DETERMINANTS OF UTILISATION OF ORGANIC FARMING PRACTICES AMONG CROP FARMERS IN SOUTHWESTERN NIGERIA

BY

OWOLABI Busuyi
MATRIC. NO. 147777
B.Agric. Agricultural Economics and Extension Services (Benin)
M.Sc. Agricultural Extension and Rural Development (Ibadan)

A Thesis in the Department of Agricultural Extension and Rural Development
submitted to the Faculty of Agriculture
in partial fulfillment of the requirement for the award of the Degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

MARCH, 2021

CERTIFICATION

I certify that this research work was carried out by Owolabi Busuyi under my supervision in the Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan Nigeria.

…….

(Supervisor)

Professor A.E. Adekoya

B. Agric. (Hons.) (Ife)
M.Sc., Ph.D (Ibadan)
Department of Agricultural Extension
and Rural Development University of Ibadan,
Ibadan Nigeria.

DEDICATION

This project is dedicated to God Jehovah, the one who causes to become, the epitome of love. His love has served as my support and my succor during the course of this study. The provider of helps and helpers for the successful completion of this Ph. D programme.

ACKNOWLEDGEMENTS

I am grateful to my supervisor Prof. A.E. Adekoya for his efforts, criticisms and advice which greatly improved the quality of this research work. May the Lord of heaven continue to shower His blessing upon you Sir.

My gratitude also goes to Prof. L. A. Akinbile, the Head of Department who is always ready to assist. Your constructive criticism of research work to improve its quality is highly appreciated. May Allah continue to bestow on you divine wisdom. My heart is full of gratitude towards the postgraduate committee in the persons of Dr. B. R. Olajide, Dr. O. T. Yekinni, Dr. Sarafat O. Tijani, Dr. O. S. Fadairoand Dr. K. A. Thomas who took it upon themselves to make sure that the research work is further fine-tuned. May the Almighty God continue to fortify them.

My sincere thanks go to Dr. I. O. Badirufor his encouragement right from the inception of this research work, his words of advice sustained my interest in this research work. Thank you Sir, may the Lord help you to achieve your goals in life. I further thank Dr. O. T. Yekinni to whom my supervisor directed me as one of the experts in my field of study. He at last saw to it that the research was successful. May Allah continue to help you in all your endeavours.

My appreciation also goes to Prof. J. O. Oladeji, Prof. O. B. Oyesola, Prof. Stella O. Odebode, Prof. PippyO. Fawole, Dr Mojisola F. Oyewole and Dr Oluwaseun A. Adeleke for their words of advice to gear me up in the course of this study. I am also grateful to Prof. A.A Ladele, Prof. M.K Yahaya, Prof. M.G Olujide, Dr Olufolake E. Adelakun and Dr N.S Olutegbe for their contributions to the success of this study at one point or the other. May God continue to bless them. My appreciation is extended to all non-academic staff of the department of Agricultural Extension and Rural Development for their support.

I also appreciate my colleagues in the Department in the persons of Dr. A.A. Adejumo and Mr. B. O. Oyelami for their assistance. I am also grateful to Prof. G. O. Adeoye and Dr. O. O. Adeoluwa from the Department of Agronomy, University of Ibadan for supplying me with oral and written information during this research work. I also say thank you to Prof. J. J. Atungwu from the Department of Crop Protection, Federal University of Agriculture,

Abeokuta as well as Dr. T. I. Olabiyi from the Department of Agronomy, Ladoke Akintola University of Technology for supporting me with some required materials for this research work.

My heartfelt appreciation is also extended to my family members, my dear wife Mrs. Funmilola K.Owolabi for words of encouragement and endurance during the course of this study. I thank my father Mr.G. O. Owolabi who slept in the Lord during the course of this studyfor his encouragement while alive, may God put you in His memory and remember you on the day of resurrection. I also appreciate my dear mother Mrs. Deborah A. Owolabi, I say big thank you to her for her prayer on my behalf, may God grant you more prosperous years. In the same vein, I am very grateful to my brothers and sisters for their assistance and encouragement. May the Lord continue to grant you all happy family life.

OWOLABI Busuyi.

ABSTRACT

Organic agriculture is being promoted due to its environmental and human friendliness. Efforts to promote Organic Farming Practices (OFP) is yielding positive results, though its utilisation is still low. Previous studies on OFP have focused on extension model and compliance with organic agriculture standards. However, information on factors which predispose farmers to the use of OFP is limited. Therefore, factors that predispose crop farmers to utilisation of OFP in southwestern Nigeria were investigated.

Four-stage sampling procedure was adopted. Oyo, Osun and Ogun states were purposively selected due to preponderance of organic corporate farmers. Using simple random sampling, 10% of 83 Local Government Areas (LGA) in the selected states and 17% of 92 wards in the selected LGA were sampled resulting in 8 LGA and 16 wards. Finally, a list of 737 crop farmers was generated from all the wards and 40% of crop farmers were sampled proportionate to size resulting in 295 crop farmers. Interview schedule was used to elicit information on respondents' personal and enterprise characteristics, sources of information, knowledge of OFP, OFP in use, utilisation of OFP, attitude towards OFP, benefits derived and constraints in utilising OFP. Indices of knowledge (low, 7.00-16.77; high, 16.78-25.00), OFP utilisation level (low, 20-40; high, 41-63), attitude (unfaourable, 46-76; favourable, 77-110) were generated. Data were analysed using descriptive statistics, Chi-square, Pearson Product Moment Correlation, ANOVA and multiple regression at $\alpha_{0.05}$.

Respondents' age, farming experience, annual income and farm size were 43.45±10.95 years, 20.44±6.94 years, ₦250,072.00±₦338,081.00 and 0.50±0.66 hectares, respectively. Most of the respondents were male (96.3%) while 94.3% of the respondents had formal education.Most of the farmers (78.6%) practised mixed cropping, while most grown crops were cassava (73.2%), maize (65.1%) and vegetables (56.3%). Major sources of information on OFP were farmers' association (126.4), print media (118.0) and radio (109.3), while 55.3% of the respondents had high knowledge of OFP. The OFP in use were use of wood ash (1.87±0.40), lemon grass extract (1.63±0.5), organic herbicides (1.34±0.61) and neem extract (1.35±0.60). The OFP level was low for 60.3% of the farmers, while 42.0% had favourable attitude towards OFP. Benefits derived from OFP by farmers included poison-free crop produce (1.65±0.48), increased crop shelf life (1.50±0.51) and increase in soil organic content (1.34±0.47). Respondents were constrained by unavailability of market for organic crop produce (1.59±0.71); inadequate capital (1.43±0.89); inadequate labour (1.40±0.62); curing of fresh manure (1.06±0.73); pests and diseases control problem (0.93±0.79). Respondents' age (r=0.334); household size (r=0.188); farm size (r=-0.402); income (r=0.422); cosmopoliteness (χ^2=32.81) and membership of association (χ^2=161.45) related significantly to utilisation of OFP. Farmers' favourable attitude (β=0.438), high cosmopolitness (β=0.427), being old (β=0.399), large household size (β=0.107), high knowledge (β=0.000) and membership of association (β=0.075) increased utilisation of OFP, while being highly constrained (β= -0.351) decreased it.
Increased knowledge, age, household size, cosmopolitness, favourable attitude towards organic farming practices and constraints were predictors of utilisation of organic farming practices in southwestern Nigeria.

Keywords: Organic farming, Soil organic matter content, Poison-free crop produce, Crop shelf life
Word count: 479

TABLE OF CONTENTS

Title Page i
Certification ii
Dedication iii
Acknowledgements iv
Abstract vi
Table of Content vii
List of Tables ix
List of Figures xiii
List of Plates xiv
List of acronyms and abbreviations xv
CHAPTER ONE: INTRODUCTION 1
1.1 Background to the study 1
1.2 Statement of research problem 5
1.3 Objectives of the study 7
1.4 Hypotheses of the study 7
1.5 Significance of the study 8
1.6 Operational definition of terms 9
CHAPTER TWO: LITERATURE REVIEW 10
2.1 History of organic agriculture 10
2.2 Activities of organic farming in Nigeria 11
2.3 Principles of organic agriculture 13
2.3.1 The principle of fairness 13
2.3.2 The principle of ecology 14
2.3.3 Principle of health 15
2.3.4 The principle of care 16
2.4 Crop breeding and organic agriculture 16
2.5 Approved practices for organic crop production 18
2.6 The relationship between organic agriculture and indigenous

Knowledge 20
2.7 Benefits of organic agriculture 24
2.8 Organic manuring 27
2.9 Organic farming as a strategy to mitigate and adapt to climate change 29
2.10 Information and communication of organic agriculture 31
2.11 Sustainable agriculture and organic agriculture 32
2.12 Types of certification in organic agriculture 33
2.13 Management of weeds on organic horticultural farm 34
2.14 The use of organic pesticides in controlling postharvest losses 35
2.15 Cultural methods of controlling pest and disease attack in organic crop production 37
2.16 Factors influencing farmers' utilisation of agricultural innovations 38
2.17 Problems of organic farming in Nigeria 41
2.18 Theoretical and conceptual framework 43
2.18.1 Theoretical framework 43
2.18.1.1 Theory of knowledge utilisation 43
2.18.1.2 Theory of planned behavior 44
2.18.1.3 Adoption theory 45
2.18.1.4 Human ecology theory 47
2.18.2 Explanation of the conceptual framework 47
CHAPTER THREE: RESEARCH METHODOLOGY 51
3.1 Area of study 51
3.2 Population of the study 51
3.3 Sampling Procedure and Sample Size 52
3.4 Method of data collection 55
3.5. Validation of instrument and test of reliability 55
3.6 Measurement of variables 55
3.6.1 Independent variables 55
3.6.1.1 Socio economic characteristics 55
3.6.1.2 Crop farmers' sources of information on organic farming practices 57
3.6.1.3 Knowledge test of crop farmers about organic farming practices 57

3.6.1.4 Attitude of crop farmers towardorganic farming practices. 57
3.6.1.5 Benefits derived from practicing organic farming practices. 58
3.6.1.6 Constraints to use of organic farming practices 58
3.6.1.7 Focus group discussion and in-depth interview 58
3.6.2 Dependent variable 59
3.7 Data Analysis 59
CHAPTER FOUR: RESULTS AND DISCUSSION 61
4.1 Respondents' socio economic characteristics 61
4.1.1 Sex 61
4.1.2 Marital status 61
4.1.3 Religion 62
4.1.4 Ethnicity 62
4.1.5 Cosmopoliteness 62
4.1.6 Household size 63
4.1.7 Educational background 65
4.1.8 Age 65
4.1.9 Primary occupation 65
4.1.10 Membership of associations 66
4.1.11 Years of farming experience 71
41.12 Income 71
4.1.13 Sources of farm labour 71
4.1.14 Cropping system 72
4.1.15 Crops grown 72
4.1.16 Crop best grown using OFP 72
4.1.17 Farm size 72
4.1.18 Source of land 73
4.2 Sources of information of respondents 76
4.3 Frequency of use of sources of information 76
4.4 Respondents' knowledge of organic crop farming practices 80
4.5 Respondents' utilisation of organic farming practices 83
4.6 Benefits derived from organic crop farming 88

4.7 Respondents' attitude towards organic crop farming practices 92
4.8 Constraints faced in practicing organic crop farming 96
4.9.0 Results of the hypotheses testing 100
4.9.1 Relationship between socio economic characteristics and utilisation of organic crop farming practices 100
4.9.2 Relationship between respondents' knowledge and utilization of organic farming practices 105
4.9.3 Relationship between benefits derived and utilisation of organic crop farming practice 105
4.9.4 Relationship between respondents' attitude and utilisation of organic farming practices 105
4.9.5 Relationship between constraints encountered and utilisation of organic farming practices 106
4.9.6 Analysis of variance in the utilisation of organic crop farming practicesacross the crop types 108
4.9.7 Analysis of variance in the utilisation of organic crop farming practices across the associations of crop farmers 111
4.10 Regression analysis of utilisation of organic farming practices with independent variables 114
CHAPTER FIVE: SUMMARY CONCLUSION AND RECOMMENDATIONS
5.1. Summary 117
5.2 Conclusion 119
5.3 Recommendations 119
5.4 Contribution to knowledge 120
5.5 Areas for further research 120
References 121

LIST OF TABLES

Table 3.1	Sampling procedure for crop farmers	53
Table 4.1	Distribution of crop farmers based on socio economic characteristics	64
Table 4.2	Distribution of crop farmers based on socio economic Characteristics	74
Table 4.3	Distribution of crop farmers based on socio economic characteristics	75
Table 4.4	Distribution of frequency of use of sources of information	79
Table 4.5	Distribution of respondents based on the knowledge of items answered correctly	81
Table 4.6	Categorisation of crop farmers based on their knowledge of OFP	82
Table 4.7	Distribution of respondents based on utilisation of organic farming practices	85
Table 4.8	Distribution of respondents based on category of OFP utilisation	86
Table 4.9	Overall categorisation of level of OFP utilization	87
Table 4.10	Distribution of respondents based on benefit derived from OFP	90
Table 4.11	Distribution of respondents based on level of benefit derived from OFP	91
Table 4.12	Distribution of respondents based on their attitude towards organic crop farming practices	94
Table 4.13	Categorisation of respondents based on their attitude towards OFP	95
Table 4.14	Distribution of respondents based on the constraint faced in practicing organic crop farming	98
Table 4.15	Categorisation of respondents based on the level of constraint faced in practicing organic crop farming	99
Table 4.16	Correlation between socio economic characteristics and utilisation of organic farming practices	103
Table 4.17	Chi-square values of association between socio economic	

	characteristics and utilisation of organic farming practices	104
Table 4.18	Correlation between knowledge, benefits derived, attitude, constraints and utilisation of organic farming practices	107
Table 4.19:	Analysis of variance showing differences in the utilisation of organic crop farming practices among different crops	109
Table 4.20	Duncan table of separation of means in utilisation of organic farming practices	110
Table 4.21	Analysis of variance showing differences in the utilisation of organic crop farming practices by crop farmers across their associations	112
Table 4.22	Duncan table of separation of means in utilisation of organic farming practices	113
Table 4.23	Linear regression analysis on contribution of selected independent variables to the utilisation of OFP among crop farmers	116

LIST OF FIGURES

Figure 1	Preparing compost manure	29
Figure 2	Theory of planned behaviour	45
Figure 3	Five stages in innovation-decision making	46
Figure 4	Conceptual framework of determinants of utilisation of organic farming practices among crop farmers in southwestern Nigeria	50
Figure 5	Maps showing study areas in southwestern Nigeria	54
Figure 6	Distribution of respondents' educational background	67
Figure 7	Age distribution of respondents68	
Figure 8	Distribution of primary occupation of respondents	69
Figure 9	Distribution of crop farmers based on association	70
Figure 10	Distribution of sources of information of respondents	78

LIST OF PLATES

Plate 1	Researcher with farmer that used organic farming practices for the production of Ginger in Oriade L.G.A., Osun State	131
Plate 2	Farmers that used organic farming practices for vegetable production in Akinyele L.G.A., Oyo State	132
Plate 3	Researcher together with crop farmers that were packing organic manure in Ido L.G.A., Oyo State	133
Plate 4	A group of crop farmers interviewed in Oriade L.G.A.	134
Plate 5	Indepth Interview with Researcher and farmers' leader in Ido L.G.A after Indepth Interview	135
Plate 6	Indepth interview with a farmers' leader in Ogbomoso south L.G.A.	136
Plate 7	Indepth Interview with a farmers' leader in in Akinyele L.G.A.	137

LIST OF ACRONYMS AND ABBREVIATIONS

ADP	Agricultural Development Programme
CAC	Codex Alimentarius Commission
FAO	Food and Agricultural Organization
FCP	Farmer Communication Programme
GDP	Gross Domestic Product
ICS	Internal Control System
IFOAM	International Federation of Organic Agriculture Movements
ISD	Institute for Sustainable Development
LAUTECH	Ladoke Akintola University of Technology.
NAFPP	National Accelerated Food Production Programme
NAPEP	National Agency for Poverty Eradication Project.
NBS	National Bureau of Statistics
NOAN	Nigerian Organic Agriculture Network or Association of Organic Agricultural Practitioners of Nigeria
NOGAMU	National Organic Agricultural Movement of Uganda
OAPTIN	Organic Agriculture Project in Tertiary Institutions in Nigeria
OFP	Organic Farming Practices
OOCORD	Olusegun Obasanjo Centre for Organic Agriculture Research and Development
PELUM	Participatory Ecological Land Use Management
PGS	Participatory Guarantee System
TOAM	Tanzanian Organic Agriculture Movement
TPC	Third Party Certification

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Agriculture plays a vital role in the development of national economy. According toNational Bureau of Statistics (National Bureau of Statistics, 2017), agriculture contributed 24.4% to nominal Gross Domestic Product (GDP) and crop production remains the major driver of the sector as it accounts for 91.97% of overall nominal growth of the sector. This sector provides employment to 71 percent of Nigerian population. Despite the level of agricultural production in Nigeria, food production has not been able to meet the required food supply of Nigerian population (Nwankpa, 2017). The desire to increase production of food has led Federal Government to come up with different agricultural programmes such as Youth Initiative for Sustainable Agriculture (YISA), Agricultural Transformation Agenda (ATA), National Accelerated Food Production Programme (NAFPP)and Agricultural Development Projects (ADP)(Daneji, 2011 andPaul, 2018). These programmes encouraged the use of modern technologies and inputs which characterize conventional agriculture, and they were expected to increase food production to meet ever increasing demand. In an attempt to achieve this aim, some farmers who were practicing indigenous agriculture have either partially or fully imbibed conventional farming practices.

There is increase in the use of agrochemicals to control pests, diseases and weeds on an expanded farmland. The negative effects of these agrochemicals do not support a form of agriculture that is environmentally friendly. The continuous use of non-organic fertilizer in conventional farming is attributed to reduction in the yields of crops.This is as a result of antagonistic reactions of non-organic fertilizer in the soil that leads to the increase in acidity of the soil which results to nutrient imbalance (Jagadish, 2018). Inorganic nutrient supplementation has greatly contributed to soil and water pollution (Khan, Mobin, Abbas and Alamri, 2018). Also, regular application of inorganic fertilizer to the soil has resulted to the accumulation of salts on soil surface as a result of its high solubility and release. The increase in price of natural gas being experiencedover the years is due to competition for use of nitrogenous substance for production of natural gas and inorganic fertilizer

(Sanyal,Malczynski and Kaplan, 2015). The use of harmful agrochemicals in agricultural production was confirmed to be a serious danger to human health. The reason being that, some toxic substances used in some agrochemicals find their way into plant product during nutrient accumulation in crop plant (Naveen, Ashok, Parveen and Manish, 2012). These negative effects have actually called for more sustainable agriculture that will engender consideration for human health and maintenance of soil properties.

Organic farming has proved to be environmentally friendly and allows production of crops and livestock without any damage to ecosystem (Yuhui, Guojun, Lichun, and Shuhua, 2019). Organic farming is defined as a production system that relies on the use ofecologicalprocesses, biodiversity and cycles as well as biodegradable materials adapted to local conditions with low external inputs so as to sustain the health of soils, ecosystems and people (Nigerian Organic Agriculture Network, 2012).Organic farming has become a good alternative to the common conventional form of agriculture. Organic farming does not support the use of synthetic chemicals for pest control, growth stimulating hormones and manipulation of genes in the crop production. This has been challenging to specialists in an attempt to device new methods to prevent and control pest and disease attack in crop and livestock management.In the developing nations, organic agriculture is considered as a good option for sustainable agricultural development since it only allows a unique combination of low external input technology, environmental conservation and input or output efficiency. Organic agriculture has approved practices and list of substances that are allowed and prohibited. The practices cut across conversion time and requirement, diversity of farming system, soil and water management, soil fertility management, prevention/control of pest and disease, weed control and planting materials. According to Nigerian Organic Agriculture Network (NOAN, 2012), International Federation of Organic Agriculture Movements has adopted four principles that govern organic agriculture, these principles are:

1. Principle of fairness: This principle supports the fact that any form of agriculture to be practiced should not jeopardise human and animal environment, that is, there should be fairness within the nexus formed by agriculture, human and animal lives.

2. Principle of health: This principle in organic agriculture implies that, the health of soil on which crops grow and the health of man and animal that depend on agricultural produce should be sustained.
3. Principle of ecology: This means that organic agriculture should be ecologically friendly, it should be related to ecological cycles and supports their sustenance.
4. Principle of care: This has to do with the consideration that must be shown to the current and future generations when it comes to maximizing agricultural benefits. In this way, the health, well-being and the environment will be protected in a precautionary manner.

The advantages of organic agriculture to those involved ranges from rural employment and development, food security, poverty reduction toimprovedlivelihood status as well as enhancing productivity of poor rural people (Hine and Pretty, 2008). Among Sustainable Development Goals are promotion of sustainable agriculture in order to end hunger, achieve food security and improve nutrition, protect, restore and promote sustainable ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and stop loss of biodiversity. These goals could be addressed through the practice of environmentally sustainable organic agriculture. In view of benefits of organic agriculture for sustainable economy, rural and environmental development, it is imperative to examine the existing opportunities for organic agriculture in Nigeria with a view to harnessing them to achieve sustainable development. Organic farming practices (OFP) reduce the possibility of environmental contamination, reduce the use of chemical inputs and minimize public health costs of pesticides poisoning for every one engaging in OFP activities. Organic fertilizers are being made from the wastes that would have contributed to environmental contamination. These fertilizers are obtained from farm and city wastes commonly referred to as agricultural wastes. Compost and animal manure were the main sources of nutrients to crop before the emergence of conventional farming that promote the use of inorganic fertilizers. Organic fertilizer application supports the growth of crops due to improved soil mineralisation and soil physical characteristics, the soil physical attributes provide adequate soil cover and conditions which minimize water and wind erosion there by preventing nutrient loss (Achieng; Ouma; Odhiambo and Muyekho, 2010).

The associated benefit of organic agriculture is encouraging many nations to make a gradual shift from conventional agriculture to organic agriculture (Moyib and Ige, 2011). Statistical information on organic agriculture is now available from 160 countries, there were 500,000 producers reported and the countries with larger organic land area are Uganda, Tunisia and Ethiopia (Willer and Kilcher, 2017). In view of the importance of organic agriculture, several initiatives have emerged in Nigeria these include Olusegun Obasanjo Center for Organic Research and Development (OOCORD), Organic Agriculture Projects in Tertiary Institutions in Nigeria (OAPTIN) and Nigerian Organic Agriculture Network (NOAN).

In response to the worldwide interest in sustainable agricultural production system. Organic Agriculture Project in Tertiary Institutions in Nigeria (OAPTIN) was founded in June 2004. It focuses on training people on organic agriculture. In 2009, OAPTIN through the Work Earn and Learn Programme trained some students for seven weeks. The training was extended to university lecturers and staff of the Ministry of Agriculture. In order to sustain this, summer school programme was set up to give opportunity for interested scientists, farmers, businessmen and policy makers in areas of training that covers composting, organic fruits, vegetable and arable crop production, organic livestock production, organic fish, snail and cane rat production. In an effort to ensure high agricultural production at sustainable level the second national conference on organic agriculture was held in Nigeria, under regulation of International Federation of Organic Agricultural Movement where the participants were charged with the responsibilities of making organic agriculture work in Nigeria (OAPTIN, 2012). Regardless of several projects on the advantages of sustainable organic agriculture for producers, consumers, government and environment in developing countries, reliable information on organic agriculture remain scarce. If organic agriculture is to be encouraged in Nigeria, factors influencing the utilisation of new technology as in the case of organic agriculture must be properly analyzed.

Utilisation refers to the acceptance and use of innovation. The new ideas or innovation could be information, hybrid of crops or new farming system (Oladele and Adu, 2003). The attributes of new idea itself which include its advantages, constraints and method of communication can affect utilisation. The users of innovation also have some attributes

that affect their willingness to utilise an innovation, these attributes include users' age, level of education, years of farming experience, land tenure system, social status, farm size and location. Moreover, among the factors that encourage the utilisation of research output and technologies disseminated by research institutes of Nigeria are awareness of the advantages of the research output, technical know-how information and exposure to the technologies. Furthermore, involvement of farmers through participatory approach to researches so that the farmers' constraints can be tackled by research findings and also the need for farmers to have access to credit facilities to enable them utilise the new idea with new challenges (Nmadu and Busayo, 2015).

1.2 Statement of research problem

The burgeoning human population has put so much pressure on the food sector. This had led to agricultural interventions that emphasized the use of chemicals to boost agricultural production. The practice of intense chemical application such as pesticides, herbicides and inorganic fertilizer is recognised to be harmful to human health and environment. Accumulation of some of these harmful chemicals in crops consumed by human harms the development of children and encourages testicular, prostate, breast, stomach and intestinal cancer. These chemicals contain heavy substances such as mercury, cadmium and lead which can destroy brain cells and contribute to various diseases such as Alzheimer. As such the health of farm workers and those who consume poisoned agricultural produce is adversely affected (Naveen*et al*.,2012). The use of agro-chemicals also has negative impact on soil. Regular use of inorganic fertilizer has led to increase in soil acidity and soil nutrients imbalance. Inorganic nutrient supplementation has also led to pollution of ground water and affects soil structure. Some of Nigeria's export crops have been failing to meet international standards due to excessive agrochemical residues. This causes economic disincentive to farmers and puts the country's agro-export in disrepute. Losses of soil fertility and the huge overhead for soil fertilisation is also a major challenge to farmers.

In order to tackle these problems, there is need to encourage farmers to utilise sustainable form of agriculture as in the case of organic agriculture (Abdullah, 2019). Literatures have shown that there are many factors that can predispose farmers to utilisation

of innovation. These factors can be the characteristics of innovation and those of potential users of innovation. The degree of relationship between the innovation and already existing practices among people, as well as benefits that can be derived from using an innovation can influence the readiness to utilise it. The users' readiness will alsodepend on his personal and enterprise characteristics (Howley *et al.,*2012). There have been several attempts to encourage farmers to utilse organic farming practices. Awareness is being created through seminars, workshops and training sessions organised by different organic agriculture organisations such as Organic Agriculture Projects in Tertiary Institutions in Nigeria (OAPTIN) and Nigerian Organic Agriculture Network (NOAN) especially in southwestern Nigeria.

There are many experimental research studies carried out on organic agriculture especially in the areas of weed control, pest and disease management, soil and water conservation as well as fertilizer and soil conditioner (Akob and Ewete, 2010; Aminu-Taiwo*et al.,* 2011;Adesina*et al.,* 2012;Ukeh*et al.,*2012; Alabi and Adewole, 2017)

There are few research studies carried out on the use of organic agriculture practices among the end users (farmers). Studies likeObabire (2017) who reported that the use of appropriate extension model in training farmers could lead to increase in knowledge and favourable attitude towards the use of organic farming practices. Also, Oyesolaand Obabire (2012) confirmed high awareness and low involvement in organic farming, while Olanrewaju (2019) reported low compliance with organic agriculture standards by Nigerian farmers. However, information on factors which predispose farmers to use of OFP is limited.

Despite the efforts made by organic agriculture organisations, utilisation of organic agriculture practices is still low as only 8,202 hectares have so far been cultivated out of a total of 83 million hectares that are suitable for cultivation representing 0.0099% of the Nigerian land area, with 597 producers out of more than 70 percent of millions of Nigerians that are engaging in agriculture (FiBL and IFOAM, 2013). This low utilisation is further noticed in comparison to other countries, for instance as at 2009, 27,748 producers in Burkina Faso and 22,515 producers in Sierra Leone had embraced organic agriculture, also the export value of organic products in Uganda from 226,954 hectares was 37 million US dollars in 2009/2010 (FiBL and IFOAM, 2013). Organic farming practices will be of little or

no value if they cannot be put to use for the economic and social wellbeing of the people involved. Therefore, this study intends to look into determinants of utilisation of organic farming practices among crop farmers. Thus, factors that directly affect farmers' decision to use organic farming practices could be analysed statistically. In order to carry out the study, the following research questions are raised:

1. What are the socio economic characteristics of respondents?
2. What are the respondents' preferred sources of information on organic farming practices?
3. What are the respondents' knowledge about organic farming practices?
4. What are the benefits derived in using organic farming practices?
5. What are the constraints encountered by the respondents in using organic farming practices?
6. What are the respondents' attitude toward the use of organic farming practices?
7. What are the organic farming practices being utilised by the respondents?

1.3 Objectives of the study

The general objective of the study is to examine the determinants of utilisation of organic farming practices among crop farmers. In order to attain the broad objective, the specific objectives are to:

1. describe the socio economiccharacteristics of respondents;
3. identify respondents preferred sources of information on organic farming practices;
4. ascertain respondents' knowledge about organic farming practices'
5. assess benefits derived in using organic farming practices;
6. examine the constraints encountered by the respondents in using organic farming practices;
7. examine respondents' attitude toward the use of organic farming practices; and
8. assess organic farming practices being utilised by the respondents

1.4 Hypotheses of the study

The following hypotheses stated in null form were tested at 0.05 level of significance in the study.

1. There is no significant relationship between socio economiccharacteristics and utilisation of organic farming practices.
2. There is no significant relationship between respondents' knowledge and utilisation of organic farming practices.
3. There is no significant relationship between benefits derived by the respondents and utilisation of organic farming practices.
4. There is no significant relationship between constraints encountered by respondents and utilisation of organic farming practices.
5. There is no significant relationship between respondents' attitude towards the organic agriculture practices and utilisation of organic farming practices.
6. There is no significant difference in the level of utilisation of organic farming practices across the associations of crop farmers.

1.5 Significance of the study

The need for sustainability of agriculture, human health and environment has called for a form of agriculture that would be human and environment friendly. Organic agriculture is now being encouraged nationally and internationally for its ability to sustain the health of soil, ecosystem and people. There are some advantages that can be attributed organic farming which include: improvement in soil texture and its water infiltration, increase in water holding capacity and improved soil microbial activities, preservation of water living organisms by reducing the influx of toxic materials into streams, rivers and lakes as a result of application of agrochemicals on the farm. In view of benefits associated with the practice of organic farming, a research work on factors that predispose farmers to its use is of significant importance.

Despite the fact that the initiative for organic agriculture has been in place in Nigeria since 2004, very few farmers are utilising the practice of organic agriculture. This study was set forth to examine the determinants of utilisation of organic farming practices. The study would reveal the factors that might be the hindrances to utilisation of organic farming practices among the crop farmers and suggest ways to tackle the hindrances. The outcome of the study would provide information about the prospect of organic agriculture thereby allowing government and non-government organisations that are interested in organic

agriculture to evolve better procedure to go about it so as to motivate crop farmers to utilise organic farming practices. The outcome of the research work would contribute to the already existing body of knowledge and serve as a guide to other researchers in related fields of study.

1.6 Operational definition of terms

Utilisation is the action of making practical and effective use of something.

Organic agriculture/farming is defined as a system of production that depends on ecological processes, biodiversity and cycles as well asthe use of biodegradable materials adapted to local conditions with little or no external inputs so as to sustain the health of soils, ecosystems and people.

Knowledge is a body of known and factual ideas which form basis for decision taking in using certain practices such as those of organic agriculture.

Attitude is a psychological way of feeling, thinking or behaving.

CHAPTER TWO
LITERATURE REVIEW

2.1 History of organic agriculture

Traditional system of farming had been in practice long time ago. For instance, forest gardening was carried out using organic farming practices dated back to prehistoric times. It is thought to be the most resilient and the oldest agroecosystem in the world. Specifically, the emergence of organic agriculture could be traced back to the beginning of the Twentieth century when conventional farming was intensified as a result of improvement in science and technology. Utilisation of synthetic fertilizers and other chemicals for soil fertility maintenance, pests and weds control was criticised and this triggered the need for organic farming more especially in India and Europe (Obabire, 2017).

Sir Albert Howard the British botanist was the first to merge traditional farming methods and modern scientific knowledge, as such he is often referred to as the father of modern organic agriculture. Between 1905 and 1924, Sir Albert Howard and his wife Gabrielle, a plant physiologist documented traditional farming practices in India and these practices were accepted to be superior compared to conventional farming practices. The first comprehensive organic farming system, that is, biodynamic agriculture was first developed by Rudolf Steiner. He explained the relationship within plants, animals and soil which can be guided by farmers during a lecture series in Poland in 1924. He said that the healthy animals depend on healthy plants on which they feed, while healthy soil will support the growth of healthy plants; healthy soil in turn depends on healthy plants and animals for manure through decomposition. Using Steiner's ideas, a student of Biodynamic Agriculture named Walter James described a broad view of a sustainable ecological approach to

farming, “the farm as organism”. He coined the term "organic farming" in his book Look to the Land published in 1940 (Paull, 2006).

In 1939 Lady Eve Balfour launched the Haughley Experiment. It was confirmed that human future and health depended on how soil was used. The validity of this experiment led to the formation of Soil Association. During the 1950s, due to the adverse effects of agrochemicals, sustainable farming system was a topic of interest. In 1962, Rachel Carson, a prominent scientist and naturalist, made known the harmful effects of pesticides, for example, DDT on human and his environment. This led to US government's 1972 banning the use of DDT. In the 1970s, the need to reduce environmental pollution to the barest minimum called for sustainable organic farming (Paull, 2007). As the difference between organic and inorganic food became clearer, one goal of the organic movement is to encourage consumption of locally grown food. In 1972, the International Federation of Organic Agriculture Movements (IFOAM) was founded in France and this body was charged with the responsibility of spreading information on the principles and practices of organic farming across the continents. Legislation and certification of organic agriculture were given more attention in 1990s. This was due to the pressure mounted by producers and consumers of organic farm produce around the globe in 1980s.

In twenty first century, emergence of organic markets has encouraged involvement of more participants in organic agriculture. Majority of these participants are still small, independent organic producers and consumers. For instance, there are local organic markets in Federal University of Agriculture Abeokuta and in University of Ibadan. Ladoke Akintola University of Technology exhibited organically produced ginger and turmeric in large organic market in Germany in 2010. Many interested people are now being trained by these institutions to engage in the production of organic crops (NOAN, 2011).

2.2 Activities of organic farming in Nigeria

The population of Nigeria is over 180 million and the country is the most populous in black African. Farming was the mainstay of Nigeria before the oil boom. The country is blessed with abundant natural and human resources. The oil deposit is much in the Niger Delta region of the country. This has both advantages and disadvantages in term of national economic growth and adverse effect on the environment. There are many cases of oil

spillage, gas flaring and pollution of water, air and soil which greatly affect agricultural activities. Apart from these adverse effects from oil region, indiscriminate felling of trees is very high in some areas of the country where people use wood as a major source of energy. Due to rapid growth in population and increase in urbanisation, available farmland has been reduced and fragmented. In attempt to manage available farmland, excessive use of agrochemicals in agricultural production has contributed to the contamination of soil and water.All these adverse effects have really called for a more sustainable form of agriculture as in the case of organic agriculture.

Nigeria has not developed its potentials in comparison to countries like Uganda and Ethiopia in terms of capacity development in organic agriculture. As of 2007, Nigeria as a country had only 3154 hectares under organic agriculture, of which 50 hectares were fully converted to organic farm. Although Nigeria is an agrarian country with track records of been one of the world best producers of some crops at one point in time, the practice of organic agriculture is still at the low ebb(Willer and Kilcher, 2017).

In view of the need for sustainable agricultural production system. Organic Agriculture Project in Tertiary Institutions in Nigeria (OAPTIN) was founded in June 2004 in Federal University of Agriculture, Abeokuta.This body focuses on training people including students, lecturers, staff of the Ministry of Agriculture, scientists, farmers, businessmen and policy makers on organic agriculture. In an effort to ensure high agricultural production at sustainable level the second national conference on organic agriculture was held in Nigeria, under regulation of International Federation of Organic Agricultural Movement where the participants were charged with the responsibilities of promoting organic agriculture in Nigeria. In the past ten years. OAPTIN has created awareness of organic agriculture. This organisation has provided fresh organic produce for FUNAAB community and Abeokuta at large. These produce include organic vegetables, pineapple, moringa, plantain, egg plants, passion fruits, fluted pumpkin, cucumber, pepper, tomato, sweet potato, pawpaw oranges and maize (OAPTIN, 2012).

LAUTECH and NAPEP organic agriculture project has received national attention. This has stimulated the interest of hundreds of people from Ogbomoso town and other neighbouring towns and citiesto take advantage of organic agriculture. LAUTECH is into training of farmers for organic crop production in warming up for international marketing of

organic farm produce such as ginger, turmeric and lemon grass. LAUTECH was called to come and exhibit organic crops in Germany during Biofach 2010. This was as a result of LAUTECH innovative activities in organic agriculture.

In 2007, Olusegun Obasanjo Centre for Organic Agriculture Research and Development (OOCORD) was introduced.This body centered on the development of organic agriculture through research. Nigerian Organic Agriculture Network (NOAN), this body was formed along with OOCORD initiative and is now serving as the head quarter in networking the activities of organic agricultural practitioners in Nigeria.The headquarter office is located in University of Ibadan. NOAN activitiesinvolve production, capacity building, standard and certification, advocacy, research and marketing(NOAN, 2018). The objectives the association are:

- To increase awareness of organic agriculture in Nigeria
- To help local farmers who have interest to convert to organicagriculture
- To build the capacity of all practitioners in organic agriculture
- To facilitate the process involved in standardisation and certification of organic produce
- To connect farmers to organic produce market
- To communicate with foreign bodies on organic farming related matter.

2.3 Principles of organic agriculture

Principles are the underlining guidelines or rules that govern the operations being carried out in organic agriculture. Agriculture is vital to human existence and as such it must be carried out in a sustainable manner, there must be rules that govern the activities in order to sustain the nexus between agriculture, human and environment. The environment in which human carry out agricultural operations encompasses plants, animals, water and soil. These are manipulated in order to grow and distribute agricultural produce. History, culture and values of community are related to agriculture since agriculture is practiced by many and touched the lives of many people. These guidelines involve humans' interaction within themselvesand their impact on the natural landscapes and the future generations to come. The four principles on which organic agriculture is based are principles of fairness, ecology, health and care (NOAN, 2012).

2.3.1 The principle of fairness

This principle considers the fact that agriculture is not practiced in isolation as such a sustainable form of agriculture as in the case of organic agriculture should be fair. Fairness implies good association between man and other things in his environment. This kind of relationship could come into play when justice, equity, stewardship and respect are allowed to reign in an ecosystem.

This underlining guideline posits that all stakeholders in farming such as the producers/farmers, the consumers/buyers, processors, distributors or marketers should entertain fairness in dealing with one another. Organic agriculture should provide enabling environment for good quality of life for both man and animal. For instance, through the avoidance of use of chemicals in crop and livestock production; agriculture would lead to poison-free food for man and animal and as such,good quality of life (NOAN, 2012). A sustainable farming should enhancefood security and good quality of life for all participants. This guideline considers the well-being, physiology and natural behaviour of animals to be important.Organic agriculture puts future generation into consideration and for this reason, there should be judicious use of limited resources for agricultural production. Organic agriculture accounts for environmental and social costs in that the production methods, forms of distribution and marketing systems are transparent and equitable.

2.3.2 The principle of ecology

Organic agriculture as part of larger category of sustainable agriculture has been proved environmentally friendly and allows production of crops and livestock without any damage to ecosystem (Yuhui *et al*., 2019). The reason being that organic agriculture is based on living ecological systems and cycles, works with them, emulates them and helps sustain them. Agricultural activities should be based on ecological processes, and recycling. Balance and sustainable ecology is very important for agricultural production. For example, living soil is meant for crop production; for animals it is the farm natural habitat; for fish and other aquatic organisms, the aquatic environment.

Organic agriculture, wild harvest and pastoral systems should fit the cycles and ecological balances. These cycles are universal but their operations may depend on the

nature of the locality. Organic farming system should be adapted to locally existing conditions and culture. Inputs should be reused where and when possible. Recycling and efficient management of materials and energy so as to reduce required inputs for production. This would in turn lead to maintenance and improvement of environmental quality and resources conservation. Organic agriculture practices help to attain ecological equilibrium through the design of farming systems, establishment of ecosystem and maintenance of genetic and agricultural variation. If this is to be attained, natural ecosystem should not be tampered with irredeemably. Sustainable practices such as afforestation, cover cropping, crop rotation, mixed cropping and avoidance of use of chemicals that are detrimental to natural habitat should be adopted in order to maintain a balanced ecosystem.

2.3.3 Principle of health

Conventional agriculture condones excessive utilisation of agrochemicals that have negativeeffectson soiland human health. For example, accumulation of some harmful chemicals in crops consumed by human harms the development of children, encourages cancer of different kinds in human. These chemicals contain heavy substances such as mercury, cadmium and lead which can destroy brain cells and contribute to various diseases such as Alzheimer. As such the health of farm workers and those who consume poisoned agricultural produced is adversely affected (Naveen *et al*., 2012). On the contrary, organic farming should support the health man, animal, plant and soil as well as planet as a whole. There is a relationship between the health status of living and non-living things in an ecosystem is interrelated. That is, if man and animal are to be healthy, agricultural produce they consume must be healthy. This further means that the soil from which crops that man and animals feed on must be healthy. Ability to withstand diseases and regenerate is a key characteristic of health. If this ability is to be maintained, natural states of plants and animals as well as their environment must be maintained as much as possible. The function of organic farming, whether in production, distribution, processing or consumption, is to maintain and improve the health of ecosystems and organisms either in or on the soil, small or big. In particular, sustainable organic agriculture is meant to produce poison-free, better quality, nutritious food that help to protect good health and well-being of all involved in an

ecosystem. For this to be achieved, chemicals of any sort that can jeopardise the health of man and animal should be avoided.

2.3.4 The principle of care

The sustainable farming system should put into consideration the care and health of current and future generation. For instance, the use of inorganic fertilizer that can ultimately turn farmland acidic is avoided and replaced with organic fertilizer that can better maintain soil fertility (Jagadish, 2018). Continuous use of this sustainable form of agriculture can maintain the natural status of our ecosystem from generation to generation.Productivity and efficiency can be improved by the farmers in a sustainable system of farming but not at the detriment ofwelfare of current and future generations. Any new technologies to be adopted need to be assessed so that the existing sustainability will not be interrupted. That is, such technology must support the natural ecosystem as much as possible. In farm management activities, sense of care and responsibility is important in making choices for the technologies to be used in organic farming. Organic agriculture should minimize or eliminate risks by adopting sustainable technologies and rejecting unpredictable and risky ones, such as genetic modification which can hinder the potential of plants and animals to resist pests and diseases. There should be joint agreement on the rules guiding sustainable agriculture through participatory approach. While the scientific knowledge is recognised,practicaland indigenous ideas of local farmers that are tested by time are not underrated.Combination of scientific and indigenous knowledge of local people can greatly contribute to sustainability(Kolawole, 2001)

2.4 Crop breeding and organic agriculture

In crop breeding, the use of genetically-modified (GM) crops has largely focused on improving food quantity and quality. The use of GM crops has not provided stable solution to food problem. For instance, in conventional plant breeding for disease resistance, vertical resistance is common compared to horizontal resistance that is

common in natural and evolutionary crop breeding. Vertical resistance is a qualitative type due to the action of single genes capable of providing complete protection, while horizontal resistance is the resistance due to the action of multiple genes and, hence, capable of providing maximum degree of protection (Robinson, 2009).

Vertical resistances are not always stable and not being able to withstand new kind of pests that emerged through resistance. They only provide immediate and short term solution, even in the process, they create another problem of diseases and pests becoming resistant, which will need a new solution or new genetically engineered variety. The introduction of genetic modified crops in agriculture leads to a chain reaction that can only benefit the producers of GM crops. This is because the producers will monopolise GM seed market and farmers will have no alternative than to be dependent on the seeds' producers each year. Examples include GM corn and soybean in the USA. Even, by the time the resistance of the GM crop breaks down, all resistant varieties would have been displaced (Ceccarelli, 2014).

Conventional crop breeding sometime produces food with unwanted characteristics, some of these characteristics are harmful to human health. Although, either some crops are genetically manipulated or not, they carry certain amount of toxins. Example is the toxin that is contained in premature tomato fruit (tomatine), but as the fruits mature, the toxin begins to reduce. When the fruits ripen enough for human consumption, toxin content would have been reduced to a consumable level. In the case of conventionally bred tomato, toxin levels can vary considerably to the point of being hazardous to human (Leonardi, Ambrosino, Esposito and Fogliano, 2000). Added to this problem, new kinds of crops produced through genetic variation are not often subjected to proper assessment of nutritionally acceptable level of toxin. Problems in genetic modification of potato during breeding for quality traits also include introgression of undesirable traits due to extensive utilisation of exotic germplasm. For instance, wild species having higher amount of glycoalkaloid which can be transferred into cultivated species leads to increase its concentration in tubers and made it harmful for human consumption.(Menasha, Manoj, and Shashank, 2018).

Genetic modification is not the solution to the low yield production in sustainable organic systems, asides the fact that modification provides an unstable protection against

diseases, it does not consistently increase yields, even in conventional agriculture. Selection of adaptable crop varieties through an organised breeding programme offers better solution. The advantage of evolutionary plant breeding method is being explored in organic farming. The method involves planting mixtures of very many different genotypes of the same crop on farmers' farmland. As a result of natural crossing, the genetic features of the crop that is produced will not be similar to those of the crop that was planted because of differences in individual's fitness. The set of crops will emerge with time which will be better adapted to the soil type, soil fertility, organic agronomic practices, rainfall and temperature (Ceccarelli, 2009).

Organic agriculture is a good option and alternative to conventional farming. Organic farming practices include integrated biological pest management, cropping systems that minimize soil erosion and reduce water loss, the use of organic manures and planned crop rotations to reduce the buildup of diseases, insects and weeds. Another benefit of organic agriculture that is easily overlooked, is its ability to reduce the ecological damage caused by over application of chemicals in pest management practices. This changes the food web structure, and as such, plant communities become dominated by a few common plants, which contribute to pest and disease outbreaks (Shaver, 2003).

2.5 Approved practices for organic crop production

NOAN recently came up with practices/requirements for organic crop production (NOAN, 2012) which are:

a. **Biodiversity:** Other plants such as trees must be left on the field so that natural ecosystem could still be maintained. Natural environment such as primary wetlands and forests shall not be tampered with in order to establish production in relation to organic requirements.
b. **Farming system diversity**: Growing of different varieties of plants and strategies to ensure maximum organic matter content, high soil fertility, improved microbial action and soil health shall be ensured by practicing crop rotation, intercropping, agro forestry or other appropriate measures.
c. **Erosion control and water management**: Soil and water conservation shall be an important part of organic agriculture. Windbreak, soil cover, minimum cultivation,

late removal of crop residues, terrace, contour planning and cover crops shall be practiced so as to prevent soil erosion.

d. **Soil fertility management**: In order to manage soil fertility, recycling of nutrients and planned crop rotation as well as controlling of leaching are integral in organic production. Mineral fertilizers may be used in a programme to address high soil fertility along with other methods such as addition of organic matter, green manures, and use of nitrogen fixing plants.
e. **Weeds, pests and diseases management**: Physical methods of pest, disease and weed control and prevention may be used. Products for preventing and controlling pest, disease and weeds that are prepared locally from plants, animals, and micro-organisms that are not genetically modified may be used. Active ingredients that derived from natural origin may be used as inputs for pest, disease, and weed management. Covered crops may also be used.
f. **Planting materials**: Seeds and seedlings must be organic in nature. In the absence of organic seeds and seedlings, chemically untreated conventional seeds, seedlings, and planting material may be used.
g. **Conversion time and requirement in organic crop production**:The time taken for a crop farmer to abide by organic standard concerning the farmland being free of chemical is defined as the conversion period. NOAN in collaboration with IFOAM agreed on three years. That means that, for a farm land to be called organic farm land; such land must be free of chemicals of any sort for at least three years. This conversion time can also be said to be period needed by the conventional farmland to reachacceptable participatory Guarantee Scheme organic status. It should be noted that when traditional farming systems fulfill the guidelines for organic farming practices (OFP) no conversion period is required. Since natural resources of virgin land would still be intact, when claiming virgin land for agriculture, no conversion time is needed. Farmland may be turned organic gradually, that is, unit by unit if there would be shock or loss if a farm is converted all at once. The full standards must be followed from the start of conversion in the unit under conversion. The farm portion converted to organic farmland should be clearly demarcated from inorganic farmland. The distance that should be between organic and conventional farmland

should be at least 40m. This distance is referred to as buffer zone. This distance is enough to deplete any chemical from conventional farmland to organic farmland through and during mineralization.

When mixed farming is the system being practiced on the farmland, the entire operation should be seen as a whole. It is not recommended to separate the conversion of individual field or individual livestock production. Organic farming that include plant or livestock production and use of remote areas, such as outlaying field and pasture as part of farm unit shouldbe operated under the same management. The remote areas should be included in the conversion plan as well. During conversion period, farmer may experience some loss in yields. The extent of loss will depend on biological nature of the farm, farmer's experience and the amount of chemicals that had been used on the farmland before. One strategy to cope with the loss during transition period is to convert partially. There should be no alternation of farmlands during and after the conversion, otherwise a farmland cannot be said to be organic.

2.6 The relationship between organic agriculture and indigenous knowledge

Organic agriculture combines indigenous and scientific knowledge to promote good relationship and a good life for all involved in a shared environment (Abdullah, 2019). Indigenous knowledge through tradition has been part of human family. The localized knowledge that is unique to particular ethnic groups for farming, health services, food processing and preparation, management of natural resources and education which is passed verbally from one generation to the other (Chris,2017). More than 70% of the national population lives in rural areas where traditional agricultural practices are encouraged and used by the local farmers to earn their living (Ekong, 2003).

Organic farming system had been in practice long time ago in traditional way among farmers before the emergence of conventional farming method. The farmers in those days practiced shifting cultivation, late removal of crop residue, planned crop rotation and multiple planting methods in replenishing fertility of soil and controlling of pest infestation without using chemicals which have adverse effects on soil, human and environment. Organic farming practices are just development on the already existing

farming practices with much interest in creating, environmentally, socially and economically viable system of agriculture. Some of these indigenous practices according to Taiwo *et al*., 2006, Iwena, 2012 and Ibeawuchi*et al*., 2015 in organic agriculture are as explained below:

a. **Mixed cropping**: This is also known as multiple cropping, it involves growing of more than one crops on the same piece of land at the same time. This practice is beneficial because it can help in reducing disease and pest infestation, soil condition is maintained since crops planted will be taking their nutrients from different soil layers. Even residues from crops will also add to soil fertility. There will be no fear of total crop failure, if one crop fails to do well, the other crops in mixed cropping will serve as a safeguard against loss for the farmer. Also, farmland will not be left exposed to erosion or leaching after one crop out of two or three crops planted is harvested, thus soil fertility will be managed and well utilised.
b. **Crop rotation**: This deals with a careful planned sequence of growing different crops at different time on a piece land with or without a fallow period. This is done so as to maintain soil fertility, break the pests and diseases cycles, control soil erosion and conserve soil water content or moisture from season to season. Crops are selected in relation to their agronomic similarity and difference so as to entertain complementary rather than competitive relationship. Thisis done by not allowing crops of the same family that can be affected by the same pests and diseases to follow each other in rotation, inclusion of leguminous crop in rotation and rotating of deep and shallow rooted plants one after the other. This practice depends on organically produced input such as poultry and farmyard manures as well as compost to boost soil fertility.
c. **Shifting cultivation**: This farming method relies on natural ecological cycles for its sustainability. The method requires that a farmer farms on a farmland till its fertility has reduced before abandoning it. While farmer does not have intention of returning to the already used land, soil fertility maintenance of the abandoned farmland is achieved through natural accumulation of nutrients from fallowing. Traditional tools such as, cutlass and hoe are used while the farmer's family

provides the labour. As a result of increase in population and urbanization that has led to reduced farmland, fallow periods in shifting cultivation is reduced. Shifting cultivation was practiced by the farmers in the past, and is now considered to be relevant in organic farming that is in practice today because the use of agrochemicals and plant growth hormones are not used. Instead, organic manures are used to improve soil fertility for better crop production (Kaushik,Goutom, Ranjan,Bhagawati and Ngachan, 2015).

d. **Agroforestry:** This involves growing of crops together with trees. Livestock may also be included in this integrated farming method. Its methods can be classified as agrosilvicultural, silvopastoral or agrosilvopastoral. Agroforestry method is said to be agrosilvicultural when seasonal plants and woody plants are grown together. It will be silvopastoral when livestock and woody plant species are grown together. When seasonal plants, woody plant species and livestock are grown together, the method is said to be agrosilvopastoral. This system of farming emanated from Indigenous approach used by farmers in the past to enrich soil fertility and conserve soil moisture. That is, the litters from the trees decompose and increase soil organic content, while the canopies provide necessary shade to reduce the rate of evaporation and evapotranspiration. Modern day approach through research includes:

- Alley cropping and improved fallows. Alley cropping is a method whereby sets of annual crops (alleys) are grown between rows of shrubs or trees. *Leucaena leucocephala, Cassia siamea* and *Gliricidia sepuim* which are capable of fixing nitrogen are commonly used. Improved fallows implies utililisation of involves leguminous shrubs or trees that grow quickly species to shorten the long period of traditional shifting cultivation system.
- Planting trees to serve as fence which are used to control movement of animals on the farmstead. *Gliricidia sepuim* is a good example of tree used in fencing.
- Using of hedgerow barriers along contours of sloppy ground to control erosion. The leaves that fall from these trees add to soil organic content through decomposition.
- Using of trees as windbreaks and shelter belt, that is, trees are planted round and within the community to shield their land from turbulent wind. These trees are also

used to demarcate community land. *Azadirachta indica* and Casuarina species are some examples of trees used for these purposes.

- Planting of trees in a scattered form, trees are pruned and used as fodder. This is common in tropics.

e. **Bush Fallow System:** is the practice in which farmlands are left to lie fallow after one or two years of cultivation. The purpose of this is to allow nutrients to revert to the soil. When a piece of land is placed on continuous cropping, year after year, the nutrients are completely used up from the soil without replacement. This system is still being practiced in areas where there is much land for farming. Production is usually on small scale under this system even in the current practices. Primitive tools such as hoe and cutlass are commonly used. During land preparation, slashing or burning is carried out. It is practiced in the rural area where population is very low. Cheap labour such as family members are employed. The use of agrochemicals is usually avoided. Naturally, the land under fallow regains its fertility through the decomposition of dead plants and animals over a period of time. As such, plant food has time to form in the soil as a result of humus accumulation. This fallow period is advantageous in that, it helps in breaking the cycles of pests and diseases. As a result of this, the incidence of pest and disease is not usually much if at all there is. Fallowing helps to check erosion. Fallowing also improves soil physical properties like soil structure, texture as well as the activities of soil flora and fauna.

f. **Cover cropping:** This is the process of planting certain plants mainly to cover soil surface. By so doing, the nutrients are conserved in the soil since the soil is not left open to any kind of erosion. Some commonly used cover crops are *Mucuna utilis, Pueraria phaseoloides, Centrosema, pubescens, Crotalaria juncea, Calopoginium mucunoides* and cowpea. All these are leguminous crops. Cover cropping has many advantages, especially in the recovering of lost nutrients to the soil. These advantages are:

- It helps in preventing erosion.
- It adds organic matter to the soil when the plants die and decompose.
- When legumes are used as cover crops, they add nitrogen to the soil through nitrogen fixing bacteria.

- It reduces evaporation thus increasing soil water holding capacity.
- It helps in soil development.
- Cover cropping reduces the power of weeds.
- It protects soil from direct heat of the sun thus maintaining soil temperature.
- It reduces leaching of the soil nutrients.
- Cover cropping serves as wind breaks and cuts down wind movement.
- It provides a suitable cover for soil organisms, e.g., earthworms, millipede,

The is a relationship between indigenous knowledge and organic farming, organic farmers' knowledge can also be said to be indigenous knowledge, that is, local knowledge that is closely related to sustainable methods of local farmers. This kind of knowledge is imperative to better health, community resilience and national food security. The indigenous farming knowledge systems have emerged from natural farming systems practiced from human inception, the ones that do not depend on costly and purchased agrochemicals that are harmful to plants and animals (Kolawole, 2001).

Experience has shown that successful development projects and programmes recognise people participation as a driving force for their continuity and sustainability. Where programme planners fail to appreciate the knowledge of the people for whom development is meant, what they reap either in the short or long-run is abysmal failure of those programmes. Allowing people to contribute to the decision-making process during programme conceptualisation and implementation is crucial to its success. Thus, Mubita, Libati and Mulonda (2017) supported the notion that, in the development practice, there is a general feeling that the process of development through the execution of projects can only be successful if the local population participate fully in their planning and execution. To neglect people's ideas is to ensure failure in development. For this reason, participatory approach should be used in developing countries especially in Nigeria to mobilise crop farmers to utilise organic farming practices (OFP). This can be so if the local farmers are able to see the compatibility between their indigenous knowledge farming methods and organic farming methods.

2.7 Benefits of organic agriculture

(a) **Little or no exposure to agrochemicals**: Organic farming does not encourage the use of agrochemicals such as pesticides because of their harmful effects. Pesticides increase the ability of diseases and pests to build resistance. When these agrochemicals are sprayed on plants, air, soil and water are polluted (NOAN, 2011).

(b) **Better quality of soil**: Healthy soil is important for the production of healthy food. Organic farming practices improve soil qualities unlike the use of synthetic chemicals that leads to destruction of useful soil bacteria. Utilisation of organic resources such as manures, crop residues and compost has the ability to improve soil productivity and crop produce. This is as a result of improved biochemical and physical properties of the soil as well as nutrient supply (Lori, Symnaczik, Mäder, De Deyn and Gattinger, 2017). If sustainable productivity is to be realized, practices which can boost organic matter content of the soil must be utilised.

(c) **Soil erosion control**: Organic farming practices such as use of cover crops, multiple cropping and late removal of crop residues protect soil from erosion. The use of organic manure on farmland adds to soil organic content. This improves soil structure and its water percolating ability and in turn, reducing the menace of soil erosion.

(d) **Reduction in the cost of production**: The use of locally available resources such as use of organic manures helps farmers to minimize the use of expensive inorganic fertilizer, thus reducing expenses and increasing profit of the farmers (Edward, 2018). The gradual release of nutrients in organic manures helps in retaining soil fertility for a longer time thus leading to increase in crop yields. When it is necessary to use chemical fertilizers, it has been reported that addition of chemical fertilizer and organic manure increases absorption of nitrogen, phosphorous and potassium in cereal crops production such as maize rather than the use of chemical fertilizer alone.

(e) **Animal health and welfare support**: Unlike conventional agriculture where natural habitat of some useful animals is destroyed, organic agriculture tends to preserve and create more habitats for these animals. Some animal such as birds are useful natural predators on the farm. Animals that live on organic farmland enjoy clean and chemical free habitat.Organic farming is not only useful for human but it is also useful

for animals. For instance, dairy animals that feed from organic farmlands have been found to produce more milk and less prone to diseases.

(f) **Improved quality of farm produce**: Agricultural produce from organic farming is free of artificial flavor since it contains no harmful chemicals. The natural nutritional content and taste of crops are preserved. Genetic components of organic crops are not manipulated. Consumption of agricultural produce obtained from organic farmland reduces the risk of diseases such as cancer and heart attacks.

(g) **Biodiversity**: Organic farming encourages biodiversity, the more the biodiversity the more the stability of the farm. That is, biodiversity determines how resilient a farm would be under adverse conditions such as unfavourable weather, pest and disease attack. There is direct relationship between increase in infectious diseases and reduction in biodiversity which is unfavourable to human. In organic agriculture, natural habitats such as forests and wetlands should not be tampered with or drained for the purpose of production according to organic crop production standards. To the extent possible and appropriate boundaries should be left in the field. Paths, hedges and roads should be used as boundaries. These boundaries act as wildlife corridors on agricultural land, help to sustain diverse ecology, and provide a habitat for many useful animals and insects and a place of abode for livestock. Biodiversity should cater for landscape features, habitat, wild plants and animal species (NOAN, 2012). Biodiversity could be used to tackle threats in an environment. These threats include biodiversity that is being lost at mass-extinction rate and pollution of the air and sea. Also, insect numbers are in steep decline in some lands. Because insects pollinate plants, scientists are now warning of potential "ecological Armageddon". Coral reefs are in trouble too. Scientists estimate that about half of the world's reefs have died in the past 30 years (Watchtower, 2018). Taungya system of farming also contributes to biodiversity. This system involves the planting of both food crops and forest trees on the same piece of land. In other words, it is a system which involves the integration of agriculture with forestry. According to Iwena (2012) biodiversity through the practice of taungya farming system has the following advantages:

- Variety of crops are harvested
- There is the availability of crop produce throughout the year.

- When leguminous crops are used, the beneficial effect of root nodules increases soil fertility for the benefit of the forest trees.
- Where land is scarce, the farmer has a piece of land to cultivate.
- The young forest trees receive direct and indirect attention from the farmer.
- It increases the income of the farmer.
- Availability of fertile land for farming;
- Increased standard of living of farmers
- Accessibility to forest products, e.g. dry wood for fuel;
- Employment of farmers in plantation activities other than initial raising of forest crops.
- Reduction in the cost of establishing plantation by the foresters.
- More land is under forest cover.
- Weed control through shade provided by the trees' canopies.
- Enrichment of soil nutrients when leguminous food crops are planted.

2.8 Organic manuring

Organic manuring deals with the application of organic manure to the soil so as to increase its fertility. According to Iwena (2012), organic manuring as a way of improving soil fertility has the following advantages:

- It encourages the activities of soil micro and macro organisms that are useful for mineralisationsuch as bacteria, earthworms and termites. These organisms promote soil aeration, easy percolation of water, mixing organic materials with soil, form humus and fix nitrogen into the soil. All these help to promote soil fertility.
- Organic manure improvessoil structure by building the particles of coarse texture soil together.
- There is increase in soil humus content through the addition of organic manure.
- It helps in maintaining soil temperature. As a result of its dark colour, humus easily absorbs heat during the day and loses it slowly at night.
- Organic manure protects soil water from being evaporated thus, helps in conserving soil water moisture level.

- Organic manure helps in maintaining appropriateratio between soil alkalinity and acidity.
- Since organic manure improves soil structure, it thus prevents soil erosion by reducing the speed of the run-off. It also reduces leaching.
- Organic matter increases the rate of water infiltration through clay soil increases water-holding capacity of soil.
- Due to the increase in the activities of soil micro-organism caused by organic manure application, there will be improvement in soil aeration.

All these advantages of organic manure help to maintain or even promote the availability of nutrients in the soil. Organic manure can be defined as the decayed plant and animal products which have been carefully prepared to supply nutrients to plants or crops. There are three types of organic manure according to (Taiwo *et al*., 2006 and Iwena,2012). These are: green manure, farm-yard manure and compost manure

(a) **Green manure**: Green manure is formed from leguminous plants and other fresh plants which are ploughed into the soil while they are still growing. The plants have to be ploughed in, when they are still young, that is, before flowering stage so that they will decay quickly to release the nutrients to the soil. The crops which are suitable for green manure include legumes like mucuna, cowpea, centrosema, calopogonium, pueraria and grasses.

(b) **Farm-yard manure:**This is the addition of animal wastes such as animal dung or feaces, urine and animal bedding which collectively undergo series of decomposition before the manure is applied to the soil. Poultry birds, generally, produce manure of a higher nutrient quality than larger animals. Large animals like cattle feed on grasses, which are high in fibre content which cannot easily decompose. Pig, goat and sheep also produce manure which are rich in nutrients. Farm-yard manure must be allowed to complete its decomposition before it can be applied to the soil, otherwise, the heat produced during decomposition would burn the roots of crops.

(c) **Compost manure**: Compost manure is the types of manure formed as a result of the rottening down of plants and animal remains in heaps or pits before the residue is applied to the soil. Compost manure may be prepared using pit or stackmethods. When the pit is used, the size of the pit will depend on the quantity of compost

needed, but a dimension of 180cm x 120cm x 60cm could be appropriate. Three pits A,B and Cas shown in Figure 1 are dug, grasses and legumes – to form the compost, ash or urine – to remove traces of acidity, animal dung – to introduce bacteria of decomposition, and a little water – to provide a moist environment for the agent for decomposition. In pit A, a layer of grass and legume is put at the bottom. Then a layer of animal dung is added followed by a thin layer of ash. Water is further sprinkled on the materials to make it moist but not wet. The whole process is repeated. Layers are added in this manner until the pit is filled up. Cover each layerup and place a long stick called a tester at the side. Check if the operation is successful, by feeling the tester. If the tester is hot, you can continue, but if it is cold, it means the operation is a failure and the whole processes have to be repeated. After two weeks, the materials are turned with a shovel and packed into pit B. This turning provides air for the compost so that the bacteria continue to work on the decaying materials. Pit A is filled with fresh materials. After another two weeks, pit B is turned into C and A turned into B. this process continues until the last pit is reached. Compost prepared in this manner can be applied directly to the soil but planting cannot be done; otherwise, the roots of the seedlings may be burnt.

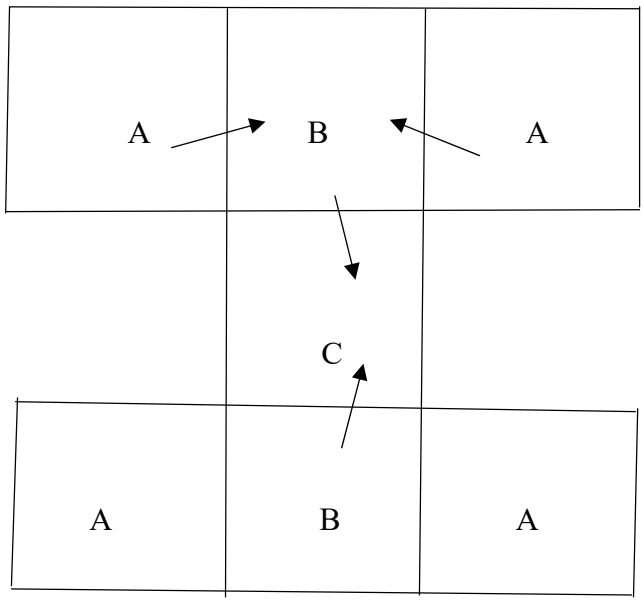


Figure 1: Preparation of compost manure

2.9 Organic farming as a strategy to mitigate and adapt to climate change

Agriculture is an undervalued and underestimated climate change tool that could be one of the most powerful strategies in the fight against global warming. There are two ways in which climate change can be addressed in agriculture, that is, through reduction of loss of soil carbon and emission of greenhouse gas. Globally, agriculture emits ten to twelve percent of greenhouse emission. This emission includes emissions from soils, enteric fermentation (greenhouse emissions from the digestion process of ruminant animals), biomass burning and manure management (IFOAM, 2018). However, there are other indirect sourcessuch as those generated from land-use changes, use offossil fuels for mechanization, transport and agro-chemical and fertilizer production. The mostsignificant indirect emissions are changes in natural vegetation and traditional land use, includingdeforestation and soil degradation. Deforestation is a common land preparingpractice in many agricultural regions that lead to massive loss of carbon stocks and massive carbon (iv) oxide emissions. Mitigation is primarily achieved through long established and optimized organic farming practices. According to IPCC (2018) and Mgbenka (2012) these practices are often relatively easy to implement and deliver good results. These practices include:

- Avoidance of chemical fertilizers and herbicides
- Building soil carbon and soil fertility
- Avoiding bare soil/ensuring the soil is always covered with vegetation
- Appropriate tillage
- Combining perennial and annual crops
- Sustainable livestock management
- Improved manure management including distribution systems
- Perennial grasslands management for effective carbon sequestration in the soil.

Furthermore, the following organic farming practices help farmers and communities to adapt to climate change:

1. Controlling and restoring erosion degraded land: Organic practices like cover cropping, planting of perennial crops, composting, green manure and appropriate

tillage help in controlling erosion, thus increasing soil health. Soils under these conditions have higher organic matter contents and efficient microbial activity which improves soil structure.

2. Drought and flooding resilience and water use efficiency: Due to the use of OFP such as crop residue retention, mulching and agro-forestry, soil moisture is conserved and crops are protected against microclimate extremes. Soil is able to capture, store and use water efficiently. Organic matter also encourages proper soil drainage in soils and this reduces the risk of waterlogging and surface-water flooding.
3. Resilient crops: Plants that of organic origin are able to get their nutrients through natural biological processes and are more resilient to harsh environment. Organic crops tend to have longer and denser roots that are able to source for water reserves deeper in the soil profile.
4. Agro-genetic biodiversity: Organic farming encourages the use of locally adapted varieties, it also encourages natural breeding which gives rise to varieties that continuously adapt to environmental pressures such as climate change.
5. Diversification: The presence of varieties of crops on organic farmland increase ecological stability and discourage the build-up of disease and pest levels and are more resilient to other environmental anomalies. Crop diversity improves nutrient uptake and contributes to a stabilized microclimate.
6. Farmers' indigenous knowledge: Farmers' traditional knowledge that have been accumulated with time is very important in adapting to climate change. This kind of knowledge had been tested and trusted with time in adapting to climate change.

2.10 Information and communication of organic agriculture

In Nigeria, seminars, workshops and training have been organised by different organisations and institutions such as NOAN, OAPTIN and FUNAAB to inform the stakeholders and the general public on the value and importance of organic agriculture. These organisations have trained farmers in different communities who are expected to encourage other farmers to adopt organic farming practices. In most of the seminars, workshops and training, participants are usually sanctioned with the responsibility of

spreading information on organic agriculture so as to promote the use of organic farming in Nigeria.

IFOAM (2014) reveals that Biovision Africa Trust is having the responsibility of information and communication of organic farming which is being implemented through its farmer communication programme (FCP). FCP is obligated to develop ways of informing and communicating the stakeholders and the general public on the value and practices of ecological organic agriculture. This programme is currently being spearheaded by Kenya (pillar leader) with collaborating countries such as Nigeria (NOAN: Association of Organic Agricultural Practitioners of Nigeria); Tanzanian (TOAM: Tanzanian Organic Agriculture Movement); Ethiopia (ISD: Institute for Sustainable Development); Zambia (PELUM: Participatory Ecological Land Use Management) and Uganda (NOGAMU: National Organic Agricultural Movement of Uganda). This pillar aims to:

- Develop capacity of information change agents including community information workers (CIWs) to foster 2-way knowledge sharing with farmers through multiple communication tools (e.g. SMS, emails, mobile telephony).
- Equip information centres of excellence to support farmers, particularly women, to access information and learning opportunities on ecological organic agriculture innovations, etc.
- Utilise multiple dissemination methods to enhance spreading of information on sustainable organic agriculture practices and technologies.
- Engage partners to support scaling up and utilisation of information on innovations in ecological organic agriculture.

The project interventions are expected to lead to strengthened use of information and communication strategies to sensitize stakeholders and general public on value and practices of EOA in contributing to improved food security, household incomes, better nutrition, and environmental sustainability in Africa. The approaches utilised will be geared towards:

1. Promoting an innovative farmer communication system: Strengthening and scaling up proven dissemination pathways using Information and Communication Technologies (ICT).

2. Strengthening capacities of civil society organisations (CSOs), farmer-based organisations and extension service agencies to use multiple sources to disseminate information on ecological organic agriculture practices to a wide audience (women farmers, farmer groups, youth, common interest groups, etc.).
3. Engaging a full range of partners including government officials, public institutions, private sector enterprises and beneficiaries in building, implementing and evaluating how the project disseminates information to farmers on ecological organic agriculture practices.

2.11 Sustainable agriculture and organic agriculture

The type of agriculture that involves the use of socially and environmentally acceptable production practices with little or no use of practices that are harmful to man's health is regarded as sustainable agriculture(Asokan, 2018). Sustainable farming systems could be described as systems that can continuously maintain a reasonable and expected level of production to the society. Such systems must be conservative when it comes to resources management and it must be commercially competitive. Food and Agricultural Organisation (FAO) also corroborated the fact that sustainable farming has five major characteristics: it must be resources conservative, non-degrading to the environment, economically and socially supportive and technically appropriate. Little or no external farm inputs such as purchased fertilizers are used in sustainable agriculture and there is efficient use of man and material resources. This shows the appropriateness of organic agriculture which is the system that leans on local cycles and conditions that prevail in an ecological system.

Sustainable farming practices include use of organic fertilizers, minimum or zero-tillage farming method, planned crop rotations, soil cover and late removal of crop residues among others. The advantage of sustainable agriculture is not only conserving natural soil resources but increasing these resources such as increasing soil organic matter content. This organic matter content helps in reducing soil erosion and increasing the soil's water-retention ability. These sustainable farming practices reduce cost of production by reducing labor and time requirements (Asokan, 2018).

The idea of sustainable agriculture is underlined with the principle of having a

system of agriculture that will care for soil quality and health on a long term basis. This is unlike conventional system of agriculture that provides immediate and short term nutrients for soil and plants but does not preserve soil alive. Organic matter as source of nutrients to soil and plants can be obtained or added through the process of decomposition and mineralisation when dead plants and animals decay. Another important reason while there is need for adding organic matter to soil is that, soil is full of micro-organisms in its natural state such organisms include bacteria, nematodes, protozoa and fungi. Also, macro-organisms such as bugs, worms and beetles are present in the soil. All these organisms play a greater role in the decomposition and mineralisation of organic matter in the soil. These organisms play their role well in the presence of organic content in the soil. The role played by these organisms are also important when it comes to maintenance of soil structure which aids water absorption.

2.12 Types ofcertification in organic agriculture

Rules and regulations have been put in place by FAO/WHO Codex Alimentarius Commission (CAC) to guide different activities in organic agriculture through certification. The certification in organic agriculture ensures that the organic products are got in accordance to the guidelines of organic agriculture. It helps both the producers and consumers to be able to rely on one another. It shields organic farmers from conventional farmers who might want to compete with them when it comes to marketing. There are different kinds of certification for the producers (European Commission, 2012):

1. **Third Party Certification** (TPC): This is a well-known type. It serves as preliminary to having opportunity to sell ones produce in bigger organic markets. This certification, unlike first and second party certifications is more dependable and reliable.

2. **Smallholder Group Certification:** This is a special type of third party certification. It is based on Internal Control System (ICS). As the name suggests, producers that are of small scale and similar agricultural practices are certified as a group. These producers sell their products jointly. Individual producer's or farmer's farm is monitored by internal monitor with the group's ICS being audited by an approved certification body.

3. **Participatory Guarantee System**: Participatory Guarantee System (PGS) is centered on quality guarantee systems. It certifies farmers in relation to their active participation in stakeholders' activities in organic agriculture movement, and is also based on their readiness

to put exchanged knowledge into practice. PGS is said to be the most common certification type in Nigeria. Many producers are now being inspected using this system globally. Similar to the ideas used for the pioneers in organic farming, PGS validates the reliability of the organic products, thus, making the products acceptable in local and international markets (Meinshausen, Richter, Blockeel and Huber, 2019). PGS intends to provide reliable organic products for buyers as in the case of TPC. The difference in PGS and TPC is the approach used in PGS that calls for direct participation of all stakeholders such as producers, buyers, marketers and some others in the verification procedure. The fact that participation is voluntary and requires low costs and less paper work makes it easy, interesting and attractive to small operators. Since PGS attributes great importance to training and knowledge acquisition, regular participation of stakeholders leads to more responsibility and empowerment.

2.13 Management of weeds on organic horticultural farm

One of the major constraints faced in organic farming is weed control regardless of the advantages associated with it. In view of population explosion and an attempt to increase food production, weed control becomes more imperative in many underdeveloped countries. It should be noted that food produced under food aid programmes in many nations are produced under conventional farming with harmful consequences of poisonous crop produce (Naveen *et al*., 2012). The issue now is the appropriate methods to be used in weed control in organic farming since herbicides are avoided. Any time seeds are planted, weeds always grow along. Crop loss resulting from weed attack is much. For instance, almost forty-fivepercent loss of agricultural production is attributed to weeds attack as reported byKorav, S., Dhaka, A. K., Singh, R. and Reddy, G. C. (2018). Various methods are used in weeds control on organic farms in different parts of the world. Adesina *et al.* (2012) examined various steps toward organic weed control among organic growers in New England. Some of these steps that are applicable in Nigeria are as highlighted below:

- Discouraging weed influx by making sure that seeds to be planted are free of weed seeds during planting.
- The use of planned crop rotation to terminate the perpetual growth of a particular weed.

- Use of cover cropping method which can smother weeds with other benefits such as erosion and leaching control.
- Proper placement of fertilizer around the crops at the right time so as to feed the crop not weeds.
- Using the right tool for weed control. Different tools are required as the crops and weeds grow bigger.
- Having uniform spacing across the farmland so as to enhance the utility of a cultivation set up.
- Timely weeding is very important, weed the farm while the weeds are still small before the farm looks weedy.

2.14 The use of organic pesticides in controlling postharvest losses

One of the most paramount problems facing farmers is poor storage facilities. Therefore, if food is to be available all-round the seasons; efficient storage of agricultural produce remains very important. Despites the fact that storage of produce would make food available for human consumption, it also makes seeds available for planting, it increases farmers' and marketers' profit for better living. In Africa, particularly in Nigeria, majority of poor and subsistent farmers usually rely on indigenous methods to prevent and control the effects of pests and diseases. These methods of pest control are knowledge acquired by different people of diverse languages and skills, which at times may be labour intensive. But these methods have little or no harmful environmental effects and are applicable with less expensive equipment (Asogwa, *et al*., 2017). Pesticides that are extracted from plants, are readily accessible and affordable as well as biodegradable. They have low toxicity to humans and other organisms that may not be targeted. The use of such repellent materials of plant origin has their own importance in this parts of the world where agrochemicals are expensive, and where these biopesticides are cheap and readily available for resource-poor farmers. In addition, the use of biopesticides to protect crop produce has the potential for decreasing the demand for broad-spectrum harmful insecticides, thereby reducing the ability of insects' or pests' resistance (Ukeh *et al.* 2012).

Synthetic chemicals have been known to cause troubling health hazard to people and domestic animals, have negative effects on the environment. Farmers spend more money to purchase these synthetic chemicals owing to the need to use them more as they lose potency

and effectiveness over time. Other problems associated with the continuous use of synthetic insecticides are reported cases of pest resistance, pest resurgence, secondary pest outbreak and leaving of residue in the ecosystem (Akob and Ewete, 2010; Alabi and Adewole, 2017). In lieu of synthetic chemicals, research findings have revealed natural plants products to be effective alternatives for combating insect and pest infestation. These plant products, also referred to as botanical pesticides are plant extracts which are obtained dried or fresh from plants parts such as barks, leaves, bulbs, seeds, cloves flowers, roots, rhizomes or fruits.

In this era of looking for a sustainable form of agriculture, there is need to return back to formerly used practices of plants and minerals as traditional methods of controlling pests and diseases instored products, which have been forgotten over past decades. (Ekeh *et al*., 2013). In Nigeria, some achievements have been recorded by the indigenous people in using different types of biopesticides. These include use of *Piper guineense* seed, *Aframomum melegueta* seed, *Azadiracta indica* leaves, *Capsicum nigrum* seed, *Zingiber officinale* rhizome, *Allium sativum* bulb, *Ocimum gratissimum* leaves, *Moringa oleifera* roots which have been employed as seed/grain protectants with encouraging results (Akob and Ewete, 2010; Alabi and Adewole, 2017; Ukeh *et al.,* 2012).

Nationally, there is plan to increase food production and food security and as such the importance of appropriate and readily available postharvest storage practices for agricultural produce cannot be underestimated (Ajaniand Onwubuya, 2012). Although, the use of natural products or plant extracts was overtaken by synthetic chemicals due to their efficacy and quick knock out effect,the use of inorganic pesticides has resulted to health hazards for humans, animal and environment. This is due to the presence of carcinogenic heavy metals in their composition therefore making biopesticides best alternatives to inorganic pesticides.

2.15 Cultural methods of controlling pest and disease attack in organic crop production

There are various cultural methods of pests and diseases control according to Meena, *et al.* (2013), these methods include:

(a) Use of crop rotation to disrupt the life cycle of the pathogen. For instance, club root is a disease specific to certain brassica crops and the level of inoculum in the soil

declines in the absence of suitable host. A gap between susceptible crops in the rotation of five years is usually sufficient to control the disease.

(b) Weed control is also important in controlling some diseases. Several diseases of cereals can survive on weed grasses and be carried over from one season to another on these hosts. It is therefore important to control weeds which can carry diseases from one crop to another.

(c) Use of proper soil drainage or floodingcan affects the susceptibility of plant to disease. Poor drainage leads to smaller and weaker plants which may be more prone to attack from pathogen. Powdery scab of potato tubers for example is worse in wet soils. Adequate drainage of arable land is therefore important in disease control. Flooding can be used to control soil borne pests. For instance, if termites are too many farmland, flooding will help to control them. Also, many insects like cutworms, potato tuber moth and root grubs are killed.

(d) Elimination of volunteer and alternate hosts plants can also be done by ploughing, ploughing helps to reduce the incidence of these disease causing organisms. Ploughing is also beneficial in burying weed host plants and volunteer crops that can habour disease causing organisms.

(e) The choice of date for the crop may also influence its susceptibility to disease. Early sowing of cereals may lead to higher levels of barley yellow dwarf virus and mildew. In contrast, early sowing of sugar beet encourages earlier leaf canopy development and renders the crop less attractive to aphid vectors of virus yellows

(f) Intercropping helps to break the pattern of cultivating similar crop year after year and limits pest and disease attack. Natural enemies of insect which may be disease causing organism tend to be more abundant in intercrops than in mono-crops, as they find better distribution of nectar and pollen sources.

(g) Identification and monitoring of crop pests: Monitoring has to do with regular inspection of crops on the farm to see if there is any abnormality as the plants grow.This is the first and important step in pests and diseases management in organic farming. Insect pests can easily be identified compared to diseases. Signs of plant diseases may be easily noticed from their physical effects on plants.

(h) Mechanical and physical pest control: This includes handpicking of insects. Physical or mechanical destruction of pests may also be done through mowing, flaming, hoeing, soil solarization and cultivation. Traps cab be set for animals that can cause damage plants. Tools that can be used to exclude insect pests from reaching crops in organic farming include protective nets and sticky paper collars that prevent crawling insects from climbing the stems of trees.

2.16 Factors influencing farmers' utilisation of agricultural innovations

Farmers are being encouraged to utilise organic agriculture as an alternative to conventional farming and its adverse effects on man and his environment. Utilisation of agricultural technology depends on a range of personal, social, cultural and economic factors, as well as on the characteristics of the innovation itself. Also education level, income, size of farm, access to information, finance, conducive environment, environmental awareness and utilisation of social networks are related to the use of best management practices (Howley *et al.*, 2012). The characteristics of the technology/innovation itself are also an important influence on farmers' technology adoption and usage decisions. In particular, the relative complexity, risk and investment characteristics of technologies significantly affect their adoption and diffusion. Considering the disparities between capital and management intensive technologies. Howley*et al.* (2012) also reported that age, specialization and size in dairy production can positively influence adopting a capital-intensive technology, on the other hand, size of operation and education positively influence the decision to adopt a management-intensive technology. The risk to bear by the farmers are also integral in influencing the technology adoption decision, especially if capital-intensive technology costs are not reversible. Other parts of the social literature of science emphasize the role of distance and location in the adoption of agricultural technologies. This means that any appreciable travel costs incurred in learning about a technology in the first time and subsequently establishing it might reduce the tendency of adopting that technology. More recently, farmers' values, motivations, objectives and attitude influence technology adoption as observed by some economists and other social scientists. According to Howley *et al.*, (2012), some of the factors mentioned above are discussed below:

(a) Income: It is generally believed that the more the income the more the ability to utilise innovation. For instance, in the case of utilisation of organic farming practices that are labour intensive. High income may enable crop farmers to counter the constraint of labour requirement. On the contrary, low income may still compel a farmer to use an innovation. This is applicable to some farmers who are resource-poor and as such they are using some traditional farming practices which are inherent in organic farming practices.

(b) Farmer's age: The importance of age lies in its effect on the adoption of innovations and the processing of information. It is well known that, in general, the older the farmers the less their willingness to try new innovations or take risks. But this factor has made some older crop farmers to retain some indigenous farming practices thus making them to practice organic farming by default.

(c) Educational level: There is expectation that education can broaden the knowledge of farmers. This is because positive relationship would mean that the higher the level of education, the higher the tendency to utilise innovation. Generally, the low educational level of the farmers hinders the adoption of new ideas, especially the complex one. With lack of formal education, information cannot be passed to these farmers through the print media or mass media, except through personal contact methods, personal discussion, result demonstrations, and visual aids.

(d) Household size: Households with larger size may encourage the use of innovation more especially when such an innovation is labour intensive compared to those with small household size. Although this sill depends on age grade and available farm labour within family members.

(e) Cost of adoption: The adoption cost of improved technology package is the cost over and above the cost of production, this may include the cash required to get the innovation and some former practices to be done away with.

(f) Cooperative membership:Being a member of cooperative society always have a positive effect on the adoption of innovation. This means that farmers who belong to one cooperative organisation or the other are expected to utilise more technologies than those who do not. Cooperative membership increases accessibility to more information on innovation, agricultural inputs related to the technologies such as

agrochemicals and fertilizers as well as credit for the purchase of inputs and payment for labour (Obuobisa-Darko, 2015)

(g) Extension contact:The extent of extension services extended to farmers increases their propensity to adopt technology. Regularity of extension contact between farmers and the extension personnel would enlighten the farmers and increase awareness for the potential gains of improved agricultural technology.Other factors affecting farmers' utilisation of innovation include environmental/climatic factors, cultural/traditional factors and infrastructural factors.

In adopting an innovation, there are five features of innovation that can influence the potential adopters (Vagnani and Volpe, 2017). These features are:

1. Observability – This is the degree to which a particular innovation adoption result could be seen or felt by the adopter.
2. Compatibility – This means the extent to which the innovation will fit into the ideas and experiences formerly had by the potential adopters.
3. Relative Advantage – This has to do with the benefits accruable to the new idea that the potential adopter may use to replace old idea.
4. Complexity – This is related to the required technical-know-how of an innovation, either it is difficult to know or not.
5. Triability – The degree to which new idea can be tried before the potential adopter will finally adopt such an idea.

2.17 Problems of organic farming in Nigeria

The following problems of organic agriculture are identified according to Bello (2008):

1. **Problem of output marketing**: Producers in organic agriculture have reported that marketing is one of the major challenges. In a system where government policy is on production of enough quantity of food for the population using conventional method, less recognition is given to organic crop production which is more of quality rather than quantity. If premium price could not be obtained for organic produce, this could serve as a hindrance

to attain maximum productivity. Unlike in developed nations where market is guaranteed for organic produce right from the beginning of cultivation, certainty of such market is low in developing countries. Although, attention is usually given to increase in food production with little or no consideration on efficient food marketing more especially after harvesting when a lot of cost is involved. In Nigeria this cost is so high that reducing the cost through efficient marketing could serve as impetus to producers or marketers.

2. **Shortage of Bio-mass**: There is constraint of getting enough organic manure which can supply all the nutrients required by plants among resource poor farmers. Although, processed and certified organic fertilizers can serve that purpose, but they may not be affordable to small scale farmers that dominate Nigerian agriculture sector. Researches have shown that crop residues ploughed into soil could add to soil organic content thus increasing productivity. But the problem is that, the crop residues that can be used for compost making are not sufficient due to competition among man and animal that use these residues as fodder and fuel. Even the little that is left on the farm is destroyed by termites. Increase in population and the disappearance of the common lands including the wastes and government lands make the task of bio-mass production and utilisation difficult among small scale farmers.

3. **Insufficient supporting infrastructure**: In comparism to conventional agriculture, governments are yet to have clearly stated policies and a credible mechanism of providing infrastructure for organic agriculture. There are few agencies for agricultural produce accreditation and accreditation is even limited to few crops. The certifying agencies are inadequate, proper marketing channels are not yet established and there is inadequate facilities for produce verification which can lead farms certification.

4. **High cost of input**: The resource poor farmers in Nigeria have been practicing organic farming by default through the use of traditional farming practices. They use local or indigenous knowledge to carry out farming activities in an ecologically friendly manner (Andrew and Elke, 2016).But available organic inputs are expensive compared to synthetic inputs used in the conventional farming system.

5. **Unavailability of some farm Inputs**: Organic fertilizers and pesticides are not well known in the country. Since marketers have little or no interest in selling these inputs due to

low demand, there is no market network. Added to this problem, is the encouragement given to farmers by most of agricultural institutes in using agrochemicals. High profit margin obtained by marketers on inorganic pesticides and fertilizers also reduces the interest of marketers in selling organic inputs.

6. **Lack of appropriate policy guiding organic agriculture**: No government policy for organic agriculture produce to be promoted for local consumption and export. The issue of quality food production through organic agriculture is not woven into the national agenda for food security, supply of inputs and self-sufficiency in food production. If this is to be done, national agreement and concerted efforts are very important to encourage all the stakeholders in organic agriculture.

7. **Lack of financial support**: Nigeria as a developing nation needs financial support if the country is to compete with developed nations in adopting and promoting organic agriculture. Several initiatives put forward to assist agriculture sector are yet to be fruitful. The 200 billionnaira Commercial Credit Agriculture Scheme was a subject of controversy between the National Assembly members, participating banks and the beneficiaries. Nigerian resource poor farmers who are willing to convert to organic farmers are burdened by unsubsidized high cost of certification from certifying agencies.

9. **Low production**: Farmers usually experience some loss in yields while doing away with agrochemicals during conversion period. There is need for time if conventional farmland is to regain its natural biological activities and fertility through nitrogen fixation from legumes and growth of beneficial insects. It may also be possible that it will take years to make organic production possible on the farm (NOAN, 2012). There is no arrangement to support small scale farmers who take the initiative to convert to organic production. These farmers find it difficult to cope with low production for the first two to three years. Even if the farmers are able to get price premiums on the organic products, such premiums will not be sufficient to cope with the initial low production.

2.18 Theoretical and conceptual framework

Theoretical framework builds the foundation of a study on the established theories, while conceptual framework shows a kind of skeletal interlink among the variables that constitute the concept of the study.

2.18.1 Theoretical framework

The theoretical framework for this study was drawn from the following theories:

1. Theory of knowledge utilisation
2. Theory of planned behavior
3. Adoption theory
4. Human ecology theory

2.18.1.1 Theory of knowledge utilisation

This theory was postulated by Rich (1979). The theory posits that knowledge utilisation is not an issue that can be studied in isolation at a point in time. Knowledge utilisation is a process that encompasses information acceptance, that is, information is retrieved or received. Information may be from a data bank, a library shelf, a consultation session, or other means. Understanding the information through information processing and testing for validity or reliability is another aspect of knowledge utilization. It involves testing information against one's own intuition and assumptions, and transforming it into a useful form. Testing does not necessarily refer to formal experimental models; it may involve cognitive procedures. The third aspect of knowledge utilisation is information application. This may include rejection or acceptance of the information. The theory suggests that many factors related to the user and technology or innovation come into play while a user is deciding whether to utilise or not to utilise a particular information. In relation to this study, these factors may include information receiver's personal characteristics (such as age, education, knowledge, belief in efficacy and social role) and enterprise features (such as farm size, farmers' experience, cropping system and income). In this study the benefits or advantages derived which could serve as attractive attributes of OFP would be identified. These benefits could be given more advocacy so as to encourage more farmers to utilise OFP.

Diffusion of innovation is an area of study under theory of knowledge utilisation. It is the way by which innovation spreads through different sources among people in the

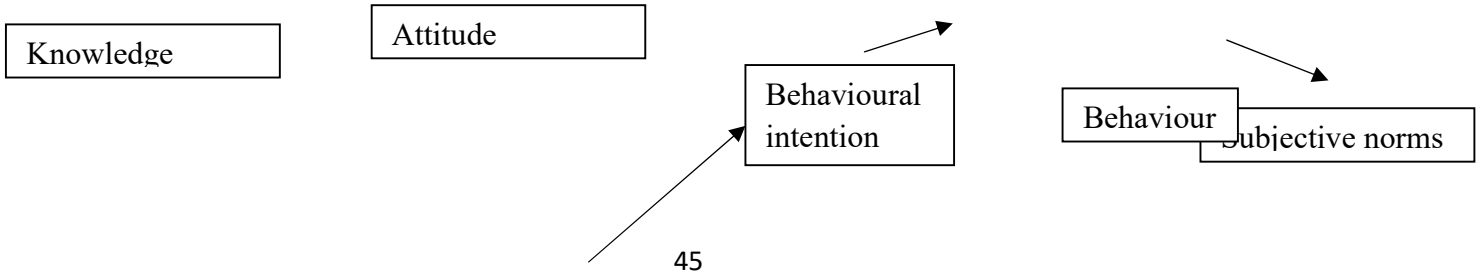
society over time (Rogers, 2003). The sources may be audio such as radio, audio visual such as television or direct contact such as extension visit or interpersonal communication. Information received would affect the knowledge of farmers which would in turn influence their attitude in using certain idea as in the case of organic farming practices. This theory is also relevant to this study in that preferred sources of information would be identified in this study, that is, sources that are commonly used by crop farmers in receiving information about organic farming practices.

2.18.1.2 Theory of planned behavior

The theory was put forward by Ajzen (1988). The reasoned action theory forms a basis from which this theory was developed. The theory of planned behaviour deals with relationship between knowledge, attitude and behaviour. It was believed that subjective norm is an outcome of environmental knowledge, higher intention and attitude. Attitude towards behaviour is regarded as the individual's positive or negative feeling about performing behaviour. The theory predicts intentional behaviour. Under this theory, there are three types of considerations that direct human action:

(a) Belief about the likely consequences of behaviour and evaluation of these consequences (behavioural belief).
(b) The tendency and motivation to meet up with social norms and values (normative belief) and
(c) Consideration of factors that may impede or facilitate performance of the behaviour and the influence of these factors (control belief)

The theory of planned behaviour is relevant to this research in that crop farmers' knowledge of OFP would directly influence their attitude towards utilisation of OFP. These crop farmers might likely be motivated by the benefits derived from utilising organic farming practices that are environment friendly and socially acceptable.



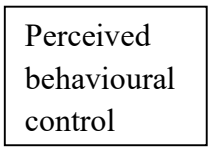


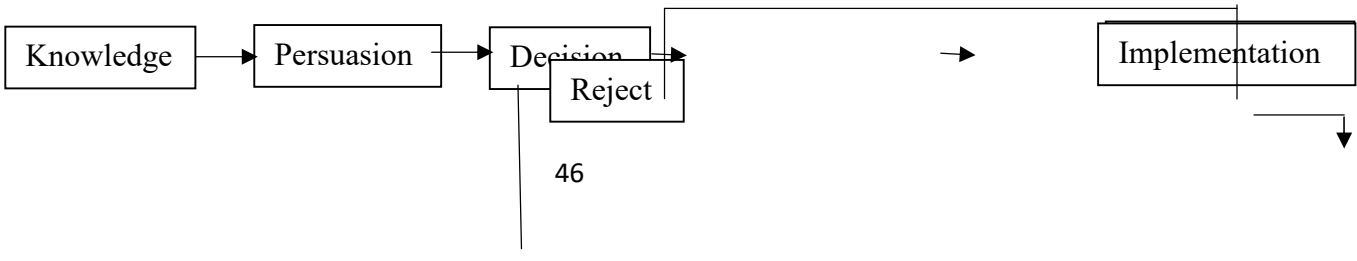
Figure 2: Theory of planned behaviour

Source: Ajzen Icek (1988)

2.18.1.3 Adoption theory

This theory has to do with explanation and prediction of reason and way as well as extent potential adopters will adopt technology (Rogers, 2003). It explains multiple factors that may influence adoption by individual or organization. This theory believes that personal characteristics will influence one's involvement in new activity. Such individual perception is important in motivating the person to activity or behavior. However, privilege must be given to participate in such action otherwise no attempt will be made to adopt (Menzies, 1982). The level of knowledge of potential adopter, the extent of innovation that is diffused of a new product and the value attached to innovativeness by prospective adopter are some parameters that can influence the rate and extent of adoption. In order to facilitate adoption of new idea such as organic agriculture, factors such as attitude, knowledge, benefits derived, constraints faced, innovation characteristics, adopter personal and economic characteristics must be well analyzed.

Ismail(2006)further explained that decision to accept or reject new idea has to be made by individuals based on their viewpoint. This decision may be made quickly by some while for the others, it may take a longer time because of thorough investigation that they would make on the technology and its predicted results. This decision is referred to as innovation-decision making. This is defined as the process through which prospective adopter passes from the first stage of having knowledge of new idea to attitude formation towards this idea, to deciding either to reject or accept, to the implementation or use of innovation, and to the point of decision confirmation. The stages are as shown below:



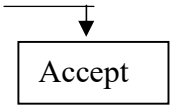


Figure 3: Five stages in innovation-decision making

Source: RogersEverett (2003)

1. Knowledge: The knowledge stage is where prospective adopter becomes aware of the new idea and becomes interested in understanding its functions.
2. Persuasion: This is the stage is where the individual is trying to ascertain the value of using an innovation. It is important that the innovation is seen to be of benefit to potential adopter. Changing the attitude of this person may require educating him on how the new idea can save him time and reduce cost of production.
3. Decision: This is the stage where it will be determined either an innovation will be adopted or rejected.
4. Implementation: The implementation stage is the process of utilising new idea. There can still be a degree of uncertainty surrounding the outcomes of the innovation and whether to hold onto the old idea or new idea.
5. Confirmation: This is the stage of evaluation, that is, a stage where adopter of new idea can clearly identify the positive outcomes of a new idea he has utilised.

2.18.1.4 Human ecology theory

This theory deals with the association between man and his physical environment. Human Ecology primarily bothers on social occurrence, which are rooted in man's dependence on little availability of natural resources to satisfy his needs (Ajeet, 2018). This implies that man is a social and biological living thing in his environment. Attention is directed to the discovery, utilisation, maintenance of resources for sustainable environment and human development. Ecologists have made it clear that resources in an ecosystem

emanated through interaction among processes that may be of fast or slow pace and between processes that may be relatively localized or that are of large spatial reach. For instance, the formation of regional biodiversity due to chaos caused by insect or fire outbreak and competition and succession that may occur in an ecosystem. These natural associations may be linear or alternating in generating stable biotic or abiotic states. It is those journeys or interactions all along that maintain the diversity of species, spatial patterns and genetic features that give resilience to ecosystems.

The theory is paramount when it comes to having a sustainable agricultural production system that puts into consideration the safety of human environment. Organic agriculture is a production system that depends on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of artificial resources with negative effects on human environment and soil physical and chemical status. The extent to which crop farmers are utilising environmentally sustainable farming practices would be examined. Examining the determinants of adoption of environment friendly system would help to identify hindering factors, and how to tackle such factors so as to encourage the adoption of this system of farming.

2.18.2 Explanation of the conceptual framework

The conceptual framework shows a kind of skeletal interlink among the variables that constitute the concept of the study as shown in Figure 3.2. The major concept upon which the study is based is utilisation of organic farming practices among crop farmers. The figure illustrates the relationship among the various independent variables as identified by the study, with effect of the intervening variables as they affect the dependent variable.

Independent variables of this study include farmers' socio economic characteristics (personal and enterprise characteristics), sources of information on organic farming practices (OFP), farmers' knowledge of organic farming practices, attitude of crop farmers towards OFP, benefits derived in using OFP and constraints to utilisation of organic farming practices. The study is built on the assertion that the utilisation of OFP is one way or the other influenced by the aforementioned variables.Personal characteristics such as crop farmers' age, education, cosmopoliteness and association might likely influence utilisation of OFP. For instance, the older the crop farmersthe more the likelihood that such farmers

might be holding onto traditional methods of crop production which might likely be compatible with organic farming practices. The level of education and cosmopoliteness of a crop farmer could also lead to pronenessto use OFP. Association that promotes a particular idea might be a source of motivation for its members to utilise such an idea. Therefore, the a priori expectation is that association that promotes organic agriculture might be a source of motivation for its members to utilise OFP. Enterprise characteristics such as farm size, farming experience and type of crop could serve as predictors of OFP utilisation. It is believed that OFP is labour intensive, as such it is expected that the larger the farm size the lower the utilisation of OFP and vice versa.

Furthermore, it is expected that the more the knowledge of crop farmers the more favourable their attitude would be towards utilisation of OFP. Similarly,increase in knowledge might also lead to increasein benefits derived by crop farmers while utilising OFP.

The higher the constraints faced the lower the utilisation of OFP by crop farmers. For instance, if crop farmers are severely constrainedby inadequate capital, unavailability of organic input and market for organic produce, such farmers would not be motivated to practice OFP as expected.Constraints faced by crop farmers might be mitigated if they are properly informed. For instance, if crop farmers get right information on marketing theirorganic crop produce, certification process and weed control methods; then there would be little or no problem in these aspects. It is also expected that there would be inverse relationship between constraints faced and enterprise characteristics of crop farmers. For example, the more the problem of weed control the smaller thefarm size that might be cultivated by crop farmers.

The dependent variable for this study is utilisation of organic farming practices by crop farmers. This is expected to be influenced by independent variables discussed above.

Intervening variables are variables that can come between independent and dependent variables. Their effects may not be easily outlined or measured but they affect the manner in which the independent variables influence the dependent variable. The intervening variables for this study include climate, government, cultural values and environment. There is an indirect link between the intervening variables and utilisation of organic farming practices.

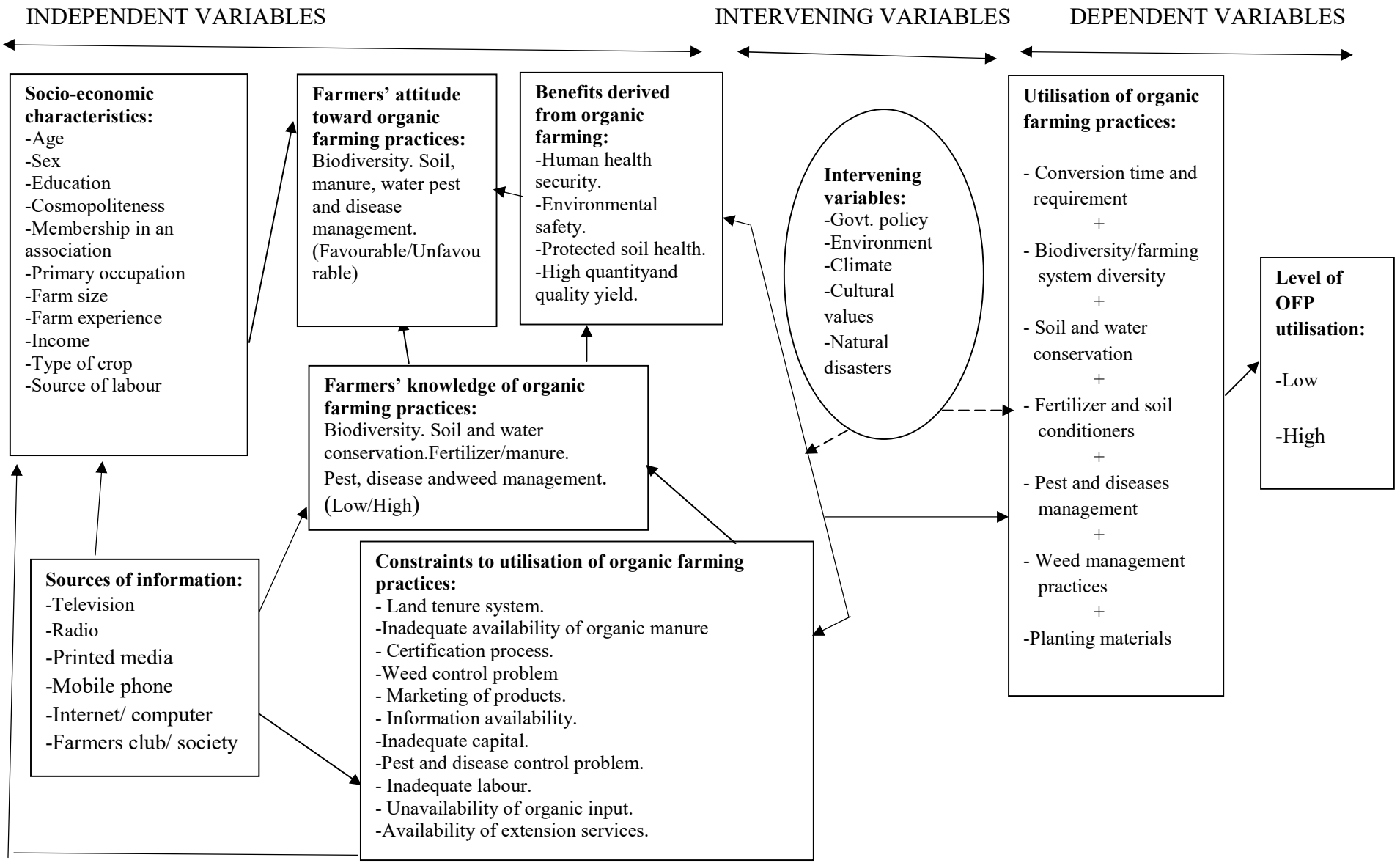


Figure4: CONCEPTUAL FRAMEWORK OF DETERMINANTS OF UTILISATION OF ORGANIC FARMING PRACTICES AMONG CROP FARMERS IN SOUTHWESTERN NIGERIA

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Area of study

This study was carried out in southwestern Nigeria. Southwestern Nigeria lies between $5^{\circ}8'$ and $9^{\circ}10'$and has an area of 114.27 km square representing 12% of total country land mass. The 2006 census put the population of Southwestern Nigeria at 27,581,992 (National Population Commission, 2006). The states included here are: Lagos, Osun, Ekiti, Oyo. Ogun and Ondo. Like other Nigerian geopolitical zones, southwestern Nigeria is predominantly agrarian area; tree crops in the area include cocoa, oil palm, rubber and cashew; while arable crops such as maize, yam, cassava and sweet potato thrive well in the zone. Cropping is mostly rain-fed.Specifically, practices like unguided application of agrochemicals, bush burning, deforestation, grazing, continuous tillage and uncontrolled farm mechanization are common in southwestern Nigeria. These practices affect the quality of soil and vegetation cover, thereby resulting into soil degradation (Amusa*et al*. 2015).

The zone is bordered by the Republic of Benin in the west, the Atlantic Ocean to the south, Edo and Delta States to the east and Kwara and Kogi States in the northern border. The climate in the southwestern Nigeria is predominantly humid with distinct wet and dry seasons. The southwest of Nigeria has three main types of vegetation, namely; mangrove forest, tropical rainforest and guinea savannah. The mean annual rainfall of southwestern Nigeria is between 1,500mm to 3,000mm.The mean monthly temperature ranges from 18^0C to 24^0C during the raining season and 30^0C to 35^0C during the dry season. However, farming activities including cropping activities take place all year round in areas bounded with rivers and streams. These farming activities are the main sources of livelihood for not less than 65% of the people in the zone (Oladeji and Thomas, 2010)

3.2 Population of the study

Crop farmers constituted the study population in the study area.

3.3 Sampling procedure and sample size

A four-stage sampling procedure was adopted in this study. The first stage involved selection of three States, that is, Oyo, Osun and Ogun using purposive sampling method. This was due to visible presence of organic agriculture organisations and groups in these States that may influence farmers in using OFP.Second stage involved use of simple random sampling technique to select 10% of 83 Local Government Areas(LGAs) present in the selected States resulting in 8 LGAs. In the third stage, 17% of 92 wards in selected LGAs was selected using simple random sampling method resulting in 16 wards.Finally, a list of 737 crop farmers was generated from all the wards and 40% of crop farmers were sampled proportionately resulting in 295 crop farmers.

Table 3.1: Sampling procedure for crop farmers

State	No. of L.G.A	Selection of 10% of L.G.A.	Selected L.G.A	No. of Wards in selected L.G.A.	Selection of 17% of wards	Selected wards	No. of crop farmers generated per ward	Selection of 40% of crop farmers
Oyo	33	3	Ogbomoso south	10	2	Arowomole	47	19
						Oke Ola/Farm settlement	50	20
			Akinyele	12	2	Ajibode	52	21
						Elekuru	60	24
			Ido	6	1	Omi Adio	48	19
Osun	30	3	Oriade	12	2	Ijebu-jesa	47	19
						Erin Oke	49	20
			Atakumosa west	11	2	Osu (I)	40	16
						Isa Obi	46	18
			Ayedire	11	2	Ile Ogbo	55	22
						Aba Olodo	56	22
Ogun	20	2	Odeda	18	3	Olugbo	37	15
						Olokemeji	42	17
						Odeda	32	13
			Obafemi Owode	12	2	Alapako Oni	36	14
						Moloko Asipa	40	16
Total	**83**	**8**		**92**	**16**		**737**	**295**

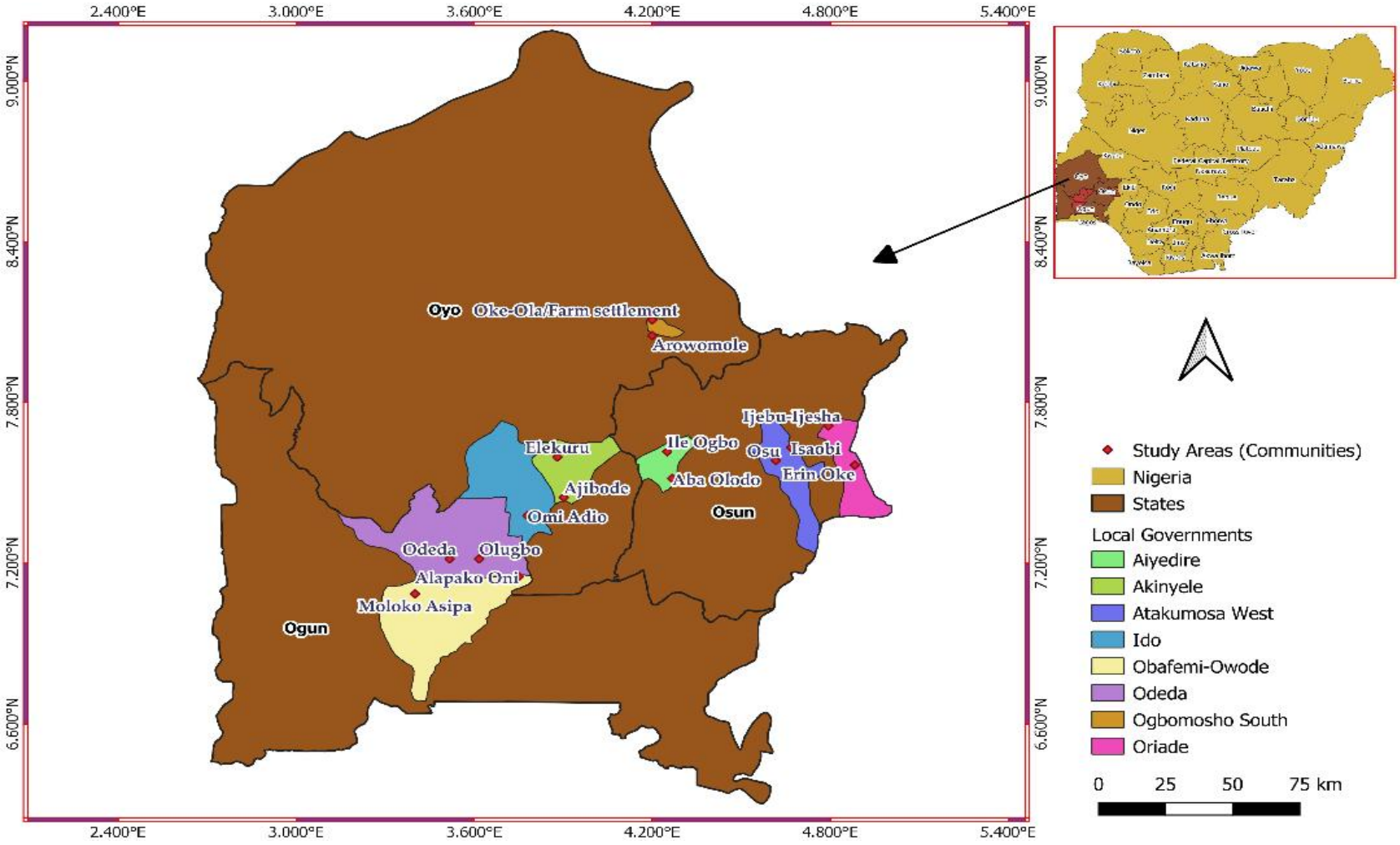


Figure 5: Maps showing study areas in southwestern Nigeria
Source: Field survey, 2017

3.4 Method of data collection

The data for this study were collected through quantitative and qualitative methods. The quantitative method was by means of interview schedule. The qualitative data were gathered with the use of Focus Group Discussion (FGD) and Indepth Interview (IDI). Five FDGs were conducted. FDGs took place in Odeda, Odeda Local Government Area (LGA), Ogun State; Omi-Adio,Ido LGA, Oyo State;Ajibode, Akinyele LGA, Oyo State; Arowomole, Ogbomoso south LGA, Oyo State and Ijebu-Jesa, Oriade LGA, Osun State. Majority of the participants in these FGDs were male while female participants were few. They all engaged in crop production. All the participants were integrated into the discussion, one or few participants were not allowed to dominate the discussion. Five Indepth Interview (IDI) were conducted with farmers' leaders one at a time. These took place in Osu, Atakumosa west LGA, Osun State; Odeda,Odeda LGA, Ogun State; Ajibode, Akinyele LGA, Oyo State; Arowomole, Ogbomoso south LGA, Oyo State and Omi-Adio, Ido LGA, Oyo State. The discussion was based on the objectives of the study. These included crop farmers' personal and enterprise characteristics, organic farming practices (OFP) in use, benefits derived from using OFP and constraints faced in using OFP.

3.5. Validation of instrument and test of reliability

The quantitative instrument was subjected to face validity with the help of professionals in Agricultural Extension and Rural Development as well as in the field of Agronomy. The reliability test of the instrument was carried out using split-half method. The instrument was administered on 60 crop farmers in Ondo State. The reliability co-efficient of 0.733 confirmed the reliability of the instrument.

3.6 Measurement of variables

3.6.1 Independent variables

3.6.1.1 Socio economic characteristics(Personal and enterprise characteristics)

Sex: Respondents were asked to indicate whether they are male or female. A nominal score of 1 was assigned to male, while 2 was assigned to female.

Ethnic Background: Respondents were asked to indicate their ethnic background. A nominal score of 1was assigned to Yoruba, 2 to Hausa, 3 to Igbo, 4 to Fulani and 5 to Efik.

Marital Status: Respondents were asked to indicate their marital status. A nominal score of 1 was assigned to single, 2 to married, 3 to widow, 4 to widower, 5 to separated and 6 to divorced.

Educational Background: Respondents were asked to indicate their educational background. An ordinal score of 1 was assigned to no formal education, 2 to adult education, 3 to primary, 4 to secondary and 5 to tertiary.

Age: Respondents were asked to state their actual age in years. This was measured at interval level.

Religion: Respondents were asked to indicate their religion. A nominal score 1 of was assigned to Christian, 2 to Islamic and 3 to Traditional.

Membership of an association: Respondents were asked to indicate the association that is most influential to the farming practices they use. A nominal score of 1 was assigned to farmers' cooperative, 2 to community development association, 3 to informal savings and credit, 4 to NOAN, 5 to OAPTIN and 6 to LAUTECH.

Cosmopoliteness: Respondents were asked to indicateif they had visited other places/ farms outside their localities that encouraged them to utilse organic farming practices (OFP). A nominal score of 0 was assigned to no and 1 to yes.

Primary Occupation: Respondents were asked to indicate their primary occupation. It was measured at nominal level by assigning 1 to trading, 2 to farming and 3 to civil service.

Household size: Respondents were asked to indicate the range of their household size. Ordinal scores of 1, 2 and 3 were assigned to 1-3, 4-6 and 7 and above respectively.

Types and number of crops: Respondents were asked to indicate the types of crops they grow. A nominal score of 1was assigned toYam, 2 to Cassava, 3 toVegetables, 4 to Maize. 5 to Banana/Plantain and 6 to pineapple. While number of crops was measured at interval level by counting actual number of crops indicated

Farm size: Respondents were asked to state their actual farmsize (in hectares).

Farmers' year(s) of experience in crop production: Respondents were asked to state their actual number ofyears of experience. The years of experience was measured at interval level.

Source of land: Respondents were asked to indicate their sources of farmland. A nominal score of 1 was assigned to Inherited land, 2 to Rented land, 3 to Leased land, 4 to Purchased land, 5 to Communal land, 6 to Family land.

Income: Respondents were asked to state their annual income in Naira from each crop.This was measured at interval level.

Cropping system: Respondents were asked to indicate the cropping system they use. A nominal score of 1 was assigned to Sole cropping and 2 to Mixed cropping.

Source of farm labour: Respondents were asked to indicate their sources of farm labour. A nominal score of 1 was assigned to Family, 2 to Hired, 3 to Self and 4 to combined.

3.6.1.2: Crop farmers' sources of information on organic farming practices

Respondents were asked to indicate the major source of information on organic farming and frequency of information from a list of six sources of information provided. The frequency of information received was measured using 3-point scale of "never" which was scored 0, "occasionally" scored 1 and "regularly"scored 2.

3.6.1.3: Knowledge test of crop farmers about organic farming practices

Knowledge of respondents aboutOFP was measured by giving a list of twenty-six knowledge questions to the respondents. Three alternative answers were provided for each questionsinstead of just yes or no question format. This was done so as to enable the respondents to reason deeply before responding. Correct answer was scored 1 and incorrect 0. Maximum score would be26 and the minimum score would be 0. The scores of items would be summed up to form a composite knowledge score for each of the respondents. Respondents would then be categorised into two, using the mean score.Respondents with scores below mean would be considered to havelow knowledge of OFP, while respondents with scores from mean and above would be considered to have high knowledge of OFP.

3.6.1.4: Attitude of crop farmers toward organic farming practices

Attitude of respondents towards Organic Farming Practices (OFP) was measured by giving alist of twenty-three attitude statements to the respondents using 5-point Likert scale. Scores of 5, 4, 3, 2 and 1 were assigned to Strongly Agreed (SA), Agreed (A), Undecided

(U), Disagreed (D) and Strongly Disagreed (SD) respectively for the positive statements and 1, 2, 3, 4 and 5 were assigned to negative statements. Maximum would be 115 and the minimum score was 23. The scores of items were summed up to form a composite attitude score for each of the respondents. Respondents were then categorised into two, using the mean score as the bench mark. Respondents with scores below mean would be considered to have unfavourable attitude towards OFP, while respondents with scores would be considered to have favourable attitude towards OFP.

3.6.1.5: Benefits derived from practicing organic farming practices

The variable was measured using a list of twenty-one benefits that could be derived from OFP. The benefits were rated usingusing3-point likert type scale of"not at all" which was scored 0, "to a lesser extent" scored 1 and "to a large extent" scored 2. Maximum score would be 42 and the minimum score would be 0. The scores were summed up for each of the respondents. Respondents were then categorised into two based on the level of benefits derived from OFP using the mean score as the bench mark. Respondents with scores below mean would be considered to have low benefit from using OFP, while respondents with scores from mean and above would be considered to have high benefit from using OFP

3.6.1.6: Constraints to use of organic farming practices

The variable was measured using a list of fourteen items. The constraints were rated using 3-point likert type scale of not severe, severe and very severewhich were scored 0, 1and 2 respectively.Maximum would be 28 and the minimum score would be 0. Severity of constraints faced by the crop farmers was categorised to be low or high using the mean score as the bench mark. Respondents with scores below mean would be considered to face less severe constraints inusing OFP, while respondents with scores from mean and above would be considered to face high constraints in using OFP.

3.6.1.7 Focus group discussion and in-depth interview

These were conducted with crop farmers to obtain qualitative information related to the following:

(i) Crop farmers' personal characteristics

(ii) Nature of respondents' enterprise

(iii) Information sources of crop farmers

(iv) Knowledge of crop farmers about OFP among respondents

(v) Benefits derived from using OFP

(vi) Constraints faced in utilising OFP

3.6.2 Dependent variable

Utilisation of organic farming practices

Utilisation of organic farming practices was measured on 3-point scale of: Never used, Used before and Still using. Never used was scored 0, Used before was scored 1 and still using was scored 2. Maximum score would be 66 and the minimum would be0. The mean score obtained for thirty three itemswould serve as the bench mark. These scores would be used to categorize the levels of utilisation of organic farming practices.Respondents with scores below meanwould be considered to have low utilisation of OFP, while respondents with scores from mean and above would be considered to have high utilisation of OFP.

3.7 Data Analysis59

The data collected were analysed with the aids of descriptive and inferential statistics. Descriptive statistics such as frequency, percentage, means, standard deviation and tables were used to analyse objectives, while inferential statistics such as Chi-square, Pearson Product Moment Correlation (PPMC), ANOVA and multiple regression were used. The hypotheses testing focused on the relationship between dependent and independent variables. Hypotheses one and two were tested using Chi-square and PPMC, hypotheses two, three, four, five and six were tested with PPMC. Hypothesis seven was tested using ANOVA, while multiple regression model was used to determine the contribution of various factors influencing utilisation of organic farming practices.

Multiple regression model

Utilisation of organic farming practices (OFP) was analysed using multiple regression model to empirically quantify the relative influence of various factors affecting crop farmers in using OFP. This study puts forward that the probability of crop farmers utilising OFP (Y) depends on the attributes like: age, cosmopoliteness, household size, farm size, attitude, benefit, information sources, knowledge, income, constraints, number of crop grown, sex, membership and education. The explicit multiple regression model is as stated below:

$Y = \beta 0 + \beta_1 x_1 + \beta_{2In} x_2 + \beta_3 x_3 + \beta_{4I} x_4 + \beta_5 x_5 + \beta_6 x_6 + \ldots\ldots\ldots + \beta_{14} x_{14} + u$

Where:

Y = Utilisation of OFP

β = Regression coefficient

x_1 = Age

x_2= cosmopoliteness

x_3= household size

x_4= farm size

x_5= attitude

x_6 = benefits of OFP

x_7= information sources for OFP

x_8= knowledge of OFP

x_9= income of crop farmer per year

x_{10}= constraints to OFP utilisation

x_{11}= number of crops grown

x_{12} = sex

x_{13} = membership of association

x_{14} = education

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Respondents' socio economic characteristics

The socio economic characteristics identified in this study include sex, marital status, educational background, age, religion, ethnicity, cosmopoliteness, primary occupation, household size, crops grown, farm size, years of farming experience, source of land, income, cropping system and source of labour. The result of analysis of these characteristics is discussed below.

4.1.1 Sex

Table4.1below shows that majority (96.3%)of the respondents were male, while female were 3.7%. This is an indication that more males were involved in organic farming.This is supported by the findings of Fasina (2016) who reported high participation of men in agricultural production. Low women participation might be due to the fact that women involved themselves in other aspects of agriculture such as processing, marketing and transportation of agricultural produce.This result is also supported by Kolawole; Oladele; Alarima and wakatsuki (2011) who found that energy sapping rice production activities were exclusively retained for men who were considered more energetic than women. On the other hand, the level of involvement by the female gender in rice marketing was high.The findings of Adeogun, Olawoye and Akinbile (2010)further corroborated low women participation in agricultural production by stating that female farmers are constrained by some factors such as access to inputs, modern technologies and land ownership thus, reducing women's ability to improve their agricultural production.

4.1.2 Marital status

The result as shown in Table 4.1reveals that majority(81.7%) of the respondents were married. The implication is that crop farmers in the study area were mature and could effectively take crucial decisions jointly with their spouses. Marital status is a crucial factor in shaping people participation and acceptance of innovation. This result also implies large family size that might be generated by the respondents who were married could create labour for OFP which really require more labour. Agbo, Iroh and Ihemezie (2015) affirmed that family labour is recognized as a major source of labour supply among small scale farmers. This result is supported by Ekong (2003) who stated that marriage facilitates farming activities in the rural areas because it is a way of accessing unpaid labour which farmers really desire

4.1.3 Religion

The findings from the study as shown in Table 4.1reveals that majority (78.6%) of the respondents in the study area were Christians. Few of the respondents were Muslims. This result shows that the people in the study area were more of Christians. The inference is that respondents had one religious affiliation or the other, and as a result, religion could be used as avenue of reaching the farmers in programs to encourage wider recognition of organic agriculture (Bamigboye, 2014). As a social organisation, religion could be an avenue for social interactions where members can share ideas and receive information.

4.1.4 Ethnicity

Table 4.1below shows that majority of the respondents were Yoruba (91.5%), while Igbo was 8.5%. This result shows that the area of study is dominated by Yoruba people. The implication of this is that respondents might have more access to inherited land to practice OFP since southwest is dominated by Yoruba people who were likely to be indigenes.Kupangwa and Dubihlela (2016) confirmed that culture as a result of ethnic background plays an important role in adoption of technology.

4.1.5 Cosmopoliteness

The findings from the study as shown in Table 4.1 reveals that 63.0% of respondents had exposure outside their own localities (cosmpoliteness). Only 37.0% of the respondents did not have such an exposure. Exposure to new ideas might likely encourage the use of such ideas. Exposure of these crop farmers to other farms outside their own localities might have made them more enlightened, increased their access to information and could contribute to their knowledge, skill and favourable attitude towards OFP.

4.1.6 Household size

The findings from the study as shown in Table 4.1reveals that 46.4% of the respondents had household sizes within the range of 1-3 persons, 45.8% within the range of 4-6 persons and 7.8% had household sizes of 7 and above. This shows that more than half of the respondents had relatively large household size. The large family size might be of advantage in term of family labour which might encourage crop farmers to utilise organic farming practices despite the fact that much labour is required. This is supported by the findings ofIronkwe; Ekwe; Okoye and Chukwu (2009) who reported that large household size among cassava producing farmers was of advantage to them in the area of labour requirement.

Table 4.1: Distribution of crop farmers based on socio economic characteristics

Variable description	F (n = 295)	%
Sex		
Male	284	96.3
Female	11	3.7
Marital status		
Single	51	17.3
Married	241	81.7
Widow	3	1.0
Religion		
Christian	232	78.6
Islamic	63	21.4
Ethnicity		
Yoruba	270	91.5
Igbo	25	8.5
Cosmopoliteness		
No	109	37.0
Yes	186	63.0

Household size		
1 – 3	137	46.4
4 – 6	135	45.8
7 and above	23	7.8

Source: Field survey, 2017

4.1.7 Educational background

The result of analysis in Figure 6 reveals that majority (94.3%) of the respondents were educated with primary (19%), adult education (14.6%), secondary (22.7%) and tertiary (38.0%) while 5.7% had no formal education. This implies that most of the respondents in the study area were literate. This personal characteristic is important in adoption of innovation, because it helps in quick understanding of innovation technical-know-how as in the case of OFP. This is supported by Oluyole *et al.* (2007), who reported that high literacy level would predispose farmers to adopt and utilise improved farm practices.

4.1.8 Age

The result in Figure 7 shows majority (71.5%) of the respondents were within the age range of 37-59 years, few of the respondents were within the age range of 20 – 36 years, while very few (8.8%) of the respondents were 60 years and above. The mean age of crop farmers (43.55 ± 10.95 years) implies that farmers were within the active and productive years and might have required vigour to engage in organic farming practices. This is in line with the findings of Fabusoro *et al.* (2010) who reported that majority of labour force in southwestern Nigeria were in their active ages. Age is one of the integral factors that influence adoption and untilisation of technology. Alao *et al*. (2014) opined that farmers within 31-60 years are economically active and strong to engage in crop production as a source of livelihood.

4.1.9 Primary occupation

Figure 8reveals that 53.6% of crop farmers made farming their primary occupation, 25.8% were into trading, while 20.6% were civil servants. This implies that farming was the major income generating occupation of the larger proportion of the respondents. This is in

line with Fabusoro *et al.* (2010) who reported that larger percentage of rural dwellers are farmers. Those who had farming as their primary occupation would devote more time into farming activities and might be ready to utilise organic farming practices that could be of benefit to them.Those crop farmers who did not make crop production their major occupation could also have favourable attitude toward organic farming. This is due to the fact that most crop farmers who engaged in petty trading might have more benefit to finance crop production using organic farming practices.

4.1.10 Membership of associations

Figure 9 shows that 14.9% of the crop farmers were members of farmers' cooperative, 9.8% belonged to community development association, 27.8% were in savings and credit groups, 26.1% were NOAN members, 15.3% belonged to LAUTECH organic farmers' association and 6.1% belonged to OAPTIN. Membership of association has been found to enhance social capital, information and innovation exchange. These could motivate crop farmers to utilise organic farming practices. This is in line with the statement made by a crop farmer who was a group leader during an in-depth interview (IDI) in Akinyele Local Government, he said:

> *"In our association we discuss how some of these organic farming practices can better be used because they help in reducing the cost of production".*(13/01/2017)

He further said that:

> *"NOAN management assists us in some aspects, for instance the management gave us pumping machine which is one of the integral tools for watering in organic farming".*(13/01/2017)

The result is also in line with Uaiene *et al.* (2009) who reported that social network influence is important for individual decisions, as farmers exchange information and learn from one another while making attempts to utilise agricultural innovations. Moreover, being a member of farmers' cooperative society could help a farmer to have access to loans, such loans could be used to execute some capital intensive aspects of organic farming practices. Obuobisa-Darko (2015) reported that innovation utilisation is significantly influenced by membership of association. Also, since certification and marketing of organic produce

require that farmers should be in group, associations formed by crop farmers could serve that purpose (Meinshausen *et al.* 2019).

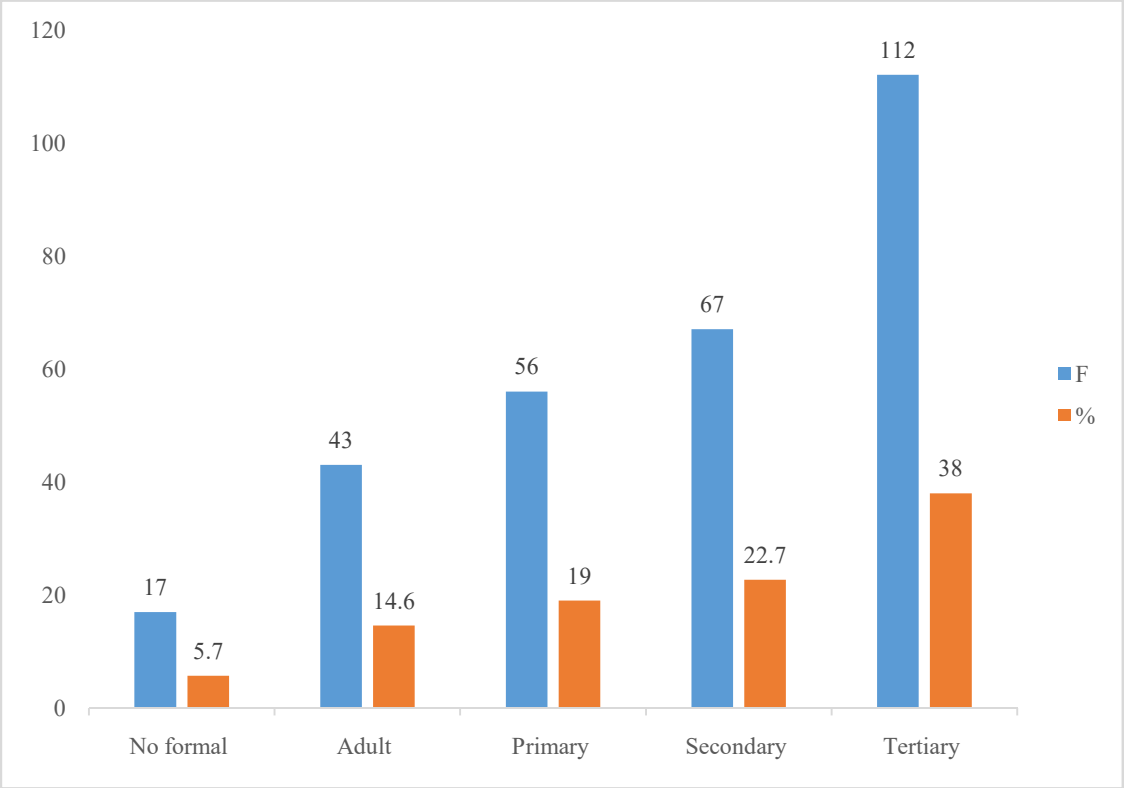


Figure 6: Distribution of respondents' educational background

Source: Field survey, 2017

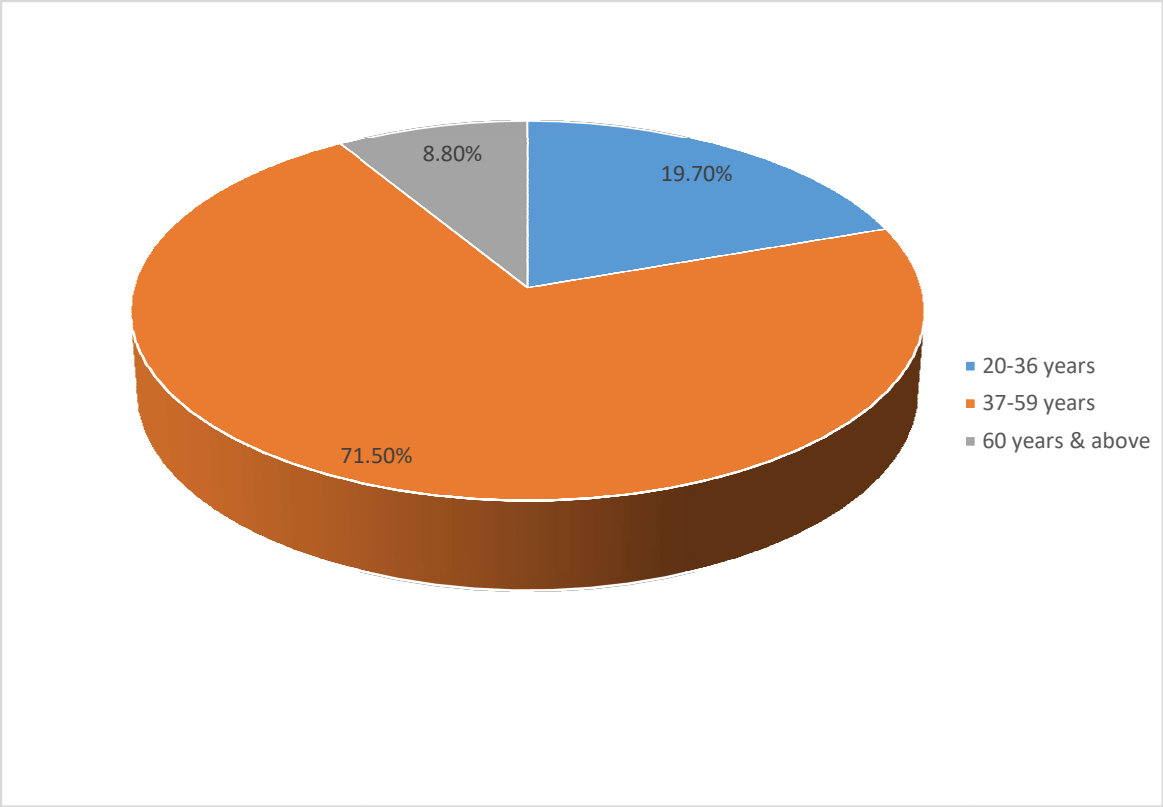


Figure 7: Age distribution of respondents

Source: Field survey, 2017

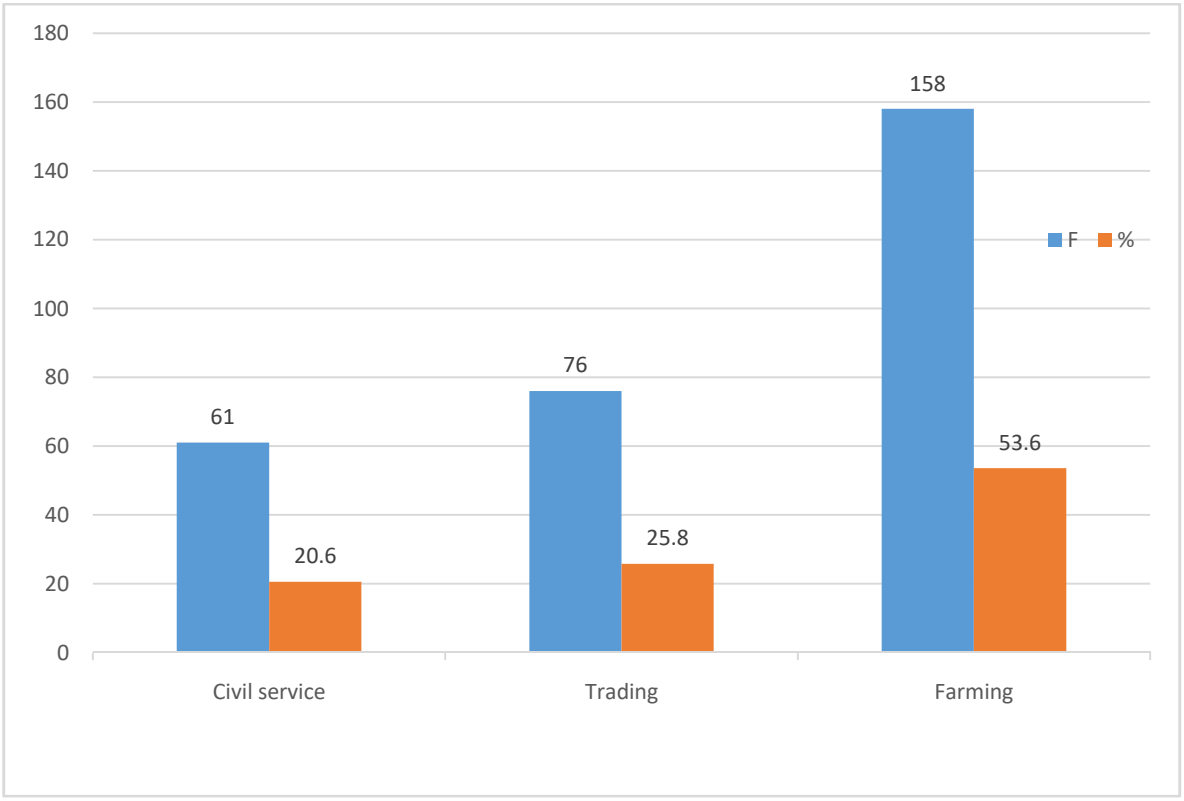


Figure 8: Distribution of primary occupation of respondents

Source: Field survey, 2017

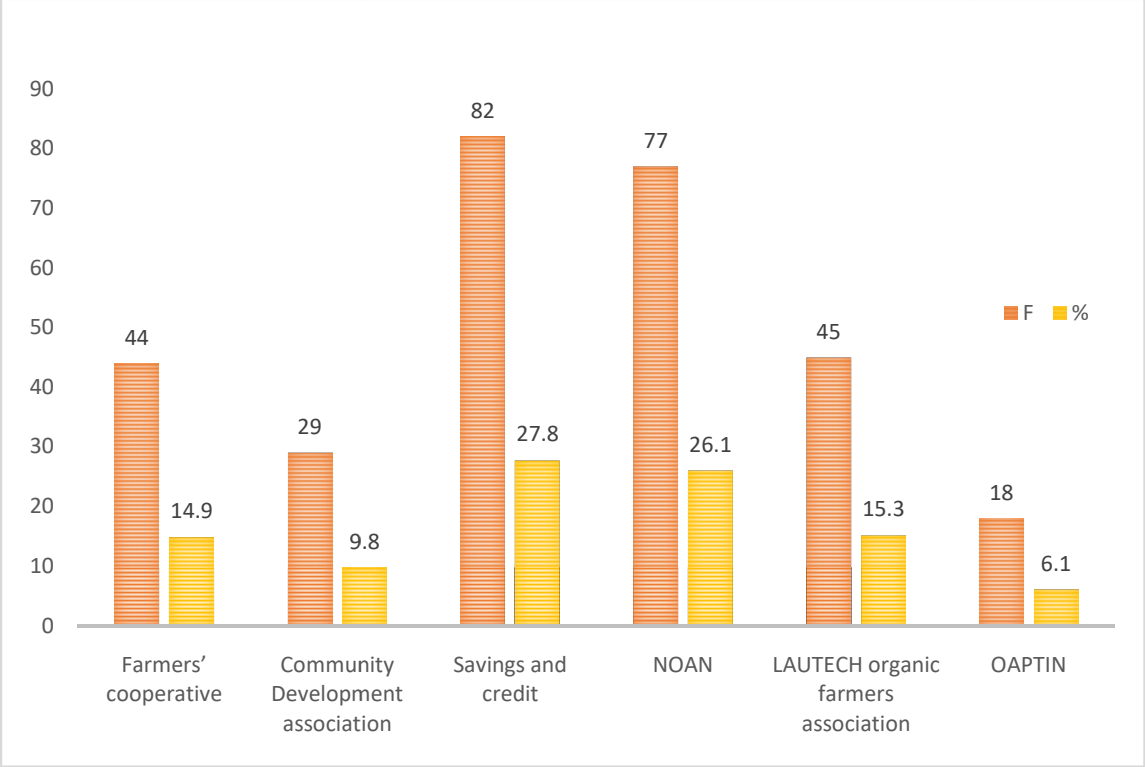


Figure 9: Distribution of crop farmers based on association

Source: Field survey, 2017

4.1.11 Years of farming experience

The findings of the study as shown in Table 4.2reveals that the mean of years of farming experience of crop farmers was 20 ± 7 years. The percentage of those crop farmers that were having 3 – 19 years of crop farming experience is 48.8% while those with 20 – 31 years is 51.2%. There is likelihood that those crop farmers who had many years of experience might find it easier to utilise more of OFP. This could be due to the fact that some organic farming practices that are already being practiced culturally might not be difficult for them to understand, adopt and utilise. Oladele (2008) opined that experience contributes to farmers' ability to improve on their farm activities.

4.1.12 Income

The result in Table 4.2 shows that crop farmers' annual income had mean value of ₦250,072.00 ± ₦338,081.00. Majority (76.3%) of the farmers earned lowest income ranging between ₦20,000.00 - ₦250,071.00. Low income might likely prevent crop farmers in acquiring some organic farming inputs and as such affecting their readiness to useOFP. This result is in line with the finding of Oyesolaand Obabire (2012) who reported that the mean income per farmer was low and that this would hinder such a farmer to acquire farming inputs.

4.1.13 Sources of farm labour

The result of the study in Table 4.2shows that the largest proportion (70.2%) of the crop farmers utilised combined labour. This suggests a relatively high demand for labour in using organic farming practices. The fact that crop farmers were able to afford combined labour implies that the farmers might be able to meet the labour requirement of organic farming activities and this may serve as an impetus to utilise OFP. This result is corroborated by Yusuf (2018)who observed that human labour is the common form of farm labour available to small holder farmers, and that this form of labour accounts for up to eighty percent of total farm power.

4.1.14 Cropping system

The result as shown in Table 4.2reveals that majority (78.6%) of the crop farmers practiced mixed cropping while only few(21.4%) practiced sole cropping. This implies that, mixed cropping was the most acceptable cropping system among crop farmers in the study area. This result is in line with the finding of Adebayo and Oladele (2013) that mixed cropping was used among vegetable farmer because it ensured income stability. The reason being that short and long term crops are planted together so that while one is not yet ready for the market, the other would have been ready so that farmers could enjoy stable income.

4.1.15 Crops grown

The result in Table 4.3 shows that crops grown among respondents were yam (13.3%), cassava (73.2%); maize (65.1%), vegetables (56.3%), banana/plantain (39.4%), pineapple (8.8%) and tree crop (9.5%). This finding is line with Oyesolaand Obabire (2012) who found that farmer grew crops of various types as mentioned above. There were some crops commonly grown among the respondents such as cassava, maize and vegetable. This might be because of high demand for these crops in the study area. This implies that there is high tendency to get more of these types of crops in organic form if crop farmers are encouraged to use OFP.

4.1.16 Crop best grown using OFP

Table 4.3 shows that more (33.6%) of the crop farmers could grow cassava better than any other crops using OFP, while 18.0% could grow maize, 11.9% could grow vegetables and 11.2% could grow pineapple. Only few (4.7%) of crop farmers could grow yam better than other crops using OFP. This implies that crops such as cassava, maize,vegetables and pineapple could be got in organic forms from crop farmers.

4.1.17 Farm size

The result of the study as shown in Table 4.3 reveals that the mean farm size of crop farmers in the study area was 0.50 $\pm$ 0.66 hectares, majority (64.4%) of crop farmers had farm size ranging between 0.03 to 0.49 hectares. Only 35.6% of them had large size farm ranging between 0.50 to 4.88 hectares. This shows that majority of the crop farmers had small farm size. This is line with FAO(2013) that majority of crop farmers in Nigeria are small scale farmers. This could likely influence the kind of agricultural innovations they would utilise. Fasina (2016) reported that the chance of not using organic fertilizer as one of organic farming practices among crop farmers increased with those having larger farm size compared to those having smaller farm size. This implies that the idea of organic farming can easily be encouraged and spread among small scale farmers.

4.1.18 Source of land

The findings of the study in Table 4.3reveal that 23.1% of respondents' farmlands were on inherited land, 21.0% rented, 19.0% leased, 11.5% purchased, 12.9% were on communal land and 12.5% family. This shows that common sources of land among crop farmers in the study area were through inheritance, rent and lease. This implies that the farmers would have some level of control over the land. This could influence their use of organic farming practices since these practices require reliable and durable source of farm land (NOAN, 2012). This result is supported by Uwagboe (2016) who reported that most farmers acquired their farm land through inheritance and rent.

Table 4.2: Distribution of crop farmers based onsocio economic characteristics

Variables description	F (n = 295)	%	$\bar{x}$& SD
Years of crop farming experience			20 ± 7
3 – 19	144	48.8	
20 – 31	151	51.2	
Income(₦)			250072± 338081
20000 – 250071	225	76.3	
250072 –1862000	70	23.7	
Source of farm labour			
Family	12	4.1	
Hired	24	8.1	
Self	52	17.6	
Combined	207	70.2	
Cropping system			
Sole cropping	63	21.4	
Mixed cropping	232	78.6	

Source: Field survey,2017

Table 4.3: Distribution of crop farmers based on socio economic characteristics

Variables description	F (n = 295)	%	$\bar{x}$& SD
Crop grown			
Yam	39	13.3	
Cassava	216	73.2	
Maize	192	65.1	
Vegetable	166	56.3	
Banana/plantain	116	39.4	
Pinneapple	26	8.8	
Tree crops	28	9.5	
Crop best grown using OFP			
Yam	14	4.7	
Cassava	99	33.6	
Maize	55	18.6	
Vegetable	35	11.9	
Banana/plantain	33	11.2	
Pinneapple	27	9.2	
Tree crops	32	10.8	
Farm size			0.50 ± 0.66ha
0.03 – 0.49 ha.	190	64.4	
0.50 – 4.88 ha.	105	35.6	
Source of land			
Inheritance	68	23.1	
Rent	62	21.0	
Lease	56	19.0	
Purchase	34	11.5	
Communal	38	12.9	
Family	37	12.5	

Source: Field survey, 2017

4.2 Sources of information of respondents

Figure 10 below shows that 22.5% of the crop farmers indicated farmers' association to be the best sources of information on OFP. While 21.0% of the crop farmers indicated that print media was the best source of information, 19.4% indicated radio, 15. 1% indicated television, 11.4% indicated internet/computer and 10.6% indicated mobile phone.Radio being one of the best sources of information to crop farmers supports the findings of Ajayi (2007) who found that the use of radio is the most popular source of information in southwestern Nigeria. This result is also supported by the findings of Okwu and Umoru (2009) who reported that rural people get agricultural information from friends/neighbors and mass media. Also Dhanshri (2011) reported that print media plays a significant role in the development communication of any country for the development of human beings.

4.3 Frequency of use of sources of information

The result of the study in Table4.4shows that the sources from which crop farmers got frequent information on organic farming practicesincludefarmers' association with 43.7% of respondents that regularly got information from this source, while 39.0% occasionally received information from it. Also, 33.9% of respondents regularly got information from print media with 50.2% that occasionally got information from it. In the case of radio as a source of information, 17.7% regularly got information from it, while 74.9% occasionally received information from this source.The fact that farmers' association, print media and radio had highest weighted scores of 126.4, 118.0 and 109.3 respectively unlike other sources of information such as: television (84.8), internet/computer (64.3) and mobile phone (60.0) shows that crop farmers couldfrequently access information through their friends in farmers' association and radio as well as print media. Friends in farmers' association being one of the best sources of information for crop farmers was supported by the statement agreedon by crop farmersduring FGD in Odeda LGA of Ogun State that:

> *"we do hear of organic agriculture from friends in ourfarmers' association".*(09/02/2017)

The low scores reported for mobile phone and computer imply that modern Information and Communication Technology (ICT) has not been well explored for OFP. This means that crop farmers may have access to limited information on OFP. The valuable information on OFP may not easily get to them in the right quantity at the appropriate time.

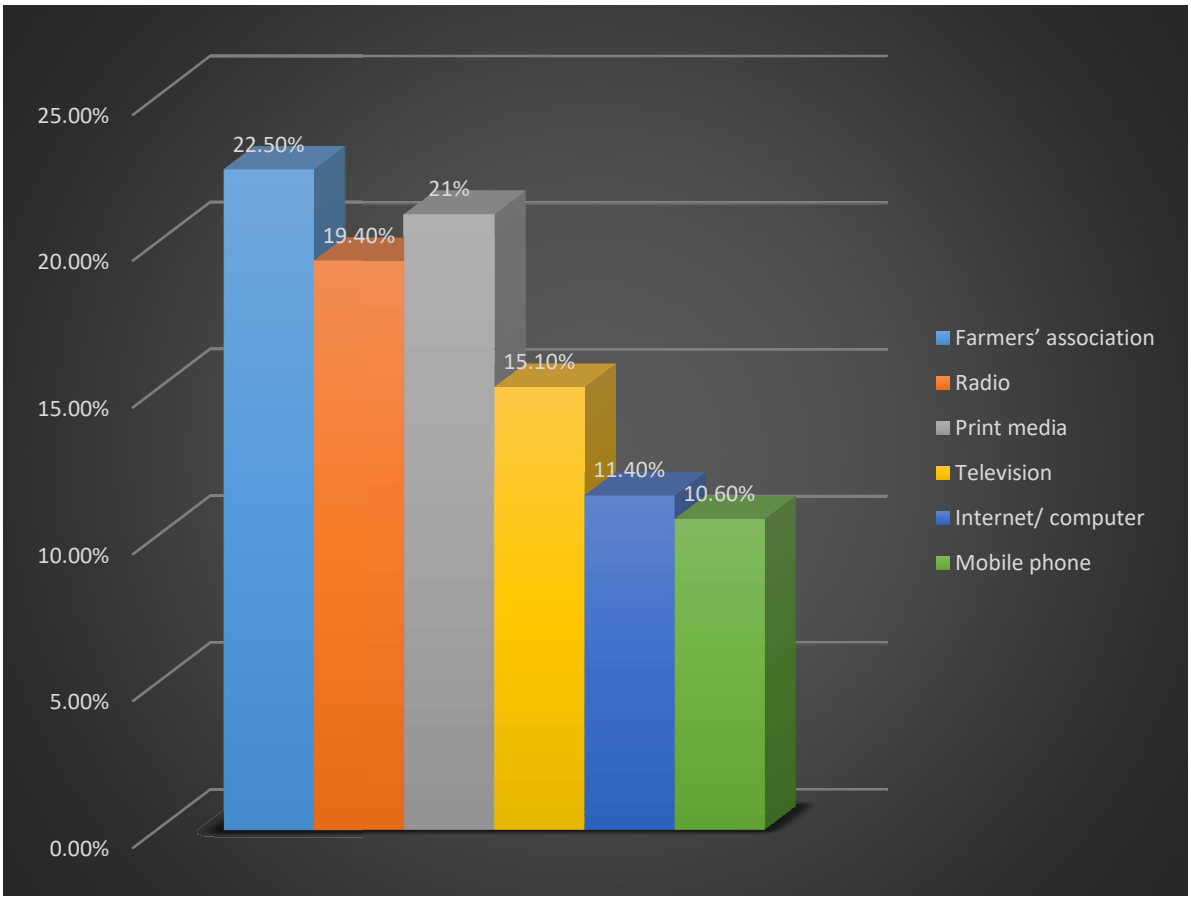


Figure 10: Distribution of sources of information of respondents

***Source**: Field survey, 2017*

Table 4.4: Distribution of frequency of use of sources of information

Sources of information	Frequency of information						Weighted score
	Never		Occasionally		Regularly		
	F	%	F	%	F	%	
Farmers' association	51	17.3	115	39.0	129	43.7	126.4
Radio	23	7.8	221	74.9	51	17.7	109. 3
Print media	47	15.9	148	50.2	100	33.9	118.0
Television	65	22.0	210	71.2	20	6.8	84.8
Internet/ computer	124	42.0	152	51.5	19	6.4	64.3
Mobile phone	138	46.8	137	46.4	20	6.8	60.0

Source**: **Field survey,2017

4.4 Respondents' knowledge of organic crop farming practices

The result of the survey as shown in Table 4.5reveals that crop farmershad high knowledge in some organic farming practices such as importance of mixed cropping (89.8%); inclusion of legumes during crop rotation (87.5%); extracts from plants for pest and disease control (87.1%); avoidance of alternating organic and conventional farmlands (86.1%);importance of planned crop rotation (85.4%); compost making (80.0%); the best way of getting organic seeds or seedlings (73.2%) and organic farming not being the same as natural farming (72.2%) among others. Nevertheless, respondents had low knowledge in some organic farming practices such asintense bush burning (38.3%); acceptable distance between organic and conventional farmlands (44.4%); use of trapping plants to control pests (47.1%) and hybrid seeds or seedlings could be planted as organic planting materials (48.1%) among others. Table 4.6shows that a little above half (55.3%)of crop farmershad high knowledge(17-25) of organic crop farming practices, while 44.7% of themhad low knowledge. This might be because of the level of education and cosmpoliteness of some crop farmers. This fact is supported by a statement agreed on by a group of crop farmers during FGD in Ido L.G.A.:

> *"with our experience and level of education, we may say that we have better knowledge of organic farming practices; but we have not been putting the practices into full use due to some constraints, for instance, many consumers do not appreciate and cannot pay for the quality of organic crop produce."*(28/02/2017)

This finding reveals that there has been a slight increase in the knowledge of crop farmers about OFPcompared to that of Obabire (2017) which declared low knowledge for farmers. The policy implication of this result is that crop farmers should be encouraged by both governmental and non-governmental stakeholders so that their knowledge in organic farming practices could be boosted andfully translated to use.

Table 4.5: Distribution of respondents based on the knowledge of items answered correctly

S/N	Knowledge test statement	F	%	Ranks
1.	The acceptable distance between organic farmland and farmland with heavy use of pesticides should not be less than 50m	130	44.1	23rd
2.	Compost making is done by using only plant refuse and water	236	80.0	7th
3.	Planned crop rotation is very important in organic agriculture	252	85.4	5th
4.	Sparing of some trees on the field as much as possible can add to soil fertility	184	62.4	15th
5.	Mixed cropping does not have any importance in organic farming	265	89.8	1st
6.	Synthetic chemicals can be used at any rate on organic farm land.	146	49.5	20th
7.	Inclusion of legume during crop rotation does not have any good effect on organic farmland.	258	87.5	2nd
8.	Intense bush burning is usually carried out on organic farmland because it adds nutrients /ashes to the soil	113	38.3	25th
9.	Organic farming discourages the activities of soil microorganisms	114	38.6	24th
10.	Use of synthetic insecticides is one of the cultural methods of controlling pest in organic farming	205	69.5	12th
11.	Melon is an example of crop that can be used in controlling weeds on organic farmland	191	64.7	14th
12.	The best way of getting organic seeds/seedling is by personally growing ones seeds/seedlings	216	73.2	10th
13.	Hybrid seed or seedlings could be planted as organic planting materials	142	48.1	21st
14.	Alternation can be allowed between organic and conventional farmlands	254	86.1	4th
15.	Hand weeding is usually avoided in organic farming because it wastes time	204	69.2	12th
16.	Early planting is important in pests and diseases control	233	79.0	9th
17.	Inorganic fertilizer can occasionally be used to increase growth in organic farming	161	54.6	17th
18.	Organic farming is the same as natural farming	213	72.2	11th
19.	Plant extracts can only be obtained from plant roots	257	87.1	3rd
20.	Incorporation of crop residue into the soil does not add to soil nutrient	155	52.5	18th
21.	The use of trapping plant to control pest is acceptable and important in organic agriculture.	139	47.1	22nd
22.	Wood ash can be used in managing soil fertility	242	82.0	6th
23.	Curing of organic manure can be done within two to four days	91	30.8	26th
24.	Freshly packed animal/poultry waste can be applied directly to crop on organic farmland	149	50.5	19th
25.	Crop certification is not that necessary in organic farming.	168	56.9	16th
26.	Mulching has only one importance of protecting the soil from excessive	235	79.7	8th

sun.

Source: Field survey, 2017

Table 4.6: Categorisation of crop farmers based on their knowledge of OFP

Knowledge	**F**	**%**
Low knowledge (7-16)	132	44.7
High knowledge (17-25)	163	55.3

Minimum = 7, Maximum = 25, Mean = 16.78, SD = 4.28

Source: Field survey, 2017

4.5 Respondents' utilisation of organic farming practices

The result of conversion time and requirement as shown in Table 4.7, no use of the same farmland for organic and conventional crop production ($\bar{x} = 1.01$) ranked highest. Avoidance of use of chemicals on farmland in not less than three years ago ($\bar{x} = 0.96$) ranked second among crop farmers, while maintaining boundary (buffer zone) between organic and conventional farmlands ($\bar{x} = 0.92$) ranked lowest. Relative low utilisation scores obtained for these practices imply that crop farmers did not keep up to the practices as expected.

Under biodiversity/farming system diversity, use of multiple cropping ($\bar{x} = 1.91$) and planned crop rotation ($\bar{x} = 1.52$) ranked higher. This implies that organic crop farmers utilised these practices well. This result is supported by Ibeawuchi*et al*. (2015) who opined that crop farmers use these practices because of their advantages as means of replenishing soil fertility and controlling pest and disease. It was further said that these practices had been parts of indigenous farming practices that crop farmers were used to.

No use of bush burning during land preparation ($\bar{x} = 1.51$) and use of soil cover/mulching/cover cropping ($\bar{x} = 1.41$) which were ranked first and second respectively were mostly utilised among crop farmers as OFP for soil and water conservation. Aminu *et al.* (2011) also confirmed that mulching as one of OFP enhanced vegetative growth and yields of vegetables because of its role in reducing water loss and ability to add to soil organic content.

In maintaining soil fertility, use of wood ash ($\bar{x} = 1.87$) which was ranked first, use of green manure ($\bar{x} = 1.36$) ranked second and use of farmyard manure ($\bar{x} = 1.24$) ranked third were mostly utilised OFP. This result is supported by the findings of Law-Ogbomo (2011) that organic fertilizer made up of green and farmyard manure can sustain continuous cropping and increased productivity. On the other hand use of certified organic fertilizer ($\bar{x} = 0.43$) was not well practiced by crop farmers. This implies that most of the crop farmers could not afford some organic farm inputs.

The mostly used OFP for pest and disease management among crop farmers were use of timely sowing of crop ($\bar{x} = 1.86$), use of lemon grass extract ($\bar{x} = 1.63$), use of copper salts ($\bar{x} = 1.58$) and use of neem extract ($\bar{x} = 1.35$) among others. Akanmu *et al.* (2012) asserted the fact that, plant extracts are useful for pests and diseases management. Furthermore, planned crop rotation was also used by crop farmers in pest and disease managements ($\bar{x} = 1.29$). Atungwu, *et al*. (2012) also supported the use of planned crop rotation for the management of pest and disease among crop farmers.

The OFP utilised for weed management among crop farmers were use of timely hand weeding ($\bar{x} = 1.81$), use of timely inter-cultivation ($\bar{x} = 1.51$) and use of organic herbicides ($\bar{x} = 1.34$). Alamu, Olaniyan, Egberonge, Bala, and Lawal, (2011) supported the fact that hand weeding is one of OFP used in weed control. This result was supported by the statement made by crop farmers during FGD in Oriade L.G.A. Osun State who said that:

> *"some of these organic crop farming practices are not strange to us, we use them because they help in reducing cost of production; more especially when we do not have money to buy chemicals or inorganic fertilizer".*(15/03/2017)

Planting materials were mostly obtained by crop farmers through the use of conventional seeds/seedlings that were not treated with chemical ($\bar{x} = 1.62$). Table 4.8 shows the level of utilisation of different categories of organic farming practices. There was greater percentage of crop framers with low utilisation scores in pest and disease management category (68.8%). This suggests that majority of the crop farmers might not have required knowledge and inputs for pest and disease management. The result is in line with AkanbiTogun and Ilupeju (2011) who reported that pests and diseases control problem makes organic farming challenging to crop farmers. Also, in soil and water conservation category, more of the crop farmers (60.7%) had low utilisation score. This could be as a result of crop farmers' negligence of soil health status while practicing clean clearing during crop production. This further suggests the need for more training and capacity building in these aspects of OFP. Table 4.9shows the overall categorisation of level of OFP utilisation among crop farmers, it could be seen that more of the farmers (60.3%) were under low utilisation of OFP.

Table 4.7: Distribution of respondents based on utilisation of organic farming practices

S/N	Organic farming practice	N%	U%	S%	$\bar{x}$	Rank
A	**Conversion time and requirement**					
1.	Avoidance of use of chemical on farmland (pesticide, inorganic fertilizer etc) in not less than three years ago	46.8	10.5	42.7	0.96	2nd
2.	Maintaining boundary (buffer zone)between organic and conventional farmlands	52.9	2.4	44.7	0.92	3rd
3.	No use of the same farmland for organic and conventional crop production	43.1	12.5	44.4	1.01	1st
B	**Biodiversity/farming system diversity**					
1.	Sparing of some trees on the field as much as possible	33.9	29.5	36.6	1.03	3rd
2.	Use of planned crop rotation	0.0	47.8	52.2	1.52	2nd
3.	Use of multiple cropping	0.3	8.1	91.5	1.91	1st
C	**Soil and water conservation**					
1.	Use of wind break	27.5	53.6	19.0	0.92	5th
2.	Use of soil cover/mulching/cover cropping	1.4	56.3	42.4	1.41	2nd
3.	Use of minimum tillage	7.5	76.3	16.3	1.09	4th
4.	Late removal of crop residue	0.0	61.4	38.6	1.39	3rd
5.	No use of bush burning during land preparation	0.0	49.5	50.5	1.51	1st
D	**Soil fertility management**					
1.	Use of nitrogen fixing crop (legumes)	3.4	79.0	17.6	1.14	4th
2.	Use of farmyard manure	11.2	53.6	35.3	1.24	3rd
3.	Use of green manure	5.8	52.2	42.0	1.36	2nd
4.	Use of certified organic fertilizer	63.7	29.8	6.4	0.43	6th
5.	Use of compost	52.9	35.3	11.1	0.59	5th
6	Use of wood ash	2.4	8.1	89.5	1.87	1st
E	**Pest and diseases management**					
1.	Use of planned crop rotation	2.4	65.8	31.9	1.29	5th
2.	Use of planting of trapping crops	69.2	9.2	21.7	0.53	10th
3.	Use of copper salts(copper sulphate/hydroxide)	1.0	40.0	59.0	1.58	3rd
4.	Use of timely sowing of crop	0.0	13.6	86.4	1.86	1st
5.	Use of neem extract	6.8	51.2	42.0	1.35	4th
6.	Use of lemon grass extract	0.7	35.6	63.7	1.63	2nd
7.	Use of mechanical traps	1.4	70.5	28.1	1.27	6th
8.	Use of repellents such as pepper to protect stored grains	25.4	60.7	13.9	0.88	8th
9.	Conservation and encouraging the predators on the fields	51.9	35.3	12.9	0.61	9th
10.	Collection and destruction of infected plant	4.7	71.9	23.4	1.19	7th
F	**Weed management practices**					
1.	Use of timely hand weeding to control weeds	0.0	19.0	81.0	1.81	1st
2.	Use of planting of cover crop to control weeds	11.5	64.7	23.7	1.12	4th
3.	Use of organic herbicides such as vinegar and citric acid	7.5	51.2	41.4	1.34	3rd
4.	Use of timely inter-cultivation	0.0	49.2	50.8	1.51	2nd
G	**Planting Materials**					
1.	Planting of chemically untreated seeds/seedlings from organic production	0.7	53.2	46.1	1.45	2nd
2.	Planting of conventional seeds/seedlings that are not treated with chemical	1.4	35.3	63.4	1.62	1st

N = Never, U= Used before, S= Still using,

Source: Field survey, 2017

Table 4.8 Distribution of respondents based on category of OFP utilisation

Level of OFP utilisation	F	%	$\bar{x}$	SD
Conversion time and requirement			2.89	2.78
Low (0-2)	156	52.9		
High (3-6)	139	47.1		
Biodiversity/faming system diversity			4.46	1.27
Low (2-3)	172	58.3		
High (4-6)	123	41.7		
Soil and water conservation			6.31	2.12
Low (3-5)	179	60.7		
High (6-10)	116	39.3		
Soil fertility management			6.63	2.39
Low (2-6)	169	57.3		
High (7-12)	126	42.7		
Pest and disease management			12.20	3.28
Low (5-11)	203	68.8		
High (12-19)	92	31.2		
Weed management			5.78	1.20
Low (2-5)	109	36.9		
High (6-8)	186	63.1		
Planting materials			3.07	0.54
Low (2)	33	11.2		
High (3-4)	262	88.8		

Source: Field survey, 2017

Table 4.9: Overall categorisation of level of OFP utilisation

Utilisation	F	%
Low (20-40)	178	60.3
High (41-63)	117	39.7
Total	295	100

Minimum = 20, Maximum = 63, Mean = 41.34, SD = 9.82

Source: Field survey, 2017

4.6 Benefits derived from organic crop farming

Table 4.10 shows that crop farmers benefited from the components of OFP they utilised. The benefits derived include: crops produce being free of poison ($\bar{x}$=1.65), job creation ($\bar{x}$= 1.50); increased shelf life of crops ($\bar{x}$= 1.50); no water pollution through surface runoff ($\bar{x}$= 1.36); enhanced taste of crop produce ($\bar{x}$= 1.35); increased organic content of soil ($\bar{x}$= 1.34); crops being richer in nutrients ($\bar{x}$= 1.32); no genetic degradation of crops ($\bar{x}$= 1.29); low risk of crop failure due to biodiversity ($\bar{x}$= 1.29); enhanced action of beneficial soil organisms/ bacteria ($\bar{x}$= 1.28); increased soil fertility/lasting soil fertility ($\bar{x}$= 1.26); increased crop yields ($\bar{x}$= 1.22) and increase in plant growth rate ($\bar{x}$= 1.21) among others. This result is supported by the research carried out by Bamigboye *et al.* (2014) who also found that, greater percentage of small scale farmer in Ekiti State enjoyed the benefits of using organic farming practices. The implication of this result is that if the constraints facing utilisation of organic crop production are identified and appropriately dealt with, utilisation of other organic crop farming practices will be easier. A statement made by one of the member of the crop farmers group during FGD in Akinyele Local Government Area Ibadan, Oyo State, shows their recognition and appreciation of benefits of practicing some of these organic farming practices:

> *"my yam was further demanded for from Lagos by one company where one of the staff had testified to long shelf-life of my yam tubers".* (13/01/2017)

Furthermore, during FGD among crop farmers in Ogbomoso south L.G.A., discussants testified to long shelf life of organic vegetables saying:

> *"vegetables we produce here do not get rotten quickly, they do not turn yellow and drop leaves compared to those they applied chemicals to."*(29/03/2017)

The responses of crop farmers concerning the benefits of organic crop production could be further asserted by the statement made by FGD members in Ido Local Government Area, Oyo State, who said:

"We prefer eating vegetables and some other crops we plant around our homes than those we plant far away for sale, because they taste better and they do not get rotten unlike those we applied some inorganic fertilizers and herbicides to".(28/02/2017)

On the other hand, there are some benefits that crop farmers are yet to experience, such benefits include: high premium price ($\bar{x}$= 0.75); availability/accessibility of organic manure ($\bar{x}$= 0.94); reduced soil erosion due to improved soil structure ($\bar{x}$= 1.19) and low investment/reduced cost of production ($\bar{x}$= 1.18). That the crop farmers have not been benefiting as much from high premium or price could be buttressed by the statement made during FGD among crop farmers in Oriade Local Government Area Osun State:

"*assuming organic crop produce are treated separately at the market and reasonable profit is obtained, appreciating the practices of organic crop production is not a difficult thing. After all, we are already using some of these practices"*. (07/04/2017)

Table 4.11 reveals that maximum benefit score was 42.00 and the minimum score was 18.00. Crop farmers were then categorised into two based on the level of benefits derived from OFP using the mean score of 26.21±6.72. Categorisation of crop farmers as shown in the Table implies that, many of the crop farmers (65.42%) did not derive high benefit from utilising OFP.

Table 4.10: Distribution of respondents based on benefit derived from OFP

S/N	Benefit derived in practicing organic crop farming	Not at all (%)	Lesser extent (%)	Large extent (%)	$\bar{x}$	Rank
1.	Improved soil structure	0.0	80.0	20.0	1.20	16th
2.	Increased soil fertility/lasting soil fertility.	0.0	73.6	26.4	1.26	11th
3.	Reduced soil erosion	0.0	81.0	19.0	1.19	18th
4.	Enhanced action of beneficial soil organisms/ bacteria	0.7	70.2	29.2	1.28	10th
5.	Increased organic content of soil	0.0	66.1	33.9	1.34	6th
6.	Increased crop yields	0.0	77.6	22.4	1.22	12th
7.	Resistance of crops to pests and diseases	21.4	60.7	18.0	0.97	19th
8.	Increased crop shelf life/crop staying longer time in store	0.7	49.2	50.2	1.50	3rd
9.	No genetic degradation of crop	0.3	70.2	29.5	1.29	8th
10.	It speeds up plant growth rate	0.3	78.3	21.4	1.21	13th
11.	No water pollution through surface runoff	1.4	61.7	36.9	1.36	4th
12.	Little or no air pollution	1.7	75.9	22.4	1.21	14th
13.	Reduced desertification thus lowering carbondioxide/ heat emission	0.0	79.3	20.7	1.21	14th
14.	High premium/price	35.3	54.2	10.5	0.75	21st
15.	Low investment/reduced cost of production	5.1	71.9	23.1	1.18	17th
16.	Availability/accessibility of organic manure	15.9	74.2	9.8	0.94	20th
17.	Low risk of crop failure due to biodiversity (e.g. mixed cropping)	4.1	63.1	32.9	1.29	9th
18.	Job creation	0.0	49.8	50.2	1.50	2nd
19.	Crops are richer in nutrients/ better nutrition	0.0	68.5	31.5	1.32	7th
20.	Crops produced are free of poison	0.0	34.9	65.1	1.65	1st
21.	Enhanced taste	0.0	65.1	34.9	1.35	5th

Source: Field survey, 2017

Table 4.11: Distribution of respondents based on level of benefit derived from OFP

Benefit	F	%
Low (18-25)	193	65.42
High (26-42)	102	34.58

Minimum = 18, Maximum = 42, Mean = 26.21, SD = 6.08

Source: Field survey, 2017

4.7 Respondents' attitude towards organic crop farming practices

Table 4.12 shows how favourable the attitude of crop farmers was toward some organic crop farming practices. For instance, planting of cover crop within the main crop to control weeds ($\bar{x}$=3.10); avoidance of application of organic manure due to fear of soil contamination ($\bar{x}$=3.91); recognition of difference between organic and conventional farming systems ($\bar{x}$ =3.87); using of mulching on farm because the decomposed mulching material add to soil fertility ($\bar{x}$= 3.80); organic crops produce are more nutritious ($\bar{x}$= 3.75); organic crop produce supports human health better ($\bar{x}$=3.73); use of plant extracts because they help in pest and disease management ($\bar{x}$=3.73); timely inter-cultivation being of help in weeds control ($\bar{x}$=3.67); chemically treated seeds are not ideal for planting in organic farming. ($\bar{x}$= 3.51); practicing manure application regardless of weed problem, ($\bar{x}$= 3.39); using organic manure despite being difficult to apply ($\bar{x}$= 3.35); practicing crop rotation, because it helps in controlling pest and disease attack ($\bar{x}$= 3.34) and practicing organic farming despite being cumbersome ($\bar{x}$ = 3.28). On the other hand, crop farmers showed unfavourable attitude towards the following organic farming practices: Organic farming is not capital intensive ($\bar{x}$= 2.60); not avoiding the use of organic manure due to its bad dour of ($\bar{x}$=2.66); practicing of minimum tillage since it protects soil fertility (2.83); having interest in organic farming because it is not labour intensive ($\bar{x}$=2.89) and application of organic manure because it improves soil fertility ($\bar{x}$=2.99).

The Table 4.13 shows the categorisation of crop farmers based on their attitude towards organic crop farming practices. More than half (58%) of the crop farmers had unfavourable attitude toward OFP, while 42% had favourable attitude. This result is supported by Obabire (2017) who found that 55.7% of vegetable farmers had unfavourable attitude towards organic farming. The implication is that crop farmers might not be well disposed to utilise OFP except there is an intervention to change their attitude positively towards organic farming practices. The result of unfavourable attitude towards OFP is further supported by the statement made during FGD among crop farmers in Oriade Local Government Area Osun State:

"*assuming organic crop produce is treated separately at the market and reasonable profit is obtained, appreciating the practices of organic crop production is not a difficult thing. After all, we are already using some of these practices."*(15/03/2017)

Table 4.12: Distribution of respondents based on their attitude towards organic crop farming practices

S/N	Attitudinal statement	SA %	A%	U%	D%	SD%	$\bar{x}$
1.	Organic farming is not cumbersome	12.9	37.3	31.2	2.4	16.3	3.28
2.	Organic farming relatively increases crop yield.	16.6	36.6	17.6	13.6	15.6	3.25
3.	Distance between conventional and organic farmland is important.	10.8	33.2	33.2	16.6	6.1	3.26
4.	Organic farming is not capital intensive	0.7	20.7	19.0	57.3	2.4	2.60
5.	Organic manure does not lead to soil contamination	14.6	63.1	20.7	1.7	0.0	3.91
6.	Organic manure improves soil fertility	8.1	31.2	15.3	42.4	3.1	2.99
7.	Organically produced food crops are more nutritious	35.6	18.6	31.2	14.6	0'0	3.75
8.	Decomposed mulching materials can add to soil fertility.	22.7	38.6	34.2	4.4	0.0	3.80
9.	Cover cropping helps in weed control	21.0	55.9	20.7	2.4	0.0	3.96
10.	Organic farming is labour intensive	7.8	32.2	26.4	8.1	25.4	2.89
11.	There is difference between organic and conventional farming systems	16.6	62.0	16.3	1.7	3.4	3.87
12.	Crop rotation is importance in organic farming.	14.9	8.8	73.2	1.0	2.0	3.34
13.	Application of manure should not be avoided despite weed problems	19.0	17.6	47.8	14.2	1.4	3.39
14.	Plant extracts help in pest and disease management	18.6	39.7	37.6	4.1	0.0	3.73
15.	Pest and disease attack should not hold one back from practicing organic farming	8.5	28.5	22.0	40.3	0.7	3.04
16.	Organic manure application improves soil water condition	10.5	21.4	24.7	43.4	0.0	2.99
17.	Organically produced food crop supports human health	25.4	22.0	52.5	0.0	0.0	3.73
18.	Bad odour of organic manure should not discourage organic farming	23.1	6.1	27.8	0.0	43.1	2.66
19.	Minimum tillage practice protects soil fertility	18.6	5.1	16.9	59.3	0.0	2.83
20.	Organic manure is difficult to apply	25.4	15.6	43.1	0.7	15.3	3.35
21.	Collection and destruction of infected plant is important in organic agriculture	22.7	24.4	21.4	6.1	25.4	3.13
22.	Timely inter-cultivation really helps in weeds control	19.7	29.2	49.2	2.0	0.0	3.66
23.	Chemically treated seeds are not ideal for planting in organic farming.	29.2	19.0	28.5	20.7	2.7	3.51

Source: Field survey, 2017

Table 4.13: Categorisation of respondents based on their attitude towards OFP

Attitude	F	%
Favourable (46-76)	124	42.0
Unfavourable (77-110)	171	58.0

Minimum = 46, Maximum = 110, Mean = 77, SD = 17

Source**: **Field survey, 2017

4.8 Constraints faced in practicing organic crop farming

The result of the survey in Table 4.14 showed that crop farmers were facing some constraints. The more pronounced constraints according to their means are as follows: unavailability of market for organic agriculture produce ($\bar{x}$= 1.59); inadequate capital ($\bar{x}$= 1.43); inadequate labour ($\bar{x}$= 1.40); curing of fresh manure ($\bar{x}$= 1.06); transportation/heavy weight of organic manure ($\bar{x}$= 0.95); pests and diseases control problem ($\bar{x}$= 0.93); certification process ($\bar{x}$ = 0.92) and unavailability of organic inputs such as seeds, seedlings and organic fertilizer ($\bar{x}$ = 0.83). These findings are supported by Adeoluwa *et al.* (2006) who reported that one of the factors limiting organic agriculture is the availability of organic fertilizer sources to meet plant essential nutrient demand. The result is also in line with Akanbi *et al.* (2011) who reported that constraints farmers faced include narrow local markets, labour requirement, pests and diseases control problem. Oyesolaand Obabire (2012) confirmed that inadequate capital as a result of low income could deter crop farmers in purchasing some organic farming inputs and this could discourage farmers in utilising OFP.Olanrewaju (2019) also reported that inadequate labour coupled with labour intensiveness could discourage the use of OFP not minding its benefits.

The statement made by the leader of a group of crop farmers in Atakumosa west LGA during an indept interview (IDI) corroborated the survey result, he said:

> *"the major constraint we face is inadequate labour although if one has enough capital he could get more labourers"*. (08/02/2017)

Also during FGD among crop farmers in Akinyele Local Government Area, a discussant said:

> *"assuming government can give us capital, our problem will be reduced".*
> (13/01/2017)

The statement made by discussants during FGD in Odeda Local Government, Ogun State

> – "*if one decides to be taking organic crop produce to our common market, that person will not have more than one cloth that he will be patching from time to time. This is because the little quantity produced by that farmer will be bought at same price, even if not less than that of conventional farm produce"*–(09/02/2017)

buttressed the problem of availability of market for organic crops produce.

Table 4.15 below reveals categorisation of crop farmers based on the severity of constraints faced in utilising OFP. Maximum constraints' score obtained was 27 and the minimum score was 0, while the mean score was 12.78±7.70. More than half of the respondents (55.3%) faced less severe constraints in using OFP, while 44.7% faced highly severe constraints in using OFP. This implies that the disposition of crop farmers that faced highly severe constraints might be influenced negatively and thus affecting their utilisation of OFP. On the other hand, those crop farmers with less severe constraints might have some favourable characteristics in using OFP. This set of crop farmers could be motivated to convert to organic crop farmers.

Table 4.14: Distribution of respondents based on the constraint faced in

S/N	Constraints	Not Severe (%)	Severe (%)	Very Severe (%)	$\bar{x}$	Rank

practicing organic crop farming

1.	Inadequate availability of organic manure	56.3	34.6	9.2	0.53	12th
2.	Weed control problem	47.5	27.8	24.7	0.77	10th
3.	Unfavourable land tenure system/ inadequate farmland	65.8	9.5	24.7	0.59	11th
4.	Certification process	34.9	38.6	26.4	0.92	7th
5.	Inadequate capital	26.8	3.4	69.8	1.43	2nd
6.	Inadequate labour	7.5	45.1	47.5	1.40	3rd
7.	Bad odour of organic manure	63.7	29.2	7.1	0.43	14th
8.	Transportation/ heavy weight of organic manure	35.3	34.6	30.2	0.95	5th
9.	Curing of fresh manure	23.4	46.8	29.8	1.06	4th
10.	Pest and disease control problem	34.9	37.6	27.5	0.93	6th
11.	Unavailability of market for organic agriculture produce	13.2	14.9	71.9	1.59	1st
12.	Little or no information about requirements for organic crop production	67.1	16.3	16.6	0.49	13th
13.	Unavailability of organic input (seed, seedling organic fertilizer)	39.3	38.0	22.7	0.83	9th
14.	Inadequate extension services from governmental or non-governmental organization	39.7	35.6	24.7	0.85	8th

Source: Field survey, 2017

Table 4.15: Categorisation of respondents based on the level of constraint faced in practicing organic crop farming

Constraints	F	%
Less severe (0-12)	163	55.3
Highly severe (13-27)	132	44.7

Mean = 12.78, S.D = 7.70, Minimum = 0, Maximum = 27

Source: Field survey, 2017

4.9.0Results of the hypotheses testing

The hypotheses for this study were stated in null form and were tested at 0.05 level of significance.

4.9.1 Relationship between socio economic characteristics and utilisation of organic crop farming practices

Ho_1: There is no significant relationship between respondents' socio economic characteristics and utilisation of organic crop farming practices.

Table 4.16 shows the relationship between age, household size and utilisation of organic farming practices. There was a positive relationship between age and utilisation of organic crop farming (r = 0.33, p = 0.00). This suggests that older farmers used more of organic farming practices. This may likely be due to the fact that older farmers adhere to their indigenous farming practices which are also used or practicable in organic farming (Abdullah, 2019). There was a positive relationship between household size and utilisation of organic crop farming (r=0.18, p=0.00). This implies that farmers with higher household size were more involved in the use of OFP as they could use family labour to augment labour requirement in organic farming. Also, there was a negative relationship between educational level and utilisation of organic farming practices (r = - 0.39, p=0.00). This implies that the lower the educational level the higher the tendency to use more of OFP and vice versa. This might be due to the fact that those that were less educated were holding on to some indigenous farming practices that are also used in OFP

The result of the survey as shown in the Table 4.16 also indicates that there was a positive and direct relationship between income and utilisation of organic crop farming practices (r = 0.42, p= 0.00). This implies that the more the income crop farmers had the more the likelihood to utilise organic farming practices. This is because the income acquired could be used to cater for the capital intensive aspects of organic farming. There was a negative and inverse relationship between number of crops grown and utilisation of organic crop farming practices (r = -0.55, p = 0.00). This suggests that the more the number of crops that farmers grew the less they were able to utilise organic farming practices. This might be due to the fact that, increase in the number of crops grown could translate to increase in farm size. There was also negative relationship between farm size and utilisation of organic crop

farming practices (r = -0.41, p = 0.00). As a result of this, null hypothesis is rejected. This implies that organic farming practices could easily be used by crop farmers with small farm size compared to those with big farm size. This result is against the finding of Bamigboye e*t al*., (2014) who reported positive relationship between farm size and organic farming practices (OFP). There is an inverse relationship between utilisation and years of farming experience (r = -0.13, p = 0.03). This implies that the more the experience of crop farmers the more the farmers tend to hold onto the farming practices they are already used to, and as such not ready to utilise some aspects of OFP that are new to them. This result is in line with Obabire (2017) who found that the more experienced the farmers were the less the practice of organic farming in vegetable production.

Table 4.17 indicates that there wasassociation between marital status and utilisation of organic farming practices (χ^2=40.11, p=0.00). This suggests that those that were married likely had more household size that could be used as family labour, more especially in organic farming where much labour is required.Also, as shown in Table 4.18there was relationship between being a member of an association and utilisation of organic farming practices, that is, χ^2=161.45 while p value = 0.00. This implies that association could influence the use of organic farming practices. The association that exists between cosmopoliteness and utilisation of organic farming practices (χ^2 =32.81, p =0.00) may likely be due to the fact that, some farmers were motivated by what they saw in relation to organic farming practices while on tour or when they travelled to another location where these practices were utilised.The relationship that exists between age, education, marital status and utilisation of organic farming practices is in line with the finding of Bamigboye *et al*. (2014) who also found that there is possibility of this kinds of relationship.

The result of the survey in Table 4.17 also shows that there was a significant associationbetween source of land and utilisation of OFP among crop fatrmers (χ^2=47.07, p = 0.00). This implies that, land source is very important when it comes to utilisation of organic farming practices, more especially since organic farmland cannot be alternated with conventional farmland (NOAN, 2012). There was a significant association between source of labour and utilisation of OFP (χ^2=13.12, p= 0.01). This implies that the availability of labour may influence the utilisation of OFP.There was an association between cropping system and use of OFP among crop farmers (χ^2= 48.64, p = 0.00). This implies that

cropping system is important when it comes to organic farming, for instance, mixed cropping system is encouraged in organic farming because it reduces the risk of crop failure (NOAN, 2012). There was also a significant association between primary occupation and utilisation of OFP. This suggests that those crop farmers in a particular line of primary occupation may be more inclined to utilise more of OFP.

Table 4.16: Correlation betweensocio economic characteristics and utilisation of organic farming practices

Variable	r	p	Decision
Age	0.33*	0.00	Significant
Household size	0.19**	0.00	Significant
Education	-0.39**	0.00	Significant
Numbers of crops.	-0.55**	0.00	Significant
Farm size	-0.41**	0.00	Significant
Income per year	0.42**	0.00	Significant
Years of farming experience	-0.13*	0.03	Significant

Source: Field survey, 2017

** significant at $p \leq 0.01$, * significant at $p \leq 0.05$

r = correlation coefficient, p= significant level

Table 4.17: Chi-square values of association between socio economic characteristics and utilisation of organic farming practices

Variables	χ^2	df	p	Decision
Sex	0.16	1	0.69	Not significant
Marital status	40.11	2	0.00	Significant
Religion	0.00	1	0.10	Not Significant
Membership of association	161.45	5	0.00	Significant
Cosmopoliteness	32.81	1	0.00	Significant
Source of land	47.07	5	0.000	Significant
Source of farm labour	13.12	4	0.011	Significant
Cropping system	48.64	1	0.000	Significant
Primary occupation	93.67	3	0.000	Significant

χ^2 =Chi-square, p=significant level, df=degree of freedom.

Source: Field survey, 2017

4.9.2 Relationship between respondents' knowledge and utilisation of organic farming practices

Ho2: There is no significant relationship between respondents' knowledge and utilisation of organic crop farming practices.

Table 4.18 reveals that there is a significant direct relationship between knowledge and use of OFP (r= 0.15, p=0.01). This implies that increase in knowledge among crop farmers could lead to increase in the use of OFP. It shows that knowledge plays an important role in utilisation of OFP. It further suggests that training and capacity building on OFP could increase utilisation of OFP among crop farmers.

4.9.3 Relationship between benefits derived and utilisation of organic crop farming practice

Ho3: There is no significant relationship between benefits derived by the respondents and utilisation of organic crop farming practices.

The result in Table 4. 18 shows that there is a significant direct relationship between benefits derived and use of OFP (r= 0.16, p=0.01). This implies that increase in benefits derived could lead to increase in utilisation of OFP. This shows that crop farmers appreciated the benefits of some OFP they used in their crop production. This implies that it would not be difficult to motivatecrop farmers to convert to organic farmers.

4.9.4 Relationship between respondents' attitude and utilisation of organic farming practices

Ho5:There is no significant relationship between respondents' attitude and utilisation of organic crop farming practices

The result in Table 4.18 shows that there is asignificant positive and direct relationship between attitude and use of OFP (r = 0.78, p = 0.00). Thus, null hypothesis is rejected. This implies that, the more favorable attitude respondents had towards OFP the more they were ready to use OFP. This result is in line with Obabire (2017), who reported that positive attitude of vegetable farmers influenced their use of OFP.

4.9.5 Relationship between constraints encountered and utilisation of organic crop farming practices

Ho4**:**There is no significant relationship between constraints encountered and utilisation of organic farming practices

The result in Table 4. 18 shows that there is asignificant relationship, but the relationship is inverse. (r= -0.59, p= 0.00). The negative relationship implies that when a crop farmer is faced with more constraints he uses few of OFP. The constraints farmers faced include narrow local markets, labour requirement, pests and diseases control problem among others. These identified constraints are in line with the constraints identified by Akanbi *et al.* (2011). The policy implication is that, if the quality of our agricultural produce is to be improved; there is need for government, institutions and institutes to join hands together in tackling constraints faced in using environmentally, economically and health sustainable organic agriculture.

Table 4.18: Correlation between knowledge, benefits derived, attitude, constraints and utilisation of organic farming practices

Variable	R	P	Decision
Knowledge	0.15**	0.01	S
Benefit derived	0.16**	0.01	S
Attitude	0.78**	0.00	S
Constraints	-0.59**	0.00	S

Source: Field survey, 2017

4.9.6 Analysis of variance in the utilisation of organic crop farming practicesacross the crop types

Ho6:There is no significant difference in the level of utilisation of organic farming practice across the crop types.

The result of the analysis of variance in Table 4.19 reveals significant difference in utilisation of organic crop farming practices among different types of crops at 0.05 level of significance. The null hypothesis is rejected. This infers that the utilisation level of OFP among crops is different.

A Duncan separation of means test as shown in Table 4.20 shows a significant difference in utilisation of organic farming practices at 0.05 significant level. Yam had mean of OFP to be 29.93, vegetables, cassava and maize are at a similar level of OFP utilisation (35.86, 37.27 and 37.27 respectively), pineapple had mean of utilisation of OFP to be43.19, while banana/plantain and trees had means of 54.45 and 56.78 respectively. The difference in utilisation may be attributed to the ease with which some crops may be grown with little or no use of external inputs such as herbicides, insecticides and inorganic fertilizer that are detrimental to human and environment. The tree crops that had the highest mean of OFP utilisation (56.78) is supported by Iwena (2012) andNOAN (2012)who explained that planting of trees is one of the organic farming practices which supports biodiversityand beneficial in maintaining soil fertility.

Table 4.19: Analysis of variance showing differences in the utilisation of organic cropfarming practices among different crops

	Sum of Squares	Df	Mean Square	F	p.
Between Groups	18820.29	6	3136.72	94.98	
Within Groups	9511.48	288	33.03		
Total	28331.77	294			

Source: Field survey, 2017

Table 4.20: Duncan table of separation of means in utilisation of organic farming practices

Crop best grown with OFP	N	Subset for alpha = 0.05			
		1	2	3	4
Yam	14	29.93			
Vegetable	35		35.86		
Cassava	99		37.27		
Maize	55		37.27		
Pineapple	27			43.19	
Banana/Plantain	33				54.45
Tree crops	32				56.78

Source: Field survey, 2017

4.9.7 Analysis of variance in the utilisation of organic crop farming practices across the associations of crop farmers

The result of the analysis of variance in Table 4.21 reveals significant difference in utilisation of organic crop farming practices by crop farmers across their associations at 0.05 level of significance. The null hypothesis is rejected. This infers that the utilisation level of OFP among crop farmers is different across their associations.

A Duncan separation of means test as shown in Table 4.22 shows a significant difference in utilisation of organic farming practices at 0.05 significant level. Those crop farmers in community development association had mean score of OFP utilised to be 32.41, farmers' cooperative, OAPTIN and savings and credit associations utilised OFP at similar levels (36.30, 36.39 and 38.00 respectively), those in LAUTECH Organic farmers' association had mean score of utilisation of OFP to be 42.07 and NOAN members had a mean score of utilisation of OFP of 51.86. This implies that NOAN members had the highest level of utilisation of OFP followed by LAUTECH Organic farmers' association, savings and credit associations, OAPTIN, farmers' cooperative and community development association The difference in utilisation may be attributed to support given by the associations. This result is corroborated by statements made during in-depth interview with a member of OAPTIN association in Odeda local government area:

"NOAN is now serving as an umbrella with a financial power who can assist her members in using more of OFP".

A crop farmer, who was a member of NOAN said:

"NOAN management assists us in some respects, for instance the management gave us pumping machine which is one of the integral tool for watering in organic farming".

Table 4.21: Analysis of variance showing differences in the utilisation of organic cropfarming practices by crop farmers across their associations

	Sum of Squares	df	Mean Square	F	p.
Between Groups	13327.076	5	2665.415	51.338	0.000
Within Groups	15004.700	289	51.919		
Total	28331.776	294			

Source: Field survey, 2017

Table 4.22: Duncan table of separation of means in utilisation of organic farmingpractices

Association of crop farmers	N	Subset of alpha =0.05			
		1	2	3	4
Community development association	29	32.4138			
Farmers' cooperative	44		36.2955		
OAPTIN	18		36.3889		
Savings and credit	82		38.0000		
LAUTECH Organic farmers association	45			42.0667	
NOAN	77				51.8571

Source: Field survey, 2017

4.10 Regression analysis of utilisation of organic farming practices with independent variables

Utilisation of organic farming practices (OFP) was regressed with independent variables in order to ascertain the contribution of various determinants of the utilisation of OFP in the study area. These independent variables were age, cosmopoliteness, household size, farm size, attitude towards OFP, benefits derived, sources of information, knowledge, income, constraints, sex, education and number of crops grown.

Table 4.23 shows that nine out of fourteen independent variables were significant determinants of utilisation of OFP among crop farmers. These determinants are: attitude (β= 0.438, p = 0.000); age (β = 0.399, p= 0.000); cosmopoliteness (β = 0.427, p = 0.000); constraints (β = - 0.351, p = 0.000); knowledge (β = 0.110, ρ = 0. 000); income (β = 0.129, p = 0.049); household size (β = 0.107, p = 0.001); membership of association (β = 0.075, p = 0.001) and number of crops grown (β = - 1.384, p = 0.000). Those independent variables with negative relationship such as constraints and number of crop grown imply that the higher these predictors the lower the utilisation of OFP. For instance, the negative relationship between constraints and utilisation implies that when a crop farmer is faced with more constraints he uses few of OFP. The constraints farmers faced include narrow local markets, inadequate labour, certification process, pests and diseases control problem among others. These identified constraints are in line with the constraints identified by Akanbi*et al.* (2011) who reported that constraints farmers faced include marketing of output, product certification and diseases management. On the contrary, those with positive relationship such as household size, attitude and age among others imply that the higher they are the more the utilisation of OFP.For instance, positive relationship between household size and utilisation of OFP implies that, the larger the household size of the crop farmers the more they were ready to use OFP. This result is in line with Fasina (2016), who found that larger household size influenced crop farmers' use of OFP as in the case of using free family labour for transporting and application of organic manure.The positive relationship between attitude and utilisation of OFP implies that, the more favorable attitude that respondents had towards OFP the more they were ready to use OFP. Also, the positive relationship between age and utilisation suggests that the older the farmers the more they used organic farming

practices. This might be due to the fact that older farmers were adhering to their indigenous farming practices which are also used in organic farming (Abdullah, 2019).

The R^2value of 0.875 implies that the significant independent variables in the regression model explain 87.5% of the level of utilisation of OFP.

Table 4.23: Linear regression analysis on contribution of selected independent variables to the utilisation of OFP among crop farmers

Variable	Beta	T	Sig.
Constant		4.185	0.000
Age	0.399	9.657	0.000
Cosmopoliteness	0.427	11.863	0.000
Household size	0.107	3.376	0.001
Farm size	0.004	0.076	0.939
Attitude	0.438	8.661	0.000
Benefits	-0.031	-1.076	0.283
Information sources	-0.011	-.466	0.642
Knowledge	0.110	4.669	0.000
Income	0.129	1.976	0.049
Constraints	-0.351	-9.170	0.000
Sex	0.010	0.427	0.669
Education	-0.045	-1.087	0.278
Membership of association	0.075	3.425	0.001
Number of crop grown	-1.384	-3.577	0.000

$R = 0.933$, $R^2 = 0.870$, Adjusted $R^2 = 0.864$, SE of error of the estimate = 3.624.

Source: Field survey, 2017

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the research findings and their implication on the determinants of utilisation of organic agriculture practices among crop farmers in the study area. Conclusion reached and recommendations made based on the conclusion of the findings are also presented.

5.1. Summary

The use of chemicals in food production was identified as a major source of health risk. This negative effect has actually called for more sustainable agriculture that will engender consideration for health of the soil ecosystems and people. Organic agriculture is being promoted due to its environmental and human friendliness.Efforts to promote Organic Farming Practices (OFP) by some corporate bodies such as NOAN and OAPTIN are yielding positive results, though utilisation is still low. Previous studies on OFP have focused on extension model and compliance with organic agriculture standards. However, information on factors which predispose farmers to the use of OFP is limited. Therefore, factors that predispose crop farmers utilise of OFP in southwestern Nigeria were investigated.

Four-stage sampling procedure was adopted. Oyo, Osun and Ogun states were selected purposively due to preponderance of organic corporate farmers. Using simple random sampling, 10% of 83 Local Government Areas (LGA) in the selected states and 17% of 92 wards in the selected LGA were sampled resulting in 8 LGA and 16 wards. Finally, a list of 737 crop farmers was generated from all the wards and 40% of crop farmers were sampled proportionate to size resulting in 295 crop farmers. Interview schedule was used to gather information on respondents' socio economic characteristics(personal and enterprise characteristics), sources of information, knowledge of OFP, OFP in use, utilisation of OFP, attitude towards OFP, benefits derived and constraints to utilising OFP. Indices of knowledge (low, 7.00-16.77; high, 16.78-25.00), OFP utilisation level (low, 20-40; high, 41-63), attitude (unfaourable, 46-76; favourable, 77-110) were generated. The data collected

were analysed with the aid of descriptive and inferential statistics. Descriptive statistics such as frequency, percentage, means, standard deviation, tables and chartswere used to analyze objectives while inferential statistics such as Chi-square, Pearson Product Moment Correlation (PPMC) and multiple regression were used.

Majority of the respondents were male (96.3%) while 94.3% of the respondents had formal education. Respondents' age, farming experience, annual income and farm size were 43.45±10.95 years, 20.44±6.94 years, ₦250,072.00±₦338,081.00 and 0.50±0.66 hectares, respectively.Most of the farmers (78.6%) practised mixed cropping, while most grown crops were cassava (73.2%), maize (65.1%) and vegetables (56.3%). Crop farmers were mostly informed through farmers' association (126.4), print media (118.0) and radio (109.3). Generally, crop farmers had high knowledge(55.3%) OFP. The OFP in use include wood ash (1.87±0.40), lemon grass extract (1.63±0.5), organic herbicides (1.34±0.61) and neem extract (1.35±0.60).

More than half (58%) of the respondents showed unfavourale attitudetowards OFP,while 42.0% had favourable attitude.Organic farming practices toward which crop farmers showed favourable attitude include planting of cover crop within the main crop for weed control ($\bar{x}$=3.10); application of organic manure without fear of soil contamination ($\bar{x}$=3.91); recognition of difference between organic and inorganic crops farming practices ($\bar{x}$ =3.87) and use of mulching on farm due to its benefit ($\bar{x}$= 3.80) among others.Although, more of the crop farmers (65.42%)did not derive high benefit from utilising OFP, but among the benefits derived from OFP by farmers were poison-free crop produce (1.65±0.48), increased crop shelf life (1.50±0.51) and increase in soil organic content (1.34±0.47). Major constraints faced by the crop farmers were unavailability of market for organic crop produce (1.59±0.71); inadequate capital (1.43±0.89); inadequate labour (1.40±0.62); curing of fresh manure (1.06±0.73); pests and diseases control problem (0.93±0.79). Crop farmers' characteristics such as age (r=0.334); farm size (r=-0.402); income (r=0.422); cosmopoliteness (χ^2=32.81) and membership of association (χ^2=161.45) related significantly to utilisation of OFP. Farmers' favourable attitude (β=0.438), high cosmopolitness (β=0.427), being old (β=0.399), large household size (β=0.107), high knowledge (β=0.000) and membership of association (β=0.075) influence utilisation of OFP positively.

5.2 Conclusion

Based on the findings of this study it can be deduced that farming activities were usually carried out by those who were in their active/middle ages in the study area. Crop farmers had some forms of formal education. Crop farmers belong to one association or the other which couldinfluence their utilisation of OFP.

The crop farmers earned low income and had small farm size.The common crops grown among crop farmers were cassava, maize and vegetables.Therespondents largely had farming as their primary occupation and used combined labour. Multiple or mixed cropping system which is encouraged in organic farming was common among the crop farmers.

The major sources of information on organic farming were farmers' club, print media and radio unlike modern Information and Communication Technology (ICT) such as mobile phone and computer that have not been fully explored. More than half of crop farmers in the study area had high knowledge of OFP.However, they had low utilisation of OFP.They mostly had unfavourable attitude towards OFP and did not derive maximum benefits from the practices. Their utilisation of OFP were constrained byinadequate capital, inadequate labourand unavailability of market for organic crop produce among others. Utilisation of OFP in the study area was determined by age of the farmers, constraints faced in utilisation, attitude, income, cosmopoliteness, knowledge of OFP,number of crop grown and household size.

5.3 Recommendations

Based on the findings of the study, the following recommendations are made to improve the utilisation of organic farming practices among crop farmers:

- Creation of organic market by associations to boost sales so as to increase their income.
- Information on benefits of OFP should be widely discussed among small scale farmers as they are predisposed to organic farming.

- There should also be advocacy on the health benefits of organic crop produce among consumers through the use of appropriate source(s) of information such as radio printed media and television. This mightstimulate the creation of more market centres for organic agriculture produce.
- Associations for organic crop farmers should be formed at state and local level and efforts should be made to enlighten crop farmers on OFP through all forms of associations they might belong to.
- Research institutes should be more involved in organic agriculture movement so that acceptable organic pesticides can be developed against constraint ofpests' infestation in organic farming.

5.4 Contribution to knowledge

The study contributes to body of knowledge as follows:

1. Personal and enterprise characteristics that are pertinent to utilisation of Organic Farming Practices (OFP) among crop farmers in Southwestern Nigeria were revealed.
2. The various sources of information on OFP for crop farmers were identified.
3. Crop farmers' high knowledge of OFP still needed to be translated to the use of OFP by tackling the constraints faced in using OFP.
4. The commonly used as well as the less used OFP were identified.
5. Benefits of OFP that could serve as motivating factors for other crop farmers to use OFP were also identified.
6. The use of OFP among crop farmers in Southwestern Nigeria is generally low due to the constraints faced in the use of OFP.
7. The attitude of crop farmers to OFP is also unfavourable.

5.5 Areas for further research

- Impact of training and monitoring on utilisation of organic farming practices among organic crop farmers could be studied.

- Level of awareness of health benefits of organic crop produce among consumers could be studied.

REFERENCES

Abdullah, M. 2019. *Research proposal on organic farming.* Retrieved on Feb. 10,2020 from https://www.researchgate.net/publication/336473678.

Achieng, J.O., Ouma, G., Odhiambo, G. and Muyekho, F. 2010. Effects of farmyard manure and inorganic fertilizers on Maize production on alfisols and ultisols in Kakamega, western Kenya. *Agriculture and Biology Journal of North America*, pp. 430-439.

Adebayo, S. A. and Oladele, O. I. 2013. Vegetable farmers' attitude towards organic agriculture practices in South Westerns. *Journal of Food, Agriculture & Environment* 11.2: 545-552.

Adeogun, S.O., Olawoye, J.E and Akinbile, L.A. 2010. Information sources to Cocoa farmers on Cocoa Rehabilitation Techniques (CRTs) in selected states of Nigeria. *Journal ofMedia and Communication Studies* 2.1: 9 - 15.

Adeoluwa, O.O., Adeoye, G. O. and Sridhar, M. K. 2006. Adoption of oil palm (*Elaeis guineensis*) Empty Fruit Bunch (EFB) as organic fertilizer in oil palm plantation. In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University of Ibadan, Ibadan, Nigeria. Pp. 38-43.

Adesina, G. O., Olabode, O. S. and Kolawole, G. O. 2012. Challenges of weed control in large scale organic horticultural crops production in Nigeria: Observatory notes from Ogbomoso agricultural zone. *International Journal of Organic Agriculture Research and Development*, pp. 48-51.

Agbo, F. U., Iroh, I. I. and Ihemezie, E. J. 2015. Access to credit by vegetable farmers in Nigeria: A case study of Owerri agricultural zone of Imo State, Nigeria. *Asian Journal of Agricultural Research* 9:155-165.

Ajani, E. N. and Onwubuya, E. A. 2012. Assessment of use of indigenous maize storage practices among farmers in Anambra State, Nigeria. *InternationalJournal of Agricultural Research, Innovation & Technology*. 2.2: 48-53.

Ajayi, M. T. 2007. Analysis of mass media use for Agricultural information by farmers in Egbeda Local Government Area of Oyo State, Nigeria, *Journal of Education System* 19.2:45-55.

Ajeet, J. 2018. Concept of human ecology contents. Retrieved on Feb. 10,2020 from https://www.researchgate.net/publication/328262539.

Ajzen, I. 1988. Attitude, personality and behaviour. Milton Keynes (ed.) Open Press Englewood Cliffs, New Jersey. Pp. 78-83.

Akanbi, W. B., Togun, V.I. and Ilupeju, E.A.O. 2011. "Challenges in an organic crop production system: LAUTECH experience". In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University of Ibadan, Ibadan, Nigeria. Pp. 69-71.

Akanmu, A. O., Popoola, A. R., Adebare, G., Abiala, M. A., Odebode, A. C. and Adeoye, G. O. 2012. Effectiveness of some plant extracts in the management of tomato pith necrosis caused by *Pseudomonas corrugata. International Journal of Organic Research & Development* 5. 127-140.

Akob, C.A. and Ewete, F.K. 2010. Control of *Sitophilus zeamais motschulsky(Coleoptera Curculionidae)* with local plant materials in the western highlands of Cameroon. *Journal of the Cameroon Academy of Sciences*9.1:3-9.

Alabi, O.Y. and Adewole, M.M. 2017. Essential oil extracts from *Moringa oleifera*roots as cowpea seed protectants against Cowpea beetle. *African Crop Science Journal*25.1:71-81.

Alamu, O. O., Olaniyan,O. W., Egberonge, A. A., Bala, M. G. and Lawal, O. I. 2011. Effect of different weed control methods on growth of *Cleopatra mandarin* rootstock seedlings. In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University of Ibadan, Ibadan, Nigeria. Pp. 32-77.

Alao, O.T., Adeboye, O.C., Deji, O.F., Adeniyi, K. M., Agbola, O. and Busari, A.O. 2014. Analysis of the impact of production technology and gender on under-utilised indigenous vegetables production in southwestern Nigeria. *African Journal of Science,Technology, Innovation and Development* 6.1: 51-53.

Aminu-Taiwo, B. R., Idowu, A. A., Alamu, O. O. and Olaniyi. O. W. 2011. Influence of mulch materials on population of root-knot nematode and other plant parasitic nematode, growth and yields of Okra. In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University of Ibadan, Ibadan, Nigeria. Pp. 2-6.

Amusa, T.A.,Enete A.A. and Okon U.E.2015.Willingness-to-pay for agronomic soil conservation practices among crop-based farmers in Ekiti State, Nigeria. *Trends in Agricultural Economics*8.1: 1-12.Retrieved on Sept. 6, 2019, from https://scialert.net/fulltextmobile/?doi=tae.2015.1.12.

Andrew, N. and Elke, P. .2016. Constraints and opportunities of organic fruit production in Tanzania. *International Journal of Agricultural Policy and Research* 4.4: 67-78.

Asogwa I.S., Okoye J. I. and Oni K. 2017. Promotion of indigenous food preservation processing knowledge and the challenge of food security in Africa. *Journal of Food Security*5.3: 75-87.

Asokan, R. 2018. Sustainable Agriculture through Organic Farming in India. Retrieved on July 18, 2019 from https://www.researchgate.net/publication/326344685

Atungwu, J. J., Ewedairo, B. I., Olabiyi, T. I. and Kehinde. L. O. 2012. Preliminary evaluation of potency of crop rotation scheme in the management of plant parasitic nematodes in organic farm in Abeokuta. *International Journal of Organic Research and Development* 5. 71-83.

Bamigboye, E.O., Yusuf, O.J., Kuponiyi, F.A. and Kolawole, O.D. 2014. Organic practices amongst smallholders in Ekiti State, Nigeria: Challenges for extension service. *Journal of Organic Agriculture and Environment* 2. 131-140.

Bello W.B. 2008. Problems and prospects of organic farming. *Ethiopian Journal ofEnvironmental Studies and Management* 1.1: 36 - 43.

Ceccarelli, S. 2009. Evolution, plant breeding and biodiversity. *Journal of Agricultur*e *and Environment for International Development* 103. 131–145.

Ceccarelli, S. 2014. Genetically modified crops, organic agriculture and breeding for Sustainability. Retrieved Sept. 19, 2019, from https://www.researchgate.net/publication/263835034

Chris, A. S. 2017. *Role of traditional ethnobotanical knowledge and indigenous institutions in sustainable land management in western highlands of Kenya*. Retrieved on Nov. 14,2019 from: https://www.intechopen.com/books/indigenous-people.

Daneji, M. I. 2011. Agricultural development intervention programmes in Nigeria. *Savannah Journal of Agriculture* 6.1: 1 – 7.

Dhanshri, M. P. 2011. Recent trends of print media in development communication. *Global Media Journal* 2.2. Retrieved Dec. 16, 2019, from https://caluniv.ac.in/global-mdia

Edward, M. 2018. Welfare effect of organic fertilizer use in Ghana. *Heliyon* 4.10. Retrieved on Feb. 10,2020 from https://www.ncbi.nlm.nih.gov/pmc/articles

Ekeh, F.N., Onah, I.E., Atama, C.I., Ivoke, N. and Eyo, J.E. 2013. Effectiveness of botanical powders against *Callosobruchus maculates* (Coleoptera: Bruchidae)in some store leguminous grains under laboratory conditions. *African Journal of Biotechnology*12.12: 1384-1391.

Ekong, E. E. 2003. *An introduction to rural sociology*. 2nd edition. Dove Education Publishers, Uyo, Nigeria. Pp.210 -237.

European Commission. 2012. *Organic agriculture information notes. Quality assurance of organic agriculture.*Retrieved Sept. 6, 2019,from https://ec.europa.eu/europeaid.

Fabusoro, E., Omotayo, A. M., Apantaku, S.O. and Okuneye, P. A. 2010. Forms and determinants of rural livelihood diversification in Ogun State, Nigeria. *Journal of Sustainable Agriculture*34.4: 417-438.

Fasina, O. O. 2016. Comparative analysis of the use of organic and inorganic fertilizers by arable crop farmers in Ondo State, Nigeria. *Journal of Organics* 3.1: 7 -12.

FiBL and IFOAM. 2013. *The world of organic agriculture: statistics and emerging trends*. Willer, H; J. Lernoud and L. Kilcher (Eds.). Bonn. P. 137.

Food and Agriculture Organization of the United Nations (FAO). 2013. Distribution of farms and farmland area by land size classes, 106 country sample. Retrieved Sept. 20, 2018, from https://www.sciencedirect.com/science/article/pii/S0305750X15002703#s0025

Hine, R. and Pretty, J. 2008. Organic agriculture and food security in Africa. UNEP-UNCTAD Capacity-building Task Force on Trade, Environment and Development. United Nations, New York. Retrieved August 14, 2017, from https://unctad.org/en/Docs/ditcted200715_en.pdf.

Howley, P., Donoghue, C. O. and Heanue, K. 2012. Factors affecting farmers' adoption of agricultural innovations: A panel data analysis of the use of artificial insemination among dairy farmers in Ireland. *Journal of Agricultural Science* 4.6: 171-172.

Ibeawuchi I. I., Obiefuna J. C., Tom C. T., Ihejirika G. O., and Omobvude S. O. 2015. Indigenous and current practices in organic agriculture in Nigeria: A Review. *Journal of Agriculture, Forestry and Fisheries* 4.6: 257-262.

IFOAM (International Federation of Organic Agriculture Movements) 2014.*Information and communication of organic agriculture.*The EOA conference in Cotonou, Benin.18th IFOAM organic world congress.Retrieved February 14, 2015, from www.eoa-africa.org/information-and-communication.

IFOAM (International Federation of Organic Agriculture Movements) 2018. *How organic agriculture helps mitigate climate change*. Retrieved on Feb. 15,2020 from https://www.organicwithoutboundaries.bio/2018/09/12/climate-change mitigation

IPCC (Intergovernmental Panel on Climate Change) 2018. IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems: Summary for policymakers. Retrieved on Feb. 15,2020 from https://www.ipcc.ch/site/assets/uploads/2019/08/4

Ironkwe, A., Ekwe, K., Okoye, B and Chukwu, I. 2009. Socio-economic determinants of cassava producers among women in Ebonyi State. *Journal of rural sociology* 9.1: 65.

Ismail, S. 2006. Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory. *Journal of Educational Technology,* 5.2:14-23. Retrieved on Feb. 10,2020 from https://www.researchgate.net/publication/284675572

Iwena, A. O. 2012. *Essential Agricultural Science for Senior Secondary School*. Tonard publishers limited, Ibafo Ogun State. 339p.

Jagadish, T. 2018. Can organic sources of nutrients increase crop yields to meet global food demand? *Journal of Agronomy*8.1-20. Retrieved on Feb. 10,2020 fromhttps://www.researchgate.net/publication/328066993.

Kaushik, B. Goutom, B., Ranjan, D., Bhagawati, R.and Ngachan, S.V. 2015. The Structure of traditional shifting cultivation system: Prospect or threat to climate. *International Letters of Natural Sciences* 46. 16-30.

Khan, M.N., Mobin, M., Abbas, Z.K. and Alamri S.A. 2018. Fertilizers and their contaminants in soils, surface and droundwater. In: Dominick A. Dellasala, and

Michael I. Goldstein (Eds.). *TheEncyclopedia of the Anthropocene.*Oxford: Elsevier5. 225-240.

Kolawole, O. D. 2001. Local knowledge utilisation and sustainable rural development in the 21st century. *Indigenous Knowledge and Development Monitor* 9.3: 13-15.

Kolawole, A., Oladele, O.I., Alarima, C.I. and wakatsuki, T. 2011. Gender roles in Sawah system of rice production in Nigeria. *Journal of Human Ecology*. 36.1:79-83.

Korav, S., Dhaka, A. K., Singh, R. and Reddy, G. C. 2018. A study on crop weed competition in field crops. *Journal of Pharmacognosy and Phytochemistry* 7.4:3235 – 3240.

Kupangwa, W. and Dubihlela, J. 2016. Influence of selected demographic variables on the adoption and use of electronic business technologies by small and medium-sized retailers. *International Journal of eBusiness and eGovernment Studies* 8.1. Retrieved Oct., 21, 2019 from https://dergipark.org.tr/en/download/article file/257009.

Law-Ogbomo, K. E. 2011. Organic fertilizer application in horticultural crop production in Nigeria: Prospects and limitation. In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University In:*Proceedings of 2nd Technical Workshop on Organic Agriculture,*Akinrinde, E. A. and Yekinni, O. T. (Eds.). University of Ibadan, Ibadan, Nigeria. Pp. 38-43.

Leonardi, C., Ambrosino, P., Esposito F. and Fogliano, V. 2000. Antioxidative activity and carotenoid and tomatine contents in different typologies of fresh consumption tomatoes. *Journal of Agric. Food Chemistry* 48. 4723-4727

Lori, M. Symnaczik, S. Mäder, P. Deyn, G. and Gattinger, A. 2017. Organic farming enhances soil microbial abundance and activity: A meta-analysis and meta-regression. *PLoS One* 12.7. Retrieved on Feb. 10,2020 from https://journals.plos.org/plosone/article

Meena, R. K., Singh, Y. V., Bana, R. S., Nath, C.P. and Kaur, R. 2013. Pests and diseases management in organic crop production system. *Popular Khet,* 1.4:164-170. Retrieved Dec. 16, 2019 from https://www.researchgate.net/publication.

Meinshausen, F.; Richter, T.; Blockeel, J. and Huber, B. 2019. Group certification internal control systems in organic agriculture: Significance, opportunities and challenges.

Research Institute of Organic Agriculture (FiBL), Frick. Retrieved on Feb. 10,2020 from http://orgprints.org/35159/

Menasha, K., Manoj, K. and Shashank, S. S. 2018. Breeding potato for quality improvement, potato - from Incas to all over the world. Retrieved on Feb. 12,2020 from https://www.intechopen.com/books/potato-from-incas-to-all-over-the-world

Menzies, K. 1982. *Sociology theory in use.* London: Routledge Regan Paul. P. 24

Mgbenka, R. N. 2012. Organic farming as a strategy for climate change adaptation and mitigation in sub-Saharan Africa: Implications for policy. *Journal of Agricultural Extension* 16.2.Retrieved on Feb. 13,2020 from https://www.ajol.info/index.php/jae/article/view/84560/74557

Moyib, F.R. and Ige, R. I. 2011. "Organic Food Production in Nigeria: Issues and Challenges". *Proceeding of the 2nd Technical Workshop on Organic Agriculture*, University of Ibadan, Ibadan, Nigeria.Pp. 44.

Mubita, A., Libati, M. and Mulonda, M. 2017. The importance and limitations of participation in development projects and programmes. *European Journal ofScientific Research* 13.5. Retrieved on Feb. 10,2020 from https://www.researchgate.net/publication/314292776

Naveen, K., Ashok K. P., Parveen, S. and Manish, K. 2012. Harmful effects of pesticides on human health *Annals of Agricultural and Biological Research* 17.2:165-168.

NBS (National Bureau of Statistics) 2017. *Nigerian Gross Domestic Product (GDP) report*. National Bureau of Statistics, Abuja, Nigeria. P. 8. Retrieved on Dec. 16, 2018 from nigerianstat.gov.ng.

Nmadu, H.S. and Busayo V.O. 2015. Socio-economic factors affecting adoption of innovations by cocoa farmers in Ondo State, Nigeria. *European Journal of Business Economy and Accountancy* 3.2. Retrieved Oct. 15, 2015 from http://www.idpublications.org/wp-content/uploads.

NOAN (Nigerian Organic Agriculture Network) 2012. *Organic agriculture standard in Nigeria*. Published by Association of Organic Agricultural Practitioners of Nigeria, University of Ibadan, Oyo State, Nigeria. Pp. 1-32.

NOAN (Nigerian Organic Agriculture Network) 2018. Annual general meeting. Annual report March 2018. Department of Agronomy, Faculty of Agriculture, University of Ibadan, Ibadan. Pp 1-2.

NOAN (Nigerian Organic Agriculture Network) 2011. General requirements for organic production. *Proceeding of the 2nd Technical Workshop on Organic Agriculture,* University of Ibadan, Ibadan, Nigeria. P. 109.

NPC (National Population Commission) 2006. A summary of the 2006 population census. Federal Government printer. FCT, Abuja.

Nwankpa, N. N. 2017. Sustainable agricultural development in Nigeria: A way out of hunger and poverty. *European Journal of Sustainable Development* 6.4: 175 - 184.

OAPTIN (Organic Agriculture Project in Tertiary Institutions in Nigeria) 2012. The 2nd international summer school programme in organic agriculture. Monday 2nd - Friday 13th July, 2012. Senate Chamber, University of Agriculture, Abeokuta, Nigeria. Retrieved on Feb. 10,2020 from https://www.organic-world.net/fileadmin/documents

Obabire, I.E. 2017. Extension Model for behavioural change in organic farming practice among vegetable farmers in Southwestern Nigeria. Department of Agricultural Extension, University of Ibadan, unpublished Ph.D Thesis. xx + 197.

Obuobisa-Darko, E. 2015. Credit access and adoption of cocoa research innovations in Ghana. *Research on Humanities and Social Sciences* 5.12: 16 – 29.

Odebiyi, J. A. and Omoloye, A. A. 2006. Crop protection and challenges of organic agriculture in Nigeria. *Proceeding of the 2nd Technical Workshop on Organic Agriculture,* University of Ibadan, Ibadan, Nigeria. Pp. 35 – 44.

Okwu, O.J. and Umoru B.I. 2009. A study of women farmers' agricultural information needs and accessibility: A case study of Apa Local Government Area of Benue State, Nigeria-*African Journal of Agricultural Research* 4.12: 1406-1407.

Oladeji, J. O. and Thomos, K, A, 2010. Assessment of agricultural practical year training year programmes Nigeria universities in south western states. *The Nigerian Journal of Rural Extension and Development.* 3: 28 - 34.

Oladele, O.I. & Adu, A.O. 2003. Constraints to feedback provision on forestry technologies. *Nigerian Journal of Agriculture and Social Research*. 3(2): pp18-25.

Oladele, O.I. 2008. Indigenous labour sourcing: subsistence family and poverty status among farmers in Nigeria. *Indian Journal of Traditional Knowledge* 7(3): 480.

Olanrewaju, P.O. 2019. Compliance of agricultural practices with organic agriculture standard among Nigerian farmers. Department of Agricultural Extension, University of Ibadan, unpublished Ph.D Thesis. 156.

Oluyole, K.A. and Adejumo, M.O. 2007. An assessment of the adoption of cocoa rehabilitation techniques among cocoa farmers in Ijebu east local government area of Ogun State, Nigeria. *Journal of Agricultural Research and Policies* 2.1: 56-60.

Oyesola, O.R. and Obabire, I.E. 2012. Awareness and farmers' level of Involvement in organic farming across two vegetation zones of Ekiti State, Nigeria. *International Journal of Organic Agricultural Research and Development* 5. 162-173.

Paul, R. 2018.Two current programs for sustainable agriculture in Nigeria. Retrieved on Sept. 06, 2019 from https://borgenproject.org/sustainable-agriculture-in-nigeria.

Paull, J. 2006. The farm as organism: the foundational idea of organic agriculture.*Journal of Bio-Dynamics Tasmania* 80. 14-18.

Paull, J. 2007. "Rachel carson, a voice for organics - the first hundred years". *Journal of Bio-Dynamics Tasmania* 86. 37–41.

Rich, R.F. 1979. Measuring knowledge utilisation: Processes and outcomes, knowledge and policy. *The International Journal of Knowledge Transfer and Utilisation* 10.3: 11-24.

Robinson, R.A. 2009. Plant breeding and farmer participation. *Breeding for durable resistance to crop pests and diseases*. Ceccarelli, S., Guimaraes, E.P., Weltzien, E., (Eds.); FAO: Rome, Italy, pp. 367–390.

Rogers, E. 2003. Diffusion of innovation. Retrieved on August 11, 2015 from https://en.wikipedia.org/wiki/Diffusion_of_innovations.

Sanyal, P., Malczynski, L. and Kaplan, P. 2015. Impact of energy price variability on global fertilizer price: Application of alternative volatility models. *Sustainable Agriculture Research* 4.4:132· Retrieved on Sept. 10, 2019 from https://www.researchgate.net/publication/283617257.

Shaver, J.M. 2003. Toward a greener agriculture. *Plant, genes and crop biotechnology.*Chrispeels, M.J., Sadava, D.E., (Eds.); Jones and Bartlett Publishers: Burlington, MA, USA, pp. 473–499.

Taiwo, L. B., Akande, M. O. and Adediran, J. A. 2006. Recycling of farm wastes for sustainable organic farming in Nigeria Agriculture. *Proceeding of the 2nd National Conference on Organic Agriculture,* University of Ibadan, Ibadan, Nigeria. P. 35.

Uaiene, R., Arndt, C. and Masters, W. 2009. Determinants of agricultural technology adoption in Mozambique. Discussion papers No. 67E.

Ukeh, D. A., Sylvia, B. A., Bowman, A. S., Mordue, A. J., Pickett, J. A. and Berkett, M. A. 2012. Alligator pepper, *Aframonmum melegueta* and giger, *Zingiber officinale*, reduce stored maize infestation by the maize weevil, *Striphilus zeamais* in traditional African granaries. *Crop protection*32:99-103.

Uwagboe, E.O. 2016. Determinants of adoption of integrated pest management among cocoa farmers in selected states of Nigeria. Department of agricultural extension, university of Ibadan, unpublished Ph.D Thesis.188.

Vagnani, G. and Volpe, L. 2017. Innovation attributes and manager's decisions about the adoption of innovations in organizations: A meta-analytical review. *International Journal of Innovation Studies* 1.2: 107 – 133.

Watch Tower Bible and tract Society. 2018. *Awake: Will we ever feel safe and secure?* Watch Tower Bible and Tract Society of New York 100.1: 3.

Willer, H. and Kilcher, L. (Eds.). 2017. The World of organic agriculture. Statistics and emerging trends. IFOAM, Bonn; FiBL, Frick; ICT, Geneva. https://shop.fibl.org/CHen/mwdownloads/download/link/id/785/?ref=1

Yuhui, G., Guojun, C., Lichun, W. and Shuhua, W. 2019. Effects of equal chemical fertilizer substitutions with organic manure on yield, dry matter, and nitrogen uptake of spring maize and soil nitrogen distribution. *PLoS ONE14.7*. Retrieved on Feb. 10,2020 from https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0219512

Yusuf, I. M. 2018. Analysis of family labour utilisation in the production of selected crops in dry-lands: evidence from Kahutu, Katsina State, Nigeria. *Agrosearch* 18.2: 15 – 27.

Plate 1: Researcher with farmer that used organic farming practices for the production of Ginger in Oriade L.G.A., Osun State

Source: Field survey, 2017

Plate 2: Farmers that used organic farming practices for vegetable production in Akinyele L.G.A., Oyo State

Source: Field survey, 2017

Plate 3: Researcher together with crop farmers that were packing organic manurein Ido L.G.A., Oyo State

Source: Field survey, 2017

Plate 4: A group of crop farmers interviewed in Oriade L.G.A

Source: Field survey, 2017

Plate 5: Indepth Interview withResearcher and farmers' leader in Ido L.G.A after Indepth Interview

Source: Field survey, 2017

Plate 6: Indepth Interview with a farmers' leader in Ogbomoso south L.G.A.

Source: Field survey, 2017

Plate 7: Indepth Interview with a farmers' leader in in Akinyele L.G.A.

Source: Field survey, 2017

INTERVIEW SCHEDULE

DETERMINANTS OF UTILISATION OF ORGANIC FARMING PRACTICES AMONG CROP FARMERS IN SOUTHWESTERN NIGERIA

Dear Respondents,

I am a student of Agricultural Extension and Rural Development, University of Ibadan, Nigeria. The purpose of this interview is to gather information on the determinants of adsoption of organic agriculture practices among crop farmers. The information obtained through this medium is absolutely confidential and would be used for the purpose of this research.

Please tick (✓) the correct answer or response as appropriate.

SECTION A: Personal characteristics

1. Name of ward/community ……..

2. Local Government Area ……

3. State ……..

4. Sex: (a) Male ( ) (b) Female ( ).

5. Ethnic background: (a) Yoruba ( ), (b) Hausa ( ), (c) Igbo ( ), (d) Fulani ( ), (e) Efik ( ) Other (specify)

6. Marital status: (a) Single ( ), (b) Married ( ), (c) Widow ( ), (d) Widower ( ), (e) Separate ( ), (f) Divorced ( )

7. Educational background: (a) No formal education ( ), (b) Adult education ( ), (c) Primary education ( ), (d) Secondary education ( ), Tertiary education ( ), (e) Other, specify …….

8. Age: …….years.

9. Religion: (a) Christian ( ), (b) Islamic ( ), (c) Traditional religion ( )

10. Which of the following associations do you belong that influences your farming practices the most: (a) Famers co-operatives ( ) = 1, (b) Community Development Association ( ), (c) Informal savings and credit ( ), (d) NOAN ( ), (e) OAPTIN ( ), (f) LAUTECH ( ), (g) 'Aaro'(work exchange group) ( ) (h) Other, specify ……..

11. Cosmopoliteness (Have you visited other place/farms outside your local environment that encouraged you to adopt organic agriculture): No ( ), Yes ( ).

12. Primary occupation: (a) Trading ( ), (b) Farming ( ), (c) Civil service. Other specify …….

13. Household size: (a) 1-3 ( ), (b) 4-6 ( ), (c) 7 & above ( )

SECTION B: Enterprise characteristics

1. Type of crops grown/ Farm size/Crop yields

Crops	**Farm size (in hectares)**
Yam	
Cassava	
Vegetable	
Maize	
Banana/plantain	
Pineapple	
Other specify:	

2. Which of the crops grown above is best produced using organic farming practices: ……..

3. Farmers' experience in crop production (in years): ……

4. Sources of farm land: (a) Inherited land ( ), (b) Rented land ( ), (c) Leased land ( ), (d) Purchased ( ), (e) Communal land ( ), (f) Family land ( ), Others, specify

5. Income averagely realized per year:

Crops	**Income in ₦ (including quantity sold, consumed and given out)**
Yam	
Cassava	
Vegetable	
Maize	
Banana/plantain	
Pineapple	
Other specify	

6. Cropping system: (a) Sole cropping ( ), (b) Mixed cropping ( )

7. Source of farm labour: (a) Family ( ), (b) Hired ( ), (c) Self ( ), (d) Combined ( )

8. What do you do with your harvested crops? (a) Sold ( ), (b) For household consumption ( ), (c) a & b ( )

SECTION C: Crop farmers' sources of information on organic agriculture practices

1. Which of these sources of information you consider to be the major source of information on organic farming practices.

S/N	**Information sources**	
1	Radio	
2	Television	
3	Print media	
4	Mobile phone	
5	Internet/computer	
6	Farmers' association	
	Other specify:	

2. Indicate the frequency of information on organic farming practices you receive from the following sources of information.

S/N	**Information sources**	**Never**	**Occasionally**	**Regularly**
1	Radio			
2	Television			
3	Print media			
4	Mobile phone			
5	Internet/computer			
6	Farmers' association			
	Other specify:			

SECTION D: Attitude of crop farmers toward organic agriculture practices.

Indicate your level of agreement to the following statement by ticking any of the 5 points scale: (a) SA (Strongly Agree), (b) A (Agree), (c) U (Undecided), D (Disagree), SD (Strongly Disagree).

S/N	Statement	SA	A	U	D	SD
i.	Organic farming is cumbersome therefore I do not practice it as much.					
ii.	I practice organic farming due to relative increase in crop yields					
iii.	Consideration of distance between conventional and organic farmland is important.					
iv.	Organic farming is capital intensive.					
v.	I sometime avoid application of organic manure because it can lead to soil contamination.					
vi.	I apply organic manure because it improves soil fertility.					
vii.	Organically produced food crops are more nutritious.					
Viii	I always use mulching on my farm because the decomposed mulching materials can add to soil fertility.					
ix.	Planting of cover crop within the main crop really help in weed control.					
x.	Organic farming is labour intensive thus I do not have much interest.					
xi.	No difference between organic and conventional agricultural produce, therefore no need to waste time in organic farming.					
xii.	I practice crop rotation because it helps in controlling pest and disease attack.					
xiii.	Too much weeds is associated with manure application, so I do not use it as expected.					

xiv.	I do not practice crop rotation because is labour and time consuming.					
xv.	There is prevalence of pest and disease attack in organic farming, so I do not practice it as expected.					
xvi.	Organic manure application improves soil water conservation.					
Xvii	Organically produced food crop supports human health better than conventional food crop.					
Xviii	I hate the bad odour of organic manure thus I avoid its use.					
Xix	I carry out minimum tillage since it protects soil fertility.					
Xx	Organic manure is very difficult to apply so I avoid its use as much as possible.					
xxi.	I do not have interest in collection and destruction of infected plant because is of little/no importance in organic agriculture.					
xxii.	Pests monitoring on the farm is helpful so as to prevent or quickly control any outbreak.					
Xxiii	I prefer chemically treated planting seeds because they are pest and disease resistant.					

SECTION E: Knowledge test of crop farmers about organic agriculture practices
Please underline the correct alternative provided under each question below:

1. The acceptable distance between organic farmland and farmland with heavy use of pesticides should not be less down 50m: (a) no, (b) yes, (c) I don't know
2. Compost is done by using only plant refuse and water: (a) yes, (b) no, (c) I don't know
3. Planned crop rotation is very important in organic agriculture: (a) I don't know, (b) yes, (c) no
4. Sparing of some trees on the field as much as possible can add to soil fertility: (a) no, (c) I don't know, (c) yes.
5. Mixed cropping does not have any importance in organic farming: (a) yes, (b) I don't know, (b) no.

6. Synthetic chemicals can be used at any rate on organic farm land: (a) no, (b) yes, (c) I don't know
7. Inclusion of legume during crop rotation does not have any good effect on organic farmland: (a) yes, (b) no, (c) I don't know.
8. Intense bush burning is usually carried out on organic farmland because it adds nutrients/ashes to the soil: (a) I don't know, (b) yes, (c) no.
9. Organic farming discourages the activities of soil microorganisms: (a) no, (c) I don't know, (c) yes.
10. Use of synthetic insecticides is one of the cultural methods of controlling pest in organic agriculture: (a) yes, (b) I don't know, (b) no.
11. Melon is an example crop that can be used in controlling weeds on organic farmland: (a) no, (b) yes, (c) I don't know.
12. The best way of getting organic seeds/seedlings is by personally growing ones seeds/seedlings: (a) no, (b) yes, (c) I don't know.
13. Hybrid seeds or seedlings could be planted as organic planting materials: (a) I don't know, (b) yes, (c) no.
14. Alternation can be allowed between organic and conventional farmlands: (a) no, (c) I don't know, (c) yes.
15. Hand weeding should be avoided in organic farming because it wastes time: (a) yes, (b) I don't know, (b) no.
16. Early planting is important in pests and diseases control: (a) no, (b) yes, (c) I don't know.
17. Inorganic fertilizer can occasionally be used to increase growth in organic farming: (a) I don't know, (b) no, (c) yes.
18. Organic farming is the same as natural farming: (a) yes, (b) I don't know, (b) no.
19. Plant extracts can only be obtained from plant roots: (a) I don't know, (b) yes, (c) no.
20. Incorporation of crop residue into the soil does not add to soil nutrient: (a) no, (b) yes, (c) I don't know.
21. The use of trapping plant to control pests is acceptable and important in organic agriculture: (a) I don't know, (b) yes, (c) no.
22. Wood ash can be used in managing soil fertility: (a) no, (b) yes, (c) I don't know

23. Curing of organic manure can be done within two to four days: (a) yes, (b) I don't know, (b) no.
24. Freshly packed animal/poultry waste can be applied directly to crops on organic farmland: (a) no, (c) I don't know, (c) yes.
25. Crop certification is not necessary in organic agriculture: (a) yes, (b) I don't know, (b) no.
26. Mulching has only one importance of protecting the soil from excessive sun: (a) no, (b) yes, (c) I don't know

SECTION F: Utilisation of organic agriculture practices

Please indicate organic agriculture practices you use from the under listed organic agriculture practices.

S/N	Organic farming practice	Never used	Used before	Still using
A	**Conversion time and requirement**			
1.	Avoidance of use of chemical on farmland (pesticide, inorganic fertilizer etc) in not less than three years ago			
2.	Maintaining boundary (buffer zone)between organic and conventional farmlands			
3.	No use of the same farmland for organic and conventional crop production			
	Others (specify)			
B	**Biodiversity/farming system diversity**			
1.	Sparing of some trees on the field as much as possible			
2.	Use of planned crop rotation			
3.	Use of multiple cropping			
	Others (specify)			

C	**Soil and water conservation**			
1.	Use of wind break			
2.	Use of soil cover/mulching/cover cropping			
3.	Use of minimum tillage			
4.	Late removal of crop residue			
5.	No use of bush burning during land preparation			
	Others (specify)			
D	**Soil fertility management**			
1.	Use of nitrogen fixing crop (legumes)			
2.	Use of farmyard manure			
3.	Use of green manure			
4.	Use of certified organic fertilizer			
5.	Use of compost			
6	Use of wood ash			
	Others (specify)			
E	**Pest and diseases management**			
1.	Use of planned crop rotation			
2.	Use of planting of trapping crops			
3.	Use of copper salts			
4.	Use of timely sowing of crop			
5.	Use of neem extract			
6.	Use of lemon grass extract			
7.	Use of mechanical traps			
8.	Use of repellents such as pepper to protect stored grains			
9.	Conservation and encouraging the predators on the fields			
10.	Collection and destruction of infected plant			

	Others (specify)			
F	**Weed management practices**			
1.	Use of timely hand weeding to control weeds			
2.	Use of planting of cover crop to control weeds			
3.	Use of organic herbicides such as vinegar and citric acid			
4.	Use of timely inter-cultivation			
	Others (specify)			
G	**Planting Materials**			
1.	Planting of chemically untreated seeds/seedlings from organic production			
2.	Planting of conventional seeds/seedlings that are not treated with chemical			
	Others (specify)			

SECTION G: Benefits derived from practicing organic agriculture practices.
Please tick as appropriate the benefits derived in practicing organic agriculture.

Benefits of organic agriculture practices

S/N	**Benefits of organic agriculture practices**	**Not at all beneficial**	**To a lesser extent beneficial**	**To a large extent beneficial**
1	Improved soil structure			
2	Increased soil fertility/lasting soil fertility			
3	Reduced soil erosion			
4	Enhanced action of beneficial soil organisms/ bacteria			
5	Increased organic content of soil			
6	Increased crop yields			
7	Resistance of crops to pests and diseases			
8	Increased crop shelf-life/crop staying longer			

	time in store			
9	No genetic degradation of crop			
10	It speeds up plants growth rate			
11	No water pollution through surface runoff			
12	Little or no air pollution			
13	Reduced desertification thus lowering carbon dioxide/heat emission			
14	High premium			
15	Low investment/reduced cost of production			
16	Availability/accessibility of organic manure			
17	Low risk of crop failure due to biodiversity (e.g mixed cropping)			
18	Job creation			
19	Crops are richer in nutrients/better nutrition			
20	Crops produced are free of poison			
21	Enhanced taste			

SECTION H: Constraints to use of agriculture practices

Indicate how severe are the under listed constraints in utilizing organic agriculture practices. Not severe (NS), Severe (S) and Very severe (VS).

Severity of constraints to use of organic agriculture practices

S/N	Constraints	NS	S	VS
I	Inadequate availability of organic manure.			
Ii	Weeds control problem			
iii	Unfavourable land tenure system/inadequate farmland.			
Iv	Certification process			
V	Inadequate capital.			
Vi	Inadequate labour.			
vii	Bad odour of organic manure.			
viii	Transportation/heavy weight of organic manure.			
Ix	Curing of fresh manure.			
X	Pest and disease control problem.			
Xi	Unavailability of market for organic agriculture products.			
xii	Little or no information about requirements for organic crop production.			
xiii	Unavailability of organic input (seeds, seedlings, organic			

	fertilizer)			
xiv	Inadequate extension services from governmental or non-governmental organization.			