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# EFFECT OF IMPROVED TECHNOLOGIES ON CASSAVA PRODUCTION AND FARM INCOME IN SHIRORO LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

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## ABSTRACT
*A field study was conducted to investigate the effect of improved technologies on cassava production and farm income in Shiroro Local Government Area of Niger State, between August and September, 2006. Specifically, the study compared the yield and income of the improved technologies of the adopters and that of the non-adopters. Data was collected from 100 farmers using stratified random sampling technique. Data was analyzed using Descriptive statistics, Farm budget Analysis and Analysis of Variance (ANOVA). The farmers who adopted herbicides only had a net farm income of N 11,975.49 per hectare and those who use improved planting materials only had a net farm income of N 102,514.12 per hectare. Farmers who adopted a combination of technologies had a net farm income of N 98,666.39 per hectare. This reveals that, adoption of improved technologies leads to increase in income. The use of improved planting materials only and the use of a combination of improved technologies were significant at 5 percent level. The income of adopters was higher than those of the non adopters. The most important problem faced by the two categories of farmers was low demand for cassava. It is recommended that for output and income of farmers to increase, farmers should adopt improved technologies. The Government needs to assist the cassava farmers to buy the excess tubers from the farmers in order to encourage them sale especially at the peak of harvest.*

***Keywords: Improved technology, Cassava, production, income, Adopters, Niger State.***

## 1.0 INTRODUCTION
Cassava is a crop of the low land tropics. It does best in a warm, moist climate where mean temperatures range from 25°C-29°C. It does very poorly under cold climate and at temperatures below 10°C [1]. It is considered as the most productive crop in the tropics [2].
Cassava is probably the only crop which cuts across all ecological zones in Nigeria [3]. And different varieties of cassava are known to exist and are differentiated by size, colour, shape of the leaf, branches, plant height etc [4].

Cassava is a friend to the small scale farmers as it grows and produces high yields in areas where maize and other crops will not grow or produce well. Farmers can obtain yields of 5-6 tonnes per hectare without fertilizer. Yield of 40-60 tonnes per hectare are possible under favourable conditions such as sufficient sunshine, friable light textured and well drained soil [5]. It is versatile and its cultivation presents no difficulty. It is known to tolerate drought and responds well to irrigation requiring little or no fertilization and yet will maintain a steady production over a fairly long period of time in continuous farming.
It has the ability to suppress weeds, particularly the improved varieties which develop many branches to form a canopy shading weeds from the sun and reducing weeding operation [6]. Cassava can also be planted as mono crop in very large plantations.

Majority of cassava grown in Nigeria is sold through traditional marketing channel [3]. The good qualities of cassava allows the cassava farmers some flexibilities in their work schedules for example, since it has no definite maturation period, harvesting maybe delayed until market conditions are favourable supporting the fact that it can be marketed continuously throughout the year. The lack of seasonality in gari production confirm that cassava roots provide a fairly predictable price throughout the year [5].

According FOA estimates, Nigeria produces 33 million tones, making it the world's largest producer in 2000. This root crop grows abundantly on Nigerian soils. Nevertheless, many cassava farmers have difficulties in the production of the crop creating a situation of food scarcity.

Most of the cassava farmers in Nigeria are still termed "small scale farmers". They are unaware of the improved technologies and investment opportunities in the cassava industry [7]. The adoption of improved production practices and improved varieties might lead to the increase in the amount of cassava production that would lead to increase in farmers' income [8]. It is on this premise that this study was carried out.

The general objective of the study is to investigate the effect of improved technologies on cassava production and farm income in Shiroro Local Government Area of Niger State.

The specific objectives of the study area include:

1. To identify the improved cassava technologies extended to farmers in Shiroro Local Government Area of Niger State and their level of adoption.
2. To compare the yield of adopters with non-adopters of improved cassava production technologies in the study area.
3. To compare the income of adopters and non-adopters of improved cassava technologies in the stud area.
4. To identify the constraints in cassava production in the study area.

## 2.0 MATERIALS AND METHODS

### 2.1 The Study Area

The study area is Shiroro Local Government Area of Niger State. The Local Government was created in May 1989. It was created out of the former Rafi and Chanchaga Local Government Areas, with Kuta as its headquarter. It consists of Seven District areas which are Kuta, Galadima, Kogo, Gurmana, Manta, Kushaka and Allawa which covered a land area of about 320 square kilometers. The Local Government Area has an annual rainfall varying between 1100m and 1600mm with temperature of about 34°C between March and June every year.

It has a population of about 159,629 people. The major ethnic groups in the Local Government Area are Gwari, Bussa and Gurmana. The main occupations of the inhabitants include farming and fishing which are facilitated by the fertile land and the presence of Shiroro dam.

### 2.2 Sampling Procedure

A sample size of 100 cassava farmers comprising 50 adopters and 50 non adopters were selected using stratified random sampling technique. 10 respondents of cassava farmers were drawn from 5 purposively selected villages based on the level of technologies adopted. The levels of technologies considered were (i) those that use fertilizer only (ii) those that applied herbicides only (iii) those that used planting materials only (iv) those that used a combination of technologies and (v) those that did not adopt any technology which were used as the control.

### 2.3 Data Collection

A well structured and pre-tested questionnaire was used for data collection. The primary data for this study were collected between August and September 2006. The data were obtained through a cross-sectional survey of the farm households that planted cassava with or without improved technologies. The data collected includes; demographic characteristics of farmers, improved technologies adopted, resources used, cropping pattern, crop output and farm income, production and marketing constraints.

2.4 Method of Data Analysis

Data for this study was analyzed using Descriptive Statistics, Farm budget and Analysis of Variance (ANOVA).

To compare the income of adopters and non-adopters of improved cassava production technologies, a farm budget model was first used to determine the net farm income. Then, analysis of variance was further used to compare the income of adopters and non-adopters of various improved technologies.

In order to identify the various constraints in cassava production Descriptive statistics was used.

### 2.4.1 Model for farm budget analysis

GI-TC

GR-TC

TC= (TFC+TVC)

NFI = GI- (TFC+TVC)

= GI-TC

## 3.0 RESULTS AND DISCUSSION

### 3.1 Improved Cassava Production Technologies Adopted

#### 3.1.1 Awareness of improved cassava technologies

Table 3.1, shows the cassava technologies available and the extent to which the cassava farmers in Shiroro Local Government were aware of them. Awareness is the first stage in the adoption process; it leads to interest, evaluation, trial and finally adoption.

**Table 3.1:** Distribution of farmers according to awareness of improved cassava production technologies in the study area

| Awareness | Improved Planting Materials% | Chemical Fertilizer% | Tractor% | Plough% | Harvester% | Storage Facilities% | Herbicides% | Pesticides% |
|---|---|---|---|---|---|---|---|---|
| Aware | 83 | 76 | 59 | 39 | 33 | 32 | 79 | 35 |
| Not Aware | 17 | 24 | 41 | 61 | 67 | 68 | 21 | 65 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Results in Table 3.1, revealed that, improved planting materials had the highest level of awareness 83 percent followed by chemical fertilizers, which had 76 percent awareness. The technology which had the least awareness was improved storage facility with only 32 percent. This suggest that majority of the cassava farmers are aware of the improved cassava production technologies.

**3.1.2** Level of adoption of improved cassava technologies

Results in Table 3.2, revealed that about 73 percent of the farmers adopted improved farming technologies. About 13 percent adopted chemical fertilizers. Table 3.2 further revealed that 47 percent of the farmers adopted herbicides. This suggests that majority of the cassava farmers in the study area adopted one form of technology or the other. Table 3.2 shows the number of adopters and types of technologies adopted by cassava farmers.

**Table 3.2** Distribution of cassava farmers according to level of adoption of technologies in the study area

| Improved Technologies | Frequency | Percentage (%) |
|---|---|---|
| Improved Planting Materials | 73 | 73 |
| Chemical Fertilizers | 33 | 13 |
| Tractor | 1 | 1 |
| Plough | - | 0 |
| Storage Facilities | - | 0 |
| Herbicides | 47 | 47 |
| Pesticides | - | 0 |

**3.1.3 Cassava yield obtained**

In comparing the mean yield difference, the Ducan's multiple range test was used. Table 3.3 shows the mean yield obtained by the various groups.

**Table 3.3:** Duncan's Multiple Range Test, Comparing the Mean Yield Difference

| Group of Farmers | Number of farmers | Mean Yield of Cassava |
|---|---|---|
| Adopting herbicides only | 8 | 1.0175[a] |
| Adopting no technology | 17 | 1.9618[a] |
| Adopting a combination of improved technologies | 55 | 5.2722[b] |
| Adopting improved planting materials | 19 | 5.5042[b] |

*Means in a column with the same superscript are not significantly different at 5 percent level.

Results in Table 3.3 reveals that the farmers who adopted only herbicide had a mean yield of 1.0175 tonnes per hectare, while those who did not adopt any technology had a mean yield of 1.9618 tonnes per hectare. Farmers who adopted only improved planting materials had a mean yield of 5.5042 tonnes per hectare. The farmers who used improved planting materials, herbicides and fertilizer had a mean yield of 5.2722 tonnes per hectare. The Duncan's Range Test shows that, there was no significant difference between the yield obtained by farmers who used only herbicides and those who did not adopt any of the improved technologies.

Similarly, the yields of farmers using improved planting materials only and those who combined both technologies showed no any significant

difference. However, the yields obtained by farmers who used only improved planting materials and those combining the improved technologies were significantly (0.05) higher than those obtained by farmers who did not adopt any improved technology and those who adopted only herbicides.

**Table 3.4** Comparing the mean income difference

| Group of Farmers | No. of farmers | Mean Yield of Cassava |
|---|---|---|
| Adopting herbicides only | 8 | 32015.625[a] |
| No technology adopted | 17 | 48174.000[a] |
| Adopting a combination of improved technologies | 55 | 129250.40[b] |
| Adopting improved planting materials only | 19 | 132090.37[b] |

*Means in a column with the same superscript are not significantly different at 5 percent level.

Table 3.4 shows the mean income obtained by the various group of farmers. The farmers who adopted only herbicide had a mean income of N32, 015.62 per hectare, while those who adopted no technology at all had a mean income of N48, 174.00 hectare.. Farmers, who adopted only improved planting materials had a mean income of N13, 2090.37 per hectare. The famers who adopted improved planting materials, herbicides, and fertilizer had a mean income of N129, 250.40 per hectare. The Duncan's Range Test shows that, there was no significant difference between the income obtained by farmers who used only herbicides and those who did not adopt any of the improved technologies. Similarly, there was no significant difference between the income of farmers using improved planting materials only and those who combined both technologies. However, the income obtained by farmers who used only improved planting materials and those combining the improved technologies were significantly (0.05) higher than those obtained by farmers who did not adopt any improved technology and those who adopted only herbicides.

**Table 3.5** Average distribution of cassava farmers according to net farm income in the study area

| Cost/Item | Fertilizer Only (₦) | Herbicide Only (₦) | Planting Materials (₦) | Combination of technologies(₦) | Non-Adopters (₦) |
|---|---|---|---|---|---|
| Machinery Hired | - | 1,000 | - | 9,020 | - |
| Labour Hired | 4,500 | 10,500 | 61,800 | 604,200 | 3,200 |
| Fertilizer/Herbicide bought | 12,800 | 18,035 | - | 637,630 | - |
| Planting Materials | - | 22,460 | 195,900 | 1,163,060 | - |
| Transportation of tubers to the market | 2,500 | 2,500 | 25,000 | 143,050 | 27,500 |
| Equipment purchased | 12,900 | 20,900 | 61,800 | 673,820 | 112,600 |
| Total cash expenses | 32,700 | 55,435 | 322,000 | 3,221,760 | 143,050 |
| Net Depreciation | 3,540 | 5,752 | 16,540 | 134,076 | 26,376 |
| Value of family labour | 20,800 | 70,855 | 205,200 | 711,300 | 107,350 |
| Total Expenditure | 57,040 | 152,002 | 543,740 | 4,067,136 | 176,776 |
| Expenditure per hectare | 57,040 | 24,516.45 | 32,627.05 | 57,283.61 | 15,925.76 |
| Income derived from cassava sale | 480,000 | 222,750 | 2,223,600 | 9,922,450 | 610,500 |
| Gross cash income | 480,000 | 222,750 | 2,223,600 | 9,922,450 | 610,500 |
| Cassava for Home consumption | 1,000 | 3,500 | 27,000 | 15,000 | 7,310 |
| Total Income | 481,000 | 2,226,250 | 2,250,600 | 11,072,450 | 617,810 |
| **Income per hectare** | **481,000** | **36,491.94** | **135,171.7** | **155,950** | **55,658.55** |
| **Net Cash Income** | **447,300** | **27,186.29** | **114,210.21** | **94,375.92** | **42,112.61** |
| **Net Farm Income** | **423,960** | **11,975.49** | **102,514.12** | **98,666.39** | **39,732.79** |

The results in Table 3.5 indicates that, the farmers who adopted herbicides only had net farm income of N11,975.49 per hectare, those who used improved planting materials only had net farm income of N102,514.12 per hectare, while farmers who adopted fertilizer only had net farm income of N423,960 per hectare. Farmers who adopted a combination of technologies had net farm income of N98, 666.39 per hectare. This reveals that, adoption of improved technologies leads to increase in income. Comparing the high cost of expenditure on adoption and its resultant net farm income to the low cost on expenditure on non-adoption and the net farm income of non-adopters, the extra gains induced, proves that, it is a favourable and a rational decision to substitute unimproved technology for improved technology.

### 3.1.5 Constraints encountered by the cassava farmers.

Table 3.6 shows the distribution of cassava farmers

by the problems they encountered while producing cassava and in the sale of the cassava tubers. The table shows the distribution of farmers according to villages and problems encountered.

**Table 3.6**The distribution of farmers according to the problems encountered in cassava production in the study area

| Problems Encountered | Kuta | Gunu | Tapila | Mutum Daya | Gwada | Total |
|---|---|---|---|---|---|---|
| Lack of capital | 15 | 12 | 16 | 20 | 11 | 74 |
| Low demand of cassava | 17 | 17 | 15 | 15 | 13 | 77 |
| Land problems | 13 | 14 | 14 | 16 | 15 | 72 |
| Inadequate planting materials | 5 | 6 | 2 | 3 | 11 | 27 |
| Inaccessible roads to the market | 4 | 7 | 5 | 4 | 5 | 25 |
| Termite attack | 7 | 3 | - | - | 2 | 12 |
| Lack of storage facilities | 6 | 5 | 10 | 7 | 4 | 32 |

Results in Table 3.6 shows that the low demand for Cassava was the most important problem faced by about 77 percent of the farmers. This pushes the price of Cassava down and it shows that people are not aware of how versatile the cassava tuber is. Lack of capital to finance their production explains why the farmers are not able to adopt all the technologies made available to them. 72 percent of the farmers were faced with land problems, as majority of the farmers worked on borrowed lands. 27 percent faced the problem of inadequate improved planting materials, 25 percent complained of bad roads that lead to the market, only 12 percent complained of termite attack. Pest attack was the least of the problems why the farmers did not adopt pesticide application on their farms.

## 4.0 Conclusion and Recommendations

Results from the study showed that majority of the farmers were aware of the Improved technologies on Cassava Production and they need to explore these improved technologies to boost their production. The Significant determinants of Cassava output were Fertilizers, herbicides and improved planting materials. The study showed that the yield of improved technology adopters was N 129,250.40 which was higher than those who did not adopt the technologies which is N 48,174.000 and their income were higher than that of the non- adopters and even at high expenditure on inputs and hired labour. The net farm income of adopters was N102, 514.12 which was higher than that of non-adopters with net farm income of N 11,975.49. This shows that using improved technologies is more profitable as it increases farmers' income and output.

The most important problem encountered by the farmers was the low demand for cassava and lack of capital to invest more. It is recommended that for cassava output to increase, farmers should adopt the improved technologies and government should buy the excess tubers from the farmers in order to provide a market for their output.

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