AN EXAMINATION OF CONSTRAINTS ON FRUIT PRODUCTION BY SMALLHOLDER FARMERS IN VHEMBE DISTRICT

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DECLARATION

I, Alidzulwi Thameson Rathogwa, hereby declare that this dissertation for a Masters Degree in Rural Development (MRDV), submitted to the Institute for Rural Development at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design and in execution, and all reference material contained therein has been duly acknowledged. The proposal was approved by the Higher Degrees Committee of the School of Agriculture at the University of Venda and all suggestions have been followed to the satisfaction of research.

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ABSTRACT

The production of fruit commodity is crucial for livelihood, job creation and income generation. Smallholder fruit farming has become one of the key strategies to tackle the problems relating to health, lack of employment and poverty amongst rural people. The purpose of this study was to investigate fruit production levels by smallholder farmers in the Vhembe District of Limpopo Province, with special focus on mango, avocado, and macadamia nuts. The author investigated factors affecting smallholder fruit farmer`s productivity and suggested policy recommendations that could lead to enhanced production. The author used both quantitative and qualitative methods of data collection by interviewing smallholder fruit farmers, and officials dealing with fruit production using structured and unstructured administered questionnaires in making observations of their farming practices. Out of a total population of 439 fruit producers, 224 were selected by employing the stratified random sampling procedures in Thulamela, Makhado and Mutale local municipalities in Vhembe District. The Statistical Package for Social Sciences (SPSS 2012, 20) was used to capture and analyse data. This was done to draw frequencies and cross tabulations. Content analysis, frequency distribution, and descriptive statistics were used to answer the objectives of the study. The study revealed shortage of water, low input use, lack of storage facilities, inadequate access to land, insecure tenure, insufficient pests, insects and diseases control, lack of access roads, labour, communication infrastructure and lack of practical management skills as major constrains contributing to low fruit production. It was envisaged that the results of the research would provide compelling scientific information that would help create a better platform for implementing improved farming strategies by government.

Key Words: *Examination; constraints; fruits production; smallholder farmers and Vhembe District*

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ABBREVIATIONS AND ACRONYMS

CASP	Comprehensive Agricultural Support Program
DAFF	Department of Agriculture Forestry and Fishery
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GIS	Government Information Services
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
LDA	Limpopo Department of Agriculture
LED	Local Economic Development
MASSP	Mechanization Access Support Scheme Policy
NBSC	National Bureau of Statistics of China
NDA	National Department of Agriculture
NRSSADC	National Research Stations of Southern African Developing Communities
RMASSP	Revised Mechanization Access Support Scheme Policy
SPSS	Statistical Package for Social Scientists
STATS SA	Statistics South Africa
SUBTROP	Subtropical fruit Growers Association
VDM	Vhembe District Municipality

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CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Background

There is worldwide consensus that fruit production is crucial for livelihood, job creation and income generation for the landless and the land owners (Muendo, Schirley and Weber, 2004). In the last two decades, interest in the production of sub-tropical fruits had remarkably increased in Asia, Europe, Latin America, and in African countries given their significant contribution to livelihood and poverty alleviation in the global trade. Smallholder fruit farming became one of the strategies to tackle problems relating to health, lack of employment and poverty (Babatunde and Oyatoye, 2005; Ibrahim and Fausat, 2011).

In Asia, smallholder farmers dominated the fruit production sector in order to generate income for livelihood and poverty alleviation. For example, in Shadong District of China, smallholder farmers accounted for US$55 million between 1990 and 2000 while the fruit production area expanded to 10.2 million hectares between 2000 and 2006. In Indonesia and Malaysia, palm oil smallholder farmers utilized between 1.37 and 1.81million hectares of land with the total output increasing from 94 000 tons in1960 to 15 million tons in 2005 (Dinchu and Anyaiwe, 2011).

In both Europe and Latin America, smallholder fruit farming showed tremendous growth as the industry was seen as a source of income for poverty alleviation. For example, smallholder apple production in Serbia increased from 59 855 tons in 1998 to 191 566 tons in 2008 (Economic analysis, 2009). This led to the development of smallholder family factories which contributed to the support of rural economic development, livelihood and poverty alleviation (Republic Statistical Institute of Serbia, 2008). In Chile, smallholder fruit producers constituted 90% of the total area under fruit crops (Bain, 2009). Subsistence and smallholder fruit producers in North America and Europe supplied their respective markets with fruits to the value of US$2.6 billion (Bàstèn, 2007).

The above mentioned background confirms that the cultivation of fruit commodity by smallholder farmers is very crucial and highly significant to the social and economic development of rural communities as it contributed to the provision of livelihood, job creation and poverty alleviation. It is against this background that the researcher explored the reasons behind low productivity of smallholder farmers in Vhembe District to enable recommendations of strategies that could enhance productivity, livelihood and poverty reduction in the.

In Africa, Nigeria and Northern Ethiopia were examples where the planting of fruit trees by smallholder farmers as a source of income generation had also gained momentum. Nigeria, for example, was ranked third after Indonesia and Malaysia in the world and number one in Africa in palm oil production with 1.65 million hectares of land under smallholder farmers, making up 80% of the national palm oil production (Olagunju, 2008; Vermeulen and Goad, 2006).

In South Africa, emerging smallholders are estimated at 35 000 and making a turnover of less than R300 000 (AgriSETA, 2010).In Limpopo Province, for example, in 2010 17 236 hectares (44%) of land on which 5 049 008 sub-tropical fruit trees (48%) including mango, macadamia nuts and avocado have been planted (Subtrop, 2010).

Smallholder fruit farmers throughout the world contribute significantly to the provision of livelihood, job creation and poverty alleviation. Despite the potential contribution of smallholder fruit farmers to accelerated growth, job creation, poverty alleviation and increased livelihood, they continue to face challenges relating to production activities. The purpose of this study was to investigate the causes of low fruit productivity levels by smallholder farmers in the Vhembe District with special a focus on three most cultivated fruit commodities: mango, avocado and macadamia. This study was aimed at investigating low fruit productivity levels by smallholder farmers in the Vhembe District and their effect on livelihood.

1.2 Statement of the Research Problem

According to the IFPRI (2005), smallholder farmers are the most disadvantaged and vulnerable groups in the developing world. These farmers have access to less than a hectare of land on which they plant trees for household consumption with some sale on local market. Faming under smallholders is characterized by low productivity and poor fruit crop quality due to the critical shortage of production input such as land, water, fertilizers, labour and capital (Baloyi, 2010; Tshikhudo, 2005). Management of crops is not intensive, the use of agricultural input is infrequent and labour focuses only on harvesting.

Vhembe District is situated in an area where sub-tropical/tropical fruits abound (Tshikhudo, 2005).However, major fruit crops are produced in commercial farms (Vhembe District LED Strategy, 2006). In 2009, sub-tropical smallholder fruit farms are estimated at 4 915, farmed on a total area of 14 152 hectares of land (Vhembe District Municipality, 2009). Active farmers in the district are approximately 439 in number. Most of these farmers are characterised by low fruit production (Vhembe District Department of Agriculture, 2010; Baloyi, 2010). There has been various literature on fruit productivity in the Vhembe District; however, not much is known about the causes of low fruit productivity. Furthermore there is limited information on the effect of low fruit productivity on smallholder livelihood and income generation in Thulamela, Makhado and Mutale local municipalities in Vhembe District. Therefore, this study was intended to investigate the reasons behind low fruit production by smallholder farmers in the Vhembe District of Limpopo Province.

1.3 Justification

One of the strategic goals of the South African Government is to stimulate rural economic growth and development through the Department of Agriculture Forestry and Fishery (DAFF, 2010). Sub-tropical fruit production has been identified in recent studies as one of the most important agricultural commodities for smallholder farmers' project development (Monitor Group, 2006; Aihoon Kojo and Associates, 2008). Vhembe District is located in Limpopo Province which is one of the poorest followed by Eastern Cape Province and having the third largest population after KwaZulu-Natal and Gauteng Provinces (STATS SA, 2010). Sub-tropical fruit production has a major contribution to make in the social–economic development of the Vhembe District considering its strategic location in the region in terms of soil fertility and rainfall patterns throughout the year (Tshikhudo, 2005).

Improving fruit production by smallholder farmers in the Vhembe District could increase livelihood and contribute to the creation of employment opportunities and the reduction of poverty. In addition to the favourable climatic conditions, the district is capable of producing a wide variety of fruits throughout the year (NDA, 2009). Available literature revealed that past research has mainly been focusing on how smallholder farmers could be linked to the market and integrated into the main agricultural sector (Oluoch-Kosura, 2010; Louw, Madevu, Jordaan and Vermeulen, 2004; Louw, Vermeulen and Madevu, 2006; Louw, Jordaan, Ndanga, Kirsten, 2008; Moraka, 2001; Miyata, Minot and Hu, 2009; Maître, Lemeilleur and Bienabe, 2011). Rarely had researchers included studies on strategies to increase smallholder fruit production which were very crucial in determining the reasons behind low productivity by small holder farmers. This necessitated the study that would enhance strategies to promote fruit productivity. Such a study would be in line with government policies, namely; food security and farmer's development programmes on plant improvement Act no. 53 of 1976 (DAFF, 2011).

Furthermore, the study was crucial in the context of rural development since improved fruit production could ensure increased rural livelihood, income generation and job creation which are the current priority focus areas of the South African government. Research findings will be shared with policy-makers, academics, researchers and other institutions focusing on the promotion of smallholder fruits production in the country. It was envisaged that the findings of this study would inform the strategic direction for the improvement of the sector.

1.4 Objectives of the Study

The main objective of this study was to investigate causes of low fruit production by smallholder farms in the Vhembe District of Limpopo Province. The specific objectives of the study were to:

- Determine the social-economic characteristics of smallholder fruit farmers in the Vhembe District.
- Investigate factors affecting fruit productivity by smallholder farmers in Vhembe District.
- Suggest policy recommendations that may lead to enhanced fruit production in the Vhembe District.

1.5 Research Questions

- What are the characteristics of smallholder fruit farmers in the Vhembe District?
- Which are the factors affecting fruit production in the Vhembe District?
- What strategies could improve fruit production in the Vhembe District?

1.6 Definitions of Keywords

Constraint

A factor that limits or restricts something or the freedom to do some things (Hornby, 2010).

Fruit

Fruit normally means a tasty fleshy product of a tree that contains seed and can be eaten as food, such as apples, oranges, and bananas (American Heritage, 2009). This commodity is also a good supplement for health optimization.

Production

This is the quantity of units a farmer produces on a specific area of land. It is usually measured by how many units of something another unit can produce. A measure relating a quantity or quality of output to the input required to produce it (Wikipedia, the free encyclopedia, accessed 20 September, 2011).

Smallholder farmers

These are smallholder farmers whose farming is characterized by low levels of production technology and small-sized farm holding of approximately 1.5 to 20 hectares per farmer, with production primarily for subsistence purposes, leaving little marketable surplus (LDA, 2008). A smallholder farmer could be regarded as the resource "poor farmer", "subsistence farmer", "small grower", "small scale farmer", "emerging or developing farmer", as opposed to the "commercial or large scale farmer" (Tshikhudo, 2005). A smallholder farmer is described as one whose scale of operation is too small to attract the provision of the services he/she needs to be able to significantly increase production (Zithutha, 2010). Smallholder farming is often associated with backwardness, non-productive and non-commercial subsistence agriculture (Baiphethi and Jacobs, 2009).

1.7 Organization of the Research study

The research study is divided into five chapters: Chapter 1 which deals with introduction and background, statement of research problem, justification, as well as research gaps and research objectives. Chapter 2 consists of literature review and introduced the concept of smallholder farmers and its definition. It also provided empirical evidence from literatures on the factors which influenced low production and quality and, the conceptual framework. Chapter 3 gives a descriptive view of the study area, research design, population and sampling, data collection methods and data analysis and ethical considerations, research execution plan and budget. Chapter 4 presents the results of the analyzed data and interpretation thereof. Chapter 5 discusses the findings and gives recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature that focuses on the concept and productivity of smallholder sub-tropical fruit farmers. Furthermore, the author intended to review factors that contribute to low fruit production and their implications for smallholder fruit farmers.

2.2 The Concept of Smallholder Farmers

The concept of smallholder farmers has been the subject of research in the Republic of South Africa and abroad (Tshikhudo, 2005; Mindes, Pedzisa and Dimes, 2008; Oluoch-Kosura, 2010). According to Tshikhudo (2005), a smallholder farmer could be regarded as the resource "poor farmer", "subsistence farmer", "small grower", "small scale farmer", "emerging or developing farmer", as opposed to the "commercial or large scale farmer". He further indicated that the concept of smallholder farming in South Africa is subjected to non-productive agriculture. In recent years, some efforts have been made to find a socio-economically accurate definition for a smallholder farmer that is relevant to South Africa to facilitate various support for the previously disadvantaged farmers.

Smallholder fruit farming became one of the ways to tackle the problem of unemployment and poverty amongst the poor people worldwide. According to the International Food Policy Research Institution (2005), smallholder farmers were the most disadvantaged and vulnerable group as a result of lack of collaterals and funding in the developing world. The institution further revealed that half of the world's under nourished people, three quarters of Africa`s malnourished children and the majority of people living with absolute poverty could be found within smallholder farms.

2.2.1 Definition of a smallholder farmer

A smallholder farmer is described as one whose scale of operation is too small to attract the provision of the services he/she needs to be able to significantly increase production (Zithutha, 2010). Smallholder farming is often associated with backwardness, non-productive and non-commercial subsistence agriculture (Baiphethi and Jacobs, 2009). Backwardness is associated with the small scale farming due to the fact that there is little production at a significantly high cost while farming methods are traditional and do not encourage economies of large scale production. As a result of that, smallholder farmers were forced to engage themselves in off-farm activities that would generate supplementary income to sustain their families (Baloyi, 2010).

Farms of smallholder farmers are characterized by low levels of production technology and are small-sized holdings approximately 1.5 to 20 hectares per farmer due to limited access to land, with production primarily for subsistence purposes, leaving little marketable surplus (LDA, 2008).

For the purpose of this study, the smallholder farmer is defined as those sub-tropical fruit farmers whose farming is characterized by low levels of production technology and small-sized farm holding of approximately 1.5 to 20 hectares per farmer, with production primarily for subsistence purposes, leaving little marketable surplus (LDA, 2008).

2.3 The Socio-Economic Characteristics of Smallholder Sub-Tropical Fruits Framers

Globally, smallholder agricultural production is on subsistence basis. These farmers are frequently occupying small fragmented landholdings of about 1 to 20 hectares (Tshikhudo, 2005). Their production is mainly for consumption with little marketable surplus sold to the local market for income generation (Mabiduro and Gbadeyan, 2011). Smallholder fruit farmers are characterized by little or no forms of savings or storage facilities (Festus, 2005; Fakayode, 2008). Most of their farms have no irrigation infrastructures and are in rain-fed conditions with low productivity levels, while their contribution to GDP is minimal due to lack of volumes which further limit economies of scales (Baloyi, 2010).

In smallholder sub-tropical fruit farms, production and quality of trees suffer from sub-optimal management and adverse environmental conditions (Berhe, K., Dessalegn, Baredo, J., Teka, W., Hoekstra, D, Tegne, A., 2009). Lack of properly developed fruit tree varieties exacerbate the problem of low productivity encountered by growers. Smallholder farmers grow trees interspersed with annual crops and fruit trees are cultivated typically to supplement household income from their main crops (Joosten, 2007). Smallholder areas are subjected to frequent droughts and poor soil fertility - two problems that keep them in a cycle of poverty (Minde *et al.*, 2008). The above characteristics are mostly prevalent in rural areas of all developing countries such as in the Sub-Saharan African countries where 70% of the population live in rural poor areas (Rockström, Barron and Fox, 2003).

Furthermore, Rockström *et al.* (2003) argues that 95% of the population of smallholder farmers found in rural areas of the developing countries are victims of unequal distribution of essential resources that include land, economic assets, support services, market access and income. A study conducted by Murovhi, Materechera and Mkhabela (2011) shows that due to lack of fertilizers, 95% of smallholder sub-tropical fruit farmers use leaf litter mixed with compost to maintain their soil fertility status. Lack of market, road and communication infrastructures and poor fruit quality in smallholder fruit farms constrained agricultural activity denying farmers opportunities to generate income for livelihood and poverty alleviation (Berhe et al., 2009).

They are saddled with constraints in limited purchasing power; inadequate access to extension services; high input prices and poorly functioning output market (FAO 2005). Smallholder agriculture is characterized by a high degree of uncertainty, low profitability and lack of the ability to meet the ever changing necessities of financial markets (Minde *et. al,* 2008).Agriculture was the significant employer of the rural people, particularly in smallholder farmers and played an important role in reducing poverty by micro-agricultural enterprise activities (Machete, Mollel, Ayisi, Amin and Venasche, 2004).

Smallholder fruit farming has therefore become one of the strategies to tackle the problem of lack, unemployment and poverty for rural people. Empirical evidence showed that, smallholder farms contributed to the social and economic development of rural people. For example, in Peru, 217 000 hectares of agricultural land for organic farming was recorded in 2010 with the Brazilian nuts covering 50% - 140 000 hectares of the total production of organic farming (Willer, Helga, Kilcher, and Lukas, 2012b). Worldwide, raspberry fruit production and trade by smallholder farmers increased with the export value of US$1.2 billion in 2007 (Murray *et al.,* 2010). In 2008, there were 128 862 producers in Mexico, of which 99.95% were smallholder farmers cultivating approximately 330 000 hectares organically (Willer *et al.*, 2012)

According to Flores (2012), the production of fruits contributed to the social and economic development by improving the lives of smallholders who were exporting the crops. The potential for increased productivity is often larger on smallholder farms because of their efficient use of family farming labour. The variety of food crops produced in Nigeria, for example, was enough evidence to attest that smallholder farmers were able to make the country self-sufficient in food crop production (Mabiduro and Gbadeyan, 2011).

Literature review sought to explore the reasons behind smallholder farmers' low fruit productivity and develop strategies that would promote productivity by identifying opportunities that would ensure sustainable livelihoods. This was crucial in the context of rural development since it was envisaged that improved fruit production would ensure large volumes of fruits, more income and the creation of employment opportunities for the rural communities.

2.4 Factors Influencing Low Production

While increased production is one of the necessary ingredients in income generation for sustainable farming and livelihood, there are also factors which are a cause of concern as they have an influence on production (Odhiambo and Mangadini, 2008; Mapfumo and Giller, 2001). Evidence from literature links low fruit production with low input use, shortage of water as a result of unexploited irrigation opportunities, land tenure insecurity factor, lack of information on market, post-harvest handling and management of fruits and unsustainable management of soil as a natural resource. Low fruit production is viewed as one of the major impediments hindering smallholder farmers from generating income for sustainable living and poverty alleviation (Pinstrup-Anderson, 2009).

2.4.1 Low input use by smallholder farmers

In their studies on soil fertility, Odhiambo and Mangadini (2008) found that most soils in Vhembe District, of South Africa were fragile and low in plant nutrients. They found that nutrients mechanisms that sustain soil fertility were insufficient to support increased production without fertilizers. Due to limited number of animals kept by rural smallholder farmers, the amount produced was insufficient to cater for increased agricultural production (Odhiambo *et al.*, 2008). Mapfumo and Giller (2001) revealed that fertilizers usage by smallholder farmers in Southern Africa remained extremely low despite substantial resources having been invested by the National Research Station of Southern African Developing Communities (NRSSADC) in developing fertilizer recommendations. The use of mineral fertilizers was constrained by its high costs and risky returns. The majority of smallholder farmers were resource poor and could not afford the high risk costs of fertilizers. A few of smallholder farmers used kraal and poultry manure.

Abercrombie (2001) further indicated that correct fertilization of trees was a very critical aspect of orchard management in order to achieve high yields and fruit quality. The low usage of fertilisers and other farm inputs by smallholder farmers resulted in low productivity and persistent declining commodity prices, which in turn adversely affected inputs use profitability (Oluoch-Kosura, 2010).

2.4.2 Shortage of water as a result of unexploited irrigation opportunities

According to Rockström, Barron and Fox (2003), 80% of agricultural land worldwide is under rain fed agriculture with generally low yield levels. While 95% of the current population growth occurs in the developing countries, of which a significant proportion of these people still depend on a predominantly rain fed rural economy. (FAO, 2005), indicated that only 4% of the sub-Saharan Africa region`s arable land is irrigated and less than 3% of its water resources are used as compared to 42% and 18%, respectively in Asia. Over dependency on rain fed agriculture by smallholder farmers and insufficient irrigation result in low and unreliable agricultural output that is vulnerable to the current drought common in sub-Saharan Africa (Oluoch-Kosura, 2010).

According to Kruger (2001), the availability of sufficient water and correct water management is a pre-requisite for improved production in fruit cultivation. This is because the optimum water regime has a direct influence on the fruit flowering, fruit set, fruit size and quality. For example, an annual water requirement for adult citrus trees is between 8500m^3 and 10 000m^3/ha/annum (Mostert, 2006).

Shortage of sufficient water causes stress to crops and the results are low productivity and therefore profitability. Currently, the global warming crisis makes it difficult for the smallholder farmers who have no sufficient irrigation infrastructures (Oluoch-Kosura, 2010). The effect of water on emerging smallholder fruit productivity was studied in order to find out whether the shortage of water was a causal and contributing factor in smallholder farmers' low fruit productivity in Vhembe District.

2.4.3 The land tenure insecurity

According to FAO (2003) access to land is a critical factor in the eradication of food insecurity and rural poverty. As the primary source of sustenance, land is used by members of the society for livelihood sustainability (Tamba, Kabba and LI, 2011). Insufficient land constitutes one of the most constraining resources facing rural households in South Africa. In their studies (Moraka, 2001, Tshikhudo, 2005; Baloyi, 2010), found that households had access to very small pieces of land ranging from 1. 5 hectares up to 20 hectares. Inadequate access to land and insecure tenure of the rights often results in entrenched poverty, rural under development and food insecurity. More secured access to land enhances productivity and improves the financial status of the rural people.

The weak land tenure arrangements lead to under investments in land by both smallholder and medium farmers (Oluoch-Kosura, 2010). In addition, lack of clear property rights limits smallholder farmer`s capacities to take advantage of various opportunities to enhance productivity (Maître, Lemeilleur and Bienabe, 2011). The effect of land ownership or lack of security of land tenure on farmers` productivity and livelihood was also studied to find out whether lack of security of land had any direct effect on productivity levels in Vhembe District.

2.4.4 Lack of information on markets

Rural producers, especially smallholder farmers, have very little information about the market demand (Baloyi, 2010).Farming information is usually gathered through contact with other actors in the commodity chain, but the accuracy of such information is not guaranteed (Bienabe, Coronel, Le and Liagre, 2004). Lack of marketing information hinders production and the supply of products to markets and agro-processing industries (Baloyi, 2010). Farm decisions require adequate information as to where, when and what price to purchase farm inputs, availability of transportation and how to dispose of the agricultural produce (Okwoche, Obine and Orbunde, 2011).Failure to have adequate information on production makes it difficult for smallholder farmers to predict production and market demand. This study investigated the effect of farming and marketing information on emerging smallholder fruit farmer's productivity. This was important as part of the investigation as adequate information was required to enhance small holder fruit productivity level.

2.4.5 Post–harvest handling and management of fruits

Fruits are horticultural products that deteriorate very fast after harvest as a result of moisture content and tenderness (Tshikhudo, 2005). Selecting the cultivar to be planted is one of the most important long term decisions to be made by a prospective fruit farmer due to its impact on quality and profitability (De Villiers and Jourbert, 2006). However, competitiveness in agriculture could be well improved by good post-harvest management practices. Oluoch-Kosura (2010) indicated that various studies in Sub-Saharan countries have reported crop yield losses of between 20% and 40% due to poor post-harvest handling which also included storage facilities, especially with perishable fresh produce such as avocados and banana fruit crops.

In his study, Tshikhudo (2005) found that out of 66 respondents, 80% of the farmers indicated that they experienced serious problems with regard to fruit loss at the storage or pack houses. In addition, lack of storage and processing facilities limited smallholder farmer`s potential to add value to their produce to boost competitiveness (Oluoch-Kosura, 2010).The relationship between post-harvest handling of crops and productivity was examined to find out if post-harvest handling and management of fruits was a cause of concern for smallholder fruit farmers in Vhembe District.

2.4.6 Unsustainable management of agricultural land as a natural resource

Land is one of the major natural resources of a developing country that smallholder farmers totally depend on(Kebebew and Urgessa, 2011). However, land degradation due to wind and water erosion, especially human induced, is the most important environmental problem which renders the land unproductive, hence poor crop production and food insecurity.

Traditionally, local farmers were known to have practised the system that encouraged the development of forests through fallow system as sustainable land use (Nyong, Adesina and Elasha, 2007).

Urgessa and Kebebew (2011) are of the view that the land use options that increase livelihood security and reduce vulnerability are necessary. Urgessa and Kebebew (2011) and Pinstrup-Anderson (2009) revealed that management of land degradation helped households to attain food security as a source of cash for all assessed households and a source of food for 72% of the assessed households in Ethiopia. The above literature showed that there is a need to investigate land use and management practices by smallholder fruit farmers in Vhembe District to find out if land use and management practices had any effect on low fruit production.

2.5 Factors That Influence Market Participation

2.5.1 Introduction

Participation in the agricultural market is a strategy through which farmers can generate income for sustainable farming, livelihood and poverty alleviation. The level of smallholder farmer's participation in the agricultural markets of South Africa is minimal in all farming activities and subsectors if not insignificant (Aihoon *et al.*, 2008). Smallholder farmer's participation on these markets is constrained by inconsistency in producing and supplying the right quantity and quality of produce to the market (Baloyi, 2010). This called for the need to investigate whether inconsistency and lack of market participation had any effect on low fruit production.

2.5.2 Consistency in producing and supplying the right quantity of produce

Moraka (2001) indicated that smallholder farmers lack consistency in terms of quantity, quality and time when it comes to supplying products to the market. Lack of marketing information renders smallholder farmers inconsistent when it comes to production and supplying products to markets and agro-processing industries (Moraka, 2001 and Baloyi, 2010). Low, Madevu, Jordaan and Vermeulen (2004) also added their voices when they indicated that many smallholder farmers could only deliver products to fresh produce markets for two to three months in a year and fail to achieve continuity in those markets.

As a result of inconsistency, traders are reluctant to conduct business transactions with such producers. This study investigated whether inconsistency and lack of market participation were contributing to smallholder farmers' low fruit production in Vhembe District. This was done by assessing their production patterns and participation in the local market. This information further enabled the researcher to find out whether the quantity produced and supplied had any effect on smallholder fruit farmers' participation in the market.

2.6 Conceptual Framework

Agriculture is one of the important sectors in a developing economy not only because of its contribution to the GDP, but for employing greater proportion of a country labour force in productive activities (Adegboye, 2004, Babatunde and Oyatoye, 2005). However, smallholder agricultural production in developing countries has largely been long subsistence basis. Farmers only produce for their families and the quantity of fruits produced is grossly inadequate for the sustenance of growing population. The result is increased wide spread of poverty amongst the people especially those living in rural areas (Mabiduro and Gbadeyan, 2011). Smallholder farming has become one of the strategies to tackle the problem of lack and poverty.

This study is aimed to examine the reasons behind low fruit production by smallholder farmers in Vhembe District. Low fruit production was viewed as a major impediment hindering smallholder farmers from generating income for a living, and alleviate poverty. Empirical evidence demonstrated how smallholder farmers could be linked to the market and integrated into the main agricultural sector (Oluoch-Kosura, 2010; Louw, Madevu, Jordaan and Vermeulen, 2004; Louw, Vermeulen and Madevu, 2006; Louw, Jordaan, Ndanga, Kirsten, 2008; Moraka, 2001; Miyata, Minot and Hu, 2009; Maître, Lemeilleur and Bienabe, 2011). However, strategies on how smallholder fruit farmers could increase production levels were not adequately addressed.

Empirical evidence from literature shows that low production of smallholder farmers was the result of a cluster of social and economic factors which were affecting them in their farming enterprise. These included low input use of fertilizers due to high transaction costs and limited access to credit and financial institutions (Mapfumo and Giller, 2001; Abercrombie 2001; Odhiambo and Mangadini, 2008; Kebebew and Urgessa, 2011); shortage of adequate irrigation water and infrastructure as a result of the limited access to funding institutions because of the lack of assets and collateral (Rockström, Barron and Fox, 2003); lack of market information as a result of transaction costs when accessing the necessary services due to the remoteness of farming areas and their low levels of education which makes interpretation of market trends difficult (Baloyi, 2010;Okwoche, Obine and Orbunde, 2011).

The land tenure insecurity has shown that lack of freehold of land by individuals contributed to low food production because investors are scared to invest in the properties that they do not own. The African customary laws which discriminate against people to have title deeds were other contributing factors of low production (Moraka, 2001; Tshikhudo, 2005; Oluoch-Kosura, 2010; Baloyi, 2010). Unsustainable management of soil as a natural resource due to lack of the necessary farming skills resulted in land degradation and poor production (Nyong, Adesina and Elasha, 2007; Oluoch-Kosura, 2010; Kebebew and Urgessa, 2011). This study aimed to assess the extent to which these factors affected the smallholder fruit farmers in order to provide recommendations to policy-makers for implementations with the idea of reducing the existing production and marketing gap between smallholder and large commercial farmers of the Vhembe District of Limpopo Province.

2.7 Summary

The above chapter provided empirical evidence from literature that focused on the productivity of smallholder subtropical fruit farmers. It also reviewed literature on socio-economic background of smallholder subtropical fruit farmers, factors contributing to low productivity and poor fruit quality. Under these factors, the following were reviewed: low input use by smallholder farmers, unexploited irrigation opportunities, land tenure insecurity, lack of information and market participation, post-handling and management of fruits, and unsustainable management of land as a natural resource. Furthermore, a review of various literatures covered those factors which influence market participation. This included among others, consistency in producing and supplying the right quantity of produce to the market.

However, the overall findings of the literature showed that low production of sub-tropical smallholder fruit farming is caused by a cluster of social and economic factors which affect the farming enterprise. For example, low input use of fertilizers due to high transaction costs, limited access to credit from financial institutions because of the lack of assets and collaterals, and shortage of adequate irrigation water and infrastructure. In addition lack, of market information as a result of transaction costs due to the remoteness of farming areas.

The land tenure insecurity also had an effect on fruit productivity. Lack of freehold of land by individuals contributed to low food production since farm owners were scared to invest in the properties that they did not own. The African customary laws which discriminate against people to have title deeds were other contributing factors of low production. Unsustainable management of soil was also another factor. For example, lack of the necessary farming skills resulted in land degradation and poor production. The literature review also found that there were inconsistencies in the production and supply of the right quantity of produce to consumers.

The next chapter entails the research methodology which the study employed in order to achieve its objectives.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

According to Sharlene (2010), methodology provides the theoretical perspective that links a researcher problem with a particular method or methods. Methods are tools, and a researcher methodology determines the way in which a tool will be utilized. The aim of this chapter is to give a descriptive view of the Vhembe District area where research was conducted. It also paid attention to research design, population and sampling procedures that were followed during the research process, including data collection methods, analysis, and ethical consideration.

There were 439 active smallholder sub-tropical fruit farmers during the study period (August to September 2013) in Vhembe District, farming on approximately 3557.9 hectares (Vhembe District Department of Agriculture farm register, 2010). The major fruit crops included mangoes, avocados and macadamia nuts (Vhembe District Department of Agriculture farm register, 2010).The research concentrated on smallholder fruit growers.

3.2 Description of the Study Area

This study was conducted in the Vhembe District of Limpopo Province, South Africa. Vhembe District is one of the five districts that form the Limpopo provincial government and is situated in the far north of Limpopo Province bordering with the Republic of Zimbabwe in the north, and Mopani District in the south east. On the south west, it borders with the District of Capricorn. It has four municipalities: Thulamela, Musina, Makhado and Mutale. The major towns are Makhado in Makhado Municipality, Thohoyandou and Malamulele, in Thulamela Municipality. The study on smallholder fruit production was conducted in all the municipalities with the exception of Musina where only citrus commercial farmers were found.

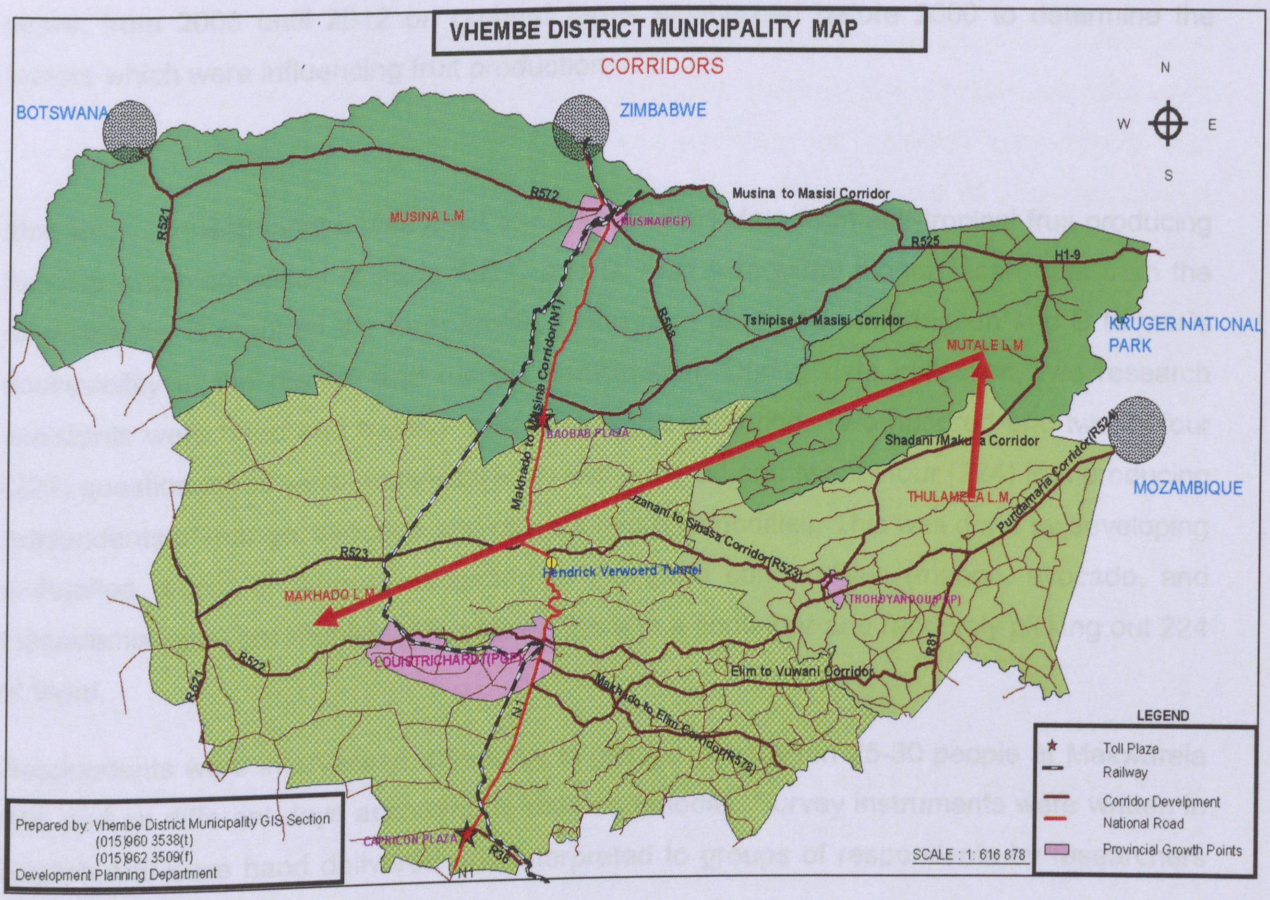
Vhembe District Municipality (VDM) covers an area of 21 402 km^2 with an estimated population of 1.3 million people according to the Vhembe District LED Strategy (2006) and the VDM Annual Report (2009/10). The district municipality is situated in an area where fruit production has a huge potential as the land is very fertile and suitable for agricultural farming (Tshikhudo, 2005). In addition, 72% of the land is used for dry land crop and animal production, and 20% is under irrigation, 1.1% is the urban area while only 5% of the land is considered arable (Vhembe District LED Strategy, 2006).

Due to its conducive climate, the district is capable of producing a wide variety of fruits throughout the year (NDA, 2009). This offers land owners and hawkers opportunities to generate income through fruit production and sales in all seasons. It is estimated that its production is not less than 4.4% of South Africa's total agricultural output, including 8.4% of the country's sub-tropical fruits and 6.3% of its citrus (Vhembe District LED Strategy, 2006).

Productive agriculture in the district is undertaken by a small number of commercial farmers around Levubu in Makhado Municipality and Musina, while smallholder farmers were scattered around the remote rural areas (Tshikhudo, 2005).Farming by smallholder farmers is characterised by low production, poor crop quality, and poor access to land, inputs, market and credit (Baloyi, 2010). The land sizes for smallholder fruit farmers range from 1.5 to 20 ha (Tshikhudo, 2005). Most people in the district live in the neglected and less developed rural areas where poverty and unemployment are rife (Moraka, 2001).

Although the district is one of the provincial districts where production and the sales of fruits have the potential to generate income for livelihood and poverty alleviation, the majority of the population still live in poverty. These people depended mainly on social grants from the government and subsistence farming in order to sustain their families (Mudau, Mogorosi and Thabede, 2005). In 2010, poverty rate was estimated at 64.7% (Baloyi, 2010), while unemployment was at 53 % (VDM Annual report, 2009/10)

Fig.1: Vhembe District Municipality map with four municipality areas (Thulamela, Makhado, Musina and Mutale). Red arrows show the study sites.



Source: Vhembe District Municipality GIS section 2013

3.3 Research Design

Trochim (2006) indicated that there was value in consciously combining both qualitative and quantitative methods in what was referred to as a mixed methods approach. Conducting a mixed-method study could enhance the validity and reliability of findings as well as allow for the exploration of contradictions found between the quantitative and qualitative results. By linking the methods at data collecting stage, the researcher could assess the validity and reliability of the findings (Sharlene, 2010). Mixed methods could assist the researcher in acquiring specific topical issues and concerns they wish to explore (Sharlene, 2010).

The researcher made use of a mixed methods approach of both quantitative and qualitative methods to collect primary and secondary data. Quantitative data were collected in structured questionnaires to obtain primary information the social and economic background. In addition, the method was used in assessing the volumes of fruit produced for the past five years, from 2008 until 2012 on orchard farms established before 2000 to determine the factors which were influencing fruit production.

Moreover, a questionnaire was used to collect primary data from sub-tropical fruit producing farmers which consisted of parts A,B,C and D. Part A required biographical data from the respondents, B required the farm profile, C the farm production information and D farmer`s accessibility to the market and market participation. During data collection, two research assistants were hired and trained to assist in data gathering. Two hundred and twenty four (224) questionnaires were administered to two hundred and twenty four (224) fruit producing respondents of mango, avocado and macadamia commodities. This was done by developing a detailed record of farmers according to the three commodities (mango, avocado, and macadamia nuts) per municipality, placing them in a container and randomly picking out 224 of them.

Respondents were interviewed differently in groups of between 25-30 people at Makwarela hall, and on different days according to their commodity. Survey instruments were written in English and were hand delivered and interpreted to groups of respondents by researchers before data collection took place.

Qualitative method was used in semi-structured interviews, to get primary data while field observations were used to study the management and cultivation practices of sub-tropical fruit trees. During this process, focus group discussion meetings were held to get qualitative data from sub-tropical fruit producers, sub-tropical fruit production cooperative executive members and agricultural officials who dealt with fruit production from the three local municipalities, Makhado, Thohoyandou and Mutale. In this process, respondents were asked questions related to fruit productions, the challenges they encountered as well as the best strategies or solutions to their problems. Six field observations, two in each municipality were made in six different days to obtain qualitative data by studying farmers` management and cultivation practices of sub-tropical fruit trees. During these field visits, the author observed farmers characteristics, land sizes, fruit yields, type and quantity of inputs applied, number of farm labourers available, farm equipments, storage facilities, and cropping practices. This was done during the fruit production season in order to get the actual figures in terms of production and to have an insight of what was happening in smallholder sub-tropical fruit farms.

Data from qualitative methodology was gathered by semi-structured interview guides and field observations. Semi-structured interviews were administered to key informants who were sub-tropical fruit producing farmers, executive members of Vhembe sub-tropical fruit production cooperative and officials with more than ten years history of sub-tropical fruit production. Six direct field observations, two in each municipality, were undertaken to obtain qualitative data by studying farmers` management and cultivation practices of sub-tropical fruit trees where the study was conducted. During these field visits, the researcher observed farmer`s characteristics, land sizes, fruits yields, type and quantity of inputs applied, number of farm labourers available, farm equipments, storage facilities, and cropping practices. During these visits, discussions with farmers were made to find out the main causes of low fruit production.

3.4 Population and Sampling Procedures

The total population of Vhembe smallholder fruit producers was 439 farmers during the study period, composed of three sub-tropical fruit commodities: mango, avocado and macadamia nuts (Vhembe District Department of Agriculture farm register, 2010). Out of the total population of 439 sub-tropical smallholder fruit farmers, 224 respondents (almost half or 50%) of the total population were selected. Half of the total population was taken in order to have a well representative sample of sub-tropical smallholder fruit producers. The sample consisted of orchard farms established before 2000, and had been in production since 2008 until 2012. The idea behind this was to get farms which had been in production for the last five years.

The study used probability sampling method employing a stratified random sampling procedure for primary data collection. The principle of this approach was to divide a population into different sub-tropical fruit commodity groups of mango, avocado, and macadamia nuts so that each element of the population belonged to a single stratum and this provided equal opportunity of selection for each element in a population (Bless and Higson-Smith, 2000).

This process involved developing a detailed record of sub-tropical fruit farmers according to the three commodities (mango, avocado, and macadamia nuts) per municipality. Then after, all the names of the sub-tropical fruit farmers were written on a piece of paper and placed in a container from which 224 were randomly picked out. This formed the number of respondents who participated in the research for data gathering. A total of 224 questionnaires were administered to 224 respondents. Respondents were invited to different meetings according to their different fruit commodity groups (mango, avocado, and macadamia nuts) during which questionnaires were administered to obtain quantitative data one group after another until 224 of them had given all the information required.

The author examined the socio-economic back-ground, factors affecting sub-tropical fruit smallholder farmers, as well as the volumes of fruits produced and market participation of 224 (50% of total population) sub-tropical fruit producing farmers. This was done in order to get information with regard to fruit production so as to identify the reasons why fruit production by smallholder farmers was low. Information received could assist the government to give policy directions to enhance fruit production and livelihood.

Table 1 below shows the total population of the sub-tropical smallholder fruit production within the Vhembe District.

Table 1: Population of Vhembe District Sub-tropical Smallholder Fruit Farmers

Commodity	Thulamela Municipality	Makhado Municipality	Mutale Municipality	TOTAL
Mangoes	48	41	5	94
Avocados	52	98	32	182
Macadamia nuts	69	51	43	163
Total	169	190	80	439

Source: Vhembe district department of Agriculture 2010

Table 2: A representative sample of Vhembe District sub-tropical fruit producing smallholder farmers. Below is a representative sample of Vhembe District sub-tropical fruit producing smallholder farmers with 224 fruit farmers to be interviewed. The author used 50% of the total population in order to have a well representative sample.

Commodity	Thulamela	Makhado	Mutale	TATAL
Mango	24	21	5	50
Avocado	26	49	16	91
Macadamia	35	26	22	83
TOTAL	85	96	43	224

Source: Vhembe District Department of Agriculture 2010

3.5 Data Collection

Data collection started in August 2013 and ended in October 2013. The researcher made use of primary and secondary data. The principal methods used for the collection of data included questionnaire survey, field observations, and unstructured interviews. The researcher used secondary data collected from various literature, journals, reliable government official reports, policy documents, Statistics South Africa, internet and books. Primary data was obtained from sub-tropical fruit producing farmers themselves, sub-tropical fruit producing associations/cooperatives, officials in the Department of Agriculture dealing with fruit production, and selected farms within the Vhembe District. Permission was requested from relevant stakeholders and respondents before data collection took place.

Questionnaire survey: Musango (2005) noted that a commonly used instrument for obtaining data that is beyond the physical reach of the researcher is a questionnaire. The questionnaires were the preferred instruments used for data collection in this study as they could be sent to a large number of people who lived far away. In addition, participants could respond to questions with the assurance that their responses would be anonymous and so they might be more truthful than they would be in a personal interview especially when talking about sensitive or controversial issues (Leedy and Ormrod, 2005).

Key informants: Key informants of the research included officials who had a long history of more than ten years of sub-tropical fruit production from the Department of Agriculture in Vhembe District, executive members of Vhembe sub-tropical fruit production cooperative, and smallholder farmers dealing with sub-tropical fruit production.

3.6 Data Analysis Methods

Data analysis entails qualitative, quantitative, and statistical analysis (Nakana, 2009). Strydom *et al.*, (2005) regard data analysis as actually consisting of three steps, namely data reduction, data display and verification. After data gathering, it was checked to verify whether information required was correctly entered in the data collecting instrument. There was no data reduction as information required was well entered into the data collecting instruments. Data was then recorded and captured into the computer software using codes to determine variables such as males, females and youth. The selected quantitative data such as the number of people living in a household and household heads was analysed by using the Statistical Package for Social Scientists (SPSS) for window version (IBM SPSS, 2012, 20).This was done in order to obtain descriptive statistical data and frequency tables for analysis and representation of the results. Qualitative data covering household fruit production patterns in the last five years was presented in terms of opinions in a logical and systematised manner guided by focus group discussions and field observations conducted. More on the data analysis is presented in Table 3 below.

Table3. Data source, collection and analysis methods matrix

Objective	Variable / type of date	Research method / tool	Data source	Analysis method
Determine the socio economic background of smallholder fruits farmers in Vhembe district.	Socio economic characteristic of smallholder fruits farmers.	a).Quantitative method using structured questionnaire and closed-ended question.	1. Sub-tropical fruits farm owners.	Simple descriptive statistics.
		b) Quantitative method using unstructured questionnaire, open-ended questions and observation.	2. Sub-tropical fruits farm owners. 3. Key informants.	Simple descriptive statistics, focused group discussions and appreciative enquiry.
		c) Use of available records.	1. Farm owners and officials working with fruits.	Simple descriptive statistics and appreciative enquiry.
		d) Review of literature	1. Journals, books, government official reports, internet.	Simple descriptive statistics.
Investigate factors affecting smallholder fruits farmers' productivity.	Assess the effect of (low input use, shortage of water, security of tenure, and market information and infrastructure) on smallholder productivity.	a) Quantitative method using structured questionnaire and close-ended questions.	1. Farm owners 2. Executive members of fruits cooperative. 3. Key informants.	Simple descriptive statistics.
		b) Quantitative method using structured questionnaire, open-ended questions, and observations.	1. Farm owners 2. Executive members of fruits cooperative. 3. Key information.	Simple descriptive statistics and appreciative enquiry.
		c) Use of available records.	1. Farm owners and official working with fruits.	Simple descriptive statistics and appreciative enquiry.
		d) Review of literature.	2. Journals, books, government official reports, internet	Simple descriptive statistics
Suggest policy recommendation that may lead to enhanced quantity of fruits production by smallholder fruits farmers in Vhembe.	Evaluate strategies smallholder fruits farmers employed to enhance productivity and livelihood.	a) Survey questionnaire and existing records.	1. From analysed data.	Thematic content analysis.

Source: Author's computation 2013

3.7 Ethical Consideration

According to Resnit (2011) ethics are norms for conduct that distinguish between acceptable and unacceptable behaviour. They are methods, procedures and perspectives for deciding how to act and for analysing complex problems and issues. Ethical norms also help members of the discipline to coordinate their actions or activities and to establish the public trust of the discipline. For example ethical norms that govern conduct in the research studies are guidelines upon which each researcher ought to evaluate his own conduct, an aspect which should be borne in mind continuously (Resnit, 2011).

Permission was therefore requested from the University of Venda to collect data for research before data collection commenced. Permission to visit respondents and areas of research was requested from the relevant stake-holders such as the local traditional structures, chiefs, ward councillors and respondents before conducting the investigation. To ensure transparency, complete information about the nature and purpose of the research was communicated to the respondents to give them an option whether to take part in the process or not. Respondents were assured of the confidentiality of the research information given, and that such information would be used for research purposes and for recommendations to policy-makers. The aims and objectives of the research were also explained to the respondents. The advantages and disadvantages of participating in the study were also explained to the participants before data was collected. The fact that participation was voluntary and non-remunerable was also communicated to the respondents prior to data collection.

CHAPTER 4 RESEARCH FINDINGS AND ANALYSIS

4.1 INTRODUCTION

The aim of this study was to investigate causes of low fruit production by smallholder farmers in Vhembe District of Limpopo Province. This chapter provides socio-economic data analysis, factors affecting smallholder fruit farms and draws interpretations in line with the main objective of the study.

This subsection provides the research response rate achieved during data collection using the structured and unstructured questionnaire. It is also important to note that only smallholder fruit producing farmers of mango, avocado and macadamia fruit commodities were considered for survey. The number of smallholder fruit producers who participated in questionnaire survey is depicted in the Table 4.1 below

4.2 Population Demography

4.2.1 Number of participants in the survey

Table 4.1 below shows the total number of respondents in the survey. It shows that 224 respondents participated in the survey, meaning that the response rate was 100%.This means that majority of people were interested in the survey. This could also be explained to mean that smallholder fruit farmers were eager to know the challenges they faced and how they could be assisted.

Table 4.1 Number of participants in the survey

Famers	224
Total number of participants in the survey	224
Percentage response rate	100%

Source: Author data computation from 2013 survey

4.2.2 Percentage response rate of farmers per commodity.

Table 4.2 below depicts the response rate of mango, avocado and macadamia fruit commodity farmers from the study areas. The table shows that the majority of respondents were avocado farmers in Makhado Municipality (53.8%), while Thulamela Municipality came second (28.6%) and the least responses was from Mutale (17.6%). With regard to mango, Thulamela got the highest response (48%), followed by Makhado (42%) and lastly, Mutale (10%).For macadamia, most responses came from Thulamela (42.2%) followed by Makhado (31.3%) and lastly Mutale (26.5%).This means Mutale Municipality had the least number of respondents in all three sub-tropical fruit commodities.

Table 4. 2: Response rate of farmers per commodity.

Municipality	**Mango farmers**		**Avocado farmers**		**Macadamia farmers**	
	Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Makhado	21	42.0	49	53.8	26	31.3
Mutale	5	10.0	16	17.6	22	26.5
Thumamela	24	48.0	26	28.6	35	42.2
Total	50	100.0	91	100.0	83	100.0

Source: Author data computation from 2013 survey

4.3 Socio-Economic Characteristic of Smallholder Fruits Farmers

This section discusses the first objective, the socio-economic characteristics of the sample household in the study area. It is divided into two subsections. The first subsection provides the household structure or composition, farm profiles, means of communication, farm sizes, household experience in the farm, proportion of farmers satisfied with the quantity and quality of fruits produced. The second subsection provides factors affecting smallholder fruit farmers, which include: number of farmers with shortage of water as a result of unexploited irrigation opportunities, proportions of farmers who irrigated their crops, proportion of farmers who lacked marketing information, proportion of farmers who exported their crops, percentage of farmers travelling long distances to the market, lack of storage facilities, low input use by farmers, household land ownership, insects pest and diseases control, households reasons for not controlling pests, access roads and lack of practical management skills.

4.3.1 Household structure of Vhembe smallholder fruit farmers

Household structure refers to the way in which a household is structured including the number of all individuals who make such a household composition. Normally the head of the household is responsible for the coordination of the household activities. It was however, pertinent to include some attributes such as gender, age, household position, household size, education, occupational status and marital status. The first information with regard to the social standing was the gender composition.

4.3.1.1 Gender profile of Vhembe smallholder fruit farmers

Table 4.3 below, shows the proportion of gender by type of fruits. The table shows that on average, males dominated the fruit production across all the three fruit commodities in Vhembe District. The highest number of male farmers is in avocado farming with 69, followed by 66 in macadamia farms and 38 in mango producing farms. More female were found in avocado commodity farms (22) constituting 23.2 %, followed by macadamia (17) with 20.5% and lastly mango (12) with 24%. The significance of the results was that males dominate the smallholder fruit farms in Vhembe District and are regarded as the provider of livelihood in most household fruit producing structures of Vhembe District. The number of females participating in fruit production was significantly small which means there was still room for female entrepreneurs to participate and contribute towards the improvement of fruits farming in Vhembe District. In order to reduce the male to female ratio gap in smallholder sub-tropical fruit farms, it was therefore recommended that rigorous programs be developed to promote and encourage more females to become agricultural entrepreneurs with special focus on subtropical fruit farming in Vhembe District.

Table 4.3 Gender Profile of Vhembe smallholder fruit farmers

	Mango farmers		Avocado farmers		Macadamia farmers	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Males	38	76.0	69	76.8	66	79.5
Females	12	24.0	22	23.2	17	20.5
Totals	50	100.0	91	100.0	83	100.0

Source: Author data computation from 2013 survey

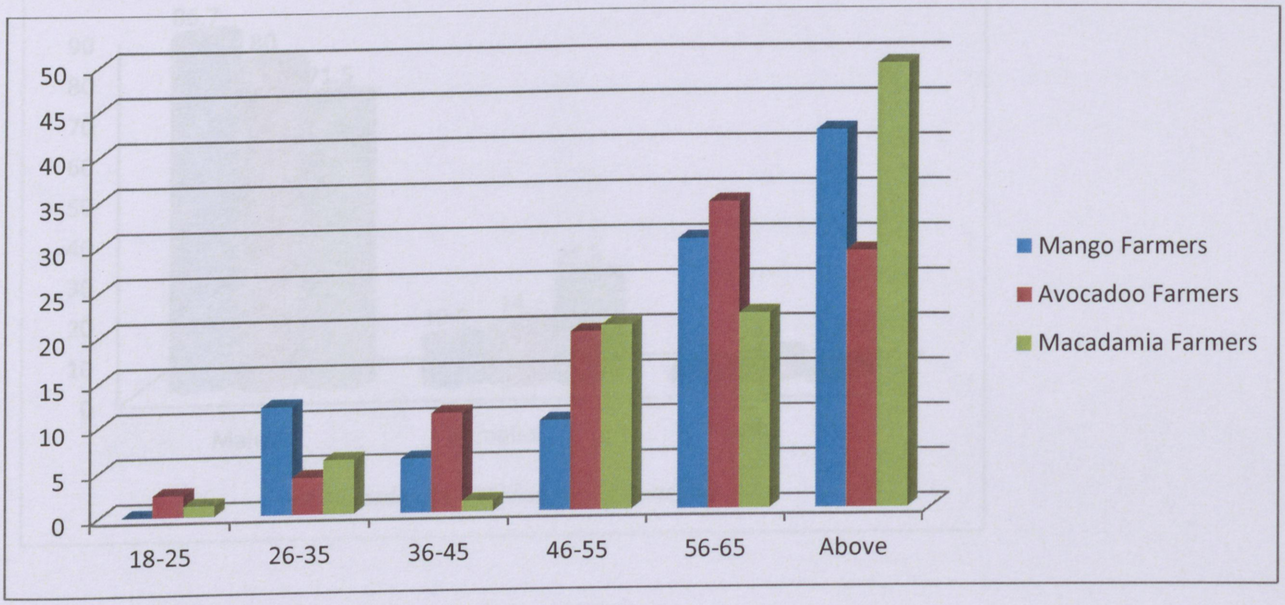
4.3.1.2 Age profile of respondents

Age profiles of the smallholder fruit farmers were considered important. The significance of age profile was to determine the different age groups which were involved in sub-tropical fruit production in the study area. Respondents were asked to fill the questionnaire in which they were asked to disclose their ages. Their age profile is depicted in Figure 2 below. Figure 2 indicates the proportion of ages of farmers interviewed by fruit type.
The survey revealed that most of the respondents were over 65 years old in all three fruit commodities (49.4%) macadamia, (42%) mango and (28.6%) avocado. The second age range of most respondents was between 56 and 60. This age range dominated the avocado farms (34.1%), followed by mango (30%) and lastly macadamia (27, 7%).

Respondents at the ages of between 46 and 55, dominated the macadamia farms (20.5%), followed by avocado commodity (19.8 %) and lastly mango (10%) fruit farmers at the age range of between 36 and 45 were in fourth position with avocado commodity (11%), followed by mango (3%) and lastly macadamia (1%). Those at the age range of between 26 and 35 showed their dominance to the mango farms (12%) followed by macadamia (6%) and lastly avocado (4.1%).

Respondents aged between 18 and 25 years were the least of all on the age range, and were more visible in avocado (2.4%) and macadamia (1%) farms only. The results of the study revealed that farms were occupied mostly by the aged and less active individuals while younger and more competent individuals had little or no farms. Since most farms were occupied by the aged and less active individuals, more farms remained unproductive and failed to sustain themselves due to low production. The solution to this is to develop programs that will stimulate the interests of youth to venture into sub-tropical fruit farming entrepreneurship and contribute towards job creation, economic growth and rural development

Figure 2: Age range of respondents



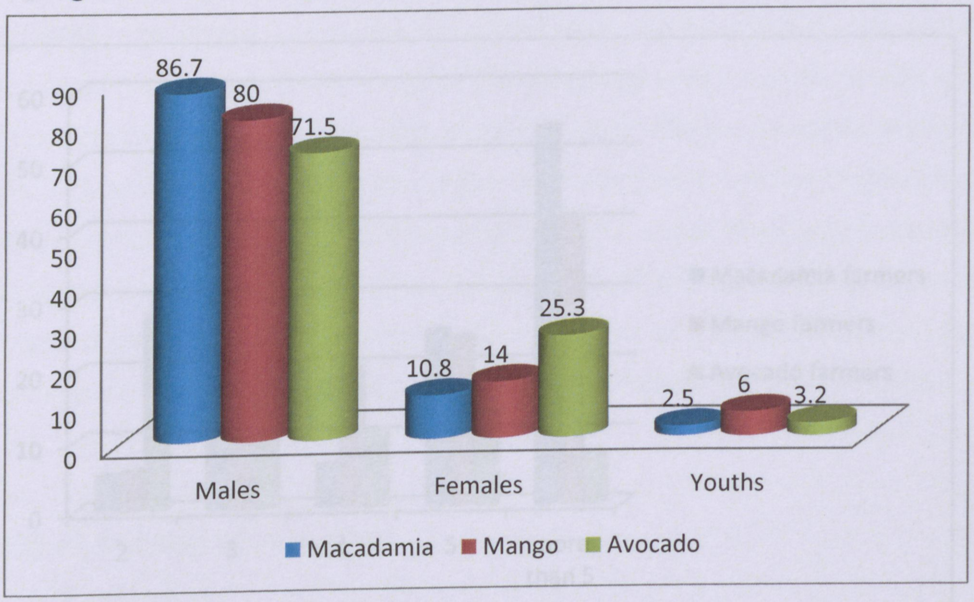
Source: Author data computation from 2013 survey

4.3.1.3 Household position

Figure 3 below depicts the proportion of household positions of sub-tropical fruit smallholder farmers of Vhembe District. Most households were headed by males in all three fruit commodities with macadamia (86.7%), followed by mango commodity (80%), and lastly avocado (71.5%).

The results of the study also revealed that female-headed households were fewer compared to males with avocado farms constituting 25.3%, while in mango and macadamia commodities female household heads constituted 14% and 10.8% respectively. The highest number of youth heading the households was in mango with 6% while the least was 2.5% from macadamia commodity. The significance of the results was that males dominated the sub-tropical smallholder fruit farms in Vhembe District and were regarded as the providers of livelihood in most household fruit producing structures of Vhembe District. This meant that provision of livelihood was still upon the shoulders of male households in Vhembe District. Therefore, the effects of low production was felt by most household fruit farmers as provision of livelihood and daily amenities by men was very limited.

Figure 3: Percentage of household position per commodity



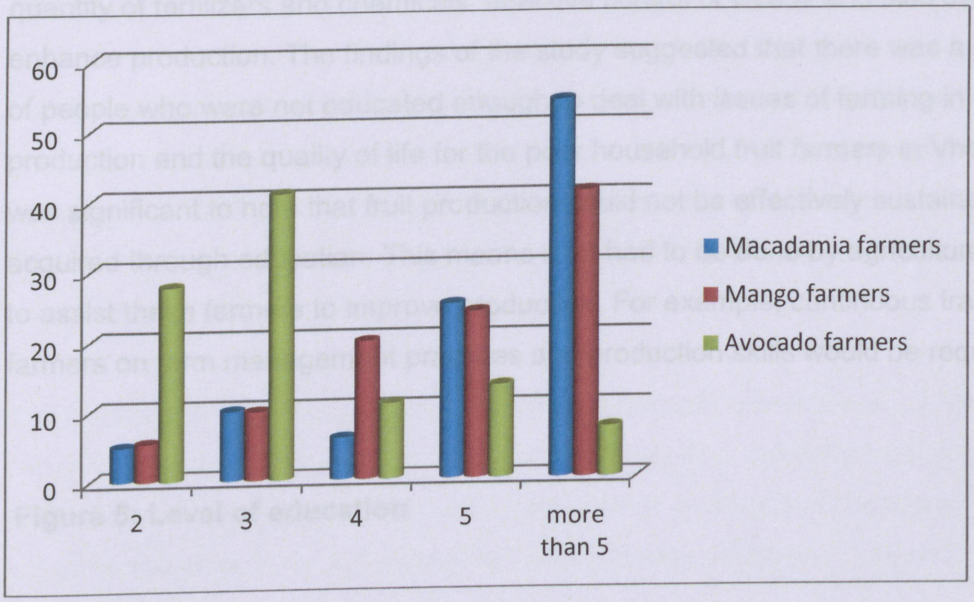
Source: Author data computation from 2013 survey

4.3.1.4 Household size

Household size refers to the number of people living in a household unit, comprising of man, woman, children and other relatives. The number of household in a family depends on the head and income provider for livelihood. Figure 4 below indicates the number of family members living in a household unit, ranging from two to more than five.

Figure 4, shows an average household size. Households with more than five family members dominated the macadamia commodity (54%), followed by mango (40%) and lastly avocado (6%).The second group of household size in dominance was the one with three family members which dominated the avocado farms (40.%), followed by macadamia commodity respondents (9%), and mango (8%). The significance of these results was that most household fruit farmers still regarded farming as their source of livelihood on which the whole family unit could depend. Household members could assist each other in the farm by working as a family unit in order to reduce the costs of labour and enhance productivity. However, low productivity had an effect on the household families since little income could be generated and their daily livelihood could not be catered for.

Figure 4: Household size



Source: Author data computation from 2013 survey

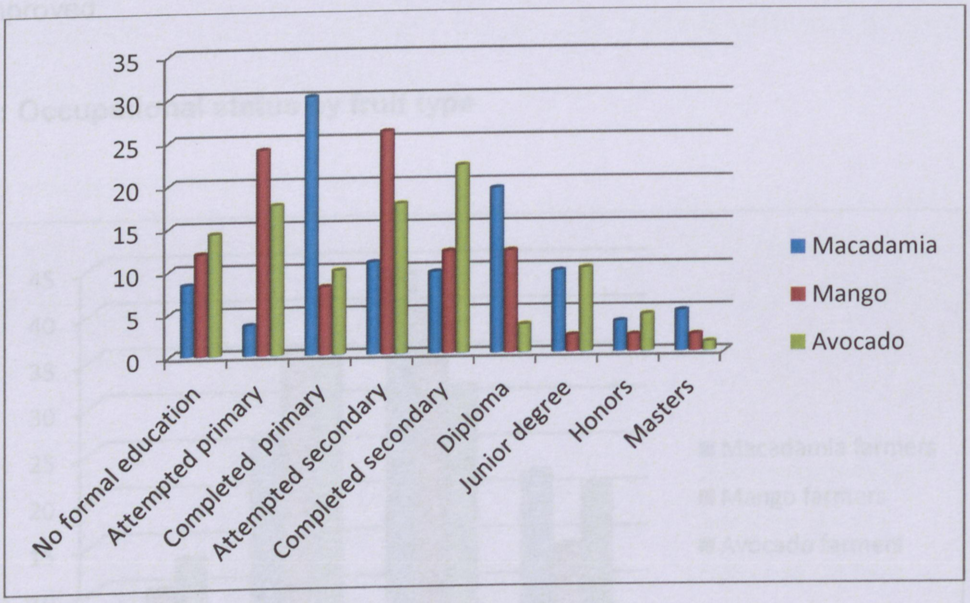
4.3.1.5 Highest Education

The level of education was another important social variable investigated among smallholder fruit farmers. Figure 5 below provides a breakdown of respondents' levels of education starting from no formal education to masters degrees.

Figure 5 shows that a total average of household level of education ranged from no formal education to masters degrees. Results of the investigation revealed that most of the farmers especially those in macadamia farms had only completed primary education (30%), followed by those in avocado (9.9%) and lastly those in mango (8 %). Households which attempted secondary schooling came second in number and dominated the mango farming (26%), followed by avocado farmers (17.6%), and lastly macadamia (10.8%).Those who had completed secondary education showed their dominance in the avocado farms (22%), followed by mango (12%) and lastly macadamia (9.6%). Household fruit farmers with junior degrees were also mostly found in avocado (9.9 %), followed by macadamia (9.6%) and mango (2%).

Farmers with highest qualification of the masters' degrees constituted the lowest percentage, in all three fruit commodities. For example: 1.1% in avocado, 2.0% in mango, and 4.8% in macadamia farms. Those with the highest level of education such as junior and Masters degrees were very few and were the only ones who had the capacity to deal with sophisticated matters related to farming such as mulching of trees, applying the right quantity of fertilizers and chemicals, effective control of weeds and also using chemicals to enhance production. The findings of the study suggested that there was a significant number of people who were not educated enough to deal with issues of farming in order to improve production and the quality of life for the poor household fruit farmers in Vhembe District. It was significant to note that fruit production could not be effectively sustainable without skills acquired through education. This means a lot had to be done by agricultural officials in order to assist these farmers to improve production. For example, continuous training of these farmers on farm management practices and production skills would be required.

Figure 5: Level of education



Source: Author `s computation from survey data 2013

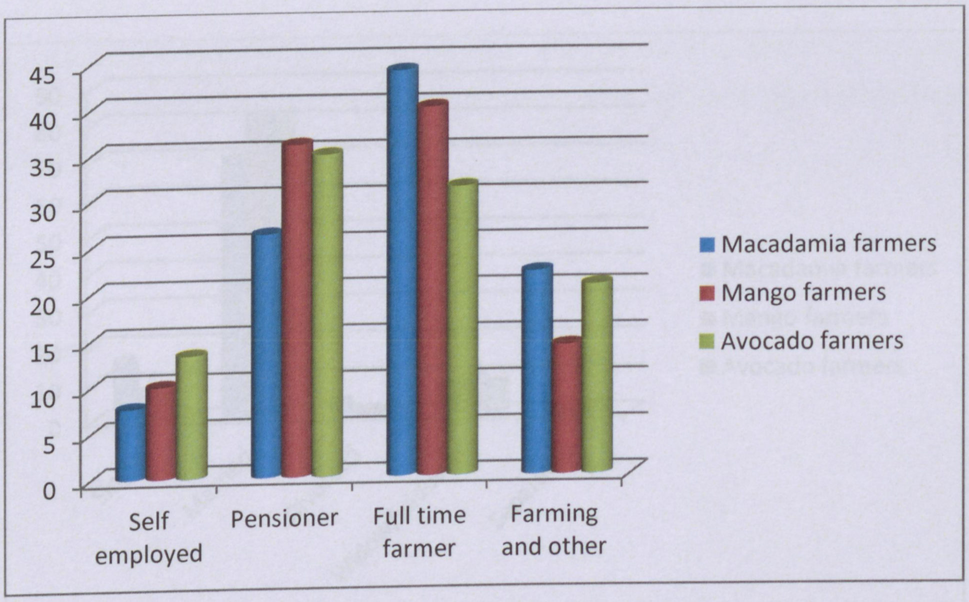
4.3.1.6 Occupational Status

Several occupational statuses were recorded from respondents during the survey. These included self-employed households, pensioners, full time farmers, and those who were doing farming and other jobs. From figure 6, it is evident that those who were full time farmers were in the majority in all three fruit commodity farms with macadamia on top (44%), followed by mango (40%) and lastly avocados (31.3%). Pensioners came second, and dominated the mango commodity farms (36%), avocado (34.9%) and lastly macadamia 26.3%.

Households which were doing farming and other work came third in number with 22% of macadamia in dominance, followed by avocado (20.5%) and lastly mango (14%).This category included teachers, clerks and magistrates doing farming on a part time basis. Those who were self-employed constituted (13.3%) of household in avocado farms (10%) in mango and (7.7%) in macadamia.

The results of the survey indicated that the majority of farmers were full time and their commitment signified the fact that they solely depended on income generated from farming. In this case, low production had serious social and economic implications as farmers could not generate income for a sustainable living and their social and economic conditions would not be improved.

Figure 6: Occupational status by fruit type



Source: Author`s computation from survey data 2013

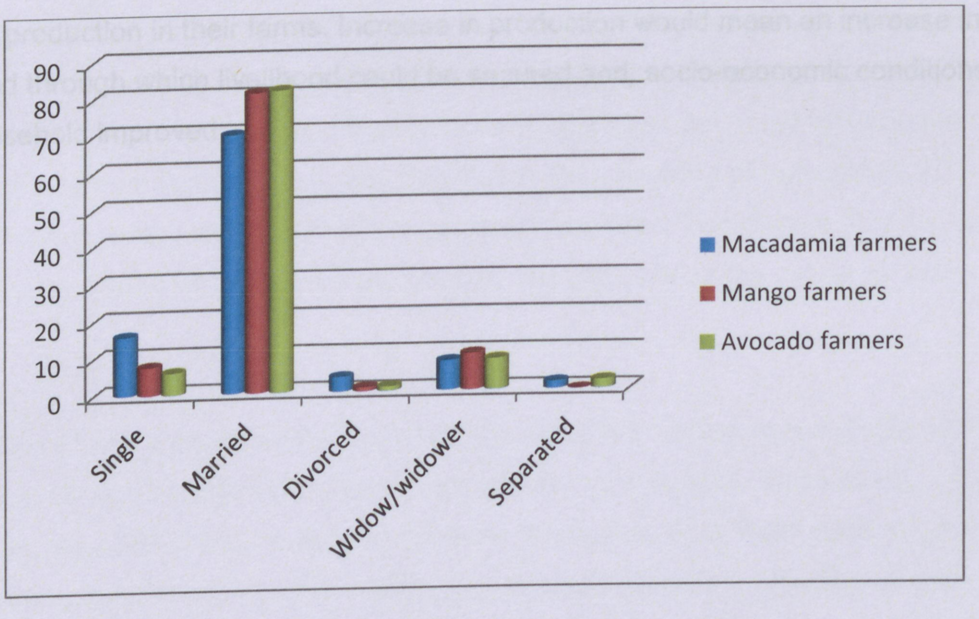
4.3.1.7 Marital status

Marital status was considered important in establishing the socio-economic status of the respondents. Figure 7 shows the distribution of the respondent`s marital status. This included single, married, divorced, widow/widower and the separated.

In figure 7 below, most farms were dominated by married people in all three fruit commodities. The highest percentage of married people was in avocado farms (81.9%), followed by mango farms with 80% while in macadamia, percentage of married people was 69.9%.Those, who were single constituted 16%, and were in the macadamia farming.

The significance of the results was that the involvement of both married and unmarried households in farming suggested the fact that their families depended on farming for income generation and social up-liftment. But involvement in farming without production inputs to increase production as it was the case with the majority of smallholder fruit farmers led to low production and unsustainable farming.

Figure 7: Households Marital status



Source: Author computation from survey data 2013

4.3.2 Farms profiles

In farm profile, the following were investigated: assistance offered in the farm, means of communication, size of the farm, duration of years in farming, satisfaction with quantity of fruits produced.

4.3.2.1 Farm workers

Table 4.4 below shows the proportion of workers in household fruit farms. A total average of household farm workers ranged from one to five and above. Results of the study showed that households' fruit farmers with two workers were in a majority and dominated macadamia commodity.

(45%), followed by household farms with one worker (28.6%) where avocado commodity farms dominated. It is critical to note that where there was one or two workers in the farm, the possibility was that it might be a husband and wife or the husband/wife working alone as the owners of the farm. Farms with more than five workers only constituted 22.0%. These were strong indications that there was a serious shortage of labour, a constraint which hampered the enhancement of production in the farms.
Provision of labour with subsidy incentives by government could help smallholder farmers to increase production in their farms. Increase in production would mean an increase in income generated through which livelihood could be secured and, socio-economic conditions for rural household improved.

Table 4.4: Farm workers

	Mango farmers		Avocado farmers		Macadamia farmers	
No. of workers	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	10	20.	26	28.6	21	25.3
2	19	38.	31	34.1	37	45
3	8	16.	10	11.	9	10.1
4	2	4.	4	4.4	10	12.4
5>	11	22.	20	22.	6	7.2
Total	50	100	91	100	83	100.0

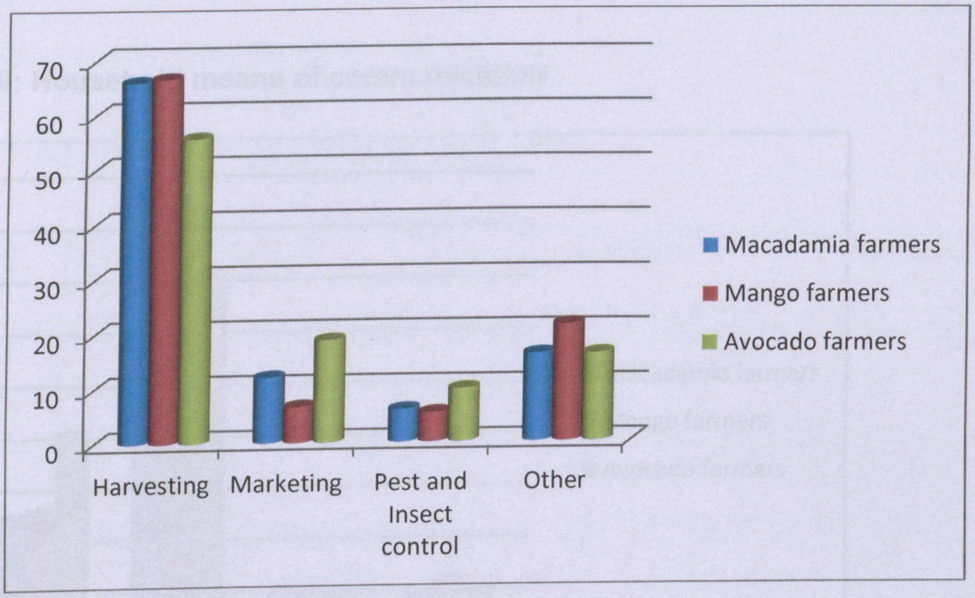
Source : Author`s computation from survey data 2013

4.3.2.2 Nature of assistance offered in the farm

Figure 8 below, shows the proportion of nature of assistance household fruit farmers needed in their farms. Over 66% of household fruit farmers indicated that assistance from farm workers was mostly needed during fruit harvesting. Eighteen per cent (18%) of them showed that assistance from farm workers was required in the marketing of fruits, while 9.7% indicated during pests, insects and diseases control periods. Twenty-one (21) per cent indicated other duties which were weed control, pruning or tilling the orchards/ farms.

The results of the survey indicated that shortage of full time labour in smallholder fruit farms was critical, although seasonal workers were sometimes available. This means, without full time labour, very little could be done to increase production since fruits were to be prepared from flowering until harvesting. For example, weeding, fertilization, irrigation, pests and disease control - all these, needed more labour and failure to secure labour could adversely affect production and income.

Figure 8: Nature of assistance offered in the farm

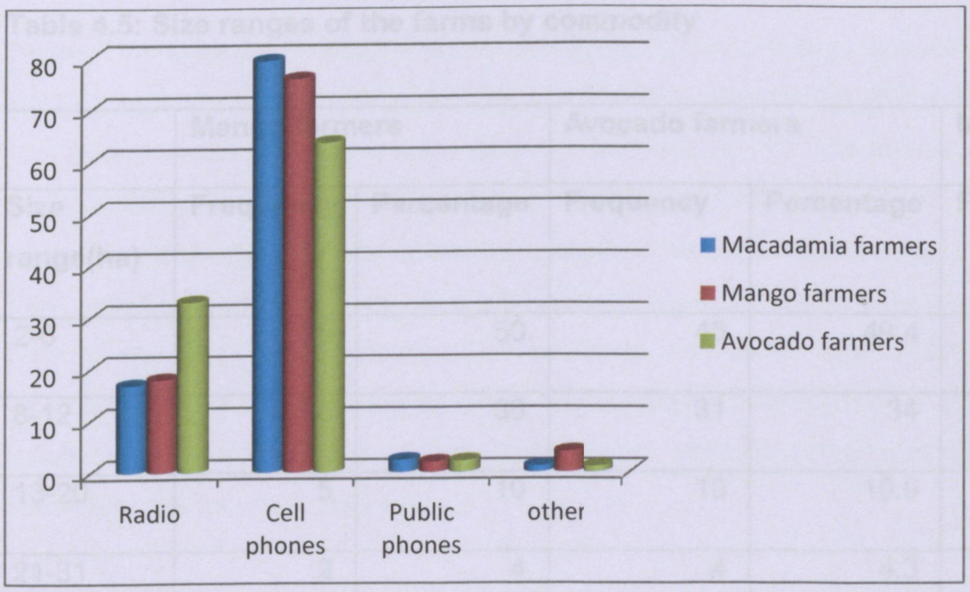


Source: Author`s Computation from survey data 2013

4.3.2.3 Means of communication

Communication infrastructure was critical in this study as farming needs information in order to be abreast with new planting and marketing information. Figure 9 shows the means of communication which fruit farmers use to get in touch with other stakeholders on farming related issues. Figure 9 revealed that an average proportion of household fruit farmers in all three commodities used cell phones as a means of communication. The highest percentage was in macadamia farms, 79.5%, followed by mango farmers, 76%, and then avocado, 63.7%. Those who used public phones constitute 2.4%. Those who received farming information by other means such as the word of mouth, friends, or newsletters constituted 4% and were mostly found in mango commodity. Those who listened to radio in order to get farming and marketing information dominated the avocado commodity with 33%, followed by mango (18%) and macadamia (16.9%) producing farms. The significance of the results showed that communication infrastructure was also vital in smallholder fruit farms, but remained a constraint in many smallholder fruit farmers of Vhembe District. Therefore, the use of cell phones is recommended to smallholder fruit farmers to make contact with the business world as telecommunication lines are not available in their farms.

Figure 9: Household means of communication



Source: Author`s Computation from survey data 2013

4.3.2.4 Size ranges of the farms

Table 4.5: Size ranges of the farms by commodity

	Mango farmers		Avocado farmers		Macadamia farmers	
Size range(ha)	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
2-6	25	50	45	49.4	40	48.1
8-12	18	36	31	34	32	38.5
13-20	5	10	10	10.9	8	9.6
21-31	2	4	4	4.3	1	1.2
32-34	0	0	1	1.1	1	1.2
35-38	0	0	0	0	1	1.2

Source: Author`s computation from survey data 2013

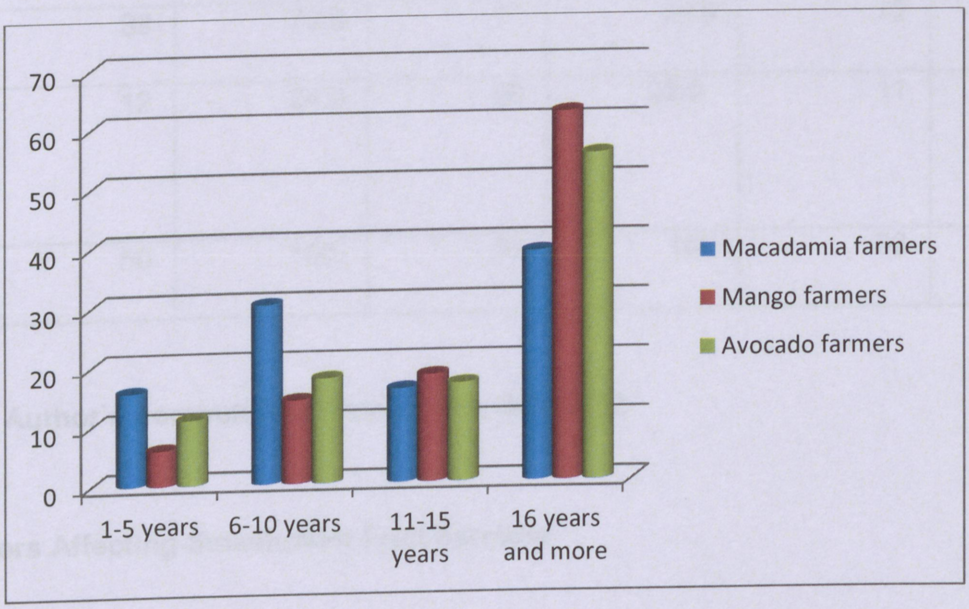
Table 4.5 shows different farm size ranges of Vhembe smallholder fruit farms. Farm size ranges started from two to six hectares (ha) on top of the table to 35-38 hectares at the bottom of the table. In the first farm size range (2-6 hectares) mango commodity tops the table by (50%) followed by avocado (49%) and lastly macadamia nuts (48.1%). In the second range (8-12 hectares) macadamia nuts dominate (38.5%) followed by mango commodity respondents (36%) (and lastly avocado (34%).From the third size range of the farms (13-20 hectares) avocados dominate (10.9%) followed by mango (10%) and lastly macadamia (9.6%).The fourth farm size ranging 21-31 hectares was dominated by avocado commodity respondents (4.3%) followed by mango (4%) and lastly macadamia (1.2%). From the fifth and sixth farm size ranges (32-34 and 35-38 hectares) macadamia nuts constitute 1.2% followed by avocado with 1.1% while mango commodity was non-existent. Results of the study showed that many smallholder subtropical fruit farms were in the first two size ranges of 2-6 (50) and 8-12 (38.5%) while very few farmers (1.2%) occupied farms ranging from 32-38 hectares. This can be translated to the fact that there were no big farms in

Vhembe District as smallholder sub-tropical fruit farmers dominated the first and second ranges of 2 to 12 hectares.

4.3.2.5. Households years of experience in the farm

Figure 10 shows the number of years farmers had been actively involved in farming, ranging from one to over sixteen. Results of the investigation revealed that the majority of household fruit farmers had sixteen years and above in fruit farming in all the three commodities with mango leading (60%) followed by avocado (52%) and lastly mango (38%). By virtue of their vast experience gained in fruit farming, results of the investigation suggested the fact that they were in a good position to deal with some of the critical issues they came across in farming in order to increase production and generate income for a living. However, lower production was a result of shortage of production inputs due to lack of funds and infrastructure. Assistance in the form of subsidy on production inputs is needed to assist these farmers increase production.

Figure 10: Households years of experience in farming



Source: Author`s Computation from survey data 2013

4.3.2.6 Proportion of farmers who were satisfied with quantity and quality of fruits produced

Table 4.6, shows the proportion of farmers' responses with the quantity and quality of fruits produced in their farms. The majority of the farmers indicated that they were not satisfied with the quantity and quality of fruits produced in all three commodities. Most of the dissatisfaction came from macadamia (86.8%), followed by avocado (78%) and lastly mango (76%). Only few farmers (24%) indicated their satisfaction with the quantity of fruits produced and were dominantly found in mango. Causes of low fruit production could be shortage of water, poor insects and diseases control and lack of additional supplements.

Table 4.6 : Proportion of farmers who were satisfied with quantity and quality of fruits produced

	Mango farmers		Avocado farmers		Macadamia farmers	
	Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
No	38	76.0	71	78.0	72	86.8
Yes	12	24.0	20	22.0	11	13.2
Total	50	100.	91	100	83	100

Source: Author`s computation from survey data 2013

4.4 Factors Affecting Smallholder Fruit Farmers

4.4.1 Introduction

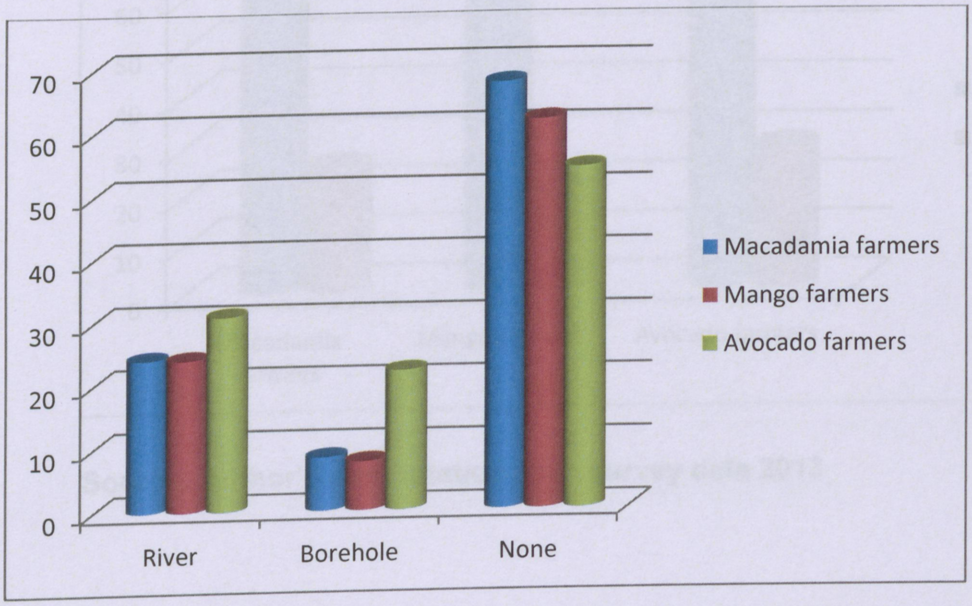
In order to satisfy the second specific objective of the study, factors affecting fruit productivity by smallholder fruit farmers in Vhembe District were investigated. This subsection provide the results of the investigation, namely, shortage of irrigation water in smallholder fruit farms, lack of market and marketing information, lack of crop supplements to enhance production, ownership of land, diseases and insect pests control, high input prices and access to roads.

4.4. 2 Number of farmers with shortage of water

Figure 11 shows different options of water sources available for fruit farmers' irrigation. From the table below, it is clear among all three smallholder fruit farming that shortage of water was a serious challenge in the Vhembe District. The majority of household fruit farmers for all three fruit commodities had limited access to water, with macadamia topping the list with (67.5%), followed by mango (61.6%), and lastly avocado (54%).

Farms which had access to water from the river source constitute 30.8% and were mostly found in avocado farms. Twenty-two (22%) per cent of the farms used bore-hole water. The high number of farmers without irrigation water was an indication that shortage of water was a critical constraint which needed to be addressed in order to enhance farmers' productivity.

Figure 11: Number of farmers with shortage of water as a result of unexploited irrigation opportunities

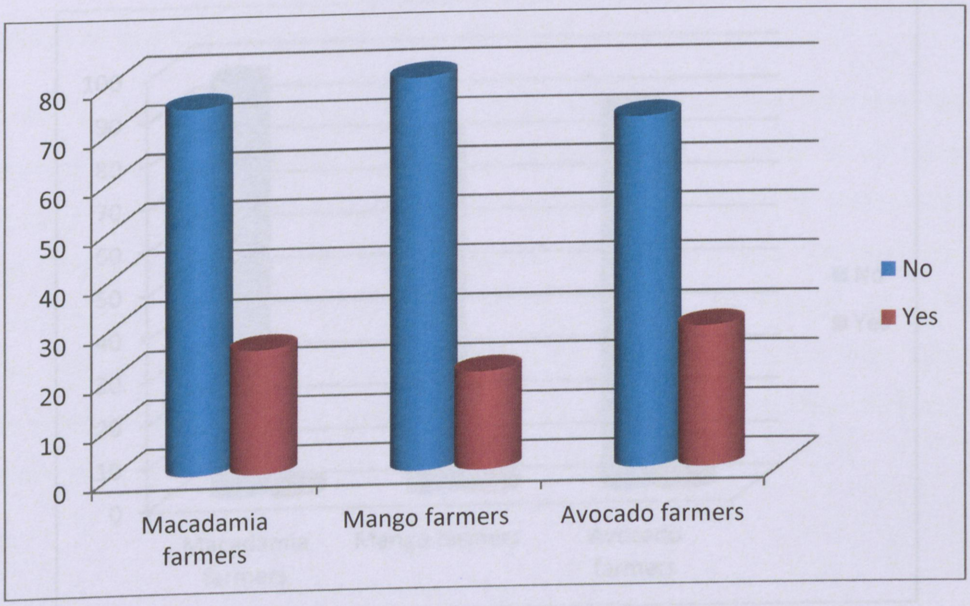


Source: Author`s Computation from survey data 2013

4.4. 3 Proportion of farmers who irrigated their crops

Figure 12 below, shows a high percentage of farmers who did not irrigate their trees. Out of the total respondents of 224, the majority did not have irrigation infrastructure with 80% mango farmers, 74.7% macadamia farmers and 71% avocado farmers. Farms with irrigation infrastructure constituted only 28.6% and were dominated by the avocado farms. The biggest percentage of famers who did not irrigate indicates that water is a serious constraint contributing to their low fruit production. Lack of irrigation had seriously contributed to smallholder farmers' low fruit production through which they could generate income for livelihood.

Figure 12: Proportion of farmers who irrigated their crops

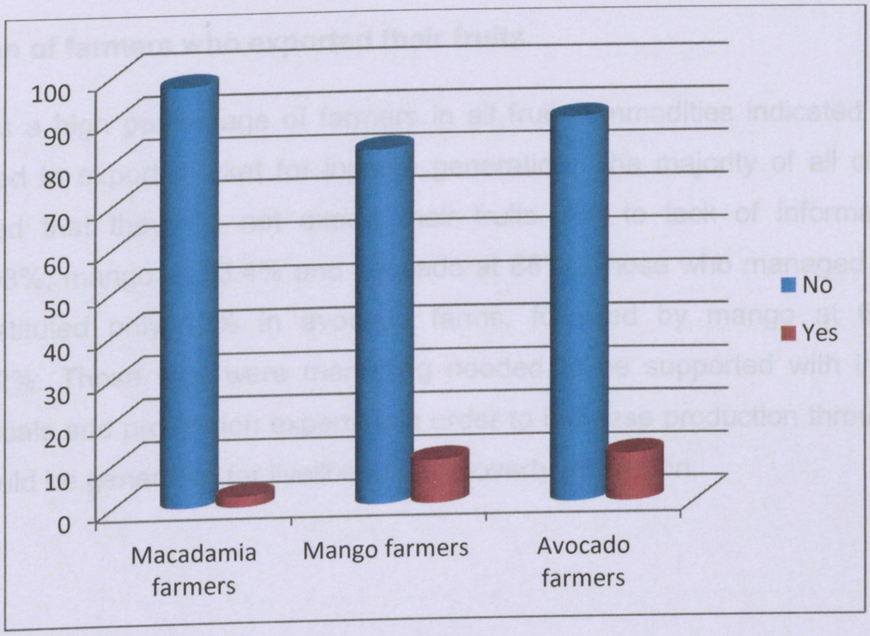


Source: Author`s computation from survey data 2013

4.4. 4 Proportion of farmers with limited access to marketing information

Marketing of crops was very important for farmers in order to generate income for the sustenance of the household and the farm. Figure 13 indicates the number of farmers with limited access to marketing information. A high percentage of farmers in all fruit commodities indicated to have limited access to marketing information and as a result they did not market their crops to national markets. During the interview, 97.5% of macadamia farmers indicated that they did not market crops, while for avocado farmers, 89% also indicated that they did not market crops at national markets, which is similar to mangoes with 82%. Farmers cited limited access to marketing information as a cause of concern. Those who marketed their crops at national markets constituted only 18% and were mostly found in mango commodity farms, followed by avocado and macadamia with 11% and 2.5% respectively. If a high percentage of farmers did not market, they could not generate income for sustainable livelihood and poverty alleviation.

Figure 13: Proportion of farmers with limited access to marketing information

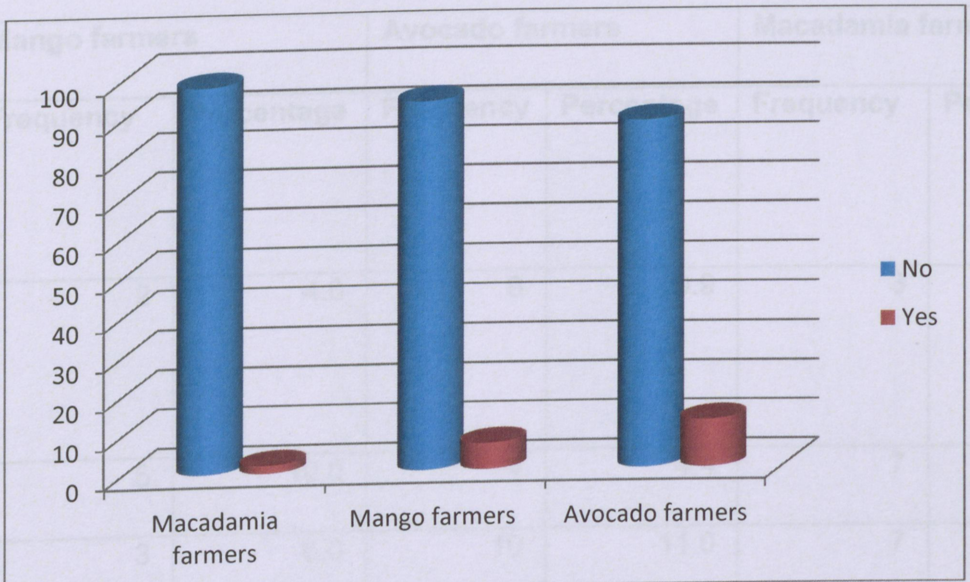


Source: Author`s computation from survey data 2013

4.4. 5 Proportion of farmers who exported their fruits

Figure 14 shows a high percentage of farmers in all fruit commodities indicated that they were not involved in export market for income generation. The majority of all commodity farmers indicated that they did not export their fruits due to lack of information with macadamia at 98%, mango at 93.4% and avocado at 88%. Those who managed to export their fruits constituted only 12% in avocado farms, followed by mango at 6.6% and macadamia at 2%. Those who were marketing needed to be supported with inputs like fertilizers, chemicals and production expertise in order to increase production through which more income could be generated for livelihood and poverty alleviation.

Figure 14: Proportion of farmers who exported their fruits



Source: Author`s Computation from survey data 2013

4.4. 6 Percentage of farmers` distance to market

Table 4.7 below depicts the proportion of smallholder fruit farmers' travel distance in order to access the nearest market. The majority of fruit farmers travelled more than 25 Km to access the market with; mango farmers at 80%, avocado at 74.7% and macadamia at 79.8%. Even if market and marketing information ware available, transportation of crops to the market could be an expensive exercise because of the distance to be covered during transportation of crops. Farmers' households who indicated that the distance to market was less than a kilometre were only 9.9% and mostly found in avocado commodity. The significance of the results suggested transport as a critical factor contributing to low production.

Table 4.7: Percentage of farmer`s travel distance to market

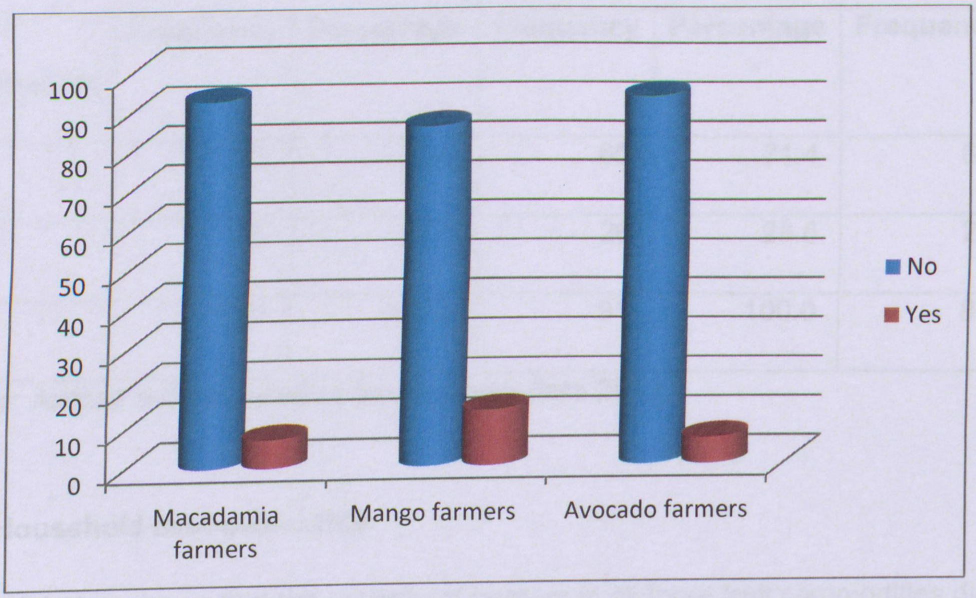
	Mango farmers		Avocado farmers		Macadamia farmers	
Distance to market	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
less than 1km	2	4.0	9	9.9	3	3.4
10km	5	10.0	4	4.4	7	8.4
10-20 km	3	6.0	10	11.0	7	8.4
more than 25km	40	80.0	68	74.7	66	79.8
Total	50	100	91	100	83	100.0

Source: Author`s computation from survey data 2013

4.4.7 Lack of storage facilities

Figure 15 below shows that most of the farmers in all three commodities did not have storage facilities for their fruits. Most of the farmers were in avocado commodity (93.4%), followed by macadamia at 92.8% and mango at 86%. Very few had the storage facilities, constituting14% in mango, 7.2% in macadamia and 6.6% in avocado. Lack of storage facilities was also a critical constraint which was discouraging smallholder farmers to produce more fruits in order to avoid the risks of losing capital when fruits get perished.

Figure15: Lack of storage facilities



Source: Author`s Computation from survey data 2013

4.4.8 Low input use by smallholder farmers.

Table 4.8 below shows that most of smallholder fruit farmers in all three commodities (75.9%) in macadamia, 71.4% in avocado and 70% in mango) did not give their fruit trees supplements in order to enhance production. Those who used crop supplements were very few constituting 30% in mango, 28.6% in avocado and 24.% in macadamia nuts. From the findings of the research shown in the table above, it was evident that the shortage of fertilizers contributed greatly to farmer`s low production. Shortage of fertilizers limited the farmer`s opportunity to enhance production.

Table 4.8: Low input use by smallholder farmers.

	Mango farmers		Avocado farmers		Macadamia farmers	
Crop supplements	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
No	35	70.0	65	71.4	63	75.9
Yes	15	30.0	26	28.6	20	24.1
Total	50	100.0	91	100.0	83	100.0

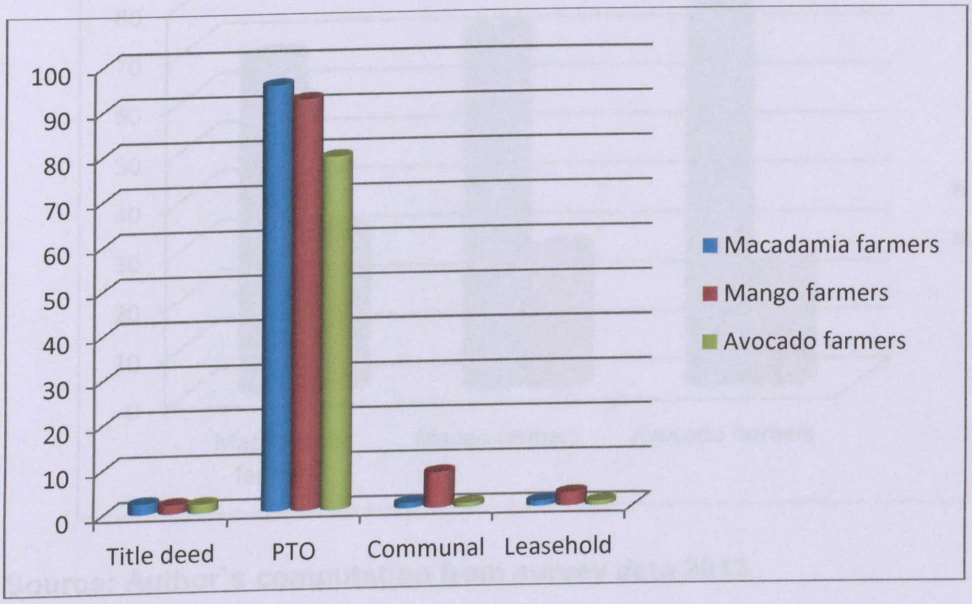
Source: Author`s Computation from survey data 2013

4.4. 9 Household land ownership

Figure 16 below shows that the majority of farmers in all three fruit commodities did not have the title deeds, but possessed the permissions to occupy documents as the legal documents for land ownership rights. Macadamia farmers (95.2%) were the most affected, followed by mango (92%) and lastly avocado (78 %). Only 0.4% had title deeds, communal (0.8%) and leasehold (0.5%). Land was one of the critical factors of production in agricultural farming. The availability of more land could mean large volumes or quantities of fruits produced by farmers through which more income could be generated for livelihood and social and economic up-liftment.

Furthermore, results of the survey revealed smallholder fruit farm sizes ranging from the smallest (2 ha) to the biggest (38 ha). The majority of household fruit farms were in the ranges of between two and six hectares and eight to twelve (8-12) hectares in size. Land tenure insecurity prohibited smallholder farmers from expanding to bigger land units. The significance of the results was that the land tenure insecurity factor had a direct effect on production. This means the size of farms prohibited production of large volumes of fruits. Smallholder fruit farmers were confined to farm lands ranging from two to twenty hectares, which was another factor contributing to low fruit production.

Figure 16: Household Land ownership

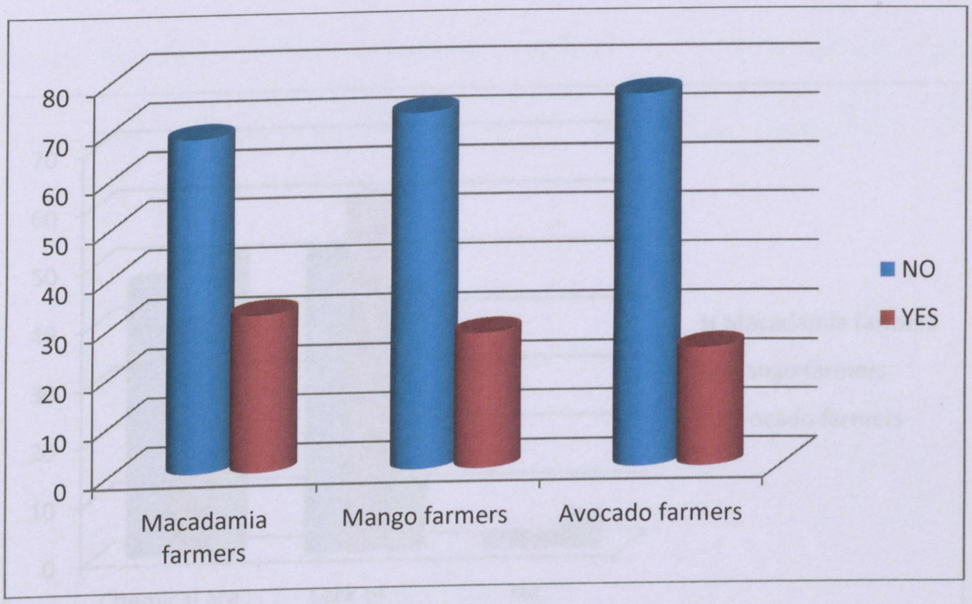


Source: Author`s Computation

4.4. 10 Insects pests and disease control

Figure17 depicts farmers' responses to questions related to pests and insects control in Vhembe District. In Figure17 below, the highest percentage of farmers in all three commodities indicated that they did not control pests and diseases with avocado farms dominating the table by 75.9% followed by mango farms with 72.5%. Macadamia came last with 68%. Few managed to control and were mostly in macadamia 32% followed by mango 27.5% and lastly avocado 24.1%. Results of the survey revealed that control of pests in smallholder farms was a serious constraint due to high prices of chemicals and lack of funds. Failure to control pests and diseases as a result of lack of funds and high prices of chemicals had a serious effect on smallholder farmers as this had a direct effect on their fruit production.

Figure 17: Insects pests and disease control

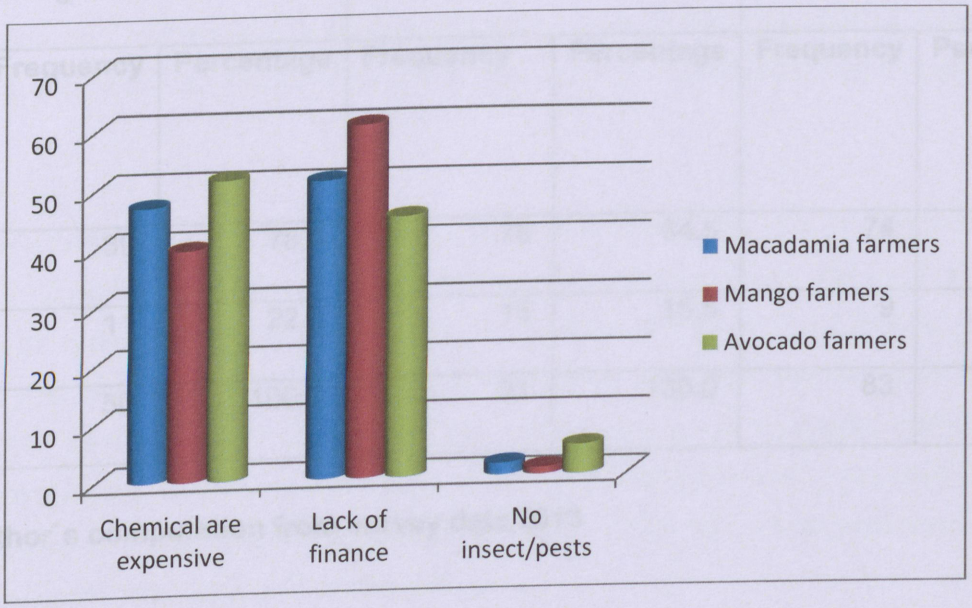


Source: Author`s computation from survey data 2013

4.4.11 Households reasons for not controlling pests

Figure 18 below depicts farmer`s view with regard to pests control. The majority of farmers who did not control pests cited lack of funds as a constraint: 64.1% mango, 55% avocado and 46% macadamia. Farmers who cited expensive chemicals constituted 55% avocado, 48% macadamia and 39% mango. Those who indicated that there were no pests were constituted only 5% in avocado, (3%) macadamia and (2%) mango. Results of the survey revealed that control of pests in smallholder farms was a serious constraint to fruit production due to high prices of chemicals and lack of funds. Failure to control pests and diseases as a result of lack of funds and high prices of chemicals had a serious effect on smallholder farmers as this had a direct effect on their fruit production major constraints which made chemicals unaffordable to them in order to control insects, pests and diseases. Only 5% of avocado farms indicated that they did not put control measures in place because there were no pests and insects in their areas. Failure to control insects, pests and diseases exposed the fruits to numerous attacks and as a result more fruits were lost leading to low production.

Figure 18: Households reasons for not controlling pests



Source: Author`s computation from survey data 2013

4.4.12 Access roads

Table 4.9 shows that 89.2% of macadamia, 84.5% avocado, and 78% mango farms do not have access to proper roads, while 10.8% of macadamia, 22% mango, and 16.5% avocado farms used tarred roads. Access roads infrastructure was a serious constraint as farmers could not be able to get their crops to markets and production inputs to their farms. From the table below, it was clear that access to smallholder farms was a serious challenge as most of the roads were not tarred.

Table 4.9: Access roads

	Mango farmers		Avocado farmers		Macadamia farmers	
Is the road tarred	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
No	39	78.0	76	84.5	74	89.2
Yes	11	22.0	15	16.5	9	10.8
Total	50	100.0	91	100.0	83	100

Source: Author`s computation from survey data 2013

4.4.13 Lack of practical management skills by smallholder fruit farmers

In order to get qualitative information, six field visits were made, two in each municipality. Field observations were used in order to study the management and cultivation practices of sub-tropical fruit trees. This was done in order to have a clearer picture and understanding of what smallholder fruit farmers were doing for the purpose of taking informed decisions in determining whether smallholder farming practices were contributing to land degradation which exacerbated poor fruit production.

During field visits, it was discovered that farmers were ignorant of key farming management practices such as weed control (Appendix 1 below), pruning and mulching to enhance production. This is corroborated by Tshikhudo (2005). Neglecting weed control could land a farmer into serious trouble as the farm could completely burn out as a result of veld fires. Appendix 2 below illustrates the damage caused by fire due to ignorance of weed control. Farmers also lacked control of insects, pests and diseases on the little fruits that they had as most of the fruits were attacked by insects and diseases and fell down (Appendix 3). Another observation was that despite the difficult circumstances under which smallholder fruit farmers were working, fruit production had the potential to thrive well if good agricultural management practices could be applied as demonstrated in (Appendix 4).

4.5 Smallholder Fruit Production And Income Trends

4.5.1 Fruit production trends

Fruit production and income trends were analysed in order to find out whether there was consistency in production and income generated by household smallholder fruit farmers.

4.5.2 Avocado

Figure 19 below depicts production trends of three fruit commodities: mango, avocado and macadamia in Vhembe District for the past five years starting from 2008 until 2012. Results of the survey indicated that in 2008, production of avocado fruit rose to 187 227 tons. During the following year farmers experienced high fruit yield when production increased by 76 886 tons to 264 113 tons in 2009. In 2010 production decreased by 77 999 tons, that is from 264113 to 186114 tons. In 2011 farmers experienced some fruit production increases again when the yield rose to 208 727 tons. On the fifth year, 2012, farmers experienced some loses when fruit production dropped to 194 537 tons.

Although avocado producing farmers received the highest quantity of tons during the last combined five years, results of the study suggested that there was inconsistency with regard to avocado production yields. Inconsistency occurred as a result of factors such as lack of irrigation water as most of farms were rain fed, lack of crop supplements to enhance production and lack of pest control since farmers indicated lack of funds and expensive chemicals.

4.5.3 Mango

From 2008 to 2010 mango producing farmers experienced some fruit losses. This is shown by the reduction in fruit yield (19 556 tons) during the years 2009 and 2010. In 2011 production improved slightly and rose to 237 722 tons, only to drop further by 28 633 tons during the following year. Although mango producing farmers received the second highest quantity of tons during the last combined five years, results of the study suggested that there was inconsistency with regard to mango production yields. Fruit production was never stable nor indicated an upward and vigorous movement which signalled better fruit yields.

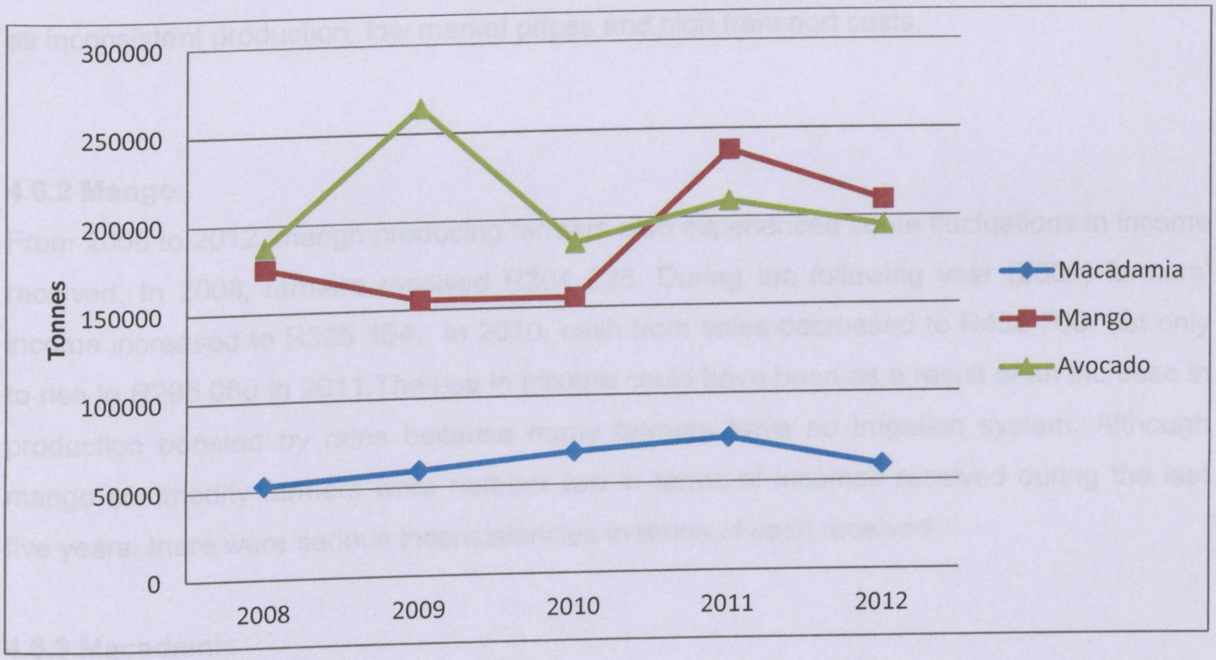
Like in avocado, inconsistency had been caused by many factors such as lack of irrigation water as most of the farms were rain fed, lack of crop supplements or fertilizers to enhance production and lack of pest control due to lack of finance since farmers indicated that chemicals were expensive.

4.5.4 Macadamia

Results of the study revealed that macadamia commodity was the least in terms of the yield for the past five years compared to mango and avocado. For example, in 2008 production was 52 845 tons, while in 2009 it increased by 6416 to 59 261 tons. In 2010, production rose to 68 127 tons and again to 74 643 tons in 2011.

Results of the study also revealed that, though production of macadamia was the least of them all in Figure 19 below; there was a steady increase in yield for this commodity for the past four years. It was however only in 2012 where farmers experienced some loses when production decreased to 58 688 tons, a decline in production by 15 955 tons.

Figure19: Households fruit production trends from 2008 to 2012



Source: Author`s computation from survey data 2013

4.6 Income Trends

4.6.1 Avocado

Figure 20 below, depicts the income generated from mango, avocado and macadamia fruit commodities in the past five years from 2008 until 2012. Results of the study with regard to income received from fruit sales indicated that in 2008, income generated from sales of avocado fruit rose to R501 300. During the following year, farmers experienced a downward shift in income received by R94 510, that is, from R501 300 to R406 790.

In 2010, income received from sales increased by R30 350 to R437 140. In 2011 farmers experienced some increases in income again when income rose to R 476 060. On the fifth year, 2012 farmers experienced loss when income dropped to R350 757. Although avocado producing farmers received the highest income from sales during the last combined five years, results of the study suggested that there was inconsistency with regard to incomes received. Inconsistencies in income received might have been caused by many factors such as inconsistent production, low market prices and high transport costs.

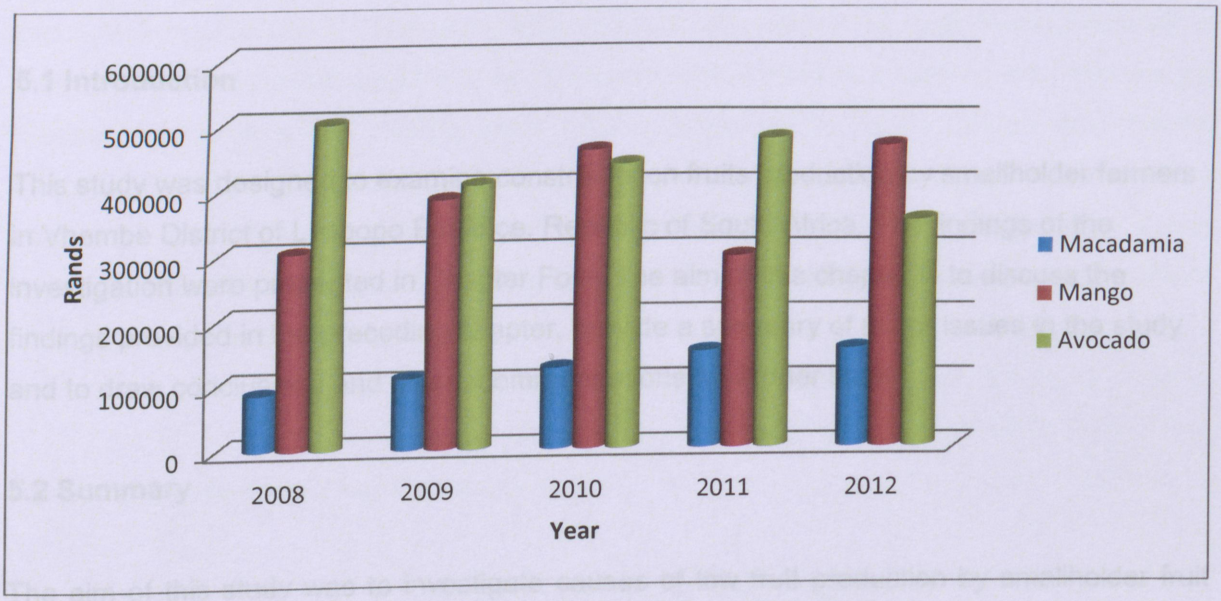
4.6.2 Mango

From 2008 to 2012, mango producing farmers also experienced some fluctuations in income received. In 2008, farmers received R304 228. During the following year (2009) farmers' income increased to R385 164. In 2010, cash from sales decreased to R458 700, but only to rise to R295 080 in 2011.The rise in income could have been as a result of an increase in production boosted by rains because many farmers have no irrigation system. Although mango commodity farmers were number two in terms of incomes received during the last five years, there were serious inconsistencies in terms of cash received.

4.6.3 Macadamia

Macadamia were the least in terms of the yield and income received for the past five years compared to mango and avocado. For example, in 2008, income received from macadamia was R87 536 and rose to R110 648 in 2009. In 2010 to 2012 income from macadamia showed similar trends of an upward movement because it increased to R125 018 in 2010, R148 630 in 2011 and R152 040 in 2012. Results of the study also revealed that, though production of macadamia was the least of them all as shown in Figure 19 above, figure 20 below also revealed similar trends with a steady increase in income for the past five years.

Figure 20: Income trends for avocado, mango and macadamia from 2008 to 2012



Source: Author`s Computation from survey data 2013

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study was designed to examine constraints on fruits production by smallholder farmers in Vhembe District of Limpopo Province, Republic of South Africa. The findings of the investigation were presented in Chapter Four. The aim of this chapter is to discuss the findings provided in the preceding chapter, provide a summary of major issues in the study and to draw conclusions and give recommendations for further study.

5.2 Summary

The aim of this study was to investigate causes of low fruit production by smallholder fruit farmers in Vhembe District of Limpopo Province. This study came into being after the realization that most of the smallholder subtropical fruit farmers had low fruit production. A mixed method of both quantitative and qualitative approaches was used for data gathering. Stratified random selection procedures were used to select a representative sample of 224 respondents out of the total population of 439 smallholder sub-tropical fruit producing farmers for data gathering. In order to find out the causes of low fruit production, the socio-economic characteristics and factors affecting smallholder fruit farmers were examined using a questionnaire as an instrument for data collection. Although a mixed methods approach for data gathering was strenuous as it took some days to have questionnaires completed and focussed group discussion meetings organized, it enabled the author to get the required data for analysis. Results of the study showed that most of the smallholder fruit farmers had no formal education, were unemployed, and on pension over the age of 65 who could not deal with issues of farming in order to improve fruit production in Vhembe District. Furthermore, results of the study revealed that the most challenging constraints with regard to smallholder fruit production were: the shortage of irrigation water, low inputs use by smallholder fruits farmers, lack of marketing information and market, poor access toroads, lack of communication infrastructure, shortage of permanent labour, lack of storage facilities, poor farm management practices by farmers and little involvement of youth in fruit farming.

Rarely had researchers included studies on strategies to increase smallholder fruit production which were very crucial in determining the reasons behind low productivity by small holder fruits farmers. This necessitated the study that could enhance strategies to promote fruit productivity. The study was crucial in the context of rural development since improved fruit production could ensure increased rural livelihood, income generation and job creation which were the current priority focus areas of the South African government. Research findings could be shared with policy-makers, academics, researchers and other institutions focusing on the promotion of smallholder fruits production in the country. It was envisaged that the findings of the study could inform the strategic direction by government for the improvement of the sector.

5.3 Discussions and Conclusions

5.3.1. Socio-economic characteristics of smallholder fruit farmers

The first objective of the study was to determine the socio-economic characteristics of smallholder fruit farmers, and the study brought the following revelations:

5.3.1.1 Gender

Males were found to be the dominant participants in all three fruit commodities in Vhembe District. The highest number of male dominance was in avocado followed by macadamia farms and lastly mango. More females were found in avocado commodity farms followed by macadamia and lastly mango. The significance of the results was that males were still dominating the smallholder fruit farms in Vhembe District and were regarded as the providers of livelihoods in most household fruit producing structures of the Vhembe District.

Since fruit production was low in smallholder fruit farms, the effects of low productivity was felt by many household fruit farmers as men could not provide the needed livelihood in most smallholder fruit farms in Vhembe District. The number of females participating in fruit production was significantly small which means there was still room for female entrepreneurs to participate and contribute to the enhancement of sub-tropical fruit production in Vhembe District. In order to reduce the male to female ratio gap in smallholder sub-tropical fruit farms, it is therefore important that rigorous programs be developed to promote and encourage more females to become agricultural entrepreneurs with special focus on subtropical fruit farming in Vhembe District.

5.3.1.2 Age

Another contributing factor to low fruit production was that farms were owned by older people in Vhembe District. Results of the study revealed that most farms were occupied by people over 65 years old and less active individuals while farms owned by younger and more competent individuals were very few. As a result of this, more farms remained unproductive and failed to sustain themselves due to low production. This had an impact on food security as most households could not feed themselves while poverty and hunger continued to affect them. In cases like these, young and energetic individuals were needed to stand firm and stem the tide of under production to ensure food security for the sustenance of rural people; developing programs that would stimulate the interests of youth to venture into sub-tropical fruit farming entrepreneurship and contribute towards job creation, economic growth and rural development.

5.3.1.3 Heads of households

The results of the survey still indicated that most households were headed by men as compared to women. This confirmed the fact that provision of livelihoods was still upon the shoulders of male heads of households in Vhembe District. Therefore, the effects of low production were felt by most household fruit farmers as provision of livelihoods and daily amenities by men was very limited because little production could not generate sufficient income for a sustainable living.

5.3.1.4 Education

Education played an important role in agricultural farming. The skills acquired through learning could enhance fruit production. The majority of household fruit farmers in Vhembe District were those who had attempted primary and secondary education and also those with no formal education. The findings of the study suggested that there was a significant number of people who were not educated enough to deal with issues of farming in order to improve fruit production and the quality of life for the poor household fruits farmers in Vhembe District.

It was also significant to note that fruit production could not be effectively sustainable without skills acquired through education. This means that farmer`s opportunities to help themselves were very limited, and more efforts were made by agricultural officials in order to assist these farmers to improve production. For example, holding of workshops, farmers' days and methods demonstrations to equip them with the basic production skills to improve production.

5.3.1.5 Occupational status

The occupational status of Vhembe sub-tropical fruit smallholder farmers showed that the majority were pensioners and doing full time jobs in their farms in all three fruit commodities, and therefore this meant that most of their incomes and livelihoods were generated from fruit farming. However, their full time commitment could not reward them as they had very little resources available to buy production inputs to increase fruit production. There were also households including teachers, clerks and administrators doing farming on a part time basis because of their circular jobs in public institutions. As a result of this their interest could not be solely focussed on farming, a factor that resulted in low productivity. Lack of full time commitment to farms signalled the fact that fruit production was compromised leading to unsustainable production and livelihood. This could be improved by committing young farmers to operate farms with the aged and the employment of farm managers in farms owned by those in circular jobs.

5.3.1.6 Marital status

On marital status, most farms were dominated by married people in all three fruit commodities. The significance of the results was that the involvement of both married and unmarried households in farming suggested the fact that their families depended on farming for income generation with the intension of poverty alleviation and social and economic up-liftment. However, those who are married have the advantage of using family labour to enhance productivity compared to those unmarried. Low productivity in fruit farming meant low income generation which seriously affected their social and economic lives as most of their daily amenities could not be provided.

5.3.1.7 Households' years of experience in farming

Fruit production is still very low in Vhembe District although many smallholder farmers had a long time in farming. Results of the investigation revealed that the majority of household fruit farmers had 16 years and above experience in fruits farming in all the three commodities. There was no difference in production level of those with more experienced and those with little experience in farming. By virtue of their vast experience gained in fruit farming, results of the investigation suggested that they were in a good position to deal with some of the critical issues they came across in farming in order to increase production and generate income for a living and poverty alleviation.

However, it was discovered that in farming, smallholder fruit farmers needed not only to gain vast experience in order to produce more but also the skills which could be acquired through workshops, finance and, production inputs subsidised by the state and that determination to succeed in farming.

5.3.1.8 Proportion of respondents who were satisfied with quantity and quality of fruits produced.

The majority of farmers interviewed indicated that they were not satisfied with the number of tons their farms produced and that their fruits were not good enough to attract the marketing agents in all three commodities. Only few farmers (24%) indicated their satisfaction with the quantity of fruits produced. Most of them cited causes of low fruit production as a result of shortage of water because most of the farms were rain fed, poor insects and diseases control and lack of additional supplements due to lack of labour and finances.

5.3.2 Factors affecting smallholder fruit farmers

5.3.2.1 Shortage of irrigation water

The majority of household fruit farmers in all three fruit commodities had no irrigation water at all in their farms. Results of the study confirmed the findings of Rockström *et al.* (2003) who found that 80% of agricultural land world-wide is under rain-fed agriculture with generally low yield levels. Their farms depended on rain fed-water, hence low fruit production. Most of them were in macadamia 67.5%, avocado 61.6%, and mango 54%.

It was apparent from all three fruit commodities that the shortage of water was a serious challenge facing smallholder farmers of the Vhembe District. 61% of respondents who did not irrigate indicated water as a serious constraint contributing to their low fruit production. The significant higher number of farmers without irrigation water was an indication that shortage of water was a critical constraint which needed to be addressed in order to enhance farmers' productivity.

5.3.2.2 Marketing of fruits

Marketing of crops is very important for any farmer in order to generate income for the sustenance of the family and the farm. A high percentage of farmers in all fruit commodities indicated that they did not market their crops to national markets (97%) macadamia, (89%) avocado and (82%) mango nor were they involved in export markets (98%) macadamia, (93.4%) avocado and (88%) mango. Farmers cited lack of marketing information, transportation and lack of market as critical factors contributing to low production.

Since a high percentage of farmers did not have access to marketing, they could not generate income for sustainable livelihood and poverty alleviation, while their social and economic up-liftment could not be realised. The establishment of the locally based market accessible and owned by smallholder fruit farmers was necessary to promote smallholder farming business.

5.3.2.3 Lack of storage facilities

However, competitiveness in agriculture could be well improved by good post-harvest management practices. According to Tshikhudo (2005) fruits are horticultural products that deteriorate very fast after harvesting as a result of moisture content and tenderness. Storage of fruits into the storage facilities is a good post-harvest management practice which enhances competitiveness in agriculture. Results of the studies revealed that 93.4% of avocado, 92.8% of macadamia farmers and 86%of mango farmers cited lack of storage facilities in their farms. As a result of that 90% post-harvest loses was experienced by these farms. Lack of storage facilities was as a critical constraint which was discouraging smallholder fruits farmers to produce more fruits in order to avoid the risks of losing capital when fruits get perished.

This corroborated with Oluoch-Kosura (2010) when he indicated that studies in Sub-Saharan countries have reported crop yield losses of between 20% and 40% due to poor post-harvest handling which also include storage facilities especially with perishable fresh produce such as avocados and banana. Lack of storage facilities had limited smallholder farmer`s potential to add value to their produce to boost competitiveness (Oluoch-Kosura, 2010). Low volumes of fruits produced by smallholder fruit farmers could in addition not justify setting up such facilities in remote rural areas.

5.3.2.4 Low input use by smallholder fruits farmers

Another revelation was that most of smallholder fruit farmers in all three commodities (75.9%) macadamia, (71.4%) avocado and (70%) mango did not give their fruit trees supplements/fertilizers in order to enhance production. It was also discovered that although fertilizer usage by other farmers was low their production was slightly higher than those who never used. The findings corroborated that of Odhiambo *et al.* (2008) and Murovhi *et al.* (2011) that nutrient mechanisms that sustain soil fertility are insufficient to support increased production without fertilizers. The effects of shortage of fertilizers was that it limited the farmer`s opportunity to enhance production through which he/she could stand a better chance of access to high value market and generated income for a sustainable living.

5.3.2.5 Inadequate access to land and insecure tenure

Land was also one of the critical factors of production in agricultural farming. The availability of more land could mean large volumes or quantities of fruits produced by smallholder farmers through which more income could be generated for livelihood and social and economic up-liftment. Inadequate access to land and insecure tenure of the rights often results in entrenched poverty and to rural under development and food insecurity.

Results of the study indicated that the majority of farmers in all three fruit commodities did not have the title deeds, but possessed permissions to occupy documents as the legal documents to show their land ownership rights. This corroborated with Bienabe et al. (2011) who said that lack of clear property rights limited smallholder fruit farmers' capacities to take advantage of various opportunities to enhance productivity. More secured access to land enhances productivity and improves the financial status of the rural people.

The significance of the results was that the land tenure insecurity factor had a direct effect to production in Vhembe's smallholder farmers. The weak land tenure arrangements have led to under investments in land by smallholder fruits and medium farmers, limiting them to generate income for livelihood as a result of low fruit productivity.

5.3.2.6 Pests, insects and disease control

On pests, insects and disease control, results of the investigation showed that the majority of farmers in all three commodities indicated that they did not control pests and diseases. Farmers cited lack of finance (60.4 %) and expensive chemicals (51.4%) as the major constraints which made chemicals unaffordable to them in order to control insects, pests and diseases. Failure to control pests and diseases exposed fruits to numerous attacks (as is in Appendices 3 below) and contributed to low fruit production.

5.3.2.7 Access to roads

Another revelation from the study was that access to smallholder fruit farms was a serious challenge as most of the roads were not tarred. Majority of smallholder fruit farms used gravel roads which were also slippery. Transport contractors were even reluctant to service smallholders due to poor feeder roads in rural areas. Because of this they relied on speculative bulk -buyer farmers to deliver their stock for sale at big markets at considerable cost reduced from the sale of prices. Access to roads infrastructure was a serious constraint as farmers could not get their crops to markets and production inputs to their farms. This challenge discouraged farmers to such an extent that the interest to produce more even faded away.

5.3.2.8 Labour

Labour is one of the critical factors of production in agricultural farming. In the farm profile of Vhembe sub-tropical smallholder fruit farmers, results of the study showed that, household fruit farmers with two workers were in the majority.

It was however noted that where there was one or two workers in the farm, it was husband and wife or the husband/wife working alone as the owners of the farm. These were strong indications that there was a serious shortage of labour, a constraint which was contributing to low production in those farms.

Sixty-six per cent (66%) of household fruit farmers indicated that assistance from farm workers was mostly needed during fruit harvesting. Eighteen per cent (18%) indicated needing assessment in the marketing of fruits, and 9.7% during pests, insects and diseases control periods. The results of the survey further indicated that shortage of full time labour in smallholder fruit farms was critical, although seasonal workers were sometimes available. Shortage of full time labour was also a contributing factor to low fruit production in most smallholder fruit farms. The acquisition of full time labour and proper supervision by smallholder fruit farmers could assist in the enhancement of fruit production by smallholder farmers.

5.3.2.9 Communication infrastructure

Communication infrastructure was critical in this study as farmers needed information in order to be aware of new planting and marketing information from stakeholders specialising with agricultural farming and marketing. Results of the study revealed that the majority of farmers in all three commodities used cell phones as a means of communication to conduct their businesses in farming. The significance of the results is that telecommunication infrastructure was needed in smallholder fruit farms, but remained a constraint since many smallholder fruit farmers of Vhembe District used cell phones. Lack of communication infrastructure cut off the smallholder fruit farmers from the outside business world and discouraged smallholder fruits farmers to produce more hence low production and low income for livelihood. Therefore, construction of tele-communication lines or infrastructure to smallholder fruit farms could help them to conduct their businesses well with the outside world.

5.3.2.10 Land ownership

Land is also one of the critical factors of production in agricultural farming. The availability of more land would mean large volumes or quantities of fruits produced by farmers through which more income would be generated for livelihood and social and economic up-liftment. Results of the survey revealed smallholder fruit farm sizes ranging from the smallest 2 ha to the biggest 38 ha. The majority of household fruit farms were in the ranges of between two to six hectares and eight to twelve (8-12 ha) hectares in size. This means there were no big farms in which large volumes of fruits could be produced. Sub-tropical smallholder fruit farmers were confined to an average farm land ranging from two to twenty hectares. This limited their opportunities to invest and expand for more production which was another factor that contributed to low fruit production.

5.3.3 Fruits production and income trends

5.3.3.1 Fruits production trends

Avocado was the commodity that produced the highest yield in the last five years, followed by mango and lastly macadamia. There were also inconsistencies with regard to tons produced yearly in avocado and mango commodities. Results of the study also revealed that, although production of macadamia was the least of them as indicated in Figure 19 above, there was a steady increase in yield for the past four years. It was, however, only in 2012 where farmers experienced a decrease in production.

This could have been caused by many factors such as lack of irrigation as most farms were rain fed, lack of crop supplements and lack of pest control due to financial constraints. In order to get the average yield the total production of each commodity was added from 2008-2012 and divided by five. Based on the analysis of the above table, the effects of water, shortage of fertilizers and poor pest control on livelihood were noted as fruit production was notably low because the average yield (from 2008-2012) in mango was 3733 tons, avocado, 2285 tons and macadamia 755 tons.

5.3.3.2 Income trends

Avocado was the commodity that received the highest income in the last five years, followed by mango and lastly macadamia. There was variation with regard to income received yearly in avocado and mango commodities. Results of the study also revealed that, though income received by macadamia farmers was the least of them all are presented in Figure 20; the same figure also shows that there was a steady increase in income from sales for this commodity for the past five years which made farmers to be better off financially.

This could have been caused by factors such as high market prices and low transport costs and cooperative farming to reduce costs. Based on the analysis of the above table, the effects of water shortage, shortage of fertilizers and poor control of pests were noted as income received from fruit production sales was also notably low. Income such as this was reasonably low if farming had to be sustainable and, social and economic conditions of poor smallholder fruit farmers were to be improved for the better.

5.4 Conclusion

The aim of this study was to investigate causes of low fruit production by smallholder fruit farmers. It is concluded that literature has shown that fruit production is crucial for livelihood, job creation and income generation for the landless and the land owners. Globally, smallholder fruit farming became one of the strategies to tackle problems relating to health, lack of employment and poverty. While increased production was one of the necessary ingredients in income generation for sustainable farming and livelihood, smallholder subtropical fruit farmers were constrained by factors which had an influence on fruit production. During the investigation, results of the study revealed the most challenging constraints which were in agreement with those reviewed in literature concerning smallholder fruit production.

These were; shortage of irrigation water, low input use by farmers, lack of market information and markets, poor access roads, lack of communication infrastructure, shortage of permanent labour, lack of storage facilities to promote crop long shelf life and, poor farm management practices by farmers. Another factor which contributed to low production was that, most farms were operated by the aged and uneducated individuals while youth participation in farming was very minimal. All these, contributed to smallholder fruit farmers` low productivity. Based on the research findings, observations and conclusions made above, hereunder, the following recommendations were made.

5.5 Recommendations

5.5.1 Shortage of water

There is an urgent need for the development of smallholder fruit farmers program where irrigation water infrastructure is provided to a selected, committed and targeted number of smallholder fruit farmers. This initiative could be undertaken by Sub-tropical fruit producers` association and Limpopo Provincial Department of Agriculture. There should be a platform of sub-tropical fruit production enhancement targeting smallholder fruit farmers for a specified period of time such as twenty (20) farmers per year for a period of five years. Such a program should have an effective exit strategy for support of smallholder fruit farmers well monitored to ensure fruit production enhancement. This model is well practiced in the Western Cape Province of the Republic of South Africa where smallholder farmers are well funded by (CASP) Comprehensive Agricultural Support Program. The program takes responsibility of soil preparation, provision of tree seedlings, installing irrigation water infrastructure, fertilization and farmers mentoring for five years (Rathogwa, 2014).

5.5.2 Lack of market and storage facilities

It is further recommended that the development of locally based subtropical fruits market and agro-processing plant with storage facilities is necessary. Such facilities will be able to cater for smallholder fruit farmers in Vhembe District by promoting long shelf life for subtropical fruits ready to be marketed.

5.5.3 Low inputs use by farmers

It is recommended to develop a multi-stakeholder forum jointly funded by Vhembe fruit producing cooperative, Vhembe District of Agriculture, Vhembe Municipality and the Limpopo Department of Agriculture to support smallholder fruit farmers with:

a. Subsidized sub-tropical fruits tree seedlings to encourage massive plantings of fruit trees that could promote economies of scales to sustain the farms and household fruit producing farmers; and

b. Subsidized fertilizers and chemicals to enhance production and the quality of the targeted sub-tropical fruits.

5.5.4 Access roads

There should be some remarkable improvements made by government on the access roads infrastructure to smallholder fruit farms to ensure easy accessibility during the transportation of agricultural outputs to markets and inputs back from retailers to smallholder sub-tropical fruit farms.

5.5.5 Communication infrastructure

There is need for improvement of communication infrastructure by government in smallholder fruit farms that could link them with consumers and other stake holders in agricultural farming business. For example, the use of agri-touch technology. This is the large computer screen based at the district centre where it is easily accessible by all farmers and it is well practiced in the Western Cape Province of South Africa (Rathogwa, 2014). . The technology is easy to operate to get information related to agricultural farming such as production, marketing etc.

5.5.6 Promotion of specialized agricultural staff

The government should appoint or retrain agricultural advisors to specialize specifically on the planting, production and managing of sub-tropical fruits commodity in order to speedily promote sub-tropical fruits production, marketing of fruits and sustainability of the fruits production project.

5.5.7 Promotion of youth to venture into farming

Developing programs that will stimulate the interests of youth to venture into sub-tropical fruit farming entrepreneurship should be started. This would contribute towards job creation, economic growth and rural development.

5.5.8 Promotion of gender balancing

It was established during the survey that males were more dominant in all sub-tropical fruit commodities. In order to reduce the male to female ratio gap in smallholder sub-tropical fruit farms, it is recommended that rigorous programs should be developed to promote and encourage more females to become agricultural entrepreneurs with special focus on subtropical fruit farming in Vhembe District.

5.5.9 Land ownership

Results of the study indicated that the majority of farmers in all three fruits commodities did not have the title deeds, but possessed the permission to occupy documents as the legal documents to show land ownership rights of farmers. Permission to occupy documents are to be replaced by title deeds which offer farmers the assurance of land ownership. This would encourage farmers to invest more in the land which could in turn lead to more production.

In order to monitor the fruit production enhancement program, it is recommended that results of research presented in this report be used as a good platform for future monitoring and further research on smallholder fruit producing farmers.

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APPENDICES

Appendix 1:

An orchard of mango trees neglected in thick grasses in Makhado municipality. In this environment trees live under severe stress as it is exposed to numerous attacks by pests, insects, wild animals and veld fires resulting in low and poor quality fruits.

Source: Rathogwa A.T

Appendix 2:

An orchard farm destroyed by fire as a result of poor management at Musunda village Mutale Municipality. The soil was exposed to water ran off and erosion and ultimately rendered unproductive.

Source: Rathogwa A.T

Appendix 3:

A heap of mango fruits with lesions of anthracnose, insects pests bites and black spots diseases as a result of farmer`s ignorance of pests and disease control.

Sources: Rathogwa A.T

Appendix 4:

Orchard farms which are well cared for and with good management practices have the potential of yielding more fruits like this avocado orchard of a young and promising farmer of Phiphidi village in Thulamela municipality

Source: Rathogwa A.T

Appendix 5: Instrument used for data collection

RESEARCH TOPIC:

EXAMINATION OF CONSTRAINTS ON FRUIT PRODUCTION BY SMALLHOLDER FAMERS IN VHENBE DISTRICT

Permission is hereby requested to get information on fruit production from fruit producers and fruit producing associations. The information given will be confidential and will only be used for research purposes and may be used to develop policy guide lines that may be used in fruit production. Respondents are free to take or not to take part in the interview. Thank you for your willingness to help

QUESTIONNAIRE

Name of the interviewer: ....

Date: ....Time of the interview.......................................

Name of respondent............................Signature.......................................

Position in the household..

Name of the farm: ....

Location of the farm: ....

SERIA NO: ☐

Instructions

1. Your answer should be genuine and honest, and based on your experiences.

SECTION A. BIOGRAPHIC DATA OF THE RESPONDENT

1. Age

Age group	Code	
<18	1	
18-25	2	
26-35	3	
36-45	4	
46-55	5	
56-65	6	
66 & above	7	

2. Gender?

Male	1	
Female	2	

3. Marital status?

Single	1	
Married	2	
Divorced	3	
Widow/widower	4	
Separated	5	

4. Highest educational qualification

No of formal education	1	
Primary		
Attempted	2	
Completed	3	
Secondary		
Attempted	4	
Completed	5	
Tertiary	6	
Diploma	7	
Junior degree	8	
Honors	9	
Masters	10	
PhD	11	

5. Occupation

Self employed	1	
Pensioner	2	
Full time farmer	3	
Farming and other	4	

6. What is your position in the farm?

Owner	1	
Leaseholder	2	
Rented	3	
Worker	4	
Wife	5	
Other	6	

7. Are you fulltime worker of the farm?

Yes	1	
No	2	

a) If not what else do you do to earn a living?

……………………………………………………………………………………

……………………………………………………………………………………

b) How much income does (a) above bring to the household annually?

R……………………………

8. Income from the enterprise during the last five years

Commodity	Y1	Y2	Y3	Y4	Y5	R
Mango						
Avocado						
Macadamia						
Total						R

9. How long have you been working here?

Less than 1 year	1	
1-5 years	2	
6-10 years	3	
11-15 years	4	
16 years and more	5	

10. Household head

Male	1	
Female	2	
Youth	3	

11. Household size

1	
2	
3	
4	
5	
More	

a) Number of family member who work in the farm

1	
2	
3	
4	
5	
More	

b) What kind of assistance do they offer in the farm?

Harvesting	1	
Marketing	2	
Pest &insect control	3	
Other	4	

c) If other members work in the farm how often?

Full time	1	
In holidays	2	
On weekends	3	
During harvest	4	
Other (specify)	5	

d) If other members work in the farm how are they related to you?

Wife	1	

Husband	2	
Son	3	
Daughter	4	
Other (specify)	5	

12. A) How many members of your household are employed elsewhere?

1	1
2	2
3	3
4	4
5 & more	5

b) How much income does (a) above bring to the household monthly?

R

13. Means of communication:

Radio	1	
Cell	2	
Land lines	3	
Public telephones	4	
Other(specify)	5	

B. FARM PROFILE

14. Farm/Land size (HA): ……………………………………………

15. Is the farm fenced?

1	Yes	
2	No	

16. Ownership of the farm

1	Title deed	
2	PTO	
3	Communal	
4	Leasehold	
5	Rented	

17. Type of fruit/commodity:…………………

18. Varieties

A)………………………………

b)………………………………

c)………………………………

d)………………………………

e)……………………………………

f)………………………………

19. Year planted: ……………………………………………

20. Water source

1	River	
2	Borehole	
3	Other	
4	None	

21. Is there a pack-house in the farm…………………………

C. PRODUCTION

22. Is your farm in production? ……………

a) If yes, fill the table below

Fruit	Major market	Q y1	Q y2	Q y3	Q y4	Q y5	Average price	Average quantity	R
Mango									
Avocado									
Macadamia Nuts									

23. Tons/ha /crates/ha: Mango[……]Avocado[……]Macadamia Nuts[………]

24. Are you satisfied with the quantity of fruits produced in the farm?……………….

A). If yes how are you enhancing the quantity of fruits? 1)……………………………….

2)……………………………………….

3)……………………………………..

4)……………………………………….

5)……………………………………….

b). If no what can be the causes of poor/low production? 1)……………………………….

2)...

3)..

4)..

5)..

c) What can be done to minimize the problem of poor/ low production?

1)...

2)..

3)..

4)...

5)...

25. Are you satisfied with the quality of fruits produced in the farm?

....

A). If yes how are you enhancing the quality of fruits? 1)..

2)...

3)...

4)..

5)...

b). If no what can be the causes of poor quality?

1)..

2)..

3)..

4)..

5)...

6)...

C) What can be done to minimize the problem of poor/low fruit quality?

1)...

2)...

3)...

4)...

5)...

26. Do you have farm records? ....

27. What assets do you have in the farm?

Vehicle	
Tractor with implements	
Storage facilities	
Office	
Others:	

28. Any value addition?

Yes	
No	

29. If yes indicate

1	Packaging	
2	Juice processing	
3	Fruit drying	
4	Archaar	
5	Other	

30. Annual income from value addition for the past 5 years

Fruit	Quantity					Average quantity	Average price	R
	Year 1	y2	y3	y4	y5			
Mango								
Avocado								
Macadamia								

31. Do you experiences some fruit loses?

Yes	
No	

a) If yes ,average fruit loses for the past 5 years

Fruit	Qy1	Q y2	Q y3	Q y4	Q y5	Average quantity	Average price	R
Mango								
Avocado								
Macadamia								

32. What are the major causes of loses?

1	Lack of market	
2	Poor fruit quality	
3	Lack of storage facility	
4	Other :	

33. Do you irrigate your fruit crops?

Yes	
No	

34. Is irrigation water enough for the whole year?

Yes	
No	

35. If yes, what type of irrigation do you have?

1	Micro-jet	
2	Drip	
3	Sprinkler	
4	Other	

37. If no, give reasons

1	
2	
3	
4	
5	
6	

38. If yes how often do you irrigate the crops?

1	Once/week	
2	Twice/week	
3	Thrice/week	
4	Other specify	

39. Do you give your crops supplements?

40. If yes which are they:?...

41. If no why?...

42. Do you control insects/pests and diseases?

……………………………………………………………………………

43. If yes how many times?

1	Once/week	
2	Once /month	
3	Twice/month	
4	Other specify	

44. If no, is it because...........

1	Chemicals are expensive	
2	Lack of finance	
3	No insects/pests	
4	Other reasons	

45. How much do you spend on?

Chemicals	R
Fertilizers	R
Labour	R
Transport	R
Repairs	R
Telephone bill	R
Electricity	R
Rent	R

D. ACCESS TO MARKET AND LEVEL OF MARKET PARTICIPATION

46. How do you market your fruits after harvest?.............

Marketing option	Mango	Avocado	Macadamia nut
Farm gate			
Local hawkers			
Nearby town			
Nationally			
Export			
Others			

47. What proportion is taken by each marketing options?

Marketing option	Mango	Avocado	Macadamia nut
Farm gate			
Local hawkers			
Nearby town			
Nationally			
Export			
Others			

48. Any contractual arrangements with specific market?.......................................

a) If you don't market what are reasons for not marketing?

i)..

ii)..

iii)..

iv)..

v)…………………………………………………………………….

vi)…………………………………………………………………………

49. Who determine the price?

1	Self	
2	Market	
3	Hawkers	
4	Commodity association	
5	Other specify	

50. How far is the market from the farm?

1		<1 km	
2		10 km	
3		10-20 km	
4		>25 km	

51. Do you incur some costs when looking for the market?.............

a) If yes which are they?

i)…………………………………..

ii)…………………………………..

iii)……………………………………

Vi)………………………………………

52. Membership to an association?...

53. What is the name of association?……………………..

54. Position in the association?……………

55. Role of association?………………………

56. Other assistance offered by association? …………………..

57. Membership benefits a)……………………………….

b)…………………………………………………….

c)…………………………………………………….

d)…………………………………………………

58. Conditions of road to town/market

1	gravel	
2	Tarred	
3	Slippery	
4	No road	

59. Means of transport

1	Self-delivery	
2	Vans	
3	Contract vehicles	
4	Other	

60. What are your sources of information on market?

a)………………………………………

b)………………………………………….

c)……………………………………….

d)………………………………………….

e)…………………………………………….

f)……………………………………………….

60. How do you contact the market?

1	Telephonically	
2	Extension officers	
3	Internet	
4	Associations	
5	Other farmers	

61. Have you ever receive any training……………………………………………?

62. If yes, fill the table below

Training provider	Area trained	Duration of the course	Year
1.			
2.			
3.			
4.			
5.			

63. If not, on which aspect of training can you be trained for…………………………..

…………………and for how long……………………………?

64. Are you receiving any support for farming…………………………….

65. If yes what kind of support?

Nature of support	Sources	Level of satisfaction
1.		
2.		
3.		
4.		

66. What are the major challenges experienced in fruit farming?

1. ……………………………………………………………………………..
2. ……………………………………………………………………………..
3. ……………………………………………………………………………….
4. ……………………………………………………………………………….
5. ……………………………………………………………………………….
6. ……………………………………………………………………………….
7. …………………………………………………………………………….

67. What could be done to mitigate these hindrances?

1. …………………………………………………………………………….
2. ……………………………………………………………………………..
3. ……………………………………………………………………………...
4. ……………………………………………………………………………….
5. …………………………………………………………………………………
6. …………………………………………………………………………………
7. …………………………………………………………………………………

THANK YOU FOR YOUR TIME

DO YOU HAVE ANY QUESTIONS?