WILLINGNESS OF ARABLE CROP FARMERS TO ADOPTING ORGANIC FARMING PRACTICES IN OYO STATE, NIGERIA

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DECLARATION

I, Omebere, Winifred OKONTA, a M.Sc. Agricultural Extension and Rural Development student in the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, hereby declare that this thesis entitled "Willingness of Arable Crop Farmers to Adopting Organic Farming Practices in Oyo State, Nigeria", submitted by me is based on my original work. Any material(s) obtained from other sources or work done by any other persons or institutions have been duly acknowledged.

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CERTIFICATION

This is to certify that this thesis has been read and approved as meeting the requirements of the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, Nigeria, for the Award of M.Sc. Agricultural Extension and Rural Development.

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DEDICATION

This research work is dedicated to God Almighty who has given me the grace to finish well. I also dedicate it to my family.

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ABSTRACT

Agriculture has grown over time due to the rise in population. In a bid to meet the demand for food, farmers in Nigeria practice conventional farming which involves the use of synthetic chemical inputs. These inputs have a detrimental effect on man and his environment. Organic farming is said to solve problems associated with conventional farming. This led to the assessment of the willingness of arable crop farmers to adopting organic farming practices in Oyo State, Nigeria. The specific objectives were to describe the farmers' socio-economic characteristics; ascertain their level of awareness; determine their level of knowledge; examine their level of perception and investigate the perceived constraints to adopting organic farming practices.

A multi-stage sampling procedure was used in the selection of three hundred and thirty-three (333) arable crop farmers in Oyo State. Data were obtained using a structured interview schedule while analysis was done using the Statistical Package for Social Science (SPSS). Both descriptive and inferential statistics were used in analyzing the data collected. Frequency counts, percentages, means, and standard deviation were used for descriptive statistics, while chi-square and Person Product Moment Correlation (PPMC) were used for inferential statistics.

The descriptive analysis showed that the mean age was 50years±10.1, the majority (70.6%) were male, married (92.5%), with an average household size of 7 members. The mean farm size and annual income were: 1.02ha, and ₦802,648 respectively. Average, (58%) and (50%) had a high level of awareness and knowledge respectively, while almost average (46.1%) had a moderately favorable perception of organic farming practices. The majority (71.5%) were willing to adopting organic farming practices. The major perceived constraints to adopting organic farming

practices were; inadequate credit facilities ($\bar{x}$=1.79), and lack of access to inputs to produce organically ($\bar{x}$ =1.57). Furthermore, the inferential analysis revealed that at P≤0.05, there was a significant association between educational level (χ2= 0.368), farm size (r=-0.114), household size (r=-0.180), farmers knowledge (r =0.128), perception of organic farming practices (r =0.122) and farmers' willingness to adopting organic farming practices.

It was concluded that arable crop farmers had a high willingness to adopting organic farming practices. The study recommended that farmers should be equipped with the requisite knowledge and skills to be effective at organic farming practices through training programs and field days. Also, adequate credit facilities should be made available to the farmers, this could be accompanied by good regulation and a monitoring process to avoid diversion of funds.

Keywords: adoption, arable crop, farmers, organic farming, willingness

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CHAPTER ONE

1.0. INTRODUCTION

1.1 Background of the problem

The International Federation of Organic Movement (IFOAM) defined organic agriculture as a holistic agricultural system that incorporates traditional innovation and science to be advantageous to the natural environment, foster fair relationships, and an increased standard of living for all involved (IFOAM, 2008). It is a farming method that uses biodegradable materials and can be thought of as a conscious effort to maximally and ethically utilize local natural resources (Adebayo & Oladele, 2014).

Organic farming has been characterized as a production process that does not allow the utilization of synthetically made agricultural inputs. The organic standards generally prohibit ionizing radiation, synthetic food processing aids, synthetic pesticides, synthetic fertilizers, sludge from sewage, synthetic drugs, products of genetic engineering, and animal cloning (Devi, 2019). According to Reganold & Wachter, (2016), organic farming is ecological or biological farming, that adds conventional conservation-minded farming methods with modern farming technologies.

The method uses crop rotation, legumes, animal manure, crop residues, green manure, off-farm organic waste, mechanical cultivation, and elements of biological pest control to supply plant nutrients and control insects, weeds, and other pests, as well as to increase productivity. Organic agriculture has proven to be environmentally friendly, as it supports the re-use of farm and household waste products as organic fertilizers (Singh, 2021).

Organic farming has several importance. It increases the soil's physical and chemical properties; it also improves plant growth and physiological activities; allows for healthier farm workers; reduces the risk of global warming; fewer residues in food; reduces ground water pollution, protects biodiversity; helps combat erosion; produces optimal condition for high yields and good quality crops (Meemken & Qaim, 2018).

Furthermore, studies have shown that organic farming decreases the pollution of the food system caused by modern farming practices, as well as the environmental degradation caused by chemical and other industrial by-products. It also enhances the pH of the soil, nutrient exchange, and water holding capacity preventing humans, animals, and plants to avoid negative impacts of synthetic inputs and damaging effects on the food we eat to provide a healthy and long-term existence. Economically, it provides an avenue for employment for the population, meets the demand of organic consumers, enables diverse marketing opportunities, and better income from premium return on organic products (Mgbenka, Onwubuya & Ezeano, 2015).

Before the invention of inorganic fertilization, our forefathers practiced farming. Shifting agriculture was used by our forefathers, and it entailed making full use of natural fertility. They used systems like mixed cropping, crop rotation, and shifting cultivation, instead of agrochemicals to restore soil fertility and control long-term pests and disease. However, organic farming was not practiced in an organized manner (Ibeawuchi, Obiefuna, Tom, Ihejirika & Omobvude, 2015).

The United States Development of Agriculture GAIN report (2014) stated that as of 2007, organic farming was practiced on 3,154 hectares in Nigeria, with 59 hectares completely converted and controlled by a few farmers and non-governmental organizations (NGOs). This was also with little intervention of the government.

However, in 2010, it was reported that hectares of land under organic cultivation increased to 11,979 hectares with 517 farmers.

Organic farming over the years has been encouraged by some stakeholders and organizations in Nigeria like Dara/Eurobridge Farm, a pioneer of organic farming that produces lemon grass, turmeric, ginger, plantains, and medicinal herbs. The Olusegun Obasanjo Centre for Organic Agriculture Research and Development (OOCORD) was founded in Nigeria as the first of its kind in 2007. It focuses on organic farming research and development, and many other organizations have driven organic farming in Nigeria (USDA, 2014).

However, investors and interested stakeholders have had quite some difficulties in getting involved in organic farming in Nigeria. This could be because the government still supports conventional farming system and has not fully promoted organic farming. It could also be because of the changes in the economic and political structures. In the light of this, scientists and farmers have had to upgrade and grow systems that rely heavily on synthetic chemical inputs including fertilizers and pesticides to increase food production and to curtail the effect of pests and diseases (Vlachogianni & Valavanidis, 2013). This has allowed farmers to recoup costs and expenses based on the scale of their operations.

In Nigeria today, organic farming has great potential to increase the number of farming jobs considering that the country's farmer population may grow as organic farming opportunities expand. The seemingly obvious and present issues are the issues of education in the sense that organic agriculture education is not fully inculcated in our school curriculum. Furthermore, when it comes to educating the rural farmers,

extension services have not been adequately improved or equipped to effectively inform farmers about organic agriculture (USDA, 2014).

Marketing in organic farming is a pricey market that does not support premium pricing for organic produce, so the income of the farmers does not increase enough to compensate for the significant amount of labor required in organic farming. (Augustine, Jokthan, Zarafi & Bivan, 2013). This has led to the issue of funding for additional labor demand. Organic farming is undeniably labor-intensive, especially when switching from conventional to organic farming (Mgbenka et al., 2015).

The Nigerian government has no policies in place to protect the practices of organic agriculture. They may have ideas, but they must still be converted into functioning papers that organic farmers may use to invest in the country's organic agriculture sector sustainably and confidently. Moreover, in Nigeria, the widespread use of indiscriminate agrochemicals and other synthetic inputs is still not widely perceived as a big issue (USDA, 2014).

The proposal to turn to organic farming in Nigeria seeks to change the current system already in place for farmers, especially arable crop farmers. Change has never been easy to introduce anywhere, particularly when it is aimed at people with a fixed pattern. Interestingly, organic farming has a tradition of being contentious. Nigerian farmers concerned with arable crop farming might find this development unwelcoming. On the other hand, farmers are also likely to adopt this new approach positively and seriously (Reganold & Wachter, 2016). The level of willingness of these farmers may be gleaned from their response towards adopting organic farming in cultivating arable crops.

1.2 Statement of the problem

Agriculture has grown over time due to the rise in global population and food demand. The practice of conventional agriculture has incurred substantial direct and indirect costs due to heavy reliance on chemical inputs which have detrimental effects on soil conditions, human health, and the ecosystem at large (Okon & Idiong, 2016).

New technologies have in the last few decades, introduced changes in the agricultural landscape. These developments have brought certain detriments to the society and environment. The productive potentials and future fertility of the global ecosystem are being threatened by these negative impacts (FAO, 2018).

Chemicals from farms detected in groundwater have caused pollution to water bodies due to nutrient runoff. Many health challenges emerged due to the contamination of food and water bodies by pesticides and nitrates. The health of farmers is also at risk due to exposure to harmful chemicals. Also, the land management method in conventional farming disrupts the habitat and function of micro-organisms. The release of an anthropogenic greenhouse gas like Nitrogen oxide from fertilizer application contributes to climate change (Wikipedia, 2020)

These negative impacts jeopardize the global ecosystem's sustainable capacity and future fertility (FAO, 2018). As a result, pursuing and promoting policies that can mitigate these effects has become critical. Nations of the world, through the United Nations, are championing this cause through the sustainable development goals (SDGs). Organic farming has been said to play key role in achieving the SDGs. According to Haring et al. (2004), organic farming is considered as the alternative to problems associated with animal health, biodiversity destruction, environmental issues, and food safety.

Despite this, organic farming is in its infancy in Nigeria as farmers still rely on agrochemicals regardless of the global awareness of climatic change and environmental degradation that might arise from the constant practice of inorganic farming coupled with the risk it constitutes to sustainable agriculture.

There have been diverse studies on farmers awareness, knowledge, and perception of organic farming practices. Furthermore, there has been studies on consumers' willingness to pay for organic products. However, there is a gap in study regarding farmers willingness to adopting organic farming practices. It then becomes imperative to investigate farmers' willingness to adopting organic farming practices.

1.3 Research questions

The study, therefore, addressed the following research questions:

1. What are the socio-economic characteristics of arable crop farmers in the study area?
2. Are the farmers aware of organic farming practices?
3. Do the farmers know organic farming practices?
4. What is the perception of arable crop farmers on organic farming practices?
5. What are arable crop farmers willingness to adopting organic farming practices?
6. What are the perceived constraints to adopting organic farming practices?

1.4 Objectives of the study

The general objective of the study was to determine the willingness of arable crop farmers to adopting organic farming practices in Oyo State, Nigeria. The specific objectives of the study were to:

1. describe the socio-economic characteristics of respondents;
2. ascertain their level of awareness of organic farming practices;
3. determine the farmers' level of knowledge of organic farming practices;
4. ascertain their level of perception of organic farming practices;
5. investigate the perceived constraints to adopting organic farming practices in Oyo state, Nigeria.

1.5 Research hypotheses

$H0_1$: There is no significant relationship between some selected socio-economic characteristics of arable crop farmers such as sex, age, marital status, household size, educational level, farm size, years of farming experience, and farmers' willingness to adopting organic farming practices.

$H0_{2:}$ There is no significant relationship between farmers' knowledge of organic farming practices and their willingness to adopting organic farming practices.

$H0_3$:- There is no significant relationship between the perception of organic farming practices amongst farmers and their willingness to adopting organic farming practices.

1.6 Scope of the study

This study covers the willingness of any arable crop farmers to adopting organic farming practices in Oyo state, Nigeria.

1.7 Significance of the study

The study was designed to bring to focus an understanding of farmers' willingness to adopting organic farming practices. The knowledge of farmers' willingness to adopting organic farming practices is crucial to ensuring that farmers are not just aware but ready to play a major role as producers of organic foods. The development and sustainability of agriculture solely depend on this which is expected to influence policy decisions at local, state, and national levels.

The findings of the study are expected to contribute to the knowledge body of organic farming by documenting farmers' levels of awareness, knowledge, perception, and willingness to adopting organic farming. This study will also establish farmers' constraints to adopting organic farming practices and therefore help to form the basis for policy formulation for organic farming programme development and improvement. The results of the study should help to evolve new strategies aimed at increasing farmers' interest in organic farming practices and should provide feedback for strengthening the research-extension-farmer linkage system thus improve extension practices in Oyo state.

The recommendations outlined in this study will assist in restructuring planned objectives by the government, implementation of farmers' decisions, and corporate choices within the scope of the study for future projections on organic farming. This study will also serve as a data bank for scholars who may want to undertake studies on organic farming.

1.8 Operational definition of terms

Organic farming: This is the method of adhering to environmentally friendly agriculture and food processing practices. These systems must be socially beneficial, economically sustainable, resource-efficient, and environmentally friendly.

Willingness: In this study, willingness is farmers' inclination or readiness to adopting organic farming practices.

Adopting: In this study, adopting refers to farmers' choice to take up organic farming.

CHAPTER TWO

2.0. LITERATURE REVIEW

This chapter presents a review of literature in the following areas;

i) Definition of organic farming

ii) Organic farming in Nigeria

iii) Principles of organic farming

iv) Organic farming practices

v) Sustainable development goals and organic farming

vi) Arable crop farming

vii) Characteristics of innovation

viii) Theoretical framework of the study

ix) Operational model of the study

2.1 Definition of organic farming

Organic farming is described by IFOAM as a "production system that sustains the health of people, ecosystems, and the soil." Organic agriculture depends heavily on biodiversity, ecological cycles, and processes that are tailored to local conditions, instead of the utilization of harmful inputs (IFOAM, 2008). It is also a farming system that requires the utilization of natural substances in the production and breeding of crops and livestock. These substances maintain the ecosystem and 'natural enemy-mediated' processes, which are related to the preservation and promotion of biodiversity (Feledyn-Szewczyk, Kuś, Stalenga, Berbeć & Radzikowski, 2016).

Organic farming combines a trio of innovation, science, and tradition to promote a shared environment while fostering a symbiotic relation and a higher living standard

for those concerned (Conserve Energy Future, 2014). Food and Agriculture Organization (FAO) states that "organic farming is a unique system that promotes and enhances agro-ecosystem health, including biodiversity, and biological activity in soils, and that this is achieved with agronomic, biological and mechanical on-the-farm methods, excluding all non-farm synthetic inputs" (FA0, 2008).

Organic agriculture is defined by the United States Department of Agriculture as "the application of cultural, biological and mechanical techniques that support the cycling of agricultural resources, maintain a natural environment and preserve biodiversity" (USDA, 2015).

2.2 Organic farming in Nigeria

The organizations promoting organic farming practice in Nigeria were; Organic Agriculture Project in Tertiary Institutions in Nigeria (OAPTIN), Nigerian Organic Agriculture Network (NOAN), Olusegun Obasanjo Centre for Organic Agriculture Research and Development (OOCORD), World Wide Opportunities on Organic Farms (WWOOF), Organic Farmers Association of Nigeria, Organic Fertilizer Association of Nigeria. Other stakeholders in organic farming in Nigeria are; Dara/ Eurobridge farm, Obasanjo farms, Olam international, Shonga farms, Maizube farms, Folawiyo farms limited.

There are standards are guiding the production of organic produce. The organic agriculture standards in Nigeria contain regulations to ensure that organically labeled products meet consistent national standards of Nigerian Organic Agriculture Network (USDA, 2014). This is a non-governmental association with full responsibility for ensuring the smooth running of organic farming in Nigeria among stakeholders. The

NOAN secretariat is located at Ibadan, which is the capital of Oyo state. The following are the standards of the NOAN (Olanrewaju, 2019).

Crop standards; the standards prescribed for crop production state that:

(i) for at least three years before the harvest of an organic crop, no illegal compounds may be applied to the soil.

(ii) it is illegal to use ionizing radiation, genetic engineering, and waste sludge.

(iii) cover crops, tillage, crop rotations, and cultivation practices are complemented with crop and animal substances which will be used to manage crop nutrients and soil fertility.

(iv) organic seeds and other planting stock would be given preference, but a farmer may use non-organic planting stock and seeds under some conditions.

(v) weeds, diseases, and crop pests, in crops, will be mainly regulated through management activities such as mechanical, biological, and physical controls.

2.2.1 Problems with organic farming in Nigeria

There are various issues associated with organic farming in Nigeria. Many farmers are unaware of the modern techniques involved in making organic materials. They still depend on the primitive ways which come with a host of back locks that potentially can deter them from the further practice of organic farming. There is, therefore, a need for proper awareness of the innovative techniques such as the preparation of vermicompost, bio-pesticides, etc. (Bhatta, Doppler, & KC, 2009).

Extension needs therefore cannot be overemphasized as it is a direct link to the farmers, researchers, and other stakeholders. However, most of the extension

programmes advocate more on the utilization of chemicals than on the use of organic inputs. There is also a paucity of information concerning pricing and markets for organic products due to the stage of organic farming in Nigeria, access to information on prices and markets is difficult. The key stakeholders like the government and extension personnel are yet to embrace the concept fully, which indirectly disrupts other processes involved (Bello, 2008)

It is important to sort out the process of marketing the product before getting started with organic farming. One of the legitimated processes is to get certified; that way, the product can be sold for its worth. Farmers go through a lot trying to distribute their products efficiently. Support for the marketing of organic products is also lacking, both at the state and federal levels. There is, therefore, a need for government policy in this area of the farming process.

Likewise, many measures in Nigeria to boost the operation of organic farming have not yielded the desired results. The Nigerian agricultural system is influenced by political factors. Therefore, any actions aimed at promoting organic farming in the country would have to face resistance from those who benefit from such policies in the conventional farming system (Bello, 2008).

There is also a major constraint of labor, the practices encouraged by organic farming require a lot of labor which ranges from weed and pest control to soil fertility practices (Bhatta, Doppler, & KC, 2009). The country still does not have extensive farm inputs like bio-fertilizers and bio-pesticides. This could be because retailers are not interested in dealing with these products due to low demand, marketing and distribution networks are lacking and retailers do not market bio-fertilizers in the majority of locations of Nigeria (Kutama, Abdullahi, Umar, Binta & Ahmad, 2013).

Some schools of thought advocate that conventional agriculture produces more yield than organic agriculture. In many cases, the farmers incur some loss in yields on the conversion from conventional to organic farming. It's also likely that converting the farm to organic production would take years. Small and marginal farmers cannot afford to lose low yields during the switch to organic farming for the first 2-3 years. There are no plans in place to compensate them during those periods. The price premiums on organic products will be ineffective because they will vanish until a large quantity of organic products is available (Bello, 2008).

2.2.2 Future of organic farming in Nigeria

Organic farming in Nigeria has great prospects for the economy and its impact on society are enormous. Shorrocks (2018) reported that in a study in the Republic of Ireland and the UK, organic farms hired more individuals than conventional farms. This shows that even in Nigeria, organic farming could help improve employment at various departments of the farm. This could also have a direct impact on people's quality of life. Also, the exportation of the product would lead to an impact on the global market and affect the country's economy positively.

Consumers have recently turned to organic food since, for humans and the environment, it is considered tastier, fresher and healthier. Unlike most conventional farms, organic farms are known to avoid pesticides largely. Some pesticides damage the environment and, in the long run, human health. Children may be more at risk than adults from direct exposure to pesticides, as in children and adults, the toxicity is often different.

The markets for organically produced crops are not so strong in Nigeria. Small organic farmers depend primarily on price premiums to make a profit. The general populace believes that organic food is healthier than conventional food, there seems to be a favorable future for organic farmers with regards to market and food quality if taken seriously in Nigeria.

However, the switch from conventional farming to organic agricultural practices is necessary as it will promote ecological sustenance, economic stability, and sustainability in the agricultural sector. The health benefits of practicing organic agriculture increasingly outweigh that of conventional agriculture. In Nigeria, the economic benefits also underscore the call for the adoption of organic farming methods, in the face of changing agricultural practice worldwide (Shafie & Rennie, 2012).

2.3 Principles of organic farming

The organic industry has seen substantial expansion in recent years. The IFOAM General Assembly came to the conclusion that the fundamental values of organic agriculture needed to be clarified. Organic agriculture is based on four principles: health, ecology, care, and fairness. Organic agriculture evolves from these principles. They share the value that organic agriculture will bring to the world, as well as a goal to develop all agriculture worldwide (IFOAM, 2008).

2.3.1 The Principle of health

Organic agriculture should aim to maintain and improve the health of the soil, plants, livestock, people, and the environment as a whole. This theory encompasses principles such as all life is interconnected, non-pollution and integrity. It also highlights that individual and societal health is inextricably tied to ecosystem health; healthy soils generate good crops, which in turn assist animals and humans stay healthy.

2.3.2 The Principle of ecology

Organic agriculture should be built on living ecological systems and cycles; working with, emulating, and supporting them. This principle encompasses values such as the prohibition of chemical substances, the use of closed cycles, recycling, reducing consumption of fossil fuels and other (non-renewable) input consumption, being site-specific, biodiversity conservation, and the adoption of a holistic approach. It encompasses organic agriculture within functioning ecological systems. It specifies that production should be centered on ecologically friendly technologies and recycling. The ecology of a specific production environment achieves nourishment and well-being.

2.3.3 The Principle of fairness

This principle is based on the idea that organic agriculture should be based on relationships that ensure fairness regarding shared environmental and living opportunities. This concept incorporates principles such as justice, animal welfare, and equality of and respect for all life opportunities. Equity, respect, justice, and stewardship of the shared environment are characteristics of fairness, both among humans and in their interactions with other living species.

2.3.4 The Principle of care

To protect the health and well-being of present and future generations, as well as the environment, organic agriculture should be maintained with precaution and responsibility. This includes principles such as precaution, participation, and transparency. These principles function jointly and are intended to be ethical, inspiring the organic movement in its full diversity and embracing it globally. Organic agriculture is a living, dynamic system that adapts to both internal and external conditions. Organic agricultural farmers may improve efficiency and output, but not at the expense of their health and well-being.

2.4 Organic farming practices

Organic farming involves various eco-friendly practices that keep the soil fertile for a long time. There are different practices used in organic farming which include crop rotation, cover-cropping, inter cropping, shifting cultivation, mulching, manuring, biological pest control, biological weed control, and hermetic storage among others.

Crop rotation is a way of preventing pests and preserving soil fertility by planting different crops in the same field at various periods of the year. Growing the same crop on land over the years with no break depletes the soil of certain nutrients over time. Crop rotation also improves soil structure, controls diseases, pests, and weeds, increases soil organic matter, controls erosion, increases biodiversity, increases yield, and reduces commercial risk.

Cover crops like clover and hay are often cycled into the rotation to bring more organic content to the soil and increase the soil's tilt (Manual, 2009). Cover crops are plants that are cultivated to cover the soil rather than to be grown. Soil erosion, water, pests, soil quality, soil fertility, weeds, and diseases are all controlled by cover crops (Edwards & Burney, 2005).

Inter-cropping is a form of multiple cropping that involves growing two or more crops close to one another. In other words, the cultivation of two or more crops at the same time simply defines inter-cropping. Intercropping's most common aim is to increase the yield on a given piece of land by using tools or ecological processes that would otherwise go unused by a single crop (Li et al., 2020).

Shifting cultivation is a system of agricultural production in which plots of land is cultivated for a short period. Thereafter, it is abandoned during the post-disturbance period while the farmer moves on to another plot fallow vegetation is permitted to grow

freely. When the soil shows signs of exhaustion or, more generally, when the field is overrun by weeds, the period of cultivation is normally over (Kafle, 2011).

Mulching is the covering of the soil's surface with a layer of material. Mulches are used to improve soil fertility and health, conserve soil moisture, improve the aesthetic appeal of the field, and reduce weed growth. A mulch could be organic. The operation of worms and other species can naturally introduce manure or compost into the soil. When used correctly, the method will increase soil productivity in both commercial crop production and gardening. (Kumar & Lal, 2012).

Organic manure comes from biological materials such as human, animal, and plant residues. They play an important role directly and indirectly in crop production. Organic manure boost crop growth directly by raising humic material uptake, and indirectly by improving the availability of plant nutrients through soil micro-organisms. The organic manure includes bulky organic and concentrated organic manure.

Bulky organic manure comprises compost, farm yard, and green manure. Farm Yard Manure (FYM) is a decomposed mix of urine, dung, farm litter, and leftover materials such as roughages. Green manure comprises plant waste material like leaves that cover the soil and are put into the soil where they boost the soil fertility and act as soil nutrients. Compost is a sizeable quantity of waste material that can be decomposed anaerobically into compost manure (Bista & Dahal, 2018).

Oil cakes, horn, hoof meal, fish meal, meat meal, and blood meal are examples of concentrated organic manure. They are naturally organic and got from raw materials from plant or animal origin, it constitutes of a larger proportion of major plant nutrients like potassium, nitrogen, and phosphorous than bulky manure. Bacteria transform organic nitrogen into readily accessible ammoniacal and nitrate nitrogen before it can

be used. As a result, organic fertilizers take longer to work but provide more nitrogen for a longer time.

Biofertilizers are substances that contain micro-organisms that can increase soil fertility. It may involve fixing atmospheric nitrogen and using mycorrhizal fungi and phosphate solubilizers. These are a sustainable and eco-friendly ways of achieving soil fertility. Biofertilizers have nitrogen-fixing biological organisms that help them establish and grow crop plants, trees and improve the production of biomass and yields of grain (Mishra, Rajvir, Mishra & Kumar, 2013). Bio-fertilizers are of two types which include Symbiotic Nitrogen-fixation and Asymbiotic N-fixation:

Rhizobium bacteria, which fix atmospheric nitrogen within the roots of leguminous plants, form tumor-like growths which are called root nodules as part of symbiotic nitrogen fixation. It is a common biofertilizer that can fix Nitrogen of 100-300 kg per hectare in a cropping season (Flores-Félix et al., 2013). Mycorrhizae, Azotobacter, Azolla, blue-Green Algae, and Azospirillium are a symbiotic nitrogen fixers that grow on decomposing soil organic matter and embed atmospheric nitrogen in the soil.

Pest control can be carried out with the use of pest repelling plants, the introduction of pest natural enemy, the use of bio-pesticide, handpicking of insect larva from plants, and the use of various natural oils against small-bodied insects. Biopesticides are derived from natural materials of plant, micro-organism, and animals' origin. They have a biological effect on nematodes, fungi, and insects, affecting their physiology and behavior. They include substances like microbes and plant extracts.

Weed management in organic farming can be done to a large extent through changing the crop dynamics and timely sowing. Also, manual weeding is highly

beneficial for crop establishment. Biological control of weeds can be very efficient and the utilization of locally available mulching materials to minimize the growth of weed and conserve moisture can be effectively employed in vegetable cultivation (Galladt, 2014).

Hermetic storage is a technique of storage that could be used when storing organic produce. It may be carried out utilizing sealed, airtight containers to manage moisture and insects in stored dry agricultural commodities. It prevents the exchange of gases between the inner and outer surroundings as well as the stored commodity, preserving moisture levels and preventing pest's invasions due to a lack of oxygen. Through biological activity connected to gas exchange of grain and organism respiration, the oxygen in the inner ecosystem is decreased to limiting levels for any living creatures, allowing hermetic storage to decrease the invasion of insects and fungi on the stored food.

2.5 Sustainable development goals and organic farming

New technologies have in the last few decades, introduced changes in the agricultural landscape. These developments have brought certain detrimental effects on the environment and society. Some of these effects include soil degradation, water pollution, soil pollution, and the increasing emission of greenhouse gas. The productive potentials and future fertility of the global ecosystem is threatened by these negative impacts (FAO, 2018). Thus, it has become imperative to pursue and promote initiatives that will curb these effects.

Nations of the world, through the United Nations, are championing this cause through the sustainable development goals (SDGs) which identify key sectors that affect human lives and push for sustainable development in those sectors. Organic

farming has been said to play key role in achieving the SDGs of the United Nations. Organic farming promotes several of the United Nation's SDGs such as; SDG 15- Life on Land, SDG 14- Life below water, SDG 13- Climate action, SDG 12- Responsible Consumption and Production, SDG 8- Decent Work Conditions, SDG 6- Clean water, and SDG 3- Good health and well-being.

In addition, there has been a focus on the importance of including smallholder farmers in the decision on how to address poverty, hunger, and environmental issues (International Assessment of Agricultural Knowledge, Science and Technology IAASTD, 2009). Many worldwide organizations have claimed that smallholder farmers and some of their endogenous technologies are viable to solve the issue of food insecurity (IAASTD, 2009).

Indeed, organic agriculture has great potentials to promote the achievement of these SDGs. The control of nutrients and pests in organic farming, according to Scialabba & Müller-Lindenlauf (2010), can play a substantial role in climate mitigation. Synthetic inputs, such as chemical insecticides, and minerals requiring large quantities of fossil fuels are not permitted under organic legislation. This saves a considerable amount of emissions of carbon dioxide (Khanal, 2009).

In 2010, findings showed that the production of nitrogen fertilizers consumes up to 0.4–0.6 gigatonnes of carbon dioxide. This is equivalent to 10% of worldwide direct agriculture emissions and 1% of overall human-induced greenhouse gas emissions. Organic agriculture is primarily responsible for reducing these emissions.

2.6 Arable crop farming

Arable crop farming is best described as the production of a wide range of annual crops. In clear terms, arable crop farming involves cultivating crops that complete their

life cycle within one year (from gemination to seed production). To this end, farming that involves planting and cultivating annual crops is termed arable crop farming. Also, it can be referred to as food crops.

From the foregoing, an arable crop farmer may thus be defined as one who engages in arable crop farming, planting, and cultivating food crops. Arable farmers produce different crops, which are called food crops. This can be incorporated into the organic farming of the different arable crops. These crops may be classified below with examples:

I. Cereal crops: These are crops grown for their edible starch grains (e.g., millet, barley, maize, wheat, rice)
II. Legumes crops: These are seeds from the legume family, that are edible and high in protein (peas, lentil, beans,)
III. Oilseed crops: These are seeds are grown to extract oil from them (sunflower, soybean, rapeseed)
IV. Forage crops: fresh or preserved crops used for animal feed (timothy, clovers, cowpea)
V. Fiber crops: These are crops grown for fiber yield (flax, jute, cotton)
VI. Tuber crops: crops with a thickened underground stem as the edible portion (yam, potato) (FutureLearn, 2019).

Arable crop farmers deal with regularly used farm produce and thus are important for the supply and availability of these products in households, communities, and the nation in extension. The crops produced by arable crop farmers include everyday food crops that are essential to the populace. An average of 6 members often makes up the household of arable crop farmers with an average of 3 hectares of land. In most cases,

the men are usually the decision-maker while in the production value chain, women play an important role (Anderson, Marita, Musiime & Thiam 2017; FAO, 2018).

According to FAO (2018), the majority of farmers in Nigeria are arable smallholder farmers. They are engaged in the production, processing, and marketing of various crops either on a full-time or part-time basis. In other cases, they are engaged in mixed farming of different arable crops (FAO, 2018). These farmers produce about 80% of the food consumed in Nigeria (Mgbenka, Mbah & Ezeano, 2016). Considering the importance of arable farmers in Nigeria, achieving sustainable agriculture relies in the hands of arable crop farmers for solutions that can help bring more sustainable agriculture such as organic farming (Sabo, Isah, Chamo & Rabiu, 2017).

While arable crop farming can be carried out using conventional and organic farming methods, there has been an increasing tilt towards the use of organic farming methods. Some small-scale arable crop farmers make use of organic manure rather than fertilizers and other agrochemicals in cultivating their crops. Organic Manures are fertilizers made from green manures, crop residues, animal waste, rural and urban composts. They have been tested over time for boosting the fertility and productivity of soils and differ widely in the number of plant nutrients that they contain.

Arable crop farmers in Nigeria have come a long way from employing only conventional methods with the intensive use of agrochemicals to opening up to the idea of embracing organic farming. The prospect of organic farming thriving in Nigeria's agricultural sectors remains high, especially in the face of global warming issues. Therefore, the adoption of organic farming by arable crop farmers will in the short and long term strengthen the food security objectives of many developing countries including Nigeria (Ikuerowo & Tehinloju, 2020).

2.7 Characteristics of innovation

Innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003). Rogers (2003) also posited that for an innovation to spread fast, it must possess the following characteristics

1. Relative advantage: The extent to which an innovation is recognized to be better than the idea it is to replace. In this context, the relative advantage of organic farming over conventional farming could increase or facilitate farmers' willingness to adopting organic agriculture
2. Compatibility: The extent to which an innovation is regarded as being in line with the adopter's current belief and prior experience. This suggests that for farmers to have high willingness to adopting organic farming, it must be compatible to their existing values, experience, and needs
3. Complexity: Farmers' willingness to accept and adopting something because it is not difficult and not too complicated for them to use. The extent to which an innovation is seen as being easy. Relating these characteristics to organic farming. Thus, a practice like organic farming that involves the use of natural inputs will be expected to influence farmers' willingness to adopting the innovation.
4. Trialability: This is the extent to which an innovation can be experimented with on a limited basis. An organic practice that is trial able would give rise to less uncertainty to the farmers who are considering it and may influence their willingness to adopting the innovation.

5. Observable results: Degree to which it is easier for individuals to see the results of an innovation. This implies that the more visible the results, the more likely farmers will be willing to adopting organic agriculture.

2.8 Theoretical framework of the study

Social Learning Theory is central to farmer learning and innovation. All approaches and methods aimed changing farmers' knowledge, attitudes and behaviors need to be situated within the social learning concept (Karubanga, Kibwika, Okry, & Seguya, 2016). The approach and method that can help the farmers in learning is with the use of audio-visual, and social media to aid in awareness creation; knowledge acquisition and retention.

According to Bandura & Walters (1977), social learning theory considers how both environmental and cognitive factors interact to influence human learning and behavior. Bandura's social learning theory proposed that learning can also occur simply by observing the actions of others. His theory added a social element, arguing that people can learn new information and behaviors by watching other people. Known as observational learning, this type of learning can be used to explain a wide variety of behaviors, including those that often cannot be accounted for by other learning theories.

Theory of Planned Behaviour (TPB) is another relevant theory to this study. TPB aids in the comprehension of behavioral intention, which is an important aspect because it is the immediate antecedent of every behavior. The stronger the intention to carry out the behavior, the more likely should be its performance. In this study, arable crop farmer's willingness to adopting organic farming practices is their behavioral intention. The stronger their willingness, the more likely their adoption.

The Reasoned Action Theory (TRA) suggests that the behavior of a person is determined by his or her intent to perform the behavior, which is a function of his or her attitude to behavior and subjective norms (Fishbein & Ajzen, 1977). While TRA addresses volitional human behavior, the TPB deals with behavior that individuals may not have complete control over, which is a critical part of the adoption of organic agriculture.

The basic objective of this theory is to identify factors that shape and modify behavioral intentions. In this study, the factors that form and change behavioral intent are the farmers' level of awareness, knowledge, perception, and constraint. These factors directly influence farmer's behavioral intent; willingness or unwillingness to adopting organic farming.

TPB is appropriate for researching the transition to organic farming for at least three reasons: first, the adoption of organic farming necessitates meticulous planning. Second, the TPB controls for potential constraints or difficulties farmers may experience when adopting organic farming. Third, the TPB allows testing that adoption may be constrained by social or technical factors (Krueger Jr, Reilly, & Carsrud, 2000)

Lapple & Kelley (2013) examined Irish agricultural survey data using the social–psychology theory of planned behavior (TPB). The goal was to understand the factors that influenced Irish farmers' decision to switch to organic farming. Because the great majority of new entrants into organic farming were converted from the conventional sector, the emphasis was on conventional farmers. This underlined the need of assessing conventional farmers' intentions to pursue organic farming.

2.9 Operational model of the study

The operational model of the study explains the interconnection between variables in the study, which will help for easy comprehension. The model in figure 1 is divided into four components:

1. The antecedent or background characteristics
2. The independent variables
3. The dependent variable
4. The intervening variables

1) The antecedents: This is the starting point of the model which tells us the prevailing conditions that have necessitated the proposal to adopting organic farming practices. They are pollution, soil degradation, food poisoning, climate change, health challenges in humans, erosion, endangered biodiversity, increasing emission of greenhouse gases, global warming.

2) Dependent variable: The dependent variables are variables that are directly influenced by the independent variable. The conceptual framework as depicted in Figure 1 provides a detailed explanation of arable crop farmers' willingness to adopting organic farming (dependent variable) which is directly influenced or affected by the independent variables.

3) The independent variables: These are the variables that influence the outcome of the dependent variable. They consist of five sets of variables:

i) socio-economic characteristics of respondents;

ii) awareness of organic farming practices;

iii) knowledge of organic farming practices;

iv) perception of organic farming practices; and

v) perceived constraints to adopting organic farming practices.

From the operational model, socio-economic characteristics such as level of education are expected to influence respondents' knowledge of organic agriculture, this, in turn, is expected to influence respondents' perception of organic agriculture, while a favorable perception is expected to have a positive effect on farmers' willingness to adopting organic agriculture.

However, a low knowledge level could result in constraints to adopting organic farming. This in turn could pose a negative influence on farmers' perception of organic farming. An unfavorable perception emanating from constraints to adopting organic farming would reduce farmers' willingness to adopting organic farming.

4) The intervening variables: - are variables that cannot be measured but have an indirect influence on the dependent variable. This includes; government policies, extension training, awareness campaigns among others.

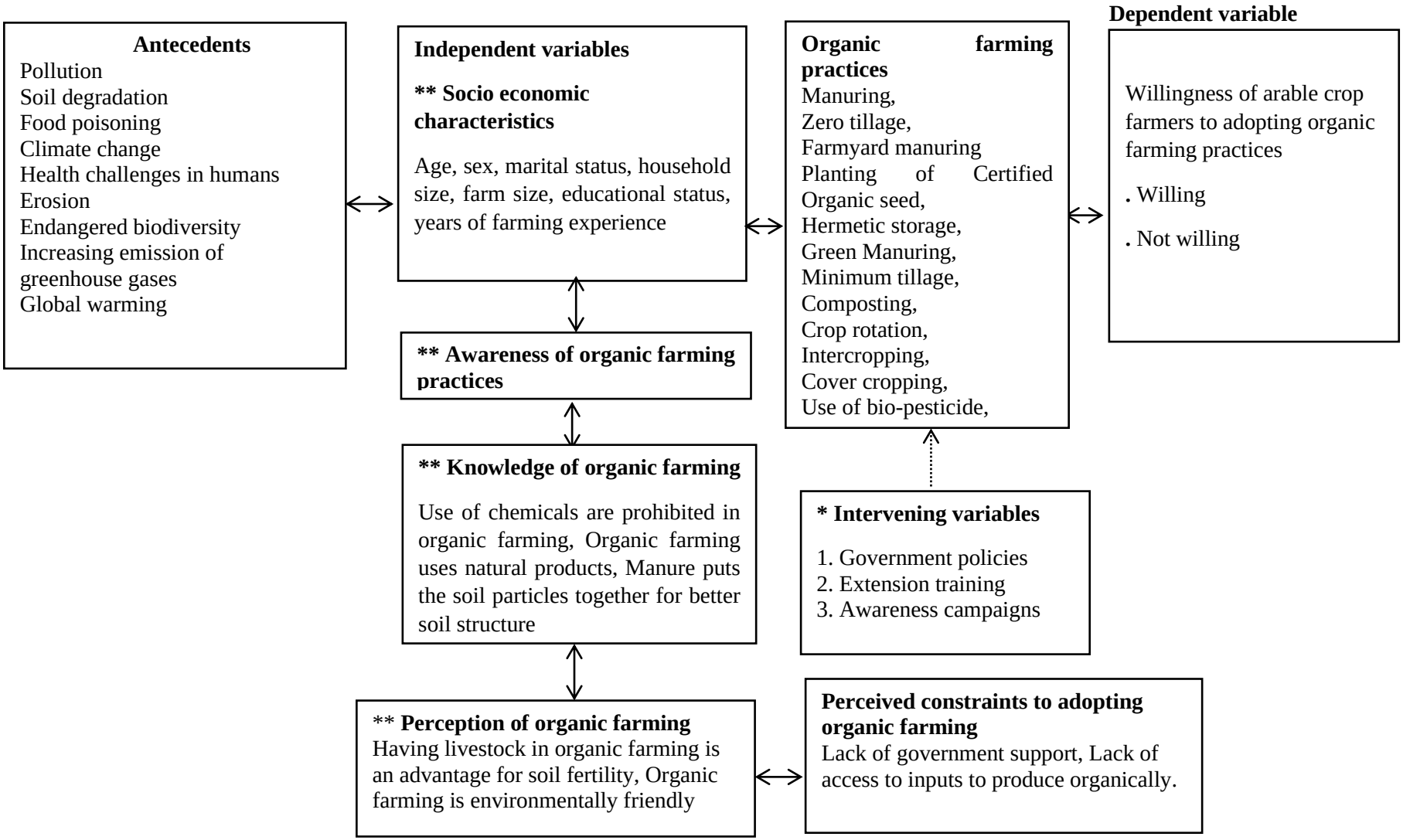

Figure 1: Operational model of the willingness of arable crop farmers to adopting organic farming practices

CHAPTER THREE

3.0. METHODOLOGY

3.1 Study Area

The study was conducted in Oyo State, located geographically in the South West region of Nigeria between latitude $7^{o}02^{1}$N and $9^{o}10^{1}$N and longitude $2^{o}04^{1}$E and $4^{o}30^{1}$E. It is bounded by Ogun State in the south, Osun State in the east, Ogun State in the west and the Republic of Benin in the east, and Kwara State in the north. A tropical climate, with distinct wet and dry seasons. The state is comprised of 33 local government areas (LGAs). Oyo State has four agricultural zones under the Oyo State Agricultural Development Programme (OYSADEP), namely Ogbomoso, Ibadan/Ibarapa, Oyo, and Saki.

3.2 Population of the study

The population of the study comprised of all arable crop farmers in Oyo state.

3.3 Sampling procedure and sample size

The respondents for the study were chosen using a multi-stage and proportionate selection procedure for representative sampling. The first stage involved selecting seventy-five percent of the ADP zones in the state giving a total of 3 zones which were Ibadan/Ibarapa, Oyo, and Ogbomosho. The second stage involved selecting thirty-five percent of the blocks giving a total of seven blocks (Ido, Ibarapa East, and Ibarapa central in Ibadan/Ibarapa zone; Oyo west and Afijio in Oyo zone; Ogbomosho south and Ogooluwa in Ogbomosho zone). The third stage involved selecting ten percent of the cells giving a total of 13 cells. The fourth stage involved selecting twenty percent of the farmers giving a total sample size of 340 respondents. However, only

333 questionnaires were retrieved and subjected to analysis. Table 1 further shows a detailed representation of the sampling procedure.

Table 1: Summary of sampling procedure

Total zones	75% of zones selected	Total number of block in selected zone	35% of block	10% of cells selected in each block	Sample Frame	20% of registered farmers
Ibadan/Ibarapa	Ibadan/Ibarapa	9	Ido	Akufo	171	34
				Batake	155	31
			Ibarapa east	Eruwa	170	34
				Lanlete	164	33
			Ibarapa central	Igboleke	125	25
				Araromi	115	23
Oyo	Oyo	6	Oyo west	Egunbiyi	110	22
				Onilefun	125	25
			Afijio	Akinola	105	21
Ogbomosho	Ogbomosho	5	Ogbomosho south	Ibapon	124	25
				Osuru	102	20
			Ogooluwa	Odo-oba	124	25
				Idi-ori	112	22
Saki	**----**	-----	-----	-----	------	-----
4	**3**	20	7	13	1702	340

Source: Field Survey, 2021

3.4 Measurement of variables

The measured variables were the independent and dependent variables. The independent variables were respondents' socio-economic characteristics, awareness, knowledge, perception, and constraint to adopting organic farming practices, while the dependent variable was arable crop farmer's willingness to adopting organic farming practices.

3.4.1 Socio-economic characteristics

i. Age: the respondents were asked to indicate their exact age in years. The interval level of measurement was used to measure respondents' age.

ii. Sex: The respondents were asked whether they were male or female and coded thus: male (2) and female (1).

iii Educational level: Respondents were asked if they had no formal education, primary school, secondary school, or tertiary education which was coded 1, 2, 3, 4 respectively

iv Marital status: Respondents were asked if they were single, married, divorced, widowed, or separated, and their responses were coded as follows; 1, 2, 3, 4, and 5 respectively.

v. Annual income: Farmers were asked to state their estimated annual income in Naira.

vi. Religion: Respondents were asked to state what religion they were in whether Christianity, Islam, or Traditional worship with code thus: Christianity (1), Islam (2), or Traditional worship (3) assigned respectively.

vii. Household size: The respondents were asked how many family members they had in their household.

viii Farm size: The size of the respondent's farm in hectares was asked.

ix. Secondary Occupation: this refers to other occupations engaged in by the farmer asides from farming. Respondents were asked to tick which applies to them; fishing, civil service, petty trading, artisans, and animal husbandry. This was later categorized as yes and no. Yes was coded 2, and no 1.

x. Years of farming experience: this refers to the total number of years the respondents have spent farming. Respondents were to indicate their years of farming experience.

xi. Types of crop cultivated: This refers to the type of arable crops cultivated by the farmer. Respondents were asked to tick and coded thus: maize, cassava, pepper, tomato, vegetables, and others. This was later categorized as yes and no. Yes was coded 2, and no 1.

3.4.2 Awareness of organic farming practices

From a list of 23 organic farming practices, respondents were asked to tick the ones they were aware of. This was measured on a two-point scale of yes and no. Yes was scored 1, and no 0. The possible maximum score for a respondent was 23, while the minimum was 0. In determining the level of awareness, each respondent's total score was categorized into high and low. A high level of awareness was within mean and above, while a low level of awareness was within zero and mean.

3.4.3 Knowledge of organic farming

Respondents' knowledge of organic farming practices was measured using fourteen knowledge statements on a five-point Likert scale thus: Strongly Agreed, (5 points); Agreed, (4 points); Undecided, (3 points); Disagree, (2 points); and Strongly Disagreed, (1 point). The mean of each statement was obtained and used to rank their knowledge of organic farming practices. The possible maximum and minimum scores were 70, and 14 respectively.

To know the arable crop farmer's level of knowledge, the total score for each respondent was categorized into high, moderate, and low. The high level of knowledge

was placed within mean + standard deviation and above, the low level of knowledge was within zero and mean-standard deviation, while the moderate level of knowledge was placed within the mean ± standard deviation range.

3.4.4 Perception of organic farming

The arable crop farmers' perception of organic farming was measured by presenting respondents with a list of thirteen perception statements on organic farming practices. They were asked to indicate their level of agreement on each of these statements on a five-point Likert type scale thus: Strongly Agreed, (5 points); Agreed, (4 points); Undecided, (3 points); Disagree, (2 points); and Strongly Disagreed, (1 point). The scale contained a mix of negative and positive statements while a reverse scoring order was used for negative statements. The mean of each perception statement was generated and used to rank their perception of organic farming practices.

The possible maximum scores for a farmer was 65, while the minimum was 13. To know the arable crop farmer's level of perception, the total score for each respondent was grouped into 3 categories: favorable, moderately favorable, and unfavorable perception. The favorable perception was placed within mean + standard deviation and above, the unfavorable perception was within zero and mean-standard deviation, while the moderately favorable perception was within the mean ± standard deviation range.

3.4.5 Perceived constraints to adopting organic farming practices

A list of possible perceived constraints affecting the adopting of organic farming practices was presented and the arable crop farmers were asked to tick the level to which they are constrained based on a three-point rating scale thus: major constraint (2), minor constraint (1), and not a constraint (0). The mean for each constraint was generated and used to rank the constraints affecting the adoption of organic farming in order of severity. The mean score of 1 was obtained by adding the score for each scale (2+1+ 0=3) and dividing it by the number of scales (3). Therefore, the severity of

constraint was regarded as major when the mean score was ≥ 1, and minor when the mean score was < 1.

Dependent variable

3.4.6 The level of willingness to adopting organic farming practices

Arable crop farmers' willingness to adopting organic farming was measured using twenty-eight organic practices on a two-point scale of willing(1) and not willing(2). The possible maximum score for a farmer was 56, while the minimum was 28. To know the arable crop farmer's level of willingness, the total score for each respondent was grouped into 2 categories: willing and not willing. The mean score of 1.5 was obtained by adding the score for each scale (2+1=3) and dividing it by the number of scales (2). The willing was placed within mean and above, while the not willing was within zero and mean.

3.5 Validation of research instrument

The data collecting instrument underwent both face and content validation. The instrument was certified valid by extension agents in the ADP and supervisors from the Department of Agricultural Economics and Extension, College of Agricultural Sciences. Landmark University, Omu-Aran, Kwara State.

3.6 Reliability test

The reliability of the research instrument was ascertained using the test-retest reliability technique. The questionnaire was administered twice to twenty randomly selected arable crop farmers in a pilot test. The data obtained from the two tests were collected and analyzed using Pearson product-moment correlation. A coefficient of 0.96 was attained which suggests that the tool was 96% dependable.

3.7 Data collection

The primary data for the study was collected with a questionnaire through an interview schedule.

3.8 Method of data analysis

The data was analyzed using the Statistical Package for Social Science (SPSS). The data collected was analyzed using both descriptive and inferential statistics. Especially, descriptive statistics such as percentages, frequency counts, means, standard deviation, graphs, and charts were used to describe the data.

Inferential statistics such as chi-square was used to establish an association between data obtained at the nominal variables and the dependent variable of the study. On the other hand, Pearson Product Moment Correlation (PPMC) was used for drawing inference between the direction and magnitude of the relationship between dependent and independent variables of the study. Consequently, the nature of the relationship between the dependent and independent variables was established at $p \leq 0.05$ (5% significant level). Chi-square analysis (χ^2) was used to establish the association between some socio-related nominal variables such as sex, educational level, and marital status in hypothesis I.

3.9 Justification of choice of statistical tools.

3.9.1 Correlation analysis

Correlation describes the statistical procedure which helps to indicate whether there is a relationship between two variables. It could be either negative or positive. The direction of the relationship is indicated by the positive or negative sign. Therefore, when r is -1, it shows a perfect negative relationship, when the r is 0, it means zero relationships, but when r is +1, it means a perfect positive relationship. Correlation

analysis was performed to determine whether or not there is a relationship between the dependent and independent variables. This was used in hypotheses I, II, and III.

3.9.2 Chi-square(χ^2)

The Chi-square test is a non-parametric statistical inferential tool for determining the association between two variables. It is usually used in the processing of nominal data. Chi-square was used to test associations between independent variables measured at nominal level, particularly socio-economic characteristics like marital status, educational level, and the dependent variable, which is the willingness of arable crop farmers to adopting organic farming practices. This was used in hypothesis I.

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

This chapter presents the findings with analyses, interpretation, and discussion of the study data based on the study objectives. This chapter is divided into sections as follows:

i. socio-economic characteristics of the arable crop farmers,

ii. farmers' awareness of organic farming practices,

iii. farmers' knowledge of organic farming practices,

iv. farmers' perception of organic farming practices,

v. farmers' willingness to adopting organic farming practices,

vi. farmers' constraint to adopting organic farming practices.

4.1. SECTION A: Socio-economic characteristics of the arable crop farmers

4.1.1: Age

Findings from Figure 2 show that the mean age of the arable crop farmers was 50 years ± 10.1. The result further indicated that 8.1% of the farmers were less than 35 years, and 25.5% were between the ages 36 and 45 years. Further, 37.8% of the arable crop farmers were between the ages of 46 and 55years, 22.2% of the farmers were between ages 56 and 65 years, while 6.3% were 65 years and above. The result implies that majority of farmers in the study area are fairly advanced in age.

From the result, it could be deduced that older people were more involved in arable crop farming than the younger ones. Consequently, this could have implications on food production because the older farmers are less energetic and do not possess the physical strength to sustain rigorous task required by farming activities which could affect farmers willingness to adopting organic farming practices. This corroborates Sharimakin & Dada (2020) findings that older people were more involved in farming activities.

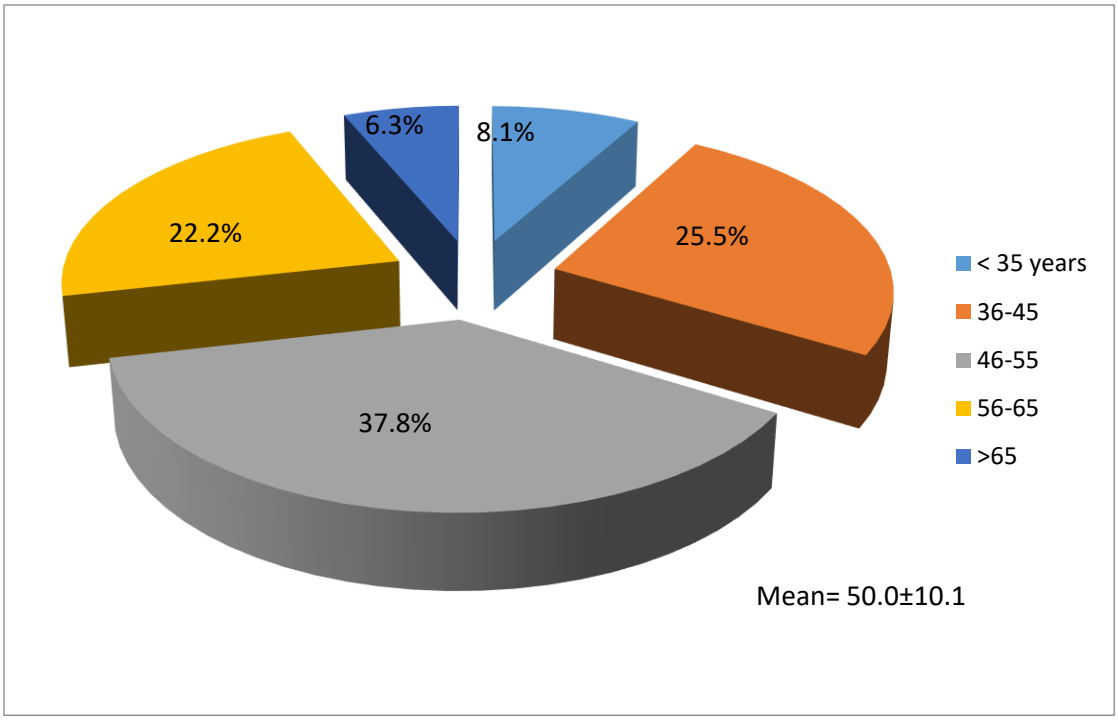

Figure 2: Distribution of arable crop farmers by age

4.1.2: Sex

The result in Table 2 shows that 70.6% of the farmers were male while 29.4% were female. This implies that males are more into arable crop farming than females in the study area. This could be connected to the tedious nature of farming activities, particularly in rural areas. This finding agrees with Sharimakin & Dada (2020) report that more male gender is involved in primary food production compared to the female gender.

Table 2: Distribution of arable crop farmers by sex

Sex	Frequency	%
Male	235	70.6
Female	98	29.4

Source: Field survey, 2021

4.1.3: Educational level

Table 3 shows that 22.2% of the farmers had no formal education, 22.2% had primary education, 32.2% had secondary education, while 23.4% had tertiary education. Majority of the farmers (77.8%) had one form of formal education or the other. This implies that most of the farmers are educated and this might enhance their willingness to adopting organic farming practices. According to Bannor, Oppong-Kyeremeh, Atewene, & Wongnaa (2019), having some degree of education is favorable to the adoption of new technologies, and having some degree of education aids in the understanding of new technologies and the negative effects some conventional practices have on the environment.

Table 3: Distribution of arable crop farmers by educational level

Educational level	Frequency	%
No formal education	74	22.2
Primary education	74	22.2
Secondary education	107	32.2
Tertiary education	78	23.4

Source: Field survey, 2021

4.1.4: Marital status

Findings in Table 4 shows that 3.9% of the farmers were single, 92.5% were married, 3.3% were widowed, while 0.3% were separated. The result indicated that majority (92.5%) of the respondents were married, which implies having family responsibility. Thus, the farmers can work with their families to substitute for farm labor due to the need for food on a subsistent basis. Igwe & Ijeh (2019) reported that the majority of arable crop farmers are married people.

Table 4: Distribution of arable crop farmers by marital status

Marital status	Frequency	%
Single	13	3.9
Married	308	92.5
Widowed	11	3.3
Separated	1	0.3

Source: Field survey, 2021

4.1.5 Annual income

Findings in Figure 5 revealed that 3.0% of the farmers earned less than ₦120,000, 30.3% of the farmers had income between ₦121,000 and ₦420,000, 32.7% of the respondents had income between ₦421,000 and ₦720,000. Further, 12.3% of the farmers earned between ₦721,000 and ₦1,020,000, and 21.6% earned ₦1,021,000 and above. The mean annual income was ₦802,648.65, while the standard deviation was ₦1,218,871.44 which indicates that most of the farmers earned above the national minimum wage of ₦30,000 per month. This implies that most of the arable farmers in the study area earn more than $1 per day which is above the poverty line. This also implies that farmers in the study area can meet their basic welfare needs. Egwuonwu & Onyeaka (2020) reported that the average monthly income of vegetable farmers was ₦35,150.

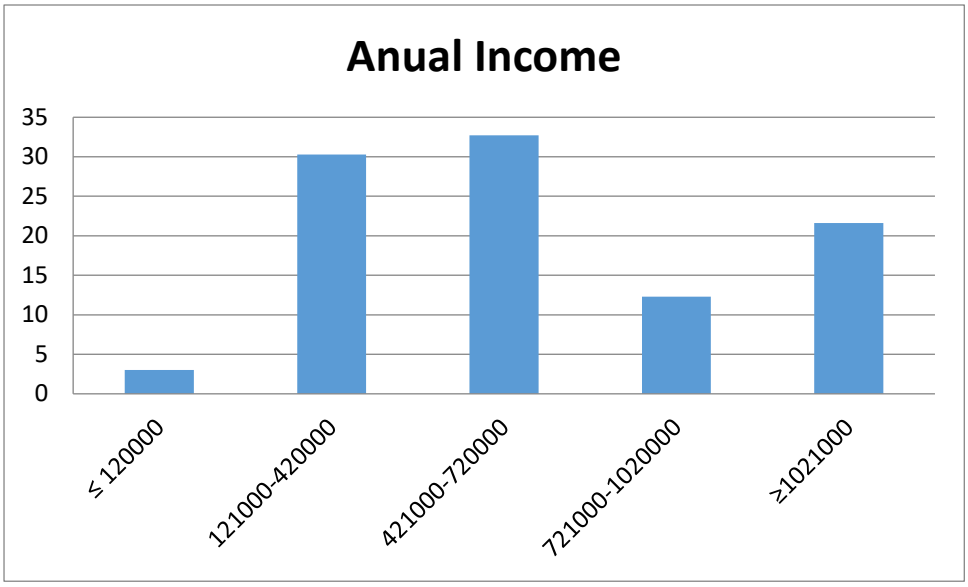

Figure 5: Distribution of arable crop farmers by annual income

4.1.6 Religion

As shown in Table 5, 44.4% of the farmers were Christians, 54.4% were Muslims, while 1.2% were traditional religious worshippers. This analysis shows that the dominant religion of the arable crop farmers in the study area was Christianity and Islam. This corroborates Alawode & Abegunde (2015) findings that Christianity and Islam are the dominant religion in Oyo state.

Table 5: Distribution of arable crop farmers by religion

Religion	Frequency	%
Christianity	148	44.4
Islam	181	54.4
Traditional	4	1.2

Source: Field survey, 2021

4.1.7 Household size

Findings in Figure 4 show the mean household size to be 7 members. About 14 % of the farmers had a household size between 1-4 members, 69.1% had a household size between 5-8 members, while 16.8% had more than eight household size. The result shows that most of the farmers had a moderate household size which can substitute for farm labor. Emaziye & Ebowore (2020); Abulude & Kolawole (2020) reported that arable crop farmers have a moderate household size. Sangodeyi (2019); Okoro, Etuk. & Akpan (2016) affirmed that many farm families take advantage of their household sizes as farm labor to increase production and maximize profits.

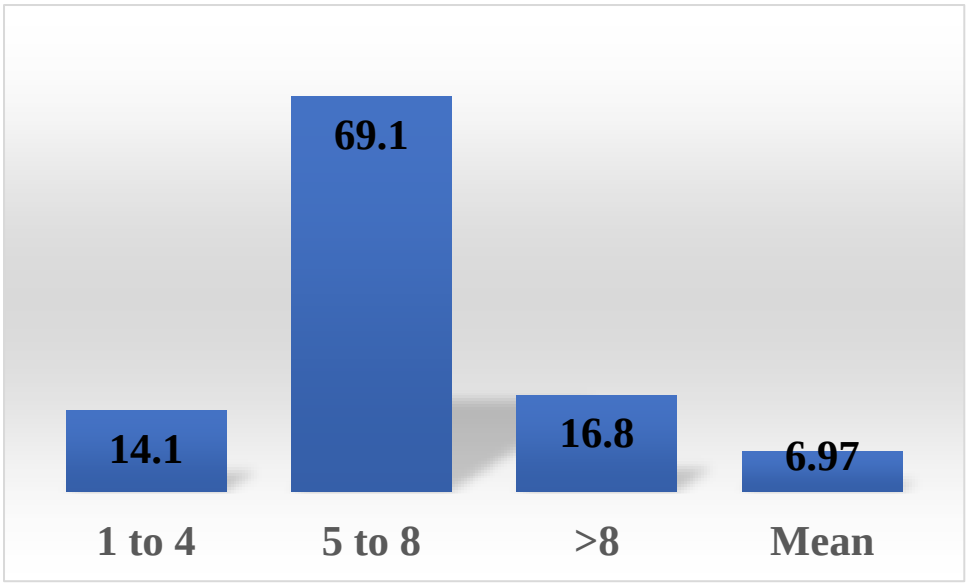

Figure 4: Distribution of arable crop farmers by household size

4.1.8 Farm size

As shown in Figure 5 the mean farm size was 1.02 hectares. The results revealed that 98.5% of the farmers had farm sizes between 1 and 5 hectares, 0.9% had farm sizes between 6 and 10 hectares, while 0.6% had farm sizes of more than 10 hectares. The result also indicated that most of the farmers have farm sizes within 1-5 hectares. This implies that most of the farmers are small-holder farmers with a low level of production. Olaniyi & Ogunkunle (2018), reported a similar finding that most arable farmers in southwest Nigeria cultivate between 1-3 hectares.

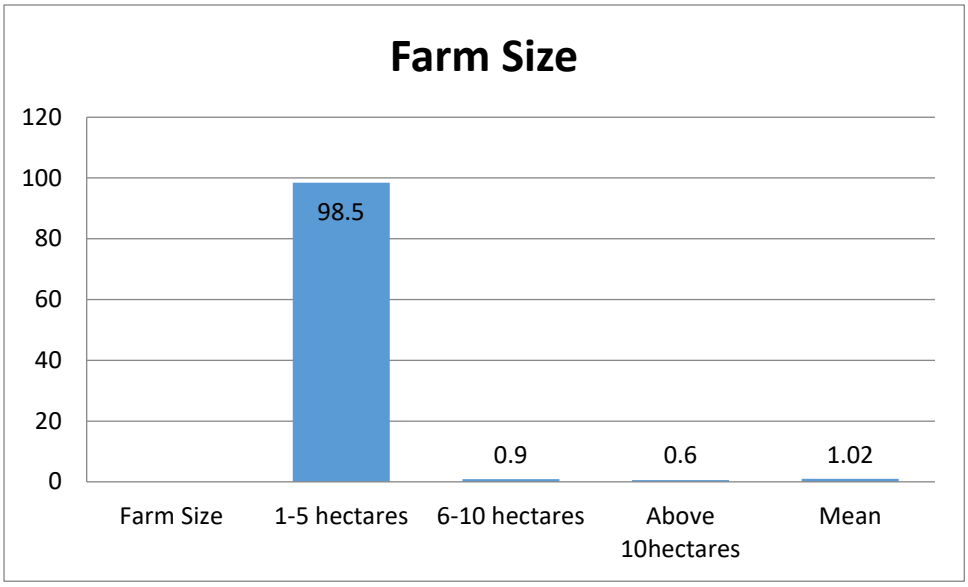

Figure 5: Distribution of arable crop farmers by farm size

4.1.9 Other Occupation

Findings in Figure 6 show that 1.8% of the farmers were into fishing, 18% were civil servants, 32.4% were into petty trading, 41.7% were artisans, while 8.4% were into animal husbandry. The finding shows that most of the farmers were engaged in one form of occupation or the other which implies that they have other sources of income. In addition, the predominant occupation of rural dwellers is agriculture, and having another occupation could be a backup income source during the off-season (Oladimeji, Abdulsalam & Abdullahi, 2015; Ibitola, Fasakin, Popoola & Olajide, 2019).

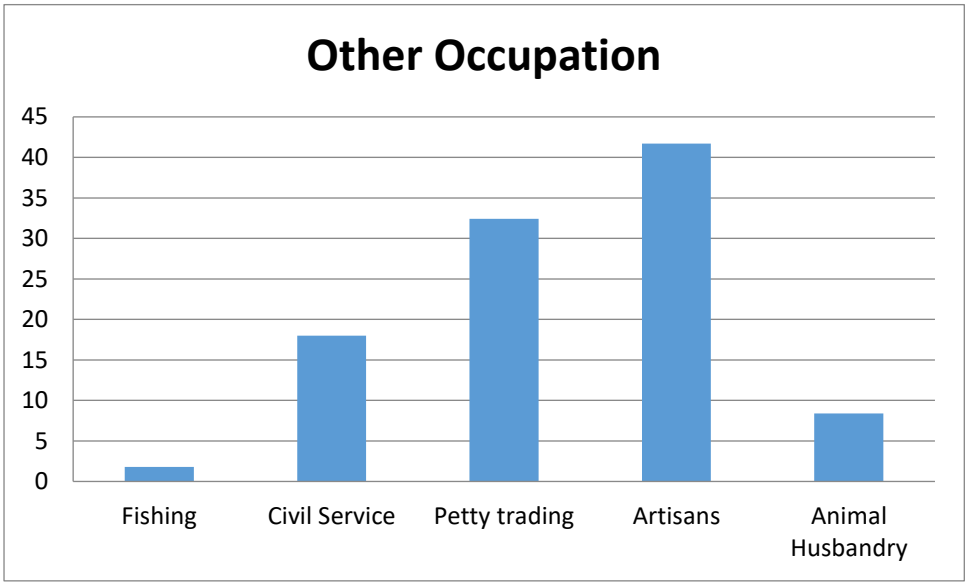

Figure 6: Distribution of arable crop farmers by other occupation

4.1.10 Years of farming experience

Findings in Figure 7 show that 15% of the farmers had farming experience less than 10 years, 32% had between 11 and 20 years of experience, 32% had between 21 and 30 years of experience, while 21% had above 30 years of farming experience. The mean years of farming experience was 25 years which implies that the majority of the farmers had a good number of years of experience. This could mean that these farmers have practiced farming for a long time, thus endowed them with the necessary practical knowledge to gain mastery. This corroborates Okoro, Asuquo & Etuk (2020) findings that the years of experience could help farmers make expert decisions on adopting farming practices. The farming experience could also influence the adoption of innovation and technology. According to K'esit, Ibok, Umoh, & Umoh (2015), farmers embracing innovation and technologies in most cases are influenced by their farming experience.

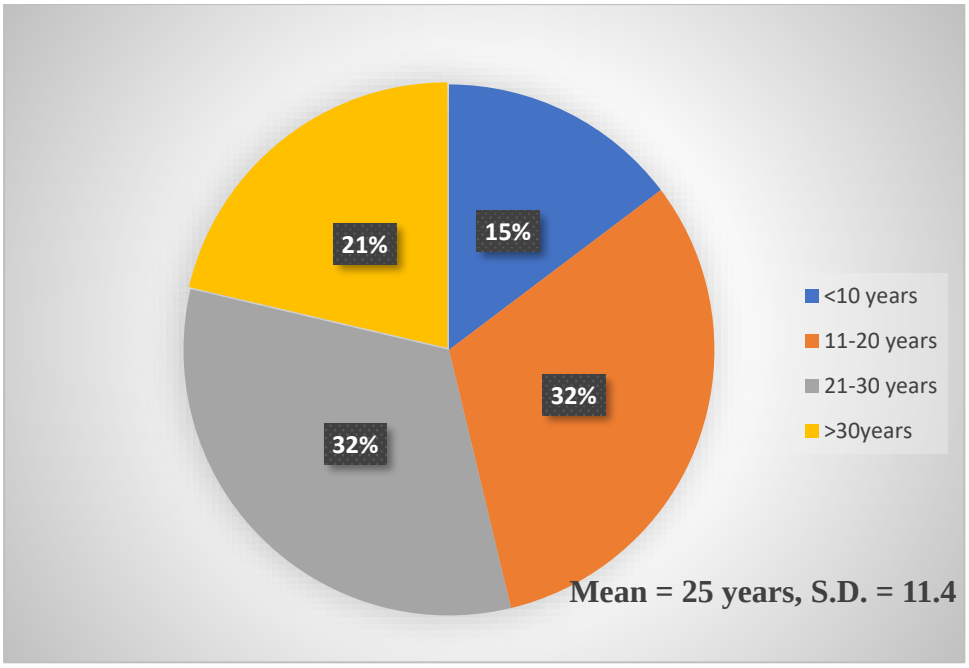

Figure 7: Distribution of arable crop farmers by farming experience

4.1.11 Type of land ownership

Findings in Figure 8 show that 52% of the farmers acquired their farmland by inheritance, 10.5% by purchase, 15.9% of the farmers rented their land, 41.7% used family land, 21.3% by lease, 0.3% used communal land, while 1.5% practiced crop sharing arrangement. It is noteworthy that no farmer used land provided by research institutes. As most of the farmers acquired their land by inheritance, this implies that they do not have to pay for the land. This finding agrees with the report of the National Bureau of Statistics NBS (2016); Onya, Ugochukwu & Ejiba (2019), that most farmlands in Nigeria were acquired through inheritance.

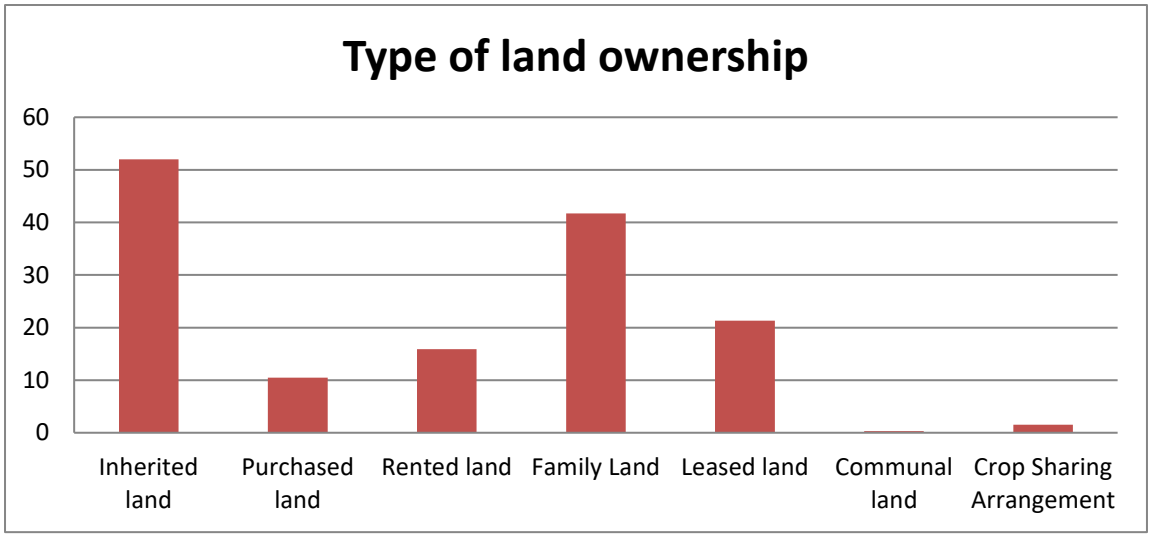

Figure 8: Distribution of arable crop farmers by land ownership

4.1.12 Types of crop cultivated

The most cultivated crops were maize (89.8%), followed by cassava (87.1%), vegetables (53.8%), tomato (41.7%), pepper (33.3%), and other arable crops (38.1%). The result further shows that farmers cultivate varieties of crops and indicates that the majority practiced mixed cropping across the study area. According to Vaughan & Ayebokiki (2014), farmers practice mixed cropping as a safety net. Ayodele & Akindele (2018), also reported that the practice of mixed cropping is predominant among arable crop farmers.

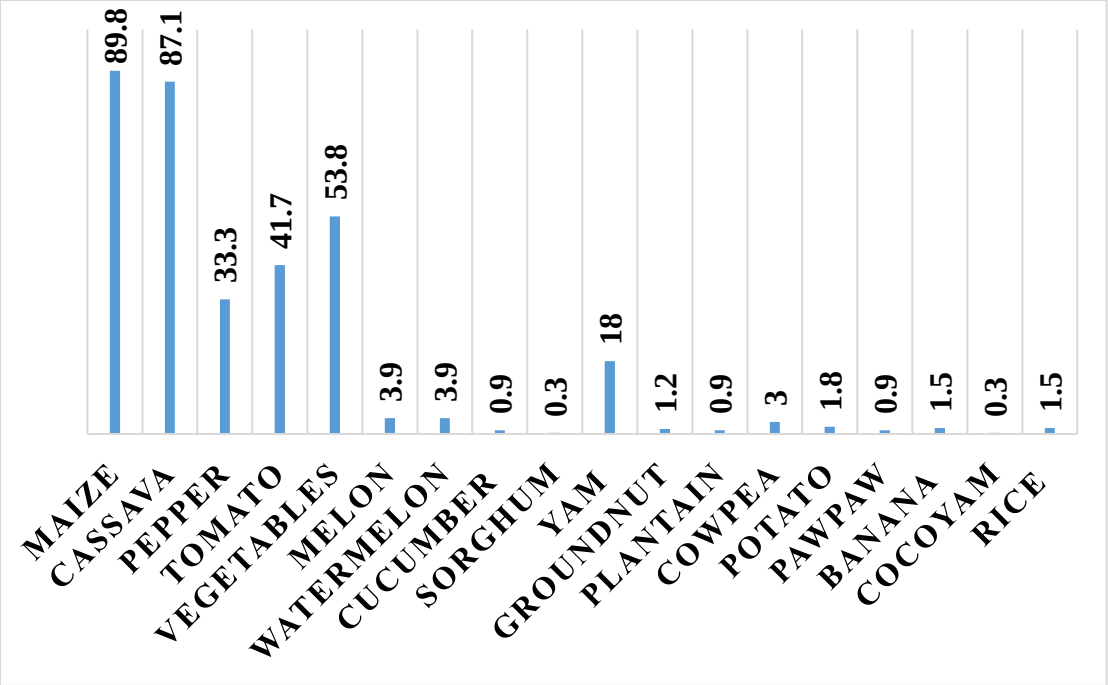

Figure 9: Distribution of arable crop farmers by type of crop cultivated

4.2: Awareness of organic farming practices among arable crop farmers

Findings in Table 6 show that majority of the respondents had high awareness of crop rotation, shifting cultivation, manual weeding, cover cropping, intercropping, rouging, mulching, storage without the use of chemicals, manuring, farmyard manuring, planting of certified organic seed, hermetic storage, green manuring, handpicking of insect eggs and larva from plants, minimum tillage, composting, zero tillage, use of bio-herbicide.

The technologies that the farmers are aware of our regular farm practices but highly emphasized in organic farming. The result, therefore, shows that farmers are aware of organic farming practices. This might influence their willingness to adopting organic farming practices. This finding agrees with Ekanem & Okon (2019), report that arable crop farmers are aware of organic farming practices and mostly practiced crop rotation.

However, slightly above average of the respondents were aware of the following practices; the use of bio-pesticide, use of bio-fertilizer, introducing pest natural enemy, the use of pest repelling plants, and the use of oils as an insecticide against small-bodied insects.

The level of awareness of organic farming practices by arable crop farmers was high. This implies that the farmers are aware of organic farming, this could be an unconscious awareness because the farmers have been using the practices because their culture supports it. This corroborates Ikuerowo & Tehinloju (2020), findings that arable crop farmers are aware of organic practices.

Table 6: Distribution of respondents according to awareness of organic farming practices. N=333

Awareness	Freq	%
Crop rotation	318	95.5
Shifting cultivation	312	93.7
Manual Weeding	312	93.7
Cover-cropping	309	92.8
Inter cropping	304	91.3
Rouging	299	89.8
Mulching	298	89.5
Storage without the use of chemicals	290	87.1
Manuring	265	79.6
Farmyard Manuring	261	78.4
Planting of Certified Organic seed	260	78.1
Hermetic storage	255	76.6
Green Manuring	242	72.7
Hand-picking of insect eggs and larva from plants	230	69.1
Minimum tillage	224	67.3
Composting	215	64.6
Zero tillage	208	62.5
Use of Bio-herbicide	204	61.3
Introducing Pest Natural Enemy	196	58.9
Use of bio-pesticide	195	58.6
Use of bio-fertilizer	193	58.0
Use of pest repelling plants	193	58.0
Use of oils as an insecticide against small-bodied insects	185	55.6

Source: Field survey, 2021

Table 7: Level of awareness of organic farming practices among arable crop farmers. N=333

Awareness	Frequency	%
Low	140	42.0
High	193	58.0
Total	333	100.0

4.3: Knowledge of organic farming practices among arable crop farmers

Findings in Table 8 show the distribution of the knowledge of arable crop farmers on organic farming practices. The farmers had high knowledge of the following statements; the use of chemicals is prohibited in organic farming ($\bar{x} = 4.42$), organic farming uses natural products ($\bar{x} = 4.35$), manure puts the soil particles together for better soil structure ($\bar{x} = 4.35$), green manuring helps to increase soil fertility ($\bar{x} = 4.30$), crop rotation help to control pest attacks ($\bar{x} = 4.29$), chemically treated seeds are prohibited in organic farming ($\bar{x} = 4.14$), compost should stay for some time before use ($\bar{x} = 4.11$).

The farmer's knowledge of the following statements shows that they had a good understanding of some organic farming practices. This could have a positive influence on their perception and attitude. Marsh, Zoumenou, Cotton, & Hashem (2017), stated that knowledge of organic farming was the most important factor in developing an attitude that allowed for the adoption of organic agricultural techniques.

The farmers had moderate knowledge on manuring using animal waste which should be left to decompose before being used in organic farming system ($\bar{x} = 4.00$), conversion to organic farms require a long transition period ($\bar{x} = 3.88$), tillage disturbs the activity of soil microbes ($\bar{x} = 3.82$), chemical herbicides cannot be used to control weeds in organic farmlands ($\bar{x} = 3.59$). This means that the farmers were moderately knowledgeable of the statements.

However, the farmers had low knowledge of the following statements; synthetic fertilizers can be used to fertilize organic plants ($\bar{x} = 2.46$), use of chemical fertilizers would enhance the growth of organic crops ($\bar{x} = 2.34$), chemical pesticides can be used to control pests in organic farms ($\bar{x} = 2.03$). This means that the farmers had low knowledge of some of the statements on organic farming practices. The implication is

that there is a knowledge gap with the farmers on organic farming practices. Farouque & Sarker (2018) stated that vegetable farmers had a low level of knowledge in most of the organic practices.

Table 9 shows the distribution of the farmers' level of knowledge of organic farming practices. Average (50%) of the farmers had a high knowledge of organic farming practices, while 29% had moderate knowledge, and 21% had a low-level knowledge of organic farming practices. Oyesola & Obabire (2011), reported that arable crop farmers have good knowledge of organic farming and the knowledge could influence them towards a favorable perception of organic farming. Mugivhisa, Olowoyo & Mzimba (2017), also reported that subsistence farmers were knowledgeable about organic farming.

Table 8: Distribution of knowledge of organic farming practices among arable crop farmers N=333

Knowledge	Mean	Rank	Status
Use of chemicals are prohibited in organic farming	4.42	1st	High
Organic farming uses natural products	4.35	2nd	High
Manure puts the soil particles together for better soil structure	4.35	2nd	High
Green manuring helps to increase soil fertility	4.30	4th	High
Crop rotation helps to control pest attacks	4.29	5th	High
Chemically treated seeds are prohibited in organic farming	4.14	6th	High
Compost should stay for sometime before use	4.11	7th	High
Manuring using animal waste should be left to decompose before being used in organic farming systems	4.00	8th	Moderate
Conversion to organic farms requires a long transition period	3.88	9th	Moderate
Tillage disturbs the activity of soil microbes	3.82	10th	Moderate
Chemical herbicides cannot be used to control weeds in organic farmlands	3.59	11th	Moderate
Synthetic fertilizers can be used to fertilize organic plants	2.46	12th	Low
Use of chemical fertilizers would enhance the growth of organic crop	2.34	13th	Low
Chemical pesticides can be used to control pests in organic farms	2.03	14th	Low

Grand mean= 3.72, Standard Deviation= 0.33

Source: Field survey, 2021

Table 9: Level of knowledge of organic farming practices among arable crop farmers. N=333

Knowledge	Frequency	%
Low	71	21.0
Moderate	95	29.0
High	167	50.0
Total	333	100

4.4: Perception of organic farming practices among arable crop farmers

Findings in Table 10 show arable crop farmers' perception of organic farming practices. The farmers had a favorable perception towards having livestock farming in organic farming is an advantage for soil fertility ($\bar{x}$ =4.36) which ranked first, followed by organic farming is environmentally friendly ($\bar{x}$ = 4.16), while farm produce from organic farming will be healthier than produce from conventional systems ($\bar{x}$ = 4.12). Organic farming is the best way to ensure sustainable future farming ($\bar{x}$ = 4.05) ranked fourth, and organic farming is culturally accepted ($\bar{x}$ =3.98) ranked next in the fifth position.

The farmers had a moderately favorable perception of the following statements; organic farming leads to high yields ($\bar{x}$ =3.72), organic farming inputs are bulky ($\bar{x}$ = 3.57), organic farming is expensive ($\bar{x}$ = 3.36), the organic standards are too complicated to follow ($\bar{x}$ =3.16), conventional farming is better than organic farming ($\bar{x}$ =3.15), and organic farming input are scarce ($\bar{x}$ =3.03). Bader (2020) reported that arable crop farmers had a moderately positive perception of organic farming.

However, the farmers in this study had an unfavorable perception of the following statements; obtaining information regarding organic farming is difficult ($\bar{x}$ = 2.87), and organic farming is time-consuming ($\bar{x}$ = 2.02). Ighoro, Alakpa, Kayenikan & Awhareno (2019) recorded an unfavorable perception of organic farming.

Also, Table 11 shows that almost average (46.1%) of the farmers had a moderately favorable perception of organic farming practices, while 38.5 % had a favorable perception, and 15.4% had an unfavorable perception of organic farming practices. This implies that the farmers had a good perception of organic farming and might likely lead to the adoption of organic farming in the study area. Oyedele, Wole-

Alo, Owolabi & Okunlola (2018) reported that arable crop farmers have a positive perception of organic farming.

Table 10: Distribution of perception of organic farming among arable crop farmers (N= 333)

Perception	Mean	Rank	Status
Having livestock in organic farming is an advantage for soil fertility	4.36	1st	High
Organic farming is environmentally friendly	4.16	2nd	High
Farm produce from organic farming will be healthier than produce from conventional systems.	4.12	3rd	High
Organic farming is the best way to ensure a sustainable future for farming	4.05	4th	High
Organic farming is culturally accepted	3.98	5th	High
Organic farming leads to high yields	3.72	6th	Moderate
Organic farming inputs are bulky	3.57	7th	Moderate
Organic farming is expensive	3.36	8th	Moderate
The organic standards are too complicated to follow	3.16	9th	Moderate
Conventional farming is better than organic farming system	3.15	10th	Moderate
Organic farming inputs are scarce	3.03	11th	Moderate
Obtaining information regarding organic farming is difficult	2.87	12th	Low
Organic farming is time consuming	2.02	13th	Low

Grand mean= 3.50, Standard deviation= 0.49

Source: Field Survey, 2021

Table 11: Level of perception of organic farming practices amongst arable crop farmers N=333

Perception	Frequency	%
Unfavourable	51	15.4
Moderately Favourable	154	46.1
Favourable	128	38.5
Total	333	100

4.5: Perceived constraints to adopting organic farming among arable crop farmers

Table 12 shows the perceived constraints that influenced farmers' willingness to adopting organic farming. Inadequate credit facilities ($\bar{x} = 1.79$) ranked highest amongst various constraints, lack of access to inputs to produce organically ($\bar{x} = 1.57$) ranked second, labor intensiveness of organic farm practices ($\bar{x} = 1.53$), poor production due to inability to address weeds and pests using organic methods ($\bar{x} = 1.51$) were ranked third, and fourth respectively.

The issue of inadequate credit facilities could be due to the credit diversion by the farmers to other non-farming activities. Abegunde (2019) reported that an average organic farmer does not use 100% of the credit facilities disbursed to them for farming activities. Although, according to Ufiobor (2017), lack of support from the government and lack of finance were barriers to the use of sustainable agricultural practices. If the aforementioned constraint remains, adoption of organic farming practices might be difficult or slow.

Table 12: Distribution of perceived constraints to adopting organic farming amongst arable crop farmers N=333

Perceived constraints	Mean	Rank
Inadequate credit faciliites	1.79	1st
Lack of access to inputs to produce organically such as bio fertilizers, bio−pesticides and seeds.	1.57	2nd
Labour intensiveness of organic farm practices	1.53	3rd
Poor production due to inability to address weeds and pests using organic methods	1.51	4th
Difficulties obtaining organic price premiums	1.44	5th
Lack of access to information on prices and markets for organic products	1.41	6th
Limited access to technical assistance	1.39	7th
Low income	1.39	7th
Low coverage of organic farming extension programs	1.37	9th
Unaffordability of organic farming materials	1.33	10th
Lack of skills to produce organically	1.22	11th
Lack of time to commit to organic farming	1.19	12th

Source: Field Survey, 2021

4.6 Willingness of arable crop farmers to adopting organic farming practices

Data in Table 13 shows the willingness of farmers to adopting organic farming practices. Majority of the farmers were willing to adopting organic certified seeds (96.7%), and crop rotation (96.7%) ranked first. Farmers were also willing to adopting mulching (96.1%) with fell in third place, followed by cover cropping (96.1%), green manuring (96.1%), composting (95.8%), storage without the use of chemicals (94.9%), poultry manuring (95.2%), and use of physical mechanism to terminate weeds (94.6%) in 4^{th}, 5^{th}, 6^{th} 7^{th}. 8^{th} and 9^{th} position respectively.

Furthermore, farmers also indicated willingness in farmyard manure (94%), intercropping (93.7%), use of bio-fertilizers (93.1%), shifting cultivation (91.9%), use of neem extract (88%), use of locust beans extract (84.7%), use of wood ash (86.2%), kitchen waste (82.9%) and the use of trap crops (80.5%). This finding agrees with Toungos & Bulus (2019) report that manure application, mulching, planting of cover crops, and crop rotation are practiced by most farmers.

However, the farmers were not willing to adopting the use of bio-herbicide (94.6%), cow dunging (91.9%), hermetic storage (89.9%), use of natural enemies (88.9%), minimum tillage (88.3%), use of beneficial insects (88.0%), zero tillage (85.3%), pig manuring (69.1%), use of biopesticide (58.9%), and the use of lemongrass extract (59.5%).

El-Shater, Mugera & Yigezu (2020) reported low adoption of zero tillage. Mobolade, Bunindro, Sahoo & Rajashekar (2019) also stated that the use of hermetic storage is not widely practiced. Even though it has been known for some time, it is still not commonly employed as an effective cost-efficient system for grains produced in the rural areas of developing countries.

The low willingness to adopting bio-pesticide could be due to a lack of proper awareness of bio-pesticide. Fenibo, Ijoma & Matambo (2020) reported that the use of bio-based insecticides in conjunction with integrated pest management (IPM) has shown to be the most effective way to influence most aspects of sustainable agriculture. As a result, bio pesticide-driven IPM, when combined with the necessary knowledge, skills, and research, can help to ensure the long-term sustainability of agriculture.

Overall, the willingness to adopting organic farming practices was high (71.5%). This implies that the majority of the farmers have high willingness to adopting organic farming practices. This could be because most of the practices are familiar and indigenous farmers also carry them out in conventional farming. Ikuerowo & Tehinloju (2020) reported that an increase in extension visits, membership of farmers' groups, access to information, and education positively increase the possibility of arable farmers to adopting bio-organic technology.

Table 13: Distribution of willingness to adopting organic farming practices amongst arable crop farmers N=333

Willingness	Willing (%)	Rank	Not willing (%)	Rank
Crop rotation	96.7	1st	3.3	27th
Organic certified seeds	96.7	1st	3.3	27th
Cover cropping	96.1	3rd	3.9	24th
Mulching	96.1	3rd	3.9	24th
Green manuring	96.1	3rd	3.9	24th
Composting	95.8	6th	4.2	23rd
Poultry manuring	95.2	7th	4.8	22nd
Storage without the use of chemicals	94.9	8th	5.1	21st
Physical mechanism to terminate weeds	94.6	9th	5.4	20th
Farmyard manure	94.0	10th	6.0	19th
Intercropping	93.7	11th	6.3	18th
Use of bio-fertilizers	93.1	12th	6.9	17th
Shifting cultivation	91.9	13th	8.1	16th
Use of natural Enemies	88.9	14th	11.1	15th
Use of Neem extract	88.0	15th	12.0	14th
Use of wood ash	86.2	16th	13.8	13th
Use of wood ash	86.2	16th	13.8	12th
Use of Locust-beans extract	84.7	18th	15.3	11th
Kitchen waste	82.9	19th	17.1	10th
Use of trap Crops	80.5	20th	19.5	9th
Use of bio pesticide	41.1	21st	58.9	8th
Use of Lemon grass extract	40.5	22nd	59.5	7th
Pig manuring	30.9	23rd	69.1	6th
Zero tillage	14.7	24th	85.3	5th
Use of beneficial Insects	12.0	25th	88.0	4th
Minimum tillage	11.7	26th	88.3	3rd
Hermetic storage	10.2	27th	89.8	2nd
Cow dunging	8.1	28th	91.9	1st

Source: Field survey, 2021

Table 14: Level of willingness to adopting organic farming practices amongst arable crop farmers N=333

Willingness	Frequency	Percent
Low willlingness< mean	95	28.5
High willingness ≥ mean	238	71.5
Total	**333**	**100.0**

4.7 Testing of Hypotheses

4.7.1 Hypothesis one: Association between socio-economic characteristics of respondents and their willingness to adopting organic farming

Table 15 reveals a positive and significant relationship between educational qualification of farmers (χ^2= 0.368) and farmers' willingness to adopting organic farming practices. The result further suggests that farmers who are more educated are more likely to adopting organic farming. Ikuerowo & Tehinloju (2020), reported that access to information and education positively increased the possibility of farmers adopting bio-organic technology. They further recommended the promotion of enhanced extension services that would adequately support farmers and extended education programs geared towards broadening farmers' knowledge on bio-organic technology. This contradicts the findings of Kisaka-Lwayo (2008); Karki, Schleenbecker, & Hamm (2011) that no significant relationship exists between educational level and adoption of organic farming.

Table 15: Result of chi-square analysis showing association between selected socio-economic characteristics of arable farmers and their willingness to adopting organic farming practices N=333

Variable	χ^2	Df	P	Decision
Sex	0.406	1	0.600	Not significant
Educational level	0.368	3	0.047	Significant
Marital status	4.489	3	0.213	Not significant

Significant at p≤0.05

χ^2- Chi -square

df- Degree of freedom

Source: Field survey, 2021

Finding in Table 16 further shows that there is a negative significant relationship between farm size (r=-0.114) and farmers' willingness to adopting organic farming. This implies that the larger the farm size of the arable farmer, the lower their willingness to adopting organic farming. Adebanjo, Mohammed & Balogun (2020) reported a negative significant relationship between farm size and organic farming adoption.

Also, the household size (r=-0.180) shows a negative significant relationship with their willingness to adopting organic farming. This implies that the larger the household size of arable farmers, the lower their willingness to adopting organic farming. Serebrenniko Thorne, Kallas & McCarthy (2020) reported a negative significant relationship between household size and adoption of organic farming practices.

Table 16: Result of correlation analysis showing relationship between selected socio-economic characteristics of arable farmers and farmers willingness to adopting organic farming practices. N=333

Variable	r	p	Decision
Age	-0.058	0.295	Not significant
Farm size	-0.114*	0.038	Significant
Years of farming experience	-0.056	0.312	Not significant
Household size	-0.180**	0.001	Significant

*** Significant at p≤0.05, ** Significant at p≤0.01**

Source: Field survey, 2021

4.7.2 Hypothesis two: Relationship between farmers' knowledge of organic farming and their willingness to adopting organic farming practices.

The finding in Table 17 shows that a significant relationship exists between farmers' knowledge of organic farming and their willingness to adopting organic farming ($r = 0.128$). This implies that as knowledge of organic farming increases among farmers, their willingness to adopting organic farming increases as well. In other words, with increased knowledge, arable farmers will be better informed on the practices involved in organic farming. This in turn would pose a positive influence on their willingness to adopting organic farming (Šūmane et al., 2018). Ma, Ma, Su, & Nie (2017) reported that information acquisition has an effect of increasing the probability of farmers' willingness to adopting organic farming.

Table 17: Result of correlation analysis showing relationship between farmers' knowledge of organic farming and their willingness to adopting organic farming practices.

Variable	r	p	Decision
Knowledge vs. willingness to adopting OF	0.128*	0.020	Significant

Source: Field survey, 2021

*** Significant at 0.05 level of significance, OF-Organic farming**

4.7.3 Hypothesis three: Relationship between farmers' perception of organic farming and their willingness to adopting organic farming

The finding in Table 18 reveals a significant relationship between arable farmers' perception of organic farming and their willingness to adopting organic farming practices (r = 0.122). This implies that as arable farmers exhibit a favorable disposition towards organic farming, their willingness to adopting increases. This result, however, is in contrast with the findings of Opoku, Bannor & Oppong-Kyeremeh (2020), that the willingness to produce organic vegetables is negatively and significantly influenced by the farmers' perception of their expertise in grading and standards in vegetable production and practices.

Table 18: Result of correlation analysis showing relationship between farmers' perception of organic farming and their willingness to adopting organic farming practices N=333

Variable	r	p	Decision
Perception vs. willingness to adopting OF	0.122*	0.026	Significant

Source: Field survey, 2021

*** Significant at 0.05 level of significance, OF- Organic farming**

CHAPTER FIVE

5.0. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The willingness of arable crop farmers to adopting organic farming practices in Oyo state, Nigeria was assessed. The specific objectives of the study were to describe the socio-economic characteristics of respondents; ascertain their level of awareness of organic farming practices; determine the farmers' level of knowledge of organic farming practices; ascertain their' perception of organic farming practices; determine arable crop farmers' willingness to adopting organic farming practices, and to investigate the perceived constraints to adopting organic farming practices.

The study was carried out in Oyo State, Nigeria. A multi-stage and proportionate sampling procedure was used to select respondents for the study. The first stage involved the selection of seventy-five percent of the ADP zones in the state giving a total of 3 zones which were Ibadan/Ibarapa, Oyo, and Ogbomosho. The second stage involved the selection of thirty-five percent of the blocks giving a total of seven blocks (Ido, Ibarapa East, and Ibarapa central in Ibadan/Ibarapa zone; Oyo west and Afijio in Oyo zone; Ogbomosho south and Ogooluwa in Ogbomosho zone). The third stage involved a selection of ten percent of the cells giving a total of 13 cells. The fourth stage involved a selection of twenty percent of the registered farmers giving a total sample size of 340 respondents. However, only 333 questionnaires were retrieved and subjected to analysis, while the remaining seven were not properly filled.

The result revealed that the majority (70.6%) of the respondents were male with a mean age of 50 years±10.1, married (92.5%) with a mean household size of 7 members. Also, 22.2% of the respondents had no formal education, 22.2% of the respondents had

primary education, 32.2 % of the arable farmers had secondary, and 23.4% had tertiary education. The mean years of farming experience of the respondents were 25 years±11.4 and their mean annual income was ₦802,648.65±₦1,218,871.44. The mean farm size was 1.02 hectares.

The respondents were involved in other occupations; 1.8% were into fishing, 18% were civil servants, 32.4% were into petty trading, 41.7% were artisans, while 8.4% were into animal husbandry. Majority (52%) of the respondents acquired their land through inheritance. The most cultivated crops by the farmers were maize (89.8%), cassava (87.1%), pepper (33.3%), tomato (41.7%), vegetables (53.8%), while 38.1% cultivated other arable crops.

Above average (58%) had a high level of awareness, while the average (50%) had a high level of knowledge of organic farming practices. About 46 % of the farmers had a moderately favorable perception of organic farming practices. Majority (71.5%) of the farmers had high willingness to adopting organic farming practices. Meanwhile, the result revealed some perceived constraints to adopting organic farming practices. Inadequate credit facilities ($\bar{x}$ =1.79) ranked first, followed by lack of access to inputs to produce organically ($\bar{x}$ = 1.57), labor intensiveness of organic farm practices ($\bar{x}$ =1.53), poor production due to inability to address weeds and pests using organic methods ($\bar{x}$ =1.51).

Furthermore, at p≤0.05, there was a significant relationship between educational level ($\chi^{2=}$ 0.368), farm size (r=-0.114), household size (r=-0.180), farmers knowledge (r =0.128), perception of organic farming practices (r =0.122) and farmers' willingness to adopting organic farming practices. The findings from the study revealed that arable crop farmers had a high willingness to adopting organic farming practices.

5.2 Conclusion

In conclusion, arable crop farmers had a high level of willingness to adopting organic farming practices in Oyo State. Farmers also had a high level of awareness and knowledge of organic farming practices Almost average had a moderately favorable perception of organic farming practices. However, they were some perceived constraints to adopting organic farming practices like inadequate credit facilities and lack of access to inputs.

5.3 Recommendation

The study recommends that extension agencies create more awareness of organic farming through awareness campaigns. Also, farmers should also be equipped with the knowledge and skills by specialists in organic farming. This is to enable them to be effective at organic farming practices through training programmes under the supervision of the Agricultural extension agencies. Furthermore, the ADPs should engage farmers in activities and field trips that build their capacity on organic farming practices this could also help them develop a favorable perception of organic farming.

Adequate credit facilities should be made available to the farmers by the government through agricultural financial institutions like farmers cooperatives and different ADPs, this could also be accompanied by good regulation and monitoring process of the credit facility provided to the farmers to avoid diversion of funds.

The practices that the farmers are not willing to practice should be emphasized during organic training meetings and workshops to help them develop their skills and change their disposition towards organic farming to a more favorable disposition which will also influence their willingness.

Also, the promotion and enhancement of information flow on organic farming should be encouraged by the extension agents through meetings, awareness campaigns, publications, field days e.t.c.

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APPENDIX

RESEARCH INTERVIEW SCHEDULE ON

WILLINGNESS OF ARABLE CROP FARMERS TO ADOPTING ORGANIC FARMING PRACTICES IN OYO STATE, NIGERIA

LAND MARK UNIVERSITY

COLLEGE OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EXTENSION

Dear Respondent,

This questionnaire schedule is intended to collect information on the above topic. All information given will be treated with absolute confidentiality and used for the purpose of this study. Thanks for your cooperation.

General information: Respondent no:…..Name of community:……

SECTION A: Socio-economic characteristics of the respondents

1. Age…… (in years)
2. Sex: Male ( ), Female ( )
3. Educational level and the number of years spent:

   No formal education: Yes ( ), No ( )

   Primary education….Secondary education….Tertiary education……
4. Marital status: Single ( ) Married ( ), Divorced ( ) Widowed ( ) Separated ( )
5. Monthly income: ……. In Naira
6. Religion: Christianity ( ) Islam ( ) Traditional ( ) Others ( )
7. Household size: ……
8. Farm size (acres)? …….

9. Other occupation? Fishing ( ) Civil servant ( ) Petty trading ( ) Artisans ( ) Animal husbandry ( ) None ( )

10. Years of farming experience …….

11. Land ownership pattern? Personal/Inherited land ( ) Purchased land ( ) Rented land ( ) Family land ( ) Leased land ( ) Communal land ( ) Research institutes ( ) Crop sharing arrangement ( )

12. Types of crop (s) cultivated….. Maize (), Cassava ( ), Pepper (), Tomato ( ), Vegetables ( ) Others namely……

SECTION B: Awareness on organic farming practices

13. Are you aware of the following organic farming practices?

SN	**Organic farming practices**	**Yes**	**No**
	Land preparation		
1	Zero tillage		
2	Minimum tillage		
	Soil fertilty		
3	Manuring		
4	Green manuring		
5	Farmyard manuring		
6	Composting		
7	Use of bio-fertilizer		
	Planting		

8	Planting certified organic seeds		
	Soil conservation method		
9	Mulching		
10	Cover cropping		
	Pest management		
11	Use of pest repelling plants		
12	Introducing pest natural enemy		
13	Use of bio-pesticide		
14	Hand picking of insect eggs and larva from plants		
15	Use of oils as insecticide against small-bodied insects		
	Others		
	Weeding		
16	Manual weeding(uprooting)		
17	Roguing		
18	Bio-herbicide		
	Storage		
19	Storage without the use of chemicals		
20	Hermetic storage		
	Farming system		
21	Crop rotation		
22	Intercropping		

23	Shifting cultivation		

SECTION C: Knowledge of organic farming among arable crop farmers

Please tick as appropriate in the box provided on each of the statements about knowledge of organic agriculture below.

SN	Knowledge statements	SA	A	U	D	SD
1	Use of chemicals are prohibited in organic farming practice					
2	Tillage disturbs the activity of soil microbes					
3	Manure puts the soil particles together for better soil structure					
4	Green manuring helps to increase soil fertility					
5	Organic farming uses natural products					
6	Conversion to organic farms requires a long transition period.					
7	Crop rotation helps to control pest attacks					
8	Chemically treated seeds are prohibited in organic farming					
9	Compost should stay for some time before use					
10	Manuring using animal waste should be left to decompose before being used in organic farming systems					
11	Chemical pesticide can be used to control pests and diseases in organic farms					
12	Chemical herbicides cannot be used to control weeds in organic farmlands					

13	Use of chemical fertilizers would enhance the growth of organic crop					
14	Synthetic fertilizers can be used to fertilize organic plants					

SECTION D: Perception of organic farming among arable crop farmers

14. Please respond appropriately to the following statements. SA=Strongly agree, A= Agree, U= Undecided, D= Disagree, SD= Strongly Disagree

S/N	Perception statements	SA	A	U	SD	D
1	Conventional farming is better than organic farming system.					
2	Organic farming is expensive					
3	Having livestock in organic farming is an advantage for soil fertility					
4	Organic farming is the best way to ensure a sustainable future for farming					
5	Organic farming inputs are bulky					
6	Organic farming is time consuming					
7	Organic farming leads to high yeilds					
8	The organic standards are too complicated to follow					
9	Obtaining information regarding organic farming is difficult					
10	Farm produce from organic farming will be healthier than produce from conventional systems.					
11	Organic farming inputs are scarce					
12	Organic farming is culturally accepted					
13	Organic farming is environmentally friendly					

SECTION E: Willingness to adopting organic farmingpractices

15. Are you willing to adopt the following organic farming practices?

S/N	Organic technologies	Willing to adopt	Not wiling
	Land preparation practices		
1	Zero tillage		
2	Minimum tillage		
	Planting		
3	Organic certified seeds		
	Soil fertility		
4	Poultry manuring		
5	Cow dunging		
6	Pig manuring		
7	Green manuring		
8	Composting		
9	Kitchen waste		
10	Farmyard manure		
11	Use of bio-fertilizers		
	Weed control		
12	Physical mechanism to terminate weeds		
13	Use of Bio- herbicide		
	Others		
	Soil conservation method		
14	Mulching		
15	Cover cropping		

	Farming system		
16	Crop rotation		
17	Intercropping		
18	Shifting cultivation		
	Pest Management		
19	Use of trap Crops		
20	Use of beneficial Insects		
21	Use of natural Enemies		
22	Use of bio pesticide		
23	Use of Lemon grass extract		
24	Use of Neem extract		
25	Use of Locust-beans extract		
26	Use of wood ash		
	Others :-		
	Storage		
27	Storage without the use of chemicals		
28	Hermetic storage		

SECTION F: Perceived constraints to adopting organic farming

16. Indicate the level of challenges you may face in adopting organic farming

S/N	**Perceived constraints**	**Major constraint**	**Minor constraint**	**Not a constraint**
1	Lack of skills to produce organically			

2	Poor production due to inability to address weeds and pests using organic methods			
3	Lack of access to inputs to produce organically such as bio fertilizers, bio−pesticides and seeds,			
4	Difficulties obtaining organic price premiums			
5	Lack of access to information on prices and markets for organic products			
6	Inadequate credit facilities			
7	Low coverage of organic farming extension programs			
8	Limited access to technical assistance			
9	Low income			
10	Labour intensiveness of organic farm practices			
11	Unaffordability of organic farming materials			
12	Lack of time to commit to organic farming			