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# Analysis of Cassava Value Chain in Kebbi State, Nigeria

**Kaka, Y.* Gindi, A. A., and Abdussalam A. J.**

Department of Agricultural Economics and Extension, Faculty of Agriculture, Kebbi State University of Science and Technology, P.M.B. 1144, Aliero, Kebbi State, Nigeria.
*Corresponding Author E-mail: ykgw72@gmail.com

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**ABSTRACT:** The study evaluated cassava value chain in Kebbi State, Nigeria. Data were collected using a well-structured questionnaire. Descriptive statistics, value chain mapping and budgetary techniques were employed for the data analysis. The results showed that the majority (89.33%) of cassava farmers were male households and they were within the active age group given a mean of 47 years with a mean household size of 5 persons. About 74.33% of the farmers were married and had an average farming experience of 9years while about 51.33% of them had formal education. The cassava farmers had an average farm size of 1.3 ha. Based on the results from the value chain survey, the cassava value chain development was mapped to demonstrate the areas that are undeveloped or need improvement. The results of budgetary analysis revealed that the net farm income was ₦168,122.51 with the return on investment of ₦1.65. This implies that for every ₦1 invested in the business, there is a return of 65k.Again, inadequate capital for start-up, unstable price, and high cost of inputs were the main constraints faced by the farmers in the area. From the findings, there is a need for the cassava farmers in the study area to form a cassava farmer corporative to solve problems of accessibility to loan, resource allocation, dissemination of information and other challenges as this will increase their productivity and output.

**Keywords**: Cassava, analysis, value chain, development, actors, profit, constraints
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## INTRODUCTION

Cassava *(Manihot esculenta Crantz)*, is a woody shrub cultivated extensively as an annual crop although it is a perennial plant (Wikipedia, 2022) It is majorly grown for its storage roots and its importance is increasing in Africa because of its diverse uses, tolerance to environmental stress such as drought, low soil fertility and its relatively high productivity where many other crops fail (McCormick and Schmitz, 2001).

The International Center for Tropical Agriculture (CIAT) has referred to the crop as the “Rambo of food crops” because of its ability to thrive in warmer climates. This particular feature of cassava will be found to be useful in the fight for food security and in combating the possible effect that the expected temperature rise by 2 degrees Celsius in Africa by 2030, will have on food availability (Cecilia, 2012).

It is predominantly consumed as food, but also used as animal feed and raw materials for related industries. Cassava is classified as 'sweet' when the cyanogenic glucoside (CG) content is less than 100 mg kg-1 fresh weight, while cultivars with CG content of 100–500 mg kg-1 fresh weight are referred as 'bitter' (Alves, 2002). The leaves serve as vegetable in at least 60 % of the countries in sub Saharan Africa (SSA), providing an important source of vitamins (B1, B2 and C), carotenoids, minerals and proteins, with crude protein content ranging between 17 – 40 %, depending on variety, stage of maturity, soil fertility, harvesting frequency and climate (Ravindran, 2021; Latif and Muller, 2015).

Cassava is the highest produced crop in Nigeria at 60 million metric tonnes (FAOSTAT, 2022) but, it is surprisingly not among the top 10 exports (Khadijat, 2021). There exists huge opportunities yet to be exploited to extend the Nigerian cassava industry to global markets and harness the trade opportunities to achieve economic growth and development. Strategies towards achieving this may be through a critical under study of the industry to identify areas of strengths and weaknesses, forestall

potential threats and utilize opportunities both locally and globally. These will ensure expansion in trade, improved cassava supply chain, identification of economical vendors and fast growing markets.

Qualities of cassava produced in Nigeria - such as high beta-carotene content which is a precursor to Vitamin A, excellent garri and fufu quality, regular shapes etc., are unique selling propositions that should come in handy in the marketability of cassava. If the right systems are put in place, from the total output of 60 million metric tonnes of cassava produced in the country based on 2020 estimates, Nigeria has the economic potential to generate revenues of over 427.3 million USD from domestic value-addition and derive income of 2.98 billion USD in exports of cassava yearly (PWC, 2020).

Presently, the federal government targets 18 billion USD annual returns from export of cassava products (Thisday, 2022).

Whereas this is very feasible, the country is yet to take full advantage of the much sought- after commodity. Production, processing and exportation of cassava and its by-products will do the Nigeria economy so much good as it will help to diversify the seemingly mono product economy, increase the country's revenue and create mass employment for the citizens. It will further foster entrepreneurship in the bid to meet with demands in areas such as, but not limited to machine manufacturing, logistics, transportation, packaging, waste management and consultation services.

As a food crop, cassava has some inherent characteristics which make it attractive, especially to the smallholder farmers in Nigeria. First, it is rich in carbohydrates especially starch and consequently has a multiplicity of end users. Secondly, it is available all year round, making it preferable to other, more seasonal crops such as grains, peas and beans and other crops for food security. Compared to grains, cassava is more tolerant of low soil fertility and more resistant to drought, pests and diseases. Furthermore, its roots are storable in the ground for months after they mature. Cassava is usually consumed in processed forms.

To promote awareness to the potential investors towards achieving the desired objectives in the Gear up for Dry Season Farming by Kebbi State Government and collaboration of Federal and Kebbi State Government to bolster food production, it became necessary to map the production, processing and marketing situation of cassava within the study area. This included the understanding who the smallholder Cassava farmers are, their production output per hectare and average price of cassava roots, production profit and Cassava processors and traders marketing margins. It is on this basis that the study was conducted to evaluate the prospects and challenges of cassava production, processing and marketing in Kebbi State, Nigeria.

## METHODOLOGY

### Study area

Kebbi State is blessed with rich agricultural potentials such as land, large water bodies and favorable climatic conditions for diverse agricultural production as well as a large proportion of the population within the productive age, which are vehicles for developing the state. Agriculture employs more than 80% of the state population. The State consists of 21 local government areas that make four Emirates: Gwandu, Argungu, Zuru and Yauri, with a total population of 4,629,880 (projected from 2006 census at 2.5% annual growth rate). It lies at the extreme North West corner of Nigeria on latitudes $10^0$ and $13^0$ 15' North and longitudes $3^0$ 30' and $6^0$ East. In the North and West, it shares borders with Niger and Benin Republics respectively, Niger State to the south and Sokoto and Zamfara State to the east and south-east. The State has two distinct seasons, rainy and dry seasons. The rainy season lasts between the months of May to October while the dry season lasts from November to April. The heaviest rainfall is experienced in the Months of August and September. The mean temperature is $23^0$C. It has a temperature ranges between $18^0$C and $42^0$C. The State lies within two ecological zones of Sudan Savannah and guinea savannah.

Kebbi State has a total land area of 3,698.69km$^2$ (3.7 million Hectares). The State is endowed with 420, 000 hectares of Fadama land out of which 170,000 hectares have shallow extractable aquifers suitable for year round irrigation. Five (5) distinct soil types ranging from sundry soils, ferruginous tropical soils, hydromorphic soils, lateritic soils and black cotton soils exists in the state. The water resources consist of surface and ground water. The sources of surface water include, River Niger, Rima river, River Zamfara, River Ka and River Shalla.

The major ethnic groups in the State are Hausa, Fulani, Dakarkari, Kambari, Zabarmawa, Gungawa, Fakkawa and Dukkawa. Farming is generally subsistence to commercial producing wide varieties of rain fed and irrigated food crops such as Millet, Sorghum, Cowpeas, Groundnut, Maize, Acha, Onions, Rice, Tomatoes, Cassava and other Vegetables. Other economic tree crops grown are Gum Arabic, Shea nut, Cashew, Mangoes and other tropical fruit trees. Animal rearing features prominently as means of livelihood to many homes in the State.

### Sampling procedure

Multi-stage sampling procedure was employed in arriving at the sample size of the study. At the first stage, contact was made with the ministry of agriculture and natural

resources, Kebbi State and a comprehensive list of all Cassava farming local government areas was obtained, thus out of the list obtained, ten local government areas was purposively selected due to higher concentration of Cassava Farmers. The second stage involve a random selection of five villages from each of the selected local government area making a total of fifty villages. The third stage was the random selection of six Cassava producing households from each of the selected village giving a total sample size of three hundred Cassava-producing households.

**Data collection**

Data collected from the Cassava farmers through a structured questionnaire administered by trained enumerators were: Information on socio-economic characteristics of Cassava producing households such as age, marital status, gender, household size, farming experience, level of education, extension contacts, etc. The input-output data such as quantity and cost of various Cassava production inputs, quantity of output obtained, price of output, number of farms and their sizes, cost of marketing, selling price and other relevant marketing information.

**Data analysis**

The data collected was analyzed using descriptive statistics in the form of tables, frequencies and percentages to describe socio-economic characteristics and challenges and constraints to Cassava production. Farm budgeting model in form of net farm income was employed to determine the profit realized by Cassava producers. Value chain map and development was used in mapping the different Cassava value chain actors existing in the study area

**Net farm income**

The following arithmetical computation was used in the study to analyze the cost structure and the net farm income in the study area. The gross farm income is the total revenue generated from the production, while net farm income is the difference between the total revenue and total cost. The total cost of production includes both total variable cost and total fixed cost. Total variable cost includes; cost of seed, cost of labour, and cost of agrochemical while total fixed cost includes cost of sprayer, cost of cutlass, land and cost of Hoe.
The formula for estimating the net farm income is stated as follows.

NFI= TR-TC …… 1

**Where:**

NFI= Net Farm Income (₦)
TR= Total Revenue (₦)
TC= Total Cost of Production (₦)
TC= TVC+TFC …….. 2
Total Cost (TC) = Total Variable Cost (TVC) + Total Fixed Cost (TFC)

The fixed inputs were depreciated using the straight-line method given by:

D = P – S/ N …… 3

**Where:**
D = Depreciation (₦)
P = Purchase value (₦)
S = Salvage value (₦)
N = Life span of asset (years)
Return on Investment (ROI) was obtained by dividing the Total revenue (TR) over the Total Cost (TC). Therefore:
ROI = TR / TC …….. 4

**Where:**
ROI = Return on Investment
TR = Gross Income
TC = Total Cost

**RESULTS AND DISCUSSION**

**Socio-economic characteristics of the respondents**

The result from (Table 1) indicates that majority (89.33%) of cassava farmers in the study area are male while 10.67% of the respondents are female. The predominance of male in farming operation may be attributed to the tedious nature and hard work involved in the various farm enterprises. Similar findings have been reported by Sanni and Ismaila, (2012) who stated that 84% of the farmers in Paiko Local Government Area of Niger State were male. The study further revealed that most (62%) of the respondents belonged to the age bracket of 41 to 50 years. The findings revealed that 9.67% of the cassava farmers were 30years and below of age. This implies that most of the farmers in the study areas were very active to carry out agricultural activities. The findings from the (Table 1) further show that majorities (74.33%) of the respondents are married, while (18%) are single, (7.67%) of the farmers are divorced. The proportion of married persons that participated in cassava production activities was high, the predominance of married individuals agreed with a study carried out by Uddin et al. (2015) which revealed that about 85.8% of the Edo state farmers were married.

**Table 1:** Distribution of socio-economic characteristics of cassava farmers.

| Variable | Frequency | Percentage | Mean |
|---|---|---|---|
| **Gender** | | | |
| Male | 268 | 89.33 | |
| Female | 32 | 10.67 | |
| **Age** | | | |
| ≤ 30 | 29 | 9.67 | 47 |
| 31 - 40 | 58 | 19.33 | |
| 41 - 50 | 186 | 62.00 | |
| ≥ 51 | 27 | 9.00 | |
| **Marital Status** | | | |
| Single | 54 | 18.00 | |
| Married | 223 | 74.33 | |
| Divorced | 23 | 7.67 | |
| **Household Size** | | | |
| ≤ 5 | 209 | 69.67 | 7 |
| 6 - 10 | 64 | 21.33 | |
| ≥ 11 | 27 | 9.00 | |
| **Educational Status** | | | |
| No formal Education | 146 | 48.67 | |
| < 6 Years | 73 | 24.33 | 6 |
| 6 Years | 39 | 13.00 | |
| 12 Years | 23 | 7.67 | |
| > 12 Years | 19 | 6.33 | |
| **Farming Experience** | | | |
| ≤ 5 | 48 | 16.00 | 9 |
| 6 - 10 | 191 | 63.67 | |
| 11 - 15 | 43 | 14.33 | |
| ≥ 16 | 18 | 6.00 | |
| **Extension Contact Per Season** | | | |
| No Contact | 189 | 63.00 | |
| ≤ 2 contacts | 102 | 34.00 | |
| ≥ 3 Contacts | 9 | 3.00 | |

**Source:** Field Survey data, 2023

The predominance of married persons that participated in activities implies that they were ready to improve their livelihood and that of their families since marriage is often associated with occupational stability and responsibility (Uddin et al., 2015). Furthermore, the result revealed that the majority (69.67%) of the farmers have a household size of less than or equal to 7 persons, this implies that respondents had access to family labour which will positively increase agricultural production. Mohammed and Abdulsalam (2015), Onyediako and Adiele, (2022) noted that large household size served as an important source of farm labor in order to improve productivity. The majority (51.33%) of the respondents had formal education, whereas, 48.67% had no formal education.

Among those with formal education, primary education accounted for 13%, 7.67% had secondary education while 6.33% had tertiary education. This implies that the respondents were educated and they were more likely to utilize information on agriculture to enhance food production. Shakiral et al, (2015) and Olutumise (2020) stated that education plays an important role in creating awareness in farming communities because educated people are capable of sourcing information on agricultural innovation. The study also revealed that 16% of the respondents had less than or equal to 5 years of farming experience, followed by 63.67% who had between 6 and 10 years of experience, 14.33% of the farmers had between 11 and 15 years' experience in cassava production. This implies that quite a number of the respondents have been farming for a long time. According to Samson et al, (2020) farming experience enhances productivity and has shown to encourage the rapid adoption of farming innovation.

**Cassava value chain development in the study area**

Based on the results from the value chain survey, the cassava value chain researcher developed the following cluster map to demonstrate the areas that are undeveloped or need improvement (Figure 1). Areas that

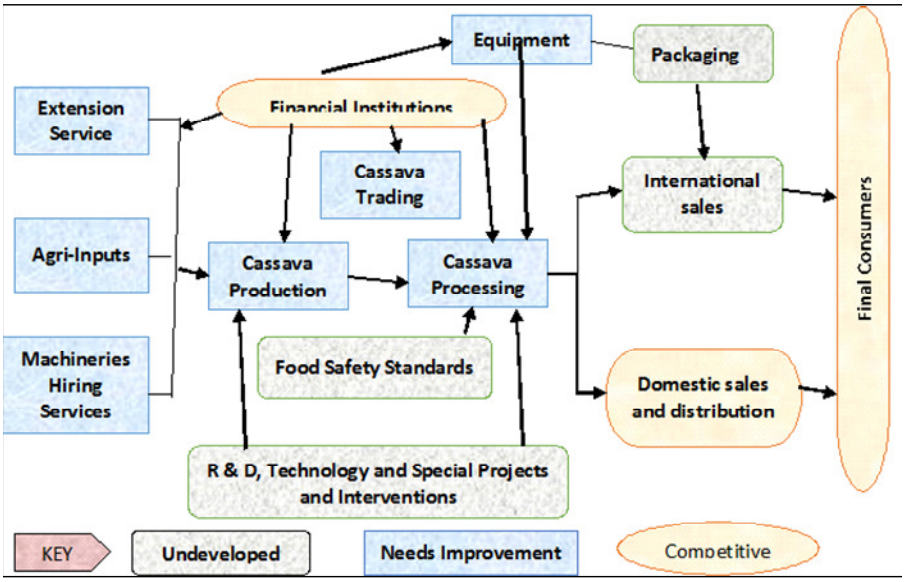


**Figure 1:** Cassava Value Chain Development in the Study Area
**Source:** Field Survey data, 2023

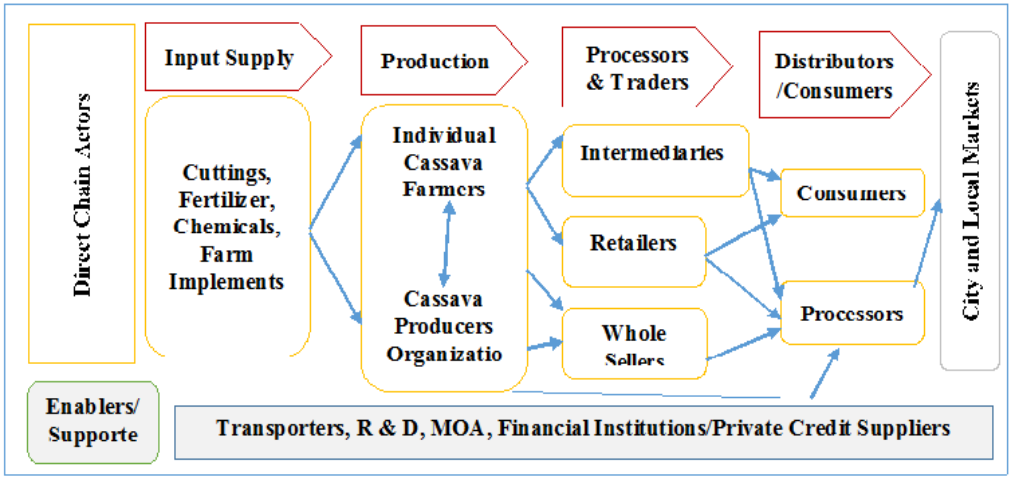


**Figure 2:** Cassava Value Chain Actors in the Study Area
**Source:** Field Survey data, 2023

are undeveloped in Cassava value chain in the study area are food safety standards, packaging, international sales and research and development while those that need improvement are extension services, agricultural inputs, machineries, production, processing and trading but areas in the value chain development where competition exist are domestic sales and distribution, financial institutions and at final level the consumers.

## Cassava value chain map

The study confined the value chain actors to only two categories (Direct Chain Actors and Enalers/Supporters). A simple trading relationship seems to take place. Inputs supply is the starting point of the chain while household ends it through consumption. The marketing channels involve a set of village traders, county buyers, wholesalers, cooking vendors and retailers. In general terms, direct actors within the value chain are considered as key players. As shown in (Figure 2), input dealers, producers, traders, processors consumers and services providers are the key players of the Kebbi State cassava value chain. The identified suppliers are cuttings, Fertilizers, chemicals, hand tools and farm implements, the producers consist of individual and organizational cassava producers.

**Table 2:** Average cost and returns of cassava production per ha in the study area.

| Materials/Inputs | Amount (₦) per ha | % of Total Cost (₦) |
|---|---|---|
| Variable Cost | | |
| Planting Materials | 53,040.00 | 22.54 |
| Labour | 64,813.79 | 27.54 |
| Fertilizer | 32,000.00 | 13.60 |
| Herbicides | 13,755.00 | 5.85 |
| Insecticides | 5,355.280 | 2.28 |
| Empty bags | 21,400.00 | 9.09 |
| Transportation | 23,228.89 | 9.87 |
| Total Variable Cost ($X_1$) | 213,592.96 | 90.75 |
| Fixed Cost | | |
| Rent on Land | 16,130.00 | 6.85 |
| Depreciation on Hoe | 813.60 | 0.35 |
| Depreciation on Cutlass | 149.84 | 0.06 |
| Depreciation on Knapsack | 2,768.23 | 1.18 |
| Depreciation on Bowl | 1,894.66 | 0.81 |
| Total Fixed Cost ($X_2$) | 21,756.33 | 9.25 |
| Total Cost [$X_4 = (X_1 + X_2)$] | 235,349.29 | 100.00 |
| Total Revenue ($X_5$) | 389,082.57 | |
| Net Farm Income ($X_5 - X_4$) | 153,734.28 | |
| Gross Margin($X_5 – X_1$) | 175,489.61 | |
| Return on Investment (ROI) = $X_5/ X_4$ | 1.65 | |

Source: Field Survey data, 2023

Under traders we have intermediaries, retailers, and whole sellers while the distributors/consumers captured consumers and processors and whole marketing takes place within the city and local markets of the study area.

**Cost and return**

Since profit is a major driving force in any investment; it is an indicator that will encourage or discourage participation. Profitability is the key to sustainability of agricultural innovations. Olomola (2017), in analyzing the value chain of cassava, cotton, maize, rice, soyabeans and sugarcane industries, placed cassava as third after rice and maize based on operating profit. In terms of yield, cassava is by far ahead of other crops. It is observed that cassava is a competitive commercial agricultural crop with attendant benefits to its farmers, processors, marketers and consumers (Ani et al, 2019).

The profitability of the cassava production enterprise was examined using costs and returns analysis. The estimated costs and returns of small-scale cassava farms in the study area are presented in (Table 2), the gross return realized by small-scale cassava producers was ₦389,082.57 per ha. The total variable cost in cassava production was ₦213,592.96 of the total cost of production comprising 22.54% of planting material, 27.54% of labour, 5.85% of herbicides, and 1.96% 2.28% of insecticides. The total fixed cost of production was ₦21,756.33, comprising 6.85% land rent,0.35% of hoes, 0.06% Cutlass, 1.18% Knapsack and 0.81% bowl respectively. The total cost of production per ha for a typical small-scale cassava production was ₦235,349.29. The net farm income was ₦153,734.28. The return on investment was ₦1.65k, implying that for every one naira invested on the business, there is a profit of 65k. Hence, cassava production is profitable in the study area. This implies that farmers can continue with cassava production in order to increase their source of income. The results of this study were similar to the findings of Fatuase (2025) that was carried out among yam farmers and Ehinmowo (2015) that was carried out among cassava. The same view was shared by Oseni et al, (2018) that farming enterprise is profitable especially in cassava production.

**Constraints militating against the cassava industry in Nigeria**

Constraints faced by cassava farmers militating against the increase in production are presented (Table 3). The results gathered were ranked and it showed that high poor access to credit (10.67%), manual process problems (10.29%), lack of storage facilities (9.82%), poor access to extension workers (9.50%) high cost of production inputs (9.35%) and inadequate capital (8.80%) are the major factors hindering investors in cassava business enterprise. Corroborating this finding, Godfray et al, (2010) asserted that enabling production facilities, viable market channels and favourable working capital should be provided to stakeholders in tropical agricultural

**Table 3:** Result of farmers constraints on cassava production.

| Constraints | Frequency* | Percentage | Rank |
|---|---|---|---|
| Manual process problems | 263 | 10.29 | 2nd |
| High cost of production inputs | 239 | 9.35 | 5th |
| Lack of improved cultivars | 136 | 5.32 | 11th |
| Inadequate capital | 225 | 8.80 | 6th |
| Price fluctuation | 216 | 8.45 | 7th |
| Lack of storage facilities | 251 | 9.82 | 3rd |
| Inadequate packaging equipment | 199 | 7.78 | 9th |
| Poor Access to credit | 273 | 10.67 | 1st |
| Taxes | 168 | 6.57 | 10th |
| Expensive Transportation | 211 | 8.25 | 8th |
| Poor Access to Extension Workers | 243 | 9.50 | 4th |
| Market linkages hindrance | 133 | 5.20 | 12th |
| Total | 2,557* | 100.00 | |

Source: Field Survey data, 2023
* Multiple responses considered.

industry in order to maximize its growth potential, human and animal food enrichment, economic and industrial benefits.

## Conclusion

The study critically and empirically analyzes cassava value chain in Kebbi State. The study employed econometrics to predict the profitability of cassava production using a survey data collected at farm level. It was concluded that cassava farmers in the area are young and active in the enterprise but are dominated by male household. The long years of experience and the literacy level of the farmers are good enough to understand the enterprise very well in order to accrue tangible profit in the process. Areas that are undeveloped in Cassava value chain in the study area are food safety standards, packaging, international sales and research and development while those that need improvement are extension services, agricultural inputs, machineries, production , processing and trading but areas in the value chain development where competition exist are domestic sales and distribution, financial institutions and at final consumers. The value chain actors identified along the cassava value chain are direct chain actors (input supply, producers, processors and traders then distributors/consumers) and enablers/supporters (transporters, R & D, MOA, financial institutions/private credit suppliers) this implies that more hands earn income from cassava in the study area. Cassava farming was found to be a profitable enterprise in the study area because it recorded a positive net farm Income and return on investment. This study also concluded that the average rate of returns on investment (returns per naira invested) was ₦1.65 on cassava farming, indicating that for every N1 invested in the study area, a profit of 65 kobo was made. Considering the profit realized on each naira invested on cassava farming, it is recommended that financial assistance in form of on-lending facilities should be provided for cassava farmers in order to reduce the major constraint of limited capital faced by the farmers. Again, to further improve on the profitability of the cassava farmers, certain variables such as agrochemicals, labour, farm size, age of the farmers and farming experience should be critically looked into by the policymaker and the Government as this will help in designing policies that will boost production for sustainable livelihood in the area.

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## Author`s Declaration

We declared that this study is an original research by our research team and we agree to publish it in the journal.

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