EVALUATION OF CHALLENGE PROGRAMME WATER FOR FOOD TECHNIQUES/TECHNOLOGIES ON SMALLHOLDER DRYLAND FARMING IN GREATER GIYANI MUNICIPALITY IN LIMPOPO PROVINCE

by

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ABSTRACT

Food security in most drought-stricken areas of Limpopo Province is a challenge to the Department of Agriculture and to all the people living in the province, especially to the resource poor smallholder farmers. Finding remedial solutions to agricultural production in stress prone conditions is therefore a high priority. The introduction of Challenge Programme Water for Food (CPWF) technologies/techniques to smallholder dry land farming in Greater Giyani Municipality was seen as one of the solutions. However, there are constraints raised by CPWF technology adopters such as shortage of labour, lack of ploughing equipment, lack of credit, shortage of land and marketing. CPWF technologies are suitable for smallholder dry land farming, especially rainwater harvesting technologies. Smallholder farmers need to be remobilised and trained on the potential benefits of CPWF technologies to enhance their adoption and spread to other areas.

DECLARATION

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Development has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all the material contained herein has been dully acknowledged.

_____ _____

Mr/Ms_____ **Date**

Student Number_____

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DEDICATION

To my late parents Madzivandlela N'wa Jack and James Makaringe, my brothers Vincent and Knox, my sister Fokisa, my husband Daniel and my sons Rito, Matimba, Ntshovelo and Nsaseko.

LIST OF ACRONYMS

ABET- Adult Basic Education

ARC-Agricultural Research Council

AIDS- Acquired Immune Deficiency Syndrome

CPWF- Challenge Programme Water for Food

GM- Genetically Modified

HIV- Human Immune Virus

HYV- High yielding varieties

ICRISAT- International Crops Research Institute for Semi-Arid Tropics

LDA – Limpopo Department of Agriculture

LDCs - Less Developed Countries

PM- Progress Milling

SF-Smallholder Farmer

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CHAPTER 1: INTRODUCTION AND BACKGROUND

1. Introduction

In this chapter the following are presented: introduction and background, statement of the problem, motivation of the study, aims of the study, objectives, research questions and definitions of concepts.

1.1 Introduction, Background and Significance of the Study

One of the aims of agriculture is farming for the production of food such as maize, meat, fruits and vegetables (GEAR report 1996, p.6). Agricultural production of foods is done for the development of people. Development is about improving the quality of life of the people; this among others is to improve economic growth, transformation and empowerment (Burkey 1993, p.53).

Agriculture in South Africa has a central role to play in building a strong economy and in the process, reducing inequality by increasing incomes and employment opportunities for the poor (Agricultural Policy in South Africa 1998). In order to increase income and employment opportunities for the poor many programmes are implemented by the Department of Agriculture (for example Challenge Programme Water for Food (CPWF).

Challenge Programme Water for Food (CPWF) is an international programme (project) which aims to improve food security, income and livelihoods of smallholder dry land farmers.

In South Africa, the CPWF project was implemented in Limpopo Province in three districts namely, Capricorn, Mopani, and Sekhukhune. In these districts, the project (programme) CPWF was implemented with the collaboration of the following institutions: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), CIMMYT, Agricultural Research Council (ARC), Limpopo Department of Agriculture, IWMI (International Water Management Institute) and Progress Milling (PM).

The Limpopo river basin in which the CPWF has been implemented is characterised by poor and unreliable rainfall, low productivity, frequent droughts and periodic flooding in some parts of the basin. This is a semi arid area, dependent on rain-fed subsistence agriculture on smallholder landholdings. The rainfall pattern is highly variable (250-600mm per annum) and is combined with a high irradiance and heat load (ICRISAT Baseline Survey Report 2007, p.7). The basin also faces challenges posed by out migration of males and HIV/AIDS resulting in farm labor increasing scarce, this impact negatively on household labour and wellbeing of farms. The HIV/AIDS incidence prevalence rate was estimated to be at 20% (ICRISAT Baseline Survey Report 2007, p.7). As a consequence of the above challenges, farming in many areas is left to women and elderly people. Labour constraints on women are particularly high since they provide care for orphans and the sick.

Large scale irrigation is restricted with little potential for expansion. As a result, smallholder farmers who settled in this region are not able to produce enough food and are perennially food insecure. However, the basin has great potential for livestock production although that potential has not been fully exploited. The project (programme) targeted all the three countries that lie in the Limpopo river basin: Mozambique, South Africa, and Zimbabwe.

Challenge Programme Water for Food project targeted smallholder subsistence farmers who could neither meet annual food requirements nor address the growing poverty problem. Agricultural interventions were therefore necessary to address the challenge of food shortage in a much holistic approach through the use of improved soil and water management technologies, crop varieties that are drought tolerant and linking farmers to markets in order to encourage them to make substantial investment in agriculture.

In Mopani District, the programme was implemented only in Greater Giyani Municipality to smallholder dry land farmers in eight village communities: Bon'wana (Mavalani), Shivulani, Thomo, Nkomo, Ngove, Hlaneki, Dzingidzingi, and Mashavele.

As already indicated earlier, Challenge Programme Water for Food (CPWF) project was developed with the overall goal of improving household food security, incomes and livelihoods of smallholder farmers in the Limpopo river basin. To achieve this goal, the project disseminated practical, cost-effective technologies of improved early maturing crop varieties of staple food crops, and water and soil fertility management methods. Specifically, the programme had the following objectives:

a) Delineate agro-ecological recommendation domains in the smallholder dry land areas of the Limpopo basin based on biophysical and socio-economic factors (e.g. socio-economic stratification of smallholder communities and households). Also collate baseline information of the domains, to be used as entry points to improve crop water productivity at the field level, livelihood strategies, market opportunities, and for targeting of technology, monitoring of project benchmarks, and for scaling up within and beyond the basin borders.

b) Validate and adapt integrated cereal and legume crop variety and soil management practices that are suitable for resource poor smallholders in a risk-prone environment. These technologies will aim to diversify cropping and livelihood options, maximise crop water productivity, and increase incomes from rain-fed farming systems in the basin.

c) Use innovative research and extension methodologies, linked to public-private partnerships, to facilitate promotion and uptake of management options and strengthen linkages to input and product markets, and to draw lessons from this experience for application to other areas and countries in Southern Africa.

d) Strengthen capacity of farmer and partner institutions to develop and implement innovative research and extension approaches; improve stakeholder participation in agricultural development, and strengthen public-private partnerships that will create income opportunities and improve crop water productivity.

The immediate objectives of the CPWF project are to:

a) Increase food security at the household level;
b) Alleviate poverty through increased sustainable livelihoods in rural and peri-urban areas;
c) Improve health through better nutrition, lower agricultural related pollution, and reduce water related diseases, and
d) Promote environmental security through improved water quality and maintenance of water related ecosystem services, including biodiversity.

The project had three major outputs, which were:

a) Increase farmer access to seed of improved cereal and legume varieties that mature early and thus escape terminal drought;

b) Increase the judicious use of mineral fertilisers, in combinations with organic sources of plant nutrients, appropriate soil / water conservation measures and improved crop varieties, and

c) Set up new institutional arrangements that link the public and private sectors with farmers' uptake of technologies; this will improve the sustainability of project outputs, and prevent agricultural resource degradation from nutrient mining and the exploitation of fragile lands.

In order to achieve the stated outputs, the project engaged farmers in the above-mentioned villages in hosting trials, which were aimed at demonstrating the effect of improved crop varieties, soil-water management, time of planting and soil fertility. In the crop by species trials, farmers planted maize, cowpeas, and groundnuts, both own variety seeds and high yield seeds varieties. In the soil water management technologies, the project promoted use of mulching, tied ridges, tied furrows planting basins and also technology of row planting. In the soil fertility improvement trials, farmers were encouraged to apply fertilisers during planting and after planting (top-dressing). Small holder farmers were also engaged in the technology of seeds variety evaluation and

intercropping. Seeds variety evaluation was done to check as to which seeds from high yield varieties and local variety yield best.

1.2 Statement of the Research Problem

Food insecurity, poor yields or low production of food in drought-stricken areas of Mopani District in Greater Giyani Municipality and poverty experienced by smallholder farmers who depend on rainfall for production are a major concern for both smallholder farmers and the Department of Agriculture.

The CPWF project promoted farming technologies / techniques such as improved crop varieties (maize, cowpeas and groundnuts), soil-water conservation technologies (planting basins, tied furrows, tied ridges, and mulching) and the use of inorganic fertilisers, all aiming to improve the livelihoods of the rural communities. Therefore, after three years of project implementation, it has become necessary to conduct an evaluation to assess the levels of adoption of various technologies that were being promoted by the CPWF project. It is against this background that this study was commissioned and conducted.

1.3 Aim of the Study

To assess the rate of uptake or adoption of technologies, which were introduced to smallholder farmers by the CPWF project in the study area.

1.4 Objectives

The objectives of the present study are:

a) To assess farmers' awareness of the technologies introduced by the CPWF project.
b) To determine the role played by smallholder farmers in the implementation of the CPWF project.
c) To assess the level of CPWF technologies/techniques adopted by smallholder farmers.
d) To assess challenges and opportunities experienced by smallholder farmers in the process of CPWF technology adoption.

e) To determine whether CPWF technologies/techniques' impacted positively on household food security and poverty alleviation.
f) To provide some recommendations on positive practices and lessons learnt in the implementation of the CPWF project.

1.5 Research Questions

The research questions of the study include the following:

a) Are farmers aware of the technologies that were being promoted by the CPWF?
b) What role did smallholder farmers play during the implementation of the CPWF technologies?
c) What are the levels, scope and extent of adoption of the technologies promoted by the CPWF?
d) What were some of the challenges and opportunities faced by smallholder farmers in the implementation and adoption of the technologies?
e) How did CPWF technologies impact on smallholder farmers on household food security and poverty alleviation?

1.6 Definition of concepts

a) **Challenge Programme Water for Food:** Challenge Programme Water for Food is an international programme whose aim is to improve food security, income and livelihoods of smallholder farmers (Woolley, Cook, Mollen and Harrington 2009, p.5).
b) **Smallholder farmers:** smallholder farmers are defined as families whose income is derived mainly from farming, Smallholder farmers practise agricultural activities in a piece of land ranging from 01(one) to 06(six) hectares. This kind of farming is referred to as subsistence farming. Subsistence farming implies producing food and fibre for the needs of the farmer and his/her family (Spedding 1988, p.8).
c) **Food security:** the availability of food one has access to. A household is considered food secured when its occupants have access to sufficient safe and nutritious food to meet their dietary needs and food preference for an active and healthy life (Agricultural Policy 1998, p.7).

d) **Technologies or innovations** are defined as new methods, customs or devices used to perform new tasks (Sunding and Zilberman 2000, p.2).

CHAPTER 2: LITERATURE REVIEW

2. Introduction

This chapter will focus on the literature review covering classification of smallholder farmers, agricultural technologies/techniques and smallholder farmers in farming in general, CPWF technologies offered to smallholder farmers and how these have tried to adopt such technologies.

2.1 Classification of smallholder farmers

As already indicated earlier, a smallholder dry farmer or a small scale farmer is one who practises agricultural activities in a piece of land ranging from 01(one) to 06(six) hectares. This kind of farming is referred to as subsistence farming. Subsistence farming implies producing food and fibre for the needs of the farmer and his/her family (Spedding 1988, p.8).

Smallholder dry land farmers are also classified as resource-poor and food insecure farmers. Food insecurity is defined as a lack of access to adequate, safe and nutritious food which is closely associated with poverty (Agricultural Policy 1998, p.7). Food security can be addressed as part of a broader attack on poverty, which includes direct employment, income, and welfare measures. It may be argued that there is adequate food at the national level, but the fact is that the majority of the population has insufficient food or is exposed to an imbalanced diet as a result of low income. These are mostly smallholder farmers who produce food or crops, especially maize depending on unreliable rainfall and frequent droughts, resulting in insecure crop production (Mgonja, Waddington, Rollin and Masenya 2005, p.5).

According to Timmer (1991, p.125) agricultural development is the key to attack poverty or to alleviate poverty**.** For this to happen, unskilled farmers have to be introduced to recent agricultural technologies /techniques.

2.2 Agricultural technologies and smallholder farming

Technologies or innovations are defined as new methods, customs or devices used to perform new tasks (Sunding and Zilberman 2000, p.2). According to Saxena (2003, p.vi) the task of developing new technologies for increasing food crop production has become more challenging and difficult because of the requirement that technologies should be more environmentally friendly and sustainable.

The efficient utilisation of limited water and the demand for food by the rapidly growing population are challenging factors for every living being in the whole world. According to Rockstrom, Barron and Fox (2003, p.157) one of the major challenges now is to feed population with limited water. This calls for new technologies to be employed so that drought prone areas become productive.

Limpopo Province is one of the provinces that face serious water shortage and the province has a large number of smallholder dry land farmers. For these farmers to produce meaningful crops they need help from the Department of Agriculture. The department needs to empower these people by getting them to learn new technologies and methods of farming that guarantee food security overall.

According to Kirsten, Van Zyl and Vink (1998, p. 152) the Department of Agriculture must focus on understanding the unique needs of the smallholder farmers as distinct from their large scale counterparts. Therefore, advanced technologies are needed to boost crop production in order to meet the needs of the rapidly growing population (Grima and Endale 1996 p.821).

Food production in many developing countries, as already indicated, is not keeping pace with the demand for food. Because of this, emphasis is being placed on modifying the existing farming systems to meet national food and equity goals. Gouse, Pray, Kirsten and Schimmelpfennig (2005, p.85) suggest that there is a need for biotechnology

companies to produce any Genetically Modified (GM) maize crops that will directly increase production of the basic subsistence food in the developing countries or use of any technology which will increase the income of the small farmers who produce these maize crops. Sarena 2003 (p. 89) adds that agricultural technologies should be in place to ensure that plants have the ability to withstand drought and also produce an economic yield under condition of water shortage.

According to Du Toit and Nemadodzi (2008, p. 133) when new technological designs are introduced to smallholder farmers in South Africa, indigenous /traditional knowledge should be considered together with scientific knowledge. Du Toit and Nemadodzi stressed that although traditional knowledge should be considered there is a need for a shift from traditional ways of cropping to high pay off input technology that has the potential of increasing output/yields sufficient for home consumption and a marketable surplus.

Sarena (2003, p.5) also agrees with Du Toit and Nemadodzi that there is a need to shift from traditional farming through technological change in order to increase agricultural production, which is essential to sustaining economic growth. The reason is that presently most countries are running out of good arable agricultural land as a result of increased urbanisation and industrial growth, hence cultivation of crops by resource-poor small-land-holding farmers is being pushed into more and more marginal lands with detrimental effects on income and the lives of the poor. Therefore, it is essential that agricultural research generate new technologies that will permit high yielding crop if food security is to be attained and economic growth attained.

Increasing the production of smallholder farmers will improve the availability and nutritional content of food. This can be attained if extension services also realise that they have a major role to play in promoting production by smallholder farmers, since many of the households derive some or all their income from agriculture. This proves that alone

smallholder farmers, without a helping hand from the extension services, cannot make it (Agricultural policy 1998, p.8). Laegreid, Bockman and Kaarstad (1999, p.69) point out that agriculture with its extensionists is the key to achieving food security for all in low-income countries.

According to Low (1989, p.136) improved access to agricultural inputs and use of developed technologies in farming would make a major contribution to the empowerment of smallholder farmers. This will result in improved food security, better income, and improved livelihoods as the CPWF project aimed.

Challenges in farming usually lead to the development of new technologies or innovations. For example, labor scarcity may induce a wide variety of labour saving innovations, while water scarcity in farming may induce the development of water saving technologies such as water harvesting technologies. Food shortage leads to the introduction of high yield varieties etc.

In most cases agricultural technologies are introduced to farmers in a package that includes several components, for example, high yielding varieties (HYV), fertilisers and the corresponding land preparation practices. Most technologies introduced complement each other and to the poor resource farmers, technologies aim at improving the income. The use of technologies is a transition out of poverty for the smallholder farmers (Besley and Case 1993, p.396). An encouragement from Pretty (1995, p.238) *is that a farmer should live as though he/she were going to die tomorrow; but he/she should farm as though he were going to live forever (East Anglian proverb, in George Ewart Evans, 1966).*

2.3 CPWF technologies/ techniques and smallholder farming

Challenge Programme Water for Food (CPWF) was introduced to smallholder dry land farmers in Limpopo Province in three districts. The province supports a relatively large

and poverty stricken rural subsistence population dependent on rain-fed agriculture. The province is also prone to devastating floods and drought, posing further challenges for food security (Reason, Hachigonta and Phaladi 2005, p.1836).

The overall project goal of the CPWF is to improve food security, incomes, and livelihoods of smallholder farmers in the Limpopo basin, thereby creating a knowledge base and developing methods for growing more food with less water (Mgonja *et al.*2005, p.4).

As already indicated earlier, a shift from traditional ways of cropping to high pay off input technology has the potential of increasing output/yields sufficient for home consumption and a marketable surplus (Du Toit and Nemadodzi 2008, p. 133). Introduction of CPWF technologies to smallholder farmers in Limpopo Province was the way of shifting farmers from the traditional ways of farming to the use of new technologies in farming that pay off at the end.

The project (CPWF) promotes farming technologies / techniques which include early planting, rows planting, use of drought tolerant improved crop varieties (of maize). It also promotes water harvesting technologies (basins/potholes planting, tied ridges, mulching, no till planting), use of repeated weeding, the technology on the use of inorganic fertilisers, soil water conservation technologies and cultivation techniques used to improve soil water availability for plant growth in drought prone areas (Mgonja *et al.* 2005, p.27).

According to Mgonja *et al.* (2005, p. 38) rainwater harvesting is viable in most parts of Limpopo Province. Therefore, small improvement in rainwater utilisation can have a significance impact on the lives of many people in the province.

2.4 Adoption and technologies

According to Feder, Just and Zilbermann (1985, p.257) adoption refers to the degree of use or utilisation of a new technology. Adoption of technologies in agriculture has attracted considerable attention among development economists because the majority of the populations of less developed countries (LDCs) derive its livelihood from agricultural production. New technologies seem to offer an opportunity to increase production and income but the introduction of many technologies has met with only partial success, considering the slow rate of adoption (Feder, Just and Zilbermann 1985, p.255).

In many countries, including South Africa, the fundamental challenge in developing a new farming system or technology, is to have it adopted and maintained by farmers, because even though technologies may be more attractive to farmers, information be of high quality and also that technologies improve yields but in reality you cannot order or instruct farmers to adopt the introduced technology, farmers are the ones to do away with old ways of farming and adopt new technologies (Ruttan 1982, p.6).

As adoption is the farmers' choice it is also important to point out that the trials conducted shed some light on the costs incurred by the CPWF in terms of time, energy, finances to run the programme and of land that could be used productively for other purposes.

It therefore essential to find out that after all has been done, there are reasonable chances of adopting the technologies in the long run by smallholder dry land farmers (Pannell 1999, p.395). According to Sarena (2003, p.9) adoption in dry land farming is influenced by the rate of returns/profitability, that is for the improved technology to be adopted it should be higher than the traditional or existing technology already adopted by farmers because marginal change in the rate of return alone is not sufficient to encourage farmers to adopt new technology.

Van Veldhuizen, Waters-Bayer, Ramirez, Johnson and Thompson (1997, p.73) confirm that adoption is the farmer' choice but as long as new technology/innovation is worthwhile then it will be adopted by farmers. Adoption of the introduced technologies by smallholder farmers in many rural areas in crop production is associated with increased yields. They add that in practice the improved production methods give yield per hectare up to five times those achieved with traditional methods of planting.

According to Precision Agriculture in the 21st Century (1997, p.12) immediate and uniform adoption of innovations of technologies in agriculture is quite rare. For this reason, it is stressed that adoption behaviour differs. Some new technologies have been well received, while other improvements have been adopted by only very small groups of farmers. According to Bird, Bultena and Gardner (1995, p.156) young farmers are vulnerable, open and grasp innovations or new technologies in agricultural practises better than old farmers.

In most cases agricultural technologies are introduced to farmers in packages that include several components, for example, HYV, fertilisers and corresponding land preparation practises. The same situation applies to CPWF project technologies. The package includes demonstrating the effect of improved crop varieties, soil-water management, time of planting, soil fertility, seeds evaluation and intercropping where components of a package complement each other, although some of them can be adopted independently.

Studies indicate that there are constraints to rapid adoption of new technologies or innovation, especially to smallholder farmers such as lack of credit, limited access to information, absence of equipment to relieve labour shortage, inadequate farm size, inadequate incentives, and insufficient human capital (Sarena 2003, p.11). This means that smallholder farmers may be faced with several distinct technologies options. Smallholder farmers may adopt the complete package of new technologies introduced to

them or they may adopt a few from the package (Feder, Just and Zilberman 1985, p.257).

According to Sebadieta, Terblanche and Ngomane (2007, p.127) non-adoption of new technologies or innovations and practices are traced back to two basic causes namely: the farmer is either unwilling to adopt the recommended practice, or unwillingness to adopt can be directly or indirectly linked to lacking need and related aspects of perception and knowledge.

The researcher agrees that smallholder farmers have farming challenges, that adoption challenges differ and that there are factors influencing adoption of technologies, but for the sake of ensuring food security, smallholder farmers have no other recourse but to welcome any positive opportunity since it is a way of getting out of poverty

CHAPTER 3: RESEARCH METHODOLOGY

3. Introduction

In this chapter the following are presented: study areas, population, sampling, research design, data collection methods, data analysis methods and ethical considerations.

3.1. Study Area

The study is conducted in Mopani District, specifically in Greater Giyani Municipality. Smallholder farmers from five (05) villages in Greater Giyani Municipality namely, Nkomo B, Ngove, Dzingidzingi, Hlaneki and Mashavele participated in the study.

3.1.1 Nkomo B

Nkomo B is situated about 20 km south of Giyani town. This is where Mahumani Tribal Authority is based. It has six (06) smallholder dry land farmers who participated during the implementation of the CPWF project and during the evaluation of adoption of CPWF technologies. The six smallholder farmers represented the whole village during both the implementation and evaluation and adoption of CPWF techniques/technologies.

3.1.2 Ngove

Ngove is situated about 10 km south of Giyani town. Ngove village is under Mabunda Traditional Authority. The village has eleven (11) smallholder project farmers under the umbrella of Mahanyisi project. These are the farmers who participated and represented Ngove village during the implementation of the CPWF project and during the evaluation of the rate of uptake of CPWF technologies.

3.1.3 Dzingidzingi

Dzingidzingi is situated about 8 km west of Giyani town. Dzingidzingi village is under Hlaneki Traditional Authority. Two smallholder farmers represented the village

community during the implementation of the CPWF project and during the evaluation of the project.

3.1.4 Mashavele

Mashavele is situated about 40 km west of Giyani town. Mashavele village is also under Hlaneki Traditional Authority. One smallholder farmer in Mashavele represented the village during the implementation of the CPWF project and also in this study.

3.1.5 Hlaneki

Hlaneki is situated about 35 km west of Giyani town. It is the village where the local tribal authority is based. The name of the tribal authority is also called Hlaneki. Twenty (20) smallholder farmers from the Dyondza ku rima project participated during the evaluation of adoption of CPWF technologies. They also took part in the implementation stage of the project.

3.2 Population, Sampling and Selection Method

In this study the population consists of smallholder dry land farmers, agricultural technicians/extension personnel, coordinator of CPWF project, ward councilors and traditional leaders.

Smallholder dry land farmers who participated in this study are farmers from five (05) village communities namely: Nkomo with six (06) individual farmers, Ngove with eleven (11) project farmers, Dzingidzingi with two (02) individual farmers, Hlaneki with twenty (20) project farmers and Mashavele with one (01) farmer. All CPWF smallholder farmers from the five villages participated in this study (40). The forty smallholder dry land farmers are the target population who participated during the evaluation of adoption of CPWF technologies in this study. The number excludes stakeholders or key informants who also participated in the study.

The key knowers or informants in this study include three agricultural technicians / extension personnel. These are the staff members of the Department of Agriculture, who championed the research on CPWF. One (01) CPWF project coordinator participated in this study. Five (05) ward councilors were part of this study as they are the political leaders representing the municipality where the research on evaluation of adoption of CPWF techniques was conducted. Eight (08) traditional leaders also contributed in the study that is three (03) chiefs and five (05) headmen from the five (05) villages. The eight (08) traditional leaders are the leaders of the communities where research on adoption of CPWF technologies was conducted. The local traditional leaders also own land utilised by smallholder farmers for farming.

The type of sampling used in this study is non-probability where purposive sampling method is used. Purposive sampling method is used to obtain in–depth information from the smallholder farmers and also from the knowers or key informants. In this study the knowers are the traditional leaders, ward councilors, extension officials and the coordinator of the CPWF project. Farmers interviewed were selected purposively from the five participating communities. All the participating farmers were interviewed to ensure that all the questions related to the project were tackled by the respondents (Schumacher and McMillan 1993, p. 378).

The sample size in this study is forty (40) smallholder farmers and 17 stakeholders. The latter consists of five ward councilors, eight traditional leaders, three extension personnel and one coordinator of the CPWF project. The sample size of forty smallholder farmers was a small reasonable sample size which the researcher managed easily. These smallholder farmers were not combined in one place but were interviewed in their respective villages. Due to time constraints and limited financial resources, the researcher had to limit the sample sizes as indicated above.

3.3 Research Design

3.3.1 Choice and Rationality of Design .

The study used qualitative methods mostly during assessment of the interventions and extent of adoption of the CPWF technologies. The study involved smallholder farmers who had participated at least two seasons on farm trials. Most of the information during the evaluation of adoption was collected from them. Structured and unstructured questionnaires were used during focus group discussions and face-to-face interviews were also used to probe and elicit more information from the participants.

Quantitative data on the number of hectares for crop production/land holding size, number of children assisting in farming, educational level of smallholder farmers, farming experience, and the number of smallholder farmers who adopted CPWF technologies were collected.

3.4 Data Collection Method

All the questions were written in the farmers' main local language, which is Tsonga to make sure that all the participants understand what was required. A pretest was done before the main data collection took place to assess right capturing of the data. Ten smallholder farmers participated in the pretest. Time was the main factor looked at during pilot testing to determine time to be used in the main data collection. The longest time to complete one questionnaire was estimated at 35-40 minutes. The clarity of the questionnaires was further improved by the review of the responses by the farmers. The ten selected smallholder farmers used during pre-testing were not part of the sample size of forty (40) smallholder farmers.

Data were collected from forty smallholder farmers and other stakeholders. During data collection, various methods were used such as face-to-face interviews/personal interviews

and group interviews/focus group discussions, where structured and unstructured questionnaires were used. Data collection to smallholder farmers was conducted from 03 June 2010 to 11 June 2010. During the collection of data the researcher had the opportunity to ask follow-up questions for clarification.

3.5 Data Analysis Method

Since the research study is more of qualitative nature, during data analysis, the study used content analysis. With the use of content analysis qualitative data were quantified so that the results could be reported in a quantitative way that is, to convert qualitative data into numerical data through the use of codes (Collis and Hussey 2009, p.164). Frequencies and percentage were used to organise and summarise data collected. By so doing, quantitative data were described or summarised. The results were presented in the form of tables, charts or figures.

3.6 Ethical Considerations

In this study meetings were secured and held with the three tribal authorities of the five (05) communities. During the meetings the leaders of the five communities and representatives of the smallholder farmers were informed of the research. The leaders of the three tribal authorities and smallholder farmers were informed and assured of the participants' rights to volunteer in the study, or to stop participation if they no longer were interested. They were also assured of confidentiality and anonymity. The researcher also explained the obligation to free dissemination of research results (Mouton 2009, p.238). The participants signed consent forms to indicate their acceptance in participating in the study.

CHAPTER 4: RESULTS AND DISCUSSIONS

4. Introduction

In this chapter results and discussions are presented. The results and discussions of the study are presented using the followings:

4.1 Characteristics of the smallholder farmers
4.2 CPWF crop production information and technology adoption
4.3 Output/yields and technology adoption
4.4 Socio-economic information
4.5 Data from smallholder farmers in projects
4.6 Data from traditional leaders/ward councilors
4.7 Response from extension officers/coordinator of CPWF project

4.1 Characteristics of the smallholder farmers

4.1.1 Age and sample size of the study

Table 1 below shows the sample size of forty respondents and the age of the respondents. About 2.5 percent of the respondents from only one (01) village out of five (05) villages were between the ages of 31 and 40.The study indicates that the majority of the respondents have exceeded active youth years and have entered into adulthood. Those between 41 and 50 years of age also constituted only five (05) percent of the respondents. They were from two villages. About 30 percent of the respondents from three villages were between the ages of 51 and 60; and 32.5 percent of the respondents were over the age of 71. This means that approximately 62.5 percent of the respondents were between the ages of 51 and 71 or above. The study found that the majority of the respondents added a number of years to their years in order to access social grants. However, many of the smallholder farmers in CPWF project reflected in the sample size were too old to be involved in farming, especially the fact that farming is a business and that many of the agricultural activities need hard labour. Many of the respondents did not have the physical capability to engage in farming.

Table 1: Age and sample size of the study

Village	Age	Number of Respondents	Percentage
Nkomo	18-30	0	0
	31-40	0	0
	41-50	0	0
	51-60	5	12.5
	61-70	0	0
	71+	1	2.5
Ngove (Mahanyisi project)	18-30	0	0
	31-40	1	2.5
	41-50	0	0
	51-60	2	5
	61-70	2	5
	71+	6	15
Dzingidzingi	18-30	0	0
	31-40	0	0
	41-50	1	2.5
	51-60	0	0
	61-70	0	0
	71+	1	2.5
Mashavele	18-30	0	0
	31-40	0	0
	41-50	1	2.5
	51-60	0	0
	61-70	0	0
	71+	0	0
Hlaneki (Dyondza ku rima)	18-30	0	0

	31-40	0	0
	41-50	0	0
	51-60	5	12.5
	61-70	10	25
	71+	5	12.5
Total		**40**	**100**

Source: Field survey 2010

4.1.2 Gender of the respondents involved in CPWF project

As can be seen from Table 2 below, about 87.5% of the respondents who participated in CPWF project in Greater Giyani Municipality in the five village communities were mostly women, especially those operating in the projects. Only 12.5% were males, and these were individually operating in their fields. On the other hand, as for ownership, most of the land is owned or registered in the men's names.

Table 2: Gender of the respondents involved in CPWF project

Gender	**Frequency**	**Percentage**
Females	35	87.5
Males	5	12.5
Total	**40**	**100**

Source: Field survey 2010

4.1.3 Educational level of respondents

The problem of low production of crops in Greater Giyani Municipality does not mean those smallholder farmers are not capable of producing more good quality crops but that factors such as improved seeds, soil fertility, water harvesting technologies to site but a few, as offered by the CPWF project requires that smallholder farmers have low /basic level of education or basic education. About 62.5 percent of the respondents in Table 3 below have no formal education at all. This impacts negatively on farming since sometimes smallholder farmers are required to apply some scientific knowledge.

Table 3 below shows that 22.5% of the respondents are undergoing ABET (Adult Basic Education), while only 7.5% of the respondents have grade 9-12. If education is used to explain adoption behaviour in this study, Table 3 indicates that 62.5 percent of the respondents are unlikely to adopt technology considering their educational levels.

Table 3: Educational level of respondents

Level of education	**Frequency**	**Percentage**
None	25	62.5
Grade 1-4	2	5
Grade 5-8	1	2.5
Grade 9-12	3	7.5
Other(ABET)	9	22.5
Total	**40**	**100**

Source: Field survey 2010

4.1.4 Land ownership

Table 4 shows that 87% of the smallholder farmers both operating in projects or individually in their fields use communal land where they have permit to occupy and to use the land. Land ownership is hosted under the leadership of the tribal authorities where the majority of the smallholder farmers are allocated land ranging from one to six hectares. Only one respondent has land above nine hectares. Ten percent of the smallholder farmers have no fields, using land allocated for project and also using their homestead yard for production purposes. The respondents, however, indicated that they had not been refused land. This has no negative impact on CPWF technologies adoption since the respondents indicated that if interested they may practise CPWF technologies in their homestead yards.

Table 4: Hectares for crop production on communal land

No. of hectares	Frequency	Percentage
0	4	10
1-3	16	40
4-6	19	47
7-9	-	-
Above 9	1	3
Total	**40**	**100**

Source: Field survey 2010

4.1.5 Type of farming

The data on type of farming reveal that 93% of the respondents are crops farmers while 7% are both crops and livestock farmers.

4.1.6 Number of children

The study shows that all the respondents have children. About 20% of the respondents have children ranging from 1-3, 70 percent of the respondents have children from 4-6, and 10 percent of the respondents having children ranging from 7-9.

4.1.7 Number of children assisting in farming

As can be seen from Table 5 below, although the respondents indicated having children, about 75% of the smallholder farmers get no assistance from their children. Only 25% of the respondents are assisted by their children.

Table 5: Number of children assisting in farming

Number	Frequency	Percentage
1	7	17
2	1	3
3	2	5
4	-	-
None	30	75
Total	**40**	**100**

Source: Field survey 2010

4.1.8 Farming experience

Data from Table 6 below reveal that 7% of the farmers have two to five years of experience in farming, enough to do agricultural farming and alleviate poverty, whereas 92 percent of the smallholder farmers have farming experience above five years. About 47% of the respondents indicated that they have been farming from a young age, hence their experience of over 20 years.

Table 6: Farming experience

Period	**Frequency**	**Percentage**
< 2 years	-	-
2-5 years	3	7
6-9 years	4	10
10-13 years	2	5
14-20 years	12	30
20+	19	47
Missing	-	1
Total	**40**	**100**

Source: Field survey 2010

4.1.9 Source of income

Table 7 shows that 72% of the respondents indicated that they did not depend on farming only. They also get pension grant. About 3% of the respondents indicated that they were doing farming as a part time job and 7% of the respondents indicated that besides farming they also received income from child social grant, and 7% relied on farming only with no other source of income. Yet 10% of the respondents indicated that besides farming they depended on their husbands who work in the private sector.

Table 7: Source of income

Source of income	Frequency	Percentage (%)
Pensioner	29	72
Working part time	1	3
Child social grant	3	7
Farming only	3	7
Other (specify)	4	10
Total	**40**	**100**

Source: Field survey 2010

4.2 CPWF crop production information and technology adoption

4.2.1 Type of fertilisers used in CPWF trials

The data on type of fertilisers used in CPWF trials implementation reveal that 100% of smallholder farmers from the five villages reported that only inorganic fertilisers were used during planting and as topdressing to promote the fast growing of crops.

4.2.2 Type of nutrients use by smallholder farmers after being exposed to CPWF project

About 17% of the respondents indicated that they applied inorganic fertilisers in their fields after being exposed to CPWF trials planting, whereas 82% of the respondents indicated that after being exposed to CPWF trials planting they applied neither kraal manure nor inorganic fertilisers. The reason given for not applying inorganic fertilisers was that fertilisers burn crops when there are not enough rainfalls.

4.2.3 Methods of planting CPWF trials

The study reveals that 100 percent of the smallholder farmers reported planting of CPWF trails in rows.

4.2.4 Smallholder farmers' method of planting

The data show that 30% of the smallholder farmers copied and practised planting their crops in rows after being exposed to CPWF trials. About 65 percent of the smallholder farmers still plant their crops by following plough (sowing the seeds when cattle, donkeys or tractor is ploughing), while 5% still plant their crops by broadcasting. Smallholder farmers indicated that they broadcast seeds only when it rains, the reason being that since they depend on rainfall, when they are making rows time is against them and moisture also evaporates.

4.2.5 Seeds used in CPWF planting trials

All the respondents indicated that during CPWF implementation both indigenous and hybrids seeds were used, the reason being that the project wanted to find out which seeds performed better.

4.2.6 Seeds used by smallholder farmers (SF) after being exposed to CPWF project

The data from Figure 1 below show the number of smallholder farmers per village communities and the seeds they are using. About 70 percent of the smallholder farmers from the five communities responded that they still use indigenous seeds in their fields during the planting even after being exposed to CPWF trials, because of insufficient seed storage capability of all improved varieties. Few of the smallholder farmers (about 30%) indicated that they both use indigenous seeds and hybrids seeds in their fields.

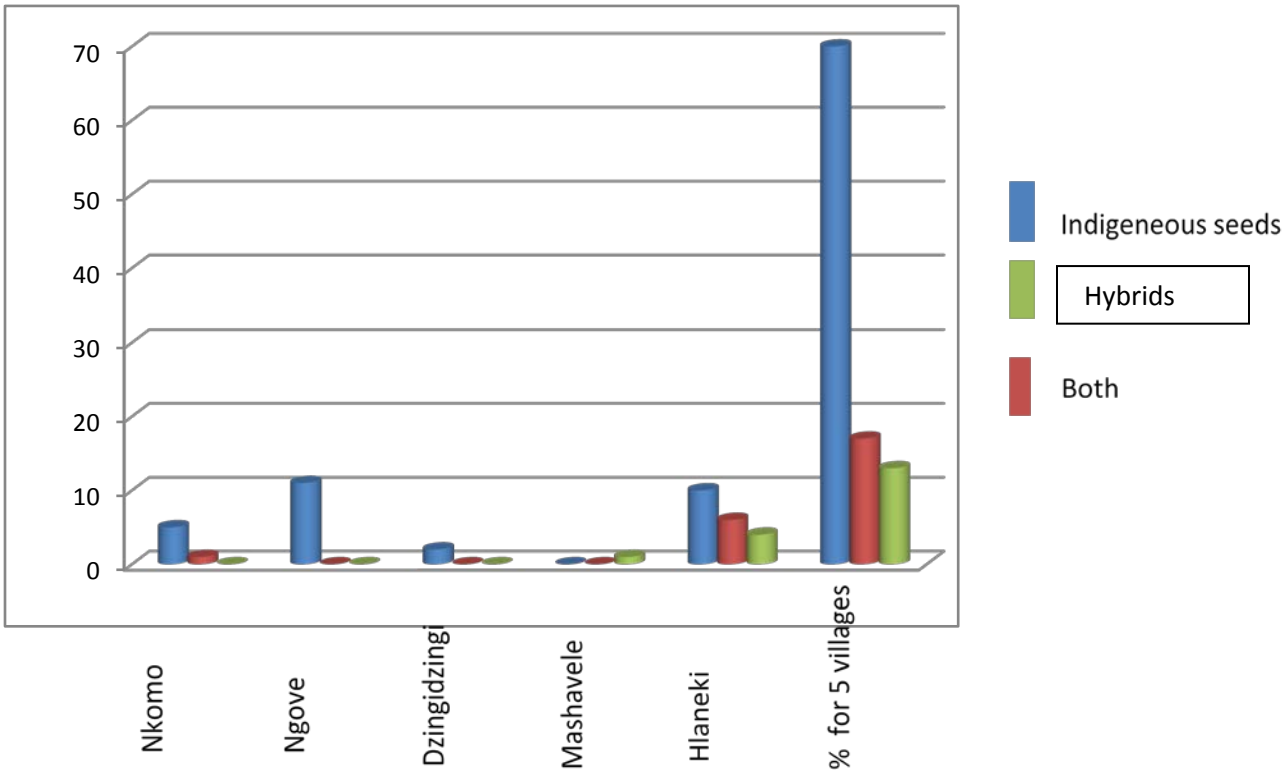

Figure 1: Seeds used by smallholder farmers after being exposed to CPWF project

Source: Field survey 2010

4.2.7 Yield improvement with the use of CPWF seeds

About 95% of the smallholder farmers from the 05 communities reported that CPWF seeds have higher yields, while 5 percent indicated that there was no yield obtained in their fields since they planted rather late.

4.2.8 Improved maize variety seeds smallholder farmers used in their fields after being exposed to CPWF project.

As can be seen from Table 8, about 25% of the smallholder farmers indicated that they were using ZM 521, whereas 7% of the smallholder farmers indicated that they used ZM 423 after being exposed to the CPWF project. About 68 percent of the smallholder farmers indicated that they would not use ZM521, ZM 423, Obatambo, and Sam in their fields, pointing out that their indigenous seeds have a better storage capacity. They stressed that they were not interested in improved maize variety seeds.

Table 8: Improved variety seeds use by smallholder farmers after being exposed to CPWF project

Improved variety seeds	Nkomo (n=6)	Ngove (n=11)	Dzingidzingi (n=2)	Mashavele (n=1)	Hlaneki (n=20)	Total (n=40)	%
ZM 521	1	1	-	1	7	10	25
ZM 423	-	1	-	-	2	3	7
Obatambo	-	-	-	-	-	-	-
Sam	-	-	-	-	-	-	-
None of the above	5	9	2	-	11	27	68
Total	**6**	**11**	**2**	**1**	**20**	**40**	**100**

Source: Field survey 2010

4.2.9 Water harvesting technologies (WHT) used by smallholder farmers before being exposed to CPWF project

The study reveals that 100 percent of the smallholder farmers were unaware or not familiar with water harvesting technologies until the CPWF project came along with the technologies.

4.2.10 CPWF water harvesting technologies(WHT) learned by smallholder farmer (SF)

About 95 percent of the smallholder farmers indicated that they learned the use of tied ridges from the CPWF project, and about 5 percent of the smallholder farmers also stressed that CPWF project also exposed them to the use of both tied ridges and basins as water harvesting technologies.

4.2.11 Equipment used for making ridges/ basins

The data reveal that 100 percent of smallholder farmers used only hand hoes for making ridges and basins and stressed that there were no other equipment to use.

4.2.12 Water harvesting technologies (WHT) practised on farmers' fields after exposure to CPWF project.

The data from Table 9 below reveals that about 22% of the smallholder farmers exposed to CPWF project copied and practised the use of tied ridges. They stressed that tied ridges were effective in holding more rain water and that tied ridges also controlled soil erosion. About 78% of the smallholder farmers indicated that they were neither practising tied ridges nor using basins for water harvesting. The reason is that both techniques involve hard laboring. They also indicated that since no one assisted them they found it difficult to practise water harvesting technologies.

Table 9: WHT practised by smallholder farmers after exposed to CPWF project

WHT	**Nkomo (n=06)**	**Ngove (n=11)**	**Dzingidzingi (n=02)**	**Mashavele (n=01)**	**Hlaneki (n=20)**	**Total (N=40)**	**%**
Tied ridges	02	-	-	01	06	09	22
Basins	-	-	-	-	-	-	-
None of the above	04	11	02		14	31	78
Total	**06**	**11**	**02**	**01**	**20**	**40**	**100**

Source: Field survey 2010

4.2.13 Water harvesting technologies (WHT) recommended to other smallholders

About 90% of the smallholder farmers stressed that they would recommend the use of tied ridges to other smallholder farmers, since it is the most effective water harvesting technology they had ever witnessed, holding a lot of moisture in the soil; 5 percent of the smallholder farmers indicated that they would recommend both tied ridges and basins to other smallholder farmers. Yet 5 percent of the smallholder farmers indicated that they would not recommend to others since they were also unable to practise WHT themselves due to the fact that the technologies demanded hard labour.

4.2.14 CPWF technologies/techniques practised by smallholder farmers

Figure 2 below shows the number of the smallholder farmers per village practising CPWF technologies. For example, Nkomo has 02 smallholder farmers practising WHT, Ngove village has 02 smallholder farmers using improved variety seeds, Mashavele has 01 farmer practising WHT, using improved variety seeds and also applying fertilisers in his field, and Hlaneki having 06 farmers practising WHT, 07 farmers using improved variety seeds and 02 farmers applying fertilisers in their fields. This is in line with what Feder, Just and Zilberman (1985, p.257) point out, that agricultural technologies should be introduced in a package where farmers face several distinct technological options to adopt. They may either adopt the complete package of the new technology or they may adopt a few from the package.

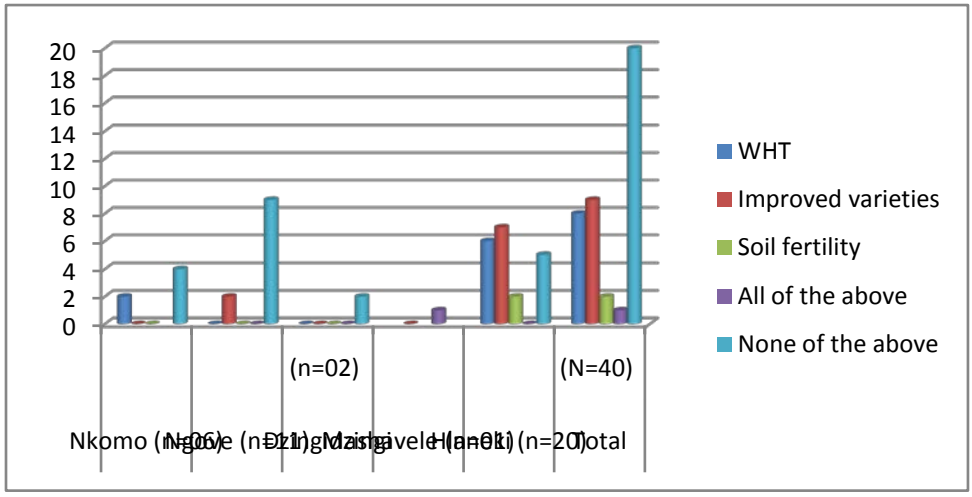

Figure 2: CPWF technologies practised by smallholder farmers

Source figure 2: Field survey 2010

4.2.15 Ratings on the use of CPWF technologies

The data from Table 10 below show that 47 percent of the smallholder farmers are interested and do practise CPWF technologies namely: the technology of using fertilisers, planting in rows, the use of improved maize variety seeds and the use of tied ridges as water harvesting technologies. About 53% of the smallholder farmers indicated that they were not interested in CPWF technologies, especially the use of tied ridges because it is labour intensive.

Table 10: ratings on the use of CPWF technologies by smallholder farmers

Rating	Frequency	Percentage
Interested & practising	19	47
Not interested & not practising	21	53
Total	**40**	**100**

Source: Field survey 2010

4.2.16 Lessons learnt from CPWF project

As can be seen from Table 11 below, 100 percent of the smallholder farmers indicated that they learned and witnessed that planting improved maize variety seeds with the application of fertilisers at planting and after planting. Using tied ridges or basins, yielded improvements. Smallholder farmers also pointed out that they found out as to which seeds yielded better (seeds evaluation).

Table 11: Lessons learnt from CPWF project

Lessons learnt	Frequency	Percentage
Yield improvements	40	100
Soil fertility	-	-
Water harvesting technologies	-	-
Rows planting	-	-
Seeds evaluation	-	-
Total	**40**	**100**

Source for Table 11: Field survey 2010

4.3 Output/Yields and technology adoption

4.3.1 Yields from CPWF trial plots

As can be seen from Figure 3, about 95 percent of the smallholder farmers indicated that CPWF yields from trials plots was high. About 5 percent of the smallholder farmers

indicated they did not get any harvest from CPWF trials, the reason being that they planted very late, when there was no rainfall to mature their crops.

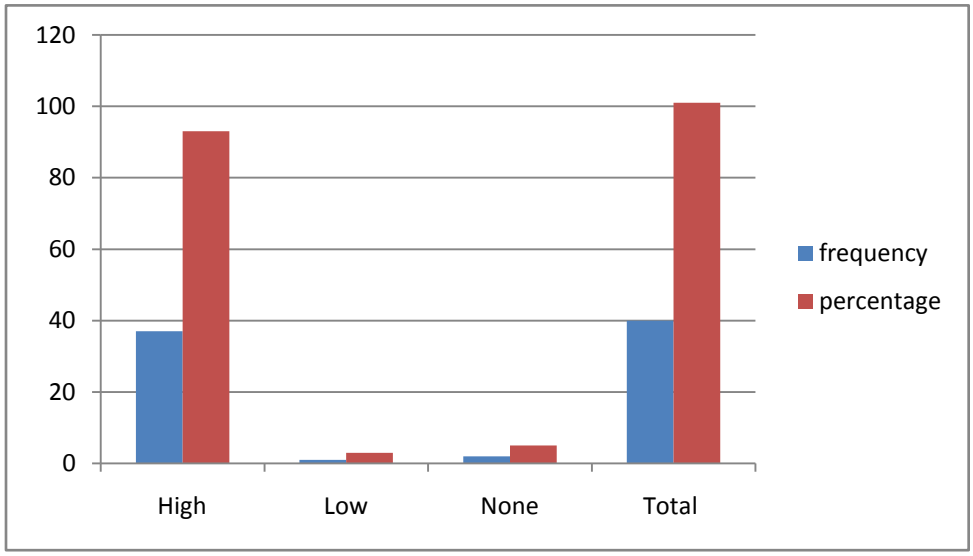

Figure 3: CPWF yields in trial plots

Source: Field survey 2010

4.3.2 The performance of local variety as compared to improved varieties in terms of yields, early maturity and resistance to drought

The data on performance of local variety as compared to improved varieties reveal that 95 of the respondents indicated that the performance of local variety was low in terms of yields, early maturing and resistance to drought. About 5 percent of the smallholder farmers could neither tell whether the performance of local variety was high nor low since their maize could not reach maturity stage due to rainfall shortage.

4.3.3 The performance of improved varieties as compared to local variety seeds

About 95 percent of the smallholder farmers reported that improved variety seeds performed high in terms of yields, whereas 5 percent of the smallholder farmers indicated that it was difficult to tell the performance since their crops could not get any yields. However, they stressed that maize stalks improved varieties were bigger than the local varieties.

4.3.4 CPWF technologies' yield increment

About 95 percent of the smallholder farmers including 5 percent of the smallholder farmers who indicated that they did not obtain any harvest due to the scarcity of rainfall during their cropping period stressed that if the rains were good CPWF technologies/ techniques were going to increase yields. Low (1989, p. 136) also confirms that in practice improved production methods give yields per hectare up to five times those achieved with traditional methods of planting but involve labour intensive.

4.3.5 Types of maize variety which yielded better

The data on type of maize variety seeds which yielded better from Table 12 reveal that 82.5 percent of smallholder farmers reported that all improved maize varieties yielded better than the local variety of seeds. About 12.5 percent of smallholder farmers indicated that ZM 521 yielded better and 5 percent of smallholder farmers reported that due to the scarcity of rainfall during their cropping period, since their trials were planted very late, their crops died due to water stress.

Table 12: Maize variety yields

Types of maize variety	**Frequency**	**Percentage**
ZM 521	5	12.5
ZM 423	-	-
Obatambo	-	-
Local variety	-	-
All improved varieties	33	82.5
Missing	2	5
Total	**40**	**100**

Source: Field survey 2010

4.3.6 Type of seeds used on farmers' fields

The data reveal that 47 percent of the smallholder farmers indicated that they were using ZM521 as one of the improved variety seeds only for consumption and not for storing the seeds. About 53 percent of the respondents indicated that they were not using improved

varieties, the reason being that all improved maize variety seeds were susceptible to storage pests.

4.3.7 Recommendation on improved varieties to be used by other smallholder farmers

The data reveal that 100 percent of the smallholder farmers indicated that they would recommend improved varieties to be used by other smallholders, but only for consumption since all improved varieties there were susceptible to pests.

4.4 Socio-economic information

4.4.1 Advisors of the smallholder farmers during CPWF trials implementation

The data show that 100 percent of the smallholder farmers reported that extension officers/ agricultural technicians played a major role during the implementation of CPWF trials. They demonstrated to smallholder farmers the laying out of trial plots on the fields, soil preparation, rows making, tied ridges making, basins making, fertiliser application, sowing, management and monitoring of the research trials. The respondents also indicated that ARC representatives and ICRISAT representatives also visited CPWF trail plots to monitor and evaluate the trials.

4.4.2 Type of labour used during CPWF trials planting

The data collected reveal that 93 percent of the smallholder farmers used their own labour during planting and management of CPWF trials and in their own fields. Seven percent of the smallholder farmers indicated that they used both own labour and hired labour in CPWF trials and in their fields.

4.4.3 Assistance in smallholder farmers' fields during planting

The data reveal that 17 percent of the smallholder farmers got assistance from family members during farming in their fields. About 7 percent of the smallholder farmers used hired labour in their fields, whereas 76 of the smallholder farmers had no assistance.

4.4.4 Use of CPWF harvest

The data from Figure 4 below reveal that about 90 percent of the smallholder farmers used all CPWF harvest for home consumption. They reported that CPWF harvests are susceptible to pests. Only 5 percent of the smallholder farmers stored the harvest for reuse. A further 5 percent of the smallholder farmers indicated that they did not get any harvest from CPWF trials. They pointed out that their trials were planted very late in their fields.

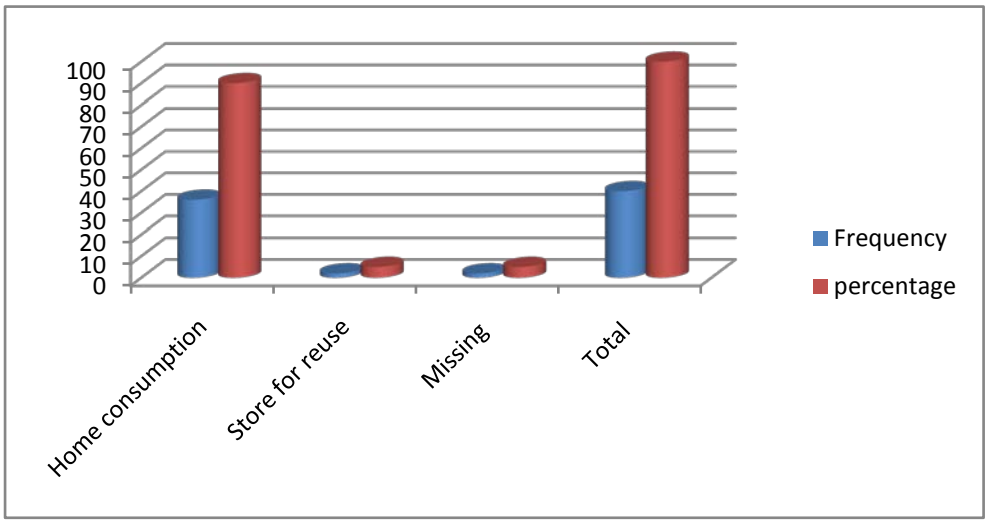

Figure 4: Use of CPWF harvests

Source: Field survey 2010

4.4.5 The storage capability of CPWF seeds/ harvest compared to local seeds

About 95 percent of the smallholder farmers indicated that storage capability of CPWF was low. Five percent of the smallholder farmers indicated that they were not sure since there was no harvest from CPWF trials and that they had not yet planted CPWF seeds in their fields

4.4.6 Use of indigenous seeds / local variety seeds after harvest by smallholder farmers

The data reveal that 20 % of the smallholder farmers consume all their produce. About 10 % of the smallholder farmers consume some of their produce and sell the rest to the local communities, while 70 % of the smallholder farmers reported that they consumed some

of their harvest and stored the rest for reuse in the next planting season, since their local variety seeds have high storage capability.

4.4.7 Smallholder farmers 'challenges or constraints

As can be seen from Table 13 below, about 75 percent of the smallholder farmers indicated that their major challenges in farming was lack of ploughing equipment. They reported that sometimes they received good rainfall, but moisture got lost while they were still waiting for a tractor to come to their field to plough. About 25 percent of the smallholder farmers indicated that their challenges included lack of ploughing equipment, shortage of labour where they stressed that even if they were interested in practising CPWF water harvesting technologies, without some labour assistance they could not make it happen. They indicated that what also constrains them is that they do not qualify to access bank credit. The farmers also indicated that since they depended on rainfall for production, when it rains every one in the community produces maize and they all end up with no one to sell their maize produce to.

Table 13: Smallholder farmers' constraints

Challenges/Constraints	**Frequency**	**Percentage**
Lack of ploughing equipment	30	75
Shortage of labour	-	-
Shortage of land	-	-
Credit	-	-
Marketing	-	-
All of the above	10	25
Total	**40**	**100**

Source: Field survey 2010

4.4.8 Food security after exposure to CPWF technologies

The data show that 68 percent of the smallholder farmers are food secured after being exposed to CPWF project. About 32 percent of the smallholder farmers indicated that they were still not food secured because they had not yet started practising CPWF technologies.

4.4.9 Period of consuming their maize produce

Table 14 below shows that 12 percent of the smallholder farmers consume their maize produce for a period of 03 months. Fifty-seven percent of smallholder farmers indicated that they consumed their food produced for a period of 06 months. About 20 percent of smallholder farmers stressed that they consume their food produced for a period of 12 months and indicated that they had never exceeded 12 months. Ten percent of the smallholder farmers indicated that they got no produce, usually due to drought.

Table 14: Period of consuming maize produce

Period	**Frequency**	**Percentage**
03 months	5	12
06 months	23	57
12 months	8	20
Above 12 months	-	-
None	4	10
Missing	-	1
Total	**40**	**100**

Source: Field survey 2010

4.4.10 Exposure to CPWF project and life change

The data reveal that 23 percent of the smallholder farmers' life changed after their exposure to CPWF project. About 77 percent of the smallholder farmers' life has not changed, however. The majority indicated that they had not yet started practising CPWF technologies. About 23 percent of the smallholder farmers who indicated that their life had changed stressed that since their exposure to CPWF project they were able to

produce enough food that fed their families for a period of 06 to 12 months, and that the money which was to be used to buy mealiemeal was now used for their children's education, meaning that their life had changed. These are also the smallholder farmers who have also started practising CPWF technologies in their fields.

4.4.11 Information on CPWF technologies and impact on adoption of CPWF technologies

The data show that 100 percent of the smallholder farmers indicated that the information given to them for more than two years was enough for them to adopt CPWF project.

4.4.12 Responsibilities of smallholder farmers during CPWF trials implementation and alleviation of poverty after exposure to CPWF project

The data reveal that 100 percent of the smallholder farmers indicated that their responsibilities were to plant, and that they owned the CPWF trials and learned all the techniques/technologies in CPWF project. Due to their commitment, data reveal that 45 percent of the smallholder farmers indicated that poverty has been alleviated after exposure to CPWF project. They stressed that they were food secured and that the money used to buy food was now being used for other family matters including their children' education. Fifty-five percent of the smallholder farmers maintained that poverty had not been alleviated and their life had not changed at all. The majority of the smallholder farmers indicated that they had not yet started practising CPWF technologies.

4.5 Data from smallholder farmers in projects

4.5.1 Introduction

Data collected for projects were conducted to clearly indicate which project would continue practising CPWF technologies/techniques given that the CPWF project was over.

4.5.2 Characteristics of smallholder farmers in projects

4.5.2.1Gender composition and the projects

Smallholder farmers from Dyondza ku rima Project at Hlaneki village and Mahanyisi Project at Ngove village responded that their projects were made up of women and that all of them were old people whose farming depended on rainfall.

4.5.2.2 Smallholder farmers' responsibilities during the implementation of CPWF project

The smallholder farmers from the two (02) projects responded that they participated on CPWF project during the implementation and that they owned the trials.

4.5.2.3 CPWF technologies adopted by smallholder farmers as group

The data from figure 5 below reveal that Dyondza ku rima Project with 20 smallholder farmers adopted the use of WHT and ZM 521 which are improved maize variety seeds. They also adopted the use of fertilisers, although with the use of fertilisers they indicated that if rainfall was low they would not apply fertilisers because fertilisers may burned their crops. The data also reveal that Mahanyisi Project, with 11 smallholder farmers, has not adopted the use of CPWF technologies.

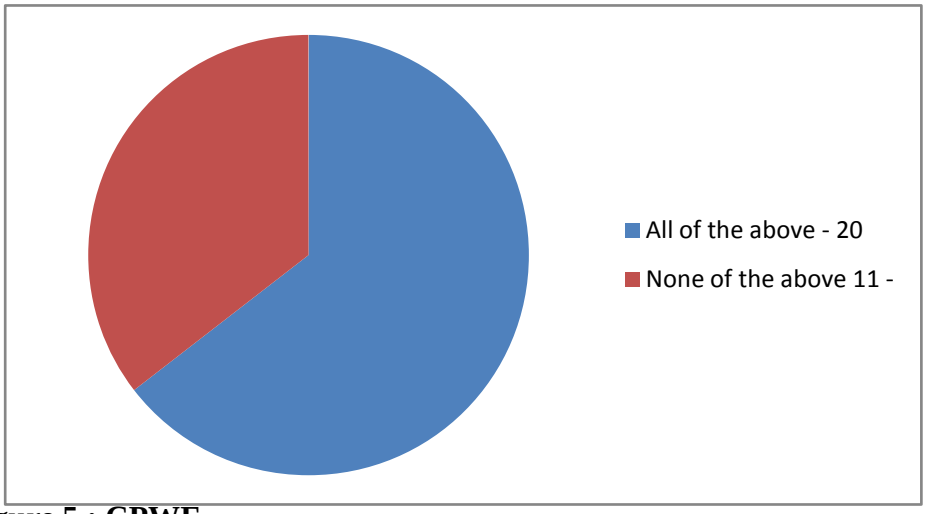

Figure 5 : CPWF technologies adopted by a project
Source: Field survey 2010

4.6 Data from Traditional leaders/Ward councilors

4.6.1 Response from Traditional leaders/Ward councilors

Data collected from both the Traditional leaders and the ward councilors reveal that poverty alleviation is in the smallholder farmers' hands, meaning that if smallholder farmers adopt and practice CPWF technologies food can be secured and poverty alleviated. Both traditional leaders and ward councilors stressed that they witnessed that CPWF technologies increased yields since CPWF trials plots were planted in the areas of their jurisdiction.

4.7 Response from Extension officers/Coordinator of CPWF project

4.7.1 The officials' views of CPWF technologies to smallholder farming

Data from extension officers and coordinator of CPWF project reveal that CPWF is a project that aims at assisting smallholder farmers in securing food, increasing income and improving their livelihoods. Technologies learned by smallholder farmers were very helpful for holding moisture in the fields for a longer time. Cultivar choice help farmers to choose which seeds will adapt to their environment and to find out which ones have higher yields. Fertiliser application assists farmers to boost their crops in terms of growth, provided of course that the rainfall is good.

4.7.2 Dissemination of the programme/project in other municipalities

The data show that dissemination of CPWF project to other municipalities may be done through results demonstrations by hosting Farmers' Days, meetings or workshops where officials from other municipalities will be informed of CPWF project and how it operates, but there is a need for improvement on CPWF project, especially during planting if it is to be introduced to other municipalities. The CPWF project needs to have solid budget for labour to assist smallholder farmers during soil preparation, making of ridges and basins since this is the most difficult work for both the extensionists and the farmers.

4.7.3 Challenges during implementation of CPWF project

The data from both the extension officers and coordinator reveal that smallholder farmers faced a number of challenges. The extension officers who were involved in CPWF project, had to do all the calculations related to fertiliser use and had to record all the activities in the trials. CPWF recordings was reported to be challenging even to smallholder farmers holding ABET qualifications and to some officials as well. Another challenge was that suitable cultivars used during the implementation of the CPWF project are difficult to get even if farmers may want to adopt.

4.7.4 Preferences during the implementation of CPWF project

Both the extension officials and coordinator reported that their main preference was witnessing CPWF trials being successful. Secondly, CPWF had funds for workshops outside the extension officers' working places to revive both the extension officers' work and smallholder farmers' eagerness to learn new methods of improving their yields.

4.7.5 Response to the achievement of CPWF project goal

The data from extensionists and coordinator of CPWF project indicated that CPWF project achieved its goal which is to improve food security, and to better the income and livelihoods of smallholder farmers. They stressed that it was up to the smallholder farmers to adopt the technologies/ techniques that they were exposed to.

4.7.6 Possibilities of introducing the programme to other districts

The data show that there is a need for improvement on the CPWF project, especially during planting, if it is to be introduced to other districts. The CPWF project needs to have a solid budget for labour to assist farmers during the stage of soil preparation, the making of ridges and basins, since this is the most difficult work for both the extensionists and farmers.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5. Introduction

This chapter will focus on the summary of the findings, conclusion and recommendations.

5.1 Summary of the Findings

The objectives of the study were:

a) To assess smallholder farmers' awareness of the technologies introduced by the CPWF project.
b) To determine the role played by smallholder farmers in the implementation of CPWF project.
c) To assess the level of CPWF technologies/techniques adopted by smallholder farmers.
d) To assess challenges and opportunities experienced by smallholder farmers in the process of CPWF technology adoption.
e) To determine whether CPWF technologies/techniques impacted positively on household food security and poverty alleviation.

In the following sections a brief discussion is made to find out if the above objectives were achieved by CPWF project.

5.1.1 Smallholder farmers' awareness of the technologies/techniques promoted by CPWF project

When collected data were examined, the findings showed that smallholder farmers were made aware of the technologies promoted by CPWF project. This is proven by the way smallholder farmers mentioned how CPWF trials were implemented, including how they were exposed to soil fertility, use of rows planting, use of improved maize seeds and water harvesting technologies. Although a high percentage of smallholder farmers indicated that CPWF technologies promote high yield, as Low (1989:136) also confirms, they would not adopt this technology because it is labour intensive. This, however, shows that smallholder farmers did not understand the main aim of introducing CPWF to them, which is to improve household food security, income and livelihoods of all the

smallholder farmers living in the Limpopo river basin where the areas are drought-stricken. CPWF project targeted these smallholder subsistence farmers since they are unable neither to meet annual food requirements nor address the growing poverty problem (ICRISAT Baseline Survey Report 2007, p.7).

5.1.2 The role of smallholder farmers during implementation of CPWF project

The study shows that the smallholder farmers as the beneficiary of the CPWF project participated throughout the CPWF project implementation. Smallholder farmers mentioned, among other things, participating on the laying out of CPWF trials, soil preparation including the use of soil fertility to promote the fast growing of their crops, learned and practised water harvesting technologies such as the use of tied ridges and use of basins. They mentioned learning planting of improved maize seeds varieties, and also evaluated which of the seeds yielded best. Smallholder farmers also strongly stressed that the CPWF trials planted were theirs, and enjoyed taking care of the trials up to maturity and harvesting.

5.1.3 The levels, scope and extent of adoption of the technologies promoted by the CPWF

According to Feder, Just and Zilberman (1985, p. 255) adoption of technologies in agriculture has attracted considerable attention among development economists because the majority of the population of less developed countries (LDCs) derives its livelihood from agricultural production, and technologies seem to offer opportunities to increase production and income. However, the introduction of many technologies has met with only partial success considering the rate of adoption. Ruttan (1982, p. 22) also confirms that even if technologies introduced to smallholder farmers were technically and economically feasible, adoption becomes the farmers' choice and research is successful only if technologies are adopted and utilised by farmers.

The study shows that the rate of adoption of CPWF technologies introduced to smallholder farmers in Greater Giyani Municipality is very low. This is confirmed by figure 2 which indicates that only 3 percent of the smallholder farmers introduced to

CPWF technologies adopted the whole package of CPWF project. Twenty percent of the smallholder farmers adopted water harvesting technologies, 22 percent of the smallholder farmers adopted use of improved maize variety seeds, 5 percent indicated that they applied fertilisers during planting and top-dressed their crops and 50 percent of the smallholder farmers still maintained that they would continue with their traditional methods of planting. The study also shows that from figure 5, only 01(one) project exposed to CPWF will continue practising the use of tied ridges and the use of ZM 521 during planting, but feared the use of fertilisers due to scarcity of rainfall in their areas.

The above findings confirm what Ruttan (1982, p.6) stresses that experience shows that immediate and uniform adoption of technologies in agriculture is quite rare and that adoption behaviour differs. It is also stressed that some technologies have been well received, while other improvements have been adopted by only a very small group of farmers.

5.1.4 Challenges and opportunities faced by smallholder farmers in adopting CPWF technologies.

5.1.4.1 Challenges/constraints faced by smallholder farmers in the adoption of CPWF technologies

The findings show that there are a number of similar challenges or constraints associated with the adoption of CPWF technologies by smallholder farmers namely: lack of ploughing equipment, shortage of labour, shortage of land and lack of access to credit.

5.1.4.1.1 Lack of ploughing equipment

The study shows that about 75 percent of the smallholder farmers stressed that lack of ploughing equipment posed many challenges in the CPWF project, especially on water harvesting technologies. Smallholder farmers indicated that during the cropping season they have to wait for ploughing equipment for months while moisture dries up in their fields. They also have no time to prepare either tied ridges or basins, which also take substantial amount of time to prepare. Consequently, they find themselves forced to plant without practising water harvesting technologies.

5.1.4.1.2 Shortage of labour

The results of the findings show that smallholder farmers indicated that CPWF project demands labour intensive during soil preparation, especially when making ridges and basins. Since some indicated that their children and those staying with them did not assist in farming, this also poses a challenge in adopting CPWF technologies.

5.1.4.1.3 Lack of access to credit

The results of the study show that smallholder farmers lack access to bank credit (which would help them practise CPWF technologies). This is a big challenge, which results in failing to access ploughing tractors, money to buy fertilisers and maize seeds. Sarena (2003, p. 11) also confirms that adoption of drought management technologies in drought- stricken areas is difficult since bankers hesitate to provide money to dry land farmers because their repayment capacity is limited and uncertain.

5.1.4.1.4 Shortage of land

The study shows that some of the smallholder farmers stressed that land is also a challenge but this has no impact on adoption of CPWF technologies since many of the smallholder farmers who voiced the land issue have not yet started practising CPWF technologies even in a small portion of their land or in their homestead yards.

5.1.4.2 Opportunities faced by smallholder farmers for adopting CPWF technologies

The findings show that there are a few opportunities gained by smallholder farmers associated with adoption of CPWF technologies namely: food security, poverty alleviation and income opportunities.

5.1.4.2.1 Food security

The results of the findings show that about 68 percent of the smallholder farmers indicated that since CPWF project came into their areas they have been encouraged to plant every season and they have obtained good harvests to last them for longer periods, and for this reason they are food secured. This is also confirmed by Table 39 which shows that 57 percent of the smallholder farmers consume their maize produce over a period of 06 (six) months and 20 percent of smallholder farmers indicated that they consumed their maize harvest for a period of 12 months.

5.1.4.2.2 Poverty alleviation

The study shows that about 42 percent of the smallholder farmers indicated that since CPWF project came, poverty had been alleviated. They also indicated that since they are food secured the money used to buy food is used for their childrens'education.

5.1.4.2.3 Income opportunities

The results of the findings show that percentage of income gains or income opportunities for smallholder farmers are very low, only 7 percent of the smallholder farmers indicated that they sold their harvest from dry land farming after exposure to CPWF project, the reason being that most dry land farmers prefer storing their products for home consumption.

5.2 Conclusion

Data collected from smallholder farmers prove that farmers in Greater Giyani Municipality are farming in drought-stricken areas that depend on rainfall. Therefore, technologies on soil and water conservation or water harvesting need to be welcomed and applied. Indeed if smallholder farmers adopt CPWF technologies which result in obtaining good yields, food security can be attained and poverty can be alleviated in the process. Income can also be generated since farmers will not be able to consume all the harvested maize crops. They will have to sell part of the produce.

Lastly, South Africa is a large agricultural country. For the economy to grow, modern and effective methods of agricultural production need to be adopted and applied. It is only then that the country will grow and become a stronger nation.

5.3 Recommendations

The recommendations are mainly based on the findings made from the study. Therefore from this study the following will benefit from the recommendations namely: smallholder farmers, extension agents, Agricultural Research Council, and academics for further research studies.

5.3.1 Smallholder farmers

The study recommends that when agricultural programmes, both national and international programmes are introduced, these programmes must be exe-ante evaluated in terms of their benefits and the smallholder farmers must act on it.

In order to resolve the challenge of shortage of labour, the study also recommends that individual smallholder farmers should implement what is called *Tsima* (helping hand) meaning that during the cropping season, for example, on Monday farmer A, B, C, D and E assisting farmer F and vice versa.

5.3.2 Extension agents

The study recommends that the Department of Agriculture should find ways and means to motivate and create interests to its agricultural technicians/extension agents for all the programmes that their staff find themselves working with the smallholder farmers. Agricultural technicians should motivate and encourage their beneficiaries (smallholder farmers) to welcome programmes such as CPWF, which seem to be of help to dry land farming. According to the smallholder farmers, some extension officers took long to visit them and give advice or help them with certain problems related to the farming technologies they were trying out and this could have impacted negatively on the adoption of the CPWF technologies.

Secondly, the extension agents should also properly explain to smallholder farmers of the aim of any programme/project which is introduced to them because some programmes such as CPWF are a transition out of poverty for the smallholder farmers. Many of the smallholder farmers seem to be unclear why they planted CPWF trials in their fields. They were also unaware that they should have also started practising CPWF technologies by themselves without a helping hand from extension officers. This may have impacted negatively on adoption.

Thirdly, there is a need for remobilising and training of smallholder farmers on CPWF technologies and its potential benefits.

Fourthly, the study also recommends that the Department of Agriculture consider the age of the beneficiaries when programmes/projects are introduced to them (smallholder farmers). The reason is that from the sample size of forty smallholder farmers evaluated on the uptake of CPWF technologies, only about 2.5 percent of the respondents from only one (01) village out of five (05) villages were between the ages of 31 and 40.

The study reveals that the majority of the respondents have exceeded active youth years and entered into adulthood. Those between 41 and 50 years of age also constituted only five (05) percent of the respondents. About 30 percent of the respondents from three villages were between the ages of 51 and 60; and 32.5 percent of the respondents were over the age of 71. This means that approximately 62.5 percent of the respondents were between the ages of 51and 71 or above. The study found that the majority of the respondents added a number of years to their years in order to access social grants. However, many of the smallholder farmers in the CPWF project were too old to be involved in farming, especially the fact that farming is a business and that many of the agricultural activities need hard labour. Many of the respondents did not have the physical capability to engage in farming.

In future, young adults dry land farmers should be exposed to modern agricultural programmes since farmers who are pensioners could not cope with CPWF technologies because the work is labour intensive. Bird, Bultena and Gardner (1995, p.156) confirm that young farmers are more valuable, open and grasp new technologies in agricultural practises faster than old farmers.

5.3.3 Agricultural Research Council (ARC)

The study recommends that ARC should research and design the equipment which can be used by smallholder farmers in dry land farming for making ridges or drilling basins. The farmers pointed out that it is because of the intensity of labour that makes them not to adopt the use of tied ridges or basins in large numbers, otherwise, all the smallholder farmers agreed that CPWF technologies do increase yields significantly.

5.3.4 Academics

There is a need for skills development for smallholder farmers since they have more farming years of experience without skills. Smallholder farmers feel neglected, hence research must be done on skills development for smallholder farmers so that they are equipped with the necessary farming tools that would see them developing as farmers.

Lastly, as already indicated earlier, South Africa is a large agricultural country. For the economy to grow, modern and effective methods of agricultural production need to be adopted and applied. It is only then that the country will grow and become a stronger nation in a number of fields.

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RESTRICTED

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

Enquiries: R.R Ramugondo

Ref: 12/5

20 October 2009

Ms. Josephine Manganyi

Greater Giyani Municipality

GIYANI

Re: REQUEST TO USE THE CHALLENGE PROGRAM WATER AND FOOD (CPWF) PROJECT IN AN ACADEMIC RESEARCH STUDY

Kindly take note that your request to use CPWF project for your Academic Research has been approved. There may however be a slight change in your topic for the study, from "impact assessment" to an "adoption study" seeing that the former is more involved and it can be properly evaluated over a long period of time, while the later will concentrate on the adoption of the various CPWF techniques which has been researched and demonstrated upon. This however will be dealt with thoroughly by yourself and who ever will be supervising you.

Wishing you good luck and success in your proposed study

Kind regards

R.R Ramugondo
Project Coordinator

Dr. K.B Liphadzi
Senior Manager: Research Services

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APPENDIX 2

QUESTIONNAIRES

EVALUATION OF ADOPTION OF CHALLENGE PROGRAMME WATER FOR FOOD TECHNIQUES/TECHNOLOGIES ON SMALLHOLDER DRY LAND FARMING IN GREATER GIYANI MUNCIPALITY IN LIMPOPO PROVINCE

PURPOSE:

Due to the challenges of food insecurity, poor yields or low production of food in drought stricken areas of Mopani District in Greater Giyani Municipality and poverty experienced by smallholder farmers who are depending on rainfall for production and the fact that smallholder farmers were exposed to CPWF technologies of which if smallholder farmers can adopt can be the solution to the challenges mentioned above this commissioned the study on evaluation of CPWF technologies.

ANNEXURE A

INDIVIDUAL INTERVIEWS/GROUP INTERVIEW

Respondent Name/Project Name

Name of interviewer:

Date of interview:

Information in this research study will be held confidential and you are asked to answer all the questions as honestly as possible.

General information

1) Sex or gender of household member.

	Code
Female	1
Male	2

2) What is your highest standard of formal education?

	code
Grade 1-4	1
Grade 5-8	2
Grade 9-12	3
Tertiary	4

Other	5

3) Please indicate your language abilities (good, fair, poor, none)

	speak	read	write
English			
Afrikaans			
Tsonga			
Sotho			
other			

4) Indicate your arithmetic and or your counting abilities

	code
Good	1
Average	2
Little	3
None	4

5) Could you say what type of land you have for farming?

	Code
Permit to occupy	1
Private ownership	2
Rented land	3
Other (specify)	4

6) How many hectares are allocated to you for crop production?

	code
1-3	1
4-6	2
7-9	3
Above 9	4

7) Indicate the type of farming you are engage in.

	Code
Crops	1
Livestock	2
Mixed	3

8) How many children do you have?

	Code
1-3	1
4-6	2
7-9	3
above 9	4

9) How many live with you?

	Code
2	1
3	2
4	3
5	4
Other (specify)	5

10) How many assist you in your fields?

	Code
1	1
2	2
3	3
4	4
5	5
Above 5	6
None	7

11) What is your farming experience in years?

period	Code
less than 2 years	1
2-5 years	2
6-9 years	3
10-13	4
14-20	5
over 20 years	6

12) What is your other source or sources of income besides farming?

	Code
Pensioner	1
Working	2
Child social grant	3
Other	4

CPWF crop production information and technology adoption

13) What type of fertilizers did you use in CPWF trials?

	Code
Inorganic fertilisers	1
Kraal manure	2
Other	3

14) What type of fertilisers do you use in your fields after being exposed to CPWF programme?

	Code
Inorganic fertilizers	1
Kraal manure	2
None of the above	3

15) Were you using these types of fertilizers even before being exposed to CPWF?

	Code
Yes	1
No	2

16) How did you plant seeds in CPWF trials?

	Code
In rows	1
Follow plough	2
Broadcast	3

17) How do you plant seeds in your fields after being exposed to CPWF?

	Code
In rows	1
Follow plough	2
Broadcast	3

18) What type of seeds did you use during CPWF trial planting?

	Code
Indigenous seeds	1
Hybrids	2
Both	3

19) What type of seeds did you use in your field during planting after being exposed to CPWF?

	Code
Indigenous seeds	1
Hybrids	2
Both	3

20) With the use of CPWF seeds, did you witness yields improvements?

	Code
Yes	1
No	2

21) From the types of improved maize variety seeds used during CPWF trial planting, which ones are you using in your fields?

	Code
ZM 521	1
ZM 423	2
Obatambo	3
Sam	4
Local variety	5
None of the above	6

22) Were you practising water harvesting technologies in your field before being exposed to CPWF ?

	Code
Yes	1
No	2

23) If “yes” tick the water harvesting technologies that you were practising

	Code
Tied ridges	1
Tied furrows	2
Basins	3
Rows making	4
All of the above	5
None of the above	6

24) Which types of CPWF water harvesting technologies did you learn during CPWF trial planting for the past two to three years?

	Code
Tied ridges	1
Tied furrows	2
Basins	3
Rows making	4
All of the above	5

25) What equipment were you using when making ridges/basins?

	Code
Hand hoes	1
Machines	2
Other	3

26) Are you practising CPWF water harvesting technologies in your fields?

	Code
Yes	1
No	2

27) Which water harvesting technologies are you practising in your field at the present moment?

	Code
Tied ridges	1
Basins	2
Rows making	3
None of the above	4

28) Which water harvesting technologies can you recommend to other smallholder farmers?

	Code
Tied ridges	1
Basins	2
Rows making	3
All of the above	4
None of the above	5
Other	6

29) Which CPWF technologies are you practising in your fields right now?

CPWF technologies	Code
WHT	1
Improved varieties	2
Use of fertilisers	3
All of the above	4
None of the above	5

30) How can you rate yourself on the use of CPWF technologies?

	Code
Interested &practising	1
Interested but not practising	2
Not interested & not practising	3

31) What lessons did you learn?

	Code
Yield improvements	1
Soil fertility	2
Water harvesting technologies	3
Rows planting	4
Seeds evaluation	5
All of the above	6

Output/Yield and technological adoption

32) How were CPWF yields from trial plots in your field?

	Code
High	1
low	2

33) What was the performance of local variety as compared to the improved varieties in terms of yield, early maturing ,and resistance to drought?

	Code
High	1
low	2

34) How was the performance of improved varieties as compared to the local maize variety seeds?

	Code
High	1
low	2

35) Which type of maize variety seeds yielded best?

Seeds	Code
ZM521	1
ZM423	2
Obatambo	3
Local variety	4
All improved varieties	5

36) Are you using this type of seeds in your fields?

	Code
Yes	1
No	2

37) Would you recommend the seeds to be used by other smallholder farmers in your area?

	Code
Yes	1
No	2

Socio-economic information

38) During the CPWF programme what were your responsibilities?

	Code
owning & care of trials	1
monitoring & evaluation	2
Other	3

39) Who was advising or guiding you during CPWF trials implementation?

	Code
Extension officers/Agricultural technicians	1
ARC representatives	2
All of the above	3

40) What kind of labour were you using in CPWF and in your fields during planting?

	Code
Own labour	1
Hired labour	2
Other	3

41) Who assists you in your field during planting?

	Code
Family members	1
Hire labour	2
None of the above	3

42) What did you use CPWF harvest for?

	Code
Home consumption	1
Sell products	2
Store for reuse	3

43) How is the storage capacity of CPWF seeds as compared to local variety seeds?

	code
High	1
low	2

44) After harvesting what do you do with your produce?

	code
Consume	1
Consume & market	2
Market only	3
Consume and store for reuse	4

45) What are your challenges/ constraints in farming?

	code
Lack of ploughing equipments	1
Shortage of labour	2
Shortage of land	3
Credit	4
Marketing	5
All of the above	6
Other(specify)	7

46) After being exposed to CPWF technologies are you food secured?

	Code
Yes	1
No	2

47) Indicate the period you consume your maize produce.

	code
06 month	1
12 months\	2
Above 12 months	3
None	4

48) Has your life changed after being exposed to CPWF technologies?

	Code
Yes	1
No	2

49) If your life has changed indicate what you now can afford.

	Code
Children' education	1
Health\medication	2
Social clubs	3
All of the above	4
None	5

50) Was the information on CPWF enough for you to adopt all the technologies?

	Code
Yes	1
No	2

51) After being exposed to CPWF technologies, can you say poverty has been alleviated?

	Code
Yes	1
No	2

52) If poverty has been alleviated which of the followings do you afford ?

	Code
Education for children	1
Health medications	2
Social clubs	3
All of the above	4
None	5

THANK YOU FOR PARTICIPATING IN THIS STUDY

. **ANNEXURE B**

QUESTIONNAIRE TO WARD COUNCILLORS/TRADITIONAL LEADERS

Name of the respondent:
Position:
Date:

Information in this research study will be held confidential and you are asked to be honestly as possible.

53) As a political leader/community leader you witnessed how CPWF trials yielded during CPWF farmers' days. If farmers practise CPWF technologies, can you say poverty can be alleviated?

	code
yes	1
No	2

54) If your answer is "no" what needs to be improved?

……
……
…….

THANK YOU FOR PARTICIPATING IN THE STUDY.

ANNEXURE C

QUESTIONNAIRE TO EXTENSION AGENTS/MANAGERS

Name of the respondent:
Position:
Date:

Information in this research study will be held confidential.

55) What are your views concerning CPWF technologies to smallholder farming?

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56) If the programme is to be implemented in other municipalities what should be improved?

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57) What were your challenges during the implementation of CPWF technologies?

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58) What did you like most during the implementation of CPWF technologies?

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……
……

59) Can you say CPWF achieved its goals?

	Code
Yes	1
No	2

60) If you were to introduce the programme to other districts, will you still use the same methods to farmers?

	Code
Yes	1
No	2

61) If the answer is “no,” how will you do it?

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……

THANK YOU FOR PARTICIPATING IN THIS STUDY.