers in strawberry production. A multi-stage sampling procedure was used to select 298 farmers comprising of 116 males and 182 females. Descriptive statistics and stochastic production function were used to analyse the data collected to achieve the objectives. The results showed that the estimated coefficients for farm size (0.740), labour (0.389), seed (0.568), fertilizer (-0.517) and agro-chemicals (0.376) for females were positive (except fertilizer) and statistically significant at different levels of probability. Conversely, the estimated coefficients for farm size (0.0.005), labour (0.083), and agro-chemicals (0.502) for males were positive and statistically significant at different levels of probability. The sum of the elasticities of production of the five variable inputs was 1.556 for females indicating increasing returns to scale. On the other hand, the estimated input elasticities of production for males was less than 1, indicating decreasing return to scale. Coincidentally, excessive rainfall, insect and disease attack, and marketing were the most critical constraints faced by both male and female farmers.

Keywords: Gender, resources, strawberry, stochastic profit frontier

INTRODUCTION

The importance of agriculture in Nigeria cannot be over-emphasized as productive agriculture offers quality food for domestic consumption, raw materials for agro-allied industries, employment that generates income, which in turn encourages other industrial, commercial services and export markets for foreign exchange earnings (Yusuf, 2015). The contribution of agriculture to Nigeria's Gross Domestic Product (GDP), with crop production accounting for an estimated 85 % of agricultural GDP, stood at an average of 56 % in 1960-1964, decreased to 47 % in 1965-1969, decrease to 35 % in 2002-2004, and a further decline to 21.2% in 2017 (World Bank, 2017).

Strawberry (*Fragaria chiloensis*) is an important small fruit among the berries cultivated in Nigeria particularly in Plateau state, with various strawberry species growing wild all over the world. Nutritionally, strawberry is superior to citrus, guava and apple in the possession of higher protein, mineral and vitamin contents, in addition to having more digestible starch. The dietetic include: vitamin C. 100gm, edible portion contain 89 g water, 0.07 g protein, 0.5 g fats, 8.4 g

carbohydrates and 59 mg ascorbic acid (Hossain *et al.*, 2016).
The world production in 2016 was 4,895,459 metric tonnes (MT) and USA was the largest producer with an annual production of 1,452,000 metric tonnes. This constitutes 26% strawberries of the entire world. The average production figure for Nigeria was 21,780 metric tonnes which accounts for about 0.45% of total world output (Food and Agriculture Organization, FAO 2017).

Small scale farmers, especially women who operate within the subsistence economy grow most of the Strawberry in Nigeria. The surplus of the product is supplied to the market in the rapidly growing urban centers. The bulk of the production of strawberry is in Plateau State, Nigeria (Enyinnia, 2001). The strawberry fruit is commercially consumed both in fresh form and can be preserved as Jellies, and squashes that can be used in off-season (Galletta and Bringhurst, 2005), and of recent in powder form through dehydration.

Gender differential issues in relation to farm productivity in subsistence farming has been of special interest from the standpoint of public policy in developing countries (Mabundza *et al*., 2014; Kabeer, 2016; Morgan *et al*., 2016; Rola-Rubzen *et al*., 2016). The difference is usually viewed from the angle of human capital theory and measurement of discrimination. Gender has proven to be an essential variable for analyzing the roles, responsibilities, constraints, opportunities, incentives, costs and benefits in agriculture (Koyenikan, 2011; Adejoh *et al*., 2017).

According to World Development Report (WDR, 2015), like many other countries in Africa, women in Nigeria have broadened and deepened their involvement in agricultural production in recent decades. Although men dominate the sector in Nigeria, a large share of women also participates across the agriculture value chain; as they are involved in production, processing, and sales. Overall 48 % of female headed households participate in the agriculture sector and, in the rural areas; almost 70 % of female headed households are involved in the sector (Damisa and Yohanna, 2007; Abdulrahman *et al.*, 2018).

However, there is debate in the general literature on gender and agricultural productivity as to the contribution of the differential use of inputs in explaining productivity gaps. It is certainly true across a range of countries that women tend to have lower levels of usage of various productive assets (Croppenstedt *et al*., 2013). This is also true in the case of Nigeria. Despite their significant role in agricultural production, women in Nigeria have relatively limited access to agriculture land and lower levels of inputs and use of extension services compared with men (Phillip *et al*., 2009). In Nigeria, men are five times more likely than women to own land and this varies across regions, with lower ownership by women and higher gender gaps in land ownership in the North compared to the South (British Council Nigeria, 2012). These constraints could limit women's productivity relative to men.

There is dearth of gender disaggregated research and documentation data in strawberry production especially in Plateau State. It thus becomes imperative to conduct this research: analysis of gender differential in production efficiency and constraints in strawberry (*Fragaria chiloensis*) production in Plateau State Nigeria.

METHODOLOGY

The Study Area

This study was conducted in Plateau State, Nigeria. The State is located between Latitudes 80 22' and 100 24' North and Longitudes 80 32' and 100 38' East. Plateau State is primarily an agrarian community. The State has a land mass of 30,913 square km or 6,678,162 acres (National Bureau of

Statistics, 2006). About two thirds of the land area is arable. The major food crops include Irish potatoes, sweet potatoes, chili pepper tomatoes and strawberry. Others include leafy vegetables, cereals, legumes and root and tuber crops and tree crops. Vegetables include carrots, lettuce, radish, cucumber, sweet pepper, hot pepper, green beans, parsley and fruits include strawberries. However, cereal production on the Plateau represents about 34% of all agricultural produce; root and tubers production represents about 32 % while horticultural crops stand out at about 21%. The least is forest products which represent 13% (Employment-oriented Private Sector Development Programme, 2010). Based on annual population growth rate of 3.2%, the projected population of the State is about 4,469,232 million people in 2019.

Method of Data Collection and Sampling Technique

Primary data were used in this study. The primary data were obtained by the use of structured questionnaire in 2018 strawberry cropping season. Information on socio-economic and demographic characteristics of households, production information such as inputs used and output in strawberry and constraints faced by the farmers in strawberry production.

A multi-stage sampling procedure was used to select respondents for this study. Three Local Government Areas (LGAs) namely: Barkin Ladi, Jos East and Jos South were purposively selected for field survey (Table 1).

Table 1: Population and sample size of strawberry farmers in Plateau State

Selected LGAs	Villages	No of male farmers	Sample size for male farmers (24%)	No of female farmers	Sample size for female farmers (24%)
Barkin Ladi	Ropp	23	6	45	11
	Kasa	18	4	61	15
	Sho	43	10	23	6
	Gashisha	18	4	64	15
Jos East	Lamingo	49	12	87	21
	Kyerkyer	35	8	44	11
	Rizek	17	4	34	8
Jos South	Chigwi	29	7	63	15
	Vwang	51	12	85	20
	Chaha	30	7	59	14
	Chwel	35	8	39	9
	Sot	46	11	25	6
	Kugwon	54	13	85	20
	Kuru	34	8	46	11
Total	**14**	**482**	**116**	**760**	**182**

Reconnaissance survey, 2017

These LGAs were chosen due to possessing climatic and ecological features that are suitable for the production of strawberry in Plateau State (Plateau State Diary, 2017). The list of villages involved in strawberry production was listed. The second stage involved a random selection of 20 % of the villages from each of the selected LGA and the selections of these villages were proportionate to the size. The last stage involves using a Yammane (1967) formula adopted by Abdulrahman *et al.*, 2016; Oladimeji *et al.*, 2017 for calculating sample size based on the assumption of 5 %

expected margins of error, 95 % confidence interval and applying the finite population correction factor. The formula is expressed as follows:

$n_0 = \frac{N}{1+N(e^2)}$ ……(1)

Where: n_0 is the sample size without considering the finite population correction factor; e = 0.05; N = total number of observation. Therefore, a total of two hundred and ninety-eight (298) strawberry farmers sieved into 116 male and 182 female strawberry farmers were randomly selected using the card method.

Analytical Techniques

Descriptive statistics and stochastic production function were used to analyse the data collected. The stochastic frontier production function was used to achieve efficiency determination. It was specified explicitly as:

$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + (Vi-Ui)$ …….. (2)

Where, ln = the natural logarithm, Y = output of strawberry (kg), β_0 = constant term,

β_1- β_4 = regression coefficients, X_1 = quantity of seed (kg), X_2 =quantity of fertilizer (kg), X_3 = total labour used (man days), X_4 = quantity of agrochemical (litres), Vi = random variability in the production that cannot be influenced by the farmer and

$-U_i$ = deviation from maximum potential output attributable to technically inefficiency.

$-U_i = \delta_0 + \delta_1 1 n Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \delta_4 \ln Z_4 + \delta_5 \ln Z_5 + \delta_6 \ln Z_6$ ……. (3)

Where: $-U_i$ = inefficiency effects, Z_1 = age of farmer (years), Z_2 = household size (number), Z_3 = formal education (years), Z_4 = amount of credit (₦), Z_5 = access to extension services (number of extension contact), Z_6 = membership of cooperative society (years), Z_7 = farming experience (years), δ_0 = constant and δ_1-δ_7 = Parameters to be estimated.

Stochastic frontier cost function (allocative efficiency) model was also estimated and is specified as:

$\ln C = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + (Vi + Ui)$ (4)

Where, ln = the natural logarithm, C = total cost of output (₦), X_1 = cost of seed (₦), X_2 = cost of fertilizer (₦), X_3 = cost of labour (₦), X_4 = cost of output (₦), X_5 = cost of agrochemical (₦), β_0 = constant term, β_1- β_5 = regression coefficients

Economic efficiency model used in the study is specified as:

The product of technical efficiency (TE) and allocative efficiency (AE) provides the index of economic efficiency (EE).

EE = TE * AE

(5)

Where; EE = economic efficiency, TE = technical efficiency and AE = allocative efficiency.

(Equations 2 - 5 adopted from Idi *et al.*, 2019)

RESULTS

Gender Differential in Production Efficiency of Strawberry farmers

The result of Maximum Likelihood Estimates (MLE) for the production frontier is presented in Table 2. The estimated parameters of sigma-squared were 0.425 and 0.359 for female and male production systems respectively. The generalized likelihood ratio statistics were -156.41 and -117.13 for female and male respectively. This ratio exceeds the critical chi-square values at 1% level of significance. The result of the production efficiency of female strawberry showed that the coefficients of farm size (0.740), labour (0.389), seed (0.568), fertilizer (-0.517) and agro-chemicals (0.376) were statistically significant at different levels of probability. However, only coefficients of labour (0.083) and agrochemicals (0.502) were statistically significant at 1 and 10 % respectively for male strawberry farmers.

The results in Table 2 also show the determinants of technical inefficiency of

female and male strawberry production in Plateau State, Nigeria. The inefficiency model for female strawberry farmers indicated that coefficients of education (-0.152) and farming experience (-0.216) were statistically significant at 5 and 10 % respectively while age (0.269), education (-0.376) and household size (-1.018) were significant at different levels of probability.

Table 2: MLE results of stochastic frontier production function

Variable	Female			Male		
	Coeff.	Std. error	t-value	Coeff.	Std. error	t-value
Production efficiency						
constant	4.845	0.947	5.113***	2.424	0.719	3.371***
farm size	0.740	0.260	2.846***	0.005	0.001	6.444***
labour	0.389	0.108	3.608***	0.083	0.014	5.739***
seed	0.568	0.242	2.346**	0.118	0.196	0.602
fertilizer	-0.517	0.201	-2.579***	0.204	0.139	1.459
agro chemicals	0.376	0.186	2.021**	0.502	0.268	1.875*
Inefficiency						
constant	2.257	2.111	1.069	1.922	2.030	0.946
Age	0.098	0.060	1.630	0.269	0.112	2.409**
education	-0.152	0.073	-2.088**	-0.376	0.201	-1.872*
experience	-0.216	0.113	-1.910*	2.352	1.507	1.561
household size	-0.062	0.103	-0.602	-1.018	0.475	-2.142**
extension contact	0.671	0.509	1.319	1.195	1.127	1.061
cooperative	-0.638	0.401	-1.594	-0.261	0.183	-1.429
credit	-0.193	0.202	-0.955	0.214	0.208	1.029
Diagnostic statistics						
sigma squared ($\sigma 2$)	0.425	0.131	3.237***	0.359	0.183	1.967*
gamma (γ)	0.460	0.211	2.185***	0.598	0.258	2.317**
LR test	54.645			77.551		
LLF	-156.41			-117.13		
mean efficiency	0.68			0.51		

*** P< 0.01, ** P<0.05, * P<0.1; LLF denote log likelihood function

Elasticities of production of variable inputs in strawberry production

The results in Table 3 show the elasticities of production and returns to scale in strawberry production in the study area. The sum of estimated input elasticities of production for male was 0.912 and are less than 1. On the other hand, the sum of the elasticities of production of the five variable inputs was 1.556 for female.

Constraints Confronting Farmers in Strawberry Production

The results presented in Table 4 assess the challenges facing strawberry farmers in the study area. The results of the constraints obtained were ranked from most critical to the least for both female and male strawberry farmers.

Table 3: Elasticity of Production and Return to Scale in Strawberry Production for Female and Male enterprise

Elasticity of production	Female	Male
farm size	0.740	0.005
labour	0.389	0.083
seed	0.568	0.118
fertilizer	-0.517	0.204
agrochemicals	0.376	0.502
Return to scale (RTS)	**1.556**	**0.912**

Table 4: Constraints Confronting Strawberry Farmers

	Female(N=182)			Male (N=116)		
Constraints	**Frequency**	**%**	**Rank**	**Frequency**	**%**	**Rank**
Excessive rainfall	175	96.2	1st	106	91.3	1st
Insect, birds and disease	156	85.6	2nd	94	81.0	2nd
Lack of output market	148	81.5	3rd	90	77.6	3rd
Storage problem	147	80.8	4th	89	76.7	4th
Poor price	135	74.0	5th	81	69.8	5th
High cost of inputs	110	60.3	6th	66	56.9	6th
Adulterated seed	87	47.9	7th	53	45.7	7th
Germination failure	19	10.3	8th	11	9.5	8th

Multiple responses were allowed

DISCUSSION

The functional form that is, Cobb-Douglas used in the estimation of production and inefficiency is an adequate representation of the data. The diagnostic statistics of Cobb-Douglas frontier function revealed that values of the gamma statistics 0.460 and 0.598 for female and male respectively are attributable to farmers' inefficiency factors. The result indicated that technical inefficiency effects were present in strawberry production in the study area. The estimated parameters of sigma-squared were significantly different from zero at 1 and 5 % level of probability, indicating a good fit and the correctness of the specified distributional assumption of the composite error term. The generalized likelihood ratio statistics for both female and male farmers exceeds the critical chi-square values at 1 % level of significance. The log likelihood ratio value represents the value that maximizes the joint densities in the estimated model.

The efficiency variable showed that the estimated coefficient for farm size for female (0.740) and male (0.005) were positive and statistically significant at 1 % level of probability. This implies that as more land is being put to strawberry production the output level will increase. Strawberry production in the area is subsistent and traditional in nature; therefore access to land would determine the level of strawberry output. This further implied that there is the possibility of increasing strawberry yield when more land is put into its production especially among women.

The estimated coefficient of labour for female (0.389) and male (0.083) was positive and significant at 1 % level of probability in either case. These show that labour exerts positive and significant influence on strawberry output. The implication of this is that strawberry output would increase if strawberry farmers in the study area increase the use of labour.

The estimated coefficient for seed was 0.568 for female is positive and statistically significant at 5 % level. The estimated 0.568 elasticity of seed implies that increasing seed by one unit will increase strawberry output of the female farmers by less than 1% which means, all things being equal the output is inelastic to changes in the quantity of seed used. The significance of seed quantity is however, due to the fact that seed determines to a large extent the output obtained. If correct seed rates and quality seeds are not used, output will be low even if other inputs are in abundance.

The coefficients of fertilizer (-0.517) was negatively related to the output of the female farmers and statistically significant at 1 % probability level. This implies that a unit increase in the quantity of fertilizer will decrease the output of the farmers by 0.52 units and this could be attributed to over utilization of these resources. Although, fertilizer is a major land augmenting input because it improves the quality of land by raising yields per hectare. This study is in contrary with the finding of Sani and Oladimeji (2017) who observed that the estimated coefficient of fertilizer was positive.

The results further showed that agrochemical was positively related to strawberry yield under female at 5 % level of significant, while under male it was negative at 1 % level. The reason for the ineffectiveness of agro-chemical on male strawberry could be non-adherence to specification on mixing formula and wrong time of application. The chemical could be washed away by rain immediately after its application, making it ineffective. The implication of this is high incidence of pest and disease infestation which invariably lead to low yield in male strawberry production.

The inefficiency variable revealed that age of the male farmers was positive and significant at 5 % level of probability and not significant for female farmers. These imply that as the age of farmer increases technical inefficiency also increases. This may be due to the fact that the older the farmer, the less the willingness to take risk and adopt innovation that may increase strawberry output. Also older farmers are less receptive to innovation unlike younger farmers.

Years of education showed a negative relation with technical inefficiency and significant at 5 % level for female and 10 % for male strawberry farmers. The negative coefficient of education reveals that a high level of education results in a reduction in technical inefficiency of strawberry farmers. Furthermore, such farmers respond fast to new technologies and adopt use of correct management practices like timely sowing and weeding, the recommended amount, time and method of fertilizer application, recommended seed rate and other improved farm management practices. Anon (2006) noted that education is one of the socio-economic variables that greatly affect farmers' decision to accept and adopt modern farm technologies.

Experience in strawberry production was negative and significant at 5 % for female farmers. This shows that increase in experience in female strawberry production would reduce technical inefficiency. Farmers' experience could be associated with skill accumulation which could enhance productivity and resource allocations thereby reduce technical inefficiency. This result is in line with the findings Sani and Oladimeji (2017) and Idi *et al.,* (2019) who argued that farmers with years of experience were more technically efficient than those with few years and that increase in farming experience provides better knowledge about the production environment in which decisions are made.

Household size showed a negative relation with predicted technical inefficiency and is significant at 5 % level for male strawberry farmers and not significant for female. A

large household size may lead to a decrease in technical inefficiency because families with fewer dependents are likely to be more financially equipped and hence able to spare resources for the purchase of fertilizer and certified hybrid seed for strawberry production *ceteris paribus*. The implication of this is that male strawberry farmers whose household sizes are more than female strawberry farmers are technically efficient. This may be due to farmer's access to family labour because as the number of people in a household increases, a pool of family labour becomes available.

The sum of estimated input elasticities of production for male strawberry a farmer on farm size, labour, fertilizer and agro-chemicals was 0.912 and is less than 1, indicating that strawberry output increased less than proportionately with any increase in farm size, labour, fertilizer, seed and agro-chemicals for female strawberry producer. On the contrary, the sum of the elasticities of production of the five variable inputs for female was 1.556 indicating increasing returns to scale. As an entity, the elasticity of production for agro-chemical was negative for male (less than zero) indicating that output decreases as farmer uses more of agro-chemical for male. The estimated elasticities of production for farm size, labour were also less than a unit for male while agro-chemicals for male was negative indicating that output would decrease with increase in the use of agro-chemicals for male. This implied that both groups of strawberry production are in stage one, hence the need for continuous use of additional variable inputs. This is important because in addition to knowing the number of efficient enterprise, degree of inefficiency and optimal scale of operation, it is also vital to know how many farms are operating under increasing returns to scale (IRS), decreasing returns to scale (DRS) or operating at optimal scale

The increasing returns to scale of 1.556 indicate that with a percentage increase, all the inputs that showed positive relationship results in a greater percentage increase in output. About 56% of strawberry female farms were found operating with increasing return to scale (IRS) or sub-optimal scale, about 91% male's farms were operating with decreasing return to scale (DRS) or supra-optimal scale, that is the farms were operating above the optimum scale, suggesting that these farms could increase their technical efficiency by reducing their production levels.

The constraints faced by the female and male strawberry farmers were ranked from most critical to the least. About 96.2 % female and 91.3 % of male strawberry farmers agreed that excess rainfall and flooding makes the farms inaccessible and prevents maximum use of the land for strawberry production. It is important to mention that strawberry production is hydrophobic plant.

About 85.6 % of female and 81 % of male strawberry farmers had problem of pest and disease infestation and this problem was ranked second among the constraints facing the farmers. This problem could be associated with poor varieties of strawberry seed that are being used by 85.5 % and 81 % of the male and female farmers respectively which is susceptible to pest and disease infestation. Also poor cultural practice could also be the reason why farmers faced this problem in the study area. The preponderance of this constraint is more during rainy season hence; the effect is greater on men.

About 81.5% of female and 77.6% of male farmers complained about lack of market for strawberry output. Markets for agricultural inputs and outputs are often missing and unreliable for smallholder farmers, which makes the acquisition of agricultural resources difficult and the supply of market services also becomes

limited. The consequent effect of poor storage and bad road conditions which are often impassable during the rainy season also does not help matters. This situation confirms the farmers' heavy reliance on middlemen who come and procure the commodity from the farm, albeit at a lower price than what the market is offering. It is believed that lack of infrastructural facilities prompt farmers to rely heavily on middlemen is typically poor, markets for agricultural inputs and outputs are often missing and unreliable for smallholder farmers.

In addition, 80.8 % of female and 76.7 % of male farmers had problem of storage and this problem was ranked third among the constraints faced by the farmers. Poor storage could increase post-harvest losses; it could also reduce quality and quantity of strawberry which result to low market value as well as low income to the farmers. Local method of storage adopted by the farmers are not effective, hence the tendency is to sell their produce immediately after harvest at a low price. Poor price is also a major problem confronting female and male strawberry farmers in the study area. 74 % of female and 69.8 % of male farmers had this problem. This was ranked second among the constraints faced by male farmers while it was first constraint among the problem faced by female farmers. This problem mostly occurs at harvest time due to glut that reduces market price. The problem could also be due to poor market or imperfect nature of most rural market in the study area. Local strawberry dealers buy directly from the farmers at farm site with low price, and later sell to consumers at high price.

High cost of inputs like seed, fertilizer and labour: This is a constraint of strawberry producers with about 60.3 % for female and 56.9 % for male. According to the respondents, due to high cost of improved seed they make use of seeds from their previous harvest which is not reliable and can jeopardize improved and sustainable productivity. Also, Farmers perceived that high cost of fertilizer constraints, according to the respondent fertilizer is made available when farmers are far into the production period, sometimes at the middle of the raining season and family labour was predominant in the study area and that is why there was acute shortage of labour. According to the farmers, during active period of production, every household would have been engaged in his family farm work. The demand for labour is normally very high and expensive during the peak period of land clearing, ridging, harvesting, processing and weeding.

Other constraints: About 47.9 % of female and 45.7 % of male farmers are faced with the problem of adulterated strawberry seed. This problem could be linked to the source of seeds. Most farmers procure their seed from fake agro-input dealers that sell adulterated strawberry seed. Problem of germination failure could also be due to poor seed varieties that are being used by the farmers. In addition, farmers could not access fertilizer at the right time of need, and where it is available, the price is too high for them to purchase.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it is evident here that, the female and male strawberry farmers did not reach the frontier of production with a technical efficiency. Age, education and household size were major socio-economic determinant of technical efficiency for both female and male strawberry producers. These factors tend to reduce inefficiencies as we improve on them. However, the major constraints faced by strawberry farmers in the area include excessive rainfall, insect, bird and disease infestation, lack of output market, problem of storage, poor harvest and high cost of inputs. Based on the findings of this study, the following recommendations are made: It is

recommended that agro-based industries and non-governmental organization should be encouraged by the local government to support research and production of strawberry products for commercial purposes. It was observed from the result that no single strawberry farm is able to attain the frontier of strawberry production, hence there is the presence of inefficiency.

In other to raise efficiency level, there is need for the commitment of non-governmental organization and government in the provision of inputs such as fertilizer, agrochemicals, seeds and farm implements at affordable rates. Fertilizer is one of the inputs that positively and significantly influence strawberry production in the study area. Therefore, government should ensure timely and adequate supply of fertilizer to farmers through its e-wallet programme at affordable prices in order to enhance the production of this crop. The most severe problems encountered in strawberry production were excess rainfall, insect, bird and disease. These constraints constitute serious impediments to strawberry production and need to be addressed adequately before strawberry production can be improved in the study area.

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