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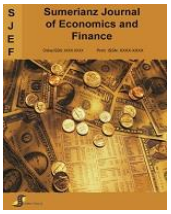

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Impact of Improved Ginger Technologies on the Income of Cooperative Farmers in Southern Kaduna, Kaduna State, Nigeria

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Abstract

This study examined the impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State. The study study specifically investigated the effect of Credit, agrochemicals, extension programmes, mechanization of ginger production and farmers' access to ginger seedling on the income of the farmers. The population of this study was made up of 3020 members of cooperative societies in the area of study. A sample of 353 was determined for the study out of a population 3020. A structured questionnaire was administered to 353 respondents only 301 responded to the questionnaire. The data collected using the questionnaire was analysed using descriptive statistics like frequency and percentages and also inferential statistics such as regression analysis and t-test statistics. All analysis was conducted using SPSS version 23. Findings revealed that all the five coefficients (Credit, agrochemicals, extension programmes, mechanization of ginger production and farmers' access to ginger seedling) have significant influence on the income of the farmers. The study also found that the joint effect of the explanatory variables- independent variables- in the model account for 0.860 or 86.0% of the variations in the impact of improved ginger technologies on the income of cooperative farmers. Based on the findings of this study, the following recommendations are made: With respect to credit, the study recommends that there is need for the development of supervised agricultural credit scheme by the ministry of agriculture that will ensure consistent availability of credit for ginger production. The farmers need to sustain the adequate use of agrochemicals to ensure increase production and productivity. The ministry of agriculture should carryout regular extension programme to the farmers to ensure adequate diffusion of modern ginger technologies by the farmers. With respect to mechanization of ginger production, there is need for the government to partner with the farmers to ensure full mechanization of ginger production in the area. There is need for adequate farmers' access to ginger seedlings by the ministry regulating agricultural production in the state. This will help to enhance sales performance and improve quality and market share of private labels.

Keywords: Ginger; Ginger technologies; Cooperative farmers; Credit; Agrochemicals; Extension programmes; Mechanization.

1. Introduction

Ginger (*ZingiberofficinaleRosc.*) is one of the cash crops in Nigeria with export potential becuse of its high demand in the global market. According to Mallam (2015) and Folorunso and Adenuga (2013), ginger belongs to the family of *Zingiberaceae*. It is a slender perennial plant with thick and branched underground stem (rhizome). It is a spice and root crop grown as cash crop in Nigeria, mostly grown in the southern part of Kaduna State (Northern Nigeria) for export. Asumugha (2002), stated that the current major five ginger exporting countries have been China, Nigeria, India, Jamaica, and Brazil. Among the five ginger expoting countries, Nigerian ginger is known to produce the highest quality essential oils mainly oleoresin and gingerol. These are valued for their aroma and pungency. Ginger cultivation in Nigeria dates back to 1927 when it was believed to have been introduced from Southeast Asia. Among the spices (pepper, ginger, onions, and chillies), it is the only one that is grown on a commercial scale for export. Ginger is mainly exported in split-dried form, while exports of fresh ginger are negligible (Mallam, 2015).

Nigeria was among the countries that the global production of ginger in 2008 was over 1.4 million metric tons (MT) and the major exporting country to US in 2007 (Folorunso and Adenuga, 2013). Out of over 1.4 million metric tons (MT) of ginger produced annually, Nigeria produces an average of 50,000 metric tonnes of fresh weight ginger per annum. About 10% of the produce is consumed locally as fresh ginger while the remaining 90% is dried for both local consumption and export. 20% of the dried ginger is consumed locally for various uses and 80% is exported (Ezeagu, 2006; Folorunso and Adenuga, 2013).

The global demand for ginger was neccessitated by the various uses of the ginger crop. it is used domestically for spicing food and also for local medicinal purposes. It is also used by pharmacuetical, beverage and cusmetics companies, for the production of drugs,beverages and cusmetics respectively. According to Mallam (2015) ginger is not only an income earner for individual farmers, it is as well a foreign exchange earner for the country, and the

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dried products are the major forms of which ginger is traded internationally. It also has various uses, which ranges from been used as spices in soups, confectonaries, zingiberone (anti-helmintic) from *Zingiberofficinale*, *oloresine* are among the extracts used for medicinal purposes (Mallam, 2015). Fresh ginger is consumed as vegetable. Ginger powder is used in making ginger beer, wine, and baked foods. The essential oil obtained from ginger is used in the food and perfume industries. Oleoresin is the total extract, which contains both volatile oil and pungent extractions. It is used in many types of baked foods, sauces, and alcohol beverages. Ginger is widely used for flavouring a great variety of foods. In western countries, ginger is used for culinary purposes. In Saudi Arabia, ginger is used mainly in the preparation of ginger coffee. In United States of America (USA), United Kingdom (UK) and Canada, ginger is widely used in meat processing industries. Ginger is extensively used in winter for curing minor ailments like cough and cold. It is also prescribed as an adjunct of many tonic and stimulating remedies. Other uses include; culinary uses such as stews, pepper soups, etc; and Medicinal/Therapeutic uses such as ginger/lime/honey anti-malarial and anti-typhoid fever portion, ginger/garlic anti-hypertension tea (Mefoh, 2006). Ginger is used in the control of atherosclerosis in rabbits and nausea and vomiting and has confectionary and beverages uses as well used as ginger ale, ginger beer, meat flavouring and tendering, diary product and livestock feeds.

Despite the increased demand and uses of ginger in both local and global market, its production is perceived to fall short of the demand for the crop, thus creating a wide gap between the demand and supply of ginger in the market place. This short fall has neccesitated the need for the adoption of improved ginger tecnologies by cooperative farmers to improve their income as a result of the incresing demand for the crop in the market place. Available literature noted that the government of Kaduna state has introduced innovation in ginger production by encouraging the farmers to join cooperative societies so that they can access funding to increase production, mechanize ginger farming, access agrochemicals to protect their crops against various forms pests and diseases, increase the productivity of the farmers and consequently the income of the farmers; and also avail themselves the opportunity of gaining from extension programme and access improved ginger seedlings. However, government effort at innovating ginger production has not been clearly seen in the eyes of the masses. (Adegboye, 2011) who evaluated farmers' response to extension services on ginger production in Kagarko local government area of Kaduna State, stated that the production of ginger like other crops in the country is majorly through poor farmers. The business has not been profitable for them as it ought to be as a result of numerous socio-economic problems facing them. They depend on the use of crude implements, old varieties of crops and personal saving as the only source of finance. This assertion warrants and empirical probing to ascertain the the impact of improved ginger technologies on the income the cooperative farmers.

1.1. Statement of the Problem

This study was necessitated by the perceived shortfall in the income of ginger farmers despite government in financing agricultural production in Kaduna state. As noted earlier, the government of Kaduna state has introduced innovation in ginger production by encouraging the farmers to join cooperative societies so that they can access funding to increase production, mechanize ginger farming, access agrochemicals to protect their crops against various forms pests and diseases, increase the productivity of the farmers and consequently the income of the farmers; and also avail themselves the opportunity of gaining from extension programme and access improved ginger seedlings. However, government effort at innovating ginger production has not been clearly seen in the eyes of the masses. A number studies have been carried out by researcher on ginger productions in Kaduna State. For example, (Ayodele and Sambo, 2014) examined the production, constraints and efficiency of production amongst the predominantly poor, rural farmers in the ginger production areas of southern Kaduna, Nigeria; (Shehu *et al.*, 2013). examined the effect of socio-economic factors on the adoption of ginger (*Zingiber officinal*) production technologies in Southern Kaduna State of Nigeria, (Folorunso and Adenuga, 2013) estimated the technical efficiency of Ginger crop production in Jaba Local Government Area, Kaduna State, Nigeria; (Adegboye, 2011) evaluated farmers' response to extension services on ginger production in Kagarko local government area of Kaduna State and Mallam (2015) assessed the response of ginger farmers to extension service delivery in Kaduna State. However, no identifiable study was on impact of improved ginger technologies on the income of farmers and the studies did not investigate cooperative societies. A more related study was that of Folorunso and Adenuga (2013) who estimated the technical efficiency of Ginger crop production in Jaba Local Government Area, Kaduna State but the study did not give accentuation to how innovation could influence the income farmers in the area. This study therefore fills the knowledge and literature by examining the impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State.

1.2. Objectives of the Study

The main objective of the study is to examine the impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State. Specifically, the study intends to: Ascertain the effect of credit on the income of the cooperative farmers, Examine the effect of agrochemicals on the income of the cooperative farmers, Ascertain the effect of extension programmes on the income of the cooperative farmers, Determine the effect of mechanization of ginger production on the income of the cooperative farmers, and Ascertain the effect of farmers' access to ginger seedling on the income of the cooperative farmers.

1.3. Empirical Literature

Ayodele and Sambo (2014) examined the production, constraints and efficiency of production amongst the predominantly poor, rural farmers in the ginger production areas of southern Kaduna, Nigeria. Results showed that,

the elasticity of production, farm size (1.21), ginger seed (2.19), fertilizer (0.06) and labor (0.09) are positive and had a significant effect on ginger production in the study area. The estimated coefficient of age (0.004), farming experience (-0.003), education (-0.02) and ginger variety (-0.28) were significant; while that of household size (0.007) was not significant. The fore-most problems affecting ginger production are risk and uncertainties (81.56%), inadequate supply of fertilizer (80.31%), lack of modern farm equipment (76.25%), and lack of credit facilities (74.1%). The technical efficiency of ginger farmers ranged between 0.74 and 1.00; with a mean technical efficiency of 0.82. Shehu *et al.* (2013) examined the effect of socio-economic factors on the adoption of ginger (*Zingiber officinal*) production technologies in Southern Kaduna State of Nigeria using descriptive and inferential statistics. The result revealed that educational level and scale of farming influenced the adoption of ginger farming innovations at $P \leq 0.05$. Using a cross sectional data obtained through a multistage sampling technique, Folorunso and Adenuga (2013) estimated the technical efficiency of Ginger crop production in Jaba Local Government Area, Kaduna State, Nigeria and further examined the factors that determined the differential in efficiency index. A total of 78 Ginger crop farmers in the study area were randomly selected for the study. The stochastic frontier production model was used in the analysis to determine the relationship between output and the level of input used in the study area. The empirical results revealed that farm size. Planting materials, fertilizers and hired labour were statistically significant at 5% level while chemicals and family labour were not statistically significant. The estimated gamma parameters (γ) of 0.37 indicated that 37% of the total variation in total output was due to technical inefficiencies of the respondents. The mean technical efficiencies (χ) level was 0.68. It was therefore concluded that there is scope for increasing the technical efficiency of ginger crops production by 0.68% with the present technology. Therefore the study confirmed that increased land, planting material, fertilizer and hired labour can be used in the area by the farmers in ginger production.

Adegboye (2011) evaluated farmers' response to extension services on ginger production in Kagarko local government area of Kaduna State. Only 2.7% of the respondents pointed out that extension worker visited them monthly while 72.7% claimed they had never seen the extension agents on their farm. Only 9.1% of the respondents adopted improved cutting and none of them adopted any improved processing technique. However, 90.0% of the respondents used fertilizer and 100% mulched ginger even though information was not given on them by extension workers. There was a significant ($p < 0.05$) relationship between frequency of extension agent's contact with the farmers and the farmers response to extension services on ginger production ($\chi 2 = 84.672$). Extension contact was discovered to be very low in the area. Two major problems identified by the respondents were finance and marketing problems. Makarau *et al.* (2013) examined the socio-economic factors that influence the adoption of ginger(Zingiber fficinale) farming Technologies in Samaru Zone of Kaduna State Agricultural Development Project (KADP) using descriptive and inferential statistics. The result also revealed that educational level and scale of farming influenced the adoption of ginger farming innovations at $P \leq 0.05$. The major constraints to adoption of ginger farming innovations identified were inadequate credit/capital (43.30%) and poor prices (37.30%). It was concluded that the level of education attained by a farmer and his/her scale of farming ease the farmers' ability to adopt improved ginger farming innovation hence a higher productivity level. Mohammed *et al.* (2016) determined relationship between farmer's socio-economic variables and profitability in chilli pepper production, and to determine the profitability in chilli pepper producers in Kaduna state, Nigeria. The result shows that 98.5% of chilli pepper farmers financed their production from personal savings. The data revealed that (58.5%) of chilli pepper farmers have extension visit. The result revealed that chilli pepper production is profitable in the study area. Based on the findings of the study, it can be concluded that investment in chilli pepper production is a viable enterprises for income generation, poverty alleviation, job creation and improvement of food security to every household since it is a profitable venture and it was also found that education was an important factor in increasing the profitability in chilli pepper production. Mallam (2015) assessed the response of ginger farmers to extension service delivery in Kaduna State using t-test and multiple regressions. The study revealed that the socioeconomic characteristics of the respondents have positive effects on their response to extension service delivery with the exception of age which showed a negative effect on their response at 5% level of probability. The major constraints were price fluctuation, inadequate extension agents and poor transportation.

In the final analysis, related studies on the impact of improved ginger technologies among cooperative farmers in Southern Kaduna, Kaduna State have been investigated from different standpoints. For example, Ayodele and Sambo (2014) examined the production, constraints and efficiency of production amongst the predominantly poor, rural farmers in the ginger production areas of southern Kaduna, Nigeria; (Shehu *et al.*, 2013) examined the effect of socio-economic factors on the adoption of ginger (*Zingiber officinal*) production technologies in Southern Kaduna State of Nigeria, (Folorunso and Adenuga, 2013) estimated the technical efficiency of Ginger crop production in Jaba Local Government Area, Kaduna State, Nigeria; (Adegboye, 2011) evaluated farmers' response to extension services on ginger production in Kagarko local government area of Kaduna State and Mallam (2015) assessed the response of ginger farmers to extension service delivery in Kaduna State. However, no identifiable study was on impact of improved ginger technologies on the income of farmers and the studies did not investigate cooperative societies. A more related study was that of (Folorunso and Adenuga, 2013) who estimated the technical efficiency of Ginger crop production in Jaba Local Government Area, Kaduna State but the study did not give accentuation to how innovation could influence the income farmers in the area. However, as a missing gap in the literature, which this study intends to fill, is to examine the impact of improved ginger technologies on the income cooperative farmers in Southern Kaduna, Kaduna State.

2. Methodology

2.1. Area of Study

The area of the study is southern part of Kaduna State (Northern Nigeria) Kaduna located in the Guinea savannah region of Nigeria. The southern Kaduna consist of the following twenty three local government,stated as follows, Birnin-Gwari, Chikun, Giwa, Igabi, Ikara, Jaba, Jema'a, Kachia, Kaduna North, Kaduna South, Kagarko, Kajuru, Kaura, Kauru, Kubau, Kudan, Lere, Makarfi, Sabon-Gari, Sanga, Soba, Zango-Kataf, Zaria with a population of 2,587,898 people representing 42.66% of the state population (National Population Commission, 2006).

The climate is predominantly tropical with two distinct seasons (dry and wet seasons). The rainy season starts from April to October with August and September as the wettest months having an annual average temperature of 23-28°C. The Southern Kaduna State is predominantly agricultural with over 75 percent of the active population engaged in farming as their primary occupation (Shamah, 2009). The major cash crop is ginger where commercial quantities (1,728.930 Metric tons) are produced annually with Jaba, Jema'a, Kachia, Kagarko and Zangon Kataf Local Government Areas as the major areas of production (Kaduna State in Perspective, 2009).

2.2. Population of the Study

The population or unit of analysis of the study consists of cooperative farmers in Southern Kaduna, State. A non-probability sampling - purposive sampling - was used to select the local government of cooperative members in southern Kaduna, state as the population because of the dominance of cooperative farmers in the areas. The researcher was able to obtain the records of cooperative farmers association with registered names through the Kaduna state cooperative farmers association. A total of five hundred registered ginger farmers cooperative societies with membership strength of 2980 were obtained from the records of cooperative farmers association in southern Kaduna, state

2.3. Sample Size and Sampling Technique

A purposively sampling technique was employed to select one cooperative societies each from the eleven Local Government Areas in Southern Kaduna, Kaduna. The select cooperative societies from the eleven Local Government Areas in Southern Kaduna, Kaduna have membership strenght of 353. Considering the size of the sample, all the members were included in the study as a sample.

2.4. Analytical Tools

Data collected were analyzed using descriptive statistics (frequencies, percentages, mean, and standard deviation) and the inferential statistics such as t-test statistics and the linear regression model. The demographic profiles were processed using descriptive statistics. Objectives of the study were processed using mean and standard deviation and the regression model of the Ordinary Least Square (OLS). T-test and F-test statistics were used to test the hypotheses of the study and the overall fitness of the model. All the analysis were done using SPSS version 23. Linear regression model of the Ordinary Least Square (OLS) approach was used to analyse the objectives in order to ascertain the influence and also determine the relationship between the independent variables and dependent variable in the conceptualised model of the study. The use of Ordinary Least Square (OLS) is informed by the fact that under normality assumption for α_i, the Ordinary Least Square (OLS) estimator is normally distributed and are said to be best, unbiased linear estimator (Gujarati and Porter, 2008).

Thus, the model of this study is stated as follows:

The functional form of the model is

$$I = f(CR, AG, EP, MGP, FAGS) \quad \text{.....(1)}$$

The mathematical form of the model is

$$I = \beta_0+\beta_1 CR +\beta_2 AG +\beta_3 EP +\beta_4 MGP +\beta_5 FAGS \quad \text{.....(2)}$$

The econometric form of the model is

$$I = \beta_0+\beta_1 CR +\beta_2 AG +\beta_3 EP +\beta_4 MGP +\beta_5 FAGS +\alpha_i \quad \text{.....(3)}$$

Where;
I = Income of Ginger Farmers
CR = Credit
AG = Agrochemicals
EP = Extension Programmes
MGP = Mechanization of Ginger Production
FAGS = Farmers' Access to Ginger Seedling
β_0 = Intercept of the model
$\beta_1 - \beta_5$ = Parameters of the model
α_i = Stochastic error term

3. Data Presentation and Analysis

3.1. Socio-economic Characteristics of Respondents

Table-1. Distribution according to respondents' gender

Options	Frequency	Percentage	Cum. Percentage
Female	218	72.4	72.4
Male	83	27.6	100.0
Total	301	100.0	

Source: Field Survey, 2017

With respect to the gender of the respondents as shown in table 1, 72.4% of the respondents are females while 27.6% are males. The implication is that females are perceptably more disposed and engaged in ginger production than the males in the societies selected for the study. Which invariably will influence the result of the study.

Table-2. Distribution according to respondents age

Options	Frequency	Percentage	Cum. Percentage
18-29	11	3.7	3.7
30-39	23	7.6	11.3
40-49	173	57.5	68.8
50-59	76	25.2	94.0
60-70	18	6.0	100.0
Total	301	100.0	

Source: Field Survey, 2017

Table 2 shows the respondents age distribution. Majority of the respondents fall within the age bracket of 40-49 years. This constitutes 57.5% of the respondents. Over 80% of the respondents are above 40years age. The implication is that the propensity to engage more ginger production increases with age.

Table-3. Distribution According to Respondents Marital Status

Options	Frequency	Percentage	Cum. Percentage
Maried	249	82.7	82.7
Divorced	6	2.0	84.7
Single	28	9.3	94.0
Widowed	18	6.0	100.0
Total	301	100.0	

Source: Field Survey, 2017

Table 3 shows the marital status of the respondents. 82.7% of the respondents are married. The implications is that as the cooperative members become married their responsibility increases, thus, informing their decision to be more engaged in other to fend for their increasing household. 9% of the respondents are single, 6% of the respondents are widowed while 2% of the respondents are divorced.

Table-4. Distribution according to respondents' educational qualification

Options	Frequency	Percentage	Cum. Percentage
Not Educated	223	74.1	82.7
FSLC	26	8.6	8.6
WASSC	25	8.3	89.7
OND/NCE	21	7.0	98.0
HND/BSC etc	6	2.0	100.0
Total	301	100.0	

Source: Field Survey, 2017

As shows in Table 4, majority of the respondents had no formal education this is indicated by 74.1% of the respondents. Suggesting that mojority of the of the respondents lack the needed intellectuallity and higher education which invariably will affect their adoption behaviour of improved ginger production. 8.6% has first school leaving certificate, 8.3% had WASSC 7% had OND/NCE while 2% of the respondents have HND/B.Sc.

Table-5. Distribution according to respondents household size

Options	Frequency	Percentage	Cum. Percentage
1-3	18	6.0	6.0
4-6	194	64.5	70.4
7-9	79	26.2	96.7
10-12	7	2.3	99.0
13-15	3	1.0	100.0
Total	301	100.0	

Source: Field Survey, 2017

Table 5 shows the respondents household size. Over 60% of the respondents had household size of between 4-15people. Indicating a large family size which is typical of a developing country like Nigeria. Large family has high dependency ratio and has more hand for cheap labour. Howver, majority of the respondents have household size of 4-6 people, which is also sizable.

4. Regression Analysis Result

Table-6. Regression Result on impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State

Model	B	Std. error	T	Sig.
Constant(C)	25.474	0.891	28.579	0.000
Credit	2.956	0.188	15.749	0.000
Agrochemicals	1.8638	0.467	3.991	0.047
Extension Programmes	0.689	0.062	11.143	0.025
Mechanization of Ginger Production	1.604	0.221	7.254	0.000
Farmers' Access to Ginger Seedling	0.355	0.121	2.931	0.004
R	0.929			
R^2	0.863			
Adj. R^2	0.860			
F-statistic	331.601			0.000

Source: Field Survey 2017
Dependent Variable: Income of Ginger Farmers

To ascertain the impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State the weighted mean of the seven independent variables were regressed on the dependent variable to enable us determine the nature of relationship between the dependent and independent variables, effect/impact of the five independent variables on the dependent variable, the overall fitness of the model using the F-statistics and probability value and the level of significance of the independent variables in influencing the dependent variables using the t-test and probability value. The table above shows the regression result. Table 6 showed the precision of the model which was analyzed using economic a priori criteria and statistical criteria.

4.1. Evaluation Based on Economic A Priori Criteria

Evaluation using this criterion enables us to determine the nature of relationship between the dependent and independent variables. In this case the sign and magnitude of each variable coefficient is evaluated against theoretical or economic a priori criteria/expectations. As shown in the table 6, it is observed that the regression line has a positive intercept as presented by the constant (c) = 25.475. This means that if all the variables are held constant or fixed (zero), the income of farmers increases by 25.5%. The result also conforms to the a-priori expectation. This states that the intercept could be positive or negative, so it conforms to the theoretical expectation. Credit has a positive relationship with income of cooperative farmers. This implies that the Credit and income of cooperative farmers increases in the same direction. That is to say that credit has a direct and positive relationship with income of cooperative farmers. In other words a ₦1.00 increase in farmers access to credit will bring about a ₦39.90 increase in the income of the farmers. Agrochemicals has a direct and positive relationship with income of the farmers. In other words a ₦1.00 increase in quantity of agrochemicals purchased will bring about a ₦295.6 increase in the income of the farmers. Extension Programmes has a direct and positive relationship with the income of the farmers. As the Extension Programmes increases it increases the income of the farmers. In other words an increase in the number of extension programmes will bring about a ₦93.0 increase in the income of the farmers. Mechanization of Ginger Production also have direct and positive relationship with the income of the farmers. Therefore, a ₦1.00 increase in the cost of Mechanization of Ginger Production will bring about a ₦168.4 increase in the income of the farmers. On the other hand, Farmers' Access to Ginger Seedling have positive relationship. As Farmers' Access to Ginger Seedling increases, the income of the farmers also increases.

5. Discussion Based on Statistical Criteria

In order to evaluate the impact of improved ginger technologies on the income of cooperative farmers in Southern Kaduna, Kaduna State, the analysis was also done based on statistical criteria by applying the coefficient of determination (R^2) and the F–test. In general the joint effect of the explanatory variables- independent variables- in the model account for 0.860 or 86.0% of the variations in the impact of improved ginger technologies on the income of cooperative farmers. This implies that 86.0% of the variations in the income of cooperative farmers are being accounted for or explained by the variations in Credit, agrochemicals, extension programmes, mechanization of ginger production and farmers' access to ginger seedling. While other independent variables not captured in the model explain just 14% of the variations in the income of the farmers.

All the five coefficients (Credit, agrochemicals, extension programmes, mechanization of ginger production and farmers' access to ginger seedling) have significant influence on the income of the farmers. Based on the findings of this study, the following recommendations are made:

1. With respect to credit, the study recommends that there is need for the development of supervised agricultural credit scheme by the ministry of agriculture that will ensure consistent availability of credit for ginger production.
2. The farmers need to sustain the adequate use of agrochemicals to ensure increase production and productivity.
3. The ministry of agriculture should carryout regular extension programme to the farmers to ensure adequate diffusion of modern ginger technologies by the farmers.
4. With respect to mechanization of ginger production, there is need for the government to partner with the farmers to ensure full mechanization of ginger production in the area.
5. There is need for adequate farmers' access to ginger seedlings by the ministry regulating agricultural production in the state. This will help to enhance sales performance and improve quality and market share of private labels.

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