COMPLIANCE OF AGRICULTURAL PRACTICES WITH ORGANIC AGRICULTURE STANDARD AMONG NIGERIAN FARMERS

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ABSTRACT

Organic agriculture, as a practice that promotes sustainable farming is gaining global acceptance. Organic agricultural production presupposes that certain standards need to be followed. Oftentimes, these standards are not strictly followed by many farmers who claimed to practice organic agriculture in Nigeria. The extent to which their agricultural practices comply with the Organic Agriculture Standards in Nigeria (OASN) is yet to be ascertained. Therefore, the compliance of agricultural practices with organic agriculture standard among Nigerian farmers was investigated.

A five-stage sampling procedure was used. Three zones: North-central, South-east and South-west were randomly selected and Benue and Niger, Anambra and Ebonyi, and Ekiti and Oyo states were randomly selected, respectively from the zones. From each state, 10% of Local Government Areas (LGAs) were randomly selected to give a total of 15 LGAs for the study. Thirty rural communities were randomly selected from the LGAs, while 20% of farmers were proportionately selected from the communities to give 310 respondents. Interview schedule was used to collect data on respondents' socio-economic characteristics including access to extension service, agricultural practices in use (endogenous and exogenous), perception of sustainable agricultural practices, constraints to use of agricultural practices (endogenous and exogenous) and level of compliance with organic standards. Indices of perception (unfavourable, 67.0-117.6; favourable, 117.7-199.0), level of compliance with organic standards (crop: low, 18.0-39.5; high, 39.6- 61.0; livestock: low 12.0-27.6; high, 27.7-46.0) were generated. Data were analysed using descriptive statistics, Pearson product moment correlation and ANOVA at $\alpha_{0.05}$**.**

Respondents' age, year of formal education, farm size, farming experience and monthly income were 47.7±11.3 years, 10.5±6.1 years, 5.8±1.3ha, 26.5±4.3 years and ₦ 30,098.7±34,509, respectively. Majority of respondents were male (69.0%) and 52.0% had access to extension service fortnightly. For crop production, endogenous practices in use were wood ash (1.00±0.10), multiple cropping (0.99±0.20), neem extract (0.82±0.10), while exogenous practices in use included paraquat (0.80±0.33), pluazifop-P butyl (0.62±0.06) and glyphosate (0.61±0.30). For livestock production, use of ground pawpaw seeds (0.66±0.30), soaked Christmas melon (0.50±0.40), soaked pawpaw leaves (0.40±0.10) were observed as endogenous practices, while ampicillin (0.98±0.10) procaine penicillin (0.67±0.10) and oxytetracyline (0.66±0.20) were exogenous practices in use. Perception of sustainable

agricultural practices was favourable among 97.7% of crop farmers; however, 53.4% of livestock farmers were not favourably disposed to sustainable agricultural practices. Farmers were constrained to observe endogenous practices by labour intensiveness (1.54±0.20) and promotion of agrochemicals (1.51±0.10), while exogenous practices were hampered by limited access to capital (1.80±0.80) and high cost of chemical inputs (1.67±0.90). Level of compliance with organic standards was low among 54.1% and 55.6% of crop farmers and livestock farmers, respectively. Years of formal education (r=0.19), access to extension service (r=-0.35), perception of sustainable agricultural practices (r=0.48) were significantly related to compliance with OASN. Compliance with OASN was significantly higher in the South West (36.8±10.4) compared to North Central (34.5±10.7) and South East (32.1±7.6).

Compliance with organic agriculture standard in Nigeria was low for both crop and livestock farmers in Nigeria. Farmers in the South West were more compliant with organic agriculture standards in Nigeria among the zones.

Keywords: Organic agriculture standards, Sustainable farming, Exogenous farm practices

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DEDICATION

This research work is dedicated to God my helper and the lifter of my head, and to all my helpers; my wife Ademidun, and Dr Olugbenga AdeOluwa God continually be your present help.

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CERTIFICATION

This is to certify that this research work was carried out by Peter Olatunde, OLANREWAJU, with matriculation number: 137151 under our supervision in the Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria.

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CHAPTER ONE

Introduction

1.0. Background to the study

In recent times, studies have shown that a higher percentage of the farmers in Africa, Nigeria in particular, practice low external inputs agriculture; innovative techniques to manage pest, weed, soil fertility, water management and livestock through safe and environmental friendly practices and thus practise organic agriculture by default (AdeOluwa 2010; Oruonye and Okrikata 2010; International Federation of Organic Agriculture Movement (IFOAM) 2011; Meludu Abolade and Olanrewaju 2012; Olaito 2014). Conscious recognition of and compliance with organic standards would be required to ensure that agricultural practices are truly organic. Organic agriculture as a production system is distinguished for being deliberate in planning, organising, and compliance to standards from land preparation to packaging of products. Organic agriculture is environmentally sustainable and incline to methods of primary production which minimise the use of external inputs, as well as lessen the impact of agriculture on the environment (Kenanoðlu and Karahan 2002; Smit 2009; Singh and Grover 2011; Dholakia and Shukul 2012). The practice of organic agriculture is rooted in sustainable agriculture, innovations of farmers' and largely on scientific findings. (AdeOluwa 2010; Singh and Grover 2011, and IFOAM 2011). Organic farming practices are entrenched in local cultures, ethical values and beliefs of peoples, thereby providing farmers renewed opportunities for maintaining and developing their local sustainable farming systems.

African Union (AU) (2011) expressed the belief and conviction in the potentials and benefits of organic system of farming, as a sustainable alternative response to the multifaceted challenges associated with synthetic inputs and concerns for sustainable agricultural production. This brought about the facilitation of African Heads of State and Government Decision EX.CL/Dec.621 (XVII) on organic agriculture. The concern for the exploitation of farmers practicing organic agriculture propelled the decision of African Heads of states. They agreed that African Union Commission should engage different development partners such as New Partnership for Africa's Development (NEPAD) to ensure the development of the organic movement in Africa with some specific objectives.

This led to the formation of African content concept of organic agriculture as Ecological Organic Agriculture (EOA). This commitment affirmed organic agriculture as Africa Union as a sustainable production system for Africa by the African leaders. This is expected to

motivate stakeholders' involvement, to leverage on the ecological friendly endogenous and exogenous practices in promoting organic agriculture production system for its health, economic and environmental benefits.

Currently, Nigeria has an organic agriculture standard published in 2012 to; enhance compliance to principles of organic agriculture, adoption of organic practices by farmers, access to local and international market, and stimulate engagement of policy makers in Nigeria.

1.2 Statement of the problem

Africa imports 90 percent of its agro-inputs, which come with its adverse effect on health, economy and environment (Trewevas, 2002 and International Fund for Agricultural Development (IFAD) 2003). Some of the imported agro-inputs (exogenous) have generated a lot of concerns due to the misuse, and low compliance with safety standards (Mokwunye, Babalola, Ndagi, Idrisu, Mokwunye, and Asogwa 2012; Issa 2105, Oyekale, 2017).

Farmers in Nigeria in a bid to remain in business have developed farming practices (endogenous) and used imported agro-inputs (exogenous) alongside, in spite of their adverse implications. These practices have made African farming practices to be referred to as low external inputs or organic agriculture by default (Walaga *et al*, 2005; International Federation Organic Agriculture Movement IFOAM 2011; and Olaito 2014). The opinion holds because, about 70 percent of the farming population in Africa could not access some of the synthetic inputs such as chemical fertilisers and agrochemicals. Although these low external inputs can be seen as potentials to leverage on for promotion of organic agriculture in Africa, conscious recognition of and compliance with organic standards would be required to make efforts truly organic.

Oruonye and Okrikata (2010) reported that botanicals developed by farmers and scientists in Nigeria are effective technically and environmentally affordable, alternatives to synthetic inputs (pesticides). Studies on indigenous practices have shown that it has sustainable potentials (Akinbile 2006; Fayinminnu and Shiro 2014; Meludu and Adesina, 2014; Indigenous Knowledge and Development Monitor (IKDM), 2016). Most of the studies on indigenous practices presented it as synonymous with organic agriculture practices, with less consideration on it compliance with organic standards.

Studies have adjudged organic agriculture as a bridge between healthy and environmental friendly indigenous (endogenous) and scientific (exogenous) practices (Singh and Grover, 2011). The strength of its production system is strict compliance with principles, practices and standard for crops and livestock (AdeOluwa 2010; Singh and Grover, 2011, and IFOAM, 2011).

The dominant practices of most farmers in Nigeria are the combination of indigenous practices and agrochemicals for production. This study therefore, intends to identify healthy and environmentally friendly practices developed by Nigerian farmers (endogenous) and scientific (exogenous) practices available for the management of soil fertility, weed, pest and diseases in crops, and also for general management practices in livestock production in Nigeria, and ascertain the compliance of these agricultural practices with the Nigeria organic agriculture standards.

The following research questions will be answered at the end of the study:

1. What are the personal characteristics of respondents in the study area?
2. What are the enterprise characteristics of respondents in the study area?
3. What is the perception of respondents on sustainable agricultural practices in the study area?
4. What is the extent of use of endogenous and exogenous in the study area?
5. What is extent of compliance of endogenous and exogenous practices with organic agriculture standards?
6. What are the constraints to the use of endogenous and exogenous practices in the study area?

1.3 Objectives of the study

The general objective of the study is to determine the tendency for compliance of endogenous and exogenous agricultural practices with organic agriculture standard in Nigeria.

Specific objectives of the study are to:

1. determine the personal characteristics of respondents in the study area,
2. ascertain the agricultural enterprise characteristics of respondents in the study area
3. determine the perception of respondents on sustainable agricultural practices in the study area,
4. ascertain the extent of use of endogenous and exogenous in the study area,
5. identify the constraints to the use of endogenous and exogenous practices in the study area,

6. ascertain the extent of compliance of endogenous and exogenous practices with organic agriculture standard.

1.4 Hypotheses of the study

The hypotheses this study were stated in null forms and tested;

1. There is no significant relationship between the socioeconomic characteristics of respondents and the level of compliance of practices with organic standards.
2. There is no significant relationship between the perception of respondents to sustainable agricultural practices and the level of compliance of practices with organic standards.
3. There is no significant relationship between the use of endogenous and exogenous agricultural practices and the level of compliance of practices with organic standards.
4. There is no significant relationship between the constraints to the use of endogenous and exogenous agricultural practices and the level of compliance of practices with organic standards.
5. There is no significant difference between the level of compliance of endogenous and exogenous agricultural practices with organic standard across the agricultural zones.
6. There is no significant contribution of selected independent variables to compliance with organic agriculture standards.

1.5 Justification of the study

Currently in Nigeria, there is growing interest and demand for organic products - crops and animal, and there is limited record on compliance of these agricultural practices based on organic agriculture standards. Thus, for rapid adoption of organic principles and practices, and to meet the ever-increasing demand for organic produces, there is a need to explore, document healthy and environmentally safe agricultural practices, which are in compliance with the Organic Agriculture Standard in Nigeria.

This study identified and categorised common agricultural practices as compliant or otherwise with organic agriculture standards. The results of the study as baseline are useful in the pursuit of promoting organic agriculture practices among all farmers (crop and livestock) in Nigeria. It will be particularly handy for the institutions and agencies that are promoting organic agriculture for the purpose of the health, economic and environment concerns.

It will also help in the documentation of the ecologically friendly indigenous knowledge. Considering the informal transmission nature of indigenous knowledge, the documentation of the existing ones across the country is imperative. The enviable ecologically friendly endogenous or exogenous documented will be easily adopted by farmers with high assurance of continuous patronage by the people. This study will stimulate significant policy to

mainstream organic agriculture into agricultural production system for rapid acceptance by stakeholders in Nigeria.

1.6 Delimitation of the study

The study is on indigenous practices from farmers' creativity, new methods of production or management practices developed by farmers from their experiences and the environmental friendly scientific products being used to meet their agricultural production needs. This helps to know what the people know, the practices in use, limitations and reasons for utilising some of the practices in the selected agricultural zones in Nigeria. The study only focused on the tendency for compliance of agricultural practices to Organic Agriculture Standard in Nigeria.

1.6 Operational definition of terms

Endogenous practices: These are practices generated and are in use by the local famers based on their agricultural knowledge, experiences and information system. In this study, endogenous practices are all the practices inherited, newly developed techniques and adopted practices through the famers' information system to manage soil fertility, weeds, pests, and diseases in crop and antibiotic, feeding materials, vitamins and minerals and diseases management in animal production. These for instance, include the use of extracts of different plants to manage disease and pests, different planting techniques to manage weeds and maintain soil fertility.

Exogenous practices: These are technologies that are generated by the scientists within and outside the study area, which have been promoted and adopted by farming populations, for instance, chemical products used to manage weeds, pests and diseases in crop and animal production.

CHAPTER TWO

2.0 Literature review

2.1 Preamble

Technology is certainly not limited to scientific (exogenous) inputs but can mean innovative and new methods of production or management practices developed by farmers within their experiences. A number of valuable endogenous innovations emerge at local levels that rarely have the opportunity to be shared and widely adopted. There is a growing enthusiasm for such ecosystem friendly and site-adapted agricultural systems to emerge throughout sub-Saharan Africa and around the world (United Nations Department of Economic and Social Affairs UNDESA, 2011). Eyong (2007) opined that the innovativeness of local people does not only include how their ancestors developed local varieties and breeds, but the current *dynamics* of indigenous knowledge (IK). Farmers develop new ways of using and managing resources to meet their production needs. Such endogenous (from within) processes are often overlooked when outsiders intervene with the intention to conserve biodiversity. Indeed, some interventions had unknowingly undermined local creativity and energies. This might have informed the perception of farmers and the society to the indigenous innovations.

2.1.1 Challenges of agriculture and indigenous innovations

Agriculture is dealing with daunting challenges. Farmers anticipate to produce good enough agricultural produces at low-priced costs to meet the food, fiber, feed, and biofuel needs of the increasing worldwide population, while contending with the underneath situation of rising manufacturing fees, more and more limited natural resources and changes in climate. Growing concerns on the unintentional impacts associated with a few agricultural production practices has led to heightened societal expectations for advanced environmental, network, labour, and animal welfare requirements in agriculture. Some of the adverse effects of the synthetic inputs are environmental and health impacts.

2.1.2 Adverse environmental impacts

1. Impact on Aquatic Organisms-pesticide residues lead to deterioration of water quality, hence reducing the number of aquatic organisms;
2. Water Pollution and Contamination- Spraying pesticides adjacent to drinking water resources may lead to their contamination also; use of hazardous pesticides and wrong pesticides application approach could result to pollution of surface and underground water
3. Soil degradation/contamination- long-term excessive use of pesticides will cause higher pesticide resistance and pesticide residues in the soil will cause soil contamination

4. Extinct of Non-Target Species- Highly toxic pesticides may have impact on the non-target species (natural enemies, etc.);
5. Air Pollution-Unsafe handling, application and disposal of pesticides products such as empty containers and obsolete products will cause air pollution

2.1.3 Adverse Health Impacts

1. Consumption of crops and plants grown under chemical pest control could cause health hazards to humans. This is especially common in the consumption of fruits and vegetables without proper washing.
2. Application of pesticides could cause physical discomfort in the absence of protective equipment in spraying pesticides.
3. It is also likely to cause skin burns when not wearing protective clothing in pesticide spraying.
4. Drinking water sources contamination caused by pesticides spraying adjacent to the resources, or overflow and drain of chemicals adjacent to drinking water resources
5. Chemical pesticides could cause harm to the health of human being when drinking waters polluted by pesticides and eating the polluted animals and agro by-products

To mitigate the adverse impacts, smallholder farmers developed some management practices. Though, the management practices of the smallholder farmers through their adaptive indigenous knowledge (IK) also need to be improved upon for sustainable production. Recent development in the field of agriculture has seen a steady rejuvenated recognition of indigenous knowledge for sustainable production globally. Indigenous knowledge, particularly in the African context, has long been ignored and maligned by outsiders. However, a growing number of African governments and international development agencies recognise that local-level knowledge and organisations provide the foundation for participatory approaches to development that are both cost-effective and sustainable (Ponge, 2011).

Descriptions of indigenous knowledge (IK) draw thought to the colonial racist concept that indigenous practices are dominated by trials and error whilst Western (contemporary) information is science characterised by means of experimentation. The former is, therefore, perceived clogged, concrete, and faulty, while the latter is painted as intangible, weighty, right, and imbued with conventional reasoning. IK evolved from experiences and experimentations, even though these experiments were not documented and the knowledge

systems had been legitimised and fortified beneath suitable institutional frameworks, way of life and practices. The practices were passed on from generation to generation, thus the enable the survival of the indigenous practices for management of natural resources and production system, economy and political organisation. The ability of the people to handle their challenges based on interaction with natural environment is referred to as indigenous coping strategies (Eyong, 2007, and IKDM, 2016).

Many of the indigenous knowledge strategies to environmental management consist of practices as minimum tillage, shifting cultivation, intercropping, and agro-forestry. Those technology and practices were not unusual and were used with different strategies of land use and control to get better yields, while maintaining health of environment. For example, intercropping maize with different crops helps to prevent the hazard of total crop failure, in that if one of the plants succumbs to environmental pressure others will tolerate. Inter planting stabilize crop yields, hold the soil and give the opportunity to gather more harvest at the same time (Yekinni, 2002).

Farmers adopt an extensive variety of indigenous agricultural practices primarily based on experience, casual experiments and intimate understanding of their environment. The utility of indigenous agricultural farming as an instance has reflected in the following:

- indigenous soil practise and planting materials
- indigenous techniques of controlling pests and illnesses
- indigenous strategies of maintaining soil fertility
- indigenous techniques of controlling weeds
- indigenous methods of harvesting and garage (Abioye, Zaid, Egberongbe, and Halima 2011).

One of the most essential elements of indigenous knowledge structures and practices is human and animal health care. The ethnoveterinary healing practices are plain evidences of the indigenous people's innovativeness to addressing their demanding situations. Those patterns are sustained by micro level institutional arrangements vested with differentiated responsibilities from era to era as a consequence ensured non-stop survival. The influence of globalization, commercialisation, migration due to development and decrease in family tie and structure has eroded system of knowledge transfer from one generation to the other.

2.2 Indigenous knowledge as an engine for sustainable development

The indigenous technologies of most of the low resource farmers do not only feed families, but also generate jobs and catalyse the growth of rural businesses (Abioye et al., 2011; International Federation of Organic Agriculture Movement IFOAM, 2011). The neglect of indigenous agricultural practices and technologies has adversely affected exploring its inherent potentials, creativity of the farmers and sustainable agricultural production. Innovations by resource limited farmers are strategies often employed to cope with climate variability as observed by Mikhail (2012). In recent times, emphasis has been on the importance of involving smallholder farmers when determining what steps should be taken to address hunger, poverty, and environmental problems (International Assessment of Agricultural Knowledge, Science and Technology IAASTD, 2009). Many international organizations have claimed that smallholder farmers and some of their endogenous technologies are viable to solve the problem of food insecurity (Food and Agriculture Organisation FAO, 2002; IAASTD, 2009).

About ninety percent of farms all over the world are less than two hectares, and these provide employment to about 1.3 billion people and dominate agriculture in developing countries (IFOAM, 2011). Smallholder farming and their endogenous innovations are the backbone of agriculture and food security, not only in the developing countries but also in the developed countries (Stabinsky, 2012). Smallholder agriculture is multifunctional, as it accounts for the majority of rural employment, most food production as well as the provision of ecosystem services; contributing to the preservation of natural resources, biological and cultural diversity. The success stories of these farmers with limited resources can be attributed to their ability to explore available natural resources within their environment, and the developed coping techniques to meet daily challenges of production. These coping techniques alongside scientific technologies ensure continuous production.

Each community often has stories of its knowledge source, which gives direction for process of development. Transfer of knowledge from one generation to the other affect information structures as well as a societal development. African and especially, Nigerian IK is holistic in nature and centuries of tight bonds with environment, produce a deep know-how and not a snap shot of the inter-relationships most of the exclusive elements of a habitat (Eyong, 2007). A lot of studies showed that IK can perform well in risk prevention, management, flora and fauna preservation and human health (FAO, 2002; Eyong, 2007; IAASTD, 2009). Presently,

agricultural scientists and developmental organisations have considered re-assessment of indigenous knowledge and technical as prerequisite for new agricultural technologies. It is also recognized that the information of farmers must be taken into account earlier than any new technology is developed and disseminated. This view is primarily based on the idea that:

- farmers have wealth of information relating their personal environment;
- farmers have developed specific capabilities designed to make the first-class use of their environment, (Indigenous Knowledge and Development Monitor (IKDM), 2016).

Traditional or indigenous knowledge of agricultural operations helps agricultural scientists, as they develop and disseminate cultivation and management practices for various crops and varieties of plants. Largely, these significance traits and features of some of the IK practices informed the claim that Africans practice organic agriculture by default. This claim holds due to the fact most of the IK have not consciously adhere to the principle and standards of organic agriculture.

2.3 Farmers and sustainable inclination

The increasing clamour for a shift from technical and economic-orientated conventional practices to people and environment-orientated agricultural practices has been firmly established by wide range of scholars across the globe. Proponents of the humans-oriented approach emphasise human development, equitable distribution of sources and lengthy-run ecological sustainability as principal issues. Human activities affect the natural system, having been portrayed as detrimental to ecosystem; this gave upward push to the yearning for effective management of the ecosystem. It is only recently that the ecologists have realized and value how traditional people used their resources without destroying them. Several researches were documented on systems of traditional knowledge. Other scholars have shown that community-based resource management systems worked because of the presence of appropriate property institutions and not merely because of a super-abundance of resources (Yekinni, 2002; UNCTAD, 2009; and IKDM, 2016).

To get the idea of indigenous knowledge structures within the proper perspective, stakeholders and businesses need to recall positive things, which consist of capabilities of understanding vis-à-vis management practices and consideration of associated phenomena inside the cutting-edge practices they promote. Stoking (2016) associated the point of interest of the scale correctly as follows:

i. Farmers frequently have answers to their issues – solutions that could differ from these promoted through external bodies, hence the role of the experts is now to offer assistance to liberate indigenous capabilities

ii. Sustainable land management is viable in difficult environments – it is not always genuine that marginalized, small-scale farmers will destroy their natural resources for short term benefit; they are similarly concern about sustainability.

iii. Societies have the capability to adapt and to change to new circumstances; they do this by developing new approaches of assembling their needs – gas, fibre, food and fodder – by using adapting indigenous and exogenous technologies and through using their very own informal experimentation techniques.

2.4 Indigenous agricultural management practices

There is collection of records of indigenous sustainable land management practices in array of environments, which were seen as tough, marginal, and scientifically difficult. Stocking (2016) suggested description of a huge number of useful resource-protecting technologies, many of which have been discovered by farmers or evolved in partnership between agricultural studies and nearby indigenous people. Some were stated to have evolved by accident while others came through planned and deliberate effects and interventions.

The listing includes the following:

i. **Crop rotation**: Crop rotation has been an age-long practice in most parts of the world including Europe, Africa and Asia. This is the practice of growing different crops sequentially with a well-planned series on the same land to reduce the impact of pests and pathogens. A good rotation plan sometime can be for two- or three-year or longer. This has proven to reduce crop loss and increase profit of farmers. This potential has been seen as useful in organic farming. Planned crop rotation is a major practice in organic agriculture for managing pest and disease as against the expensive use of synthetic inputs.

ii. **Bush fallowing**: This is a practice in Africa and among subsistence farming population. Land is cultivated for a time frame and then left fallow for some years to restore the soil fertility. In the time past, fallow fields may be left untilled or tilled but not planted for the fallow duration. So often, the fallow fields were used for pasturage for animals, which had the incidental benefit of fertilizing the soil. Brief rotational bush and grass fallow structures are the dominant structures of traditional agriculture of forest and savannah environments. Motives for this are lack of appropriate techniques for soil fertility sustenance and crop manufacturing and higher frequency of cultivation. Fallow kinds may be natural or planted with short duration and soil fertility regenerating plant -

leguminous species. In Eastern part of Nigeria, planting of green fallows popular. An added benefit of that is the better-quality competitive capacity of the green fallow species over the weeds within the fallow, although the exercise calls for massive time and money investments in seed sowing, which may additionally reduce the price/benefit ratio.

iii. **Shifting cultivation**: The practice is observation based, when a land has been cultivated for some period of time and the farmer observed that the productivity of the land has decreased, that become strong indication for the farmers to move to a virgin land. Unlike bush fallowing, moving cultivation further to periodic rotation of fields entails an occasional motion of settlements with cultivated fields. It is the most common system of subsistence farming, and particularly contains curb-and burn exercise (the reducing and burning of forests or woodlands to create fields for agriculture or pasture for livestock). The benefits encompass keeping the soil sufficiently fertile while there may be ample available land for farming and preventing the spread of insect pests, other pests and plant pathogens. The disadvantages are greater, and encompass insufficient cultivable land for meals manufacturing, requirement of big land location, inadequate time for soil fertility restoration and waste of farmers' strength sources in frequent slashing of agricultural fields. The pressure on land may not allow for such practice now, but it was one of the practices of the early farmers to sustain the health of the soil and improve soil fertility.

iv. **Mixed / multiple cropping systems**: This farming approach has been recognised as the most practiced by traditional farmers. It involves concurrent cultivation of crops. Sometimes, farmers cultivate about two or more crops on the same piece of land in a planting season. Most traditional farmers do not have a well structured sequence of planting crops. They plant crops together base on their farming experience and needs. The major advantages of the system of production include soil fertility maintenance, enhance security of food and improved income and prevent erosion, fix nitrogen and weed interference

v. **Continuous cropping**: This is one of recent cropping systems where a land is cultivated throughout the planting seasons of a year. The practice promotes maximum utilisation of available resources, especially where there is pressure on land for other human activities. This system encourages use of synthetic inputs as a very to manage the soil fertility and increase productivity. Many traditional and resource poor farmers admire this system but could not afford it, because of expensive input requirement. This constrain made some of the farmers to use both traditional practices and synthetic inputs together to meet their

production needs. The organic farming system encourages mixed cropping in place of continuous cropping.

vi. **Mono-cropping**: This is also a contemporary system of crop production that focuses on quantity of a particular commodity. Crops are cultivated sequential and logical manner on the same land. The element crops are selected on the basis of complementary or supplementary relationship; deep soil feeders (e. g. yams) ought to follow shallow soil feeders (e.g. maize). The system is chemical intensive, and elaborates because farmers exercise plenty of deforestation and shorter fallowing.

vii. **Mixed farming**: This system entails the complementary raising of plants (arable agriculture) and livestock. In an average mixed farm, a farmer may additionally domesticate pasture or maize to feed some of the animals at the same time as the animals offer traction and transportation services as well as manure. The manure (extra droppings, wastes) helps soil improvement which in the end improves crop yields. Whilst properly maintained, mixed farming encourages the intensification of land use for cropping through quick fallows.

viii. **Integrated Pest Control (IPM):** It is about using local and scientific knowledge on resistant varieties, alternative natural pesticides, bacterial and viral pesticides, use of pheromones, appropriate rotation and multiple cropping and habitats for natural enemies to the pests. It is now widely used, but is has greatest potential application in developing countries.

2.5 Limitations of indigenous management practices

As other forms of knowledge have their limitations or weaknesses, so does indigenous knowledge. The recognition of such will enhance its integration with scientific knowledge. Some of the indigenous practices may also have become obsolete because of rapid changes in the environment or the socio-economic and cultural landscape. Past and current evidence showed that some indigenous practices such as bush burning, over-grazing, over-hunting, or over cultivation of the land have negative impact on environment. It would be misleading to assume indigenous practices are always “good”, “right” or “sustainable” (International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), 2008; and IKDM, 2016)

2.6 Livestock production and the use of herbs

Livestock farmers are usually confronted with enhancing cattle overall performance for economic advantage. Quite a few research and production techniques were hired, including

the use antibiotics and growth promoters to realize this goal (Kehinde *et al*., 2010). Good performances were attained but not without side effect on the livestock and health of consumers (Donoghue, 2003), Western world response to the adverse effects was the ban of the products (Nweze and Nwankwagu, 2010). Consequently, many sought for alternatives especially in the use of herbs and spices as supplements in animal rations (Bunyapraphatsra, 2007; and Owen, 2011). Odoemelam *et al.*, (2013) reported that, currently in Europe commercial swine and chicken rations include about 33.3 percent of mixtures of herbs and spices to improve growth and health performance.

2.7.0 Sustainable agriculture

Considerable concern has been given to the search on sustainable agricultural systems over the past two decades. These systems are defined as productive and profitable that cause minimal negative impact on the environment and result in maximum positive social impacts for farm families and the society. The common statement from farmers is "if the system is not productive and profitable, it is hardly sustainable". This is certainly true in the short term, and the short term is the only way to evaluate most systems' success in the current economic environment. To ensure long term, there must be conservative agriculture production systems. And if we create a system that skews the advantages in the direction of a few people in each community, vicinity, or United States, this kind of machine hardly ever qualifies as a socially ideal or equitable technique of producing food, fiber, and fuel. Layout and choice of sustainable structures want to consist of a thoughtful evaluation in their social effect – on people, households, and the network.

According to Pretty and Hine (2001), sustainable agriculture seeks to make the great use of nature's goods and offerings as practical inputs. It integrates natural and regenerative techniques together with nutrient recycling, nitrogen fixation, soil regeneration and natural enemies of pests into meals manufacturing tactics. It reduces using non-renewable inputs (insecticides and fertilizers) that harm the surroundings. It makes higher use of the information and competencies of farmers, so enhancing their self-reliance. It also uses social capital, which is the people's capacities to work collectively to resolve commonplace control problems which include pest, watershed, irrigation, and woodland and credit control. Sustainable agriculture jointly produces food and different goods for farm households and markets. It additionally contributes to other non-meals functions that cannot be produced by using other sectors like on-farm biodiversity, groundwater recharge, city to rural migration

and social brotherly love. Sustainable agriculture technologies and practices need to be regionally-tailored. Precise shape to make sure continuity and compliance to sustainable practices everywhere in the international is of excessive significance. This organic agriculture as encapsulated in its concepts and standards.

2.7.1 Organic agriculture

Organic agriculture is a holistic production system based on active agro-ecosystem management rather than on external inputs. It builds on traditional agriculture and utilizes both traditional and scientific knowledge. It is a form of sustainable or ecological agriculture that involves production according to precise standards. Organic agriculture offers a wide range of food security, economic, environmental and social benefits (UNCTAD, 2009). Organic agriculture builds on and keeps alive farmers' rich heritage of traditional knowledge and traditional agricultural varieties. Some differences between traditional and organic farming are presented in Table 1.

2.7.2 Principles of organic agriculture

Organic agriculture includes all agricultural systems that promote the environmentally, socially and economically sound production of food and fibers. These systems take local soil fertility as a key to successful production. By respecting the natural capacity of plants, animals and the landscape, it aims to optimize quality in all aspects of agriculture and the environment. Organic agriculture adheres to globally accepted principles, which are implemented within local social-economic, climatic and cultural settings (IFOAM, 2011).

The above submission of IFOAM and other scholars is an encouragement to have rethink and review of the unsound practices, and the abandoned indigenous environmentally friendly practices in compliance to organic principles and standards. This will serve as leverage for adoption of organic principles and practices among vast resource limited farmers for sustainable production.

Table1: Differences between traditional and organic farming

Organic methods that can be found in traditional farming	**What is specific to organic farming**
• Closed nutrient cycle and low external inputs, • Recycling of biomass through mulching and composting, • Mixed cropping and /or crop rotations, • Sustainable management of resources; soil, water, energy, • Maintenance of soil fertility and prevention of soil erosion, • Animal friendly husbandry practices	• Use specific guidelines or control system • Use of microbial preparation for pest management, • Use of high yielding, but disease resistant breeds of crops and animals, • Release or efficient attraction of beneficial insects • Introduction of efficient green manures, cover crops, crop rotations, nitrogen fixing plants and trees • Use of improved tools for soil cultivation, weeding, sawing etc. • Application of improved compost methods and bio fertilizers • Compliance to standards, • Certification • Group marketing and/or direct marketing of products

Adapted from IFOAM, 2011

IFOAM (2011) discussed Organic agriculture as based on: **the principle of health**, **the principle of ecology, the principle of fairness, and the principle of care.** Each principle is articulated through a statement followed by an explanation. The principles are used as a whole. They are composed as ethical principles to inspire action.

Principle of health

Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

This precept factors out that the fitness of people and communities cannot be separated from the fitness of ecosystems - healthful soils produce healthy plants that foster the health of animals and people. The role of organic agriculture, whether or not in farming, processing, distribution, or consumption, is to maintain and decorate the health of ecosystems and organisms from the smallest in the soil to humans. Mainly, organic agriculture is meant to produce excessive high-quality, nutritious food that contributes to preventive fitness care and nicely-being. This view of ensured the avoidance of artificial fertilizers, pesticides, animal pills and meals components that can have damaging health effects.

Principle of ecology

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

This precept roots organic agriculture inside dwelling ecological systems. It states that manufacturing is to be primarily based on ecological approaches, and recycling. Nourishment and well-being are completed via the ecology of the precise manufacturing environment. As an example, in the case of crops that is the living soil; for animals it's far the farm environment; for fish and marine organisms, the aquatic surroundings. Organic management ought to be tailored to nearby conditions, ecology, way of life and scale. Inputs must be decreased by means of reuse, recycling and efficient management of materials and strength so as to maintain and improve environmental first-class and preserve sources. Organic agriculture attains ecological stability via the layout of farming systems, establishment of habitats and renovation of genetic and agricultural diversity.

Principle of fairness

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

This principle is characterised by fairness, impartiality, mutual respect and stewardship of the shared global, both amongst humans and in their relations to different living beings. It emphasizes that those promoting organic agriculture desire human relationships in a way that

ensures fairness at all degrees and to all parties - farmers, workers, processors, vendors, buyers and consumers. Organic agriculture gives everybody involved with an amazing excellent of existence, and make contributions to food sovereignty and reduction of poverty. It ambitions to supply a enough deliver of accurate nice food and different merchandise. This principle insists that animals must be furnished with the situations and possibilities of life that accord with their physiology, natural conduct and well-being.

Principle of care

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

Organic agriculture is a residing and dynamic gadget that responds to inner and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and boom productivity; however this must not be at the risk of jeopardizing fitness and properly-being. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken. This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture. Science is important to make sure that organic agriculture is wholesome, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture, thus prevent good sized risks through adopting suitable technology and rejecting unpredictable ones, which include genetic engineering. The mechanism of those concepts is installed in the practices, requirements and structure of organic agriculture. Some the indigenous farming practices in Nigeria mirror the principles and practices of organic agriculture, the need to validate its compliance to natural requirements both for neighbourhood and global marketplace is relatively imperative. IK should be observed, cultivated, harvested and promoted greater vigorously for socio-economic transformation.

2.7.3 Organic production and handling standards

The Organic Agriculture Standards in Nigeria contains regulations to ensure that organically labelled products meet consistent national standards (NOAN, 2012).

- **Crop standards**

  The organic crop production standards say that:

  a. Land will have no prohibited substances applied to it for at least 3 years before the harvest of an organic crop.

b. The use of genetic engineering, ionizing radiation and sewage sludge is prohibited.
c. Soil fertility and crop nutrients will be managed through tillage and cultivation practices, crop rotations, and cover crops, supplemented with animal and crop waste materials.
d. Preference will be given to the use of organic seeds and other planting stock, but a farmer may use non-organic seeds and planting stock under specified conditions.
e. Crop pests, weeds, and diseases will be controlled primarily through management practices including physical, mechanical, and biological controls.
f. When these practices are not sufficient, a biological, botanical.

- **Livestock standards**

These standards apply to animals used for meat, milk, eggs, and other animal products represented as organically produced. The livestock standards say that:

a. Animals for slaughter must be raised under organic management from the last third of gestation, or no later than the second day of life for poultry.
b. Producers are required to feed livestock with agricultural feed products that are 100 percent organic, but may also provide allowed vitamin and mineral supplements.
c. Producers may convert an entire, distinct dairy herd to organic production by providing 80 percent organically produced feed for nine months, followed by three months of 100 percent organically produced feed.
d. Organically raised animals should not be given hormones to promote growth, or antibiotics for any reason.
e. Producers are prohibited from withholding treatment from a sick or injured animal; however, animals treated with a prohibited medication may not be sold as organic.
f. All organically raised animals must have access to the outdoors, including access to pasture for ruminants. They may be temporarily confined only for reasons of health, safety, the animal's stage of production, or to protect soil or water quality.

CHAPTER THREE

3.0 THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 Theoretical framework

The following theories have been considered relevant for this study;

- Theory of Adoption
- Theory of plan behaviour

3.1.1 Theory of Adoption

The theory postulated by Roger (1995) is one of the most popular theories on adoption of technology. According to Roger's theory (1995), individual makes decision to accept or reject technology. He asserted that, decision of some could be immediate, but for some people they go through series of processes that may include observation, research and scientific proved before they adopt an innovation. The innovation-decision process is officially defined as "the process via which a man or woman (or different selection-making unit) passes from first understanding of an innovation to forming a mindset toward the innovation, to make a decision to undertake or reject, to the implementation and use of the brand new concept, and to the confirmation of this choice. Rogers also identified a set of attributes to help predict when and where adoption occurs under given social circumstances: relative advantage, compatibility, complexity, trialability, and observability. He finalised these constructs after many years examining such topics as agriculture and preventive medicine from his seat as a social researcher. Relative advantage examined the degree to which an innovation is perceived as better than the thing it is replacing. Implied subcategories of relative advantage included the potential for increased profit, improved social status, a decrease of personal discomfort, and other workplace incentives. Compatibility measured the degree to which an innovation "fits" in the current climate by considering the new system's interoperability with the existing practices.

When adopters have the option of using the innovation on a trial basis without large overhead investments of time or financial resources, this is an increase in the trialability of the innovation. Many potential users also like to see the innovation in use by their peers and understand its benefits before they choose to adopt. This quality is known as observability. The last of Roger's five attributes was complexity, defined as the degree to which an innovation is perceived as relatively difficult to understand and use. This theory is considered in this study to explain the characteristic of endogenous and exogenous agricultural practices and its use. It will also be used to explain the constraint to use of the endogenous and

exogenous agricultural practices in the study area. This will also help to consider the nature of some of the items in the organic agriculture standard as against the respondents' agricultural practices.

3.1. 2 Theory of planned behaviour

This theory was postulated by Ajzen and Fishbein (1980). It is a major theory of behaviour in respect to technology adoption. He additionally propounded that individual behaviour is pushed by using intentions and environmental understanding, where behavioural intentions are the function of the character's mindset toward the behaviour and subjective norms surrounding the performance of the behaviour. Attitude toward the behaviour is described as the man or woman's high quality or poor feeling approximately the performing behaviour. It is decided via an assessment of one's ideas regarding the consequence springing up from a behaviour and evaluation of desirability of those results. Subjective norm is described as an individual's belief of the whether humans vital to the character assume the behaviour needs to be done. Consequently, the typical subjective norm can be expressed as the sum of an individual's notion improved through motivation evaluation for all relevant referent.

According to Ajzen, the central factor in the TPB is the individual's intention to exhibit a given behaviour. This intention is informed by the perception and motivation of individual in order to perform the behaviour. This theory is relevant to this study as it concerns the perception and motivation of individual to perform behaviour. The perception of the farmers that use the endogenous and exogenous practice will influence the motivation for it continuous use.

3.2 Description of conceptual framework for level of compliance of endogenous and exogenous agricultural practices with organic agriculture in Nigeria

The flow of schematic diagram (Figure 1) is such that personal characteristics of the farmers could influence the enterprise characteristics of the farmers, which would in turn indicate the types of agricultural practices used (whether endogenous or and exogenous). The identified agricultural practices used will affect the perception to use either endogenous and / or exogenous practices for production. For example, if the respondent's farm size is above five acres and enterprise is more of commercial, he might have an unfavourable perception to use endogenous agricultural practices, and might not be using it.

At the third level, the frequency of use of endogenous and exogenous agricultural practices for both crop and animal production seasonally would enhance acquaintance with the procedures of the practices and the detailed components of each practice. The frequency of use will reflect the practices being used and consistency of use of the identified practices by the respondent. This will help to know the practices that are relevant and the consistency of use.

The frequency of use of the endogenous and exogenous practices that are in compliant with organic principles will be influenced by affordability, adaptability, cost effectiveness, duration, easy of communication and environmental friendliness. These factors will determine the constraints to the use of the organic compliant endogenous and exogenous practices and such constraints will influence the consistency of use and vice-versa.

The fifth level shows the extent of use of the identified endogenous and exogenous practices for production that are in compliant to organic principles. The extent of use will reflect in the consistency of use of any of the identified practices of the respondent. If the practices are consistently used by a farmer with ten years of farming experience, it will reflect in the continuous use of such practice, compare to a farmer of the same year of experience, who only use it once within same numbers of years.

The intervening variables are variables that may or may not have direct effect on the independent variables but could have some impacts on the study; they include government policies, culture and climate change among others.

The dependent variable is the extent of compliance of the endogenous and exogenous agricultural practices to organic standards. The respondent practices in compliant with organic standards were scored and the scores were be used to categorize the extent to which endogenous and exogenous practices comply with organic standards. The index of the practice was determined to categorise the practices as high or low index.

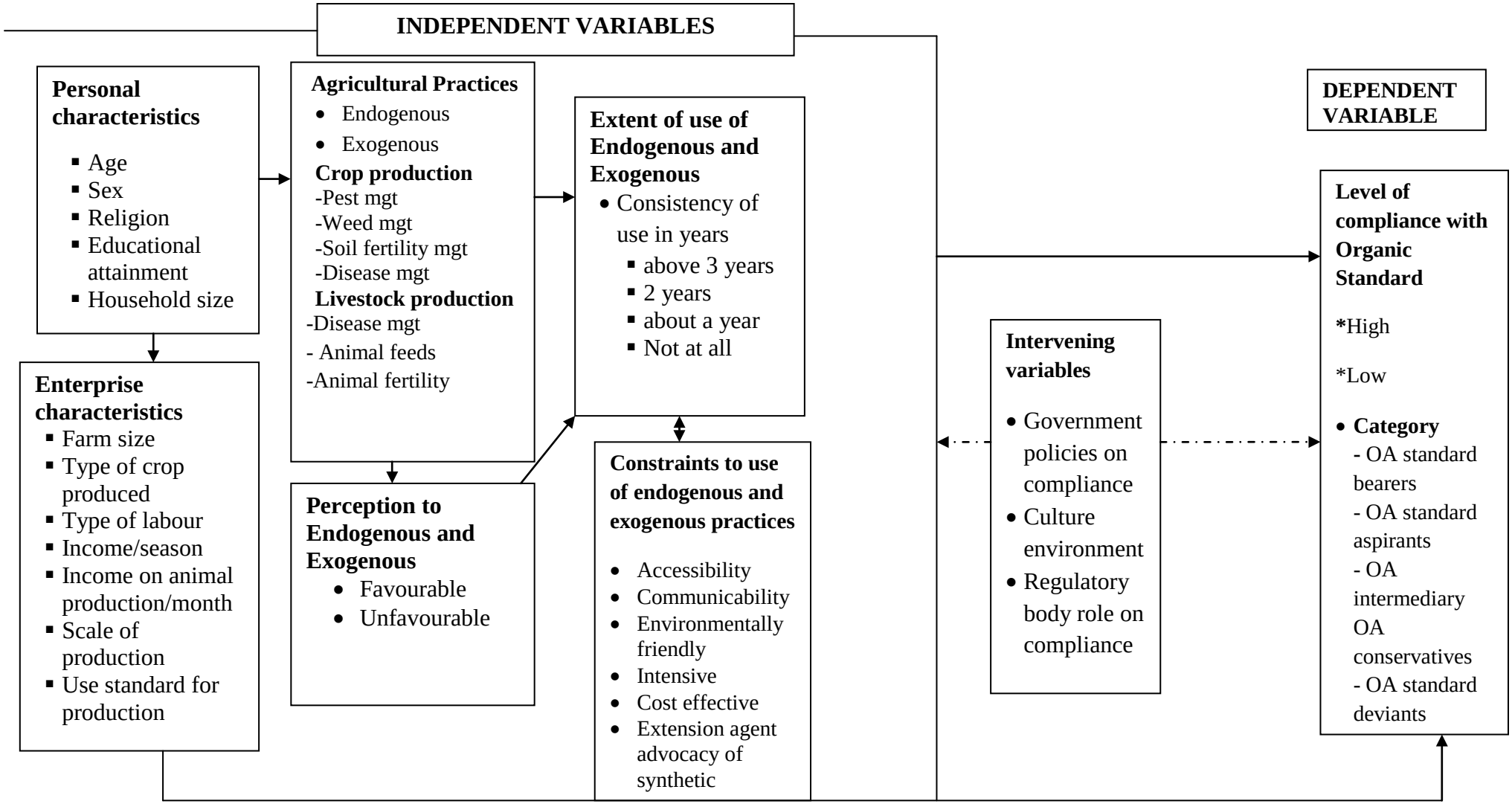

Figure 1: COMPLIANCE OF AGRICULTURAL PRACTICES WITH ORGANIC AGRICULTURE STANDARD AMONG NIGERIAN FARMERS

CHAPTER FOUR

4.0 Research Methodology

4.1 The study area

The study was carried out in Nigeria with a coordinate of $7^0$62'N$6^0$97'E. Nigeria is a republic in West Africa with land mass area of 923,768,00 square kilometres, water area of 13,000 square kilometres and lies between Latitudes 4^0 to 14^0 North and between Longitudes $2^0$2' and 14^0 30' East. Nigeria shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east and Niger in the north. Its coast lies on the Gulf of Guinea in the south and borders Lake Chad to the northeast. Nigeria climate varies from the tropical at the coaster to sub-tropical further inland with two marked seasons. The rainy season begins from April to October and the dry season from November to March. Absolute maximum temperature in the coaster areas of the South is 37^0C while the absolute minimum temperature is 10^0C. The climate is drier further north where extreme of temperature ranges from 45^0 to 60^0 are common.

Nigeria is the most populous country in Africa with a population of 140,431,790 in 2006 and 167,394,693 in 2012 (3.2% National Population Commission growth rate estimate) and Human Development Index (HDI) of 0.459-the 156^{th} in the world. The population of Nigeria is divided into over 250 different ethnic groups. The three largest ethnic groups are the Hausa-Fulani's who are predominant in the north, the Igbos who are predominant in the south-east and the Yorubas who are mainly in the south-west. The Edo people are predominant in the region between Yorubaland and Igboland. Other minority groups are Ibibio, Efik, Tiv, Annag, people of the coastal south-eastern Nigeria and the Ijaw of the Niger Delta and others that are spread all over the country especially in the middle belt and north (NPC, 2006).

The major sectors sustaining the economy of Nigeria includes agriculture, oil and gas industries, mining, tourism and culture, transportation and others. Agriculture was the most important sector of the economy before independence and subsequent oil boom accounting for more than 70% of the GDP and 75% of export earnings. Presently, oil is the major sector sustaining the economy which has fallen and affecting the economy of the nation which has led to a proposed plan to increase concentration on agriculture for a better economy.

Nigeria has 36 states which are divided into six agricultural/geo-political zones:

North-west zone: The land size of the zone is 223,150km^2 and the population is put at 35,915,467. The states in this zone are Jigawa, Kaduna, Katsina, Kano, Kebbi, Sokoto and Zamfara.

North-east zone: The land size of the zone is 289, 422km^2 and the population is 18,984,299. The states in the zone are Adamawa, Borno, Bauchi, Gombe, Taraba and Yobe States.

North-central zone: The population of the zone is put at 20,369,956 and the land size is 231,677km^2 .It consists of Benue, Kogi, Kwara, Niger, Nasarawa, Plateau and the FCT.

South-west zone: Lagos, Ogun, Ekiti, Osun, Oyo and Ondo are the states in this zone with a land size of 78, 505km^2 .The population of the zone is 27,722,432.

South-east zone: consists of Abia, Anambra, Enugu, Ebonyi and Imo states with a population of 16,395,555 and a land size of 28, 983^2.

South-south zone: The land size of the zone is 85,315km^2 with a population of 21,044, 081. The states in the zone are comprises of Akwa-ibom, Bayelsa, Cross River, Delta, Edo and Rivers states. National Population Commission (NPC, 2010).

The Table 2 presented the agricultural zones in Nigeria as described by National Population Commission (NPC, 2010).

Table 2: Agricultural zones and their states

Northeast	North Central	Northwest	Southeast	Southsouth	Southwest
Adamawa	Benue	Kaduna	Abia	Akwa-Ibom	Ekiti
Bauchi	Kogi	Kano	Anambra	Bayelsa	Lagos
Borno	Kwara	Katsina	Ebonyi	Cross River	Ogun
Gombe	Nassarawa	Kebbi	Enugu	Delta	Ondo
Taraba	Niger	Jigawa	Imo	Edo	Osun
Yobe	Plateau	Sokoto		River	Oyo
	FCT, Abuja	Zamfara			

Source: National Population Commission (NPC, 2010)

From the agricultural zones the following states were randomly selected for this study; Niger, Benue, Ebonyi, Anamba, Oyo and Ekiti, respectively and the basic features of the areas of this study are as follow.

Niger State

Niger State is located in the Guinea Savannah zone of Nigeria and lies between latitudes 8°20'N and 11°30'N of equator and longitude 3°30'E and 7°20'E of the Greenwich Meridian. The land area is about 76,363 Km^2 and administratively it is divided into 25 Local Government Areas with varying physical features like hills, lowland and rivers. The state enjoys luxuriant vegetation with vast Northern Guinea savannah found in the North while the fringe in mostly southern guinea savannah. The people are predominantly peasant farmers cultivating mainly food crops such as yam, maize, rice, millet for family consumption, and market. Farming activities are mostly carried with simple implements.

Benue State

Benue State is an area within the quadrilateral formed by latitudes 4° and 14° North of the Equator and longitudes 2.75° and 14.5° East of the Greenwich Meridian (National Population Commission (NPC), 2006). The state has a total area of about 30955 Km^2 and administratively it is divided into 23 Local Government Areas with its headquarters at Makurdi. According to the 2006 census results, Benue State has a population of about 4.2 million (NPC, 2006). About 75% of the population lives in the rural areas and the main occupation is farming. Benue State has a tropical climate, which manifests two seasons. The rainy season is April to October while the dry season is from November to March. Annual average rainfall varies from 1,750 mm on the Southern part of the State to 1,250 mm in the North. In the mountain region Turan and Ikyurav-ya areas of Kwande Local Government, average rainfall rises up to 4,000 mm. The hot season comes in mid-April with temperature between 32° and 38°C with high humidity. Benue State is referred to as the "Food Basket of the Nation" because of the abundance of its agricultural resources. About 80% of the State population is estimated to be involved directly in subsistence agriculture. The State is a major producer of food and cash crops like yam, cassava, rice, groundnuts and maize. Others include sweet potatoes, millet, sorghum, sesame and a wide range of others like soya beans, sugarcane, oil palm, mango, citrus and banana. Irrigation farming along the bank of Rivers Benue and Katsina-Ala is a common feature. The state can boast of a great deal of livestock resources like goats, poultry, sheep, pigs and cattle which are traditionally reared on free range by small holder farmers. Though, the major occupation is crop farming, a lot of fishing activities are carried out on Rivers Benue and Katsina-Ala. Irrigation is widely practiced

along the riverine areas during the dry season. Vegetable crops such as tomatoes, okro, carrot, onion, pepper and amaratus are grown in large quantities. It is also a common practice to find each farming family keeping one form of livestock or the other, such as poultry, rabbitery, piggery, sheep and goat on a small scale. Average farm size is 1.5 to 2.0 hectares.

Anambra State

Anambra is a State in South East, Nigeria. Its State theme is "Light of the Nation". Its boundaries are formed by Delta State to the West, Imo State to the South, Enugu State to the East and Kogi State to the North. The state lies between latitudes 5040' and 7005' North and longitude 0035' and 8030' East. It has 21 Local Government Areas and an estimated population of 4,177,828 (NPC, 2006).The state covers an area of 4,41684km, has tropical rain forestry vegetation, humid climate with a temperature of about 871 and a rainfall of between 152-203cm. Anambra State is one nine states of the agro-ecological zones located in the South Eastern part of Nigeria. It is divided into four agricultural zones namely Aguata, Awka, Onitsha and Anambra zones.

Ebonyi State

Ebonyi State lies approximately 7° 30°E and 5°40°N with a land area of approximately 5,932 Km^2 and a population of 1,453, 882 persons (NPC, 2006). The state is made up of thirteen (13) Local Government Areas, which are divided into three (3) agricultural zones namely: Ebonyi North, Central and South zones. The major crops grown in the area are, rice, yam, cocoyam, maize, cassava, groundnut, vegetables and fruits, while fishing activities are predominant in the southern zone of the state.

Oyo State

Oyo State has thirty-three (33) Local Government Areas. The state is bounded in the West by the Republic of Benin, in the North by Kwara State, in the East by Osun State and in the South by Ogun State. It has two ecological zones – forest and derived savannah which have implications for food production, fishery and rearing of some animals. There are two growing seasons because of the bimodal pattern of rainfall distribution. The rainy season starts in April and ends in October while the dry season starts in November and ends in March. The average rainfall varies from 1100mm to 1250 mm per annum. Major crops grown in the state include maize, cassava, vegetables, cowpea, soybean and pineapple. Tree crops grown include cocoa, kolanut, oil palm, cashew and citrus. Two-thirds of the crops are grown during the first rainfall cycle which is usually from March to June. The second rainfall cycle however is from July to October and is usually short. Mixed cropping system of farming is common in the state.

Ekiti State

Ekiti State is located between latitude $7^{o}30^{l}$and $8^{o}15^{l}$ north of the equator and longitude 4^{o} 47^{o} and $5^{o}40^{o}$ of the Greenwich Meridian. The estimated population figure of Ekiti State was 2,384,212 (NPC, 2006). The relief of Ekiti State consists of undulating plains. The highest contour line of 540m above sea level is found around the North eastern limit of the state. The rocks are dominated by the crystalline rocks, which form parts of the basement complex geology of the South- Western Nigeria. Ekiti State has a total annual rainfall of about 1400mm with a low co-efficient variation of about 30% during the rainfall peak months, and with an average of about 112 rainy days per annum. Agriculture is the main occupation of the people which provides income and employment for more than 75% of the population of Ekiti State. The main cash crops are cocoa, coffee, kolanut, cashew and oil palm. Other tree crops include citrus fruits, coconut, mango, sugar-cane, guava and pine apple. Due to the conducive climatic condition, the state enjoys luxuriant vegetation. It also boasts of various species of timber that provide raw materials for wood based industries. Among the food crops are: yam, cocoyam, cassava, maize, plantain/banana, rice, beans, pepper, tomatoe and varieties of vegetables (Ogundele and Jegede, 2011)

4. 2. Population of the study

Population of the study consisted of all farmers in the study area.

4.3 Sampling procedure and sample size

A multistage sampling procedure was used to select respondents for this study as follows;

Stage 1: 50% of the six agricultural zones were randomly selected. This gave three agricultural zones for this study.

Stage 2: 40% of the states in the selected agricultural zones were random selection. This gave 6 states in all.

Stage 3: 10% of the Local Government Areas (LGAs) in the selected states were randomly selected. This gave 15 LGAs (Ebonyi state 2 LGAs, Benue state 2 LGAs, Anambra state 2 LGAs, Niger state 3 LGAs, Ekiti state 2 LGAs and Oyo state 3 LGAs).

Stage 4: Two (2) communities were randomly selected from each of the 15 LGAs, to give thirty rural communities.

Stage 5: This stage involved generation of numbers of farmers in rural communities. Then random selection of twenty percent of farmers in the selected rural communities to give a sample size of 310 respondents across the six states in the three agricultural zones in Nigeria.

Table 3: Sample procedure and sample size

50% Agric Zones in Nigeria	40% of the States in Agric Zones	10% of LGAs	2 Rural Communities in the LGAs	Sample frame generated	20% of farmers
North Central	Benue	2 Tarka, Otukpo	4	260	52
	Niger	3 Katcha, Lapia, Lavun	6	255	51
Southwest	Oyo	3 Saki West, Ibarapa, Atisbo	6	285	57
	Ekiti	2 Ekiti West, Oye	4	225	45
Southeast	Anambra	3 Anambra West, Anambra East, Akwa North	6	245	49
	Ebonyi	2 Ikwo, Onueke	4	280	56
		15	**30**	**1550**	**310**

4.4 Method of data collection

Data were collected for this study through primary source. Data were collected using quantitative and qualitative methods for this study. Validated structured questionnaires were used to collect quantitative data while Focus Group Discussion (FGD) and In-depth interview (IDI) were used to collect qualitative data on; the agricultural practices in use, the procedure of the agricultural practices and extent of compliance to organic standards in this study area. Four FGDs (Eruwa, Anambra East, Lavun, and Ikwo LGAs farmer groups) and three IDIs (Farmer leaders in Atisbo, Ikwo, and Anambra East LGAs) were conducted for this study. Three FGDs were done among crop farmers in each zone while one was conducted for livestock farmers in North central zone. The relevant questions were asked in line with the objectives of the study for qualitative items. These include; practices in use, identification of materials used for composting and as plant extracts**,** methods of processing materials, reasons for use of practices, and time of application of processed materials. This enhanced identification of practices that complied with organic standards.

4.5 Instrument validity and reliability

Experts in the Department of Agriculture Extension and Rural Development Agronomy, Crop Protection and Environmental Biology, and Animal Science from Faculty of Agriculture and Forestry, University of Ibadan assisted for both face and content validity of the questionnaire used as instruments for this study. Split half method was used for reliability test of the questionnaire, so as to ensure that a consistent result is obtained from the respondents. The instrument was pre-test in Ogun State, where respondents with similar characteristics to the study's respondents are, but who were not included in the study. A reliability coefficient for perception statement (r = 0.794), frequency of use of endogenous practices (r= 0.873), frequency of exogenous use (r=0.94), constraint to use of endogenous practices (r= 0.92), constraint to use of exogenous practices (r=0.85), level of compliance (r=0.83) was obtained for crop farmers, while frequency of use of endogenous practices (r= 0.875), frequency of exogenous use (r=0.77), constraint to use of endogenous practices (r= 0.87), constraint to use of exogenous practices (r=0.83), level of compliance (r=0.91) was obtained for livestock farmers.

4.6.0 Measurement of variables

This study identified some important variables, which were categorized as independent and dependent variables on which the hypotheses of the study were tested.

The identified independent variables were personal characteristics, enterprise characteristics, and perception of respondents to agricultural practices, use of agricultural practices, extent of use of agricultural practices, and constraints to use of agricultural practices.

4.6.1 Section A: Personal characteristics

1. Age: This was measured at actual value in years.
2. Sex: This was measured at nominal level. Male respondents were scored of 1 while female scored 2.
3. Religion: Nominal values were assigned to different religious affiliations as follow: Christianity (1), Islam (2), Traditional (3) and other specified religion were assigned numbers respectively.
4. Household size: This was measured at actual number of persons in the household.
5. Highest educational attainment: This was measured as actual years for formal education.
6. Year(s) of farming experience: This was measured in actual year of farming.

4.6.2 Section A: Enterprise characteristics

1. Type of crops cultivated (enterprise): Types of crop cultivated
2. Farm size: Actual farm size in plots, which was converted to hectare as standard farm size.
3. Source of labour: The types of labour employed for their farm operations. Nominal values were assigned as follows: Family labour (1), Hired labour (2), Communal labour (3), Mechanized labour (4)
4. Income /season: Income per season in naira.
5. Other sources of income: Other sources of income in naira per period.
6. Use of standard or guide line for agricultural production: Yes (1) or No (0).

4.6.3 Section C: Perception of respondents on sustainable agricultural practices as it relates to health, economy and environment

Perception of respondents on sustainable practices as it relates to health, economy and environment was measured by developing a list of forty five perception statements. The responses were scored using a 5 – point Likert scale of Strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D) and Strongly Disagreed (SD) with the score of 5,4,3,2, and 1 respectively for the positive statements and 1,2,3,4, and 5 for negative statements. Maximum was 199 and the minimum score was 67. Each item score was computed to form a composite perception score for each of the respondents. Respondents were categorised into two, using

the mean score of 117.70±33.14 as the bench mark, such that scores below the mean had unfavourable perception while scores equal to or above the mean had favourable perception.

4.6.4 Section D: Extent of use of endogenous and exogenous agricultural practices

The respondents indicated in years the consistency of use of the identified practices. Three (3) years was used as the yardstick for commitment to use and ordinal values were assigned as follows: above three years (3)**,** about two years (2)**,** about one year (1) and not at all (0)**.** The index of the practices use by each respondent was achieved through the weighted mean and used to rank the practices in use.

4.6.5 Section F: Constraints to use of endogenous and exogenous agricultural practices

The respondents identified the constraints to use of endogenous and exogenous agricultural practices. Some of the attributes of the practices such as cost effectiveness, environmental friendly, accessibility, affordability, adaptability, bulkiness, extension agent advocacy of synthetic products. The respondents indicated the constraints to use of the practices, 10 items were given with response options; not a constraint, mild constraint and serious constraints. Scores of 0, 1 and 2 were assigned respectively. The weighted mean was computed and used to rank the constraints in order of importance.

4.6.6 Section H. Level of compliance of the agricultural practices with organic standards

The term compliance describes the ability to act according to an order, set of rules or request (International Compliance Association (ICA) 2017). The dependent variable of this study is the level of compliance of agricultural practices with organic standards. This was measured using Nigeria organic agriculture standard document. The respondents were provided with 25 items from the organic standard, they were asked to indicate the frequency at which they comply with organic agriculture standard. The respondents were provided with four response options always (65-100% compliance), sometimes (35-64% compliance), rarely (1-34% compliance) and not at all. Scores of 3, 2, 1 and 0 were assigned for statements that indicate compliance with standard while 0, 1, 2, and 3 were assigned respectively for statements that indicate non compliance with standard. The minimum and maximum score obtained 18 and 61. The index of frequency of compliance was determined and the mean (39.60±7.58) was used as bench mark to categorised respondents into high or low.

4.8 Data analysis

Data were analysed using descriptive (frequency and percentages, mean and standard deviation) and inferential statistics (Chi-square, Pearson product moment correlation (PPMC) and ANOVA) as presented in Table 4.

Table 4: Statistical tools used for testing the hypotheses

	Statistical tools
$H_0$1	Chi-square and PPMC
$H_0$2	PPMC
$H_0$3	PPMC
$H_0$4	PPMC
$H_0$5	PPMC
$H_0$6	PPMC
$H_0$7	ANOVA

CHAPTER FIVE

5.0 RESULTS AND DISCUSSION

This chapter shows the results and discussion of the study as it relate with the various specific objectives and hypotheses of the study.

5.1 Personal characteristics of the respondents

Essentially, respondents to this unit of analysis are personally characterised by the variables such as age, sex, marital status, year of formal education, year of farming experience, occupation. These are examined in the following units.

5.1.1 Age

The age distributions as shown in Table 5 reveal that 72.9% of the respondents were within the age bracket of 31 and 50 years. The mean age of respondents was 47.0 ± 11.32 years, which is similar to the findings of Adepoju and Obayelu (2013) that found the average age of most rural farmers as 47 years in Ondo State. This shows that most of the farmers were still in their active and productive years. Since a significant proportion of the respondents are in the youthful age, it suggests that given adequate farming resources and technical knowledge, the farmers would have the potential to maximise their farm outputs thereby increasing their income and livelihoods (Wakawa, Amaza, and Kwaghe 2015). The young farmers have higher degree of risk adjustment strategies and can participate in new agricultural projects.

5.1.2 Sex

In Table 5, distribution of respondents by sex shows that 69.0% were male, while 31.9% were female. Though, many women assist their husbands in farming activities in, Nigeria, Haile (2016) submitted that, women roles in agricultural development are becoming more popular in the last few decades.

5.1.3 Marital status

Respondents' marital status in Table 5 indicates that few (6.8%) of the respondents were single, almost all (90.0%) of them were married and very few (3.2%) of them were divorced. It implies that most of the respondents are married. Ekong (2003) opined that marriage facilitates farming activities in rural communities in Nigeria, because it's source of unpaid labour. Although, organic agriculture is a new practice to many farmers, married individuals are more likely to comply with organic principles as previous studies have shown that married farmers tend to adopt innovation or new practices than the single to enhance income (Agbamu 2006 and Ekong, 2010).

Table 5: Distribution of crop farmers by personal characteristics n=310

Variables	Frequency	Percentage	Parameter
Age			
21 – 30	27	8.70	Mean = 47.78
31 – 40	121	39.0	S.D = 11.32
41 -50	105	33.9	
61 -70	55	17.7	
Above 70	2	0.7	
Sex			
Male	214	69.0	
Female	96	31.0	Mode = Male
Marital status			
Single	21	6.8	
Married	279	90.0	Mode = married
Divorced	10	3.2	

Source: Field Survey, 2017

5.1.4 Year of formal educational

This result in Table 6 reveals that the overall average of the respondents was 10.5±6.12 years, while the mean year of formal education for the respondents in North central, South west and South east are 8.2±4.50, 12.1±4.60, and 11.3±4.30, respectively. This implies that majority of respondents in North central had primary education, while most of the respondents in South west and South east had more of secondary education. This is in line with the findings of Ozor, Garforth and Madukwe (2011), that majority of the farmers in Nigeria across the agro-ecological zones had an average of primary or secondary school. Also, this aliment with the finding of Adeniyi and Yekinni (2015) who reported an average formal education of 9.6 years among rural farmers in Southwest Nigeria.This result implies considerable high level of literacy among the farmers, which is an important factor that influences utilisation of new ideas and agricultural practices.

5.1.5 Year of farming experience

The distribution of respondents by year of farming experience in Table 7 shows that, 45.1% had farming experience within 10 and 20 years while 21.6% were within 21 and 30, 18.1% were within 31-40, 11.0% were within 41-50 and only 4.2% had years of farming experience within 51-60 years. The average year of farming experience was 26.5±4.33years, implying that these farmers are well knowledgeable on farming activities. According to Nkeme, Ibok, Umoh and Umoh (2015) embracing of new innovation and technology in most cases is influenced by farming experience which they can easily engage in.

5.1.6 Occupation of respondents

Occupation of an individual has influence on the economic status and the type of agricultural practices such a person engaged in. Table 8 shows that, 46.4% of the respondents engaged in farming, followed by trading (35.8%). This implies that farming was the major income generating occupation of the respondents. This conforms to the finding Thomas and Sanyanolu (2017) that predominant occupation of the rural dwellers is agriculture. Though, most of the respondents have secondary occupation, which are other sources of income. Table 8 shows that, 21.6% of the respondents engaged in hunting as secondary occupation. Majority of those that farming was not their primary occupation indicated that farming (21.0%) while others identified trading (18.4%) and artisan (7.1%) as their secondary occupation. This buttress the result of FAO (2018) that farming is the primary occupation, a relatively high share of income of 43 percent stems from non-agricultural wages, indicating that Nigeria's smallholders diversify their income-generating

Table 6: Distribution of respondents by year of education across zones n=310

Item	North central	South west	South east
No Formal education	25(24.3)	22(21.6)	40(38.1)
Primary education	36(35)	36(35.3)	27(25.7)
Secondary Education	36(35)	33(32.4)	32(30.5)
Tertiary Education	6(5.8)	11(10.8)	6(5.7)
Total	103(100)	102(100)	105
Mean and Std	8.2±4.50	12.1±4.60	11.3±4.30
Overall mean and Std	10.5±4.74		

Source: Field Survey, 2017

Table 7: Distribution of respondents' years of farming experience

Variables	Frequency	Percentage	Parameter
1 – 10	55	17.7	
11 – 20	85	27.4	Mean = 26.46
21 – 30	67	21.6	S.D = 4.33
31 – 40	56	18.1	
41 – 50	34	11.0	
51 – 60	13	4.2	

Source: Field Survey, 2017

Table 8: Distribution of respondents' occupation

Variables	Frequency	Percentage	Parameter
Primary occupation			
Farming	144	46.4	
Marketing	2	0.6	
Trading	111	35.8	
Teaching	24	8.7	Mode = farming
Artisan	5	1.6	
Civil servant	13	4.2	
Agric worker	3	1.0	
Engineering	2	0.6	
Politics	2	0.6	
Medical practitioner	1	0.3	
Secondary occupation			
Hunting	67	21.6	
Artisan	22	7.1	
Farming	65	21.0	
Trading	57	18.4	
Students	3	1.0	
Fishing	10	3.2	
Hairdressing	9	2.9	
Hotelier	2	0.6	
Civil servant	6	1.9	
Tailoring	4	1.3	
None	56	18.1	

activities beyond agriculture, particularly running a business in retail or manufacturing. In this way, Nigerian small business owners can reduce their degree of exposure to both natural (mainly droughts and fires) and man-made disasters (e.g. displacement or armed conflicts).

5.2 Enterprise characteristics of the respondents

This section of the result shows the respondents' methods of land acquisition, types of labour use, farm size, monthly income, type of enterprise, access to extension services, and use of standards or guidelines for production.

5.2.1 Land acquisition

In Figure 2 majority (61.0%) of the respondents inherited their farm lands, 22.0% by rent, 11.2% and 5.1% leased and purchased respectively. This shows that a larger proportion (66.1%) of the respondents have permanent access to land through inheritance and purchased, which would allow various farming activities without restriction. This agrees with the findings of Fasina (2016) that most farmers farmed on inherited land. This is also supported by the report of National Bureau of Statistics (NBS) 2016 that most farm lands in Nigeria are acquired through family inheritance.

5.2.2 Type of labour:

Family and hired labour were the major forms of labour used by both livestock and crop farmers as presented in Figure 3. This is corroborated by Eric (2012) that small scale farmers frequently farm more intensively and have more labour available per unit of land and acquire hired labour. Though, there was higher proportion of crop farmers using hired labour compared to the livestock farmers, this could be attributed to the intensity of crop production and the farm size cultivated.

5.2.3 Farm size

Figure 4 reveals that, very few (3.60%) respondents had farm size less than 1 hectare, 50.5% had farm size between 1 and 3 ha, while reasonable proportion (37.6%) had 4-6 ha and few (8.3%) had above 6 ha of farm land. The average farm size was 5.8±1.34 ha. This finding is in line with the Oyebade (2014) that claimed that most rural farmers in Nigeria usually cultivate between 1-2 hectares of land. This implies that some of the farmers are small holders, which has a lot of influence on the type of agricultural practices that may likely be adopted.

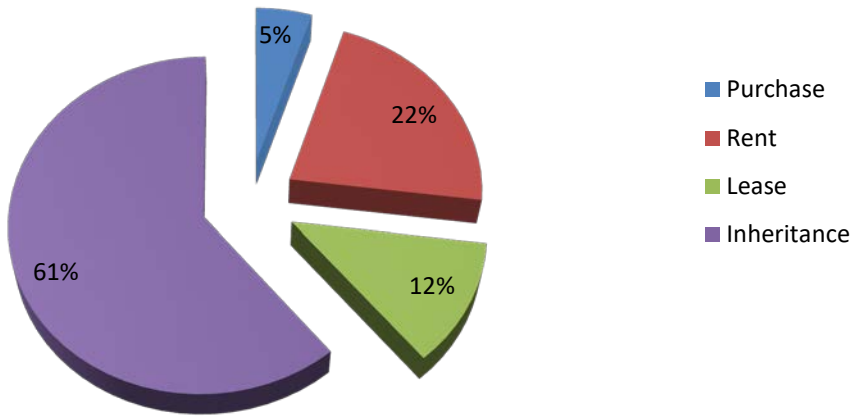

Fig 2: Distribution of respondents by land acquisition

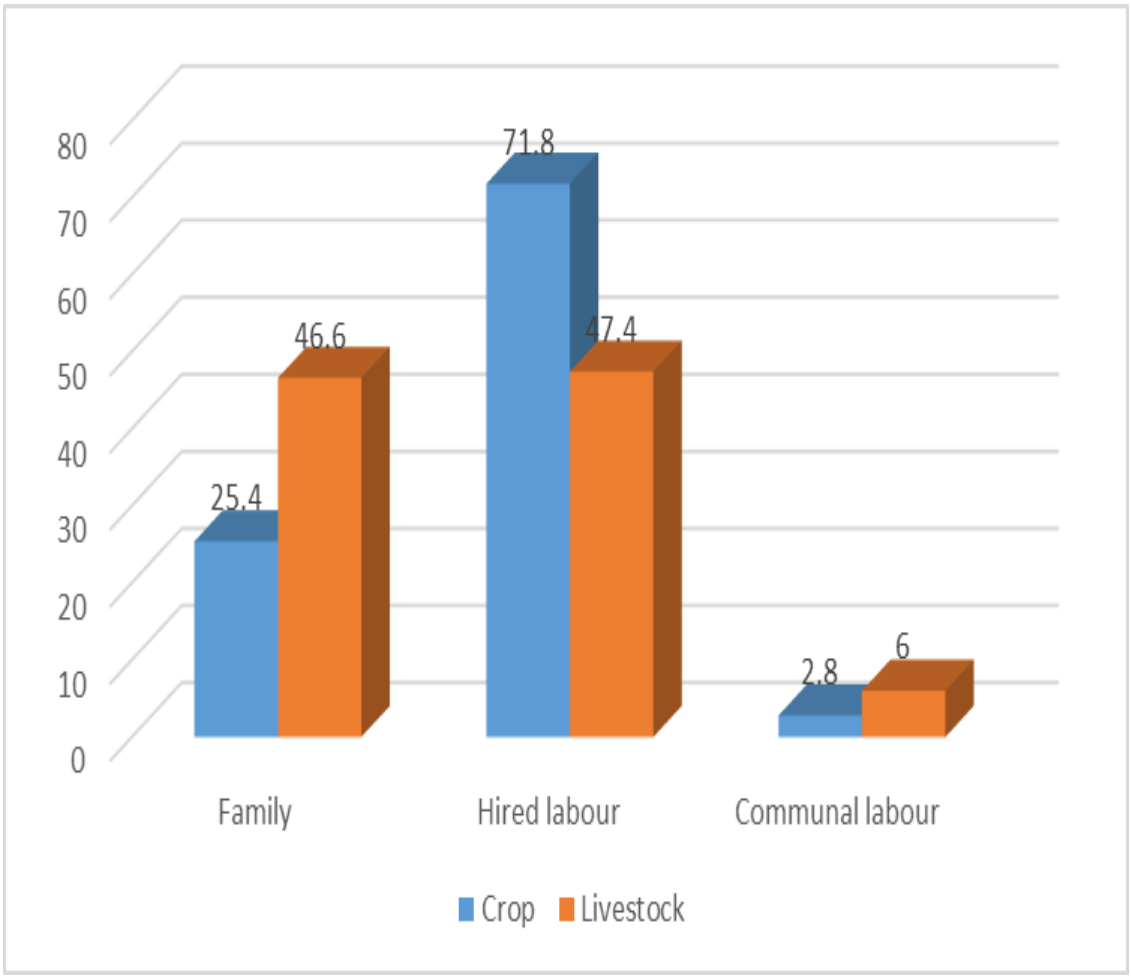

Fig. 3: Distribution of respondents by type of labour

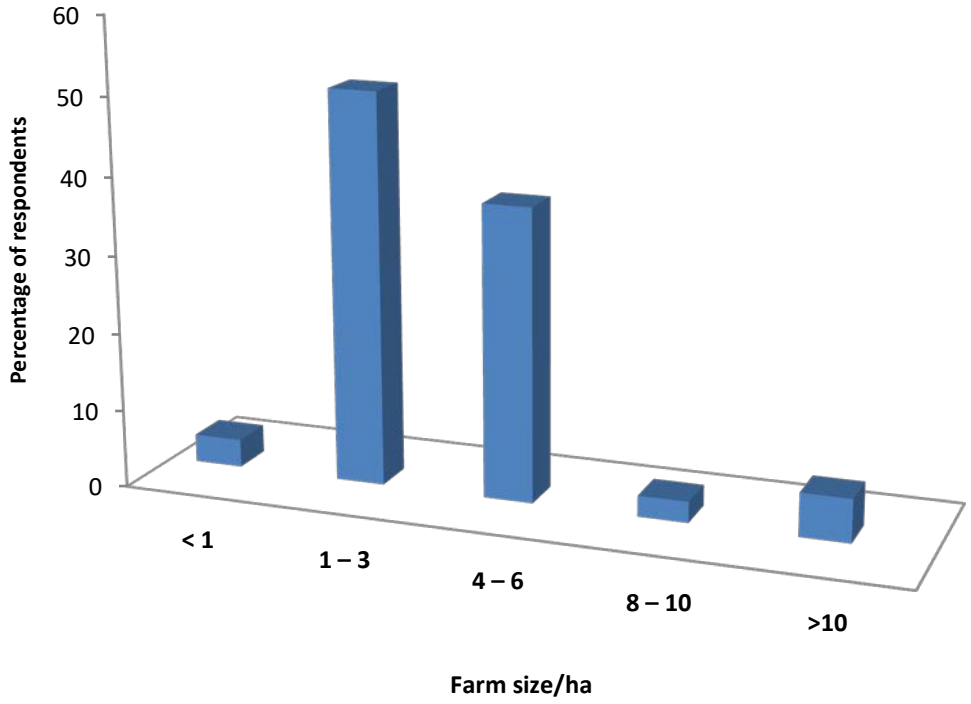

Fig. 4: Distribution of respondents by farm size

5.2.4 Monthly income of respondents

Respondents' income across the zones as presented in Table 9 indicates that the average income per month was ₦ 30,098.7±34,509. Though, the average income for North central, Southwest and South east were ₦33,855.1±37,137.0, ₦32,525.0±40,116.7, and ₦ 24,056.9±23,795.6, respectively. FAO (2018) found the average monthly income of Nigeria farmers to be ₦ 25,920, which is similar to the finding of this study. Based on the average income of the respondents across the zones, the Table shows that majority of the respondents fall below the mean and only few are above the mean. This connotes that a larger proportion of the respondents are low income earners, which could be attributed to their small scale production. This is in agreement with the findings of Ezeh (2013) that most farmers were low income earners in Nigeria.

5.2.5 Enterprise

Figure 5 shows that the dominant crops among the respondents were cassava cultivated by 94.4% of the farmers, maize (90.4%), yam (84.7%), sweet potato (45.8%), pepper (62.1%). Other crops cultivated are tomatoes (52.5%), and leafy vegetable (45.2%). This implies that respondents are involved in cultivating varieties of crops, which is an indication that, majority largely practices mixed cropping across the zones. Vaughan and Ayegbokiki (2014) asserted that many farmers practice mixed cropping as safety net. This is also in line with the report of FAO (2018) that the cropping system of Nigerians is characterized by diversification of production, mainly relying on 5 major crops (maize, cassava, yams, beans and millet), hence, food as well as income sources are highly diversified and not depended on only one crop.

Also, result in Figure 6 shows the livestock enterprises of respondents on multiple response bases. Figure shows that livestock reared by farmers are poultry (78.9%), goat (82.0%), sheep (53.4%), cattle (28.6%), pig (25.6%), duck (21.1%), turkey (23.3%), rabbit (13.5%), guinea fowl (2.3%) and fish farming (1.5%). This connotes that the respondents were involved in multiple livestock farming and thus provide opportunity for multiple source of income. Majority of the livestock farmers were into goat, poultry, sheep cattle and pig farming.

Table 9: Distribution of respondents by income across zones

Zones	Variable	Frequency	Percentage	Parameters
North central	Low	63	61.2	
	Medium	25	24.3	33,855.1±37,137.0
	High	15	16.4	
Southwest	Low	70	68.6	
	Medium	19	18.6	32,525.0±40,116.7
	High	13	12.7	
Southeast	Low	78	74.3	24,056.9±23,795.6
	Medium	21	20.0	
	High	6	5.7	

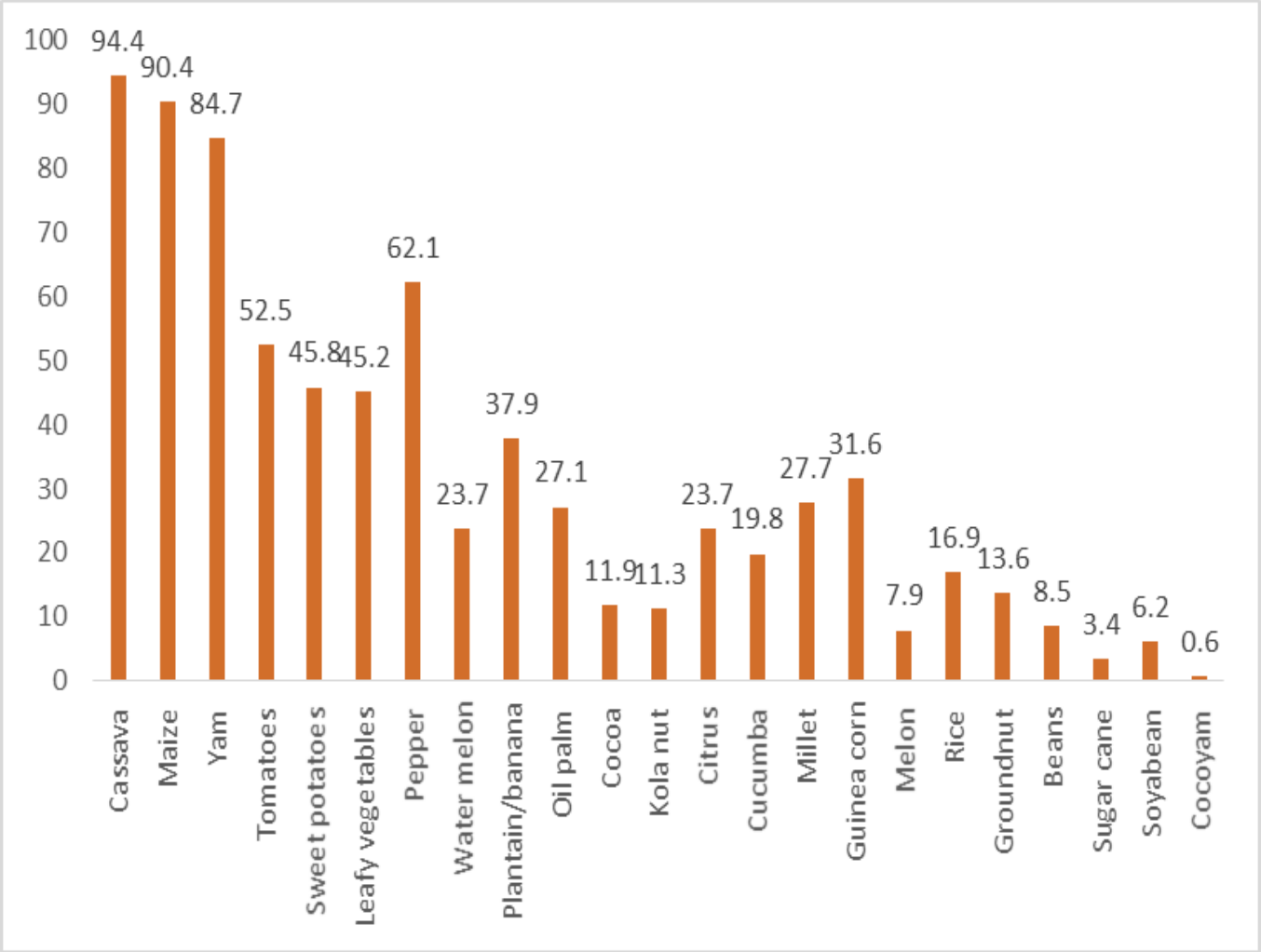

Fig. 5: Distribution of respondents by crop enterprise

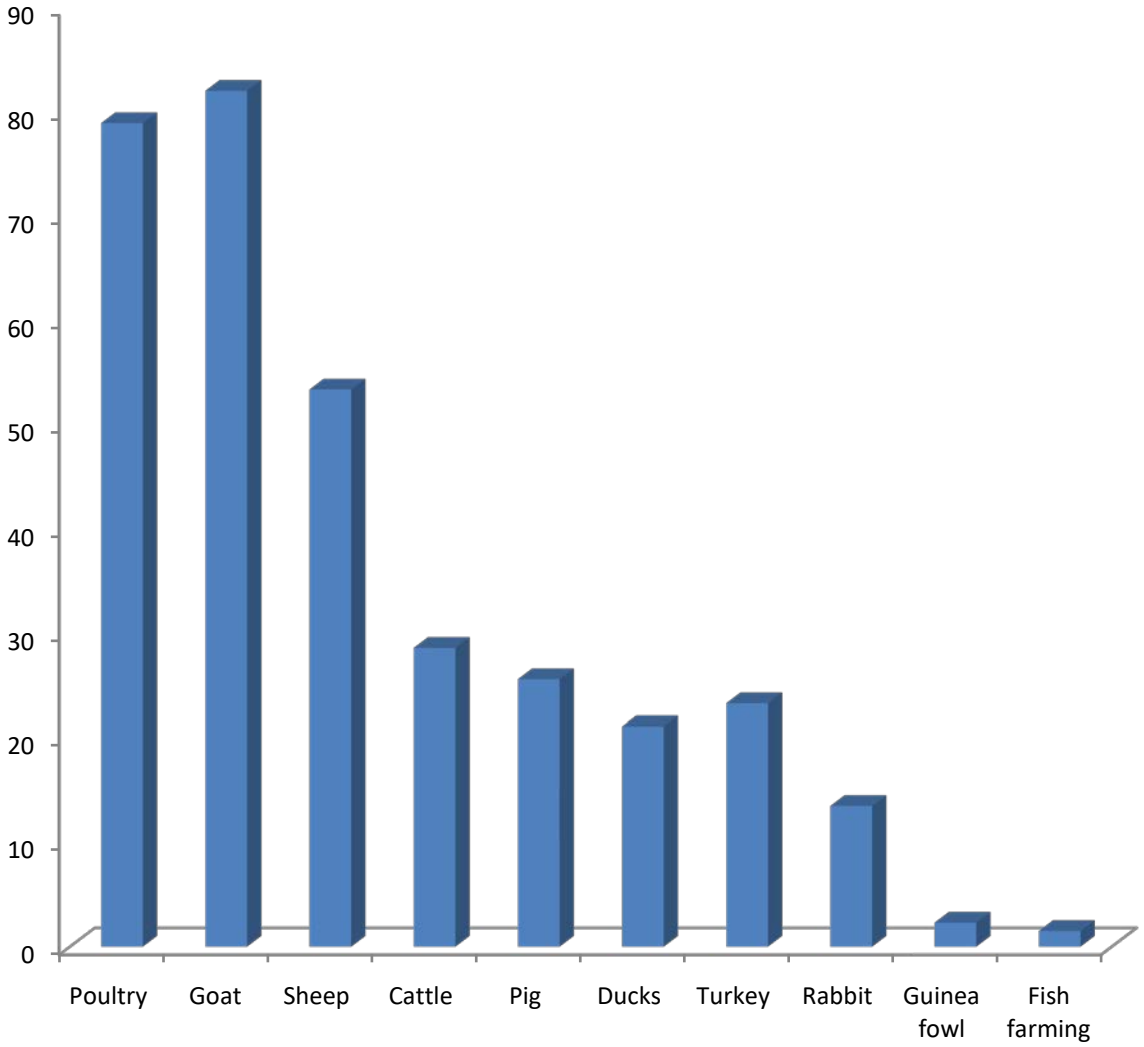

Fig. 6: Distribution of respondents by livestock enterprise

5.2.6 Access to extension service

Respondents access to extension services presented in Figure 7 shows that, majority of the respondents across the zones; North central (24.3%), Southwest (47.5%), and Southeast (27.6%) had access to extension services fortnightly. The Southwest respondents had more access to extension service, follow by Southeast and North Central. This implies that the farmers have access to extension services, which could influence their agricultural practices from indigenous to modern agriculture practices, this agreed with the findings of Abolhasan Sadati, Shaabanali Fami, Asadi and Abolghasem Sadati (2010), and Adesope, Njoku,Oguzor, and Ugwuja (2012) that extension contact with farmers influenced their agricultural practices. This was buttressed during sessions of FGD;

…we use to have meeting with extension agents through Farmers Field School, this exposed us to many practices, opportunities, use of chemicals and even this organic thing (Eruwa, LGA, Oyo State, 2017).

…the extension people use to come and teach us to do agric as business (Anambra East LGA, Anambra, 2017).

…the extension agents are our friends, they make us produce vegetables for export market because that is the interest of the Governor (Anambra East LGA, Anambra, 2017),

This extension man is from our village, so he uses to tell us about agriculture and all the type of chemicals (Lavun LGA, Niger State, 2017).

This finding is at variance to the general option on farmer - extension agent ratio in Nigeria. This is because majority of the respondents claimed to be in contact with extension agents either through Farmer Field School or fortnight meetings.

Though, across the zones substantial percent of the respondents do not have access to extensions services. This could be due to such farmers low participation in the national training programmes organized to enhance agricultural production in Nigeria.

5.2.7 Use of standard or guideline for farming practices

Generally the use of standards or guideline for farming practices by respondents is low as presented in Table 10. Most of the respondents are not aware or use any standards or guideline for their agricultural production.

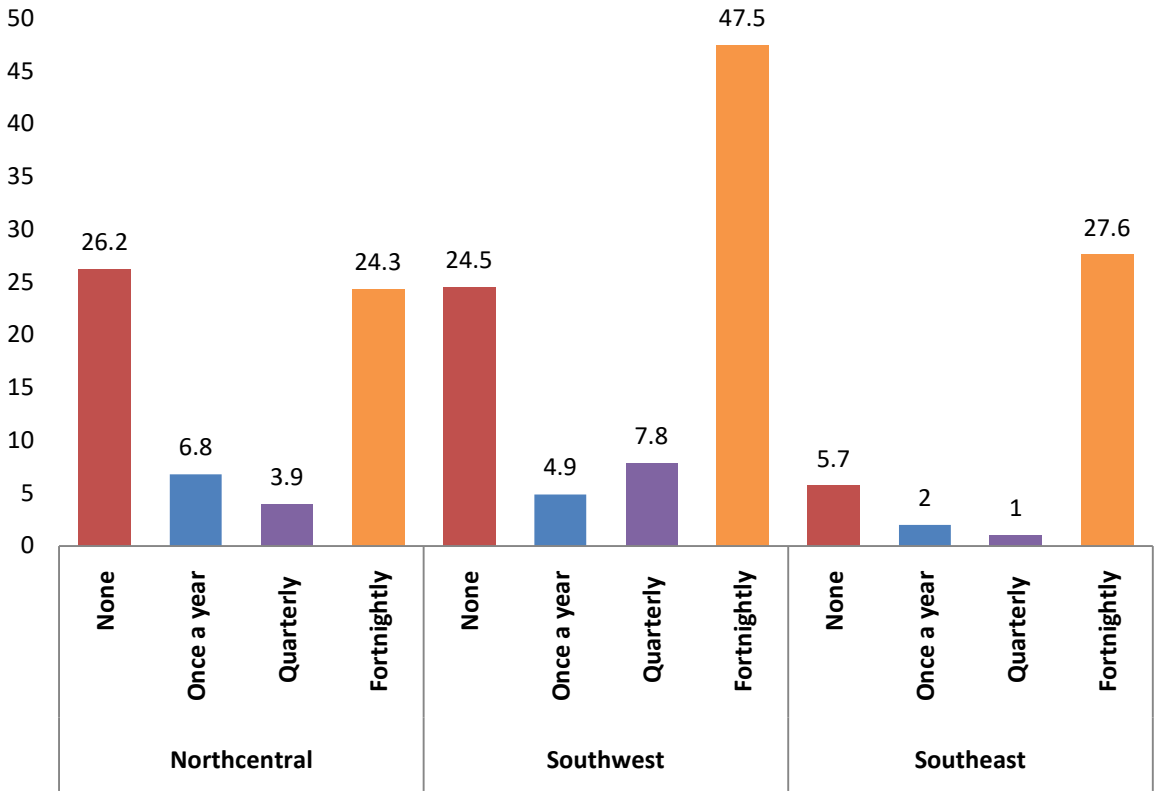

Fig. 7: Distribution of respondents by access to extension services

Table 10: Distribution of crop farmers by use of standard or guideline for farming practices

Variables	Frequency	Percentage
Crop farmers		
No	172	97.2
Yes	5	2.8
Livestock farmers		
No	117	88.0
Yes	16	12.0

Source: Field Survey, 2017

Among crop farmers 97.2% do not have any standard or guideline while 88.0% of the livestock farmers do not have any standard or guideline they complied with for their agriculture practices. This was supported by response during IDI;

I don't know any farmer around here that is using standard, even the precautions for use of herbicides; we don't do it, except for washing of hands and maybe bath after use. It is not because we don't know the importance; most of us think if it will kill us we ought to have died before now (Ebonyi State, 2017).

I know the quantity of herbicides to the mixture together, this is my work for over 40 years, and would I now be looking at book to farm. Maybe, now that you're talking about following guidelines and the government give us guidelines and enforce it, some people will use it (Atisbo LGA, Oyo State, 2017).

This connotes that majority of the respondents practices were not influenced by any guideline or standard; which is an indication of porous agricultural practices, which could limit the access to international market as observed (NASSCO, 2016). This could also, be attributed to weak controls, low knowledge of the benefits of having guideline for production, poor attitude of consumers to safe food and inadequate enforcement to comply with standards by relevant regulatory institutions. This view was the opinion of Mokwunye *et al*. (2012) and NASSCO (2016) that low awareness and uncontrolled agrochemical use have undermined export of agricultural produces in Nigeria.

5.3 Perception to sustainable agricultural practices among respondents

This section of the result shows the respondents' perception to sustainable agricultural practices. Respondents were categorised by their perception score into favourable and unfavourable perception.

The categorisation of the perception score as represented in Table 13 shows that almost (97.7%) all crop farmers had favourable perception to sustainable agricultural practices, while very few (2.3%) of them had unfavourable perception**.** The perception statements for both crop and livestock farmers in Table 11 (a and b) and 12 (a and b) shows that respondents combined both endogenous and exogenous production, thus the opinion of majority to either of the practices was favourable. This could also be attributed to their farming experience

Table 11a: Distribution of crop farmers' perception to sustainable agricultural practices (n=310)

S/N	Variable	S D	D	U	A	S A
1	Successive cultivation of a single land increases incidence of past invasion	25.4	30.5	9.6	13.6	20.9
2	Indigenous agric practices can be used both for small and large scale farming	9.6	16.9	1.7	50.8	20.9
3	Use of indigenous agric practices is not costly	10.7	12.4	7.9	38.4	30.5
4	Sourcing for large quantities of manure for production is a difficult task	20.3	33.9	3.4	26.0	16.4
5	Plant extracts to manage diseases and pest is cheaper and more effective	4.0	13.0	10.2	41.8	31.1
6	Use of indigenous farming lead to reduced cost of production	9.0	23.7	6.8	35.0	25.4
7	Application of animal manure cannot increase yield of crops appreciably	8.5	16.4	7.9	31.6	35.6
8	Preparation of farm yard manure is labour intensive	13.6	34.5	9.0	27.1	15.8
9	Indigenous practices are effective but do not give quick result	16.9	33.9	11.9	23.7	13.6
10	It is difficult to have profit when one use only crop rotation, animal manure,use of plant extracts and leguminous crops for production	10.7	13.6	8.5	45.2	22.0
11	It is simpler and easier to use indigenous agric practices than using chemical inputs for farming	5.6	14.1	2.3	42.9	20.0
12	Indigenous agric practices do not pollute water sources	7.3	10.2	7.3	47.5	27.7
13	The use of animal manure may generate poisonous odour in the air	16.4	20.9	9.0	31.1	22.6
14	Natural resources should be protected even if it will lead to incurring losses in the short run	2.3	4.5	6.8	24.5	24.8
15	Use of indigenous agric practices protect natural resources for the next generation	4.5	5.6	7.9	44.1	37.9
16	It is better to improve soil fertility by application of green manure, like cultivation of cowpea and melon	1.7	2.3	7.3	45.8	42.9
17	Use of crop rotation is sufficient for weed control	5.6	21.5	7.3	39.0	26.6
18	Use of manure helps to improve soil structure and reduce weed population	6.8	11.9	8.5	35.6	37.3
19	Retaining plant residues on farmland may increase incidence of weed invasion	5.6	20.3	14.1	35.6	24.3
20	Use of minimum tillage reduces soil erosion and soil disturbance	6.8	5.6	8.5	44.1	35.0
21	Retaining plant residues on farm enhance water conservation	4.0	10.7	9.6	40.1	35.6
22	Use of animal manure can be considered when one cannot afford chemical fertilizer for soil fertility	13.0	15.8	5.6	31.1	34.5

Table 11b: Distribution of crop farmers' perception to sustainable agricultural practices (n=310)

S/N	Variable	S D	D	U	A	S A
23	Cultivation of mixed crops not only increase total production but also reduces soil erosion	4.5	6.2	2.8	55.9	30.5
24	Plant residues are useless and hence they should be burnt	7.3	19.2	9.0	33.9	30.5
25	Use of crop residues on farm will decrease soil fertility	5.6	12.4	10.7	36.2	35.0
26	Use of indigenous practices can only be done in crop production	10.2	15.8	7.3	39.0	27.7
27	Extension agents encouraged one to stop using indigenous agric practice	8.5	12.4	5.1	18.7	41.2
28	Use of chemical inputs is not good for health of the soil and human health	22.0	36.7	7.3	19.8	14.1
29	Use of chemical pesticide have negative effects on soil organisms or other organisms	23.7	30.5	10.7	20.9	14.1
30	Use of chemical herbicide can lead to dizziness, vomiting, blurred vision or skin sores	21.5	32.8	9.0	15.8	20.9

Table 12a: Distribution of livestock farmers' perception to sustainable agricultural practices (n=310)

S/N	Variable	SD	D	U	A	SA
1	Use of plant extract to control diseases is cheaper and effective	24.1	53.4	3.8	12.8	6.0
2	Indigenous agric practices can be used both for small and large livestock farming	5.3	12.0	3.8	60.9	18.0
3	Use of indigenous livestock practices is not a costly investment	2.3	12.8	3.8	62.4	18.8
4	The indigenous livestock practices are effective but not very fast	21.1	61.7	6.0	11.3	0.0
5	Use of indigenous practices can only be done in crop production, so one need to use chemical inputs in animal production	9.8	18.8	17.3	30.8	23.3
6	Higher income is possible without using chemical inputs in livestock production	5.3	22.6	15.8	36.1	20.3
7	It is easier to use indigenous agric practices than using veterinary medication for animal production	5.3	14.4	2.3	37.6	40.6
8	Indigenous livestock practices will not pollute environment and natural resources	3.8	26.3	3.8	40.6	25.6
9	Natural resources should be protected even if it will lead to incurring losses in the short run	0.8	5.3	4.5	60.9	28.6
10	Use of indigenous agric practices to protect natural resources for the next generation	0.8	10.5	6.8	46.6	35.3
11	Extension agents make me to stop using indigenous livestock practices	7.5	32.3	13.5	32.3	14.3
12	The overuse chemical medication on livestock have caused diseases resistance in livestock	1.5	16.5	4.5	55.6	2.8
13	Chemical antibiotics have negative effects on human and animal health	30.8	48.1	9.8	7.5	3.8
14	Use of some chemical medication to manage livestock diseases have the likelihood of a farmer being hospitalized or have long-term illness	6.0	15.8	9.0	44.4	24.8
15	Use of chemical medication can lead to dizziness, vomiting, blurred vision or skin sore both on animal and human being	7.5	39.8	11.3	30.8	10.5
16	I do not always eat livestock products I use chemical to produce to avoid health consequences	6.0	27.1	13.5	39.1	14.3
17	There is no indigenous livestock practices that can help handle animal diseases, so the choice of chemical inputs becomes necessary	16.5	28.6	12.0	30.1	12.8

Table 12b: Distribution of livestock farmers' perception to sustainable agricultural practices (n=310)

S/N	Variable	SD	D	U	A	SA
18	Eating animal with heavy dosage of antibiotics will make one sick	24.1	41.4	9.0	22.6	3.0
19	No farmer can do without chemical medications in livestock Production	6.5	27.8	8.3	28.6	20.3
20	Use of chemical inputs give the opportunities to have more benefits on livestock production e.g loan	6.0	19.5	6.8	45.1	22.6
21	Use of chemical inputs increase livestock production and income	2.3	9.0	6.0	56.4	26.3
22	Chemical inputs have to be used for market oriented produce	1.5	20.3	19.5	43.6	15.0
23	Use of chemical inputs for livestock production is too costly	12.0	16.1	7.5	21.1	9.4
24	Livestock farming is made easier with chemical medication	2.3	9.0	8.3	54.9	25.6
25	Use of chemical medications is preferred because one needs to use what friends are using for livestock	10.5	23.3	10.5	46.6	9.0

Table 13: Categorisation of respondents' perception to sustainable agricultural practices

Level	Frequency	Percentage	Parameters
Crop farmers			
Unfavourable	4	2.3	Mean = 117.70±33.14, Min =67.00, Max =199.00
Favourable	173	97.7	
Livestock farmers			
Unfavourable	71	53.4	
Favourable	62	46.6	

Source: Field Survey, 2017

overtime and contact with extension services as reported by Abolhasan Sadati *et al.* (2010) and Ovwigho (2014) that farmers experience and contact with extension personnel informed their opinion on sustainable agricultural farming practices. This was further captured during some of the FGD sessions;

… when we use some of the indigenous practices our environment are safe for us and our animals (*Eruwa LGA, Oyo State, 2017*)

…Most of us grow up to see that using indigenous practices are good but its limitations and need for more money, easy of farming informed our use of chemicals, thought it has side effects on health.. (Eruwa LGA, Oyo State, 2017)

We cannot dispute the fact that we harm ourselves because of use of the chemicals; in fact vegetables that naturally grow around my house do not grow again because I have stopped using indigenous practices… (Anambra East LGA, Anambra State, 2017).

For some of us that are educated, we know the benefits and disadvantages of the indigenous and the chemicals practices; they all have their goods and bad (Anambra East LGA, Anambra State, 2017).

On the other hand, the livestock farmers' perception towards sustainable agricultural practices as shown in Table 13 reveals that 53.4% had unfavourable perception to sustainable agricultural practices while 46.6% were favourably dispose to sustainable agricultural practices. This could be attributed to exposure of livestock farmers to some synthetic inputs which are readily available for use, low access to capital, low effectiveness of indigenous medicine, inadequate access to extension personnel (livestock specialist) as identified as constraints to livestock production in Table 16 of this study. This was also expressed in the course of the FGD sessions that;

……. we believed that some of the indigenous mixtures could be very good to cure some diseases in poultry but they are not readily available as the English medicine... (Eruwa LGA, Oyo State, 2017).

…..… the use of the synthetic medicine are always available and that is what we are using in this Tarka area for our livestock (Tarka LGA, Benue State,2017).

5.4 Endogenous and exogenous practices in use by respondents across zones

This section of the result shows the respondents' endogenous and exogenous practices across zones. The most used endogenous and exogenous agricultural practices in use by respondents were ranked for both crop and livestock across zones as presented on Table 14(a and b) and 15(a and b) respectively.

5.4.1 Endogenous agricultural practices in use across zones

The weighted mean distribution of endogenous agriculture practices in use for pest and soil fertility management as presented in Table 14 shows that wood ash, neem extract, multiple cropping were mostly used endogenous practices across the zones for pest management. The use of wood ash was higher in South west zone (34.7) than North Central (28.3) and South east (20.7), respectively. This could be attributed to the density of trees in the South west zone compare to other zones. The use of neem extract was also higher in South west zone as well as multiple cropping than the other zones, which is an indication that South zones still use more of the indigenous practices than other zones. This implies that majority of the farmers still use some indigenous practices to manage both insect and rodent pests. This finding is corroborated by the report of Eze and Echezona (2012) and Meludu and Adesina (2014) that majority of the farmers in African and Asia use some indigenous practices like neem extracts, wild tobacco, wood ash, and chilli to control and repel pest. Moyin-Jesu (2010) also affirmed that wood ash is used as insecticide.

The Table also shows that in North central and South east, crop rotation ranked highest as the most used endogenous practices for soil fertility management, while poultry manure ranked highest in South west. The use of poultry manure can be attributed to the high population of poultry farmers within the South west zone. Though, other zones too use poultry manure for the management of soil fertility. The FGD corroborated this during a session;

The soil in the North requires more fertilizer, so we use both NPK and a lot of poultry manure from the South to meet up. They bring the poultry manure either wet or dried in trucks (Benue State, 2017).

This implies that largely, the farmers used some of the endogenous practices to supplement the exogenous practices for so many reasons, which may include; low income and inability to access enough fertiliser. This was corroborated by Omari, Bellingrath-Kimura, Addo, Oikawa and Fujii (2018) that this is the situation of some farmers in Africa, who due to low access to agrochemicals, use indigenous inputs as supplement.

Table 14a: Distribution of respondents' endogenous practices in use across zones

Zone	Item	Never		Occasionally		Always		Weighted average	Rank
		Freq	%	Freq	%	Freq	%		
North				Pest management					
Central	Neem extract	39	37.9	15	14.6	9	8.7	21.0	3rd
	Wood ash	26	25.2	11	10.7	26	25.2	28.3	1st
	Multiple cropping	23	22.3	4.9	4.9	35	34.0	28.2	2nd
	Lemon grass extract	58	56.3	1	1.0	4	3.9	3.7	5th
	Alligator pepper	59	57.3	2	1.9	2	1.9	3.3	5th
	Trap setting	53	51.5	5	4.9	5	4.9	8.3	4th
				Soil fertility mgt					
	Poultry manure	14	13.6	12	11.7	37	35.9	36.7	2nd
	Cover crop	25	24.3	13	12.6	25	24.3	29.7	3rd
	Crop rotation	8	7.8	10	9.7	45	43.7	40.0	1st
	Use of wet mulching materials	33	32.0	6	5.8	24	23.3	22.0	5th
	Compost	39	37.9	12	11.7	12	11.7	20.0	6th
	Cow manure	24	23.3	7	6.8	32	31.1	28.3	4th
				Livestock					
	Aloe vera leaves	26	25.2	6	5.8	8	7.8	11.3	6th
	Neem extract	10	9.7	18	17.5	12	11.7	26.0	1st
	ground pawpaw seeds	21	20.4	15	14.6	4	3.9	17.7	3rd
	Soaked pawpaw leaves	23	22.3	10	9.7	7	6.8	14.7	4th
	Scent leaves extract	10	9.7	16	15.5	14	13.6	25.3	2nd
	Ground alligator pepper	23	22.3	6	5.8	11	10.7	13.3	5th
Southeast				**Pest management**					
	Neem extract	34	33.3	15	14.7	6	5.9	19.0	2nd
	Wood ash	32	31.4	16	15.7	7	6.9	20.7	1st
	Multiple cropping	34	33.3	8	7.8	13	12.7	16.7	3rd
	Lemon grass extract	44	43.1	8	7.8	3	2.9	10.0	4th
	alligator pepper	50	49.0	3	2.9	2	2.0	4.3	6th
	Trap setting	44	43.1	5	4.9	6	5.9	9.0	5th
				Soil fertility mgt					
	Poultry manure	32	31.4	11	10.8	12	11.8	19.0	3th
	Cover crop	27	26.5	16	15.7	12	11.8	24.0	2nd
	Crop rotation	22	21.6	10	9.8	23	22.5	25.3	1st
	Use of wet mulching materials	33	32.4	5	4.9	17	16.7	16.3	4th
	Compost	37	36.3	13	12.7	5	4.9	16.3	4th
	Cow manure	47	46.1	4	3.9	4	3.9	6.7	6th
				Livestock					
	Aloe vera leaves	40	39.2	6	5.9	1	1.0	6.7	6th
	Neem extract	10	9.7	18	17.5	12	11.7	26.0	1st
	Ground pawpaw seeds	21	20.4	15	14.6	4	3.9	17.7	3rd
	Soaked pawpaw leaves	23	22.3	10	9.7	7	6.8	14.7	4th
	Scent leaves	10	9.7	16	15.5	14	13.6	25.3	2nd
	Ground alligator pepper	23	22.3	6	5.8	11	10.7	13.3	5th

Table 14b: Distribution of respondents' endogenous practices in use across zones

Zone	Item	Never		Occasionally		Always		Weighted average	Rank
		Freq	%	Freq	%	Freq	%		
Southwest				**Pest management**					
	Neem extract	19	18.1	20	19.0	20	19.0	33.3	3rd
	Wood ash	12	11.4	10	9.5	37	35.2	34.7	1st
	Multiple cropping	4	3.8	7	6.7	48	45.7	39.0	2nd
	Lemon grass extract	39	37.1	7	6.7	13	12.4	15.7	6th
	Alligator pepper	39	37.1	16	15.2	4	3.8	18.7	5th
	Trap setting	20	19.0	12	11.4	27	25.7	30.0	4th
				Soil fertility mgt					
	Poultry manure	7	6.7	33	31.4	19	18.1	45.7	1st
	Cover crop	12	11.4	15	14.3	32	30.5	36.3	2nd
	Crop rotation	19	18.1	23	21.9	17	16.2	34.3	5th
	Use of wet mulching materials	18	17.1	27	25.7	14	13.3	36.3	2nd
	Compost	16	15.2	18	17.1	25	23.8	34.7	4th
	Cow manure	22	21.0	17	16.2	20	19.0	30.3	6th
				Livestock					
	Aloe vera leaves	25	23.8	13	12.4	8	7.6	18.3	5th
	Neem extract	9	8.6	22	21.0	15	14.3	32.0	1st
	Ground pawpaw seeds	16	15.2	22	21.0	8	7.6	27.3	3rd
	Soaked pawpaw leaves	20	19.0	14	13.3	12	11.4	22.0	4th
	Scent leaves	13	12.4	19	18.1	14	13.3	28.3	2nd
	Ground alligator pepper	29	27.6	9	8.6	8	7.6	14.3	6th

Source: Field Survey, 2017

The livestock farmers identified their most frequently used endogenous practices for across the zones as follows; neem extract, scent leave extract and ground pawpaw seeds. This implies that farmers use some plants and plant extracts to treat some livestock ailments. This agrees with the findings of Moyin-Jesu (2010) and Eze *et al.* (2012) that African farmers use plant extracts for manage livestock ailments.

5.4.2 Exogenous agriculture practices in use across zones

The weighted mean distribution of use of some exogenous agriculture practices in use as identified by respondents in the study area was presented in Table 15 a and b.

The weighted mean distribution of exogenous agriculture practices in use for crop as presented in Table 15 (a & b) shows that glyphosate and paraquat products ranked high as the most exogenous inputs in use by respondents across the zones. The table also shows that in North central glyphosate (39.3) ranked first, followed by paraquat (34.1), and 2,4 D amine (24.7) respectively. South west respondents use more of glyphosate (31.0) products, followed by paraquat (24.0) and atrazine (21.0). Whereas, atrazine (33.7) was rated high as the most frequently used pesticide, followed by paraquat (32.7) and glyphosate (26.7) as the third most used pesticide. WHO and NAFDAC classified Paraquat, Glyphosate, atrazine and lindane as moderately hazardous while Fluazifop-P butyl as obsolete (WHO, 2010; Friends of the Earth Europe 2013; NAFDAC 2016). The use of these pesticides by farmers is an indication of low knowledge on its hazardous effects. The finding could also be attributed to poor monitoring by regulatory institutions as noted by Mokwunye, Babalola, Ndagi, Idrisu, Mokwunye, and Asogwa (2012) and National Social Safety Nets Coordinating Office (NASSCO, 2016) that poor monitoring of farmers and agro inputs by regulatory bodies underscores the danger inherent in the misuse of agrochemical which undermines healthy food through farmers' noncompliance with standards.

Result in Table 15 (a & b) also shows that ampicilline (21.7), fowl pox (16.0) and cocodiostats (15.3) were the mostly used exogenous medications use by livestock farmers in the North central, while ivomec (28.3), ampicilline (27.7) and mebendazole (27.0) were the frequently used in South west. The experience is different in the South east as oxytetracycline (29.7), coccodiostat (25.3) and amplicilline (23.7). Some of these antibiotics and vaccines have been found to pose less acute hazard in normal use (WHO, 2010). It probably means that the availability by respondents have relatively low hazardous effect.

Table 15a: Distribution of respondents by exogenous agricultural practices in use across zones

Zone	Item	Never		Occasionally		Always		Weighted average	Rank
		Freq	%	Freq	%	Freq	%		
	Crop								
North	Paraquat	13.8(13.2)		12.0(11.4)		33.2(31.6)		34.1	2nd
Central	Atrazine	29 (28.2)		4 (3.9)		30 (29.1)		24.0	4th
	Fluazifop-P butyl	50 (48.5)		5 (4.9)		8 (7.8)		10.3	7th
	2,4,D Amine	31 (30.1)		10 (9.7)		22 (21.4)		24.7	3rd
	Glyphosate	10 (9.5)		20 (19.0)		29 (27.6)		39.3	1st
	Metalaxyl	34 (33.0)		5 (4.9)		24 (23.3)		21.0	5th
	Lambda	43.3(42.5)		5.3(5.2)		6.3(6.2)		9.6	9th
	Lindane	26 (25.2)		3 (2.9)		11 (10.7)		10.3	7th
	Dichlorvous	36 (35.0)		6 (5.8)		21 (20.4)		20.0	6th
	Livestock								
	Ampicillin	23 (22.5)		17 (16.7)		7 (6.9)		21.7	1st
	Cloxacillin	44 (43.1)		2 (2.0)		1 (1.0)		2.7	10th
	Oxytetracyline	32 (31.4)		5 (4.9)		10 (9.8)		11.7	6th
	Amphotericin	37 (36.3)		2 (2.0)		8 (7.8)		7.3	9th
	Mebendazole	32 (31.4)		6 (5.9)		9 (8.8)		12.0	5th
	Ivomec	29 (28.4)		9 (8.8)		9 (8.8)		15.0	4th
	Coccodiostats	29 (28.4)		10 (9.8)		8 (7.8)		15.3	3rd
	Lasota	34 (33.3)		3 (2.9)		10 (9.8)		9.7	7th
	Gumboro	34 (33.3)		3 (2.9)		10 (9.8)		9.7	7th
	Fowl pox	28 (27.5)		10 (9.8)		9 (8.8)		16.0	2nd
Southwest	Paraquat	29 (28.2)		4 (3.9)		30(29.1)		24.0	2nd
	Glyphosate	19 (18.1)		13 (12.4)		27 (25.7)		31.0	1st
	Atrazine	30 (29.4)		13 (12.7)		12 (11.8)		21.0	3rd
	Fluazifop-P butyl	48 (47.1)		4 (3.9)		3 (2.9)		6.0	8th
	2,4,D Amine	35 (34.3)		11 (10.8)		9 (8.8)		17.0	4th
	Metalaxyl	40 (39.2)		10 (9.8)		5 (4.9)		13.3	6th
	Lambda	48 (47.1)		4 (3.9)		3 (2.9)		6.0	8th
	Lindane	32 (31.4)		6 (5.9)		9 (8.8)		12.0	7th
	Dichlorvous	38 (37.3)		11 (10.8)		6 (5.9)		15.0	5th
	Livestock								
	Ampicillin	8 (7.8)		19 (18.4)		13 (12.6)		27.7	2nd
	Cloxacillin	20 (19.4)		10 (9.7)		10 (9.7)		16.7	10th
	Oxytetracyline	18 (17.5)		13 (12.6)		9 (8.7)		19.0	7th
	Amphotericin	17 (16.5)		19 (18.4)		4 (3.9)		21.7	4th
	Mebendazole	9 (8.7)		19 (18.4)		12 (11.7)		27.0	3rd
	Ivomec	8 (7.8)		21 (20.4)		11 (10.7)		28.3	1st
	Coccodiostats	16 (15.5)		16 (15.5)		8 (7.8)		21.3	5th
	Lasota	17 (16.5)		10 (9.7)		13 (12.6)		18.7	8th
	Gumboro	15 (14.6)		13 (12.6)		12(11.7)		21.0	6th
	Fowl pox	19 (18.4)		11 (10.7)		10 (9.7)		17.7	9th

Table 15b: Distribution of respondents by exogenous agricultural practices in use across zones

Zone	Item	Never		Occasionally		Always		Weighted average	Rank
		Freq	%	Freq	%	Freq	%		
Southeast	Paraquat	20 (19.0)		20 (19.0)		19 (18.1)		32.7	2nd
	Atrazine	21 (20.0)		25 (23.8)		13 (12.4)		33.7	1st
	Fluazifop-P butyl	35 (33.3)		12 (11.4)		12 (11.4)		20.0	6th
	2,4,D Amine	41.8(41.0)		6.8(6.7)		6.3 (6.2)		11.1	8th
	Glyphosate	27.3(26.0)		16.7(15.9)		15.0(14.3)		26.7	3rd
	Metalaxyl	38.3(37.2)		10.0(9.7)		14.7(14.3)		19.8	7th
	Lambda	35(34)		9(8.7)		25 (23.9)		25.6	4th
	Lindane	35 (33.3)		4 (3.8)		7 (6.7)		8.7	9th
	Dichlorvous	30 (28.6)		10 (9.5)		19 (18.1)		22.7	5th
	Livestock								
	Ampicillin	19 (18.1)		17 (16.2)		10 (9.5)		23.7	3rd
	Cloxacillin	32 (30.5)		3 (2.9)		11 (10.5)		10.3	9th
	Oxytetracyline	14 (13.3)		25 (23.8)		7 (6.7)		29.7	1st
	Amphotericin	37 (35.2)		7 (6.7)		2 (1.9)		8.3	10th
	Mebendazole	20 (19.0)		12 (11.4)		14 (13.3)		21.3	6th
	Ivomec	24 (22.9)		16 (15.2)		6 (5.7)		20.0	7th
	Coccodiostats	18 (17.1)		20 (19.0)		8 (7.6)		25.3	2nd
	Lasota	20 (19.0)		14 (13.3)		12 (11.4)		22.0	4th
	Gumboro	20 (19.0)		14 (13.3)		12 (11.4)		22.0	4th
	Fowl pox	25 (23.8)		8 (7.6)		13 (12.4)		16.7	8th

Source field survey, 2017

5. 5 Constraints to use

This section discussed the constraints to use of endogenous and exogenous practices by crop and livestock respondents in the study area. The mean of listed constraints were used to rank and discuss the constraint faced by respondents.

5.5.1 Constraints to the use of endogenous practices

Labour intensiveness ($\bar{x}$ =1.54) constitutes the most prominent limitation to the use of endogenous practices in the study area as represented in Table 16. Labour intensive nature of endogenous agricultural practice coupled with labour shortages could discourage the use of endogenous agricultural practice not minding its benefits. Husain and Sundaramari (2013) identified labour intensiveness as major constraint to the use of indigenous agricultural practices. The other constraints to use are; difficulty of weed management ($\bar{x}$ =1.51), inadequate strength due to old age ($\bar{x}$ =1.48), advocacy to use of chemical product by extension agent, slow effects of indigenous practices ($\bar{x}$ =1.43), mode of application of manure and indigenous pesticides ($\bar{x}$ =1.41) and belief about indigenous practices ($\bar{x}$ =1.17). This implies that, the majority of the respondents considered difficulty in weed management and influence of extension agents as constraints to use of endogenous practices, and this conformed to the findings of Husain *et al.* (2013), that difficulty in handling of bulky inputs reliance on readymade inputs, extension contact, more time consuming, over reliability on the external chemical inputs, lack of proper and limited information on indigenous materials are the constraints to use of indigenous practices. This implies that, ease of farming practices is essential to it use, therefore, for farmers to adopt organic farming practices efforts must be geared towards reducing its labour intensiveness and effectively engage the services of extension agents to promote organic practices.

The livestock farmers' ranking of constraint to use of endogenous agricultural practices in Table 16 reveals limited/low effect of indigenous practices on diseases and parasite control ($\bar{x}$ =1.40) as first, poor growth rate of indigenous livestock ($\bar{x}$ =1.30) as second, limited access to information on indigenous livestock practices ($\bar{x}$ =1.28) as third, high mortality rate due diseases outbreak ($\bar{x}$ =1.27) as fourth and last on list was limited market for indigenous animal products ($\bar{x}$ =0.98). This implies that the low effectiveness of indigenous practices for livestock affects the use.

5.5.2 Constraints to use of exogenous practices

Limited access to capital ($\bar{x}$ =1.80) was ranked first among others as the constraint to use of exogenous agricultural practices as shown in Table 17. This was closely followed by

Table 16: Distribution of respondents by constraints to use of endogenous practices

Items	Mean	Rank
Crop		
Labour intensiveness of indigenous practices	1.54	1st
Difficulty of weed management under indigenous method	1.51	2nd
Inadequate strength due to old age	1.48	3rd
Advocacy to use chemical products by extension agent	1.43	4th
Slow effects of indigenous practices	1.43	4th
Mode of application of manure and indigenous pesticides	1.41	6th
Bulkiness of indigenous materials	1.40	7th
Low or inadequate documentation of indigenous practices for younger generation to use	1.40	7th
Indigenous agric. practices not applicable to large scale farming	1.32	9th
Packaging of indigenous farm inputs not attractive	1.30	10th
Indigenous agric. practices not effective on large scale farming	1.26	11th
Unavoidability of indigenous farming materials	1.23	12th
Inaccessibility of raw materials for indigenous farming	1.20	13th
Belief about indigenous practices	1.17	14th
Livestock		
Limited/low effect on diseases and parasite control	1.40	1st
Poor growth rate of indigenous livestock	1.30	2nd
Limited access to information on indigenous practices	1.28	3rd
High mortality rate due diseases outbreak	1.27	4th
Inability to control predators like hawks, cats, dogs using indigenous practices	1.25	5th
Low income to purchase inputs for production	1.24	6th
Low education level of farmers	1.24	6th
Poor breeding stock	1.18	8th
Limited access to extension services	1.17	9th
Limited access to credit service	1.11	10th
Limited market for indigenous animal products	0.98	11th

Source field survey, 2017

Table 17: Distribution of respondents by constraints to use of exogenous practices

Items	Mean	Rank
Crop		
Inadequate access to capital	1.80	1st
High cost of chemical inputs	1.67	2nd
Fear of buying adulterated inputs	1.52	3rd
Side effects on health of farmers	1.50	4th
Inadequate know how on use of chemical farm inputs	1.49	5th
Side effects on environment	1.49	5th
Lack of gadget to adhere to safety measures on use of chemical inputs	1.46	6th
Attractive packaging of inputs	1.29	7th
Low access to chemical farm inputs	1.22	8th
Increase in readily available alternative inputs	1.22	8th
Ease of application on inputs	1.13	10th
Inadequate access to extension services	1.04	11th
Livestock		
Increase in awareness of alternative medications to chemical medications	1.84	1st
Limited access to capital	1.65	2nd
Side effects on health	1.44	3rd
Limited access to synthetic medications	1.34	4th
Side effects on environment	1.22	5th
Limited technical know-how on synthetic medications	1.19	6th
Lack of gadget to implement safety measures in the use of synthetic medication	1.17	7th
Limited access to extension services	1.12	8th

Source: Field Survey, 2017

high cost of chemical inputs ($\bar{x}$ =1.67), fear of buying adulterated inputs ($\bar{x}$ =1.52), side effects on environment ($\bar{x}$ =1.50), inadequate technical use of chemical farm inputs ($\bar{x}$ =1.49), side effects on health of farmers ($\bar{x}$ =1.49), lack of gadget to adhere to safety measures ($\bar{x}$ =1.46) and access to extension service ($\bar{x}$ =1.04). This implies that majority of the farmers have not been able to use exogenous agricultural practices due to limited capital, high cost of chemical inputs, fear of adulterated input and sensitive to the effect of chemical inputs on the environment. This finding is in line with the opinion of Walaga *et al.* (2005), that African farmers have the potential to use low external inputs for their production than dependence on agrochemical inputs, for the reason that; high cost of agrochemical, poor technical knowhow and the side effects of agrochemical inputs on environment. This suggests that, promoting effective and efficient low external inputs production system such as organic agriculture could reduce the unending limitations associated with the use of some harmful agro inputs, which the majority of the small scale farming population could not afford or bear.

However, the livestock farmers' ranked increase in awareness of alternative medications to synthetic medications ($\bar{x}$ =1.84) first served as constraint to use of exogenous agricultural practices in Table 17. This was followed by limited access to capital ($\bar{x}$ =1.65), limited access to synthetic medications ($\bar{x}$ =1.44), side effects on health ($\bar{x}$ =1.34), limited technical know-how on synthetic medications ($\bar{x}$ =1.22) and limited access to extension services ($\bar{x}$ =1.12) as constraints to use of exogenous agricultural practices. This implies that, increase in awareness of alternative medications to synthetic medications, limited access to capital, limited access to synthetic medications, side effects on health, limited technical know-how on synthetic medications and limited access to extension services were the serious constraints to use of exogenous practices in livestock production. This further suggests that leveraging on the increasing quest for alternative medication of the farmers and consumers would enhance the adoption of organic livestock practices and reduce the fear of side effect on health. Extension service should also focus on livestock farmers to improve their production.

5.6.0 Tendency for compliance of agricultural practices with organic principles and standards

This section presented the result on the tendency of respondents' agricultural practices to comply with Nigeria organic agriculture standards. Lists of items were developed based on

the Nigeria Organic Standard to describe the tendency for compliance of agricultural practices of farmers with the organic standard. Weighted mean of responses of farmers were used to identified the practices that were in compliance and otherwise.

5.6.1 Tendency for compliance with agricultural practices with organic principles and standards

The distribution of the results as represented in Table 18 (a &b) demonstrated that for the general farm practices, tendency for compliance of the respondents' practices was low, as only few of the respondents complied with standards of no use of synthetic herbicides (57) mineral fertilizer (NPK) (35), chemical to control pest on farm (94) and no use of synthetic chemicals by neighbouring farm (98). Likewise, only few of the livestock farmers complied with the standards of no use of synthetic herbicides (62), insecticide (68), antibiotics (79.5) inputs to manage ailments and use pesticides to control pests and weeds. By implication, majority of the respondents do not comply with organic standard, because of the synthetic inputs such as NPK is not allowed in organic farming. Though, majority use manure (192), only of few (98) the crop farmers considers curing of the manure before application. This also implies that most farmers that used manure do not adhere to standard of organic practices.

With respect to soil management the table shows that, some of the respondents' practices show compliance as some with the use crop rotation (194). Though crop rotation is a major practice in organic farming, having a well-planned crop rotation is the acceptable practice. Some of the respondents indicated they have well-planned crop rotation plan (143). The FGD report revealed that the few that used crop rotations do not have succession plan for the crop rotation as expected by the organic standard.

On pest management practices respondents shows compliance by using neem extracts for controlling pest (124.5), no addition kerosene to plant extracts(123), and chemical pesticide to neem extract (121.5). Though, majority (98) do not comply with the standards on the use same knapsack sprayer to apply the plant extract.

Table 18a: Distribution of respondents by extent of compliance with organic practices

Items	Always	Sometimes	Rarely	Not at all	Weighted mean
General practices					
No use of mineral fertilizer (NPK) on farm	133(75.1)	18(10.2)	4(2.3)	22(12.4)	37.0
No use synthetic herbicides to control weed on farm	116(65.6)	35(19.8)	6(3.4)	20(11.3)	57.0
Use manure (poultry, cow, pig dropping) on farm	37(20.9)	11(6.2)	59(33.3)	70(39.5)	192.0
Use cured manure before application	90(50.8)	42(23.7)	22(12.4)	23(13)	98.0
No use of battery powder as seed dresser to protect seeds before planting	29(16.4)	29(16.4)	15(8.5)	104(58.8)	111.0
No use of fire for land clearing	53(29.9)	63(35.6)	23(13)	38(21.5)	128.0
No use of chemical to control pest on farm	88(49.7)	51(28.8)	16(9)	22(12.4)	94.0
No use of chemical to control weed and pest by neighbor farmers	90(50.8)	42(23.7)	22(12.4)	23(13)	98.0
Soil fertility management					
No use of wet poultry manure	49(27.7)	43(24.3)	18(10.2)	67(37.9)	113.0
Use of crop rotation on farm	32(18.1)	42(23.7)	14(7.9)	89(50.3)	194.0
Use of planned crops rotation on farm	41(23.2)	24(13.6)	42(23.7)	70(39.5)	143.0
No bad odour of compost before application	46(26)	28(15.8)	17(9.6)	86(48.6)	105.0
No addition of some fertilizer to compost for it to be effective and give high yield	26(14.7)	15(8.5)	43(24.3)	93(52.5)	151.0
Pest management					
Use neem extracts for controlling pest	81(45.8)	18(10.2)	45(25.4)	33(18.6)	124.5
Do not use same knapsack sprayer used for chemical for neem extract	88(49.7)	51(28.8)	16(9)	22(12.4)	94.0
No addition of some chemical pesticides to neem extracts for it to be effective and control pest	18(10.2)	48(27.1)	12(6.8)	99(55.9)	121.5
No addition of soda to neem extract	19(10.7)	24(13.6)	11(6.2)	123(69.5)	107.5
No addition of kerosene to neem extract	13(7.3)	25(14.1)	19(10.7)	120(67.8)	123.0
No use of tobacco extracts to control pest and diseases on farm	12(6.8)	23(13)	10(5.6)	132(74.6)	109.0
No addition of detergent to neem extracts	17(9.6)	15(8.5)	6(3.4)	139(78.5)	96.5

Table 18b: Distribution of respondents by extent of compliance with organic practices

Items	Always	Sometimes	Rarely	Not at all	Weighted mean
No use of herbicides to control weed on farm	64(48.1)	38(28.6)	8(6)	23(17.3)	65.5
No use of chemical to control pest by neighbor farmers	62(46.6)	43(32.3)	15(11.3)	13(9.8)	79.5
Use of plant extract to control pest	39(29.3)	19(14.3)	48(36.1)	26(19.5)	128.0
No use of some chemical substances to plant extracts for effectiveness	18(13.5)	23(17.3)	26(19.5)	66(49.6)	108.0
No use of hormone inducing medicine for livestock	24(18)	44(33.1)	22(16.5)	43(32.3)	109.5
No use of growth promoter in the feed of livestock	44(33.1)	30(22.6)	15(11.3)	44(33)	82.0
No addition of abattoir waste to livestock feed	14(10.5)	23(17.3)	17(12.8)	79(59.4)	96.5
No addition of colouring material to feed of livestock to make it attractive	17(12.8)	11(8.3)	24(18)	81(60.9)	99.5
No marks on livestock with hot iron or anything that make permanent mark	14(10.5)	27(20.3)	13(9.8)	79(59.4)	92.5

Source: Field Survey, 2017

The proportion of those that used plant extract (neem) might have contaminated the extract of the previous synthetic inputs in the sprayer, implying that, the respondents believe in the use of plant extracts, but need to be educated on the basic standards for using plant extracts because similarity in indigenous practices and some organic practices do not confer organic status to such practices; compliance to standard ensures such (Walaga *et al.*, 2005).

5.6.2 Level of compliance with agricultural practices with organic standard by enterprise

The result in Table 19 shows that 51.4 % of crop farmers had low level of compliance with organic standards. Similarly the study found that among livestock farmers 55.6 % were within the low compliance category. This suggests that crop farmers have the tendency to comply with organic standards than the livestock farmers. This could be due to the inadequate endogenous practices that livestock farmer could use for livestock management and low effect of indigenous practices as identified as one of the constraints to use endogenous practices (Table 16). This further buttressed the finding of this study that majority of the respondents do not comply with any standard for the production. This is in line with the findings of Mokwunye *et al* (2012); Issa (2015) and Oyekale (2016), that Nigeria farmers still have low compliance to sustainable agricultural practices.

5.6.3 Level of compliance with agricultural practices with organic standard by zone

The result in Table 20 shows the level of compliance of respondents with organic standards across zones categories as high or low. In the Table, South west had more of the respondents that scored high (62.7%) in the tendency to comply with organic standards, followed by North central (43.7%) and South east (34.3%) with the least score. The high tendency to comply by the respondents in South west could be attributed to the availability of information on the use of some indigenous practices for both crop and livestock production (Meludu *et al*, 2014). Aside, the awareness of organic agriculture beginnings from the zone, this could have also contributed to the high score in the tendency to comply with organic standards in the zone.

Table 19: Distribution of respondents level of compliance with organic standards by enterprise (n=310)

Level	Percentage	Parameter
Crop farmers		
Low	51.4	Min =18.00, Max =61.00, Mean = 39.60
High	48.6	
Livestock farmers		
Low	55.6	
High	44.4	

Source: Field Survey, 2017

Table 20: Distribution of respondents level of compliance with organic standards by zone (n=310)

Zone /categories	North central %	South west %	South east %
Low	56.3	37.3	65.7
High	43.7	62.7	34.3

Source: Field Survey, 2017 **Parameter:** Min =18.00, Max =61.00, Mean = 39.60

5.7.0: Hypotheses of the study

This section reports the results of data analysis with which the hypotheses of the study were tested.

5.7.1: Hypothesis 1: Relationship between socioeconomic characteristics and level compliance to organic standard

The socioeconomic characteristics of the farmers used in the analysis are age, years of formal education, years of farming experience, labour size, access to extension service (crop), access to extension service (livestock) and monthly income was analysed using Person product Moment Correlation (PPMC).

Table 21 shows that that there was significant relationship between years of education (r= 0.19), access to extension services for crop farmers (r= -0.21), access to extension services for livestock farmers (r= -0.35) and their level of compliance with organic standard. The significant relationship between education and compliance may be attributed to the fact that educational qualification of the respondents might have exposed them to environmental sustainability overtime as well as inform their decision on compliance to standards. This concurred with the findings of Esiobu and Onubuogu (2014); Esiobu, Onubuogu, and Ibe (2015) that individuals with higher educational attainment mostly have the tendency to comply with the guidelines of improved farming practices and technology for the benefits attached to it. No thought, education on public safety and healthy agricultural production would enhance the possibility of farmers to comply with standard.

Contacts with extension personnel have been affirmed to have significant relationship with farmers' adoption of improved agricultural practices (Oyesola and Obabire 2011; Fadare Akerele and Toritseju 2012; Ovwigho, 2014). The inverse relationship between extension services and compliance with organic standard implies that, the more farmers are in contact with extension service providers, the less their compliance to organic standards. This may be due to the messages of the extension service providers, which centred on conventional farming. This also could be attributed to level of engagement of extension service providers in the promotion of organic agriculture. This emphasised the significant roles of agricultural extension service personnel on the practices of farmers. The current interaction of farmers with the extension officers can be leveraged on to promote organic agriculture in the study area.

Age, years of experience, labour size, and monthly income do not have significant relationship with compliance with organic standard. This could be attributed to the fact that

Table 21: Relationship between socioeconomic characteristics and compliance with organic standard

Variable	r - value	p - value	Decision
Age	- 0.82	0.149	Not significant
Years of formal education	0.19	0.001	Significant
Years of farming experience	0.02	0.709	Not significant
Labour size	- 0.12	0.104	Not significant
Access to extension services (crop)	- 0.21	0.006	Significant
Access to extension services (livestock)	- 0.35	0.000	Significant
Monthly income	0.038	0.599	Not significant

Source: Field Survey, 2017

compliance is first the factor of value and enabling environment. Many farmers have not seen the value for complying with any standard, thus the need for value reorientation on safe and health production and consumption than monetary gain. As the popular sayings health is wealth emphasised that. The government agencies saddled with the responsibility ensure compliance with basic guideline for the use of agricultural inputs should do more in the interest of the innocent consumers and protect the environment.

5.7.2 Hypothesis 2: Perception to sustainable agricultural practices and compliance with organic standard

The result of the analysis shows in Table 22 revealed that there was positive and significant relationship (r=0.484, p=0.000) between the respondents perception of sustainable agricultural practices and level of compliance. This finding can be explained that, majority of the respondents used both endogenous and exogenous agricultural practices to complement each other for their production. The implication of this is that farmers are aware of the benefits and limitations of some of these endogenous and exogenous agricultural practices. Therefore, their disposition to sustainable agricultural practices may likely influence compliance with organic agriculture standard. This is in line with the position of Olowogbon, Fakayode, Jolaiya and Adebola (2013) that the utilisation of eco-friendly farming practices greatly depends on the disposition of the farmers.

5.7.3 Hypothesis 3: Relationship between the use of endogenous and exogenous practices and compliance with organic standard

Table 23 highlights that there was significant relationship (r=0.114, p=0.044) between the respondents endogenous agricultural practices and compliance with organic standard. This finding may be explained by the fact that, some of the respondents are smallholder farmers; who had low access to synthetic inputs and with relatively low income. These could have informed the use of available indigenous practices to make up for their agricultural production. Some of the endogenous practices; crop rotation, use of manure, use of plant extract and multiple cropping are allowed in organic farming. The implication is that some of the practices of the respondents could be leveraged upon for conversion to organic agriculture practices, through awareness, training and effective engagement of extension service providers.

The Table also shows that, there was no significant relationship (r=0.025, p=0.663) between the respondents use of exogenous agricultural practices and compliance with

Table 22: Distribution of respondents' perception to sustainable agricultural practices and compliance with organic standard

Variable	r – value	p - value	Decision
Perception	0.484	0.000	Significant

Source: Field Survey, 2017

Table 23: Distribution of relationship between the use of endogenous and exogenous practices and compliance with organic standard

Variable	r – value	p - value	Decision
Endogenous practices vs. compliance	0.114	0.044	Significant
Exogenous practices vs. compliance	0.025	0.663	Not significant

Source: Field Survey, 2017

standard organic standard. This finding may be attributed to the exposure of respondents to some agrochemicals, old age, and ease of use, peer influence and contact with extension service providers. As respondents identified labour intensity, old age, exposure to agrochemical and contact with extension service providers as constraints to use of endogenous practices, which have some similarities with organic agriculture practices.

5.7.4 Hypothesis 4: Relationship between constraints to the use of endogenous and exogenous practices and compliance with organic standard

Result in Table 24 shows that, there was negative and significant relationship (r= -0.110, p=0.050) between the respondents' use of endogenous agricultural practices and compliance to organic standard. This means that the lower the constraints to use of endogenous practices, the higher the level of compliance with organic standards. This may be explained by the fact that, respondents have some component of organic practices but some of the practices need to be improved upon for ease of use. Among the constraints to use are bulkiness of material, labour intensity, low mineralisation and others. This is in line with the position of Giller, Witter, Corbeels, and Tittonell (2009) that most of the indigenous practices are labour intensive and farmers may find the use of herbicides attractive. This implies that specific intervention should be done to improve on some of the practices of the farmers that are in compliance with organic standard for ease of adoption.

The Table also indicated a positive and significant relationship (r = 0.275, p =0.000) between respondents' constraints to the use of exogenous agricultural practices and the compliance with organic standard. The higher the constraint to the use of exogenous agricultural practices, the higher the compliance with organic standards. This may be explained that, the exogenous (synthetic) inputs are available but may not be accessible for use because of low income, low access inputs, and other constraints as also identified by Walaga (2005).

5.7.5 Hypothesis 5: Difference in the use of endogenous and exogenous agricultural practices within the zones

The study tested the hypothesis for significant difference in use of endogenous and exogenous practices within the zones. The result presented in Table 25 shows that significant difference exist (F=10.80, p=0.000) in endogenous agricultural practices within the zones. This means that use of endogenous agricultural practices significantly vary from within the zone, especially in term of different vegetation and knowledge of the use of plants and plants extracts as pesticides and fertiliser. This may be an indication of varying degrees of

Table 24: Distribution of relationship between constraints to the use of endogenous and exogenous practices and compliance with organic standard

Variable	r - value	P – value	Decision
Constraints to endogenous practices	- 0.110	0.050	Significant
Constraints to exogenous practices	0.275	0.000	Significant

Source: Field Survey, 2017

Table 25: Distribution of difference in the use of endogenous and exogenous agricultural practices within the zones

Variable		Sum of squares	df	Mean square	F	Sig.	Decision
Endogenous Practices	Between Groups	5122.22	2	2561.11	10.80	0.00	Significant
	Within Groups	72795.88	307	237.12			
	Total	77918.09	309				
Exogenous practices	Between Groups	21670.42	2	10835.21	7.585	0.00	Significant
	Within Groups	438538.05	307	1428.46			
	Total	460207.47	309				

Source: Field Survey, 2017

endogenous practices available in the different zones as well as the documentation and transfer of such knowledge or practices from one generation to another.

This implies that, to effectively leverage endogenous practices of farmers for compliance with organic agriculture standards, their vegetations and understanding of eco-system are relevant factors to consider. Studies have established that available nature resources contribute to farming practices (Stoll 2000; Yekini 2002; Ponge 2011; and Owen 2014).

Also, Table 25 shows that a significant difference exist (F=7.585, p=0.001) in exogenous agricultural practices between the zones. This implies that use of exogenous agricultural practices vary from one zone to another. The difference is an indication that the zones have varying degrees of exposure to exogenous (synthetic) inputs and access to its use. This could be attributed to the soil structure, weather condition, access to synthetic inputs, farm size and intensity of production. Wang, Deng and Ma (2017), reported that climate condition, farm size influence low compliance of farmers to standard.

5.7.6 Hypothesis 6: Difference in compliance with organic standards across the zones

The study tested the hypothesis for significant difference in compliance with organic agriculture standards across the zones as presented in Table 26 and 27. Table 26 reveals that a significant difference exist (F=6.23, p=0.002) across the zones. Table 27 further shows that there was significant difference in compliance with organic standards across the zones with South west having the highest (36.8), followed by North central (34.5) and South east (32.1). This is in accordance with the previous finding of this study on Table 20. This implies that compliance with organic standard vary from one zone to another. This variance could be traced to the level of organic agriculture awareness and promotions in the different zones in Nigeria. This is in agreement with some of the comments of the respondents during FGD;

During our Farmer Field School, the organic experts discussed with us the benefits of the organic agriculture. They told us that there is a market for organic produce, if we follow the guidelines (Eruwa LGA, Oyo State).

In Anambra State, an organisation came to train farmers to produce vegetable based on organic practices and those farmers are enjoying the benefits, it's just that some of us don't plant vegetable (Anambra East LGA, Anambra State).

I have been to Shongi farm in Benin Republic, to be trained on organic farming (Ebonyi State, 2017).

Table 26: Distribution by difference in respondents' compliance with organic standards across the zones

Variable	Sum of squares	df	Mean square	F	Sig.	Decision
Between Groups	1156.79	2	578.39	6.23	0.002	Significant
Within Groups	28495.43	307	92.82			
Total	29652.21	309				

Source: Field Survey, 2017

Table 27: Summary of analysis of variance (ANOVA) on difference in level of compliance with organic standards across the zones

Zones	N	Mean	SD
South east	103	32.1	7.6
North central	103	34.5	10.7
South west	105	36.8	10.4

Source: Field Survey, 2017

5.7.7 Post Hoc test for compliance of respondents

The Post Hoc test shows the difference in mean of the compliance with organic standard between the zones for crop and livestock farmers**.**

The Ducan Multiple Range Test (DMRT) in Table 28 further reveals that the mean score 44.35 of South west zone is statistically greater than the means score 41.21 of North central and the South east. This means that the tendency for compliance with organic agriculture is higher in Southwest than North Central; and North Central than Southeast. This may be explained by the fact that the promotion of organic agriculture started from South west, which largely could have influenced the compliance of the respondents' practices. Aside, the available indigenous practices and vegetation might have contributed to the use of indigenous practices compare to other zones. This fact was identified by respondents from Southeast and North central during FGD. From the previous findings (Fig 6 and Table 21) of this study, the significant contribution of the extension agents and relevant government institutions could further enhance adoption of the organic principles and practices in Southwest, as some of the respondents mentioned that organic agriculture were taught at their Farmer Filed School, and experience that other zones do not enjoyed.

5.7.8: Percentile categorisation of respondents for tendency to comply with organic standard

The respondents were further categorised into five groups based on their socioeconomic characteristics as it relate with tendency to comply with organic standards. Index of compliance to organic agriculture standards of the respondents were used to categorise them into five groups; Organic standard bearers, Organic standard aspirants, Organic standard intermediaries, Organic standard conservatives and Organic standard outliers using percentile as represented in Figure 8. The factors that could predispose the respondents into each group were determined using Logit regression model. Several diagnostic tests were also conducted to ensure validity and reliability of the results.

Organic standard bearers: These are the farmers whose agricultural practices complied with organic standards. The study reveals that 2.3% of the respondents could be regards as having closeness to organic standard as shown in Figure 8. Their practices are more of low external inputs. Some socioeconomic variables that could predispose them to this category are; years of farming experience (β= 0.041, $p<0.05$), years of education (β= 0.148, $p<0.05$) and income (β= 0.433, $p<0.05$) as presented in Table 29. This may be attributed to the farmer awareness or involvement in organic agriculture.

Table 28: Post Hoc test for compliance of respondents by zones

Zones	N	
South east	59	33.46
North central	63	41.21
South west	55	44.35
Sig.		1.000

Source: Field Survey, 2017 **Subset for alpha = 0.05**

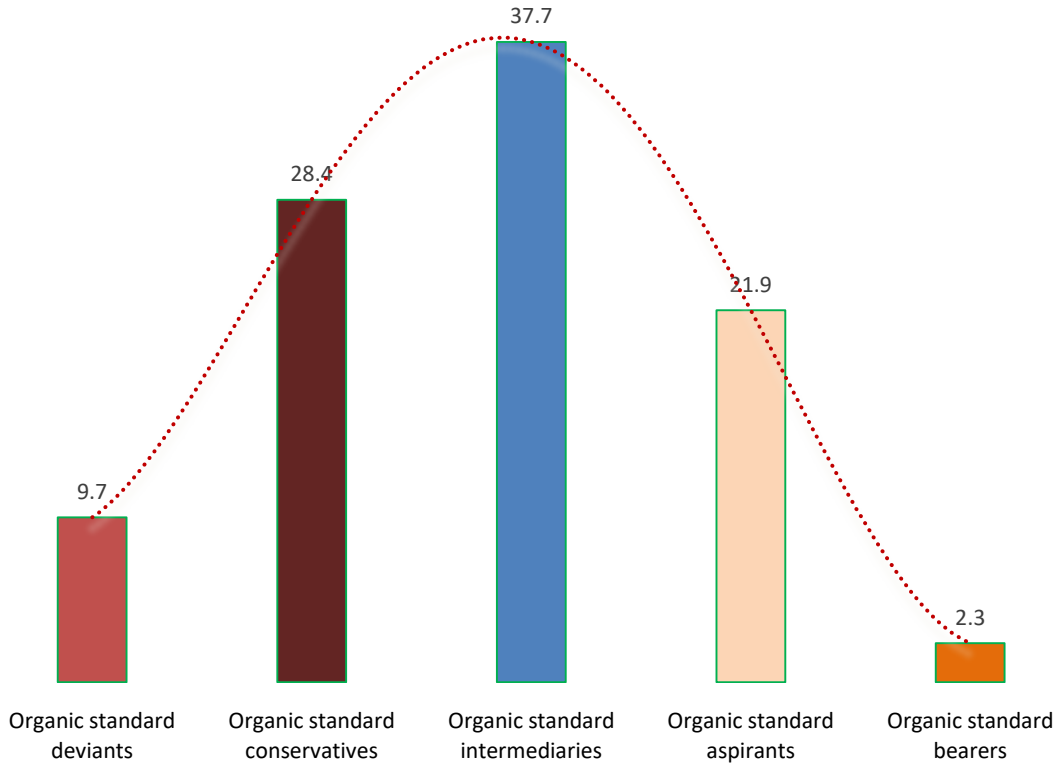

Fig. 8: Categories of respondents by compliance with organic standard

Table 29: Predictors of organic agriculture standard bearers

Model	β	standard error	Z	P	Decision
Age	0.099	0.024	0.400	0.685	Not significant
Years of farming experience	0.041	0.123	2.74	0.008	Significant
Years of Education	0.148	0.083	1.78	0.025	Significant
Permanent access to land	0.935	0.754	1.24	0.215	Not significant
Income	0.433	0.12	2.14	0.030	Significant
Access to extension	-0.971	0.695	-1.40	0.163	Not significant
Perception	0.028	0.197	0.15	0.884	Not significant
Enterprise scale	-0.425	0.671	-0.63	0.526	Not significant

LR=23.07, p =0.0048, Pseudo R^2= 0.399, loglikelihood = -18.056

With persuasion and advocacy on the economic, health and environmental advantages of organic agriculture conversion of this set of farmers would be easier.

Organic standard aspirants: These are the farmers whose agricultural practices are similar to the organic production practices. Figure 8 shows that 21.9% of the respondents fell into this category. Some socioeconomic variables that could predispose them to this category are; years of farming experience (β= 0.540, $p<0.05$), years of education (β= 0.403, $p<0.05$), permanent access to land and perception to sustainable practices (β= 0.680, $p<0.05$) as presented in Table 30. Leveraging on the favourable perception of farmers in this category would bring about their conversion to organic farmers.

Organic standard intermediaries: These are farmers who combined both endogenous and exogenous agricultural practices as a sustainable strategy. Figure 8, shows that 37.7% of the respondents were in this category. Some of the socioeconomic variables that could predispose them to this category are; years of education (β= 0.220, $p<0.05$), access to extension service (β= -0.3280, $p<0.05$) and perception to sustainable practices (β= 0.676, $p<0.05$) as presented in Table 31. These farmers are aware of the merit and demerits of both endogenous and exogenous agricultural practices, so they are using both to ensure sustainable production. Taking the advantage of their access to extension services to promote organic agriculture would enhance their adoption of organic practices.

Organic standard conservatives: These are farmers whose agriculture practices are largely exogenous practices. The study shows that 28.4% of the respondents fell in this category as shown in Figure 8. Some socioeconomic variables that could predispose them to this category are; age (β= 0.670, $p<0.05$), perception to sustainable practices (β= 0.041, $p<0.05$) and enterprise scale (β= 0.393, $p<0.05$) as presented in Table 32. The age and enterprise characteristics of this category could leverage on by providing organic agriculture farming inputs/ tools that could bring about ease of production. Furthermore, these large scale farmers could be converted through awareness on health, economical and environment benefits of organic agriculture.

Organic standard deviants: These are farmers whose agricultural practices are mainly exogenous practices. The study equally shows that 9.7% of the respondents fell in this category as shown in Figure 8.

Table 30: Predictors of organic standards aspirants

Model	B	standard error	Z	P	
Age	-0.677	0.028	-1.39	0.166	Not significant
Years of education	0.403	0.400	2.28	0.023	Significant
Years of experience	0.540	0.020	2.79	0.005	Significant
Permanent access to land	0.123	0.084	3.08	0.020	Significant
Income	0.292	0.585	0.57	0.572	Not significant
Access to extension	0.330	0.578	0.66	0.512	Not significant
Perception	0.680	0.119	2.97	0.049	Significant
Enterprise scale	-0.782	0.172	-1.11	0.215	Not significant

LR=108.66, p =0.000, Pseudo R^2= 0.331, loglikelihood = -108.76

Table 31: Predictors of organic standard intermediaries

Model	B	standard error	Z	P	
Age	0.076	0.014	0.56	0.878	Not significant
Year of education	0.220	0.046	5.30	0.000	Significant
Years of experience	-0.391	0.236	-1.55	0.121	Not significant
Permanent access to land	0.892	0.328	0.31	0.757	Not significant
Income	0.799	0.190	0.12	0.907	Not significant
Access to extension	-0.328	0.165	-2.24	0.025	Significant
Perception	0.676	0.098	2.42	0.016	Significant
Enterprise scale	0.070	0.142	0.05	0.961	Not significant

LR Chi=73.70, p =0.000, Pseudo R^2= 0.279, loglikelihood = -168.61

Table 32: Predictors of organic standard conservative

Model	B	standard error	Z	P	
Age	0.670	0.014	2.96	0.000	Significant
Education	0.201	0.033	0.61	0.539	Not Significant
Years of experience	0.369	0.104	0.36	0.718	Not significant
Permanent access to land	0.611	0.295	-1.02	0.308	Not significant
Income	-0.780	0.191	-0.41	0.679	Not significant
Access to extension	0.649	0.939	0.88	0.380	Not significant
Perception	0.041	0.013	3.17	0.002	Significant
Enterprise scale	0.393	0.228	2.02	0.043	significant

LR Chi=73.89, p =0.000, Pseudo R^2= 0.300, log likelihood = -147.99

Some of the socioeconomic variables that could predispose them to this category are; years of education (β= -0.627, p<0.05), access to extension service (β= -0.328, p<0.05) and perception to sustainable practices (β= 0.676, p<0.05) as presented in Table 33. These farmers would need awareness and advocacy on the health implication of synthetic inputs on farmers, consumers and the environment, for them to appreciate organic agriculture practices. Taking the advantage of their access to extension services to promote organic agriculture would enhance their adoption of organic practices.

5.7.9 Determinants of tendency to compliance with organic standards by respondents

In order to determine the relative importance of each independent variable, the net contribution of each variable and the total variance explained by all the variables on the respondents' compliance to organic agriculture standard, a Tobit regression was conducted. Several diagnostic tests were also conducted to ensure validity and reliability of the results. The chi-square test which is used to indicate the overall statistical significance of the logistic regression model exhibits a p-value of (Prob > chi2 = 0.000), implying that the model fits the data reasonably well and provides a better fit than an empty model with no predictors. Similarly, the Pseudo R^2 (McFadden's pseudo R-squared) reported in the tables reveal that the explanatory variables are meaningful in explaining variations in the response variable. The study reveals as presented in Table 34 that; years of education (β= 0.41, p<0.05) had a significant effect on the tendency of respondents to comply with organic standards. It means that a unit increase in education leads to 0.41 unit increase in compliance with organic standards. This implies that the more farmers are educated, the more their tendency to comply with organic standards. This suggests that, the level of education on the benefits of sustainable practices such as organic agriculture would enhance the compliance of farmers with organic standard. This education might not necessarily be the formal classroom education, but forms of training that would boost their understanding on principles and practices of organic agriculture. This is an indication that years of farming experience could influence the compliance of farmers with organic standard. This implies that, identifying farmers with some level of experience in farming and sensitising them on the benefits of organic agriculture might influence their decision to embrace and practice organic agriculture. The Table also further unveiled that, access to extension service (β= -0.75, p<0.05), contributes negatively to the tendency to comply with organic standard.

Table 33: Predictors of organic standard outliers

Model	B	standard error	Z	P	
Age	0.037	0.045	0.84	0.398	Not significant
Year of education	-0.627	0.602	-4.86	0.000	Significant
Years of experience	0.035	0.027	1.28	0.199	Not significant
Permanent access to land	0.212	0.197	0.33	0.757	Not significant
Income	0.799	0.190	0.12	0.907	Not significant
Access to extension	-0.328	0.165	-2.24	0.025	Significant
Perception	0.676	0.098	2.42	0.016	Significant
Enterprise scale	0.306	0.442	0.82	0.412	Not significant

LR Chi=138.77, p =0.000, Pseudo R^2= 0.704, loglikelihood = -29.174

Table 34: Summary of Tobit regression model of determinants of compliance with organic agriculture standard

Model	B	Standard error	P	T	Decision
Age	-0.068	0.054	-1.25	0.213	Not significant
Years of education	0.411	0.092	4.46	0.000	Significant
Years of experience	0.100	0.042	2.28	0.023	Significant
Land permanent	0.425	0.117	1.28	0.203	Not significant
Access to extension	-0.756	0.300	-4.43	0.000	Significant
Monthly income	0.481	0.370	1.03	0.303	Not significant
Perception	-0.110	0.030	-3.55	0.000	Significant
Endogenous practices	-0.046	0.036	-1.29	0.198	Not significant
Exogenous practices	-0.355	0.014	-2.49	0.013	Significant
Constraints to endo practice	-0.098	0.089	-1.10	0.273	Not significant
Constraints to exo practice	-0.307	0.659	-2.60	0.010	Significant
Enterprise scale	-0.311	0.420	-0.74	0.459	Not significant

LR chi=226.63, prob >Chi = 0.000, loglikelihood= -1026. 84

The Tobit regression model is expressed as follows:

Since the level of compliance cannot be negative, the dependent variable can be written using an index function

$Ii = B^T X + ei$ ---------- (1)

$Yi = O$ if $I^i = T$---------- (2)

$Yi = I$ if $I > T$ ---------- (3)

Where,

Y represents a limited dependent variable, which simultaneously measures the decision to comply and intensity of compliance

I is an underlying latent variable that indexes compliance

T is an observed threshold level

X is the vector of independent variables affecting compliance

Bi is a vector of parameters to be estimated

ei is an error term.

If the non-variable T becomes a continuous function of the independent variables and O otherwise for the generated case, the value log likelihood function is given as, empirical model are presented below;

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 + ei)$

$Yi = xi\ \beta + ui$ if $x\ \beta + ui > 0$

If $x\ \beta + ui \leq 0$ $i = 1, 2... N$

Where N =number of observations

Y = Compliance

X_1 = Age (in years)

X_2 = Sex (male =1 and female = 0)

X_3= Education level (Years of formal education)

X_4 = Monthly income (Total amount in naira)

X_5 = Perception (Perception index)

X_6 = Endogenous practices (Endogenous practices index)

X_7 = Exogenous practices (Exogenous practices index)

X_8 = Constraints to Endogenous practices (Endogenous practices index)

X_9 = Constraints to Exogenous practices (Exogenous practices index)

ei = Error term

This suggests the impactful roles of the agricultural extension service to farmers and their practices. The negative contribution can be ascribed to the mandate of extension personnel to promotion of the use of synthetic inputs for ease of farming and higher yield as against sustainable practices which organic agriculture represents. The implication is that, extension personnel should be adequately employed, trained, and encouraged with incentives to rapidly promote organic agriculture among farmers in the study area for adoption of organic agriculture and thus, achieve compliance with organic standards. The implication is that farmers must be encouraged to desist from the use of exogenous practices due to their harmful impact on their lives and consumers and the environment. Also, the Table reveals that, constraints to exogenous practice ($\beta = 0.31$, $p<0.05$), negatively influence the tendency to comply with organic standards. This implies that an increase in constraints to exogenous practice would result in increase in compliance to organic standard. It also suggests that farmers would have more tendencies to comply with the organic standards when the constraints to use exogenous practices increase and vice versa.

Chapter Six

Summary, Conclusion and Recommendation

6.1 Summary

Many farmers in Africa practice low external input farming. This claim has made many to think farmers in Africa, practice organic agriculture by default. The opinion holds because, about 70 percent of the farming population in Africa could not access some of the synthetic inputs such as chemical fertilisers and agrochemicals. These low external inputs can be seen as potentials to leverage on for encourage the adoption of organic agriculture in Nigeria and Africa at large. Therefore, this research assessed the extent of compliance the Nigerian farmers' agricultural practices with Nigeria Organic Agriculture Standards (NOAS).

This study was conducted in Nigeria with six agricultural zones; South South, South East, South West, North East, North Central and North West zone. The study population was all farmers in three agricultural zones in Nigeria. A multistage sampling procedure was used to select respondents for the study. The primary data were collected using quantitative and qualitative methods. Quantitative data were collected with validated structured questionnaires. From three agricultural zones, six states (Ebonyi, Anambra, Benue, Niger, Ekiti and Oyo) were randomly selected for this study. From the six states, 15 Local government Areas (LGAs), and randomly from each of the LGAs two rural communities were selected. Twenty percent of the farmers were selected as respondents for this study using simple random sampling technique. Variable measured in the study were socio-economic characteristics, endogenous and exogenous practices in use, and the extent of compliance with organic practices.

The study shows that a higher proportion of the respondents were male (69.0%), the mean in years for; age (47.7), formal education (10.5), farming experience (26.5), and farm size (5.8) in hectares with average monthly income of ₦ 30,098.7±34,509 and most (52.0%) had access to extension service fortnightly.

The agricultural practices in use; Wood ash (1.0), multiple cropping (0.99), neem extract (0.82), Paraquat (0.80) and Fluazifop-P butyl (0.62), Glyphosate (0.61) were in use for crop production, while grinded pawpaw seeds (0.66), soaked Christmas melon (0.50), soaked pawpaw leaves (0.40), Ampicillin (0.98) Procaine penicillin (0.67) and Oxytetracyline (0.66) were in use for livestock production. A significant relationship was established with the use of endogenous agricultural practices ($r=0.114$, $p=0.044$) but no significant relationship exist between use of exogenous agricultural practices ($r=0.025$, $p=0.663$) and level of compliance to organic standard.

Perception to sustainable agricultural practices was favourable among crop farmers 97.7%, however 53.4% were not favourable disposed among livestock farmers. A significant relationship (r=0.484, p=0.000) was established between the perception of respondents to sustainable agricultural practices

For endogenous practices; labour intensiveness (1.54) and advocacy to use chemical (1.51) while exogenous practices; limited access to capital (1.80) and high cost of chemical inputs (1.67) were constraints to use of agricultural practices. There was a negative significant relationship (r= -0.110, p=0.050) between constraint to use of endogenous agricultural practices and level of compliance to organic standard while a positive significant relationship (r = 0.275, p =0.000) between constraints to use of exogenous agricultural practices and the level of compliance with organic standard.

Level of compliance with organic standards was low among crop farmers (51.4%) and livestock farmers (55.6%). Years of education (r=0.19), access to extension service (r=-0.35), perception to sustainable agricultural practices (r=0.484), constraint to use of agricultural practices were significantly related to compliance with organic agriculture standards.

Significant difference in compliance with organic agriculture standards existed across zones (F=6.23). The study tested the hypothesis for significant difference in compliance with organic agriculture standards between the zones; a significant difference exist (F=6.23, p=0.002) across the zones. Compliance with OASN was significantly higher in the South West (36.8±10.4) compared to North Central (34.5±10.7) and South East (32.1±7.6).

Determinants of compliance with organic agriculture standards; years of education (β= 0.41, $p<0.05$), year of farming experience (β= 0.10, $p<0.05$), access to extension service (β= -0.75, $p<0.05$), perception to sustainable practices (β= -0.11, $p<0.05$), exogenous practice (β= -0.35, $p<0.05$), and constraints to exogenous practice (β= -0.31, $p<0.05$) had significant effects on the tendency to comply with organic standard.

6.2 Conclusion

1. Endogenous and exogenous agricultural practices were employed by farmers across the selected ecological zones of Nigeria.
2. Labour intensiveness, difficulty of weed management, advocacy to use of chemical product by extension agent are constraints to use of endogenous practices while limited access to capital, chemical inputs, fear of buying adulterated inputs are constraints to use exogenous practices.

3. Some endogenous practices by crop farmers which are similar to OA practices include; wood ash, multiple cropping, and trapping, and neem extract, cover crop, wet poultry manure and crop rotation are in similar to OA practices while grinded pawpaw seeds, soaked Christmas melon, soaked pawpaw leaves, aloe vera leaves, and scent leaves were in use by livestock farmers.

4. The majority of the respondents do not follow any guideline or standard for their production, this is evident in the use and misuse of hazardous pesticides.

5. Compliance with OASN was significantly higher in the South West compared to North Central and South East.

6. The practice of low external inputs does not in any way make the agricultural practices of farmers in Nigeria conform to organic agriculture. Hence, concerted efforts must be made by all stakeholders in agricultural value chain to ensure promotion of organic agriculture standard and enforce compliance, for Nigerian farmers to maximise the economic opportunities both at local and international market.

6.3 Recommendations

On the findings of the research, the following recommendations are hereby made;

1. Organic agriculture movement should intensify efforts on awareness creation, advocacy, and training on the benefits, practices and standard of organic agriculture for both livestock and crop farmers and other stakeholders in Nigeria, to ensure compliance with organic standard.
2. Organic agriculture movement in Nigeria should effectively engage agricultural extension service providers to promote organic practices and ensure compliance to standards.
3. Encouraging farmers to leveraging on some of the organic standard compliant practices would enhance conversion to organic farming among Nigerian farmers.
4. The majority of Nigerian farmers do not use standards for agricultural production, it is therefore imperative for government institutions; NAFDAC, Ministry of Agriculture and Rural development, Ministry of Environment, Ministry of Health and other food safety enforcement institutions to enact policy and ensure compliance with standards for it health, economy and environmental benefits.

6.4 Contributions to knowledge

1. Compliance with organic agriculture standards among crop and livestock farmers in Nigeria is low. Though, South West zone was more in compliance compared to North Central and Southeast zones.
2. Low consciousness of organic agriculture standards among farmers bedevilled the increasing awareness of organic agriculture across the selected agricultural zones in Nigeria.
3. Percentile categorization of the farmers based on compliance with organic standards was as follows; Organic standard bearers, Organic standard aspirants, Organic standard intermediaries, Organic standard conservatives, and Organic standard laggards.
4. Years of education, access to extension service, perception to sustainable agricultural practices, constraint to use of agricultural practices were significantly related to compliance with organic agriculture standards.

6.5 Areas of further studies

Further study should be done to investigate;

1. Health, economic and environmental losses of non-compliance with standard among farmers in Nigeria.
2. Compliance of organic farmers practices with Organic Agriculture Standards in Nigeria
3. Communication strategies of extension agents and promoters of OA for compliance with organic standards
4. Participants of out-growers scheme and non-participants compliance to organic standards in Nigeria

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Appendix I

Section A: Personal Characteristics

1. Local Government Area:_____,
   State:_____
2. Sex: Male ( ), Female ( )
3. What is your age in years? _____
4. Marital Status: Single ( ), Married ( ), Divorced ( )
5. Your tribe :_____
6. How many years of formal education do you have: _____
7. How many years of farming experience do you have:_____
8. What is your primary occupation:_____
9. What is your secondary occupation: _____

Section B: Enterprise characteristics

10. How did you acquire your land? Inheritance ( ), lease ( ), rent ( ), purchase ( )
    Specify others
11. What is the number of workers on your farm: _____
12. What is your farm size: _____ acres/ hectares
13. What is your type labour : family ( ), hired labour ( ), communal labour ( )
14. What is your labour size: _____
15. Crops cultivated : Tick as many as applicable

Crops cultivated	**Yes**	**No**
Cassava		
Maize		
Yam		
Tomatoes		
Sweet potatoes		
Leafy vegetables (Amaranths, Ugwu, Celosia, Corchorus etc)		

Pepper		
Water melon		
Plantain/banana		
Oil palm		
Cocoa		
Kolanut		
Citrus		
Cucumba		
Millet		
Guinea corn		
Specify others		

16. Which of the following equipment do you use on your farm? Ridger ( ), Weeder ( ), Harrow ( ), Planter ( ), Plough
17. What is your source of water for irrigation and use on your farm? Well ( ), River ( ), Stream ( ), Rain ( ),

18. Income per period in naira (₦): _____ Period: Daily ( ), Weekly ( ), Monthly ( ), and Annual ( )
19. Do you have access to extension services? Yes ( ), No ( )
20. If yes to question 17, how often do you have access to extension services? Fortnightly ( ), quarterly ( ), twice in a year ( ), once in a year ( ) specify others

_____

Section C: **Perception on endogenous and exogenous agricultural practices**

21. Please tick (√) as appropriate your perception on endogenous and exogenous agricultural practices as it relate to health, economy and environment
    SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree.

Perception Statements	SA	A	U	D	SD
It is simpler and easier to use indigenous agriculture practice than using chemical inputs for farming					
Indigenous agriculture practices can be used both for small and large scale farming					
Use of indigenous agriculture practices is not costly					
Sourcing for large quantities of manure for crop production is a difficult task					
Use of plant extracts to control pest and diseases is cheaper and more effective					
Constant use of chemical inputs do not pollute water resources					
Indigenous agricultural practices do not pollute environment and natural resources					
Use of chemical inputs is not good for health of the soil and human health					
The use of animal manure may generate poisonous odour in the air					
Use of chemical pesticide have negative effects on soil organism or other organisms					
Natural resources should be protected even if it will lead to incurring losses in the short run					

Perception Statements	SA	A	U	D	SD
Use of indigenous agriculture practices protect natural resources for the next generations					
It is better to improve soil fertility by application of green manure, like cultivation of cowpea and melon					
Use of crop rotation is sufficient for weed control					
Chemical pesticides on farms eventually can lead to pest resistance					
Use of green manure helps to improve soil structure and reduce weed population					
Successive cultivation of a single crop increases incidence of pests' invasion					
Retaining plant residues on farmland may increase incidence of weeds invasion					
Use of chemical fertiliser lead to more benefits from crop production					
Use of indigenous farming lead to reduced cost of production					
Use of minimum tillage reduce soil erosion and soil disturbance					
Retaining plant residues on farm enhance water conservation					
Application of animal manure cannot increase yield of crops appreciably					
Use of animal manure can be considered when one cannot afford chemical fertiliser for soil fertility					
Preparation of farm yard manure is labour intensive					

Perception Statements	SA	A	U	D	SD
Mixed cropping cannot only increase total production but also reduces soil erosion					
Plant residues are useless and hence they should be burnt					
Use of crop residues on farm will decrease soil fertility					
Crop yield can only be achieved with more application of chemical fertiliser					
Use of chemical herbicide can lead to dizziness, vomiting, blurred vision or skin sores					
I do not always eat farm products I use chemical inputs to produce to avoid health consequence					
The use of chemical inputs makes farming easier					
Use agrochemicals give more income					
Chemical inputs have to be used for market orientated produce					
Use of chemical enable one to make quick money in crop farming					
Indigenous practices are effective but do not give quick result					
Use of indigenous practices can only be done in crop production					
It is difficult to have profit when one use only crop rotation, animal manure, use of plant extracts and leguminous crops for production					
Use of chemical inputs is preferred because one needs to use what friends are using for production					

Perception Statements	SA	A	U	D	SD
No farmer can do without chemical inputs for crop production					
Use of chemical inputs is too costly					
Extension agents encouraged one to stop using indigenous agric practices					

Section D: Use of endogenous agricultural practices

22. Kindly tick (√) as appropriate the indigenous agricultural practices you use for pest management, and soil fertility in crop production and your consistency of use within last 3 years

Endogenous Practices (Crop Production)	Frequency of use			Consistency of use			
	Always	Occasionally	Never	>3 years	Between 1 and 3 years	< 1 year	Not at all
Pest Management							
Neem extract							
Neem extract + Kerosine							
Wood ash							
Multiple cropping							
Lemon grass extract							
Alligator pepper and lemon grass extract							

Endogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	**Occasionally**	**Never**	**>3 years**	**Between 1 and 3 years**	**< 1 year**	**Not at all**
Tobacco							
Baobab							
Local black soap							
Cocoyam corm extract							
Sap from cassava tuber							
Locust-beans extract							
Marigold flower							
Pawpaw extract							
Dried pawpaw leaf							
Trap setting							
Soil fertility							
Poultry manure (cured)							
Wet poultry manure							
Cover crop							
Crop rotation							
Application of raw animal manure in soil							
Use of wet mulching materials							

Endogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	**Occasionally**	**Never**	**>3 years**	**Between 1 and 3 years**	**< 1 year**	**Not at all**
Compost							
Cow manure							
Abattoir manure							
Pig manure							
Sheep and goat manure							
Specify others							

Use of exogenous agricultural practices

Kindly tick (√) as appropriate the exogenous agricultural practices you use for pest management, soil fertility in crop production and your consistency of use within last 3 years

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Contact Herbicide							
Gramozone							
Ravage							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Parae force							
Weed off							
Selective Herbicide							
Round up							
Atrazine							
Primentra							
Stump							
Fulsilade							
2, 4, D							
Force top							
Force uron							
Buta force							
Vestamine							
Amino force							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Systemic Herbicide							
Round up							
Glycel							
Fiscosate							
Delsate							
Vanish							
Clear weed							
Turn down							
Up root							
Force up							
Specific others							
Fungicide							
Team							
Cocaobre							
Copper nordox							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Funguran –OH							
Chanp Dp							
Nordox							
Ridomin plus							
Z-force							
Forcelet							
Seed plus							
Dress force							
Apron plus							
Others							
Insecticides							
Actara							
Karate							
Store Force							
Act force							
Dizpyafos							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Pinex 48EC							
Termex							
Tremicot							
Tricel							
Gammalin							
Champ DP							
Ridonil plus							
Vestafos							
Mono force							
Cotchem							
Diazol							
Basudin							
Thionex							
Endocel							
Endo force							
Endo cot							
Endo farm							
Thiodan							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
Dime Force							
Perferkthion							
Cyperdicot							
Dimethoate							
Deltapad							
Dash							
DDVP							
Pest off							
Rhonchlorv							
Cyperforce							
Best cypermethrin							
Best action							
Unden							
Smash							
Dizvan							
Delvap							
Capsifox							
Cyperfit							

Exogenous Practices (Crop Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year	Not at all (0)
DD force							
Specify others							

Section F: Constraint to use of endogenous and exogenous practices

23. Kindly tick (√) as appropriate constraints to use of endogenous farming practices

Constraints to use of endogenous farming practices	**Seriously**	**Mildly**	**Not at all**
Inaccessibility of raw materials for indigenous farming			
Labour intensiveness of indigenous practices			
Extension agent advocacy of use of chemical products as the best			
Bulkiness of indigenous materials			
Unaffordability of indigenous farming materials			
Slow effects of indigenous farming practices			
Indigenous agriculture practices not effective on large scale farming			
Beliefs about indigenous practices			

Constraints to use of endogenous farming practices	Seriously	Mildly	Not at all
Low or inadequate documentation of indigenous practices for younger generation to use			
Inadequate strength to engage in hard work due to old age			
Indigenous agriculture practices not applicable to large scale farming			
Difficulty on weed management under indigenous method			
Mode of application of manure and indigenous pesticides			
Packaging of indigenous farm inputs not attractive			
Specify others			

Constraints to use of exogenous practices

Kindly tick (√) as appropriate constraints to use of exogenous crop farming practices

Constraints to use of exogenous practices	Seriously	Mildly	Not at all
Inadequate access to capital			
Inadequate know how on use of chemical			

farm inputs			
Low access to chemical farm inputs			
Lack of gadget to adhere to safety measures on use of chemical inputs			
Inadequate access to extension service			
Ease of application of inputs			
Side effects on health of farmers			
Side effects on environment			
Increase in readily available alternative inputs			
High cost of chemical inputs			
Fear of buying adulterated inputs			
Attractive packaging of inputs			
Specify others			

Section G: Level of compliance with organic standard

24. Please, indicate as appropriate the practices on your farm. The response options imply frequency of use of the practices in **percentage** i.e **Always = 65-100, Sometimes = 35 - 64, Rarely = 1-34 Not at all = 0**

General Practices	**Always**	**Sometimes**	**Rarely**	**Not at all**
Do you use mineral fertilizer (NPK) on your farm				

General Practices	**Always**	**Sometimes**	**Rarely**	**Not at all**
Do you use herbicides to control weed on your farm				
Do you use manure (poultry, cow, pig droppings) on your farm				
Do you consider curing (allowing the manure to decay and at a regular temperature) before application				
Do you use battery powder as seed dresser to protect seeds before planting				
Do you use fire for land clearing				
Do you use chemical to control pest on your farm				
Does your neighbor farmer use chemical to control weed and pest				
Do you use the toilet on your farm				
Soil fertility management				
Do you use wet poultry manure				
Do you use crop rotation on your farm				
Do you use crop rotation plan for crops you rotate on your farm				
Do you compost the manure you use on your farm				
Do you use abattoir manure for your compost				
Do you use pig manure for your compost				
Does your compost have bad odour after you processed it				
Do you add some fertiliser to your compost for it to be				

General Practices	Always	Sometimes	Rarely	Not at all
effective and give high yield				
Pest Management				
Do you use neem extracts for controlling pest				
Do you use separate knapsack sprayer for your neem extract				
Do you add some chemical pesticides to your plant extracts for it to be effective and control pest				
Do you add soda soap to your plant extracts				
Do you add kerosene to plant extracts				
Do you use tobacco extracts to control pest and disease on your farm				
Do you add detergent to your any of the plant extracts you use on your farm				

24. Do you use any standard or guideline on your farming Yes ( ), No ( )

25. If yes to question 24 above, what guideline or standard do you use? .....

Thank you sir / ma

Questionnaire

University of Ibadan Faculty of Agriculture and Forestry

Department of Agriculture Extension and Rural Development.

This questionnaire is designed to assess the level of compliance of endogenous and exogenous agricultural practices with organic agriculture standard in Nigeria
Kindly provide answers as appropriate. All information provided will be held in strict confidence and used for research purposes only.

Section A: Personal Characteristics

1. Local Government Area: _____,
   State:_____
2. Sex: Male ( ), Female ( )
3. What is your age in years? _____
4. Marital Status: Single ( ), Married ( ), Divorced ( )
5. Your tribe :_____
6. How many years of formal education do you have: _____
7. How many years of farming experience do you have:_____
8. What is your primary occupation:_____
9. What is your secondary occupation: _____

Section B: Enterprise characteristics

10. What is your type labour : family ( ), hired labour ( ), communal labour ( )
11. What is your labour size: _____
12. What is your flock size: _____
13. Livestock enterprise: Tick as many as applicable:

Livestock enterprise	Tick
Poultry	
Goat	

Sheep

Cattle

Pig

Ducks

Turkey

Rabbit

Specify others

14. What is the income per period in naira (₦): _____ Period: Daily ( ), Weekly ( ), Monthly ( ), and Annual ( )
15. Do you have access to extension services? Yes ( ), No ( )
16. If yes to question 15, how often do you have access to extension services? Fortnightly ( ), quarterly ( ), twice in a year ( ), once in a year ( ) specify others

    _____

Section C: **Perception on endogenous and exogenous agricultural practices**

17. Please tick (√) as appropriate your perception on endogenous and exogenous agricultural practices as it relate to health, economy and environment
    SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree.

Perception Statements	**SA**	**A**	**U**	**D**	**SD**
It is simpler and easier to use indigenous agriculture practice than using veterinary medication for animal production					
Indigenous agriculture practices can be used both for small and large livestock farming					

Perception Statements	SA	A	U	D	SD
Use of indigenous livestock practices is not a costly investment					
Use of plant extract to control diseases is cheaper and effective					
Indigenous livestock practices will not pollute environment and natural resources					
Natural resources should be protected even if it will lead to incurring losses in the short run					
Use of indigenous agriculture practices to protect natural resources for the next generations					
The overuse of chemical medication on livestock have caused disease resistance in livestock					
Chemical antibiotics have negative effects on human and animal health					
Use of chemical inputs give the opportunities to have more benefits on livestock production e.g loan					
Use of some chemical medication to manage livestock disease have the likelihood of a farmer being hospitalised or have long-term illness					
Use of chemical medications can lead to dizziness, vomiting, blurred vision or skin sores both on animal and human beings					
I do not always eat livestock products I use chemical to produce to avoid health consequence					
Livestock farming is made easier with chemical medications					
Use of chemical inputs increase livestock production and income					
Chemical inputs have to be used for market orientated produce					

Perception Statements	**SA**	**A**	**U**	**D**	**SD**
There is no indigenous livestock practices that can help handle animal diseases, so the choice of chemical inputs become necessary					
The indigenous livestock practices are effective but not very fast					
Eating animals with heavy dosage of antibiotics will make one sick					
Use of indigenous practices can only be done in crop production, so, one need to use chemical inputs in animal production					
Use of chemical medications is preferred because one needs to use what friends are using for livestock production					
No farmer can do without chemical medications in livestock production					
Higher income is possible without using chemical inputs in livestock production					
Use of chemical inputs for livestock production is too costly					
Extension agents make me to stop using indigenous livestock practices					

Section D: Use of endogenous agricultural practices

18. Kindly tick (√) as appropriate the indigenous agricultural practices you use and the consistency of use of the indigenous agricultural practices for disease management in livestock within last 3 years

Endogenous Practices (**Livestock Production)**	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year (1)	Not at all

Endogenous Practices (Livestock Production)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year (1)	Not at all
Intestinal worms							
Baobab leaves							
Boiled bark of Iroko tree							
Soaked Pawpaw leaves							
Grinded pawpaw seeds							
Soaked Tagiri in water							
Grinded tobacco							
Squeezed tobacco							
Roasted seeds of Iroko tree							
Grinded the bark of Oloora plus palm oil							
Sand paper leaves							
Diarrhoea							
Squeeze scent leaves Daidoya / Nahianwu / Efinrin							
Fermented white maize with salt							

Endogenous Practices (**Livestock Production)**	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year (3)	Between 1 and 3yrs	<1 year (1)	Not at all
Grinded Alligator pepper							
Aloe Vera leaves							
Neem leaves extract							
Specify others							

Use of exogenous agricultural practices

Kindly tick (√) as appropriate the exogenous agricultural practices you use and the consistency of use of the exogenous agricultural practices for disease management in livestock within last 3 years.

Livestock Production (Disease management)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year	Between 1 and 3yrs	<1 year	Not at all
Antibiotics							
Procaine penicillin							

Livestock Production (Disease management)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year	Between 1 and 3yrs	<1 year	Not at all
Ampicillin							
Cloxacillin							
Oxytetracycline							
Deoxycycline							
Antifungal							
Amphotericin							
Nystatin							
Griseofulvin							
Dewormer							
Thiabendazole							
Mebendazole							
Thiophanate							
Febendazole							
Levamisole							
Antiprotozoals							
Coccidiostats							
Ectoparasiticides Bold							
Ivomec (both ectoparasite and endoparasites)							

Livestock Production (Disease management)	**Frequency of use**			**Consistency of use**			
	Always	Occasionally	Never	>3year	Between 1 and 3yrs	<1 year	Not at all
Asuntol							
Diazuntol							
Malathion							
Antiviral							
Antiviral vaccine Bold							
Lasota RNDV1/o							
Komorov							
Gumboro							
Marek							
Fowl Pox							
Disinfectant							
Lysol							
Izal							
Potasium permanganate							
Morigard							
Polidine							
Worm treatment							
Gental violet							

Livestock Production (Disease management)	Frequency of use			Consistency of use			
	Always	Occasionally	Never	>3year	Between 1 and 3yrs	<1 year	Not at all
Crystal violet							

Section E: Constraint to use of endogenous and exogenous practices

19. Kindly tick (√) as appropriate constraints to use of indigenous livestock farming practices

Constraints to use of endogenous farming practices	**Seriously**	**Mildly**	**Not at all**
Limited / low effect on disease & parasite control			
High cost of feeding			
High mortality rate due to disease outbreak			
Inability to control predators like hawks, cats, dogs using indigenous practices			
Unavailability of market for indigenous animal products			
Poor sales of animal products			
Poor income to purchase inputs for production			
Lack of adequate access to information on indigenous practices			
Inadequate production skills			
Lack of adequate pasture lands			
Inadequate access to credit			
Inadequate extension services			
Poor participation in farmers organization			
Poor breeding stock			

Constraints to use of endogenous farming practices	**Seriously**	**Mildly**	**Not at all**
Poor production			
Poor growth rate			
Low education level of farmers			
Specify others			

Constraints to use of exogenous livestock farming practices

Kindly tick (√) as appropriate constraints to use of exogenous livestock farming practices

Constraints to use of exogenous practices	**Seriously**	**Mildly**	**Not at all**
Inadequate access to capital			
Low level of know-how on chemical medications			
Low access to chemical medications			
Lack of gadget to implement safety measures in the use of chemical medication			
Inadequate extension service			
Side effects on health of farmers			
Side effects on environment			
Increase in awareness of alternative medications to chemical medications			
Specify others			

Section F: Extent of compliance with organic standard

20. Please, indicate as appropriate the practices on your farm. The response options imply frequency of use of the practices in **percentage** i.e **Always = 65 -100, Sometimes = 35 - 64, Rarely = 1-34 Not at all = 0**

General Practices	**Always**	**Sometimes**	**Rarely**	**Not at all**
Do you use chemical inputs (antibiotics) for livestock production on your farm				
Do you use herbicides to control weed on your farm				
Do you use insecticides to control insects on your farm				
Do you give access to pasture and/or outside exercise on your farm				
Do you combine synthetic medication with plant extracts to treat disease on your livestock				
Do you vaccinate livestock against disease outbreak				
Do you use chemical to control pest on your farm				
Does your neighbor farmer use chemical to control weed and pest				
Do you use the toilet on your farm				
Do you use plant extracts to control pest				
Do you add some chemical substances to your plant extracts for effectiveness				

Do you allow your livestock to have free range				
Do you use hormone inducing medication for your livestock				
Do you use growth promoter in the feed of livestock				
In the feed given to your livestock do you have any of abattoir waste				
Do you add colouring material in the feed of livestock to make it attractive				
Do you make marks on livestock with hot iron or anything that make permanent mark on them				

21. Do you use any standard or guideline on your farming Yes ( ), No ( )
22. If yes to question 2 above, what guideline or standard do you use? .....

Thank you sir / ma