The contribution of adopting organic farming practices to household food security

(A Case study of Dovehouse Organics)

Submitted by

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December 2017

Submitted in fulfilment of the requirements for the degree of

Master of Agriculture, Agricultural Extension and Rural Resource Management

in the School of Agricultural, Earth and Environmental Sciences

University of KwaZulu-Natal, Pietermaritzburg

DECLARATION

I declare that this research dissertation is my own work; it was undertaken by myself, except where otherwise indicated. It is submitted for the degree of Master of Agriculture (Agricultural Extension and Rural Resource Management) at the University of KwaZulu-Natal, Pietermaritzburg. It has not been submitted for any other degree at any other university.

Signed:

23 March 2018

Angel Silindile Ndlovu: Student Date

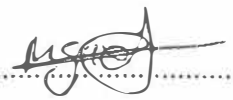
As supervisor, I agree that this dissertation be submitted for examination.

K. J. Caister

26 March 2018

Dr Karen Caister: Supervisor Date:

As a co-supervisor, I agree that this dissertation be submitted for examination.



26/03/2018

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ABSTRACT

Adoption of organic farming improves production over time, suggesting that it could be possible to feed the growing world population through food produced using organic farming methods. Globally, the consumer demand for naturally grown and healthier food has been growing, creating an incentive for farmers who are engaged in organic farming. This inquiry set out to investigate the extent to which adoption of organic farming methods or practices contributes to household food security. Analysis compared the food security status of non-trained farmers with farmers who had been trained by Dovehouse Organics (DVO) with a permaculture philosophy and organic farming practices. Data were collected from 100 sampled farming households (53 trained and 47 non-trained households) through the use of a questionnaire. The study used the Household Hunger Scale (HHS) to determine the food security status of the farming households. A linear regression model was used to assess the relationship between adoption of organic farming practices and household food security. Sixty-seven percent of the sampled households were food secure. About 87% of the farming households that adopted organic farming technology are food secure. Of the households that did not adopt organic farming technology, 55% are food insecure. About 89% of the trained farmers believed they were producing more than enough food for their needs, compared to 38% of the non-trained farmers. The results show that a large number of farmers adopted the organic farming practices that were offered at DVO in their daily crop production activities. There were various reasons for adopting the organic farming technologies, including improved production and yield, better pest management, and improved potential for having excess to sell. A positive relationship between adoption of organic farming practices and food security was observed, suggesting that as farmers adopt the organic practices into their farming systems, chances of being food secure increased. Adopting organic farming practices may have improved the food security status of organic farming households in Richmond. Similar studies with a larger sample size need to be conducted to ascertain the contribution of organic farming to household food security. In terms of improving the contribution of organic farming to food security, it is recommended that more training opportunities, production support and guidance be made accessible, particularly for emerging organic farmers who require information and advisors for guidance. Given the high market demand of organically produced products, further research into opportunities that organic farmers have for selling their produce would assist to diversify household income.

DEDICATION

I dedicate this work to my brother Nkosinathi Emanuel Ndlovu. May his soul rest in eternal peace.

ACKNOWLEDGEMENTS

Acknowledgement is greatly expressed to the following people who made this dissertation possible:

To God Jehovah be all the glory.

Dr Karen Caister for consistent support and encouragement throughout this work.

Dr Mjabuliseni Ngidi for co-supervising this work.

My family for your prayers and support.

Mr Zondi for encouragement and support.

Dovehouse staff for being available to assist all the time when I called for help.

The farmers whom I interviewed and without whom this work would not have been done.

The key informant and research assistant who respectively connected me with the relevant farming households and assisted me to collect data from the selected area.

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LIST OF ABBREVIATIONS

AOFGS:	Australian Organic Farming and Gardening Society
AOSC:	Africa Organic Service Centre
ASFG:	African Small Holder Farmers Group
CBO:	Community Based Organisations
DAFF:	Department of Agriculture, Forestry and Fisheries
DVO:	Dovehouse Organics
ERP	Extension Recovery Plan
FAO:	Food and Agriculture Organization
FFS:	Farmer Field School
FGDs	Focus Group Discussions
HFIAS	Household Food Insecurity Access Scale
HH:	Household
HHS:	Household Hunger Scale
IDP:	Integrated Development Plan
IFAD:	International Fund for Agricultural Development
IFOAM:	International Federation of Organic Agriculture Movements
IFPRI:	International Food Policy Research Institute
INR:	Institute of Natural Resources
KIOF:	Kenya Institute of Organic Farming
KOFA:	Kenya Organic Farmers Association
KZN:	KwaZulu-Natal
LED:	Local Economic Development Plan
NEPAD:	New Partnership for Africa's Development
NGO:	Non-Governmental Organisation

NOAF:	National Organic Agriculture Forum
NOGAMU:	National Organic Agricultural Movement of Uganda
OA:	Organic Agriculture
SADC:	South African Development Committee
UNCTAD:	United Nations Conference on Trade and Development

DEFINITION OF TERMS

Conservation Agriculture	It is a way of farming that conserves, improves and ensures efficient use of natural resources. It aims at producing high crop yield while reducing production costs. It is a way to achieve sustainable agriculture, and improve livelihoods. (World Bank. 2008).
Conventional Agriculture	In this research, it refers to a farming method that uses synthetic chemicals fertilisers, pesticides, herbicides and other external input on the farm.
Farmer	Refers here to a respondent; a respondent could be someone who attended training at Dovehouse Organics or someone who did not.
Food Security	Food security is a situation which exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. (Food and Agriculture Organization [FAO], 2007:1)
Household head	Refers to the leader of the household; in this research, this is not necessarily the same person as a farmer.
Organic Agriculture	Is a production system that sustains the health of soils, ecosystems and people (International Federation of Organic Agriculture Movement [IFOAM], 2009). It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with possible adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair

	relationships and a good quality of life for all involved. (IFOAM, 2009). For this study, organic agriculture is understood as agriculture that does not use commercially prepared chemical fertilizers, herbicides or pesticides as inputs, but rather resources on hand for managing pests and soil fertility in a conscious awareness of environmental well-being.
Selling excess	This refers to whether farmers sell crops from the garden if they have produced more than they need for household consumption.
Traditional Agriculture	Refers here to production of food crops that is not solely based on formally acquired education on farming, but based on indigenous agricultural knowledge passed from generation to generation through experience and careful observation

CHAPTER ONE: THE PROBLEM AND ITS SETTING

1.1 Introduction and background of the study

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization [FAO], 2007:1). After a long period of massive oversupply of food globally, food insecurity is still very prevalent, especially in developing countries. Even in countries that export large quantities of food, some people are starving. For a long time, a common perspective was that food security is mainly about the production of high quantities of food (Institute of Natural Resources [INR], 2008). Simply adding chemical fertilisers to increase yields was seen as a simple solution to the food security challenge. While increased production is necessary for food security, it does not automatically translate into food security for all. What is important is who is producing the food, and who has power to purchase it.

The world may produce enough food, but those who do not have access to technology and information to produce it may still be food insecure. Access to education and agricultural knowledge is important to help farmers adapt to change in the agriculture industry (United Nations Conference on Trade and Development [UNCTAD], 2008). Food security is about poverty reduction, access to resources, and distribution, globally, nationally and locally. Organic farming is an accessible and appropriate food production method for rural farmers that are most likely to be food insecure since it uses resources that are already available in the community (INR, 2008).

Persistent hunger and food insecurity has demonstrated that agriculture alone (be it conventional or not) cannot solve food insecurity problems. Globally, food production is more than enough to feed the global population; the problem is getting the food to people who need it. In market-marginalised areas, organic farmers can increase food production by managing local resources without having to rely on external inputs or food distribution systems over which they have little control and or access. Under the right circumstances, organic agriculture can feed the nation.

Organic agriculture refers to, amongst other things, exclusion of synthetic chemicals such as pesticides, fertilizers, fungicides and insecticides or genetically modified seed. The

International Federation of Organic Agriculture Movement (IFOAM) defines organic farming as the system of production that does not only sustain the health of soils but also the ecosystems and people. This production system relies on ecological processes, biodiversity and cycles adapted to local conditions, as opposed to the use of external inputs with possible adverse effects. It combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (IFOAM, 2009:2).

According to a sub-Saharan study, over 60 percent of the population in sub-Saharan Africa depend on agriculture for their livelihoods (Department of Agriculture, Forestry, Fisheries [DAFF], 2012). Through organic agriculture, smallholder farmers have an opportunity to realise production goals which may not be possible by using intensive synthetic chemical fertilisers, pesticides, and herbicides because smallholder farmers may not afford to purchase such chemicals (Hellin & Higman, 2002).

Sale of organic food and drink increased by 43% between 2002 and 2005 worldwide (INR, 2008). Van Zyl (2000) indicated that estimating the total organic turnover in South Africa is difficult, but it could be in the order of R45 million, with some of the produce being exported to European countries. Evidence shows that practising organic farming increases production for smallholder farmers (Vaarst, 2010).

While traditional farmers may have practised organic farming by default (Pophiwa, 2012), due to their lack of access or power to purchase synthetic chemicals (Scialabba, 2007), organic farming is a challenging system which requires training to equip smallholder farmers with knowledge and skills necessary for making informed decisions when practising organic farming. Experience, adequate extension support and training are some of the things which are critical when practising organic farming (Scialabba, 2007). DAFF (2012) also indicated that investment in agricultural training is necessary to improve food security.

Farmers have complex decisions to make about farming; such decisions are influenced by on farm and off farm factors (FAO, 2007). Considering that organic farming is a knowledge intense system, organic farmers have particular decisions to make, in addition to the general decisions of managing a farm (Scialabba, 2007). A study in Limpopo Province showed that most homestead farmers in rural areas require support through information sharing in order for them to make sound decisions about organic farming, pest and disease control, and marketing (Chitja, 2008).

Whilst there are various challenges that hinder the success of agricultural production, constraints relating to the provision of quality education and training has been identified as a critical issue to be addressed (Department of Agriculture, Forestry and Fisheries [DAFF], 2012). Participation in experiential learning and participatory group approaches in areas such as Kenya, Uganda and Republic of Tanzania resulted in improved crop productivity, production and income (FAO, 2008). Organic farming has been found to be the best model for emerging farmers (Kelly & Metelerkamp, 2015). In South Africa, informal organic farming by smallholder and subsistence producers may feed as much as two-thirds of the population. Due to complexity of the agricultural sector in this country, it is envisaged that organic farming will become the mainstream form of agriculture to comply with agendas such as Sustainable Agriculture, the Clean Development Mechanism, and the proclaimed Green and Clean Economy from the South African government (Kelly & Metelerkamp, 2015).

1.2 Significance of the study

Food and nutritional security remain an issue of concern in South Africa. Organic farming has been identified as a pathway towards sustainable development and achieving household food security. Organic agriculture may thus be an option in some areas to strongly support rural development. Therefore, determining the contribution of adopting organic farming on household food security is important for a variety of reasons. The question of how to face the growing problem of food insecurity in Africa becomes more and more important, especially due to the steadily increasing population and changing consumption patterns. While organically produced food seems not to be able to feed all people, organic agriculture might help to reduce food insecurity. Organic farming is one of the sustainable approaches to farming that can contribute to food and nutritional security. South Africa has a growing organic market with products sold as home deliveries, in specialised stores and in large supermarket chains or in specialised restaurants or special organic markets. The results of this study provide policy makers with important information regarding the contribution of adopting organic farming to the household food security.

The number of households and persons that have restricted access to food decreased from 23.9% and 28.6% in 2010 (Statistics South Africa [Stats SA], 2016) to 22.3% and 24.9% in 2016, respectively (Stats SA), 2017a). However, since 2011, the number of households and persons with limited access to food have been stagnant. The population of South Africa increased from 40.6 million in 1996 to 51.7 in 2011 to 55.6 million in 2016; and with the

increasing population, creative and sustainable agricultural systems are required to meet the demand (UNCTAD, 2008). Rural and peri-urban areas of South Africa are facing a serious challenge of food insecurity at a household level (Hendriks *et al.*, 2016). In rural areas, agriculture is a tool that can be used to reduce poverty (Machethe *et al.*, 2004), however, conventional agriculture raises serious concerns about the sustainability of food production due to the detrimental impact it has on the environment. Therefore, adoption of organic farming is seen as an alternative, not only to reduce environmental degradation but to also reduce input costs when farmers use the resources they have. UNCTAD (2008) stated that when compared to most conventional production systems, organic farming can be more conducive to food security in Africa, and in the long term, it is more likely to be sustainable.

Organic agriculture does not only contribute towards sustainable agriculture, but it also increases production, and improves food security and livelihoods for smallholder farming communities (Vaarst, 2010; Vaarst *et al.,* 2009). While organic farming can play a significant role in food security in Africa, it is not easy to properly and appropriately implement (adopt) organic farming methods unless policies enable fair development of food systems and create an enabling environment. The lack of access to information and skills forms part of the challenges facing rural small-scale organic farmers. As such, there are a number of organisations involved with training smallholder farmers on organic farming practices, but training alone is not good enough if farmers do not adopt what they have been taught.

Organic farming is a knowledge-intensive approach to agriculture (Sligh & Christman, 2007). On the other hand, input-based agriculture in conventional systems relies largely on the use of prepared agrochemicals to solve problems. Organic farming demands an in-depth understanding of farms (as entire systems) and farmers as capable experimenters and innovators with a wealth of experience and knowledge (Von der Weid, 2007). There is, however, limited research to explain the role of organic farming in agriculture, rural development, and food security in the Southern African context, including South Africa (Modi, 2003). Through adoption of organic farming, farming households can improve their food security situation. Vaarst *et al*. (2009) indicated that organic agriculture is suited for many poor and marginalised households given that the smallholder gets high quality produce whilst using naturally available materials to produce. Chitja (2008) stated that even though success stories of organic farming have been documented, it is not known whether the same success can be replicated for South Africa. There is a need then to examine the contribution of organic farming to household food security.

1.3 Research objectives

The main objective of the study was to determine if adoption of the organic farming practices contributes to household food security. The specific objectives were:

- To determine whether farmers are practicing organic practices that they acquired during training at Dovehouse Organics.
- To investigate the significance of organic farming training on food security.

1.4. Sub-problems

The contribution of adopting organic farming practices on household food security was explored through four sub-problems:

- What are the characteristics of the sampled farming households?
- What are food production practices, land tenure system and organic farming knowledge at homestead level?
- What organic farming practices were farmers trained on and adopted?
- Does adoption of organic farming practices improve household food security status?

1.5 Study assumption

The study assumed that all households were honest when answering the survey questions and did not withhold any information which could have an impact on the results. It was assumed that organic farmers who were trained and interviewed did not use agro-chemicals. It was further assumed that households would reliably recall all issues relevant to the study, i.e. times when there was not enough food and times when there was enough food. Given that all the interviewed farmers reside at Richmond, it was therefore assumed that all the farmers are subjected to similar climatic conditions such as rain or drought.

1.6 Study limits

Data collected for this study was limited to the use of questionnaires and observation. As a case study it produces context specific knowledge and is therefore not generalizable. Organic farming refers to the production system that relies on ecological processes, rather than the use of external inputs. No soil experiments were conducted to determine whether the farmers use agro-chemicals or not. The study was limited to Richmond area; the results of the study are therefore not generalised to other areas. Richmond area was selected because it had a large

enough group of organic farmers who were trained at Dovehouse Organics (DVO). Food security consists of four pillars (availability, accessibility, utilisation and stability). This study focused only on two pillars: the elements of food availability and access. Food availability was looked at from a hunger perspective and not production of food from the gardens. The study focused only on crop production, and not on livestock production.

1.7 Structure or shape of the dissertation

This dissertation consists of five chapters. Chapter One outlines the rationale behind the study; importance of the study; research objectives and sub-problems; assumptions made and the limits of the study. Chapter Two provides a review of related literature in line with the objectives. The review discusses the concepts and practices of organic farming; provides an overview of organic farming practices at a global, regional and national level, and discusses the factors affecting the adoption of organic farming; discusses organic farming training offered in South Africa and organic farming training as an intervention for improving food security. Chapter Three provides a picture of the study area and describes the methodology employed in the study, including research design, data collection tools, data cleaning, treatment and analysis. Chapter Four draws a conclusion regarding the whole investigation, which sought to understand the contribution of adopting organic farming practices to household food security. Chapter Five summarises the findings, which are then used to draw a conclusion guided by the research objectives and sub-problems of the study. The summary of findings is also used to make recommendations for further research studies.

1.8 Conclusion

This chapter provided an overall map of the dissertation, which included the background of the study and the need for the research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Seventy five percent of the world's 1.2 billion poor people live in rural areas of the developing countries (Scialabba, 2007), most of whom depend on agriculture for their livelihoods (World Bank, 2008). The situation in Southern Africa is similar to the rest of the world. Food shortage is an ongoing problem and long term projections suggest that regional food production per capita is likely to decrease in the future, worsening the poverty situation (Misselhorn, 2004). Through agriculture, hundreds of millions of rural poor people have an opportunity to move out of poverty (World Bank, 2008). Agriculture is recognised widely as a foundation of the economy, especially for developing countries (DAFF, 2012).

While the impact of farming on poverty reduction is widely acknowledged, there are certain areas which need to be improved in the sector. The African Small Holder Farmers' Group (ASFG) reported that knowledge for decision-making, access to markets, technology, an increasing asset base, and equal opportunities can turn farming into a viable livelihood for smallholder farmers. Given that famers have complex decisions to make about farming (FAO, 2008), training provides farmers with the necessary knowledge, skills and required technical information to assist them in making effective farm management decisions to enhance their farm practices (Furo *et al.*,2012). Organic farming uses on farm resources to improve soil fertility. A sound understanding of the biological system is essential for organic farmers to maintain the intensive management required in organic farming (Chitja, 2008).

Organic farming, which is also known as biological or ecological farming, refers to a holistic production system which enhances and promotes health of an ecosystem, biodiversity, biological cycles, and soil biological activity (Kristiansen *et al.*, 2006). Organic farming practices are increasingly adopted as a development strategy to alleviate food insecurity (Vaarst, 2010). Organic farming encourages the use of on farm resources with agronomic, biological, and mechanical methods where possible, and discourages the use of synthetic pesticides (Kristiansen *et al.*, 2006). It is land care and use, based on developing and managing biological diversity in the field for integrated pest, disease and soil fertility management. Organic compost, manure, and natural disease/pest control are used in organic farming as opposed to agrochemicals. Organic certification is a marketing strategy to claim a higher market price. This takes production to a level of regular monitoring and evaluation. The

production criteria and practices are exactly the same. Both can be marketed, and both can be consumed at household level. However, in order to guarantee organic as a brand, consumers demand 'proof' that food is actually organic. The achievement of organic certification by the farmer gives the consumer confidence in the quality of the product (Parrot & Elzakker, 2003).

Sustainable agriculture is agriculture that meets today's livelihoods needs, and does not compromise the right of neighbours, and future generations, to meet their own needs. The effort of women, men, and children is required to adapt complex rural livelihoods to a changing environment, for enhancing, and protecting the natural, physical, social, and human capital, for the current, and future generations (Corpstake, 1997). However, diminishing soil fertility is a main cause for the falling of yields in many places (Gruhn *et al.*, 2001), especially for smallholder farmers who live in poor communities and depend entirely on farming for food. A soil depletion rate is reported to be roughly 18 times faster than natural soil formation in the United State of America. The situation is worse for developing nations, as their soil is depleted at least 36 times faster than it is being formed in nature (Pimentel, 2006). The decline in soil fertility impacts food security especially where small holder farming is a primary source of livelihood (ASFG, 1999). It is therefore essential to find a way to reverse these losses to our soil base, for sustainable agriculture to be achieved (Jeavons & John, 2001).

The world is facing a so called "global food crisis" as well as "climatic crisis". The wide range of benefits of organic farming have been widely publicised, including environmental benefits and improved production (INR, 2008). Farming, however, is a risky business owing to unpredictable environmental factors (Jarvis *et al*., 2006). The banning of agro-chemicals, such as pesticides and herbicides, in organic farming presents a further risk for farm productivity (Jarvis *et al.*, 2006), especially as they reduce dependency over time on chemicals for pest and disease management. Scialabba (2007) states that organic farming is no longer a phenomenon of developed countries and Chitja (2008) found that in southern KZN, there is a potential for smallholder farmers to benefit from organic farming; but availability and access to resources, inputs and appropriate production information is important to make informed decisions about organic farming and its related risks.

Organic farming is a knowledge intensive approach to agriculture (Sligh & Christman, 2007). The system uses on farm resources to improve soil fertility, and a sound understanding of biological systems is essential for organic farmers to maintain the high level of management practice required in organic farming (Chitja, 2008).

In spite of the positive attributes of organic production, there is limited research to explain its role in agriculture, rural development and food security in the southern African context (Modi, 2003). This literature review first provides an overview of organic farming, outlines the food security situation in South Africa, and KwaZulu-Natal in particular, and collectively show links between training, organic agriculture and food security.

2.2 The concept of organic farming

Organic farming is often narrowed down to no use of chemicals (Vaarst, 2010). Organic farming is broader than that. It is about managing a farm as an integrated whole system. Organic farming is defined by IFOAM (2009:13) as follows:

> Organic agriculture includes all agricultural systems that promote the environmentally, socially and economically sound production of food and fibres. These systems take local soil fertility as a key to successful production. By respecting the natural capacity of plants, animals and the landscape, it aims to optimise quality in all aspects of agriculture and the environment. Organic agriculture dramatically reduces external inputs by refraining from the use of chemo-synthetic fertilisers, pesticides, and pharmaceuticals. Instead it allows the powerful laws of nature to increase both agricultural yields and disease resistance.

Before farmers were introduced to chemically synthesised fertiliser, biocides, and fossil fuel, they had no option but to work with biological and ecological systems (Kristiansen *et al.*, 2006). In the 1980's when the public became aware of the shocking and improper systems used in industrial food production and processing, there was growing interest toward more sustainable methods of farming, which lead to an explosive growth in organic agriculture (Kristiansen *et al.*, 2006). It became clear that the industrial production system that was thought to be ideal for all types of production processes was not ideal for all.

Organic agriculture is a holistic agricultural production system based on international standards and guided by the principles of health (Boon & Semakula, 2010). The principles are embedded in the way people interact with the environment, relate to one another, and pave a way for future generations. In a broader sense, how people treat soils, water, plants and animals in order to produce and distribute food and other goods is what is of concern in organic farming.

2.3 Principles of organic farming

According to IFOAM (2014), organic farming is a holistic systems approach guided by four principles:

Health: Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. The role of organic agriculture is to sustain and enhance the health of ecosystems and organisms. Organic agriculture aims to produce high quality, nutritious food that contributes to preventive health care and well-being. It should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.

Ecology: Land use should be based on living ecological systems and cycles, and increased soil organic matter: working with them, emulating them and helping sustain them.

Fairness: Organic agriculture should build on relationships that ensure fairness with regard to common environment and life opportunities.

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

2.4 Organic agriculture by regions

Organic farming is practised in almost 172 countries worldwide; it is estimated that more than 43.7 million hectares of land is organically managed worldwide (Research Institute of Organic Agriculture, 2016). These figures could be even more as they do not account for uncertified organic farming, which is mostly predominant in developing countries. Table 2.1 below shows the total land under organic farming by region. In terms of the continents, Australia/Oceania accounts for the largest area under organic farming, followed by Europe and Latin America.

Table 2.1: Distribution of organic agriculture land by region in 2014

Region	Hectares of land under organic agriculture per region (million)
Oceania/Australia	17.3
Europe	11.6
Latin America	6.8
Asia	3.6
North America	3.1
Africa	1.3

Source: Research Institute of Organic Agriculture, 2016.

2.4.1 Organic farming in Oceania

The region, which includes Australia, New Zealand and other smaller countries like Fiji, Papua New Guinea, Tonga and Vanuatu, has the largest agricultural land under organic cultivation. Forty percent (40%) of the land was reported to be managed organically by the year 2014 (Willer & Lernoud, 2017). Australia has had a long history in the organic farming industry, as the first organic society in the world was founded in Australia the "Australian Organic Farming and Gardening Society (AOFGS)" based in Sydney. The organic industry receives support from government to encourage organic farming, but there are no subsidies aiming at organic farming per se. It is mainly overseas demand that has strongly influenced the growth of the organic industry in Australia. Europe accounts for 70% of Australian organic export and most Australian organic beef is exported to the US (Escobar & Hue, 2007). Since 1992, Australia has had National Standards for organic and biodynamic products. These were mainly enforced for export products. In 2006, Australia agreed to adopt organic standards, which, once in place, could be used by authorities to shape the domestic market. However, the organic food market is still considered a niche market in Australia, and the consumer demand for organic products continues to rise. On the domestic market, organic produce receives a substantial price premium over that of conventionally grown produce. The importance of organic farming has been applauded by the New Zealand government following the launch of the National Organic standard in 2003 by establishing a New Zealand Organic Sector Strategy (Willer & Lernoud, 2017).

2.4.2 Organic farming in Europe

Organic agriculture continues to develop dramatically in Europe. In 2015, organic farm land increased by more than 10% to 31.1 billion US Dollars. About one quarter of the world's organic production is in Europe, which accounts for more than 11 million hectares of land managed by more than 3400,000 producers (Willer & Lernoud, 2017).The emphasis of the European Common Agricultural Policy (CAP) on environmentally sensitive agricultural systems and policy implementation has contributed largely to the fast growth of the organic farming sector. Over 90% of organic food and drink sales come from Europe and North America (Willer & Lernoud, 2017).

Retail sales of organic products fetch premium prices. In 2014 alone, sales of organic products totalled approximately 26.2 billion euros in Europe (Willer & Lernoud, 2017). Germany was the largest market for organic products with retail sales of 7.9 billion euros, followed by France (4.8 billion euros), and UK at 2.3 billion euros (Willer & Lernoud, 2017).Another remarkable

growth in the organic market happened between 2014 and 2015 when Sweden experienced an increase of more than 40%, which is remarkable growth for a well-established market (Willer & Lernoud, 2017).

2.4.3 Organic farming in Latin America

Latin America had the third largest area under organic farming in 2015 (6,7 million hectares), the region with the largest area was Oceania (22,8 million hectares), followed by Europe at 12,7 million hectares (Willer & Lernoud, 2016). While the region had the third largest area under organic farming in 2015, during the same year it is the only region which did not experience growth in its organic produce. This was mainly due to the decrease of grazing land in the Falklands Islands. In terms of their organic produce, many countries in Latin America are important exporters of organic produce such as banana, cocoa and coffee. (Willer & Lernoud, 2017).

2.4.4 Organic farming in Asia

About 3.6 million hectares of land is managed organically in Asia; food safety is the key driving force behind consumer interest in organic farming in the region. At the workshop held in December 2015 on "Developing agricultural value chains in the Mekong region", co-organised by the Vietnam Ministry of Industry and Trade and ERIA (Economic Research Institute for ASEAN and East Asia), food safety was raised as a primary concern. Ensuring food safety in production, processing, and handling, including transportation, was regarded as value adding (Willer & Lernoud, 2017). Many organic producers in Asia, Africa and Latin America have a high export orientation, and as a result, they are producing exclusively for the export market.

2.4.5 Organic farming in Africa

The National Organic Agriculture Forum (NOAF) encouraged African countries to invest in the further development of organic agriculture for poverty reduction and food security (NOAF, 2015). In recent years, the world has seen growing awareness about health and environmental issues. This awareness has fuelled the demand for sustainably grown food as the public is concerned about the safety and quality of food they eat, and climate change. About 2000 agricultural and veterinary chemicals can potentially be injected into the soil in conventional farming. These agricultural toxicants include: synthetic fertilisers, pesticides (herbicides, insecticides, fungicides), fumigants, mycotoxins, hormonal growth promoters, anthelmintic, antibiotics, and other medications (Oates & Cohen 2009). Even though the food regulatory bodies worldwide have not reported on any health benefits of organic farming, the exclusion

of toxicants in organic farming suggests lower residues than produce from conventional farming (Oates & Cohen 2009).

The African traditional farming method is characterised by low external input, providing potential ground for organic agriculture becoming a viable development option for Africa (Parrot & Elzakker, 2003). Though not “organic”, many farming methods in Africa resemble that of organic farming laid by IFOAM as basic standards. In 2004, the Africa Organic Service Centre (AOSC) was established in order to help enhance the role that organic agriculture plays in terms of food security in Africa. The AOSC was first based in Kampala, Uganda, but later a decision was taken to move it to Dakar, Senegal. The centre serves, amongst other things, as a place where African countries can draw inspiration and exchange information in order to further develop the organic sector.

The establishment of organics as a marketing strategy in Kenya started around 1980 through the effort of non-governmental organisations (NGOs), and private organisations such as Kenya Institute of Organic Farming (KIOF), which gave birth to Kenya Organic Farmers’ Association (KOFA) (Kledal *et al.*, 2010). The association established organic farming standards based on standards by IFOAM and the European Union in order to create a vibrant organic market (Kledal *et al.*, 2010).

While organisations such KIOF and KOFA were looking at developing markets for organic farmers, non-governmental organisations and community-based organisations (CBOs) aimed at assisting rural farmers to address declining agricultural productivity, land degradation, poverty, food insecurity, and low incomes. NGO’s worked with farmers with low incomes who were not able to afford conventional inputs. The use of compost, wood, stable manure, ash, and later, by green manure presented by organic systems of agriculture, meant a low cost opportunity to improve farm productivity for smallholder farmers. An unintended consequence was that organic farming became associated with poverty and this “poor man” perception of organic agriculture which continues today. This is considered to be a reason for the low level of commercialisation of organics at the smallholder level (Taylor, 2006).

Despite the contestations that organic agriculture cannot meet the world food demand, the organic farming sector is increasing in Africa, particularly in the Southern countries. More than 435 000 hectares and 118 000 farms (excluding uncertified farms) are now managed as certified organic in Africa (Willer & Yussefi, 2005).

2.4.6 Organic farming in South Africa

South Africa has a long history in the organic farming sector; the South African Biodynamic Association was one of the five founders of IFOAM in 1972. Organic farming has grown from small groups producing organic products to a formalised sector. Farmers, particularly smallholder farmers who practise organic farming in South Africa, have good opportunities to improve their food security situation, and develop sustainable rural livelihoods. The country is one of the few countries with a significant demand for its domestic organic products. Local supermarket chains are showing interest to stock organic products. The African organic farming foundation estimated a value of R100 million in the South African organic market across all categories of produce (Hartigh, 2015). The high growth of organic demand and sales has led to local supermarket chains to look for more sources of organically grown food. Woolworths and Pick 'n Pay, which are the only large retailers who report on their organic product sales, indicated an increase in the demand of organic products. For example, in the free range and organic food category, Woolworths reported a growth from R0.67 billion in 2011, to R1.7 billion in 2012, to R4 billion in 2013. Pick 'n Pay also cited an increase in their organic and fair trade products by 50% during 2012 (Kelly & Metelerkamp, 2015). By increasing their organic products they directly support small scale organic production. In fact, Woolworths was the first national retailer to provide a guaranteed market for organically certified small-scale black rural farmers in KwaZulu-Natal (Lyne & Hendriks, 2009).

Consumer demand for healthier food in South Africa has been on a steady increase ((Kelly & Metelerkamp, 2015). According to the research by Asset Research (2014), when compared to other Southern African countries, South Africa has the largest organic production area. Even though with challenges, organic agriculture is seen as a vehicle to provide employment opportunities for millions of small farmers and for women and youth groups, together with economic and financial benefits in South Africa ((Kelly & Metelerkamp, 2015).

The South African population increased from 40.6 million in 1996 to 55.6 million in 2016 (Stats SA, 2016). To feed this population, food production needs to increase in proportion using the same natural resources. Magdoff and Van Es (2000), observed that the productivity of top soil tends to be lost with time; however, fertility could be maintained by adding organic matter. Most rural communities in South Africa, predominantly traditional authority areas, have been relying on organic matter to maintain soil fertility (Gori & associates, 2004). The indigenous farming systems that were used in the past in South Africa are similar to that of organic farming

(Kelly & Metelerkamp, 2015), 2015). Thousands of subsistence farmers have been following organic farming practices in South Africa, even though not certified as such.

It can be argued that all farming before the introduction of synthetic chemicals was “organic”. While all land is suitable for organic farming; the land used by rural communities in predominantly traditional authority areas is mostly suitable for this kind of farming because the resources are available, such as grass for mulching and animal manure, and the areas are usually distant from pollution-generating environments like manufacturers. On the other hand, some farmers do not use pesticides and synthetic fertilizers in their farming operations because they cannot afford the high prices attached to these inputs and many are aware of both the harm of such inputs as well as the benefits of organic production (Niemeyer & Lombard 2003).

2.5 Factors affecting adoption of organic farming by smallholder farmers

There is a positive relationship between adoption of organic farming practise and attending training. Kallas *et al*. (2009) found that farmers who participated in more training and visits had higher levels of adoption. Farmers’ participation in training and visits made them able to acquire knowledge and information about organic farming practices. Uganda is a good example of how agricultural training can contribute to the adoption of organic agriculture. As is the case with most African countries, subsistence farmers in Uganda have been organic farmers by default in that their farming methods are largely comparable to organic farming, except that they are not certified as such. In 2003, Uganda had the world’s thirteenth largest land area under organic agricultural production, and the greatest in Africa (Pophiwa, 2012). Uganda was able to achieve this because farmers, mostly subsistence, form farmers’ groupings and associations and farmers are assisted with training in the general practices of organic farming, and organic certification (Pophiwa, 2012). Mzoughi (2011) found that economic concerns amongst farmers also contributed to their decision about adopting organic agriculture. Farmers, mostly subsistence, can have great financial gains when practising organic agriculture; these could be derived from the sale of organic produce and as well as savings from not purchasing agricultural inputs.

2.6 Advantages of adopting organic farming for smallholder farmers

Smallholder farmers manage farms of less than two hectares of owned or rented land using family as the main source of labour and farming is one of the key contributors to family income (Nagayets, 2005). Smallholder farming is a predominant livelihood and source of food for many rural communities. Africa is more dependent on agriculture than any other continent;

more than half a billion Africans or 65% of the population depend on small scale farming as their primary source of livelihoods (Africa's Small Holder Farmers). Smallholder farming also provides more than half of the world's food supply (Actionaid, 2011). This makes smallholder farming the most efficient and socially just way to increase productivity and household food security (Actionaid, 2011).

According to International Fund for Agricultural Development [IFAD] (2013), a large proportion of the chronically hungry people are smallholder farmers in developing countries who mainly produce to eat and are often too poor to afford inputs. Many smallholder farmers are facing challenges relating to decreased production due to soil fertility degradation, which requires increased input of fertilizers and synthetic pesticides; on the other hand, the escalating prices of agro-chemicals makes it difficult for small holder farmers to afford agro-chemicals (Kristiansen *et al*., 2006). Opting to utilise an agricultural method that does not use agricultural chemicals is beneficial to the smallholder farmers. Organic farming has relatively low external input costs because no agricultural chemicals are used; this makes organic farming attractive and affordable for low-income communities to adopt (Gori & associates, 2004).

Farming without the use of agrochemicals such as synthetic pesticides is receiving much recognition as a sustainable agricultural system for smallholder farmers. Smallholder farmers not only lack financial power to purchase input, i.e. herbicides and commercial synthetic fertilizers, but they are also marginalized from product markets because they reside in rural areas far from markets (UNEP, 2008). Adopting organic farming means that farmers do not rely on agro-chemicals, thus reducing the cost of external inputs, and this limits the need to go into debt (Goldblatt & Bormann, 2010). The current biggest expenditure is on farm feeds item, followed by fuel and fertilisers. Retail prices of these commodities are associated to the oil price and the rand/dollar exchange rate, both of which are not within the control of a farmer. A shift towards fertilisers produced in a farm and improved soil fertility would minimise input costs and the vulnerability of farmers to international price fluctuations (Goldblatt & Bormann, 2010).

Niemeyer and Lombard (2003) found that farmers not only benefit from the reduced expenditure on agricultural chemicals, but they are also motivated by environmental sustainability and improved soil fertility associated with organic farming. Important ecosystems services such as nutrient recycling, water production, flood mitigation, carbon absorption, and regulation of a number of species are provided by biodiversity. Given that 37%

of the earth's surface is under some form of agriculture (INR, 2008), agriculture has an opportunity to conserve biodiversity. Biodiversity is influenced by the design and implementation of sound organic practices. These include a minimum tillage, returning crop residues to the soil, mulching and crop rotations, and the greater integration of nitrogen-fixing legumes that increase the return of carbon to the soil, and raise productivity and encourage carbon storage (FAO, 2008). Soil fertility is key in managing productivity (Jeavons & John, 2001). Land treated with a consistent humus supply from vegetable and animal waste produced crops that are not only resistant to pests, but the animals who fed on those crops also received that resistance (Gomiero, 2016).

According to the INR (2008), the broad poverty alleviation agenda of New Partnership for Africa's Development (NEPAD) includes many objectives that in part can be achieved by organic agriculture. These include eradication of extreme poverty and hunger, achieving universal education, promoting gender equality and empowering women, reducing child mortality, and improving maternal health. Food security and income generation can be enhanced through practicing organic agriculture, particularly in low input / rural production systems. Research shows that organic agriculture can produce enough on a per capita basis for the current world population (Scialabba, 2007). Evidence shows that organic farming can increase yield by up to 180% for subsistence systems and that organic agriculture is a plausible alternative farming system for smallholder farmers (Scialabba & Lindenlauf, 2010).

2.7 Challenges of adopting organic farming for smallholder farmers

Organic farming is being promoted and is gaining acceptance all over the world, however as with other agricultural production systems, there are a number of challenges facing organic agriculture. Organic farming and management is very knowledge intensive. One of the challenges facing organic agriculture, particularly smallholder farmers, is difficulty in disseminating information in remote and marginal rural areas (Lwayo, 2007). This limits the spread as well as sustainability of organic agriculture. Given that organic farming and management is a knowledge intensive farming system (Vaarst, 2010), organic farmers require technical information to enable them to improve their livelihoods; but farmers are unable to get such information because they are usually isolated (Institute of Natural Resources, 2008). The lack of knowledge about organic farming amongst influential role players in educational and research institutions and government bureaucracy poses a challenge on its own in that it leads

to a poor acknowledgement of its potential in poverty eradication and food security (INR, 2008).

The lack of information and technical skills amongst smallholder farmers is seen as the reason for the decrease in yield which farmers experience; the major reason for lower yield is pest and diseases. The reported initial decrease in production when converting from conventional farming to organic farming is another challenge experienced by smallholder farmers. Despite the challenges smallholder farmers are facing, more conversions have been noted amongst smallholder farmers compared to commercial farmers (Niemeyer & Lombard, 2003). In general, most smallholder farmers face fewer challenges associated with conversion because their farming methods are in many ways comparable to organic farming (Matelerkamp, 2015).

2.8 Food security situation in South Africa and KwaZulu-Natal

Considering the food security definition as indicated above, food security is multidimensional, consisting of food availability, accessibility, affordability, and utilization (Clover, 2003). Altman *et al.* (2009) stated that there is a mismatch between national food security in the South African context, and the actual experiences of households in obtaining food.

Altman *et al.* (2009) suggested that in order to understand household food security status in the country, investigation must be done on how the workings of the food distribution system and the resources of a household determine its access to food. The skewed distribution of income in the country, which is recognized as the most significant one, has a role in the food insecurity problem faced by households in South Africa (Mjonono *et al.*, 2009).

Rising food prices exacerbates the problem of household food insecurity (Altman *et al.*, 2009). Worsening the situation is the price of electricity which was set to rise by at least 100% between 2008 and 2011 (Altman *et al.*, 2009). The poor consumers are the most affected by the global food crisis; maize and wheat are the staple diet of the poor in South Africa. The rise of food prices presents a serious challenge for the urban and poor people because most of them are net buyers of food (Altman *et al.*, 2009). Food prices are expected to rise over the next decade, and with the rise of food prices, poor household are left with no option but to spend a greater proportion of their expenditure on food. Even though they spend more on food, their diet is expected to become less diverse, and of poor quality (Altman *et al.*, 2009). Income and asset status of a household often determines its food security status. Low-income households tend to

be more vulnerable to food price inflation, because a larger proportion of their expenditure goes to food.

Altman *et al.* (2009) state that there is little certainty on what is known about household food security in South Africa. As much as a general opinion has been that a large proportion of households in South Africa are food insecure, a precise baseline estimate of actual household food insecurity is lacking (Altman *et al.*, 2009). With regards to food security situation in KZN, the general household survey of 2016 indicated that 76% of household in KZN had adequate access to food, and 17,8% and 5,8% had inadequate and severe inadequate access to food, respectively (Stats SA, 2016).

2.9 Organic agriculture, environment and food security

The key concern in the academic discussion is the extent to which organic farming can enhance food security in the African region in terms of all the four dimensions of food security, namely, food availability, access, stability, and utilisation.

Sustainable soil management can contribute to healthy soils and improve food security, and also contribute to stable and sustainable use of the ecosystem (Gomiero, 2016). Soil health and water supply are valuable resources for human health, and agricultural activities can either improve or degrade the environment. Organic farming is a sustainable agricultural farming system that aims to make the best use of environmental goods and services while protecting the natural, social, and human capital (UNEP, 2008). Organic agriculture is one of the most feasible sustainable agricultural systems, which has multi-functionalities for promoting both sustainable food security and nutritional security (Boon & Semakula, 2010).

Vaarst (2010) reported that in developing countries (where a large number of people grow food on a small scale and a large proportion of food production occurs), conversion to organic farming results in yield increase, with an average for all plant foods giving a yield increase of 1.726 over conventionally produced food. Proper implementation of appropriate ecological methods of organic agriculture offers an opportunity to increase productivity and improve food security and livelihoods (Vaarst *et al.,* 2009). The positive contribution of organic farming to food security is widely recognised. One of the outcomes of the first African organic conference held in May 2009 in Kampala, Uganda, is that organic farming should not only be used as a sustainable food system to improve family food security, but also as a community development strategy.

2.10 Organic agricultural training offered in South African and KwaZulu-Natal for smallholder farmers

The Department of Agriculture, Forestry and Fisheries (2012) recognizes smallholder farmers as the drivers of many economies in Africa, and that they play a significant role in livelihoods creation amongst the rural poor. However, the production of this sector is low. Some of the challenges that impede the growth of smallholder farmers and their ability to effectively contribute to food security relative to the commercial farmers are lack of access to land, and poor physical and institutional infrastructure. Lack of human capital has also been identified to be a serious constraint for smallholder farmers, as lack of production knowledge leads to lower quality in production (DAFF, 2012).

Various NGOs offer organic farming training around South Africa. To mention a few, these include Sanveld Organics in Western Cape, Organic Farms and Whole Foods in KwaZulu-Natal, and Food and Trees for Africa in Johannesburg. At the University of KwaZulu-Natal, organic farming is featured in some modules to a small extent (Polepole, 2010). In mainstream education, organic farming is featured as a sustainable form of agriculture.

2.11 Organic agricultural training as an intervention for food security

According to DAFF (2012), investing in agricultural training is an important long-term strategy to fight food insecurity. Given that organic farming is increasingly viewed as a plausible production system for sustainable agriculture for smallholder farmers (Chitja, 2008), organic agriculture training should be strengthened, particularly amongst smallholder farmers. Pophiwa (2012) supports this notion and states there is a need to build capacity in production and processing of organic products by training farmers to gain skills in soil management, pest control and post-harvest management in a way that does not contravene the practices of organic farming (Pophiwa, 2012). Good soil management needs to be adaptive and is better achieved through education and understanding than with simple recommendations (Magdof & Van Es, 2000).

Agricultural training can play a significant role in achieving household food security, which is currently one of the challenges facing the Southern African countries. Learning takes place in many forms; the overall aim of teaching and learning is that the learner must take information and be able to apply it in a different situation. Corte (2003), defines transfer of knowledge as a productive use of acquired knowledge, skills and motivations in new contexts and tasks, and agricultural training aims to achieve this. An extension officer's job includes disseminating

information on improved farming methods/technology to farmers (Erbaugh *et al.*, 2010). There is no single definition of extension – the term originally referred to adult education programs offered by Oxford and Cambridge universities (Swanson & Rajalahti, 2010). The aim of adult education was to extend the work of the universities to areas outside the university. When the United Kingdom transferred the duty of agricultural services to the Ministry of Agriculture during the early twentieth century, the term 'agricultural advisors' was formally adopted (Swanson & Rajalahti, 2010).

Dissemination of improved agricultural technology funded by government dates back to the middle of the nineteenth century, in Ireland and the United Kingdom. Between the years 1845 and 1851 there was a potato scarcity in Ireland, and agricultural advisors assisted potato farmers by introducing new crops as a means to diversify food (Swanson & Rajalahti, 2010). In the second half of the nineteenth century, the method of using agricultural advisors started being practiced in various places such as European and North American Swanson & Rajalahti, 2010). Extension programs were introduced in Sub-Saharan Africa after the World Bank showed support for such programs; as a result, in 1981 extension was prevalent in Kenya. Unlike the developed world where NGOs and private companies are fully involved in supporting extension service delivery, government and parastatals remain the main supporter (provider) of extension services. In most places of Sub-Saharan Africa (extension officers or agricultural advisors have a significant duty of disseminating necessary knowledge and skills to farmers to assist them in making effective decisions for farm management) (Furo *et al.*, 2012).

Abdu-Raheem and Worth (2011) recognize lack of economic power to purchase food as one of the many factors that contribute to food insecurity. Lack of economic power is mostly as a result of involuntary unemployment. Abdu Raheem and Worth state that innovation and transfer of technology has a significant role in food security, particularly in South Africa, where the revival of agriculture is seen as a potential solution to the problem of unemployment in the country (Klasen & Woolard, 2008). An adoption of a new technology by farmers translates into increased demand for planting, weeding, and harvesting; as a result, farm jobs are created (Abdu-Raheem and Worth, 2011). In this way, agricultural extension directly contributes to food security. The indirect contribution of agricultural extension happens when new technology stimulates relationships between on farm and off farm income sources (Reardon *et al.*, 2001). Growth in agriculture attracts off farm investment through supply linkages, by supplying inputs to the agricultural sector.

Adoption of Integrated Pest Management technology (IPM) by farmers in Uganda is a good example of the role of agricultural extension in disseminating new technology to farmers, thus improving the food security status of the farmers. Farmer Field School (FFS) is one of the approaches to agricultural extension, and has been used in eastern Uganda to promote IPM for smallholder farmers growing groundnuts, cowpeas, and sorghum (Erbaugh *et al.*, 2010). The study compared adoption of IPM principles between two groups, participants and non-participants in FFS; the result of the adoption of IPM was high and low respectively (Erbaugh, 2010). The study concluded that participation in FFS is a prerequisite for the adoption of IPM strategies.

A similar study was conducted in Lesotho. The country is considered as one of the least developed countries and a significant proportion of the population derives it livelihood from agriculture (Khoalenyane & Morahanye, 2010). Decline in agricultural production due to land degradation and soil compaction led to the Minister of Agriculture and Food Security (MAFS) together with the Food and Agriculture Organization (FAO) to introduce a new technology called Conservation Agriculture (CA) to improve agricultural production **(**Khoalenyane & Morahanye, 2010). Conservation agriculture was considered a solution because it encourages farmers to produce in a more sustainable and environmentally friendly way, by adopting the concepts of Integrated Pest Management and Integrated Weed Management (Khoalenyane & Morahanye, 2010). Despite the strong climatic variation, farmers who adopted CA principles have noted higher agricultural yields (Khoalenyane & Morahanye, 2010). Farmers encountered a number of challenges as they adhered to CA principles. The challenges were mostly a result of poor understanding by farmers (Khoalenyane & Morahanye, 2010). In order to fully exploit the potential of organic farming, there is a need for farmers to get training in some basic practices of Organic Farming (OF), such as pest control and maintaining soil fertility using organic procedures (Pophiwa, 2012). In Lesotho, extension workers played a significant role in disseminating information and training farmers on conservation agriculture.

Despite the significance of extension service as an agricultural knowledge and information system, extension services have received enormous blame for a number of reasons, such as poor service delivery by extension officers. Low staff member numbers is one of the reasons for this. Staff quality is often low in developing countries; 40% of extension workers have secondary education, and 33% have certificates or intermediate diplomas (Furo *et al.*, 2012). These are some of the reasons why extension services have been labelled as being unproductive and irrelevant to the needs of the farmers. Agricultural Extension service is not any better in

South Africa; a number of weaknesses have been identified in the system, and this has led to the establishment of the Extension Recovery Plan (ERP) (DAFF, 2012). ERP aims to revitalize the state of agricultural extension and advisory services in the country (DAFF, 2012). For effective support and guidance, the World Bank recommended a ratio of 1:100 for extension officers to farmers (Furo *et al*., 2012). However, the ratio of an extension officer to the farmer varies from 1:1 800 to 1:3 000 in developing countries. In developed countries of Europe, North America and Asia, the ratio is 1:400 ((Furo *et al*., 2012).

2.12 Dovehouse Organics farmer training

Dovehouse Organics (DVO) is in Howick – it forms part of the KZN Midlands Meander tourist and craft route. The farm, which was established in the year 2000 by Paul and Shereen Duncan, is roughly 50 kilometres from Pietermaritzburg Central. Dovehouse Organics runs two-week agro-ecological farming courses which are accredited by the Skills Education Training Authorities (SETA). They also offer training on permaculture/organic training to the general public and organisations. The main focus of DVO is to educate people on environmentally sensitive and alternative ways of living, eating and recycling. The terms organic farming and permaculture are used interchangeably at DVO.

The DVO guidelines define permaculture as *conscious design and maintenance of an agriculturally productive ecosystem, which has the diversity, stability, and strength of natural ecosystems. It is a harmonious combination of land and people, supplying their food, energy, shelter and other material and non-material needs in a sustainable way*. Without sustainable agriculture, there is no possibility of a sustainable human culture. This definition concisely captures all the activities which take place during the training at DVO. It is important to note that experiential learning is used at DVO during the training.

Understanding of farms as ecosystems is one of the main practices being stressed at DVO. This is done through zone planning whereby the entire area is designed and the location of each zone determined by the number of times it will be used or visited. For example, zone 1 up to 5 can follow this sequence: house/business, vegetable garden, staple food system, large scale semi-managed system such as woodlots, and unmanaged wild system of indigenous species. Once all elements are zoned accordingly, participants are then taken through a slope analysis task. Slope mapping is essential in that it gives an indication of all the incoming energies and where they come from – in this way, a farm should work in the direction of a force of gravity. The following practices of organic farming are also the main topics during training.

2.12.1 Bed preparation

Four main types of bed systems are presented: pit beds, trench beds, lasagne or sheet mulched and standard beds. The quality of the soil environment determines which type of bed is appropriate; for instance, poor or rocky soil will require digging of trenches, while good fertile soil may need a standard bed (Figure 2.1).

Figure 2.1: Bed preparation training at Dovehouse Organics with trainees
Source: Dovehouse Organics.

2.12.2 Water catchment and storage

Catching water on site from the rain and storing it for later use is encouraged. The reason for this is because water from the river or dams might be polluted by petrochemicals or biologic pollutants.

2.12.3 Companion planting

Plants find security and support from each other, amongst other things, through nutrient cycling. While some plants are good at nitrogen fixing, some plants transfer minerals from the bottom to subsoil. Crops such as onions are good at repelling or attracting some insects.

2.12.4 Compost making

Compost making is one of the most interesting activities that take places during training. Liquid manure and composting are done using the same material; liquid manure takes from two weeks to two months to prepare, while compost can take at least six weeks. Compost provides nutrients and microorganisms for the top soil to increase nutrient availability to plants. Earthworms play an important part in compost making. Each earthworm can produce 30 litres of soil a year. Worm casts are compost of the highest grade, containing minerals and organic matter in soluble form. Earthworms are attracted by no tillage and prefer soil with a pH of seven.

2.12.5 Pests, diseases and weed management

Pests, diseases and weeds refer to organisms or species which cause damage to growing and stored crops. While there are many ways to manage pests, diseases and weeds, DVO prioritised an approach which minimises crop damage by strategically placing other pests and weeds to serve as predators and deterrents. Crop rotation is one of the methods which are used as pest, disease and weed control. Planting crops when the pests are dormant or relatively inactive can assist.

CHAPTER THREE: CHARACTERISTICS OF THE RESEARCH FIELD AND RESEARCH METHODOLOGY

3.1 The research field

This study was conducted at Richmond, under the Richmond Local Municipality. The municipality is one of the seven administrative areas of UMgungundlovu District Municipality (Figure 2) and falls on the southern part of it, approximately 38 kilometres south of Pietermaritzburg, the capital city of KwaZulu-Natal province (Figure3.1). It lies roughly 80km North-west of Durban. The area, which is situated on the banks of the upper Illovo River in the midlands of KwaZulu-Natal, is mostly famous for its significant tourist attractions such as Blarney cottage, Bealieu Dam, and Herbert and Cecil Rhodes' cotton farm (Duma, 2012).

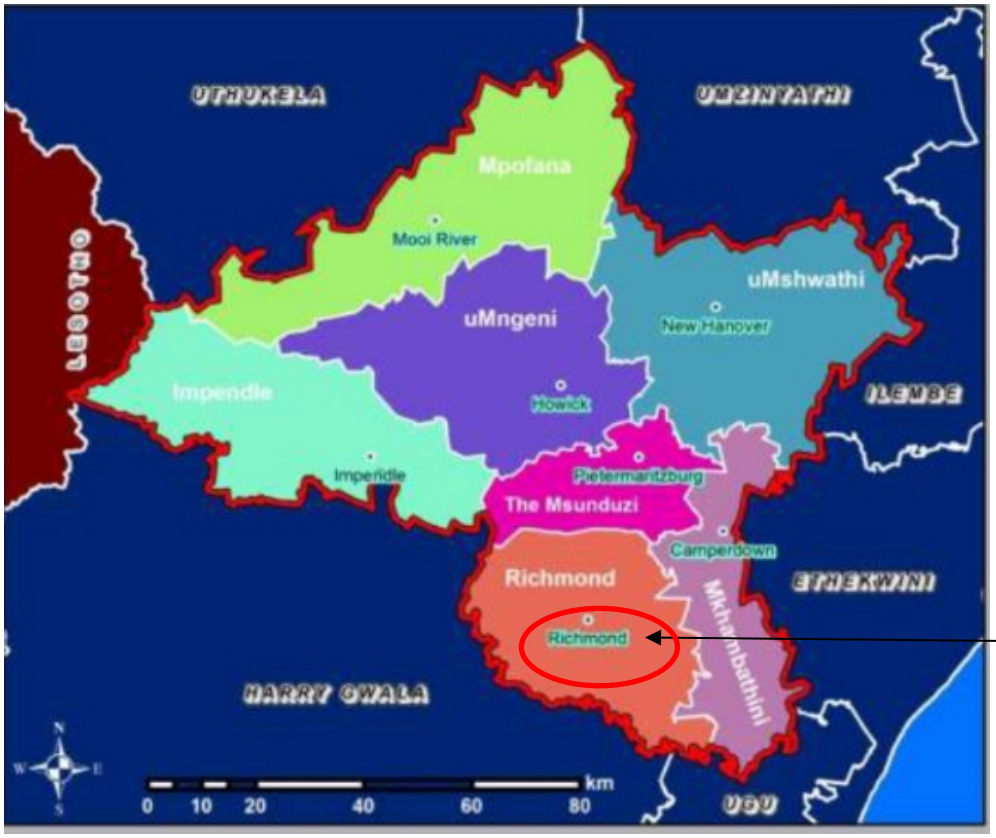

Figure 3.1: Map showing the location of the study area at Richmond Municipality (UMgungundlovu IDP, 2016/2017).

The majority of the population resides in areas which are predominantly rural and characterized by low levels of basic services and facilities, and substantial unemployment. Richmond Local Municipality, which is the fourth smallest local municipality under UMgungundlovu District

Municipality, has an approximate population of 65 793 and 16 446 households with an annual population growth of 0.40%. In terms of education, 16.10% of the total population have not been to school, 22% have matriculated (grade 12) while only 4.2% have higher education. Females head almost 50% of the households in Richmond (Stats SA, 2017b).

The unemployment rate in Richmond is 26%, with agriculture being the backbone of the economy in the area. Agriculture does not only use a large proportion of the municipal land area, but it is also a source of employment for many people in the area. The majority of large scale agriculture activities are owned by commercial farmers and corporate organisations. Subsistence farming and limited production occurs in peri-urban and rural settlements (Duma, 2012). The main economic sectors in the areas can be broken down as follows: Agriculture (45–50%); community services (25–30%); trade (5–10%); and finance (5–10%) (Stats SA, 2016).

According to the Skills Development Framework (SDF) Review (2009) report, most of the residents at Richmond work in factories and industries situated in both Richmond and Pietermaritzburg. The report notes that the number of low-income earners in the Richmond area is very high. The majority of the population depends on social grants and pensions that are received from the government. The escalating rate of unemployment in the area is also exacerbated by the high rate of school drop-outs.

3.2 Research methodology

This chapter presents the tools and process of collecting and analyzing data while explaining the process of entering the field, collecting data and analyzing it. The objective was to determine if adoption of organic farming practices contributed to household food security.

The study was conducted at Richmond, KwaZulu-Natal Province, with farmers who attended organic farming training and those that never attended training at DVO. The survey was conducted in order to determine if participation in organic farming training has an influence on food availability and accessibility for farmers' households. Richmond was chosen as a study population because there was a large enough group of trained farmers to make this location a viable study population.

In 2014, I was doing an in-service learning experience for my PGDip Food Security at Dovehouse, Howick, KZN (Described in 2.12). I stayed longer to participate in facilitation and training. With this contact, I was able to go back to Dovehouse to request permission to investigate the impact of this learning for people who had been trained. A key informant in this field work was a Richmond based organic farmer trained by Dovehouse who I had met during my own training. Hereafter, he is referred to as the Key Informant. He was largely influential in helping me enter the community legitimately. As an insider, he assisted me in identifying farmers who attended training and were still practicing organic farming and those that did not attend Dovehouse training. He also introduced me to his employee (referred to as the research assistant) who acted as a guide in the community for me and assisted with protocols for entering homes, and helped clarify ambiguity, nuances and conversation around the questionnaires and research.

3.2.1 Sample selection: Population and respondents

Participants in the study were drawn from a population of farming community members at the Richmond. All homestead black farmers in the Richmond area qualified to be part of the study, but due to time and cost factors (Bhattcharyya, 2006), only 100 farmers were selected and requested to participate in the survey. Out of 100 farmers interviewed, 53 had undergone DVO training while 47 never attended the training.

As stated by Teddlie and Yu (2007), purposive sampling involves selecting certain units or cases for a particular purpose. In this study, a purposeful approach to inviting volunteers was used. Farmers were selected based on accessibility, attendance at DVO and non-attendance, and willingness of farmers to participate in the study.

With regard to farmers who attended the DVO training, the key informant assisted the researcher in contacting farmers and requesting participation. Fifty-three volunteers were included. To select the non-trained participants, we (researcher and research assistant) walked through the community, beginning from the key informant's farm, and as we came across a house that he knew was not practicing organics, we stopped and asked whether they would be willing to be part of the study. We made appointments with those who were willing until we reached 47, which was the amount to make up a respondent group of 100.

3.2.2 Gaining entry to the community

In August 2014, a preliminary meeting was held at Richmond to provide the key informant with all substantial information about the researcher's intention to conduct a study in the area on "How does adoption of the organic farming practices contribute to household food security

levels of the farming households?" This meeting was also to plan for visits to the community. Present at this meeting was the researcher from UKZN, DVO personnel who are based at Richmond, and three smallholder organic farmers from the Richmond area.

The meeting assisted, amongst other things, in understanding the norms and values of the community, which needed to be observed when conducting the survey. At the meeting, the researcher from UKZN was advised to work with a local representative (research assistant), known in the community to facilitate entry to the farmers and community at large and also gain trust of the survey participants. Dovehouse Organics was also included because of its long-term working relationship with the Richmond community. That facilitated easy community access and allowed the researcher to work in the area where DVO has a long-term development programme.

3.2.3 Piloting and or pretesting the tool(s)

During the meeting, the researcher and the key informant, together with the farmers, reviewed the questionnaire. During the review of the questionnaire, pretesting of the survey instruments was done. The purpose of the review of the questionnaire was to improve the survey instruments and inform the researcher of any questions that sounded either unclear or offensive to the respondents. Coates *et al.* (2007) indicated that in order to adapt phrases, definitions and examples to the local context and to ensure that questions are understood appropriately, the questionnaire should initially be revised with a group of key informants. The researcher and research assistant took note of such comments and the questionnaire was adjusted while retaining the original meaning of the questions. Reviewing the questionnaire was useful in that it helped the researcher(s) to familiarise themselves with the questionnaire and also to know the approximate time required to complete an interview. Before the respondents were asked to participate in the review, they were informed that participation was voluntary and that they were permitted to withdraw from the study at any time should they wish to do so. Respondents were also informed that the information they provide would be kept confidential, and used solely for educational purposes. After incorporating all the inputs from the meeting into the questionnaire, the survey data collection process began in the same month.

3.2.4 Research design

A survey of 100 farming households was conducted to determine the influence of adoption of organic farming training practices on household food security of the farming households. Data collection was carried out, in August 2014, through the use of a structured survey questionnaire (Appendix A). While the questionnaire was written in English, the researcher and research assistant conducted the interviews in IsiZulu, which is a local language in Richmond. Using a local language ensured that questions were understood by the respondents. Farmers' responses to questions were recorded in the questionnaire by the researcher and research assistant.

The survey data was largely quantitative, but a qualitative approach was adopted to get information on open-ended questions (see Appendix B for example). The use of a quantitative method provides a picture of the influence of the adoption of organic farming training practices on farmers' household food security situation. Flick (2009) and Williams and Vogt (2011) argue that neither qualitative nor quantitative analysis provides a complete picture on its own. Quantitative analysis enables observation of numbers, while qualitative analysis goes beyond figures, clarifying underlying meanings in the quantitative data (Aloe & Becker, 2011; Macdonald, 2008). Roshan (2009) stated that both qualitative and quantitative data methods are important for comparative studies. Where both methods are used, the two methods complement each other to deepen the analysis (Williams & Vogt, 2011). The challenge of qualitative data analysis lies in making sense of high volumes of data (Macdonald, 2008). This involves reducing the volume of raw information, identifying significant patterns and structuring a framework for communicating the essence of the findings (Macdonald, 2008). Qualitative data analysis has no set rules for analysis (Patton, 2002). In such analyses, researchers need to establish innovative analytical frameworks for consistent context-specific analysis. In this study, qualitative data was analysed through identifying themes, and this data gave an in-depth understanding with respect to the various reasons for adopting organic farming practices and interpreting the farmers' understanding of organic farming as a production system (see section 4.2.3).

The questionnaire used in this study was divided into two sections. Section one collected data related to household demographics while section two asked questions about farmers' understanding of organic farming and soil management, including general information on farming practices. Section two also included food access (nine questions of the Household Food Insecurity Access Scale) and food availability questions. The last three questions of the Household Food Insecurity Access Scale (HFIAS) (Q7, Q8 and Q9) along with the follow-up-

occurrence questions constituted the Household Hunger Scale (HHS) (Ballard *et al.*, 2011) which was used as a food security indicator in this study. A 4-week (30 day) recall period was used for collecting HHS data. Both trained and non-trained farmers received the same questionnaire, so as to follow a standard process and avoid bias (Creswell, 2008). Given that a common questionnaire was used to collect data from both trained and non-trained farmers, respondents answered questions that were relevant to their situation.

The researcher and the research assistant accompanied by the key informant visited farmers at their households and requested them to participate in the study. Appointments were made telephonically for farmers who were not at home during the initial visit, and those farmers were later visited at the agreed time. Face-to-face interviews were chosen because it allowed the researcher to probe, and it also covered potential issues relating to literacy. The University of KwaZulu-Natal gave the ethical clearance for this study in August 2014, with ethical number MSS/0973/Ndlovu (Appendix C).

3.2.4 Data analysis and treatment

Data from the completed questionnaires was coded and entered into the Statistical Package for Social Sciences (SPSS) program (version 22). Descriptive statistics were used to provide the general characteristics of the respondents' households, types of crops grown, organic farming practices trained on and adopted, food security status of the sampled households, and land tenure system used by households. Correlation coefficients and cross tabulations were used to show relationships between adoption of organic farming practices and food security status. The HHS was used to assess the food security status among the selected farming households. Appendix D shows the detailed calculation of HHS.

3.2.4.1 Variables and food security relationship estimation

A Chi-Square was used to assess the relationship of food security and a number of variables including organic farming practices, household head characteristics and household food security status. HHS category was used as an independent variable and as a proxy for household food security status. Households, which experience either moderate or severe hunger, were classified as food insecure and assigned a score of 1 whereas households which experience little to no hunger were regarded as food secure and were assigned a score of 0. The Chi-Square tested if there is a relationship between the household food security status and a number of variables indicated in table 3.1 below.

Table 3.1: A priori expectations for the relationship between household food security and other variables

Variable name	Definition and measurement	Expected relationship[1]*
Attended training	Farmer attended Dovehouse Organics training (Yes =1, No =0)	-
Age of a household	Age of household head in years	-
Education	Number of years of schooling	-
Gender	Gender of household head (Male=1, Female=0)	-
Adoption of technology	Farmer adopted the organic farming technology or even individual organic farming practices	-
Start practice year	Year in which a famer started practicing organic farming	-
Tenure system	The type of tenure system under which the household plant vegetables or crops	-
Household income	Household income source	-
Household size	Household size in numbers	+
Occupation	Occupation: The main occupation for the respondent	-
Practice organic farming	Practice of organic farming by the respondent (Yes =1, No = 0)	-
Farm size	Size of the land which the HH use for production	-
Skills of trainee	Competency of the trainee	-

3.2.5 Validity and reliability

This case study used a interview process for obtaining information that became data. The process of piloting the questionnaire provided opportunity to improve the tool, to assess whether the responses were usable and appropriate as data for answering the research objectives. Furthermore, the researcher spoke the same language as the respondents adding confidence in both interpretation of nuance as well as accuracy in recording responses. Obviously, as a case study, the sample is small, the information focussing on detail rather than quantity and cannot be generalised. The trail of evidence provided in the appendices allows for replication of the process. One does not expect to have the same results in another research project, but the methodology will produce contextually relevant knowledge around the contribution of organic practices to household food security in rural villages.

[1] Where relationship between the independent and the dependent variable are either positive or negative. See Chi-square (X^2) values in Table 5.8 and 5.9.

CHAPTER FOUR: RESULTS AND DISCUSSION

The study was set to investigate if participation in the DVO farming training influenced the food security status of trained farmers, with a particular focus on food availability and accessibility. A Household Hunger Scale (HHS) (Ballard *et al.*, 2011) was used to compare the food security situation of farmers who attended training at DVO and those who did not attend training at DVO. The results of the study are presented in this chapter in relation to the four sub-problems:

- What are the characteristics of the sampled farming households?
- What are the food production practices, land tenure system, and organic farming knowledge at homestead level?
- What organic farming practices were farmers trained on and have they adopted?
- Does adoption of organic farming practices improve household food security status?

4.1 Characteristics of sampled households

This section presents the general household characteristics of farming households. It provides information on household size, income, expenditure, education level and gender of the household head. In addition, the information is disaggregated by trained and non-trained where appropriate.

4.1.1 Farmer's age, education level and size of sampled farming households

Household size is an indicator of the maximum number of people the farmer is feeding at a household level. In a range of one to 13 possible household members, the average household size for the Richmond farmers was seven members (Table 4.1). The farmers who were trained were feeding larger families, compared to the farmers who were not trained. The minimum and maximum age of the household heads were 20 and 75 respectively, with a mean of 42 years. Table 4.1 also demonstrates that the average age for DVO trained participants was 41 compared to 44 years for the non-trained participants. The level of education of the farmers ranged from no schooling to 13 years of completed school with post-school diplomas or degrees. All respondents in the two groups had similar years of schooling; it would not seem that level of education was different between the two groups.

Table 4.1: Description of household characteristics of surveyed farmers

Farmer characteristics N=100	**Description of Farmer characteristics**				**Trained Farmers n=53**	**Non-trained Farmers n=47**
	Minimum	**Maximum**	**Mean**	**SD**	**Mean**	
Age of respondent	20	75	42.36	15.882	41	44
Number of years of schooling	1	13	5.7	2.541	6	6
Household size	1	13	6.93	4.658	8	5

Source: Survey output 2014 Note: SD=Standard deviation

4.1.2 Gender and occupation of farming households

Of the 100 farmers investigated in the study, 53 were farmers that attended the training while 47 never attended the DVO training. Regardless of participation in the training, the majority (70%) of the farmers were female, with only 30% being male (Table 4.2). This is in line with the literature indicating that women are the main participants in homestead farming in South Africa (Hart & Aliber, 2012).

Table 4.2: Gender of farming households (N=100)

Farmer characteristics N=100	Dovehouse Organics training participation				Total	
	Participants		Non-participants			
	count	%	Count	%	Count	%
Male	19	63	11	37	30	30
Female	34	49	36	51	70	70

About 29% of the surveyed households reported petty/business/self-employment and entitlements as sources of income. Eleven (69%) farmers who had attended training at DVO had formal employment, compared to five (24%) households who were non-participants in the DVO training who had formal employment. Occupation refers to a job or profession as a means of earning a living. The results in Table 4.3 also showed that 13 (87%) of the DVO trained

participants had farming as their occupation compared to two households (13%) from those that did not attend the training. This means that trained farmers considered farming as their means of earning a living.

Table 4.3: Occupation of farmers (N=100)

Farmer characteristics N=100 **Occupation of farmer**	Dovehouse Organics training participation				Total	
	Participants		Non-participants			
	Frequency	%	Frequency	%	Frequency	%
Farming	13	87	2	13	15	15.8
Formal employment	11	69	5	31	16	16.8
Pensioner (grants)	5	24	16	76	5	22.1
Petty trading/business/self-employment	15	52	14	48	15	30.5
Remittances	1	50	1	50	1	2.1
Student	0	0	0	0	0	4.2
Casual labourer	1	25	3	75	1	8.4
Other	15	52	14	48	15	15.8

Source: Survey output, 2014.

4.1.3 Income and expenditure of farming households

Fifty-one percent of the households received their income from social grants, followed by 18% and 17% of the households who derived their income from petty trading/business/self-employment and formal employment, respectively. Only about 8% of the households received income from sales of produce (Table 4.4). Regarding household food expenditure, 55% of households spent an amount between R416 and R833 per month. The average food basket for a black South African household of four members is R2 560 per month, indicating that each

person spends R640 on food per month[2] (PACSA, 2017). A family of six might expect to spend R3 840 on basic food per month. The Richmond households do not reflect a general context of South African families, as a family of six spends a maximum of R833 per month on food, approximately R139 per person. Results indicates that households spend less money on food then the national average.

Table 4.4: Income and expenditure of farming households

Farmer characteristics	Dovehouse Organics training participation				Totals for Respondent Group N=100	
	Trained n=53		Non-trained n=47			
Sources of income	Frequency	%	Frequency	%	Frequency	%
Old age pension or grant	24	48	26	52	24	48
Employment	12	71	5	29	12	71
Sale of produce	7	88	1	13	7	88
Other	0	0	0	0	0	0
Petty trading	7	39	11	61	7	39
None	3	60	2	40	3	60
Annual Expenditure on food: ZAR	Frequency	%	Frequency	%	Frequency	%
5 000–10 000	15	27	40	73	15	27
11 000–16 000	20	95	1	5	20	95
17 000–22 000	15	75	5	25	15	75
23 000–28 000	2	100	0	0	2	100
29 000–34 000	0	0	1	100	0	0
35 000–40 000	1	100	0	0	1	100

Source: Survey output, 2014

4.2 Food production at homestead level and land ownership

This subsection presents results regarding types of crops produced by households, land type used for the production of crops, and farmers' knowledge of organic farming.

[2] Pietermaritzburg Agency for Community Social Action [PACSA] (2017) has, for a number of years, monitored food basket costs for families in KZN.

4.2.1 Types of crops grown

There are a number of crops grown by the farming households in Richmond. The types of crops reported as grown in the last six months included: cabbage, beans, tomatoes, sweet potatoes, potatoes, amadumbe[3], green beans, beetroot, broccoli, carrot, cauliflower, lettuce, garlic, ginger, onions, peppers, pumpkin, spinach, sweetcorn, leeks, maize, brinjal, imifino[4], peas, avocados, parsley, kale, and chillies. Growing diverse crops is one of the rational and cost effective methods farmers can use to build resilience into the agricultural systems. This method is mostly important for organic farmers because use of pesticides is discouraged. Crop diversification can suppress disease outbreaks and dampen pathogen transmission (Lin, 2011). Diverse crop production, especially when produced all year round, would contribute to the nutritional adequacy of food intake. Figure 4.1 shows the percentage of households involved in growing different types of crops.

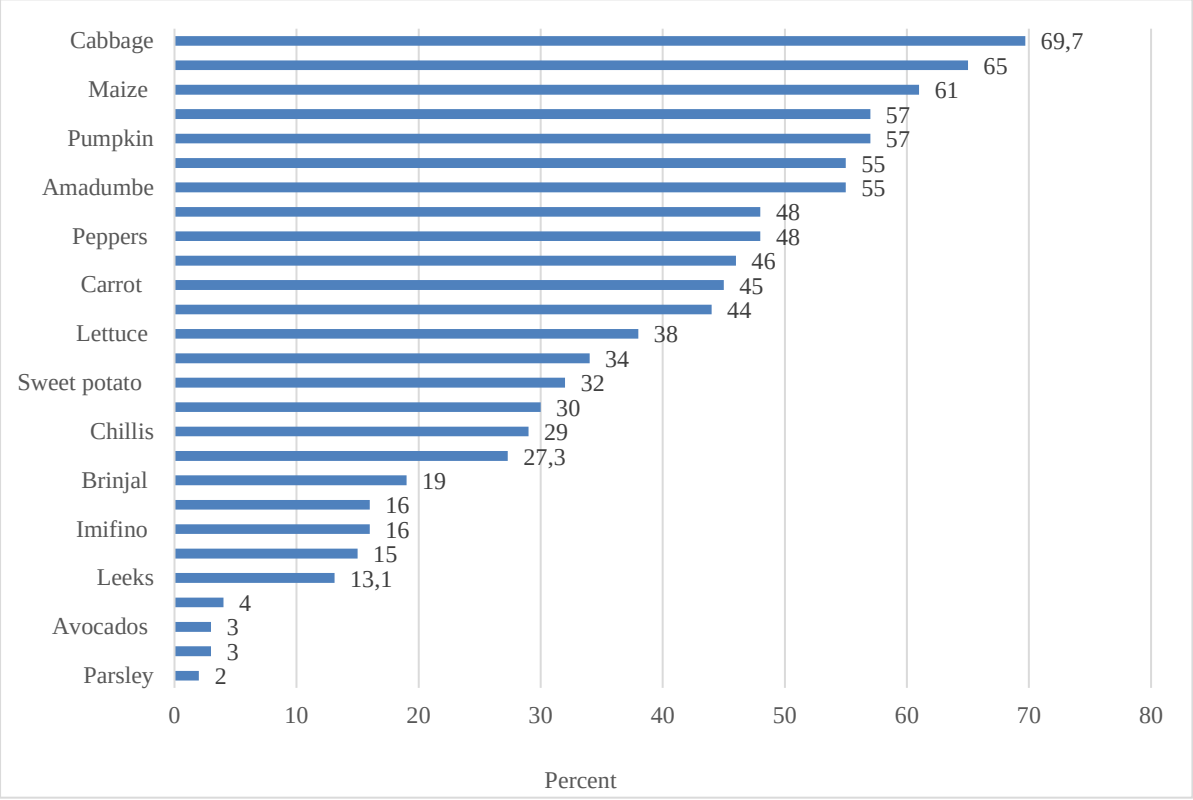

Figure 4.1: Percentage of households producing each crop type

Source: Survey output, 2014

[3]Amadumbe is the isiZulu word for taro root (*colocasiaesculenta*).

[4] Imifino refers to the leaves collected from wild and cultivated green plants. Imfino may be pumpkin leaves, wild herbs, i.e., amaranthus thunbergii, Wild Mustard, water navel (Modi, 2003).

Of the 27 types of crops in the study area, cabbage was the most popular crop as it was grown by about 70% of the households. This was followed by spinach and maize which were respectively grown by 65% and 61% of the surveyed households (Figure 5.1). Maize is a staple crop for most South Africans (Southern African Development Committee, [SADC], 2016). More than half of the households also indicated that they produced beans, pumpkin, beetroot and amadumbe. While more that 40% of the households grew crops such as potatoes, peppers, tomatoes, carrot and onions, very few households grew crops like parsley, avocados and peas (Figure 4.1).

Sweet potatoes were produced by 32% of the farmers; sweet potatoes are a good source of carbohydrate and of vitamin A. The vegetable is promoted for alleviating vitamin A deficiency (Laurie, 2017). The nutritional benefit of sweet potatoes may contribute to quality of food and improved nutritional status. The crops that were adopted the least by farmers are leeks and kale, despite the fact that DVO provides farmers with seeds of these crops. It would appear that despite the training and exposure to crops, most farmers chose to grow crops that are common in the area.

4.2.2 Land tenure system

Regarding the land used by the farmers to produce food, it was reported that 48% of the farmers were using purchased (own) land.[5] This was followed by 22% and 18% of the farmers who practiced crop production on inherited and tribal land, respectively. Approximately 7% of the households used borrowed land whilst 5% of the households were reported to have leased their crop production land. Tribal, inherited and purchased land provides a reasonable expectation of tenure security. This suggests that the investment in organic land management by these farmers will provide benefits for this generation and the next. Figure 4.2 shows households access to land for farming.

[5] An assumption which we did not think to check at the time of data collection was whether 'purchased' land meant that there was a title deed.

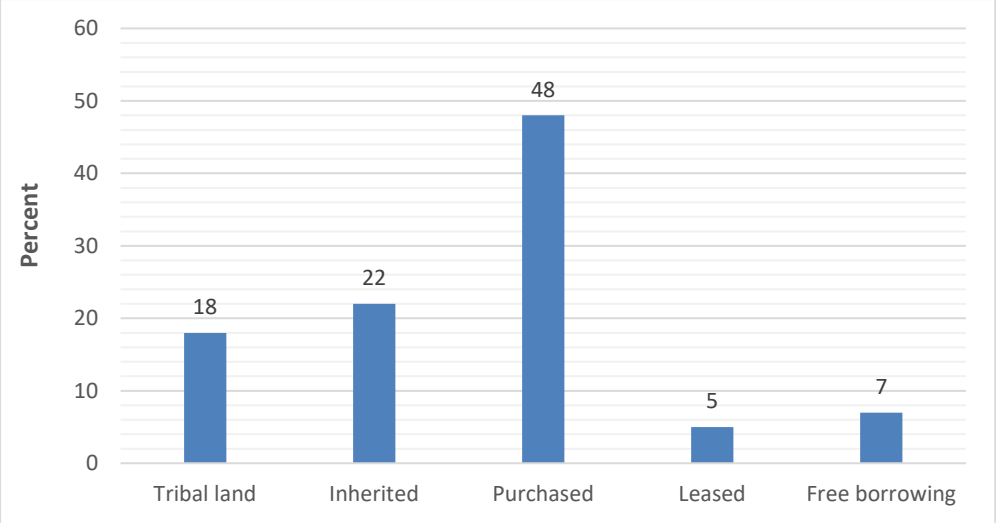

Figure 4.2: Household access to land for farming

Source: Survey output, 2014

4.2.3 Farmers' understanding of organic farming

This section presents an overview of the farmers' understanding of organic farming. The question regarding farmers' understanding of organic farming was asked to both trained and non-trained farmers. Many farmers associated organic farming with no use of agricultural chemicals and also referred to organic farming as an ancient method of farming. The responses obtained from farmers are grouped into five categories (Table 4.5). Refer to Appendix B.

Table 4.5: Farmers' general understanding of organic farming at Richmond (Colours represent thematic coding in Appendix B)

Common understanding of organic farming by farmers at Richmond
Farming without using agricultural chemicals
An ancient[6] method of farming
Farming which minimally disturbs the soil
Farming that protects the environment
Utilizing available resources

Most of the farmers who did not attend training at DVO were not able to define what organic farming was. This finding is in line with the literature, as Pophiwa (2012) reported that

[6] I use the term 'ancient' because in isiZulu we say '*indlela endala yokulima'*, meaning, 'we have seen our parents doing it'.

traditional farmers might not be aware that they are practising organic farming and this happens by default since their farming methods are largely comparable to organic farming methods. When the researcher asked the question regarding whether chemicals were used or not, farmers indicated that chemicals were indeed not used. However, farmers mentioned that they have information sharing sessions where they discuss issues, mainly about pest and disease control without using agricultural chemicals. Farmers were generally keen to know more about organic farming; the main concern they had was with regards to pest and disease control.

With regard to agro-chemicals, farmers generally understood that agricultural chemicals are not safe for the environment and humans; one woman even went further to explain that she thinks her knee problem could be as a result of chemicals she uses in the garden. This is evident in that most farmers referred to organic farming as a farming method which protects the environment; this is in agreement with a general understanding of organic farming. While a large number of farmers had indicated that they adopted organic farming to improve yield, only one farmer associated organic farming with producing enough food cost effectively. This is in agreement with a popular interpretation of organic farming which associates organic farming with low external input, and use of available resources.

Generally, there were higher numbers of trained farmers or farming households involved in producing crops compared to non-trained farmers (Table 4.6). About 71% of the trained farmers produced cabbage compared to 29% that were non-trained. Of the 53 trained farmers, 34 were reported to be producing maize, while for the non-trained farmers, 27 of 47 farmers produced maize. It is only with respect to producing avocados that more non-trained farmers (67%) were observed compared to trained farmers (33%) (Table 4.6). Results also showed that parsley was only grown by farmers who had attended training, indicating the important role that can be played by training or access to information. It would appear that after being exposed to the variety of what was possible; farmers would adopt what they find relevant to their lifestyle.

Table 4.6: Comparisons of trained and non-trained farmers based on crops produced

Crop grown	Attended Dovehouse Organics training					Crop grown	Attended Dovehouse Organics training			
	Attended		Not attended				Attended		Not attended	
	Frequency	%	Frequency	%			Frequency	%	Frequency	%
Cabbage	49	71	20	29		Onions	33	75	11	25
Beans	36	63	21	37		Peppers	39	79	10	21
Tomatoes	35	76	11	24		Pumpkin	37	65	20	35
Sweet potato	21	66	11	34		Spinach	43	66	22	34
Potatoes	31	65	17	35		Sweetcorn	10	63	6	38
Amadumbe	35	64	20	36		Leeks	6	46	7	54
Green beans	27	79	7	21		Maize	34	56	27	44
Beetroot	39	71	16	29		Brinjal	14	74	5	26
Broccoli	19	70	8	30		Imifino	10	63	6	38
Carrot	33	73	12	27		Peas	3	75	1	25
Cauliflower	25	83	5	17		Avocados	1	33	2	67
Lettuce	30	79	8	21		Parsley	2	100	0	0
Garlic and ginger	9	60	6	40		Kale	2	67	1	33
						Chillies	23	79	6	21

4.3 Organic farming practices and adoption by farmers

This section is set to examine the levels of farmers' adoption of organic farming practices. In general, organic farmers were trained on or exposed to various practices of organic farming, including: bed preparation, compost making, water/rain harvesting, crop rotations, companion planting, mulching, worm management, pest and disease control, pruning, harvesting, liquid manure and plant propagation. Figure 4.3 shows the percentage of farmers that indicated they received training on different areas.

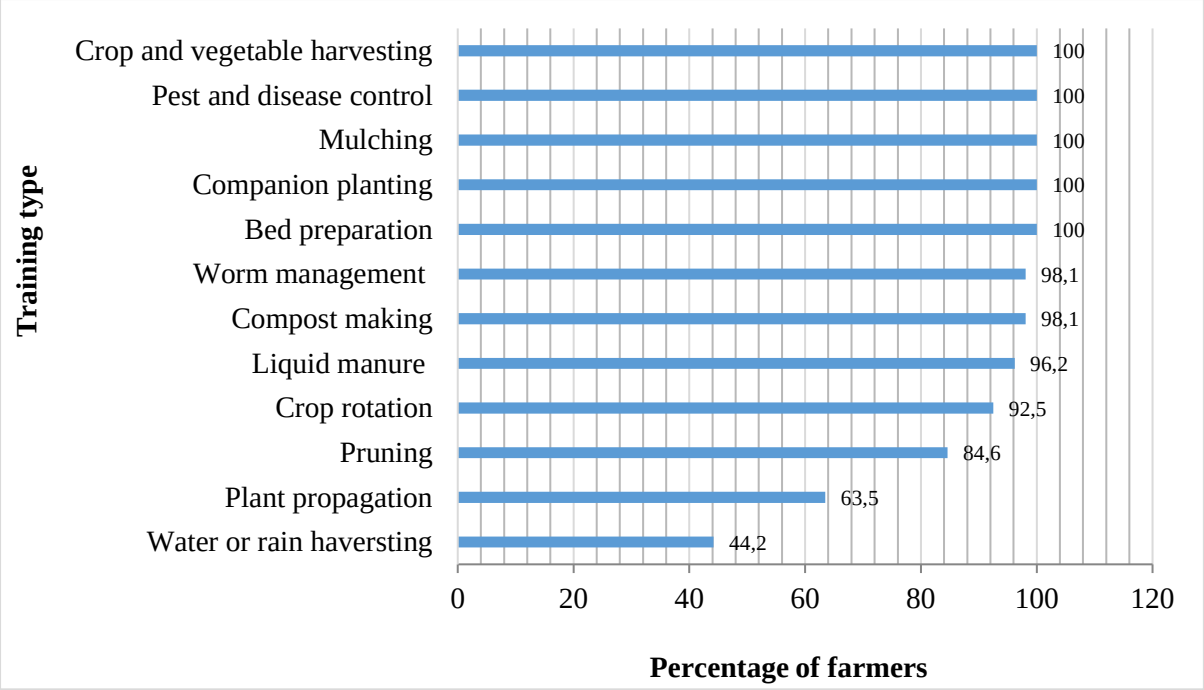

Figure 4.3: Percentage of farmers that received training on various practices of organic farming

Source: Survey output 2014

Results in Figure 4.3 clearly demonstrate that the majority of farmers received training on various practices of organic farming. All farmers reported that they were trained on crop and vegetable harvesting, pest and disease control, mulching, companion planting and bed preparation, as indicated in Figure 4.3 above. While a larger number of farmers were also trained on worm management and compost making, there was a high number of farmers who indicated to have received training on liquid manure and crop rotation (Figure 4.3). More than 80% of the farmers also received training on pruning. Training on water or rain harvesting was provided to a smaller number of farmers as less than 50% of the farmers reported to have been provided with training in this. All the trained farmers adopted the organic farming practices

that they were taught. Figure 4.4 shows the percentage of households who indicated that they adopted various organic farming practices.

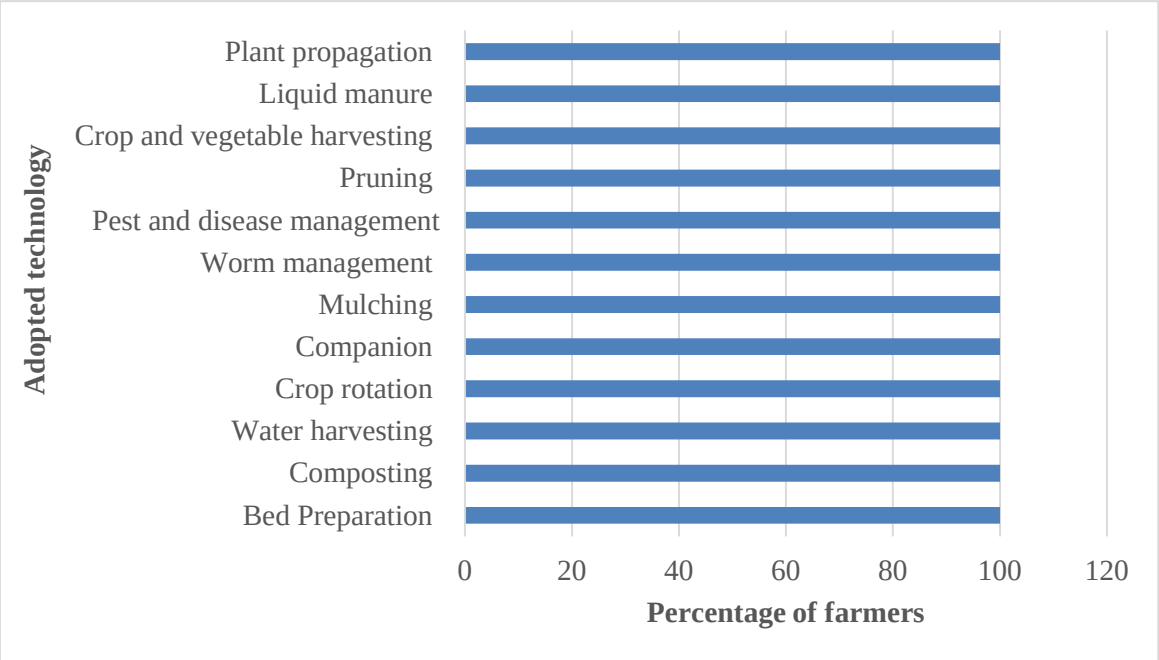

Figure 4.4: Adoption of organic farming practices by farmers

Source: Survey output 2014

When asked to rate the quality of training provided to the trainees, on average, about 66% and 33% of the trained farmers indicated that the quality of the training was, respectively, very good and good, while one percent of the trained farmers found the training quality to be poor. About 70% of the trained farmers reported that the quality of training on bed preparation, water harvesting and plant propagation was very good. At least 60% of the trained farmers pointed out that the quality of the remaining organic farming training practices were also very good (Figure 4.5). Notably, there were very few instances where trained farmers indicated that the quality of training was poor. The highest percentage reported by farmers as poor quality was 4% regarding pruning. More farmers rated training as very good when it comes to bed preparation and water harvesting, and these are given much focus at DVO when training is being conducted. Whilst training on compost making is also an area of focus during the training, about 2% of the farmers felt that the content of training in this area was poor in that it did not meet their expectations. These farmers indicated that they expected a sudden increase in their produce by using organic matter, but this was not the case.

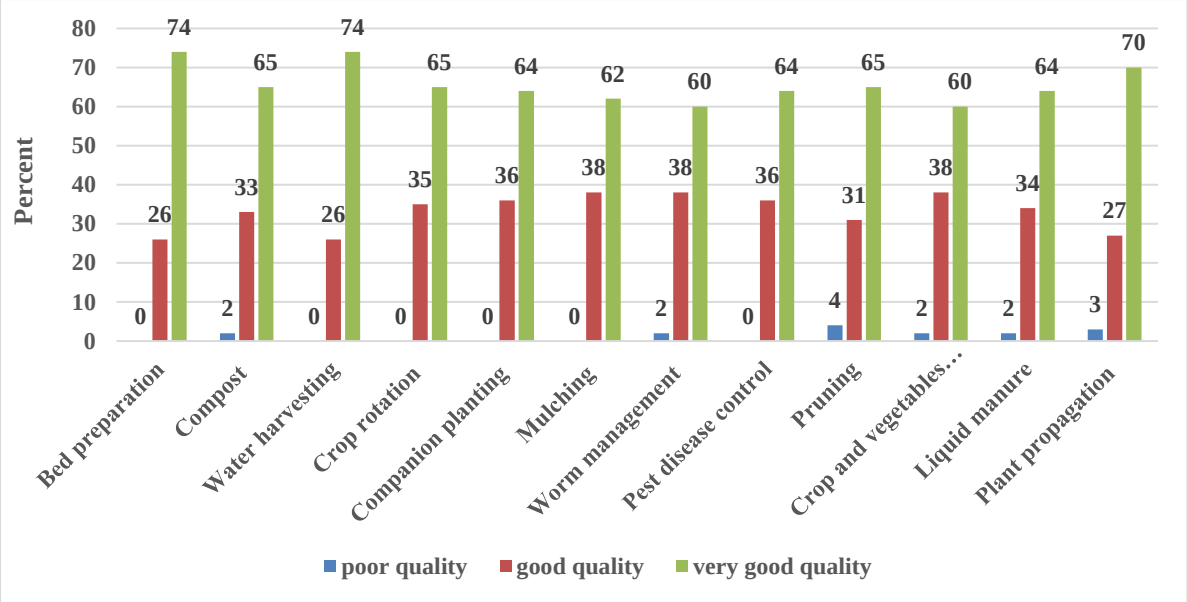

Figure 4.5: Quality of training on organic farming practices

Source: Survey output, 2014

4.3.1 Technology adoption and reasons for adoption

A large number of farmers adopted the training methods that were offered at DVO in their daily crop production activities. Although plant propagation was not adopted, trained farmers adopted the specific organic farming technologies in which they were trained. Trained farmers pointed out various reasons for the adoption of these technologies (Table 4.7).

A large number of farmers practiced bed preparation to improve production (22%) (Table 4.7). This was followed by 21% of the farmers who reported that their involvement in bed preparation was for better pest management. This is consistent with Table 4.7; it is evident that farmers had identified strategies to help themselves with better pest management. The least number of farmers indicated that they practice bed preparation in order to sell excess. Regarding compost making, the results showed that most households or farmers practice compost making to improve yields and for better pest management, as this was reported by 28% and 23% of the surveyed farmers, respectively. Water harvesting was practiced by most farmers in order to improve yields and for better pest management, while crop rotation was largely practiced to improve production, improve yield and for better pest management. Generally, organic farming practices were largely adopted to improve production, improve yield and for better pest management. It is noted in the results that very few farmers indicated that the organic farming practices were adopted to diversify income sources and for better market sources. This could be because the surveyed farmers seldom sell their produce.

Table 4.7: Reasons for adopting organic farming practices

Organic farming practices	Improve Production		Improve Yield		Better pest management		Better soil management		Diversify income sources		Selling Excess	
	F*	%	F*	%	F*	%	F*	%	F*	%	F*	%
Bed preparation	54	22	54	22	52	21.1	47	19.1	32	13	7	2.8
Compost making	54	21	83	27.9	70	23	50	16.8	37	12.4	4	1.3
Water harvesting	25	18.8	35	26.3	31	23.3	22	16.5	18	13.5	2	1.5
Crop rotation	51	21.9	49	21	48	20.6	47	20.2	36	15.5	2	0.9
Companion planting	53	21.2	52	20.8	53	21.2	51	20.4	38	15.2	3	1.2
Mulching	53	21.6	53	21.6	52	21.2	50	20.4	35	14.3	2	0.8
Worm management	52	21.6	52	21.6	52	21.6	50	20.7	33	13.7	2	0.8
Pest management	53	21.5	53	21.5	53	21.5	51	20.6	35	14.2	2	0.8
Pruning	44	21.2	44	21.2	53	21.5	42	20.2	31	14.9	3	1.4
Veg harvesting	52	21.7	51	21.3	52	21.7	49	20.4	33	13.8	3	1.3
Liquid manure	50	21.3	50	21.3	51	21.7	48	20.4	32	13.6	4	1.7

F* represents Frequency: Source: Survey output 2014

4.4 Food security status of the trained and non-trained farmers and relationships between food security and adoption of technology and other socio-economic factors

This sub-section explored the food security situation of all participants and compared the food security status of the trained and non-trained farmers. It also explored the relationship between the adoption of organic farming practices, socio-economic factors and the food security status of the trained farming households. The socio-economic factors assessed for relationships with food security status included: gender of the respondent, age of the respondent, household income source, attending training at DVO, main occupation, land tenure system used by the farming household, size of the land used for farming, number of people in the farming household and number of years of schooling of the respondent.

The food security status results showed that 67% of the households were food secure, where food security is defined in this research in terms of food availability and food accessibility (Figure 4.6). Comparatively, 87% of the households who adopted the technology were food secure whilst only 45% of the households who did not adopt the technology were food secure. This means that there were more food insecure households amongst those who did not adopt organic farming practices.

About 65% of the households reported to be producing more food crops than they need. Regarding the non-trained farmers, about 62% pointed out that they did not produce enough food, compared to only 11% from the trained farmers who reported that their crop produce was not enough. This means that 89% of the trained farmers were reported to be producing more food than what they need, compared to 38% of the non-trained farmers. Clearly, these results show that having attended the training helps the farmers to produce more than enough food. When asked about their extra food, approximately 37% of households indicated that they sell their extra food, 52% give it to their neighbours, whilst nine per cent and two per cent of the farmers reported that they exchange and store their extra food, respectively.

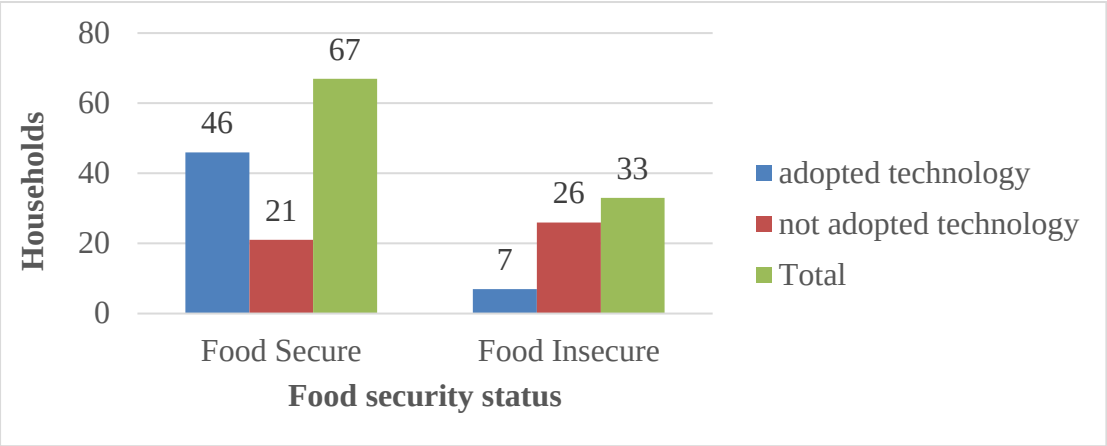

Figure 4.6: Technology adoption and food security status of the sampled households
Source: Survey output 2014

A positive relationship between adoption of organic farming practices and food security status was observed, suggesting that as farmers adopt the organic practices into their farming systems, they had food available and accessible to them and chances of being food secure increased (Table 4.8).

Farming households that adopted the organic farming practices were more food secure compared to farming households that did not adopt organic farming practices, with 67% of the households who adopted being food secure. The findings illustrate that there was a positive relationship between each of the organic farming practices (bed preparation, compost making, water harvesting, crop rotation, companion planting, mulching, pruning, crop harvesting, and liquid manure) and food security status as shown in Table 4.8 above. This implies that as the farmers adopt any of the organic farming practices (except water harvesting), their food security situation is positively affected or likely to be improved.

The results showed that there was no significant relationship between adopting water harvesting and food security. The findings generally showed that adopting any of the organic farming practices (except water harvesting) that formed part of the training could positively influence their food security situation as the majority of the farmers who adopted any of the practices are food secure. The findings demonstrated that the majority of the farmers who did not adopt water harvesting were food secure, implying that adopting water harvesting technology does not considerably improve farmers' food security situation (Table 4.8). This could be because the majority of the famers in the study area use water from the taps to water their gardens. This could bring about a challenge of sustainability if farmers had to pay for the

water in future, because currently they are able to water their plants freely as they do not pay for the water.

Table 4. 8 Relationship between farmers' adoption of organic agricultural practices and food security status

Variable		Technology adoption		Statistic	
Categorical variables		Adopted	Not adopted	X^2 value	Significance
		Organic practices			
Food security status	Food secure	46	21	19.980	0.000***
	Food insecure	7	26		
		Bed preparation			
Food security status	Food secure	45	22	18.705	0.000***
	Food insecure	7	26		
		Compost making			
Food security status	Food secure	45	22	18.705	0.000***
	Food insecure	7	26		
		Rain water harvesting			
Food security status	Food secure	18	49	1.713	0.191
	Food insecure	5	28		
		Crop rotation			
Food security status	Food secure	42	25	15.219	0.000***
	Food insecure	7	26		
		Companion planting			
Food security status	Food secure	46	21	19.980	0.000***
	Food insecure	7	26		
		Mulching			
Food security status	Food secure	46	21	19.980	0.000***
	Food insecure	7	26		
		Pruning			
Food security status	Food secure	38	29	13.324	0.000***
	Food insecure	6	27		
		Crop harvesting			
Food security status	Food secure	45	22	18.705	0.000***
	Food insecure	7	26		
		Liquid manure			
Food security status	Food secure	44	23	19.946	0.000***
	Food insecure	6	27		

Note: ***, **, *significant at 1%, 5% and 10% level respectively

Regarding the socio-economic factors, a positive relationship was found to exist between socio-economic factors such as household income source, attending DVO training, main occupation and the number of years of schooling (Table 4.9). This means that the source of income and main occupation for farming households are important as they positively influence the food security status. Attending DVO training contributed positively towards the food security status of farming households. The number of years spent schooling also contributed to the food security status of the sampled farming households. Overall, this suggest that as the relevant institutions take part in encouraging and training farming households on agricultural methods, organic farming practices in particular, socio-economic factors such as income source, main occupation and schooling should also be considered. For example, farming household members should be encouraged to study. Table 4.9 shows the socio-economic factors that showed positive relationship when assessed with food security status. There was no significant relationship observed between other socio-economic factors (gender, age, land tenure system and the size of the land used) and food security status of the faming households (Appendix E).

Table 4.9: Relationship between farmers' socio-economic factors and food security status

Food security status		Household income source			
	Food secure	66		13.165	0.010***
	Food insecure	32			
Food security status		Attended DVO training			
	Food secure	46		19.980	0.000***
	Food insecure	7			
Food security status		Main occupation			
	Food secure	65		14.571	0.024**
	Food insecure	30			
		Number of years of schooling			
Food security status	Food secure	66		22.040	0.037**

Note: ***, **, *significant at 1%, 5% and 10% level respectively

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

This study set out to investigate if adoption of organic farming practices contributes to household food security for rural farming households in Richmond. The study compared farmers who attended training at DVO with farmers who never attended training on organic farming. Two objectives were defined as the scope of this study:

- To determine whether farmers are practicing organic practices that they acquired during training at Dovehouse Organics.
- To investigate the significance of organic farming training on the food security status of the Richmond households.

This sections presents the conclusion, policy implications, recommendations and areas for improvement in the future studies.

5.1 Discussion and conclusions

Food insecurity exacerbates poverty thus delaying the South African government's plan to halve poverty by 2030. The current sufficient supply of food at a national level cannot solve the food insecurity problem because a large number of households continue to be trapped in hunger and food shortage situations. However, organic farming (although there are differing views) is seen in policy process as a vehicle towards reducing food insecurity and hunger.

DAFF (2012) argued that investing in agricultural training is important to meet the food needs of the growing population, improve food security, and to enable farmers to adapt to different challenges such as changing climatic conditions. The farmers in this study perceived organic practice as worthwhile. The evidence suggested that their expenditure on food was often less than the minimum food basket required for someone who is reliant on purchasing food. The farmers were able to utilise locally available resources and appropriate technology to produce for their needs (some produced more). They perceived organic farming as confirmation of the nature conserving practices of their ancestors. This connection encourages adoption because it feels right, is socially and culturally coherent, and is consistent with their values and beliefs.

Organic agriculture has been on the increase in Africa owing to the growing demand globally for naturally grown and healthier food, particularly by consumers in the developed countries. There is no single solution to what needs to be done to serve poor and food insecure populations. However, organic agriculture is considered to be one of the means by which farmers can improve their livelihoods. For example, understanding the importance and

potential contribution of income for households from organic produce is illustrated by the Ezemvelo Farmers' Organisation in the KwaZulu-Natal province. These farmers sell some of their organic produce to Woolworths and illustrates how rural-based and smallholder farmers can brand their produce and contribute to the market demand.

The contribution of organic agriculture to household food security cannot be ignored. This means that encouraging households to engage in and adopt organic agriculture is a justified course. Engaging in organic agriculture establishes farming practices that not only enhance soil structures, conserve water, sustain biodiversity, but also increase livelihood options and food security.

A positive relationship between adoption of organic farming practices and food security was observed, suggesting that as farmers adopt the organic practices into their farming systems, chances of being food secure increased. Farming households who were trained on and adopted organic farming practises benefitted from engaging in organic approaches. These households have a comparatively better food security status. Therefore, considering investing in organic agricultural training, among other strategies, is an important long-term strategy to fight food insecurity. This, therefore, challenges the government not only need to finalise the national policy on organic farming production but also to develop a policy implementation strategy with clear plans to train farmers and support those farmers that are involved in organic farming. Access to information and advisors who can facilitate farmers' learning are crucial issues for the future implementation of organic and agro-ecological methods.

Generally, farmers who attended the DVO training on organic farming were producing more types of crops compared to those who did not attend the training, suggesting that acquiring knowledge in organic farming might have influenced farmers to grow a greater diversity of crops, which is a desirable objective of growing food for home consumption. Organic foods attract premium prices, but for the household that is involved in organic farming, it not only contributes to food availability in an affordable way (access), there is also diversity, and the potential to sell the surplus (income generation).

5.2 Policy implications and recommendations

The farmers in this study benefited from their training and moved towards organic production. They created a local network to support themselves and share learning. From this observation, we can make several recommendations.

Investing in organic agricultural training, among other strategies, is an important long-term strategy to fight food insecurity. Therefore, the government need to finalise the national policy on organic farming production also to develop a policy implementation strategy with clear plans to train farmers and support those farmers that are involved in organic farming. Access to information and advisors who can facilitate farmers' learning are important issues for the future implementation of organic and agro-ecological methods.

When the farmer changes from conventional to organic farming, there is the need for appropriate agricultural extension and nutritional advice or programmes, championed by the government and NGOs, to support the accumulation of knowledge and experience that optimise production of organic foods. For example, appropriate agricultural extension advice can help improve organic agricultural practices while appropriate nutritional advice or programmes can help households to diversify their organic crops for nutritional benefits.

Change is inevitable; agricultural spaces and traditional agriculture are threatened by increasing population and repurposing land for housing. There is a need for households to re-claim ownership of their own food security and take advantage of food security programmes. For this to happen effectively, it is recommended that government and NGOs should initiate and facilitate the implementation of capacity-building programmes, particularly around organic farming. This will ensure that farming households have access to the necessary skills for increased efficiency in the application of organic farming practices. Appropriate training of extension officers is key in organic farming. South African extension officers do not receive organic farming training in their mainstream training and therefore find it difficult to support organic farmers. Provision of organic farming extension services could help reduce some of the challenges facing organic farmers.

5.3 Recommendations for improvement of the study

Household food security data was collected at a time when farmers had already adopted the organic farming practices. It would have been better had household food security data been collected before and after the adoption of organic farming practices , as this would have given a clearer picture on the contribution of the adoption of organic farming to household food security. It was assumed that the households applied appropriate organic farming practices. The study could have assessed, through practical demonstrations, the application of different practices as per their adoption by individual farmers, to ascertain that the practices are really followed. No focus group discussions (FGDs) were employed in the study. The study could

have included FGDs to get an in-depth qualitative understanding of the organic farming practices used by households and their food security benefits thereof.

5.4 Recommendations for further research

The study focused on farming households in the community of Richmond at Richmond Municipality. Further study could be conducted in other areas to validate the effects of organic farming on household food security. The study did not use FGDs as part of the data collection tools. Further study could use panel data and include the FGDs to get an in-depth understanding of the organic farming practices in the study area. The study focused on two elements of food security, including food availability and access. Further study assessing the food security status of the farming households could consider the element of food utilisation in order to determine the nutritional status of the households as well.

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APPENDICES

Appendix A: Questionnaire

Appendix B: Farmers' understanding of organic farming

Appendix C: Letter of ethical Clearance

Appendix D: Household Hunger Scale

Appendix E: SPSS Data Outputs

Appendix A:

Household Survey Interview Questionnaire

Date of Interview: _____

Address/ location/GPS: _____

Name of correspondent: _____

SECTION A:

1.1. Gender

Male	1
Female	2

1.2. Age

_____

1.3. Which of the following are sources of income for the household?

Old age Pension or grant	1
Employment	2
Selling of products from the garden?	3
Other (Specify)	4
Other (Specify)	

1.4. What is your main occupation? _____1) Farming 2) Formal employment 3) Pensioner 4) Petty trading/business /self employed

5) Remittances 6) Student 7) Casual labourer 8) Other (specify) _____

1.5. Can you please provide a rough estimate of the total household expenditure per month?

Total expenditure per month	Range
200-–600	1
700–1 100	2
1 200–1 600	3
1 700–2 100	4
2 200–2 600	5
2 700–3 100	6

1.6. Can you please provide a rough estimate of the total household expenditure per year?

Total expenditure per month	Range
5 000–10 000	1
11 000–16 000	2
17 000–22 000	3
23 000–28 000	4
29 000–34 000	5
35 000–40 000	6

1.7 What is your highest educational qualification? -

Highest grade completed	Number	Number of years studied
Did not go to school	1	
Grade 11 or Lower	2	
Grade 12 (Standard 10)	3	
Post Matric Diploma or Certificate	4	
Degree	5	
Post Graduate Degree	6	
Informal training (specify the type of training)	7	

1.8 How many people, including yourself live in your house, for at least three months in a year? _____

1.9 Approximately estimate the size of the land that the household use for production? _____

1.10. What type of tenure system does the household use for the land in which they plant?_____1)inherited, 2)purchased, 3)lease, 4)rent, 5)free borrowing, 6) other (specify)_____

SECTION B:

2.1. Did you attend training at Dovehouse? _____

2.2. When did you attend organic farming training at Dovehouse? _____

2.3. Have you attended any other training somewhere else on organic farming? _____ 1) Yes 2) No

If yes, how many trainings? _____

2.4. How would you describe / define organic farming?

_____

_____

2.5 Do you practice the kind of farming described above? _____1) Yes 2) No

2.6 If yes, when did you start practicing this kind of farming? _____

3.1. Soil management

- What did they teach you about soil management during training?

_____

_____

_____

- How have you been able to apply this knowledge?

_____

_____

_____

- Do you find difficult or easy to apply this knowledge? _____

- What makes it difficult or easy for you to apply this knowledge?

_____
_____
_____

4.1 How do you prevent pests and diseases in the garden?

_____
_____
_____

4.2. Or what do you do to remove pests from the garden?

_____
_____
_____

5.1 The following questions will capture information regarding training that you have received on organic farming at Dovehouse Organics, if any.

Training provided *Codes:* 1. *Yes* 2. *No*	1. If yes, When did you attend the training?	2. How was the quality of the training provided? *Codes:* *1. Poor* *2. Good* *3. Very good*	3. Where did you get/attend the training? *Codes:* *1. Dovehouse*	4. Was the trainer useful in the challenges that you faced? *codes* *1. Yes* *2. No*	5. Did you adopt this agricultural technology/ principle which you were trained on? *Codes:* *1. Yes* *2. No*	6. Why did you adopt it? *Codes:* 1. *Improve production* *2. Better pest management* *3. Improve yield* *4. Better soil management* *5.Diversity income source* *6. Better market sources.* *7. other (specify)*	7. Can you rate your skill in this activity? *Codes:* 1. *Poor (not competent)* *2. Competent* *3. Very competent*	8. How can the training be more helpful? *Codes:* *1. Elongate the duration of training.* *2. Intensify onsite demonstration.* *3. Provide ongoing support after the completion of the study.*

1. Bed Preparation									
2. Compost making									
3. Water/ rain harvesting									
4. Crop rotations									
5. Companion planting									
6. Mulching									
7. Worm management									
8. Pest and disease control									
9. Pruning									
10. Harvesting									
11. Liquid manure									
12. Plant propagation									

6.1. What crops/vegetables do you grow from your garden?

Crop / vegetable grown by the Household	**Yes/no**
1. Cabbage	
2. Beans	
3. Tomato	
4. Sweet potato	
5. Potatoes	
6. Amadumbe	
7. Green beans	
8. Beetroot	
9. Broccoli	
10. Carrots	
11. Cauliflower	
12. Lettuce	
13. Garlic and ginger	
14. Onions	
15. Peppers	
16. Pumpkin	
17. Spinach	
18. Sweet corn	
19. Leeks	
20. Maize	
21. Other (specify)	
22. Other (specify)	
23. Other (specify)	
24. Other (specify)	
25. Other (specify)	
26. Other (specify)	
27. Other (specify)	
28. Other (specify)	

7.1. Out of the food harvested from the garden, how much is used by the household? _____

7.2. Does the household produce more food than they need from the garden? _____

7.3. If yes to 7.2. What does the household do with extra/ remaining food?

Sell		store		exchange		give to neighbours/relatives	

7.4. Does the Household sometimes run out of food? _____

7.5. If yes to 7.4, which months does the Household run out of food?

_____

_____

8.1. If yes to 7.4, what does the Household do when there is not enough food?

_____

_____

_____

8.1This section captures food situation in your household.

Responses 1) No 2) Yes **Frequency responses**: *1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)*

Food consumption	**Response**
1a. In the past four weeks, did you worry that your household would not have enough food? If no skip to 2a	
1. b. If yes to 1a, ***how often did this happen?***	
2a. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	
2b. If yes to 2a, ***how often did this happen?***	
3a. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	
3b. If yes to 3a, ***how often did this happen?***	

4a. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	
4b. If yes to 4a, ***how often did this happen?***	
5a. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	
5b. If yes to 5a, ***how often did this happen?***	
6a. In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	
6b. If yes to 6a, ***how often did this happen?***	
7a. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	
7b. If yes to 7a, ***how often did this happen?***	
8a. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	
8b. If yes to 8a, ***how often did this happen?***	
9a. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	
9b. If yes to 9a, ***how often did this happen?***	

9.1. Since you attended the training, what have you shared with friends, neighbours, or other farmers regarding soil fertility?

_____

_____

9.2. Can you please explain what good soil fertility in your understanding is?

_____

_____

9.2. What were the most interesting things that you learnt in this course?

_____

_____

_____

9.3 Would you recommend this training for other small scale farmers?

_____

9.4 Why would you recommend it?

_____

9.5 Or why would you not recommend it?

_____

10.1 Do you have any other comments regarding the training that you attended at Dovehouse Organics?

Appendix B: Farmers' understanding of organic farming.

These statements are drawn from the open-ended questions. They are colour coded to demonstrate content analysis and resulted in the five common understandings of organic farming for the Richmond farmers.

Farming that produces good food without chemicals
An old method of farming, use animal manure to compost
Farming with animal manure and making beds
Use a fork to prepare soil and use animal waste to fertilise the soil
It is farming that produces healthy food and use mulching to prevent weeds
Use a fork to prepare garden and use animal waste as fertiliser
No use of chemicals in the garden, and recycle household waste
Farming that uses readily available resources and does not cost
No use of manure, use repellent plants to chase pests in the garden
Farming without manure and chemicals, and also no overturning of the soil
Farming without chemicals, available natural resources are used as compost. Farming that saves nature and does not require labouring
Farming without using chemicals, only use compost
Framing without using chemicals
Working with nature and protect it, organic farming saves money it discourages outsourcing of resources
No use of chemicals, only use household available resources and recycle it in the garden
Farming without using chemicals, make own compost with household waste
Farming without using poison, use animal manure. Organic farming works with nature and therefore does not cost
Farming without using chemicals
Farming that protects the environment
Making use of resources available in the household, and no use of chemicals.
Don't know
Expensive way of farming because it produces less food
Farming without chemicals and respecting the environment
An old way of farming which was used by our ancestors before chemicals came
Dark soil with worms
Don't know
Farming without fertilisers
Don't know
Don't know
Farming without using chemicals
Don't know
Farming without chemicals to protect the environment
Dark soil that can produce healthy food
I don't know
Farming without manure and chemicals, only uses compost
Farming without using chemicals, only use homemade compost
Farming using household available resources
I don't know
I don't know

Farming without chemicals, only use compost
Farming in an old fashion which was used by our great parents
A clever way of farming that builds and protect the environment
An ancient method of farming that does not use chemicals
It is an easy way of farming, very cost effective because it uses readily available resource. no need to buy everything from the shop
An ancient method of farming that does not destroy nature
Mulching and timeous irrigation
Farming without using chemicals as this damages the soil, only use compost
Farming that uses animal waste for compost
Farming without chemicals
I don't know
I don't know
Farming that does not use manure
I don't know
Farming without using chemicals
An easy way of farming that works with nature
I don't know
I don't know
Farming without using chemicals
An ancient method of farming
I don't know
Farming without chemicals
Farming without using chemicals
I don't know
An ancient method of farming
I don't know
I don't know
Farming with no chemicals
Farming without using chemicals
Farming without using manure, only use homemade compost. Manure and other chemicals are dangerous to the body
Farming without fertiliser
Farming without manure or fertiliser, only use compost
It is an old way of farming that protects the environment
I don't know
Farming without fertilisers or chemicals. Use home resources to make compost for the garden
Farming without using manure
Farming that protects the environment because it does not use chemicals
I don't know
An ancient method of farming which is good for our health
Farming without using chemicals
Method of farming which does not use chemicals to protect the environment

Appendix C: Letter of ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

25 August 2014

Ms Angel Sibindile Ndlovu 208505605
School of Agriculture, Earth and Environmental Sciences
Pietermaritzburg Campus

Protocol reference number: HSS/0973/014M
Project title: The Influence of Organic farming skills training on House Hold food security.

Dear Ms Ndlovu

Expedited Approval

In response to your application dated 15 August 2014, the Humanities & Social Sciences Research Ethics Committee has considered the above mentioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/px

cc Supervisor: Dr Karen Calister
cc Academic Leader Research: Professor Onisimo Mutanga
cc School Administrator: Ms Marsha Manjoo

Humanities & Social Sciences Research Ethics Committee
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Appendix D: Brief process of calculating the Household Hunger Score

The frequency-of-occurrence responses were categorised into three: “Rarely” (once or twice in the past 30 days, “Sometimes” (3–10 times in the past 30 days) and “Often” (more than 10 times in the past 30 days). Rarely was coded as 1, sometimes coded as 2 and often coded as 3. The responses to each frequency-of-occurrence question from the three frequency categories (“rarely, sometimes and often”) were recorded into two frequency categories (“rarely or sometimes and often”), using SPSS. For each frequency-of-occurrence question, a new variable was created. The “rarely” and “sometimes” frequency categories are combined for the purpose of data analysis (Ballard *et al.*, 2011). For each new variables created, a frequency response of “rarely” (originally coded as “1”) is coded as “1”; a frequency response of “sometimes” (originally coded as “2”) is coded as “1”; and a frequency response of often (originally coded as “3”) is coded as “2”. Next, a code of 0 added for all households that replied “No” to each of the corresponding occurrence question. Then all households had a value of 0, 1, or 2 for the three new variables created. The values of newly created variables were summed for each household to calculate the HHS score. Each household then had a HHS score between 0 and 6. These values were then used to generate the HHS indicators. Two cut-off values (>1 and > 3) were applied to the generated HHS scores to obtain the three household hunger categories: 0–1 little to no hunger in the household; 2–3 moderate hunger in the household and 4–6 severe hunger in the household. Households with little to no hunger were classified as food secure and households with moderate and severe hunger were classified as food insecure.

Appendix E : SPSS Data output

Outputs related to crops produced and training attendance

		Attend_training_Dovehouse: Did you attend training at Dovehouse?			
		yes		no	
		Count	Row N %	Count	Row N %
Cabbage grown in your garden	Yes	49	71	20	29
	No	4	13	26	87
Beans grown in your garden	Yes	36	63	21	37
	No	17	40	26	60
Tomatoes grown in your garden	Yes	35	76	11	24
	No	18	33	36	67
Sweetpotato grown in your garden	Yes	21	66	11	34
	No	32	47	36	53
Potatoes grown in your garden	Yes	31	65	17	35
	No	22	42	30	58
Amadumbe grown in your garden	Yes	35	64	20	36
	No	18	40	27	60
Greenbeans grown in your garden	Yes	27	79	7	21
	No	26	39	40	61
Beetroot grown in your garden	Yes	39	71	16	29
	No	14	31	31	69
Broccoli grown in your garden	Yes	19	70	8	30
	No	33	46	39	54
Carrot grown in your garden	Yes	33	73	12	27
	No	20	36	35	64
Cauliflower grown in your garden	Yes	25	83	5	17
	No	28	40	42	60
Lettuce grown in your garden	Yes	30	79	8	21
	No	23	37	39	63
Galic_ginger grown in your garden	Yes	9	60	6	40
	No	44	52	41	48
Onions grown in your garden	Yes	33	75	11	25
	No	20	36	36	64
Pappers grown in your garden	Yes	39	80	10	20
	No	14	27	37	73
Pumkin grown in your garden	Yes	37	65	20	35
	No	16	37	27	63
Spinach grown in your garden	Yes	43	66	22	34
	No	10	29	25	71
Sweetcorn grown in your garden	Yes	10	63	6	38

	No	43	51	41	49
Leeks grown in your garden	Yes	6	46	7	54
	No	46	53	40	47
Maize grown in your garden	Yes	34	56	27	44
	No	19	49	20	51
Brinjol grown in your garden	Yes	14	74	5	26
	No	39	48	42	52
Imifino grown in your garden	Yes	10	63	6	38
	No	43	51	41	49
Peas grown in your garden	Yes	3	75	1	25
	No	50	52	46	48
Avocados grown in your garden	Yes	1	33	2	67
	No	52	54	45	46
Parsley grown in your garden	Yes	2	100	0	0
	No	51	52	47	48
Kale grown in your garden	Yes	2	67	1	33
	No	51	53	46	47
Chillis grown in your garden	Yes	23	79	6	21
	No	30	42	41	58

OG Farmers understanding of organic farming

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Better way of farming that protects the environment and produce good food	62	62,0	62,0	62,0
	Expensive way of crop farming	1	1,0	1,0	63,0
	Not using manure but gras or mulching to create dark soil with worms	7	7,0	7,0	70,0

	Ancient method of farming	4	4,0	4,0	74,0
	Farming in bed with mulching and weeding	3	3,0	3,0	77,0
	Other	4	4,0	4,0	81,0
	dont know	19	19,0	19,0	100,0
	Total	100	100,0	100,0	

		Attend_training_Dovehouse: Did you attend training at Dovehouse?			
		yes		no	
		Count	Row N %	Count	Row N %
The type of tenure system which the household uses for plating vegetables or crops	given by chief	12	67	6	33
	inherited	13	59	9	41
	purchased	21	44	27	56
	lease	0	0	3	100
	rent	2	100	0	0
	free borrowing	5	71	2	29

		Attend_training_Dovehouse: Did you attend training at Dovehouse?			
		yes		no	
		Count	Row N %	Count	Row N %
Practice of organic farming by the respondent	Yes	53	100%	0	0%
	No	0	0%	47	100%

Outputs related to reasons for producing

$bedadoptreason Frequencies

		Responses		Percent of Cases
		N	Percent	
Reasons for adopting bed preparation[a]	improve production	54	22,0%	101,9%
	better pest mgt	52	21,1%	98,1%
	improve yield	54	22,0%	101,9%
	better soil management	47	19,1%	88,7%
	diversify income source	32	13,0%	60,4%
	better market sources	7	2,8%	13,2%
Total		246	100,0%	464,2%

a. Group

Outputs related to organic farming training practices

Bed5.1.1 Bed preparation training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	52	98,1	100,0	100,0
Missing	System	1	1,9		
Total		53	100,0		

Compost5.2.1 Compost training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	52	98,1	98,1	98,1
	no	1	1,9	1,9	100,0
	Total	53	100,0	100,0	

Water_rain_harvesting5.3.1 :Water or rain haversting training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	23	43,4	44,2	44,2
	no	29	54,7	55,8	100,0
	Total	52	98,1	100,0	
Missing	System	1	1,9		
Total		53	100,0		

Crop_rotation5.4.1 Crop rotation training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	49	92,5	92,5	92,5
	no	4	7,5	7,5	100,0
	Total	53	100,0	100,0	

Mulching5.6.1 Mulching training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	53	100,0	100,0	100,0

Comp_planting5.5.4 Companion planting training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	53	100,0	100,0	100,0

Worm_mgnt5.7.1 Worm management training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	52	98,1	98,1	98,1
	no	1	1,9	1,9	100,0
	Total	53	100,0	100,0	

Pest_disease5.8.1 Pest and disease control training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	53	100,0	100,0	100,0

Pest_disease5.8.2 Pest and disease control quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	good	19	35,8	35,8	35,8
	very good	34	64,2	64,2	100,0
	Total	53	100,0	100,0	

Pruning5.9.1 Pruning training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	44	83,0	84,6	84,6
	no	8	15,1	15,4	100,0
	Total	52	98,1	100,0	
Missing	System	1	1,9		
Total		53	100,0		

Crop_veg_harvesting5.10.1 Crop and vegetable harvesting training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	52	98,1	100,0	100,0
Missing	System	1	1,9		
Total		53	100,0		

Liquid_manure5.11.1 Liquid manure training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	50	94,3	96,2	96,2
	no	2	3,8	3,8	100,0
	Total	52	98,1	100,0	
Missing	System	1	1,9		
Total		53	100,0		

Plant_propagation5.12.1 Plant prepagation training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	33	62,3	63,5	63,5
	no	19	35,8	36,5	100,0
	Total	52	98,1	100,0	
Missing	System	1	1,9		
Total		53	100,0		

Outputs related to ranking of the training

		Count	Row N %
Bed5.1.2 Bed preparation train?ing quality	poor	0	0
	good	14	100
	very good	39	100
Bed5.1.3 Bed preparation training source	Dovenhouse	53	
	CEDARA College	0	
	Other	0	
Compost5.2.2 Compost train?ing quality	poor	1	100
	good	17	100
	very good	34	100
Compost5.2.3 Compost training source	Dovenhouse	52	100
	CEDARA College	0	0
	Other	0	0
Compost5.2.2 Compost train?ing quality	poor	1	100
	good	17	100
	very good	34	100
Compost5.2.3 Compost training source	Dovenhouse	52	100
	CEDARA College	0	0
	Other	0	0
Water_rain_harvesting5.3.2 :Water or rain haversting training quality	poor	0	0
	good	6	100
	very good	17	100
Water_rain_harvesting5.3.3 :Water or rain haversiting training source	Dovenhouse	23	100
	CEDARA College	0	0
	Other	0	0

Outputs related to Table 5.8 and Figure 5.6

HHS_cat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no hunger	67	67,0	67,0	67,0
	Moderate hunger	29	29,0	29,0	96,0
	Severe hunger	4	4,0	4,0	100,0
	Total	100	100,0	100,0	

Crosstab

Count

		Principles and technology		
		adopted	not adopted	Total
Food security status	Food Secure	46	21	67
	Food Insecure	7	26	33
Total		53	47	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.980[a]	1	.000		
Continuity Correction[b]	18.120	1	.000		
Likelihood Ratio	20.840	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.780	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.51.

b. Computed only for a 2x2 table

Crosstab

Count

		Bed preparation		
		adopted	not adopted	Total
Food security status	Food Secure	45	22	67
	Food Insecure	7	26	33
Total		52	48	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.705[a]	1	.000		
Continuity Correction[b]	16.909	1	.000		
Likelihood Ratio	19.540	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	18.518	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.84.

b. Computed only for a 2x2 table

Crosstab

Count

		Compost		
		adopted	not adopted	Total
Food security status	Food Secure	45	22	67
	Food Insecure	7	26	33
Total		52	48	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.705[a]	1	.000		
Continuity Correction[b]	16.909	1	.000		
Likelihood Ratio	19.540	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	18.518	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.84.

b. Computed only for a 2x2 table

Crosstab

Count

			Water rain harvesting		
			adopted	not adopted	Total
Food security status		Food Secure	18	49	67
		Food Insecure	5	28	33
Total			23	77	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.713[a]	1	.191		
Continuity Correction[b]	1.116	1	.291		
Likelihood Ratio	1.807	1	.179		
Fisher's Exact Test				.217	.145
Linear-by-Linear Association	1.696	1	.193		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.59.

b. Computed only for a 2x2 table

Crosstab

Count

			Crop rotation		
			adopted	not adopted	Total
Food security status		Food Secure	42	25	67
		Food Insecure	7	26	33
Total			49	51	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.219[a]	1	.000		
Continuity Correction[b]	13.605	1	.000		
Likelihood Ratio	15.963	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	15.067	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.17.

b. Computed only for a 2x2 table

Crosstab

Count

		Comp_planting		
		adopted	not adopted	Total
Food security status	Food Secure	46	21	67
	Food Insecure	7	26	33
Total		53	47	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.980[a]	1	.000		
Continuity Correction[b]	18.120	1	.000		
Likelihood Ratio	20.840	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.780	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.51.

b. Computed only for a 2x2 table

Crosstab

Count

		Mulching		
		adopted	not adopted	Total
Food security status	Food Secure	46	21	67
	Food Insecure	7	26	33
Total		53	47	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.980[a]	1	.000		
Continuity Correction[b]	18.120	1	.000		
Likelihood Ratio	20.840	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.780	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.51.

b. Computed only for a 2x2 table

Crosstab

Count

			Pruning		
			adopted	not adopted	Total
Food security status		Food Secure	38	29	67
		Food Insecure	6	27	33
Total			44	56	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.324[a]	1	.000		
Continuity Correction[b]	11.806	1	.001		
Likelihood Ratio	14.224	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.191	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.52.

b. Computed only for a 2x2 table

Crosstab

Count

			crop harvest		
			adopted	not adopted	Total
Food security status		Food Secure	45	22	67
		Food Insecure	7	26	33
Total			52	48	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.705[a]	1	.000		
Continuity Correction[b]	16.909	1	.000		
Likelihood Ratio	19.540	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	18.518	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.84.

b. Computed only for a 2x2 table

Crosstab

Count

		liquid manure		
		adopted	not adopted	Total
Food security status	Food Secure	44	23	67
	Food Insecure	6	27	33
Total		50	50	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.946[a]	1	.000		
Continuity Correction[b]	18.091	1	.000		
Likelihood Ratio	21.149	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.746	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.50.

b. Computed only for a 2x2 table

Crosstab

Count

		plant propagation	
		not adopted	Total
Food security status	Food Secure	40	40
	Food Insecure	28	28
Total		68	68

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	68

a. No statistics are computed because plant propagation is a constant.

Outputs related to Table 5.9

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Sex: Gender of the respondent * Food security status	100	100.0%	0	.0%	100	100.0%
Age of a respondent * Food security status	100	100.0%	0	.0%	100	100.0%
Income: Household income source * Food security status	98	98.0%	2	2.0%	100	100.0%
Attend_training_Dovehouse: Did you attend training at Dovehouse? * Food security status	100	100.0%	0	.0%	100	100.0%
Occupation: The main occupation for the respondent * Food security status	95	95.0%	5	5.0%	100	100.0%
The type of tenure system which the household uses for plating vegetables or crops * Food security status	100	100.0%	0	.0%	100	100.0%
Size of the land which the HH use for production * Food security status	100	100.0%	0	.0%	100	100.0%
Number of people who are staying in the house for atleast 3 months a year * Food security status	99	99.0%	1	1.0%	100	100.0%
The number of years which the respondent has studied * Food security status	99	99.0%	1	1.0%	100	100.0%

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Sex: Gender of the respondent	Male	23	7	30
	Female	44	26	70
Total		67	33	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.811[a]	1	.178		
Continuity Correction[b]	1.241	1	.265		
Likelihood Ratio	1.880	1	.170		
Fisher's Exact Test				.247	.132
Linear-by-Linear Association	1.793	1	.181		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.90.

b. Computed only for a 2x2 table

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Age of a respondent	20	4	1	5
	21	3	1	4
	22	2	1	3
	23	2	0	2
	24	2	0	2
	25	4	2	6
	26	4	0	4
	27	2	0	2
	28	1	0	1
	29	2	0	2
	30	0	1	1
	31	1	0	1
	33	1	0	1

	34	1	0	1
	35	4	1	5
	37	2	0	2
	39	1	1	2
	40	2	3	5
	41	2	0	2
	42	1	1	2
	44	1	2	3
	45	2	1	3
	46	2	0	2
	47	1	0	1
	48	0	2	2
	49	0	1	1
	50	0	1	1
	51	1	0	1
	52	1	1	2
	53	0	1	1
	54	1	0	1
	55	0	1	1
	56	0	1	1
	57	1	0	1
	58	0	2	2
	59	2	1	3
	60	4	2	6
	62	1	0	1
	63	1	2	3
	64	3	1	4
	66	1	0	1
	67	2	0	2
	68	1	0	1
	69	1	0	1
	74	0	1	1
	75	0	1	1
Total		67	33	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.630[a]	45	.405
Likelihood Ratio	58.411	45	.087
Linear-by-Linear Association	4.540	1	.033
N of Valid Cases	100		

a. 92 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

Crosstab

Count

		Food security status		Total
		Food Secure	Food Insecure	
Income: Household income source	Old age pension or grant	26	24	50
	Employment	15	2	17
	Sale of produce	8	0	8
	petty trading	13	5	18
	none	4	1	5
Total		66	32	98

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.165[a]	4	.010
Likelihood Ratio	15.988	4	.003
Linear-by-Linear Association	3.710	1	.054
N of Valid Cases	98		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.63.

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Attend_training_Dovehouse: Did you attend training at Dovehouse?	yes	46	7	53
	no	21	26	47
Total		67	33	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.980[a]	1	.000		
Continuity Correction[b]	18.120	1	.000		
Likelihood Ratio	20.840	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.780	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.51.

b. Computed only for a 2x2 table

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Occupation: The main occupation for the respondent	Farming	14	1	15
	formal employment	14	2	16
	Pensioner	9	12	21
	petty trading/bussiness/self employment	19	10	29
	Remittances	1	1	2
	casual laborer	2	2	4
	none	6	2	8
Total		65	30	95

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.571[a]	6	.024
Likelihood Ratio	15.730	6	.015
Linear-by-Linear Association	1.976	1	.160
N of Valid Cases	95		

a. 6 cells (42.9%) have expected count less than 5. The minimum expected count is .63.

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
The type of tenure system which the household uses for plating vegetables or crops	given by chief	14	4	18
	inherited	15	7	22
	purchased	29	19	48
	lease	2	1	3
	rent	2	0	2
	free borrowing	5	2	7
Total		67	33	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.948[a]	5	.708
Likelihood Ratio	3.606	5	.607
Linear-by-Linear Association	.102	1	.750
N of Valid Cases	100		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .66.

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Size of the land which the HH use for production	0	1	0	1
	>0 - <0.25ha	24	10	34
	=>0.25 ha - <0.5ha	42	23	65
Total		67	33	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.858[a]	2	.651
Likelihood Ratio	1.168	2	.558
Linear-by-Linear Association	.632	1	.427
N of Valid Cases	100		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .33.

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
Number of people who are staying in the house for atleast 3 months a year	1	3	0	3
	2	4	1	5
	3	9	5	14
	4	9	5	14
	5	11	0	11
	6	9	9	18
	7	6	3	9
	8	8	4	12
	9	3	3	6
	10	2	1	3
	11	2	0	2
	12	1	0	1
	13	0	1	1
Total		67	32	99

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.147[a]	12	.291
Likelihood Ratio	19.272	12	.082
Linear-by-Linear Association	.978	1	.323
N of Valid Cases	99		

a. 19 cells (73.1%) have expected count less than 5. The minimum expected count is .32.

Crosstab

Count

		Food security status		
		Food Secure	Food Insecure	Total
The number of years which the respondent has studied	0	10	12	22
	2	2	2	4
	3	1	2	3
	4	2	2	4
	5	1	1	2
	6	3	3	6
	7	2	1	3
	8	2	2	4
	9	7	3	10
	10	13	1	14
	11	1	2	3
	12	20	1	21
	13	2	1	3
Total		66	33	99

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.040[a]	12	.037
Likelihood Ratio	25.248	12	.014
Linear-by-Linear Association	13.631	1	.000
N of Valid Cases	99		

a. 20 cells (76.9%) have expected count less than 5. The minimum expected count is .67.