PERCEPTION OF FARMERS IN RURAL NORTH-EASTERN NIGERIA ON A NEWLY INTRODUCED SUSTAINABLE AGRICULTURE TECHNIQUE

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Submitted in partial fulfillment of the Requirements for the degree of Bachelor of Science 2016
PERCEPTION OF FARMERS IN RURAL NORTH-EASTERN NIGERIA ON A NEWLY INTRODUCED SUSTAINABLE AGRICULTURE TECHNIQUE

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ABSTRACT

The world is at the verge of having a global crisis, with environmental degradation and malnourishment being two points of focus. Industrial agriculture, otherwise referred to as conventional agriculture, has led to ecological degradation globally. The use of heavy machinery, chemical fertilizers, heavy irrigation, and intensive tillage have had negative impacts on the environment and future generations. A solution in form of sustainable agriculture and its methods have the potential to replace conventional agriculture. Sustainable agriculture attempts to produce food in the same quantity as industrial agriculture, but while ensuring environmental, social, and economic factors are at equilibrium. The willingness of farmers to adopt such techniques, however, remains unclear. This study examined farmers’ perceptions and personal adoption of a newly introduced sustainable agriculture technique, permaculture, in a rural, semi-arid region of northeastern Nigeria. All respondents participated in a training program in permaculture in 2015. Perceptions were measured based on increase in crop yields and social benefits. Questionnaires (n = 34) were used to obtain data from respondents. Using descriptive statistics, multinomial logistic regression analyses, and crosstabulations, I found that 33 of the
34 respondents experienced an increase in their crop yields. While most respondents experienced social benefits, these benefits were more commonly reported among women. My findings suggest that rural farmers have a positive disposition toward sustainable agriculture and permaculture in particular.

**Keywords:** Conventional agriculture, crop yield, Nigeria, perceptions, permaculture, social benefit, sustainable agriculture
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Chapter 1

INTRODUCTION

The word sustain originated from the Latin word *sustinere*, which means to maintain or to keep in existence (Gold, 2015). Sustainability is based on the philosophy that we are obligated to meet the needs of the present generation without compromising that of the future. A historical definition of agriculture states that it is a science which educates us on what crops are to be planted on a particular type of soil and what processes are involved in order to achieve high yields. Understanding the definition of these two terms results in a concept known as sustainable agriculture, it is an essential motion that is important for the future of farming and may protect the world’s food and crop system from degenerating. Sustainable agriculture can simply be elucidated as a process of producing crops in such a way that the economic, environmental and social aspects of farming are at equilibrium (Kopali 2013). It can also be defined as a philosophy based on human achievements and understanding the future impacts of our activities on the environment and other living organisms.

Various researchers have described sustainable agriculture, each description depends on the location and is different from one zone to the other, there is yet to be a finalized definition of sustainable agriculture (Kotile, 1998). Sustainable agriculture is often referred to as alternative farming, organic farming, ecological farming or regenerative farming (Lockeretz, 1988). Sustainable agriculture is the solution to problems that come along with farming in an ecological way (Lal, 2008). Unlike conventional agriculture which is driven by profit and productivity, sustainable agriculture is more concerned with the use of physical, ecological, chemical, economic and social aspects of agriculture to develop new farming methods that are
safe and have no negative effect on the environment (Lichtfouse, 2009). It aims to maintain soil fertility, elude pollution, use of crop rotation and use of animals such as cows instead of machines (Trewaves, 2001). Malnourished children in underdeveloped nations, overweight children in developed nations, global warming, worldwide chemical pollutions which often result to dead zones, desertification and much more are obvious reasons that conventional agriculture is, in fact, detrimental to the Earth (Lal, 2008). Sustainable agriculture puts into consideration the medium and long term effects of agricultural practices on the agroecosystem. It endeavors to attain great yield and at the same time achieving ecological equilibrium to gain soil fertility and environmental hygiene. It takes a proactive approach instead of solving problems as they occur (FAO, 2016). A research on 17 states in the United States of America deduced that sustainable farmers mostly made use of cover crops, minimum tillage, crop rotation, and mowing as the major practices for weed control (Hanson, 1995).

There are many benefits of sustainable agriculture some of which might include:
Increase in soil quality via soil building techniques such as cover crops, crop rotation, minimum or no tillage and use of organic manure such as compost. These practices improve soil structure and function which encourage soil’s fauna and flora. The soil has a better capacity to retain nutrients and water; energy and nutrient cycles are also increased. These practices also helps to control soil erosion by protecting it from erosive forces. Soil biodiversity increases and the loss of nutrients are reduced. Good soil tends to have an effect on, harvest, it increases yields and also creates healthier crops. Due to chemical fertilizers and pesticides, agricultural areas tend to pollute groundwater. Fertilizers used for conventional farming are made with
phosphorus and nitrogen that eventually find their way into rivers, lakes, and other water bodies, this results in the excess nutrition of microorganisms such as phytoplankton found in the water (Mushtaq, 2015). The microorganisms then begin to deplete the oxygen, suffocating aquatic animals and finally resulting in dead zones. The use of these chemical fertilizers will have a long-term effect on the sustainability of farming, consumer’s health and the health of the farmer’s themselves. Replacing these synthetic products with more organic manure such as animal compost and hay, enhances soil structure and water infiltration decreases the risk of water pollution.

Sustainable agriculture decreases the need for non-renewable resources by decreasing agrochemical demands. Carbon found in the soil can be sequestered by using sustainable techniques, this process mitigates the greenhouse effect and global warming (Gold, 2015). As more organic carbon is retained in the soil, the potential of mitigating climate change also increases. Nevertheless, there is need for more research in this field. There is little or no ecological data on soil organic carbon for developing countries, with a lack of comparison between farm systems in Africa and Latin America (Lal, 2008).

Sustainable agriculture also helps support biodiversity at all levels of organization. At the gene level, indigenous and adapted seeds and breeds are more suitable as they are able to resist infections and can handle climatic stress compared to any hybrid variety. At the species level, variation of plants, soil microorganisms, and animals enhance the nutrient and energy cycle for agricultural production (Hanson, 1995). At the ecosystem level, the conservation of natural environment around the organic
farms and lack of chemical use create appropriate habitats for wildlife. The use of neglected species such as loquat, longan, and cashew, often for crop rotation, helps decrease erosion of agrobiodiversity, in the process creating a healthier gene pool (FAO, 2016). Although there are various sustainable techniques as it relates to agriculture, this study is going to discuss about the permaculture technique.

The word permaculture is a combination of the words permanent and agriculture, it is a different approach to sustainable agriculture. It proves that it is possible to design the ecosystem to serve the human population without degrading the environment (Rhodes, 2015). It integrates animals, human, landscapes and plants into a single functioning system. Permaculture began in Australia in 1978 and was introduced by Bill Mollison and David Holmgren, it has now developed into an international movement with demonstration sites and farm models around the world (Simmons, 2006). Research has proven it successful in every climate including the tropics, mountains, shores and deserts (Holmgren, 2002). It does not require a lot of materials, energy or human labor for, maintenance; it is powered by the recycling of waste products. It decreases pollution and also increases yield by the use of high-yielding species.

Permaculture is a system of design that aims to imitate nature by thoroughly observing the natural cycles, energies, and resources on a farm site. By creating patterns such as the ones shown in figure two that harmonize with patterns of the earth permaculture assists with energy flow and water runoff in farm lands (Bell, 2005). Permaculture makes use of manure which is basically made of animal waste and hay, manure is composed of most elements needed for the growth of plants. It
helps improve the soil structure, subsequently improving water infiltration leading to
decrease in crop water stress and erosion (Holmgren, 2002).

Figure 1: Permaculture pattern done on the farm model in Bole community. Credit: Ogundijo, Rotimi

Figure 2: Compost manure used for permaculture in Bole community. Credit: Ogundijo Rotimi

The population of the world is expected to reach 9.2 billion people by the year 2050,
this is 34% higher than it is today. With this dramatic change, it is expected that food
production will also have to increase to accommodate the entire population. The ability of African farmers to handle this drastic change is a course for concern, especially with the fact that African’s are already facing harsh factors such as: Food security, climate uncertainty, malnutrition and economic pressure. Countries such as South-Africa and Kenya have begun to find sustainable solutions to this problem. The World Wildlife Fund have made efforts to promote sustainable agriculture in South Africa and minimize the adverse effects of farming on the environment (WWF-SA, 2014). The Kenya Sustainable Agriculture Land Management Project has helped small-holder farmers build smart agriculture skills. It has implemented Agroforestry, on approximately 45,000 hectares in Kenya’s Nyanza and Western provinces (The World Bank, 2015).

Agriculture in Nigeria has over the past decade continued to deteriorate. Up until the 1970’s, agriculture in Nigeria was its major source of income; but due to the discovery of oils just before independence and the adverse effect of the civil war in the 1960’s, agricultural development has not been much of a success (Manyong, 2005). Since independence in 1960, decisions taken by the government has left agriculture in second place to oil produce. Coffee, rubber and palm oil plantations in the East and Mid-West were deserted, same for the cocoa plantations in the West and the groundnut pyramids in the North (Adedeji, 2010). Agriculture in Nigeria used to provide 85% of its foreign exchange making food very cheap (Adedeji, 2010). Nigeria’s overdependence on oil has put its economy in a downward spiral. The government and nation at large have come to this realization and various programs have been brought up with the purpose of ushering the population back into agriculture. Unfortunately very little has been achieved, some of these programs
include National Land Development Authority (NALDA), Operation Feed the Nation (OFN), National Food Acceleration Protection Program (NAFPP) and many more. There have also been policies put in place such as the policy of self-sufficiency in food and raw material production, rural development, self-employment, privatization of public enterprises and increased export promotion which are all under the structural adjustment program (Titilola, 1987). The trend of green revolution and organic agriculture originated from already developed countries like the United States of America. These programs are thought to have failed in Nigeria due to factors like:

- Lack of investigation and monitoring of already established programs, to evaluate their success or failure rate leading to abandonment. (reason why this research is a necessity as it investigates the already established sustainable program by AUN for farmers in the Bole Community)
- Lack of properly functioning agricultural policies in Nigeria that do not support sustainable farming
- The stereotypic belief that agriculture is for the poor, this leads to negative attitudes towards farming
- Lack of knowledge on new ideas and developments in the agricultural sector
- Economic constraints (Adeola, 2015)

Sustainable Agriculture in Nigeria is still at a very young stage, to achieve the goal of sustainability, it is essential for the farmers to gain a better understanding of the system. Nevertheless, it is important to know that no agriculture is sustainable except it is profitable and is able to maintain farming families, in the sense that it provides
very good income and good quality of life. Knowledge is a part of human behavior, hence placing emphasis on the importance of examining farmer’s perception of the idea of SAP.

Sub-Saharan Africa has the lowest level of produce, observed; Nigeria is located there and is characterized by rain-fed agriculture, lack of food and management practices (Adeola, 2015). This research is designed to investigate the perception of farmers with regards to different practices of sustainable agriculture.

The American University of Nigeria (AUN) received a grant of twenty six thousand, six hundred and sixty three dollars from the Swiss Agency for Development and Cooperation (SDC) to train IDP farmers and provide them with start-up equipment and seeds. The Office of Sustainability at AUN took up that project; they delivered and distributed seeds and farm implements to 100 farmers. In addition, they conducted a two-day training for one hundred farmers in June 2016. These farmers were taught the principles and techniques of sustainable agriculture, specifically permaculture.

The type of agriculture used by most of these farmers before SAP was conventional agriculture, which is based on the use of industrial chemical fertilizers, pesticides, herbicides and other synthetic products for farming. Initially, this was accepted by farmers worldwide, harvests came in multiples, more than farmers had seen before. There was little or no degeneration of the soil and the pests had not adapted to pesticides (Mushtaq, 2015). With time, pesticides have become a household need; the common use of these products has caused havoc in our soil and water. They
denature the soil and kill soil organisms that play an important role in preserving the fertility, drainage, aeration, structure and function of the soil.

Figure 3: Photograph of farmers being trained at SAP. Credit Ogundijo, Rotimi.
AIMS AND OBJECTIVES & HYPOTHESES

Aim
To determine the perception of farmers on a newly introduced sustainable agriculture in Bole community.

Objectives
- To understand the perceived contributions of the sustainable agricultural project to enhancing social relationships
- To understand the perceived contributions of the sustainable agricultural project to enhancing crop yield
- To identify the type of sustainable technique they were taught
- To recommend my findings to the AUN community.

Research Questions
1. What is the perceived effect of SAP on crop yield among rural farmers in Bole community?
2. What is the perceived effect of SAP on social relationships among rural farmers in Bole community?

Hypotheses
H1: There is a positive perceived impact of SAP on crop yields in Bole community
H2: There is a positive perceived impact of SAP on social relationships in Bole community
Chapter 2

METHODS:

Study Site

The study site was a farm in Bole community, located in Yola South Local Government Area of Adamawa State (Figure 4). It shares boundaries with Sebore and Mbamba villages in the East, Yolde-Pate in the West and Yola and Cholli Village in the North. It is under the Tukur district (Figure 5). Although the predominant tribes of Bole are Vere, Fulani and Laka, other tribes like Higgi, Margi and Kilba are also found there.

Figure 4: Map of Adamawa State. Credit: http://nigeriazipcodes.com/367/adamawa-zip-code/
The community is a dry semi-arid woodland characterized with slope hills. There are 30 ward heads in Bole some of them include: Bole-Jabbe, Bole-Kiilaru, Bole-Bando, Bole-Jareded and Lakare. They community has a secretary called Muhammad Yahya and a village head called Abdulmuminu Abubakar.

The most common occupation in Bole community is farming; some women are also involved in pottery and some men in blacksmithing. There is a rainy season from May-October and a dry season from November-April. Farmers in Bole community plant mostly rice, beans, ground nut, maize, guinea corn and pumpkins.

Figure 5: Ariel view of the farmland in Bole community. Credit: Ogundijo Rotimi
Data Collection and Analysis

My sampling unit was an individual participant (rural farmers) in SAP organized in 2015 the Office of Sustainability at the American University of Nigeria. Of the 70 farmers from the community who participated in SAP, I aimed to interview at least 45 people. With the assistance from Bole community leaders and an investigator from SAP, the farmers were called to a general area. With the assistance of an interpreter who spoke fluent Hausa. I administered a questionnaire which included solely questions. The questionnaire covered demographics and information about education, occupation, farming techniques used before and after SAP, the perceptions of respondents on the effect of SAP on crop yields, and questions relating to the respondents’ social interactions with other SAP members since completing the training.

Social factors measured were used to create an index of social benefit. I asked respondents to answer yes or no to the below questions. Regarding other participants in the SAP program:

- Do you still see them?
- Do you farm together?
- Do you exchange your harvest with them?

An index of 3–6 for each respondent was then calculated, with a 3 being high social benefit (answering “yes” to all three questions) and a 6 being no social benefit (answering “no” to all questions).
For statistical analysis I used multinomial logistic regression to determine the effect of demographics and other variables on the respondents’ present use of sustainable agriculture (permaculture technique). Adoption was measured as 1) only using permaculture, 2) only using conventional techniques, or 3) using a combination of both permaculture and conventional techniques. I also did cross-tabulations on social index score and categorical variables to determine any relationship among these. For this analysis, given the small sample size, I collapsed the social index into two categories: 1) high social benefit (index score of 3–4), and 2) low social benefit (index score of 5–6).

*Ethical Guidelines*

I ensured to spend a minimum of 10 minutes before every interview session explaining the informed consent. I also made sure to acquire an oral informed consent at the beginning of all interviews. Before the commencement of this study, I successfully completed the Protecting Human Research Participants training managed by the National Institutes of Health Office of Extramural Research (Certification Number: 2187657). I also obtained approval from the AUN Institutional Review Board (IRB approval code: AUN-16-10-04)
Chapter 3

RESULTS

Although I initially planned to interview 45 farmers, my final sample size 34 (n = 22 women, n = 12 men).

Demographic Characteristics

The average age of the respondents is 41.8 years, (SD = 13.1, range = 20 – 50 years). One person (2.9%) was single, while a majority of the respondents 28 (82.4%) was married. 3 (8.8%) of them were widowed and 2 (5.9%) were divorced. A greater percentage 28 (82.4%) of the farmers went through some form of formal education while 6 (17.6%) of them had no form of education.

All respondents in this study were former internally displaced peoples who fled the Islamic terrorist group Boko Haram. Farmers came from several local government areas (LGAs) in two states (Adamawa and Borno) in the northeastern part of Nigeria (Figure. 6).

Occupation and Crop Yield

Respondents were experienced farmers, with most of them farming at a very young age. Their farming experience ranged from 3 years to 55 years. Before the respondents were introduced to permaculture, 31 (91.2%) of them were practicing conventional agriculture which they referred to as traditional agriculture. Traditional agriculture involves the use of strong chemicals for fertilization and no particular planting pattern. 3 (8.8%) of them were already using some sustainable agricultural techniques, such as manure for fertilization and ox plow for minimum tillage. This
was likely because conventional techniques were more expensive due to the chemicals and machinery required.

After the SAP training, a majority of the respondents 20 (58.8%) applied the techniques they learned, 2 (5.9%) of them did not apply these techniques and 12 (35.3%) of them combined both sustainable and conventional techniques. Of the 58.8% of the respondents that applied permaculture on their farmland, they all said they observed a change in their harvest. All of them but one person observed an increase in crop yields and robustness of their crops. The person who experienced a decline in crop yields blamed it on the difference in soil, noting that the soil in her home was better than that in Bole community.

After conducting a multinomial logistic regression analysis, I found no relationship among the demographic and other variables (e.g., age, gender & farming experience
and the farmers’ adoption of sustainable agriculture techniques) and the farmers’ present use of sustainable agriculture techniques.

*Social Aspect*

Of the 34 respondents, 32 (94.1%) went out of their way to visit each other and make friends after the program training. Nineteen (55.9%) of them farmed together, while 15 (44.1%) did not. Seventeen (50%) of them shared their harvests with others while the other 17 (50%) did not. I observed a relationship between genders and sharing of harvest, female respondents shared their harvest more than the male respondents did, out of the 50% that shared their harvest, 14 of them were women and three of them were male.

A social index was created based on the questions: (1) Do you go out of your way to see the colleagues that attended the SAP training with you (2) Do you farm with those colleagues (3) Do you share your harvest with them. These questions were closed-questions its options were either yes or no. In the questionnaire, yes was coded (1) and no was coded (2), a respondent with a score with the range 3-4 has attained high social benefits while someone with a score within the range 5-6 has attained low social benefits (Table 1). My assessment of social interactions indicated that women may gain a greater social benefit than men. Although cross-tabulations of the revised (two-category) social index and categorical variables (e.g., gender, marital status, religion, and education) did not indicate statistically significant relationships, individual cross-tabulations did show one significant result between gender and the sharing of harvests (Table 2). Overall, one-half of respondents shared their harvests, but these individuals were more likely to be women. Of the 34
respondents in this study, 3 men and 14 women shared, while 9 men and 8 women did not share

**Table 1:** Social index of respondents (n = 34) based on four categories

<table>
<thead>
<tr>
<th>Social index</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>13</td>
<td>38.2</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>23.5</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>35.3</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2.9</td>
</tr>
</tbody>
</table>

**Table 2:** Results of cross-tabulation between gender and whether respondents said they shared their harvests with other participants in the SAP program.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test Statistic</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Fisher’s exact test</td>
<td>–</td>
<td>0.035</td>
</tr>
</tbody>
</table>
Chapter 4

DISCUSSION

Introducing a set of new rules and program to people who know little or nothing about it could a bit cumbersome, the respondents ages and level of education were factors that did not favor SAP. Yet for the sake of research and passion for sustainability I had to embark on this research to properly compare the effect the new program had to a norm that has been practiced for years and passed down one generation to the other.

In this chapter, proper discussion of sustainable agriculture is our main point of call. Sustainable agriculture is a main necessity to obtain a certain level of sustainable development. After all, it is said that sustainable agriculture is the one that properly manages the resources of agriculture to quell the constant hunger of the human needs while the quality of the environment and natural resources are properly conserved, enhanced and maintained. This should lay its main focus on increasing the agricultural rates for the adequate supply of food while doing little or no damage to the basic resources. Data was carefully analyzed to further stress that sustainable technique of farming is good enough to erode the previously practiced form of farming. We took into consideration farmers in the region, which consist of a variety of people; educated and uneducated.

In the process of this research, I expected the farmers to have a positive perception towards sustainable agriculture and its impact on crop yields and social behavior. Evidence has shown that sustainable agriculture has the ability to bring both economic and environmental benefits. Some countries in Africa, Asia and Latin
America, where lack of enough food supply is a major concern have testified to a substantial increase in food production using regenerative methods (Niels, 2015).

My results prove my first hypothesis right as farmers did have a positive perception on the impact of sustainable agriculture on crop yields. Farmer’s answers to the questions that were posed to them with regards to sustainable agriculture showed their understanding of its potentials as a substitute for conventional agriculture. The farmers that did apply the sustainable technique enjoyed increase in their crop yields and robust in their crops. With the use of pattern techniques in planting, minimum tillage, and manure instead of chemical fertilizers, these farmers were able to avoid soil erosion and degrading of the soil nutrients. A research done on farmers’ perception of sustainable agriculture in south-western Nigeria showed that farmers have a positive disposition towards sustainable agriculture as they experienced a major increase in crop yield (Adeola, 2015).

Success in crop yield is dependent on the farmers’ adoption of sustainable techniques. A study of the perception of farmers in Pakistan on sustainable agriculture found that although farmers are interested in obtaining information with sustainable agriculture practices, there is a communication gap between extension agents and farmers (Mirani, 2002). Another factor that might have affected their adoption of this sustainable practices is tradition. Due to the fact that all the respondents in this study are rural farmers and might not have been exposed to an urban way of life, they will prefer to use methods that were passed from their forefathers. These methods are not sustainable, one of the respondents mentioned
that she was taught to random planting by her parents but after the SAP training she began to realize how patterned farming reduced water loss and runoff in her farm.

Age is another factor that should be considered with regards to adoption of sustainable techniques. Of the 14 respondents that either combined or did not use these sustainable techniques, most of them were over 50 years old. Their ability to understand and assimilate new information at that age is a tough task. Lack of standard education amongst farmers is another reason why they might not have adopted these techniques; this study proves that as the farmers that did not adopt these sustainable techniques had no form of formal education. A study in India also shows that due to the fact that most of the farmers lack education, they were unable to understand the concept of sustainable agriculture which seemed to be complex to them (Bhutto, 2007). A study in southwestern Nigeria proves that due to education, farmers were able to gather information from the media and via interaction with professionals; this kept them updated on news about sustainable agriculture (Adeola, 2015).

The farmer that had a negative perception of SAP on crop yield, claimed that the soil she was used to at her initial settlement was better suited for farming unlike that found in Bole community. In future studies, I recommend location and soil type to be used as variables in determining the perception of farmers.

With regards to the social aspect of this research, I was not sure of what to expect with this section as there was no literature that specifically studied this aspect. My second hypothesis was also proven correct as farmers did enjoy some sort of social
benefits. Although social benefits were not as pronounced as the increase in crop yields, I was able to determine the variables that affected it. Due to the fact that all the respondents were former IDP’s, they are forced to make new friends and family.

This training seems to have brought them together faster as most of them have neighboring farms and often share the same equipment. Women had an edge over men at enjoying high social benefits, they tend to go out of their way to see each other more and share harvest amongst themselves. In the process of administering the questionnaire one of the male farmers said he did not share his harvest because he believes that everybody should reap what they sow; there was a roaring chant of agreement amongst the male farmers present. Marital status seemed to also be a major factor when it came to social benefits. Married respondents enjoyed more social benefits than single respondents, the divorced and widowed were on the other end as they did not enjoy any form of social benefit. I believe that if the study did not restrict social benefits to individual interactions, we would have been able to determine other social impacts which include employment. I also recommend a future research on this study which will give the farmers time to expand and possibly have enough crop yields so as to invest in social activities such as organic farm holidays. A study shows that Tuscany, Italy offers environmental friendly holidays which include simple meals to weeklong stays (Marzoli, 2005). With more time and proper supervision the community should also be able to enjoy social benefits like organic national parks.

In the process of this research I faced two major limitations, the first was my sample size, due to the fact that there was not enough time I was unable to recruit more
farmers from the SAP training, I recommend that the respondents that I was unable to reach out to should be contacted for the sake of further research and also monitoring of the program. Getting a larger sample size will give us a clearer perspective on this study. The second limitation I faced was timing, as at the time this research took place harvest had just begun; therefore I was unable to compare harvest from last year when they were using conventional agriculture methods and harvest from this year where they applied the new sustainable techniques.

This study proved that more work needs to be done in monitoring programs such as SAP, almost half of the respondents did not strictly abide by the training. This further reduced my sample size in terms of their perception on crop yield. I believe with the assistance of extension agents, there will be proper monitoring of farmers. With presence of extension agents, farmers in Bole community will be able to constantly communicate their perceptions and worries to the host of the program.
Chapter 5

CONCLUSION

It can be concluded that farmers in Bole community had a positive disposition towards sustainable agriculture and its techniques. This is evident as they did perceive an increase in crop yields and robustness in their harvest. They also perceived an impact of sustainable agriculture on social relationships; the respondent did enjoy some form of social benefit although it was not as pronounced as that of crop yield. This study has shown that sustainable agriculture if applied is of ought-most benefit.

I recommend that ecological data be obtained to be able to compare this year’s harvest to last year’s. The farmers that were not reached put to in this study should be contacted so as to attain broader perceptions on sustainable agriculture.
APPENDIX 1

QUESTIONNAIRE

DEMOGRAPHIC DATA

1. Age (years): ___________________
2. Gender:     Male (1)            Female (2)
3. Marital Status: Single (1) Married (2) Divorced (3) Widow/Widower (4)
4. Religion: Muslim (1) Christian (2) Other (3)
5. Level of Education: Primary (1) Secondary (2) Tertiary (3)
6. Former place of residence (State & LGA):

OCCUPATION/CROPS

7. How long have you been farming for? ________________
8. What farming practice were you using before the Sustainable Agriculture Program (SAP) brought to you by American University of Nigeria? Conventional Agriculture (1) Sustainable Agriculture (2)
9. Are you presently applying the farming techniques you learnt from SAP? Yes (1) No (2) Combined (3)
10. If yes, after adopting this program have your crop yields changed? Yes (1) No (2)
    If yes, is it: Better (1) Worse (2)

SOCIAL ASPECT

Regarding other people that joined you at the training:

11. Do you still see them? Yes (1) No (2)
12. Do you farm together? Yes (1) No (2)
13. Do you exchange your harvest with other farmers? Yes (1) No (2)
REFERENCES


