

## INTEGRATING CASHEW (*ANACARDIUM OCCIDENTALE*) WITH FOOD CROPS: PERCEPTIONS OF FARMERS AT AMOMA, IN THE KINTAMPO SOUTH DISTRICT OF THE BONO EAST REGION OF GHANA

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**ABSTRACT.** Income maximization from cashew products and proper utilization of resources has significantly evolved in Amoma, as a result of cashew diversification with food crops. The aim of the study was to assess the perceptions of farmers on integrating cashew with food crops. The study aimed to identify the type of food crops intercropped with cashew, as well as reasons and its associated challenges. A total of 83 respondents were purposively sampled from four communities (Asesase, Kukuroase, Tutuoase and Afapemu). The results indicated that all farmers had knowledge on food crops integration with cashew. Amongst the food crops cultivated with cashew include yam, maize, cassava and groundnut. Reasons stated for integration of food crops include weed control, subsistence use and also financial safety nets. Farmers' major challenge was financial and also weeds control on their farm. The study concluded that yam was the commonest intercrop of cashew followed maize. Key challenges encountered by farmers were weed invasion and inadequate disposable cash for maintenance practices,

such pruning and weeding. In pursuit of achieving the Sustainable Development Goals 1 (No Poverty) and 2 (Zero Hunger), the study recommends that farmers be trained on proper food crop integration methods at Amoma to boost yield, financial stability and enhance living conditions.

**Keywords:** intercropping; cashew; food crops; food security; SDG 1&2.

### INTRODUCTION

Originally from South America, Cashew (*Anacardium occidentale*) was brought to Africa and Asia in the 16th century (Dendema and Corsi, 2014). This tropical nut is found among non-traditional cultivated plants for export from Ghana (Woongnaa, 2013). Although it has long been known as a useful plant, it is noted as an economically important tropical tree crop only in this century (Woongnaa, 2013). Evans *et al.* (2015) reported that in the late 1970s, through networks of

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farmers in communities located in the Ivorian border area, cashew plantations gradually expanded their area in the Bono East region.

According to Opoku-Ameyaw *et al.* (2011) the intercalation of fruit trees with field crops has been practiced since ancient times in the tropics. To increase growers profits, in the northern part of Ghana it is recommended to intercalate cashews with yam and corn during the early period of the plantation.

By doing so, it is possible to ensure the necessary food in the household, to obtain income that would amortize the expenses of setting up the establishment, to control the weeds and to make better use of the growing resources (Opoku Ameyaw *et al.*, 2003; Dalvi *et al.*, 2019). Thus, the Region became the center of cashew nut production for export.

Therefore, farmers were interested in producing raw cashew nuts to satisfy this market, to the detriment of the local food market (Wongnaa and Awunyo, 2013). Correspondently, cashew cultivation diminishes the land area available for agricultural crops (Mariwah *et al.*, 2019). There is therefore the need to promote the integration of cashew and food crops, thus this study which sort to explore the perception of farmers on the said practice. Although the area planted with cashew trees has increased more and more to meet export requirements, there have been few studies to assess perception of farmers on integrating cashew with crops in Amoma (Opoku-Ameyaw *et al.*, 2011; Boafo, 2019). This study can therefore influence policy that will promote cultivation of cashew with food crops to ensure resources, such as labor, land and capital are used efficiently and as a result promote food

security. The study aims to assess the perceptions of farmers on integrating cashew with food crops at Amoma, Kintampo South District in the Bono East Region of Ghana by:

- establishing the assortment of crops intercropped with cashew in the area;
- identifying the reasons for growing cashew with those food crops;
- assessing the challenges associated with intercropping cashew with the food crops.

## MATERIALS AND METHODS

### Description of study sites

South Kintampo District, with the capital Jema, is one of 11 in the Bono East region of Ghana. Kintampo South is bounded by longitudes 10 20' west and 20 10' east and latitude 80 15' North and 70 45' south. Amoma is one of the major agricultural production centres in Kintampo South District (*Fig. 1*), which is indicated in the map of Kintampo South District. The town is found in the woodland savannah zone. The ecological region of Kintampo South District offers very favorable conditions for cashew cultivation (Dedzoe *et al.*, 2001). Amoma was selected because of its involvement in cashew production. Amoma is a town with four sub communities which are: Asesase, Kukuroase, Tutuoase and Afapemu.

The location of the District in the transition zone from the Wet Semi-equatorial to the Tropical Continental climate imprints in the zone a Tropical climate modified and, respectively, a Wet Semi-equatorial climate.

The area has a wet and a dry season. The wet season begins in March, with a maximum of rainfalls in June, after which there is a decrease in the amount of rainfalls until July. The dry season is highlighted

## INTEGRATING CASHEW WITH FOOD CROPS AND PERCEPTIONS OF FARMERS

towards the end of August and reaches its peak in September-November.

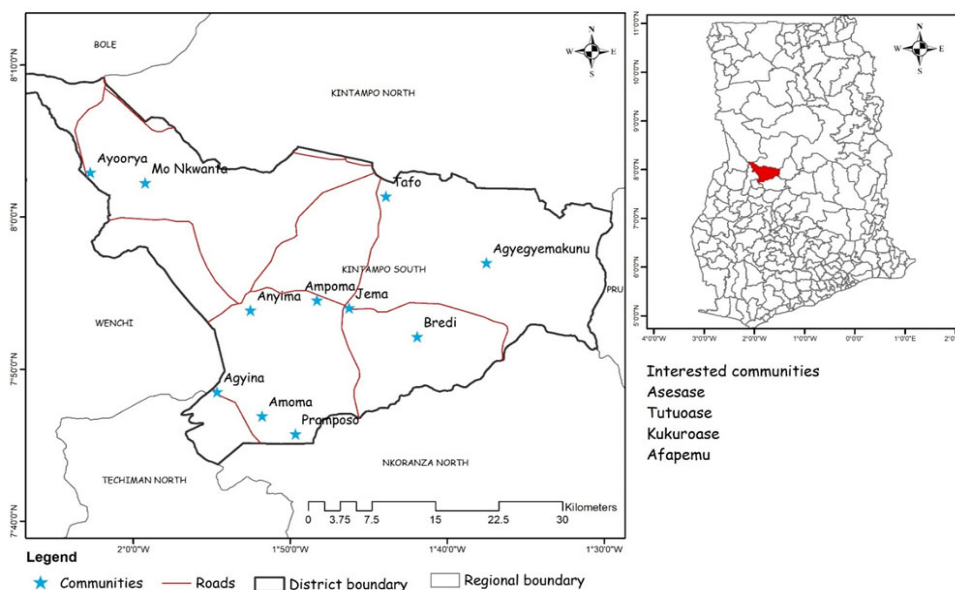
The yearly rainfall average ranges from 1,150 mm - 1,250 mm. Regarding the thermal regime, the lowest monthly average value of the temperature is registered in August (24°C) and the highest in March (30°C) (MOFA, 2021).

The vegetation is characteristic of the wooded savannah, with trees taller than those on typical northern savannah grassland but shorter than deciduous species in the south. Dominant are the species of mahogany, senya, shea, wawa, dawadawa or odum (MOFA, 2021).

In this natural environment, characterized by fertile soils and favorable

climatic conditions, agriculture is the main economic branch, occupying 72.7% of the labor force and contributing 60% of household income. However, the agriculture practiced is a subsistence one, in the conditions in which a small number of farmers have financial resources for the establishment of plantations or the purchase of high-performance agricultural machines.

Major crops cultivated includes: maize, yam, millet, groundnut, watermelon, rice, cashew, mango and also vegetable crops, such as tomatoes, garden, pepper, as well as livestock production. The major agriculture production centers in the district are: Amoma, Apesika, Ayima, Jema, Ntankoro, Pamdu, Nante and Kokuma (MOFA, 2021).



**Figure 1 - Kintampo South District map**

### Research design, sampling method and sampling size

The design of the research is that of a social survey conducted in four communities that were selected taking into account the size of cashew production. These include: Asesase, Kukuroase, Tutuoase and Afapemu.

By use of the Yamanes formula at a confidence level of 10%, 83 respondents

were selected out of the total cashew farmers' population of 500 in the district. On community levels by the use of proportions, 28 respondents were engaged at Asesase, 22 at Totuoase, 20 at Kukuroase and 13 respondents were interviewed at Afapemu.

The individual respondents were selected from a list of farmers using the

systematic random sampling approach, where every other odd numbered farmer was selected.

### **Source and method of data collection**

The study employed primary data sources, which was mainly obtained from interviewing the cashew farmers. The relevant primary data for the study was obtained using structured questionnaires administered to the respondents. There were both open-ended and closed-ended questions on the surveys.

### **Data processing and analysis**

The data collected from questionnaires through interviews were entered and coded using Statistical Package for Social Sciences (SPSS) version 20.0. The responses were organized into the categories of the questionnaires administered to describe the demographic characteristics of the interviewed cashew farmers. In addition, the type of food crops cultivated with cashew, the reason for growing cashew with those food crops, as well as the challenges they encountered were also categorized.

The descriptive step of the data analysis included comparing percentages of the responses to the different variables. To evaluate the correlation between the demographic characteristics of respondents, cross tabulation was used in SPSS. Chi-square test was also performed to find the statistical relationship between the demography of the cashew farmers. For all statistical test,  $p \leq 0.05$  was considered significant. The results were presented in tables and charts using Microsoft Excel 2016.

## **RESULTS AND DISCUSSION**

### **Demographic characteristics of respondents**

Out of the 83 cashew farmers interviewed, 65% (54) were men, whilst 34.9% (29) were women. The minimum age of the 83 cashew farmers was 28 years

with the maximum age 95 years, and the mean age was 54 years. Most of the farmers were between the ages of 50-59 years (29%), while 1% was in the age class of 20-29 years. The age categories were disaggregated by gender. From the 54 male cashew farmers engaged, 31% were in the age class 50-59 years while the highest of 34.5% of women were within 40-49 years. There was no significant statistical difference between the ages and sex of the cashew farmers ( $p = 0.334$ ). The major primary occupation of the respondents was farming, 75.9% (63). Trading was the second occupation 18.1% (15) and teaching was 2.4% (two). In addition, carpentry, hair dressing and masonry were the least reported occupation, 1% (one) each of respondents.

Majority, 57.8% (48) did not have a secondary occupation, but 24.1% had farming as their secondary occupation. Results showed that 74% (61) of cashew farmers interviewed had farm sizes ranging from 1-9 acres. The major income of the farmers was from farming 73.5% (61), the least percentile source of income reported by the farmers was hair dressing 1.2% (one). The income the farmers obtained from trading was 20.5% (17). Teaching and driving accounted for 2.4% (two) each of respondents. Most of the men obtained their income from farming 74.1%, whilst teaching and driving accounted for 3.7% each of respondents. In addition, more women also received income from farming 72.4% and none of them obtained income from teaching and driving.

There was no male hair dresser and no female mason, carpenter and teacher. The responses from the respondents

## INTEGRATING CASHEW WITH FOOD CROPS AND PERCEPTIONS OF FARMERS

revealed that 16.9% (14) ended education at the basic level, most of farmers ended at JHS, 47% (39), and 10.8% (nine) ended at SHS level. In addition, those who ended at the tertiary level were 2.4% (two) whilst 22.9% (19) did not have formal education. The men were more educated than the women. Half of the men (50%) completed JHS, 13.0% completed basic, those who completed SHS and those who did not have formal education were 16.7% each. The men who completed tertiary level were 3.7%. Most of the women completed JHS (41.4%), those who did not have formal education were 34.5%. No female farmer had attended SHS or tertiary, but 24.1% completed basic level. There was a significant statistical association between level of education of the farmers and their gender (0.037).

The responses from the 83 respondents revealed that 67.5% (56) farmers were household heads and 32.5% (27) were not household heads. Statistically, a significant relationship was found between household heads and gender ( $p= 0.000$ ), this implied that majority of the male farmers had a higher likelihood of being household heads. Many of the male farmers, 85.2% out of the 54 were household heads, whilst 14.8% of them were not household heads. Moreover, 34.5% of the female farmers were household heads, as well as 65.5% were not household heads. Majority of the farmers owned their land, 79.5% (66). The farmers who hired their land were 3.6% (three), while 16.9% (14) were using their family land. Many of the men (54) owned their land (77.8%), the men who used hired lands were 1.9%, as well as 20.4% were using family land. In

addition, majority of the women (29), about 82.8%, also owned their land, 10.3% of them were using family land and only 6.9% of the women used hired land. The findings suggested that there was no association of gender with land tenure system ( $p= 0.285$ ). All 83 respondents (100%) knew about cultivating cashew with food crops. Male farmers were 65.1% (54) and female farmers were 34.9% (29). With the responses from respondents, 97.6% (81) of the farmers cultivated cashew with food crops. Those who did not cultivate cashew with food crops were 2.4% (two). The men who cultivated cashew with food crops were 65.4%, as well as 34.6% of women who cultivated cashew with food crops. Both men and women farmers who did not cultivate cashew with food crops were 50% each. The majority of farmers who completed basic level (50%), JHS (64.1%) and SHS (66.7%), had farmed for periods ranging from 5-20 years each. Tertiary had 50% each for farming periods within 5-20 years and < 5 years. In addition, the farmers without formal education had 21.1% each for farming periods 5-20 years and < 5 years. None of the farmers with SHS and tertiary had farmed for periods between < 5 years and > 20 years. There was a significant statistical relationship between education level of the farmers and the number of years in farming ( $p= 0.009$ ).

The analysis of the socio-economic characteristics for the study reveals that both male and female farmers were involved in cultivating cashew with food crops. The male farmers out-numbered their female counterparts, this is in line with the findings of Adjei *et al.* (2020), but contradict the research of

Okogbaa *et al.* (2018), who reported that only males were engaged in cashew farming at Lafia in Nigeria.

The surveyed farmers were on average 54 years old, which implies that most of the cashew farmers are still relatively in their active and productive years of which is good and can improve cashew production at Amoma. This correspond to the study of Peprah *et al.*, 2018, who reported that most growers are energetic young people. However, the result contradicts Wongnaa and Awunyo - Vitor (2013). They reported that fewer number of youths grow cashews. The cashew farming was considered as a masculine work, this may account for the more male involved. Even though, the men were more than their female counterparts, their ages did not determine whether males or females were the majority. In addition, the male farmers had more cashew farms. In this case, larger farm size than the females, this may be the fact that farming work is considered as masculine and they are able to work on relatively larger land areas. This finding is similar to the result of Peprah *et al.* (2018), who revealed that farming activities in rural Ghana are carried out by men who receive support from their spouses. Findings are in line with Caperchione *et al.* (2012), who stated that cashew cultivation requires physical effort and financial support, attributes that are usually lacking in women. Therefore, most women cannot be actively involved in the business and are limited to providing support to their male counterparts.

According to Peprah *et al.* (2018), it is only through effective policy formulations and implementations that women can be encourage to venture into

cash crop production. These policies are therefore to pave way in terms of access to natural and physical capital.

The primary occupation of cashew farmers shows that more than half of the cashew farmers are involved in full-time farming. Trading, teaching, carpentry, hair dressing and masonry were few according to the farmers. Cashew farming was their main source of income due to the diversity of its product when intercropped with food crops. This result agrees with Peprah *et al.* (2018), who reported that among the cash crops, farmers prefer cashews, which provide them with a more substantial income than cocoa, for example, as it is more resistant to the climatic conditions in the area.

This implies that cashew farmers will be more dedicated to improving their crop given necessary incentives, such as credit, participatory research assistance for increased output, income and sustainable livelihood (Lawal and Uwagboe, 2017).

Married couples had a larger land size. This could account for fact that land is a family property and getting married gives one access to these lands (Djurfelft, 2020). Intercropping cashew with food crops requires more personnel. When the men grow the cashew, the women also intercrop food crops thus this trend. This compelled most of farmers to marry in order to obtain the larger farm size. Majority of the farmers were introduced to some form of formal education, but quiet substantial amount were illiterates (Adjei *et al.*, 2020; Ackah *et al.*, 2020). When it came to gender disparities, male farmers were better educated than female farmers. The findings support a research by Adjei *et*

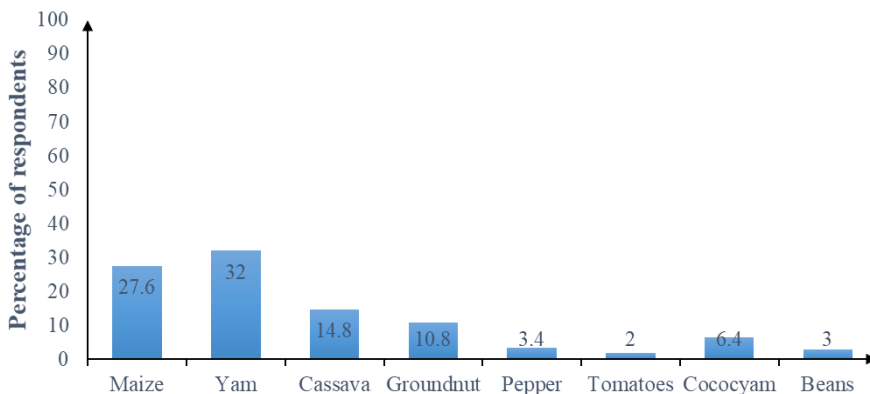
al. (2020) that found male farmers in the Nkoranza South Municipality have higher educational levels than female farmers. The low level of female graduate record to the fact that some of them may be school dropout as a result of teenage pregnancy or early marriage. This study corresponds to the study of Adjei *et al.* (2020). Furthermore, the result indicated that the male farmers mostly owned their lands. This agrees with Adjei *et al.* (2020) and disagrees with Ackah *et al.* (2020) in their earlier report that both males and their female counterparts were equitably represented in terms of ownership of land. This result may be due to the laborious work in cashew cultivation. Although there are no rules that prevent women from cultivating cashews, most farms belong to men, who are also the heads of the family (Adjei *et al.*, 2020).

Majority of the farmers, both male and their female, counterpart had farm size between 1-9 acres. Gender and farm size were found to have a statistically significant association  $p < 0.05$  (0.049). This result is in line with Adjei *et al.* (2020), whose result had statistically significant relationship between gender and farm size (0.003).

Moreover, the number of years in farming depicts that most of the farmers have been farming for more than 5 years. It was noted that the farmers are able to diversify their product when intercrop the cashew with food crops, because cashew is more lucrative and long term (Ackah *et al.*, 2020). More than half of the farmers intercropped cashew with field crops, but only in the early phases of the cashew crop, according to the findings (Adjei *et al.*, 2020).

### **Types of food crops integrated with cashew by farmers at Amoma**

The results indicated that yam, maize and cassava were the dominant food crops grown with cashew at Amoma (Fig. 2). These crops were found to be intercropped with cashew mostly because they are the most cost-effective intercrop on cashew farms (Lawal and Uwagboe, 2017; Ardiani *et al.*, 2020). Yam and maize were also recommended in Ghana as crops that generate higher returns to farmers when intercropped with cashew (Opoku-Ameyaw *et al.*, 2011). It was observed in the study of Aremu-Dele *et al.* (2021) that cashew intercropped with cassava and maize did not have negative effect on the development of the cashew seedlings, as the young cashew tree did not affect the growth parameters of these crops. In order for cashew farming households to maximize gross farm income, a study also confirmed that these food crops should be cultivated with cashew to maximize farm income (Adu, 2016). In terms of gender disparity, the male farmer mostly grows yam, maize and tomatoes. They basically cultivate those food crops on a large scale and on commercial bases, since commercial farming activities is considered masculine work in Ghana. However, their female counterparts cultivate cassava, groundnut, pepper, cocoyam mostly for subsistence bases and sometimes sell the surplus for the upkeep of the family.



**Figure 2 - Types of food crops integrated with cashew by farmers at Amoma**

**Reasons for growing the food crops with the cashew at Amoma**

This study revealed that the practice of intercropping food crops with cashew was introduced by the Ministry of Food and Agriculture (MoFA) in Jema; the District capital of Kintampo South.

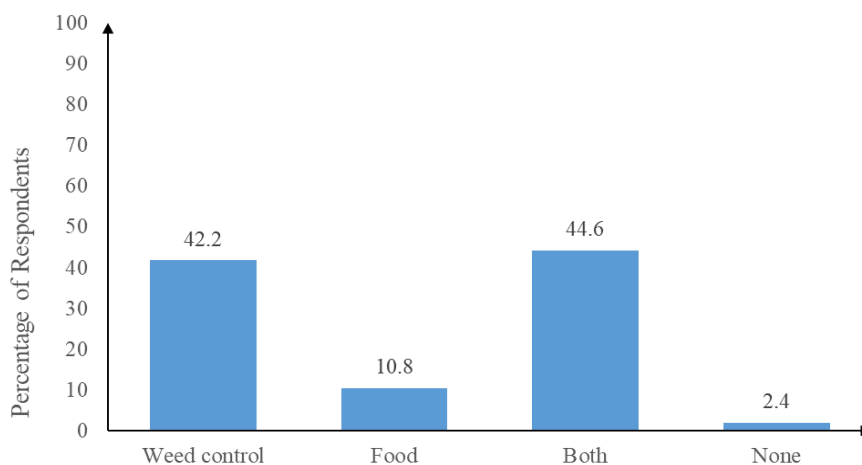
The report also highlighted that before the project which included plantation of cashew with food crops, the farmers reportedly were investing a lot of money into cashew cultivation and also the conversion of vast food crop lands into cashew farms. The practice was then introduced to ensure proper utilization of land, reduce cost of labor, avoid weed and most importantly, get food crops for sale or subsistence use when the cashew is not matured. In Ghana, there has been an increasing trend of shift from food crop production to cashew production in the transitional zone of the country for the purposes of income maximization and response to adverse effects of climate change (Adjei *et al.*, 2020).

Cashew has the potential for intercrop due to the large plant spacing in its cultivation (Aremu-Dele *et al.*,

2021). According to the result obtained, the farmers’ reasons for growing cashew with food crops were to control weeds and also food before the cashew start fruiting (*Fig. 3*). This result is in line with Aremu-Dele *et al.*, 2021, who stated that intercropping is the most practice of multiple cropping, which is carried out to provide additional income to farmers as an alternative source of income. In addition, Aremu-Dele *et al.* (2021) also stated that intercropping is cultural method of weed control in both arable and tree crop production and has been observed to reduce weed biomass in cashew intercrop with food crops. This means that aside creating an alternative source of income, it is also an effective weed control method at the early establishment phase of cashew. Cowpea /vegetable intercrops may be planted as subsistent intercrops in cashew plantation and also for the additional benefits of soil health improvement, amelioration and nutrition from nitrogen released from the cowpea to the plantation (Adjei *et al.*, 2020). Yam has a prostrate growth style in its early stages, which allows it to smother weeds to some extent (Marambe, 2021)



## INTEGRATING CASHEW WITH FOOD CROPS AND PERCEPTIONS OF FARMERS



**Figure 3 - Respondent's reasons for cultivating cashew with food crops at Amoma**

Therefore, in order to increase the profits of Ghanaian farmers, it is opportune to intercrop cashew with yams and maize during the early establishment period (Opoku-Ameyaw *et al.*, 2011). It is considered that cashew production can reduce poverty, contributing to the achievement of the Sustainable Development Goal 1 (Peprah *et al.*, 2018).

The practice of intercropping was an innovative indigenous practice that helped farmers overcome periods of extreme poverty, as it allowed them to save money that would have been spent on food (Adjei *et al.*, 2020).

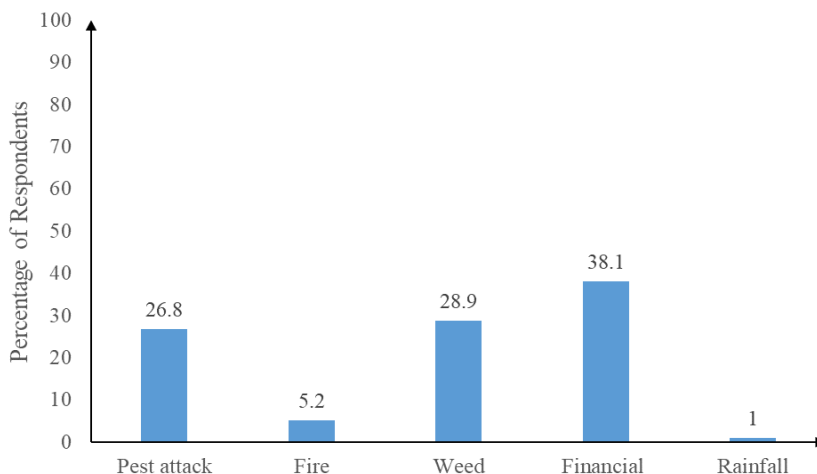
This agricultural practice has allowed farmers to grow and store, especially corn, beans and stalks (processed cassava), providing food for their families throughout the year (Adjei *et al.*, 2020). However, in cases where farmers have limited land sizes, intercropping is mostly done to maximize land utilization (Ardiani *et al.*, 2020). The pruning from the branches is popularly for firewood and charcoal (Pujiasmanto *et al.*, 2021).

### **Challenges of cultivating cashew with food crops at Amoma**

Farmers are mostly faced with a lot of challenges, where some are mostly beyond control (Mariwah *et al.*, 2019). Amidst these, farmers face a lot of challenges in practicing the system of intercropping cashew with food crops. The costs of managing the farm was the main problem identified proceeded by pest weeds, pest infestation and wild fires accordingly (Fig. 4). Studies identified lack of fund for purchase of pesticides, fire outbreaks in dry season as the main constraints in many cashew farms (Lawal and Uwagboe, 2017) and could also be a challenge in cashew intercrops, as opined by the farmers. In India, non-availability and uneven supply of sufficient raw materials, cost of imported raw material and non-availability of skilled personnel were challenges in their cashew production (Bhoomika and Rani, 2018). The result shows that the farmers do not receive any support from government and non-governmental organizations. This report agrees with Okogbaa *et al.* (2018). The

farmers did not make mention of any diseases affecting the cashew, but both cashew and the food crops sometimes are destroyed by some pest and wild

animals. However, diseases, such as anthracnose, powdery mildew, die back of cashew, leaf and nut blight affect cashew in India (Pattanayak *et al.*, 2020).



**Figure 4 - Respondent’s challenges associated with cultivating cashew with food crops at Amoma**

An earlier report from Lawal and Uwagboe (2017) indicated that cashew farmers do not use fertilizers because the crop is reported as hardy in nature, but notwithstanding, poor usage of fertilizer may probably be due to lack of funds. The most prevalent insect pests on cashew plantations are the Stem girdler and the Tailor ants; these the farmers control using pesticides (Lawal and Uwagboe, 2017).

### CONCLUSIONS

Yam was identified as the most common intercrop of cashew, followed by maize. Farmers were challenged both financially and also with the intrusion of weeds on the farm plots. The cost of managing the farm at the early stage so that weeds do not compete with the crops were major problem.

The study recommends that, Farmers who cultivate cashew should intercrop it with food crops, such as yam, maize and cassava, in order to reduce cost in terms of proper utilization of the land, maintenance practices and also for food. Subsequently, farmers should be educated and provided with assistance from the Ministry of Food and Agriculture to promote the intercropping activities.

Finally, the farmers should be advised to set apart some of their lands solely for crops, so that when the cashew canopy closes, there will be food available to ensure food security, which will fulfill the Sustainable Development Goal 2 (Zero Hunger), safe guard goal 1 (No Poverty), as well as support goal 13 (Climate Action) through carbon storage of cashew trees.

## INTEGRATING CASHEW WITH FOOD CROPS AND PERCEPTIONS OF FARMERS

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