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**FACULTY OF ARTS**

**DEPARTMENT OF DEVELOPMENT STUDIES**

**THE CONTRIBUTION OF CONSERVATION AGRICULTURE IN PROMOTING  
FOOD SECURITY AMONG SMALLHOLDER FARMERS IN WARD 15 ZAKA  
DISTRICT (2008-2014)**

**BY**

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**APPROVAL FORM**

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## **DEDICATIONS**

This research is dedicated to my Cousin Janeth Mahoya

## **ACCRONYMS**

FAO: Food Agriculture Organisation

UN: United Nations

UNICEF: United Nations Children Education Fund

AGRITEX: Agricultural Technical and Extension Services

AIDS: Acquired Immune Deficiency Syndrome

CA: Conservation Agriculture

HIV: Human Immune Virus

NGO: Non-Governmental Organization.

SAT: Sustainable Agricultural Trust.

CF: Conventional Farming



**Abstract**

Conservation Agriculture (CA) is widely adopted in Zimbabwe, because it is well recognized as a climate adaptation measure. As a matter of fact CA improves yield by 50-100 percent as outlined by Mazvimavi. This research is primarily focusing on assessing the contribution of CA in enhancing household food security of smallholder farmers in ward 15 Zaka district. However qualitative research method is employed in this research and tools used include questionnaire, interviews and field observation among others. Full success of CA in promoting food security in Zimbabwe is threatened by a number of factors which ranges from economic, social, political and environment as shall be explained in chapter 4. Therefore the findings of this study shows that, though there are some notable challenges faced in CA but its benefits remain outstanding as clearly outlined by farmers in chapter 3.

## INTRODUCTION

### **Introduction**

In Zimbabwe Conservation Agriculture in the form of basins and organic farming is widely adopted by smallholder farmers since last decade. Basin farming is a subsystem of CA commonly and locally referred to as Conservation Farming. CA embrace three basic principles as widely practiced internationally namely crop rotation, provision of crop residue retention to act as mulch and minimum soil disturbance (Kassam *et al.*, 2009). Despite these three main principles, improved crop management is also a crucial part of CA promotion in Zimbabwe including weed removal, timely planting and maintenance of plant populations. This paper seeks to assess the contribution of CA in enhancing food security among smallholder farmers by presenting findings from ward 15 Zaka district.

Zaka district is not immune to climate change and other factors which affect food security. The district is naturally located in dry region, it experience high food shortages since last decades. Recycle of hunger and starvation invited humanitarian attention in Zaka; CARE international is one of the prominent NGOs actively participate against hunger in Zaka and other districts at large. Food insecurity in Zimbabwe as a nation is caused by climate change, unemployment, underdevelopment of agriculture sector, population increase and land degradation among other factors.

Food security is derived from agriculture, so the underperformance of agriculture would negatively affect national food security. In Zaka live stocks are used as drought power surviving strategy to stabilize food security in times of crop failure. Recurring droughts and population increase which convert grazing area into cultivation lands threaten livestock production in Zaka and Zimbabwe as a nation. In fact in the context of Zaka there is no potential formal source of

employment for the local people, the able bodied age resorted to migration into towns and foreign lands such as South Africa and Botswana for greener pastures. However, although remittances are sent back but they are too limited to cover basic needs including food, since most of them are not having decent jobs.

After severe food shortages in 2002, many NGOs launched food aid programs nationwide. This breeds the concept of reviving CA as an exit package of Seasonal Targeted Assistance program in an endeavor to promote sustainable household food security. The renewed CA efforts come with donor intervention in 2003, contributing through training of smallholder farmers and constant supply of inputs. Due to poor harvest witnessed in Conventional farming CA adoption rate increases year after year. Initially farmers were adopting because they want to access inputs, but with the realization of much heralded CA production impact, the adoption scaled higher in Zaka and nationwide. Therefore, this study seeks to examine contribution of CA in promoting food security among smallholder farmers.

### **Background of the study**

Conservation Agriculture (CA) or No tillage (NT) came into practice in the 1930s after the dustbowls devastated mid west of America. The government of America then supported farmers to quit their traditional way of farming and to adopt no tillage/minimum tillage, so as to solve the problem of soil degradation and low yield. In the 1940 seeding was developed to seed direct without much soil disturbances, with the notable advantages from CA it began to spread widely over Europe. For instance, according to Geraldez et al (1994) in 1982 in Spain no tillage found to be advantageous in terms of soil recover, moisture retention and yield increase and Spain is a leading country in Europe in terms of CA. In an endeavor to solve problem of food insecurity, CA experiments were held in France by INRA and ITCF mainly with cereals and began to gain

momentum nationwide. About 200,000 hectares were under CA and some farmers developed superior no till systems with green manure cover crops and crop rotation which are working very well (Rolf Derpsh 2010)

After a notable increase in Climate change, food security became threatened worldwide and Conservation agriculture or No till farming technology gained momentum in the 1990s and spread widely over the world, leading to the revolution in agriculture particularly in the Southern Brazil, Paraguay and Argentina. This technology is mostly used by smallholder farmers in communal lands. Sub Saharan region is considered the driest region with undefined rainfall patterns, countries suffered severe food shortages to sustain the increasing population, hunger and malnutrition is increasing child mortality rate in the region. Despite the reported benefits of CA it's wider up scaling in Sub Saharan Africa is fairly limited (Ndah et al 2013); the only notable positive is in Burkina Faso. Burkina Faso experienced high adoption rate of CA mainly because of its sand to sandy loam texture are fragile in structure (Zida 2011) Malawi and Zambia are also at forefront in the implementation of conservation Agriculture.

According to Oldrieve (1993), In Zimbabwe CA was first implemented by Brian Oldrieve at Hinton Estates in north Eastern Zimbabwe in the late 1980s. With the influx of NGOs in Zimbabwe, in a bid to promote sustainable food production they introduced Conservation Agriculture to the rural Zimbabwe from 2003. According to Mazvimavi et al (2009) farmers across Zimbabwe have shown interest in the conservation farming technology with the evidence of yield gains between 10 and more than 100% depending on inputs level. For instance, NGOs which promote Conservation Agriculture in Masvingo include; Gutu district Caritas and Hope Tariro Trust, in Chiredzi- FACT and Plan, in Chivi- CARE, Caritas and in Zaka- SAT and CARE among others. The province is located in region 4 it receives erratic rainfalls and high

temperatures, it is vulnerable to food shocks. Therefore without Conservation Agriculture the problem could be worse.

The research is conducted in ward 15 of Zaka central district, the area falls in agro-ecological region 4, and receiving erratic rains from 450-600mm per year, consequently the area experienced seasonal droughts. In trying to reduce starvation in the district government introduced small plot irrigation schemes (Fuve-Panganai irrigation scheme) but it's unfortunate that only few farmers from ward 15 managed to chance irrigation lands the remaining large fraction depends on dry land farming which is prone to rainfall variability. Savannah is the type of vegetation in the area, small thorny bushes. Population of the district according to census of 2012 (Zimstat) is 181 301, including 98 948 female and male 82 352, therefore it is very difficult for the poor soils of Zaka to feed high population.

Geographically the district is located sharing boundaries with Chiredzi, Bikita and Chivi. Ward 15 is located about 32km from Zaka district council offices along the road to Mashoko mission in Bikita. The largest employer of the area is sugar cane plantations in the low veldt and others depend on informal cross boarder to neighboring countries like South Africa and Botswana. Conservation Agriculture a key component in Sustainable agriculture program, it was introduced by CARE International in 2005 commonly known as basin farming. The district is largely dominated by poor acidic sandy soils, which is not favorable for crop production.

### **Statement of the problem**

Food insecurity is threatening whole world, since the problem increases from the past decades. Generally the problem is intensified by climate change, increasing population and land degradation particularly in the Sub Saharan Africa. Hunger related diseases are causing high

child mortality rate globally. Therefore the study area is not immune to the factors affecting food security, since Conservation Agriculture is adopted as an improved technology with multiple solutions to factors affecting agriculture, this research is going to assess its contribution on food security in ward 15 Zaka district.

### **Aims and objectives**

The aim of this study is to assess contribution of conservation farming in promoting food security in Zaka

#### Specific objectives

- To assess farmer's view on Conservation Agriculture
- To assess the successes of conservation farming in food security.
- To examine constraints faced in implementing conservation agriculture

### **Research questions**

The study is guided by main research question: Does Conservation Agriculture benefit small holder farmers in Zaka district. Below are sub questions to guide the focus of the study.

- a. What are constraints and prospects of Conservation Agriculture in Zimbabwe
- b. How does conservation Agriculture contribute to household food security of smallholder farmers
- c. What are farmers perception towards Conservation Agriculture

### **Justification of the study**

Zimbabwe's largest population is living in rural areas and agriculture is their survival strategy for both subsistence and commercial. New technology like Conservation Agriculture needs more

attention since the topic is controversial among scholars, whether CA is viable to Food security or not. However this study is going to be of great importance to many stakeholders in Zaka.

**Community-** this will be a true reflection of the impacts of CA at ward level, so by surfacing its impacts on food security this will help to increase community awareness about CA, hence the adoption rate may also increase at both ward and district level, consequently production may rise.

**Other researchers-** it could be of paramount importance to the next researchers, the availability of stocks of information is crucial in that, they could know what was studied and understand the gaps which needs focus and it is going to be both a source of information and reference.

**NGOs-** they could know the effectiveness of sustainable agriculture program and they come up with more strategies which a more superior or relevant to the area.

**Government** the study is going to be relevant even to the government in policy formulation, for example with the full knowledge of CA constraints it may fund the program so as to improve food security. A ready example is of America in the 1970 laws were enacted in favor of Conservation farming and the governments end up funding CA farmers in both North and South America.

#### DEFINITION OF TERMS

***Conservation Agriculture:*** is a type of farming which is economically viable, environmentally friendly and socially just. CA is no tillage based cropping system (Kassam et al 2009). The term is interchangeably used with terms like No tillage, Minimum tillage, Zero tillage, Sustainable Agriculture and organic farming among others

**Food security:** is the availability and accessibility of nutritious food for a long time through morally acceptable ways.

**Small holder farmers:** smallholder farmers are rural farmers practicing diversified agriculture on small portion of land. Largely depends on family labour

**Livelihoods:** activities that people do to make their living. According to chambers (1995) livelihoods encompasses people's skills, income, assets activities necessary to get the necessities of life

**Climate change:** is a change in distribution of weather patterns ie wind, temperature and rainfall for a long time.

#### DELIMITATIONS

The research is confined to Zaka Ward 15, the place is hard struck by poverty and previous interventions by NGO failed to reduce food crisis, 80 km from Masvingo Town. The farming area lies ecological region 4 with an average of 450-600 mm per year (AGRITEX, 2011). Drought and dry spells are occurring due to erratic rainfall as a result there is recurrent crop failure so drought resistant crop are grown cotton, soya, sorghum and maize though at a risk. Farming is the main source of livelihood. 50 farmers were interviewed which is 10% of the population sample from which the data is collected.

#### Literature review

This section is to focus on scholarly literature and identifying gaps which lead to the promotion of this research. Of course the researcher is acknowledging that conservation agriculture is not a new phenomenon in research grounds it is already studied by a number of scholars but there is



different in perception between the researcher and other scholars thus why he wants to address the gaps left by other scholars.

The few studies that evaluate the efficacy of CA, focused on the aspect at macro level (regional, national and provincial); hence this study has got micro view at ward level. For example Mazvimavi et al (2012) on his paper titled Productivity and Efficiency Analysis of Maize under Conservation Agriculture in Zimbabwe argues that, so far there is no empirical evidence to show that CA can indeed lead to efficiency gains which can increase productivity that is crucial for improving livelihoods of smallholder farmers in Zimbabwe. In addition, S Munonga et al on their journal Estimating the role of Agricultural Technologies in improving rural households welfare: a case of Masvingo. Of course they outlined the benefits of CA but they focused on the aspect at provincial level, hence this study is going to focus CA's impacts at ward level.

Of more importance, most of the research which were conducted before were neglecting Zaka district. Gukurume Simbarashe et al (2010) argues that rural farmers in ward 21 of Chivi South District, however, did not have an understanding of how conservation farming can be an engine for moving them out of the food insecurity quagmire confronting them. On the contrary, the program is perceived as a mechanism meant to reverse the gains they have made in ensuring food security in their households. These local farmers however hold contradicting and conflicting perceptions on Conservation Farming. The majority of them strongly believe that basins do not conserve moisture but expose their crops to the scorching sun. However, this study is going to focus on a different district, since information about CA in Zaka is lacking. Of which there is different perception in people from different regions, because Zaka CA is welcomed. Therefore this research is going to assess the impacts of CA towards food security in Zaka.

Literature available shows interest over long term benefits of CA for instance LS Marongwe outlined that, it is important to note that CA is being promoted for its long term impacts on the environment. Recent studies from both local and international research have shown positive changes in soil quality in terms of physical structure, infiltration rates and carbon content. The long term benefits of CA systems will have on mitigating the effects of climate change, land degradation and soil fertility decline. Apart from that, on the history course of CA, it started in America in respond to soil devastation by dustbowls, this however shows that CA was discovered to counter soil degradation in the long run. Therefore this research is going further on assessing CA's effective on Food security in Zaka.

According to L.S Marongwe, in recent years there has been a rapid increase in a number of farmers practicing CA technologies via planting basins. The reason for increase in high adoption rate is the failure of government to provide farm inputs and NGOs promoted CA with supply of Input packages, for example CARE and SAT (Sustainable Agriculture Trust) provided inputs in Zaka to CA farmers in 2010. However although the adoption rate is of much importance but the gap is that, there is no attention given to impacts of CA on food security, since food security is the prominent issue for human development.

Conservation farming improved crop production, Hasane etal (2000) evaluate the impact of planting basin and use of fertilizer and manure on millet crops in Niger. According to their literature over 5 years 1971-1976 farmers realised yield gains of up to 511%. Haggblade and Tembo (2003) is of the view that, In Zambia farmers who use planting basin and crop residue achieved 56% yield gains in their cotton fields. Therefore this study is going to evaluate impacts of Conservation farming in Zaka ward 15, of which in Zaka conservation Agriculture is mainly for maize production, unlike the literature of Hasane etal and Haggblade and Tembo who

evaluated this technology in millet and cotton of which they are already drought tolerant crops which are capable in resisting shocks of climate change.

Therefore the above mentioned aspects partly suggest that, despite the existing literature there is still a gap which attracted the attention of the researcher to take this study, in short L.S Marongwe et al's analysis were more concerned about adoption rate of CA, S Munonga et al and Mazvimavi et al 2012 were generalising the issue at macro level and there is lacking information particularly on the area to be studied: among other aspects.

### **Research methodology**

Meyers (2009) postulates that, research method is an approach of probe that moves from the underlying assumption to research design and data collection. This study employed qualitative research methods, according to Brayman 2008 Qualitative research is a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data. Data was collected through use of Questionnaires, Interviews, Field observation and Desk research

### **Research design**

According to Business Dictionary a research design is a detailed outline of how an investigation will take place. In this case the researcher adopted descriptive research design as it helps to describe how Conservation Agriculture is taking place in ward 15 through analyzing reports provided by Agritex officers and Care officers as well as information from CA farmers during interviews. Explanatory research is also important in this research, hence the researcher wanted to explain why Conservation Agriculture transform food security in Zaka over the traditional way of farming the mouldboard ploughing.

## **Sampling**

Sampling is a process used in statistical analysis in which a predetermined number of observations will be taken from a larger population. This research adopted two types of non probability sampling, which are convenient and purposive sampling.

### **Purposive Sampling**

The research employed this type of sampling, by opting Zaka district over other districts in Zimbabwe this is because the area falls in agro ecological region 4 and received semi arid conditions. The area is prone to long dry spells during rainy season and consequently a number of farmers adopted Conservation Agriculture so as to stabilize food production. So by conducting a study over an area where households largely practise Conservation Agriculture, this study is appropriately considering the productive area where research questions adequately answered.

Apart from that purposive sampling is also employed in choosing respondents. To this end the researcher chose people who are expert and professional in Conservation Agriculture. In this case the population sample was largely dominated by farmers followed by Agritex and CARE officers dealing with this Program. This was so because the researcher wanted people with deep understanding of the concept and the sample is composed by real beneficiaries of Conservation Agriculture so they provided the needed knowledge

### **Convenience sampling**

According to Business dictionary convenient sampling is a statistical method of drawing representative data by selecting people because of the ease of their volunteering or selecting units because of their availability or easy access. Convenience sampling was used to come up with ward 15 of Zaka district. Ward 15 was conveniently sampled due to accessibility. Unlike other wards ward 15 is located near busy road from Jerera growth point to Mashoko Mission so transport was no longer a problem. Apart from that, the researcher comes from ward 15, so it

helped him in observation and he observe the area of study since the inception of the program and he is among Conservation Agriculture beneficiaries of ward 15.

### **Target population and sample**

Target population generally mean a members of a group in which a study is interesting. The study targeted rural smallholder farmers in ward 15, particularly Conservation Agriculture beneficiaries and its stakeholders (Agritex, CARE and Councillors)

### **Sample size**

According to Dictionary Central sample size is the number of entities (subjects, etc.) in a subset of a population selected for analysis. The study sampled 40 respondents. This sample is made up of 35 farmers, 1 CARE field officer, 3 Agritex Officers and 1 Councillor. The researcher found it logical to use such sample size to answer research questions through Interviews and Questionnaires. It must be noted that in case of this study and its scope increasing sample size has no difference in results because the geographical location of the area characterised the area with same climatic and environmental conditions

### **Data collection techniques**

This research employed data collection tools such as questionnaire, field observation, desk research and interviews as shall be explained below

### **Field Observation**

According to Mc Daniel and Gates (2001) observation is a systematic process of recording the behaviour patterns of people objects and occurrences without questioning or communicating with them. The researcher made use of field observation, since the researcher comes from the area he observed the case from the inception of the Conservation Agriculture program since 2005, he then compared Conservation Agriculture plots with Conventional Plots as shown in pictures below. The researcher was taken by lead farmers to five conservation agriculture plots

of maize and five conventional plots of maize in order to observe on his own. Field observation improved the practical knowledge of the researcher, since maize from Conservation plots looked healthier and promising better yields as compared to Conventional maize which turns yellowish at early stage and wilted during the day.

### **Interviews**

The researcher conducted both telephonic and face to face interviews. Face to face interview helped the researcher in noticing where the respondent get lost and allow rephrasing of questions as well as application of local terminology to clarify issues. He made face to face interviews with six farmers, CARE field officer and a councillor. Telephonic interviews was also used to gather information from 3 Agritex officers, since the research was carried out during Easter Holiday and Officers were on vacation then for the sake of time as well as cost telephone was used. However in telephonic interview the research noticed one big challenge, Officers provided information in brief due to airtime costs and they failed to respond some of the questions since they need office research.

### **Questionnaires**

According to Hair, Bush and Otrinau (2000) a questionnaire is a formalised framework consists a set of questions and scales designed to generate primary data. The researcher conducted household questionnaire in gathering data, to this end he distributed 29 questionnaires to farmers. This has got advantage in time, respondents managed to complete as many questions in short time this allowed the researcher to complete the exercise in less than a week.

### **Desk research**

The researcher employed desk research to develop this research, in this case he use journals, articles and web sources among others. This tool is significant in this research, since it

advocated for visiting of past documents on the subject of Conservation Agriculture and gives the researcher platform to compare different literature.

### **Limitations**

The researcher meet challenges in conducting the research, first and foremost absents of appropriate people with knowledge. For example CARE officers who conducted Conservation Agriculture were not available so he interviewed other partner field officer and forced to largely depend on reports. Apart from that, the Agritex Officer who was worked in ward 15 for the past years was passed away, so his replacement lacked deep knowledge of the program from where it starts, but the researcher then interviewed some other 2 Agritex Officers worked in neighbouring wards but they made exchange visits during the time where the Program was under CARE support and they provide information but it time consuming. Though the researcher made it clear that, the information is for academic use, farmers were afraid to produce sensitive information like “*how many meals you take per day...*”. Most of the farmers rejected tap recording, so the researcher was forced to quickly write information, of which recording is important and it allow the researcher to play after interview and analyse data. Apart from that, lack of compensation made farmers to ill respond to the questions.

### **Ethical considerations**

The researcher respected all ethical, cultural, religious and political ideologies. First and foremost, reasecher seeks permission from responsible authorities to venture in ward 15 ( DA, Chief, ward Councilor and village heads.) respecting cultural and religious values did not provide a challenge to the researcher since it is his place of origin, so he knows much about societal ideologies belonging to the community. The researcher made it clear that the research is for academic purpose and there is no compensation in participating. The researcher avoided

sensitive issues so as to guarantee respondents privacy and confidentiality. This is in line with Nancy Walton's thinking that, in research ethics first is to protect human participants.



## **CHAPTER 1**

### **CONSERVATION AGRICULTURE IN ZIMBABWE**

#### **1.0 Introduction**

In Zimbabwe more than 60percent of the country is situated in dry regions 4 and 5 and experiences seasonal droughts annually. The overall decline of crop production in Zimbabwe is due to rainfall variability, loss of fertile soils and population pressure. Conservation Agriculture emerged as a solution to the above problems, use of mulch increases soil moisture retention and organic manure application improves soil structure, consequently yield increases. Though conservation Agriculture was already practiced earlier on but the renewed efforts of donors complimented by government support improves the adoption of Conservation Agriculture nationwide. In 2009, 600 officers and 8000 farmers were trained (LS Marongwe 2010) of which increased stock of knowledge is a basic requirement to increase Conservation uptake among smallholder farmers. Therefore this chapter is going to provide an overview of conservation Agriculture, conservation agriculture adoption and impact on food production in particular Zimbabwe.

#### **1.1 Conservation Agriculture in general**

FAO (2012) noted that Conservation Agriculture is an approach to managing agro-ecosystems for improved and sustained productivity, increase profits and food security while preserving, enhancing the resource base and the environment. CA has got three main principles which are permanent soil cover/ mulching, crop rotation/crop diversification and minimum soil disturbance as shall be discussed in detail below.

Mulching can be defined as permanent soil cover, preventing direct sunlight from reaching ground where the plant is stationed. Apart from preventing direct sun heating the earth, mulch

also used to prolong moisture, such that plants cannot easily wilt especially in moments of dry spells which occur in Zimbabwe during rainy season. Mulching also helps to control soil temperatures, during periods of excess sun heat it could help by absorbing sun rays such that the ground can heat slowly. It prevents sun rays from reaching directly to the plant roots. During the period of winter when there is colds it also retains heat slowly there by maintaining plant favorable temperatures.

Furthermore, mulching also increases infiltration rate by minimizing surface runoff, such that plants can have enough moisture to sustain them for a long period. Mulch helps farmers through weed suppression, in fact mulch prevents sunlight reaching the ground to this effect weed seeds cannot be able to germinate even if they germinate on top they easily wilt since its roots find it difficult to reach soil, and they also became easy to remove. Moreover, mulching also improves soil nutrient, for instance mulching material such as tree leaves, crop residues and dead grass can easily decay and quickly converted into nitrogen by soil bacteria's. Therefore this shows that mulching has got multiple advantages which end up improving plant health; consequently production scaled higher a condition which directly improves food security. The diagram below clearly shows mulching applied in a maize field to improve moisture retention and improve infiltration rate.

Fig 1: Mulching in maize field



Source: MSc Thesis by Nicolas Dubreil November 2011

Minimum tillage, this simply refers to minimum disturbance of soil, the only disturbance is directly on planting station while preparing seed bed. This mechanism is developed as a counter measure to erosion. Conventional way of farming loosen the whole land and it became vulnerable to both wind and soil erosion. Such that in a long run vast tracks of land can become useless due to land degradation a condition which is rampant in Sub Saharan Africa. Furthermore this principle has got a advantages over conventional way, for example it allows maximize crop feeding, to this effect fertilizer and organic manure is directly placed in the basin and mixed with little soil before placement of seeds. Unlike the conventional way where manure is randomly thrown and at times at early stage the plant struggle to reach organic nutrients since the roots are not long enough to reach few centimeters apart. Therefore this promoted rapid growth of plants even at early stage when the roots were still short, since manure is directly placed at the point

Of more importance direct seeding is more superior in the sense that, it gives a farmer allowance to maintain plant distance. Plant distance is crucial because it maintains plant population such that plants in a plot can adequately feed on resources applied, that balance denied chances of nitrogen shortage or lack of ventilation which in turn threatened health of a crop. Apart from that, plant basins created by farmers using hand hoes are significant in collecting water in the field such that it reduces surface runoff, in fact even rain is little it can be trapped and collected in a basin and the plant can utilize. The diagram below shows land preparation, manure applied in basins so as to improve soil fertility, which is crucial for plant development.

Fig 2: land preparation



Source: L.S Marongwe etal 2012

Crop rotation can be defined as scheduling of different crops in sequential seasons. Benefits of this mechanism range from pest, disease control and maintenance of soil nutrient balance. In fact

plants have got different nutrient requirements, this then affect soil nutrient in different ways. For example, corn quickly absorbs nitrogen and phosphorous. And legume plants fixes nitrogen back into the soil, therefore the basic principle of this method is to avoid planting same general crop category in a same plot in following seasons. (Maize after groundnuts) This also prevents pest and diseases in the sense that, same botanical plants are likely to suffer from the same disease, of which disease and pests can reside in crop residue and soil. For example Colorado potato beetles like to eat potato plants and they also feed on tomato leaves, since it's bacterial and fungal reside in soil. Therefore crop rotation is necessary in prevention of diseases, which is a key to plant development and yield increase in return

### **1.2 Background of Conservation Agriculture in Zimbabwe**

Conservation Agriculture can be traced back from Rhodesia, in the 1920s after a notable increase of soil degradation, increase of fuel prices, decline of soil fertility and rise of spare parts prices due to sanctions, accelerated the demand for low tillage in Commercial sector (Smith 1988). According to Nyagumbo (1998) the demand for Conservation Agriculture increased in the commercial sector even after the independence but before the land reform and it was estimated that 30 percent of commercial farmers were preferred Conservation Farming. Oldrieve (1993) has it that, Conservation Agriculture in the form of Conservation farming basins was first implemented in Musana communal lands in Northern Eastern part by Brian Oldrieve. In those years farmers were able to increase yield and reduce soil erosion.

According to L.S Marongwe (2012) conservation tillage for sustainable crop production system also known as the Contil project, was a project between GTZ and Agritex implemented from 1988-1996 with the objective of developing new methods to solve soil loss, declining yields and run off problems. The projected tested mould board plough and hand hoe holing out in both

Northern and Southern Zimbabwe. Moyo and Hagman (1994) postulates that after five seasons of research he concluded that mulch ripping with its higher water use efficiency appeared to be the most viable in semi arid areas of Zimbabwe. However though it was scientifically proven but there was passive uptake of Conservation Agriculture in the 1990s.

Conservation Agriculture was revived in 2003 after a substantial donor funding injected into the communities through the provision of inputs and knowledge. Donors were primarily targeting to improve food security of vulnerable households in the rural sector who own no cattle or tractor for land cultivation. In Zimbabwe the leading NGOs on the promotion of CA include Faith based Organizations, Foundation for farming, GOAL and Concern just to mention a few. Conservation Agriculture aims at improving production per unit area allowing farmers to produce more from small area, increase profitability and leave more under natural vegetation contributing to environmental sustainability Marongwe et al (2010). According to L S Marongwe et al (2012) increased involvement of government saw the launch of the Conservation Agriculture Promotion Network (CAPNET) in 2008 and membership included different ministries for instance Ministry of Agriculture, Mechanization, EMA, Research and Extension among others.

A rapid increase in farmers who practice Conservation Farming involving planting basins was seen in 2009. According to LS Marongwe (2010) increase in adoption rate is due to inaccessibility of farm inputs, such that those who are willing to conduct demonstration were given inputs support by NGOs. But she further illustrates that, though some adopted because of inputs but others are willingly adopt because they want to realize yield increase and they adopt in the absence of inputs. 600 extension officers over 8000 farmers were trained in 2009 (L.S Marongwe 2010)

COMESA and FAO in 2010 held two CA reviews in Zimbabwe and come up with the National Conservation Agriculture Implementation Framework for Zimbabwe to guide Conservation Agriculture Implementation by different stakeholders, who agreed on a target of at least 500, 000 farmers practicing Conservation Agriculture on at least 250, 000 hectares by 2015 with the doubling of yield on CA fields in comparison to conventional fields (Ministry of Agriculture, Mechanization and Irrigation Development 2010) Furthermore Conservation Agriculture becomes a viable way of farming among the rural communities. There is a contrary connection stuck between level of disposable income and taking up of Conservation Agriculture imply that household with disposable income are more unlikely to adopt and strengthen the use of conservation Agriculture than individuals with lower income, since they are capable to hire tractors for cultivation and the poor people lacked funds for tractor hire and cattle to haul plough.

### **1.3 Adoption of conservation agriculture in Zimbabwe**

Generally, adoption of conservation Agriculture in Zimbabwe increases. Adoption of Conservation Agriculture is centered upon a number of factors which ranges from influence of NGO support, Influence of Gender and labor availability. These traits will determine the expansion of Conservation Agriculture area as shall be explained below

Influence of NGO support, according to Mazvimavi (2010) Conservation Agriculture promotions has commonly been associated with free input packages, where farmers are given seed and fertilizers for their plots. LS Marongwe (2010) noted that, in recent years there has been a rapid increase in the number of Conservation Agriculture Farmers involving planting basins due to critical inaccessibility of inputs by smallholder farmers in the country. Initially NGOs was targeting 0.25ha under Conservation Agriculture and farmers tend to expand the area due to input availability from NGOs (Twomlow 2008)

Furthermore, gender also influenced the adoption level of conservation agriculture. Due to increased demand of labor there is difference between female headed families and male headed families, male headed families experienced C.A at large scale as compared to female headed. Mazvimavi (2010) supports the idea and further argues that, male headed households have a large CA plot area than female counterparts except for the 2004-05 seasons where the area was similar for both male and female headed households. This so because 2004 was the first season for most of the farmers to practice CA so they were sticking to small plot size area regardless of land availability. And also Influence of labor availability, Mazvimavi (2010) argued that C.A is labor intensive technology and farmers generally cited labor intensity as a major constrain to increase CA plot size. Labor is required for basin preparation, manure application and continuous weeding. So to this end farmers with more labor is likely to increase area of Conservation Agriculture, for instance if a household have one adult member the size area is much limited as compared to a five member family. Therefore difference in expansion of CA plots is primarily influenced by labor availability at household level.

#### **1.4 Production impact of Conservation Agriculture in Zimbabwe**

In general there is high production realized in Conservation Agriculture as compared to conventional draft tillage. According to Mazvimavi (2010) maize which is the main crop grown in all areas of Zimbabwe yielded an average of 1556kg/ha and 750kg/ha in Conservation and conventional farming respectively. This shows effectiveness of Conservation Agriculture over conventional way of farming, as shall be elaborated by statistical data below.



Table 2: Maize yields from conservation agriculture (CA) plots and non CA plots for 3 seasons

N Region	District	2006-2007		2007-2008		2008-2009	
		C A	C F	C A	C F	C A	C F
II	Bindura	1950	920	1109	510	1490	1208
III	Chirumanzu	1162	789	1207	340	1428	914
IV	Nkayi	1244	789	1175	398	1579	792
V	Chivi	1500	910	1061	270	1658	874

Key: CA- Conservation Agriculture and CF-Conventional Farming

Source Mazvimavi (2010)

The table above claims that Conservation Agriculture produces high yield than Conventional Farming because CA technologies improves infiltration rate, moisture retention capacity and soil fertility among other issues. However impact of Conservation Agriculture on Food security is going to be discussed in detail in the next Chapter.

## **1.5 Conclusion**

In summation, food security is affected by poor soils, climate change and population growth. Conservation Agriculture is promoted in Zimbabwe as a counter to the above problem. Conservation Agriculture in Zimbabwe can be traced back from the Smith regime, in the 1990s Conservation Agriculture was largely practiced in North Eastern highlands of Zimbabwe in the Musina communities. However Conservation Agriculture technology gain momentum since last decade after NGOs intervention, consequently Conservation Agriculture improves food production as compared to conventional farming. Therefore impact of conservation agriculture on food security is going to be assessed in detail in the next chapter.

## **CHAPTER 2**

### **CONSERVATION AGRICULTURE AND FOOD SECURITY IN ZAKA**

#### **2.0 Introduction**

This chapter seeks to provide an account of Conservation Agriculture in Zaka from Introduction of the program to the community, major trainings carried by CARE International under this program, Farmers views on Conservation Agriculture as a panacea to food security and to assess how Conservation Agriculture impacted Food security In Zaka. However this study interviewed 40 respondents, of which 80% of the respondents show appreciation to Conservation Agriculture though the remaining percentage misbelieve the benefits of C.A in relation to labor required. Therefore this chapter gives the real account of Conservation Agriculture in ward 15 Zaka district.

#### **2.1 Introduction of Conservation agriculture in Zaka**

Food crisis of 2002 invited great attention of humanitarian organizations. In Zaka, the situation was followed by food intervention from CARE international under Seasonal Targeted Assistance Program. Conservation agriculture was introduced as an exit package with an objective of promoting sustainable food production. It was designed as a response to seasonal droughts which hit the district year and again. The program was funded by FAO and implemented by CARE international; aims of the program was to end poverty through Agriculture, to improve household food security, to increase rural farmer's income levels and to reduce land degradation in Zaka. Stake holders engaged in this program includes Agritex, Healthy, Vertinary and traditional leaders just to mention but a few.

CARE international after signing memorandum of understanding with the District Administrator of Zaka in 2005 it started conservation Agriculture program. Mobilization and meetings were conducted at both ward and cluster level. The primary objective of these gatherings was to

explain the program and outline program objectives. According to CARE reports, training began in June 2005, it was conducted at Zaka offices, and it was a training of trainees which include, Cluster leaders, AGRITEX Officers, and Councilors among others.

## 2.2 Trainings & activities of C A at cluster level

These clusters were made up of ten farmers who are committed to conservation agriculture in ward 15. In ward 15 CARE formulated ten clusters with maximum of ten members. First and foremost, Conservation Calendar was introduced to farmers. This calendar is explaining time of operations according to conservation agriculture requirements. Below is the detailed Conservation Farming calendar

ACTIVITY	TIME
Land preparation (digging basins)	May- July
Application of basal fertility amendments	July – October
Planting	After first rains October- November
First weeding	As soon as weed starts
2 <sup>nd</sup> Weeding	December – January
3 <sup>rd</sup> Weeding	March – April
Application of Top dressing	December – January
Post harvest Management	June- July

Source: R Sillah (2012)

Land preparation (plant basins): In fact all experiments were carried out at a demonstration plot, each and every cluster have got their Demo plot. The first demonstration of digging basins was done on the 15<sup>th</sup> July 2005 led by AGRITEX Officers and CARE staff. According to S Twomlow etal (2008) Planting basins are holes dug in a weed-free field into which a crop is

planted and are prepared in the dry season from July to October. The recommended dimensions of the basin are 15 cm × 15 cm × 15 cm, spaced at 75 cm × 60 cm. According to the C.A calendar provided above these operations are encouraged to be considered in between May and June. Demonstrations were carried out before farmers went on to practice to their fields.

Compost making, there are two types of compost anaerobic compost and aerobic compost. Farmers were trained on how to make compost. Compost making particularly aerobic compost consist of several stages, below is the stages provided by a farmer during interview.

- i) Measure square box of 1m\*1m and put pegs measured 1m length*
- ii) Apply chop material at the base (small thin branches of shrubs, kitchen scrap material- the smaller the better)*
- iii) Put brown and green materials (green grass and tree leaves)*
- iv) Put water (keep it moist not wet)*
- v) Cover with kraal manure (1 wheelbarrow)*

NB: sprinkle water continuously until the compost is ready and the compost will be ready after the decay of all material.

Liquid fertilizer, farmers were also trained on how to make liquid fertilizer, which is idea for top dressing. It is commonly applicable when plants run short of nitrogen. The first stage is to put cow dang in a sack and place it in a drum of water and seal the drum for several weeks. Then collect the water and apply direct at plant roots. Crop management, farmers were encouraged to put 3seeds in a basin but after three weeks thinning is needed to maintain plant population. To this effect a plant registering poor stunted growth is to be removed from the basin. This stage also involves removal of weeds in the field so as to prevent it from feeding on basal manure.

Field days, after all the trainings before harvest, field days are conducted. Every cluster is supposed to choose the best field to host a field day. To this effect, the farmer who hosted the function is given time to outline all the activities from the first day. According to CARE reports field days are primarily designed to celebrate good work carried by farmers, Knowledge sharing (through exchange visit), Market linkages and to refresh farmers

### **2.3 Impact of conservation agriculture on food security in Zaka**

FAO defined food security as a situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets dietary needs and food preferences for an active and healthy life. There are four dimensions of food security which are food availability, food accessibility, food stability, and food utilization. Therefore in Zaka farmers outlined that conservation agriculture improves food security through yield increase, crop rotation give rise to small grain production, timely operation, solves draft power problem and soil infertility problem among other aspects as shall be discussed below.

Farmers clearly outline that, there experiencing poor yields in non conservation fields. This is mainly due to inadequate rainfall, poor soils and lack of funds to purchase fertilizer. For instance one of the respondents says

*“ pambeswa dzinenge dzisina kurimwa mumakomba parikubuda goho diki nekuti ivhu redu raneta rangove jecha chete. Apa hatisi kukwanisa kuwana mari yemafertilizer, pasina fertilizer kwangove kufira mahara ”*

Farmers are experiencing poor harvest in non conservation plots due to infertility of the soils and they lacked fertilizers due to poverty. And they argued that their lands are now useless without any fertility amendments.

Closely associated with the above idea farmers strongly argue that C.A technology improves healthy status of crops as compared to non CA farming. Maize in basins grows much better than those under conventional farming due to direct application of basal fertility on plant station. The lead farmers was once quoted saying

*“chibage chinenge chisiri mumakomba chinenge chakatsvukuruka chinonoka kukura pane chemumakomba. Pamwe chinogona kutumbuka chiri chipfupi chisingadariki muchiuo.”*

Crops which are not under C.A show poor growth and quickly turn yellowish. This shows that, CA is the only solution to better harvest as clearly seen in pictures below. Maize under C A looks healthier as compared to Conventional whilst promising good harvest. Improved crop healthy status is directly related to high production which in turn contributed to food availability at household level. Below are the pictures showing maize plants under different technologies CA vs conventional so as to clearly express the significance of CA in promotion of food security.

Fig 3: pictures of Maize under CA versus Conventional Farming



Source: Raw data

The above pictures shows crop difference, under C A crops grows faster and healthier due to availability of organic manure placed at plant station unlike in conventional farming. The plot

from the left side is of conventional farming where plants registering stunted growth due to ill application of manure and no plant basins which collects water in this case water flows all over and plants struggle to get moisture during times of dry spell. This is in line with Kassam et al (2009) who argued that, C.A can increase yield by 20-120%, because the pictures above shows that though conventional maize are planted earlier than conservation plot but the conservation maize is promising better yield.

Improved yields is the most important impact of C.A. in fact farmers in ward 15 clearly point out that there is production increase. Farmers outline that they are realizing better yields in C A plots as from 2005. Farmers confessed that before conservation agriculture they were vulnerable to excess food shortages due to crop failure which resulted in poor harvest. One of the farmers argued that

*“munzvimbo medu mange mune nzara yakaoma, vamwe vedu vasiri kuita zvemakomba vachiri kutambura chikafu. Kubva ndisati ndaita zvemakomba ndaikohwa zvisaga zvisahanu kana zviru pasi mudhunduru rimwe, asi gore randatanga kuita makomba ndakaita zvisaga gumi, gore rapera ndakaita makumi maviri nekuti ndakarima dhunduru nehafu.”*

This means that, people experienced high food shortages before inception of CA into Zaka communities and that condition is still prevalent to those who do not consider CA. Before the respondent farmers adopt CA he never harvested 5 bags of maize in an 0.25ha but he then harvested 10bags in 2006 when he started CA in the same area where he was failing to produce. Last year he increased the area approximately to 0.75ha and yielded a tone. Therefore improved harvest under C.A contributed to household food stability which is defined as availability of food for a relative long period.



Of more importance, Conservation Agriculture maintains proper plant population which improves yield. Another Agritex Officer from ward 15 postulates that, wise farming should take into consideration plant population because it is a necessary factor for high yields. For instance in CA there is high yield because, initially farmers sow three seeds in a basin and remove one after germination this helps to keep plant population. Unlike in Conventional where seeds are throughout the furrow and without maintaining proper spacing measurements so this resulting in high plant population and reduces aeration and increases competition over soil minerals amongst plants.

Crop rotation promoted food security. In fact crop rotation generally means growing of different variety in sequential seasons. This promoted crop diversification, thereby allowing farmers to consider other crops in a bid to maintain rotation status. Other food crops seriously considered are nuts, millet, rapoko, sorghum and cow pees. Farmers were hinged on traditional thinking of regarding maize as the only source of food security. For instance another female farmer postulates that, his husband was denying growing of other crops before CA came into the area since he said “*nyimo nechinyemba hazvidyiwe sadza*” which means cow peas and round nuts are not important because they cannot produce mealie meal. However crop diversification is important because it reduces risks of harvest failure during drought periods, thereby increase food accessibility in the community since farmers sell other crops if there is plenty of surplus to community members. Because food availability alone does not mean food security but there is need for accessibility by all members. To this effect other people could even resorted to casual labor “*maricho*” for food and they can cheaply purchase from their local counterparts.

Closely associated with the above point of crop diversification, CA give rise to small grain production, In fact farmers were experienced food insecurity in ward 15 due to high negligence of other food security crops. For example another farmer confessed in an interview

*“vazhinji vedu tange takarasikirwa taisarima mbeswa dzetsanga diki tichiti ndezvevanoita madoro, asi kuuya kwakaita Conservation Agriculture takadzidziswa kuchinjanisa mbeswa kuitira zvirwere, ndipo patakabva tatanga kurima rukweza, mapfunde ne mhunga”*

This shows that farmers in ward 15 begin to seriously consider small grain production after the introduction of C A which strongly support crop diversification. Of which small grain crops are drought resistant crops which thrive even in little rain years. This is due to its low transpiration rate as compared to maize and the area is located in dry region where it receives erratic rains. To this end small grain production ensures food production. For instance in 2008 farmers from ward 15 experienced poor maize harvest, but small grains performed better. Therefore it is from this end when Conservation farming improves food availability.

Conservation Agriculture also improves food security through timeliness operation. According to C A calendar above, land preparation quickly begin in winter season, basin digging and basal fertility application. Such that during the time rains come farmers could immediately sow seeds in basins. This is most important since the area receives late rains in some seasons after December, so to wait for cattle plough may delay time since cattle slowly recover to haul plough as they come from winter season with limited pastures as stated by another farmer during interview.

In conjunction with above point, C A solves draft power problem. In fact a food shortage was intensified by lack of draft power among other households in ward 15. For instance another stated that

*“ vazhinji vedu hatina mombe tinorarama nekukumbira vanadzo tozovabetsera kufudza. Izvi zvaita tive nenzara nekuti mombe taizopiwa pasi paoma, uye nguva yatinofudza ivo vari muminda nekudaro tairamba tine nzara ”*

A lot of people in ward 15 are food insecure due to lack of draft power, they largely depend on others cattle in some cases they are given when the moisture is gone. And they pay in kind, by herding rich people's cattle whilst they left their fields unattended. So with C A farmers managed to till their land with hand hoes in winter and they experienced better yields since they left with enough time to attend their fields. This then lead to yield increase which contributed to food availability.

Moreover, team work is also important, in the realization of food security. For instance farmers worked in groups for basin preparation. This evoked a sense of unity among them and provides a good base of socialization. To this effect farmers find it easier to access food from their group members due to the concept of “*mushandirapamwe*” collective farming, partnerships built during the planting season (Nevel Tshuma etal 2012.) Some farmers also borrow food and promise to retain after next harvest often called “*mudirira*” therefore from this end one can be in a position to argue that Conservation Agriculture makes food accessible direct and indirect.

#### **2.4 Farmer's views on conservation agriculture**

Farmers views on conservation agriculture is influenced by environment and socio economic benefits they realized in conservation Agriculture. Most of the farmers are strongly supporting CA despite its labor intensive.

### **A. Economic benefits**

It solves Lack of draught power problem: 80% of the respondents argued that Conservation Agriculture is good, because it allow farmers without draft power to catch up with time. Hove and Twomlow (2006) argued that majority of smallholder farmers in Southern Africa struggle to cultivate their fields in timely manner due to lack of draft power such as donkeys and cattle. This is in line with the situation in ward 15, hence respondents noted that they lost draft power during drought and almost every year cattle died due to shortage of pasture in winter and diseases. Those animals survived they are slow to recover and pull plough, so they need Conservation Agriculture so as to meet the first rains. Therefore this improves food security since crops mature in time before winter months, where they suffered poor growth due to temperature changes.

Population pressure over land, farmers outlined that land surface is being outpaced by population growth and traditional chiefs in ward 15 embarked on reallocation of land where farmers lands are to be halved to cater for young growing couples. In fact in ward 15 there are high cases of stream bank cultivation this shows shortage of enough land for cultivation. So there is need to maximize production from a small plot and leave other portion for live stocks. Since people of their area were unwilling to move to new resettlement areas. Therefore the use of Conservation Agriculture is viable to ensure household food accessibility.

CA reduces amount of inputs required in a plot as compared to Conventional Farming. For instance some of the respondents clearly outline that, for many years ago before the inception of CA and in non CA plots they apply a lot of fertilizer because they sprinkle throughout the furrow whilst in CA fertilizer is directly drilled at plant station and a plot which require three bags of fertilizer, only one is suitable for the same area under CA. therefore this is economically viable,

especially considering the fact most of the smallholder farmers are poor and cannot afford to buy many fertilizers and lacked capital access in commercial banks due to lack of collateral.

Furthermore 80% of the respondents outlined that, Conservation Agriculture helped them since it advocated for organic manure in absents of fertilizer so farmers access cheap natural inputs. In this case they were trained to make both underground and open compost as well as liquid fertilizer for top dressing. They were also trained in seed selection and preservation (OPV). In fact smallholder farmers in rural areas are poor and cannot afford to buy farm inputs fertilizer and seeds. They also lacked collateral security such that they failed to access loans from formal banking sector so to this end the is no other way for them to Food stability except through C.A. Farmers show high appreciation to CARE who introduced CA into their communities.

Apart from improved food security levels, farmers also clearly outlined that Conservation Agriculture improved their income base through selling of surplus. To this end they managed to pay school fees for their children thereby reducing school drop outs at local school. Farmers also derived income from beer brewing using sorghum and millet from Conservation Agriculture plots. They articulated that CARE trained them to grow small grain which resist high temperature and yield even in dry circumstance, they grow small grains in furrows and its residue left in field to act as soil cover. Therefore this shows that, farmers in ward 15 welcomed C.A program to improve food security and income access.

## **B. Social benefits**

Farmers argue that, Conservation Agriculture is important since it improved social networking. The issue of partnership in C.A evoked the sense of unity among them, a condition which lead those groups to graduate into other economic projects. For example the Munanga cluster in ward

15 started poultry project during off rain season in 2011. They simply get income from selling of Surplus from C.A. Not only poultry project but ISAL “*mukando*” also emerged from these groups of C.A. therefore Farmers outlined that C.A program revived sense of cooperation which lead to formulation of other projects which they take advantage to improve even house structures and to purchase properties.

Apart from, off season projects they also enjoyed market linkages which again stimulated by working in collaboration. In fact farmers lacked advertising skills so before C.A they suffered market problems but now they take advantage of groups to advertise their farm produces and other commodities. Therefore it is from this end where farmers greatly acknowledge the importance of C.A this is complimented by environmental benefits as explained below.

### **C. Environmental benefits:**

50% of the respondents show positive view towards Conservation Agriculture with concern to environment. They outlined that before C.A they were afraid of land degradation, which reduced their lands and render some of their fields useless. Heavy rains of cyclone Eline and Japhet eroded their lands because the soil was loosened by land tillage and became loose for soil erosion. Creation of gullies and streams on their fields distressed them; however they adopted C.A and made dead level contour ridges as prescribed by CARE Officers and Agritex. Dead level contours and they are not for draining water from fields but for collecting water so as to provide moisture to the crops.

Apart from that, application of manure helps to improve their lands in a long run. One of the farmers clearly outlined that before C.A they were used to sell kraal manure to farmers who experienced irrigation farming under Fuve- Panganai Irrigation schemes. They pin point that

instead of fertilizer if organic manure is applied effectively the same plot of land can run for two seasons without any fertility amendments and yield at constant level.

However the remaining 20% doubt the benefits of Conservation Agriculture. They argued that planting basins need much labor which cannot be compared to the yield of Conservation Agriculture. They further expose that labor is the most limiting factor particularly considering the fact that, families are made up of different age groups elder and school aged group, of which the dominating age group is already occupied by school, so its difficulty for them to consider Conservation Agriculture and they outlined that they are willing to quit next season.

In addition, they also complained about the issue of poor germination they experienced in Conservation Agriculture. The issue of basin seed makes it easy for pests like mice and birds to attack the seed before germination. So they outlined that they repeated seeding for several times this demands time and labor whilst other crops needs attention. Therefore they said they experienced poor yields on other crops due to time demanded by C.A and this exposes them to seasonal food shortages. Furthermore 20% of the farmers were in contrary to Conservation Agriculture, hence they outlined that the basins collect too much water if the rainfall is above normal like 2013-14 season which was characterized by heavy downpours from December-January, so this resulted in high rate of water logging and leaching of nutrients. They clearly pointed out that, they inherited C.A because they were aiming to attract favor from NGOs in the next projects to come.

In addition to the above, they also claimed that how can they leave cattle in kraals and dig whilst they have got plough. One of the farmers is quoted saying “*mwari akati komborera nemombe diga udye ndeye varombo*” which means basin digging is meant to address problems

of poor people who don't have draught power, God has blessed them with cattle and Donkeys to use. Therefore this shows that although there are much heralded benefits but it is a long way to achieve 100% adoption rate cause farmer still believe in their traditional way of farming.

## **2.5 Conclusion**

Conservation Agriculture in Zaka plays a crucial role in improving household food security. According to farmers interviewed they all outline that conservation agriculture produces better harvest even on poor soils. However in Zaka there is an indication of high turn up of people to conservation agriculture in the next seasons. Farmers perceptions is influenced by economic, social and environmental benefits they realized in conservation agriculture the large percentage of respondents shows great appreciation to conservation Agriculture. Conservation agriculture challenges faced by farmers in Zaka are to be explained in the next chapter.



## **CHAPTER 3**

### **CHALLENGES & PROSPECTS**

#### **3.0 Introduction**

This chapter seeks to discuss challenges encountered in CA production; generally CA is compromised by a number of challenges which can be categorized into economic, social and political challenges. Conservation agriculture is labor intensive, this is the major challenge faced by C A farmers, they lacked CA equipment so they rely on hand hoe for basin preparation and weeding. However there are other factors which compliment labor intensity which threatens CA success in Zimbabwe and Southern Africa as a region. Therefore the primary duty of this chapter is to discuss challenges faced in CA.

#### **3.1 Economic challenges**

##### **3.1.1 Labor Intensive**

Conservation Agriculture requires much labor particularly in land preparation and weeding. CA advocated for reduced tillage and smallholder farmers in Zimbabwe largely depend on hand hoe and preparation begin in winter season whilst farmers wanted to focus on other off farm activities like gardening, pottery, weaving and basketry. Apart from that continuous weeding increases labor demands, farmers end up weeding more than three times. This is the most challenging factor in adoption of conservation Agriculture among smallholder farmers since they lacked labor supply, especially considering the fact that, most rural families are composed of five members and able bodied members are very mobile for greener pastures (South Africa, Botswana) and children's are tied up with school. They lacked funds to hire labor and female members are already tied up with reproductive roles such as cooking, fetching water and firewood so CA increases labor demands. This is the major reason why most of the farmers refused CA over Conventional since in Conventional animals do land preparation.

In addition, more labor is needed in making tree branch fence to protect CA plot from animal invasion, whilst land was prepared in winter season when live stocks freely move. So they end up disturbing basins, in this case many farmers uses tree branches because they lacked access to wire fences. Of which the process of cutting down of tree branches and pulling them is another issue which demands more labor. Therefore it is from this juncture when CA is regarded as a labor intensive and this limited adoption rate in Zimbabwe.

According to S. Gukurume (2010) the ravaging HIV and AIDs pandemic is further compounding on the already precarious situation as far as labor is concerned. It is merciful to hear that women who are supposed to provide labor in CA fields are then supposed to nurse sick HIV patients as well as to take care for little orphans orphaned by HIV and AIDs pandemic. Therefore despite its much noted benefits but labor requirements is still a challenge which is threatening CA success.

### **3.1.2 Input shortage**

Lack of access to inputs among smallholder farmers provided a major challenge to progress of CA. In puts in terms of fertilizers and seeds, initially farmers enjoyed input access from NGOs because the program was heavily supported by NGOs, hence they were given both seeds and fertilizers for CA. This component is crucial because increased adoption rate was registered in areas where there is strong NGO support since farmers want to access inputs. In fact smallholder farmers lacked access to loans from commercial banks and ill function of GMB which was a major supply of Inputs for the past years. According to Huggins and Reganold (2008) argues that, CA demand extra nitrogen fertilizer to meet nutritional requirements of some crops because organic matter immobilizes nutrients. Due to limited funds, farmers often resorted to soil from antihills “*ivhu repachuru*” which they apply in CA plots to improve soil fertility, however this again requires more labor.

### **3.1.3 Lack of CA equipment**

Closely associated with labor problem, the smallholder farmers lacked access to Conservation Agriculture equipment. The technology is not yet available on markets, for example Sub soiler and Rippers. CA equipment helps in reducing labor requirements for example CA machinery are effective and efficient. In fact this can also increase area under CA cultivation because machines are faster as compared to human being. For example CA machines are highly used in America when direct drill tractors are often used for land preparation in Rice farms. Therefore equipment shortage became a challenge in Conservation Agriculture

### **3.1.4 Lack of Market linkages**

Of course there is yield increase through CA but the challenge emerges is lack of market linkages to absorb surplus. In the past years farmers were depending on GMB which was a potential market of grains, but now GMB is poorly performing, so to this end farmers are not developing because market is a crucial factor for development. Rural farmers lacked marketing skills such as advertisement and value addition so they largely depend on black market. Of which black market underpaid their farm produce and to some extent the purchase commodities with grains. Because farmers need money after selling of surplus to pay school fees for their children's and to purchase inputs.

## **3.2 Social challenges**

### **3.2.1 Migration**

In Zimbabwe CA is vulnerable to migration, which provides a major challenge. For instance, most of the farmers who were trained by CARE to spearhead Conservation Agriculture program migrated in 2008 after economic crisis for green pastures. This provided a challenge in remembering spacing measurements as well as Conservation Farming Calendar so it may lead to total decline of the program in future, S Ndlovu et al (2013) says that, the sustainability of

Conservation Farming program lies in availability of manpower, knowledge and age. Adger (2013) is of the view that conservation farming is a new technology which needs proper education to the beneficiaries.

### **3.2.2 Lack of community buy inn**

It is difficult to convince people that, cultivation without plough is productive whilst the same farmer relies on that type of farming all years ago. For instance Gukurume (2010) quoted one of the respondents saying *“what will be the use of donkeys then, if I dig myself instead of using those donkeys for draught power”* however these farmers are very calculative, because they do not opt out of the program but they pretend to be real missionaries as they want to secure input supply from NGOs and they later use them in conventional farming.

### **3.2.3 NGO support withdrawal**

NGOs have got both positive and negative effects on Conservation Agriculture contributed direct and indirect. They only matter period duration of a project and they quickly withdraw funds without concerning that the project is at take off stage. In this case Farmers outlined that CARE support was quickly withdrawn hence they need more assistance particularly on this project. Because they don't have access to inputs and extension workers shows limited support to CA because there are real preacher advocated for conventional farming before inception of CA so it is difficult to make U turn from conventional farming.

## **3.3 Environmental challenges**

### **3.3.1 Mulch**

All smallholder farmer experienced mulch problem as a challenge in practicing all three principles of CA. In fact crop residue such as maize stove is used to feed live stock during dry season particularly in winter when pastures are dried up. Grass is a problem and it is not enough for their live stocks and they cannot use it as mulch material and in most cases is highly used as

roofing material. In some cases they used crop residue of millet and rapoko which is not ideal for live stock feeding but the problem with it is of termites. In fact crop residue retention might attract termites to permanently live in the field and attack next crops this result in poor germination and poor crop development. So mulch is a real problem in Zimbabwe of which farmers decided to implement only two principles of Conservation Agriculture and leave their fields without soil cover, this exposed crops to sun rays and poor moisture retention often reduce their yields.

### **3.3.2 Climate change**

Although CA is considered a climate change adaptation strategy, but it cannot withstand extreme climate change effects, for example long dry spells. In 2008 farmers in dry regions experienced poor harvest in both CA and non CA plots due to little rainfall and high temperatures. Another good example is of 2013-2014 season when excess rainfall received between December and January. In this case basins collected a lot of water a condition which degenerate into water logging and leaching. Therefore CA fields failed to appropriately perfume in extreme climate change effects.

### **3.3.3 Dryness of the soil**

Of more importance, land preparation (basin digging) is conducted in dry winter season. In this period the soil is dry and hard for a hoe to penetrate. Zimbabwe's soil varies in relation with region for example deep down in Chiredzi, Mwenezi and Chikombedzi the area is characterized by black clay soil which is difficult to work on during dry season. Apart from that there are also stony areas likes Mandamabwe in Chivi, hence it is an expensive exercise to prepare plant basins in dry season so most of the farmers wait for first rains while failing to catch up with timeliness in operation of CA.

### **3.4 Political challenges**

#### **3.4.1 Political intervention**

NGOs are the chief promoters of CA in Zimbabwe, but in 2008 before elections the program was vulnerable to political intervention since the ruling party (ZANU PF) condemned NGOs on the assumption that, there are opposition party (MDC) colleagues. To this effect a number of NGOs were banned particularly in Masvingo only Faith based Organizations were exempted. This then compromised CA knowledge spreading to farmers hence project duration runs out before the project meet its targeted objectives and goals. For example in Zaka CARE officers were violently disbursed by local war veterans. Therefore CA is not immune to political upheaval so in most cases it suffered political stability since its drivers NGOs are the common enemy of ruling party.

### **3.5 Technical challenges**

#### **3.5.1 Limited extension support**

Conservation Agriculture lacked extension support; According to P. Nkala etal (2011) In some instances where extension services are provided, extension workers look at their involvement in the CA projects as extra work for which they should be remunerated separately. Since CA is a knowledge intensive technology, it would be difficult to successfully promote this technology without the help of well-trained and experienced extension workers. They only offer support during the period when NGO operate in that particular area, because they are enjoying more benefits than farmers. So to this effect they refused to support the program without other incentives, a condition which compromised proper dissemination of CA knowledge into communities without NGOs. This is the main challenge faced by Conservation Agriculture complimented by climatic vulnerability.

### **3.6 Prospects**

To increase success in CA, farmers expect Conservation Agriculture Technologies, so as to minimize labor required and to increase area under C.A cultivation. For instance use of animal drawn rippers and direct seeders, may lead to scaling up of production given the fact that in Zimbabwe according to (ZIMVAC 2009) about 50% of smallholder farmers owned cattle this shows that CA drawn technologies will help farmers since they got draught power already.. Therefore this is in line with Matsimba et al, who argued that, the use of animal traction C.A techniques could double or treble the area cultivated per draft animal

Apart from that, there is need for improved input access to farmers. In this case government assistance is needed, like in the past decades where farmers accessed inputs through GMB and retain after harvest and in the case of crop failure due period was extended to next season and it was in form of grains. Farmers outlined this is the only viable option in which they can access inputs or through NGO support because of lack of funds by themselves to purchase inputs. They noted that CA has got the potential to improve their yields if inputs made available because input shortage is a stumbling block to CA success

Extension support is needed to increase CA knowledge, especially considering the fact most of the farmers are not educated enough to keep memories for long time and migration of Community CA leaders as noted earlier on, eroded the knowledge base of CA. According to E.C Makwara (2010) to increase awareness among communal farmers there is need to run refresher courses for extension workers. This would get them to fully equipped and grounded to impart such knowledge to their clients' (communal farmers). Therefore this would make farmer's journey from mould board plough to CA easy.

### **3.7 Conclusion**

Finally, though there are much heralded benefits of CA but it is vulnerable to socio economic and political challenges among others. Labor intensity is the chief challenge to explain why CA adoption is still limited in Zimbabwe; however it is complimented by climate change, lack of market linkages, lack of CA equipment and unavailability of mulching material. Therefore as a way forward to ensure scaling up of CA adoption rate there is need for extension support and extension support so as to improve information dissemination which is a pre condition for successful CA.



## **GENERAL CONCLUSION**

The primary objective of this project was to assess the contribution of Conservation Agriculture in promoting food security among smallholder farmers of ward 15 Zaka district. This study is subdivided into four chapters, before the first chapter there is an introduction. This study employed qualitative research methods and research tools used are observation, interviews, questionnaires and desk research. However the introductory chapter encompasses aims of the study, research questions, justification of the study, statement of the problem, research methodology and literature review among other aspects. The research finds it worthy to discuss the food security issues of Zimbabwe before he moved on to the subject CA.

First chapter introduced food security issues in Zimbabwe, this chapter poses that in the 1980s was considered a bread basket, and she was the largest exporter of grains in Southern Africa feeding neighboring countries such Botswana, Malawi and South Africa. This partly means Zimbabwe was having national food security but in the early 1990s grain production drastically declining hence the agriculture sector was vulnerable to land degradation, SAPS, land Reform, Climate change and HIV which generally reduces labor among other factors. Chief among them is climate change; climate change became a major threat not only in Zimbabwe but globally. In Zimbabwe its impact is severely felt in form of recurring droughts and floods in other parts of the nation, a ready example is of flood out brake in tokwe Mkosi recently and Muzarabani area which experiences floods almost annually. Zimbabwe also experienced recurring droughts for example in 1992, 2002 and 2008 among others, in its long standing history the 1992 drought was one of the extreme droughts faced by the nation and it reduces smallholder draught power, a condition which caused food shortages for a number of years. Therefore there are fluctuations in food production trends due to rainfall availability since the nation depends on rain fed agriculture

Second chapter gave an overview of CA in Zimbabwe, in fact CA can be traced long back from Smith regime. But it was then revived in 2003 with donor efforts; a number of NGOs launched the program nationwide, the main objective of this campaign is to restore household food security particularly to the vulnerable households in rural areas. It is well noted that humanitarian intervention alone cannot break the vicious cycle of hunger and starvation. So this is in line with the biblical quotation which argues “*instead of giving person a fish just teach him how to fish.*” However CA adoption rate in Zimbabwe is highly influenced by issues such as availability of labor, willingness and availability of free input packages just to mention but a few. Therefore CA shows high production impact across all five agro ecological regions in Zimbabwe as mentioned earlier in a table above adapted from Mazvimavi (2010.)

Furthermore, the third chapter went on to give an account of how CA is being practiced in Zaka district ward 15. This chapter is containing main findings of the study obtained through questionnaire, interviews and observations. Though it shows limited extension support CA was highly welcomed in ward 15 this was because the ward was severely food insecure for a long period. In fact the area was largely depending on Seasonal Targeted Assistance provided by CARE funded by FAO and WFP. With the coming of CA there were no options except to take it with both hands or to die. Of course some people labeled it “*diga ufe*” which means “*dig and die*” but after noticing high production impact the name was then literally reframed to be “*diga udye*” meaning “*dig and eat*” however this chapter moves on to account for farmers perceptions on CA, of which 80 % of the respondents interviewed shows high appreciation to CA but the 20% of the respondents are doubting CA benefits since their main argument is CA requires much labor which often outweigh its benefits. Therefore it is difficult to base our argument on their views since power is an intangible commodity and cannot be compared to tangible yields,

because initially in the book of genesis it is outlined that, ”....*you shall eat the plants of the field in the sweat of your face....*”

The final chapter moved on to provide challenges and prospects in CA, there are political, socio and economic challenges threaten CA. in an include of lack of market linkages, labor intensive, lack of mulch, lack of inputs and limited extension support. However the main challenge is labor requirement, CA demands a lot of labor in both land preparation and continued weeding without forgetting the fact that, labor is generally limited by migration of able bodied family member to greener pasture as well as HIV and AIDs effect. Though CA is recognized as climate change adaptation strategy but extreme weather events may actually cause crop failure in both CA and non CA plots although its effect is not evenly felt in these two different plots. Therefore the final judgment of this project is although there are many challenges but there is high production in CA which contributed to food stability, access, utilization and availability among smallholder farmers.

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**APPENDIX 1**  
**OBSERVATION GUIDE.**

1. To observe CA plots
2. To observe plant status of both crops in CA and CF
3. To observe area size.
4. To observe age group of CA participants

**APPENDIX II**

**INTERVIEW GUIDE (NGO)**

**An interview guide to CARE OFFICER for the project conservation agriculture introduced by CARE International in ward 15 Zaka**

**TOPIC**

**The contribution of Conservation Agriculture on food security among smallholder farmers Zaka ward 15**

**INTRODUCTION**

Delight Mawire is a fourth year student at Midlands State University, carrying out a research on the contribution of Conservation Agriculture on household food security in ward 15. Your co-operation is greatly appreciated.

1. Name Organisation.....
  
2. Position in the organisation.....
  
3. When did the project start?.....
  
4. What are the aims of the project?.....  
.....  
.....  
.....



5. What are the main activities of the project

.....  
.....

6. What is the duration of the project?.....

7. Why rural people of Zaka?.....

.....

8. Is the performance of the project helping to fulfil the aims?.....

.....

9. What kind of assistance do you give to the beneficiaries?.....

.....

.....

10. How many beneficiaries are taking part in the project?.....

11. Who selects the beneficiaries?.....

12. Do men and women participate equally in taking responsibilities?.....

.....

.....

13. What has limited the number of beneficiaries?.....

.....  
.....  
.....

14. Does your organisation monitor the distribution of inputs?.....

.....

15. How often do you visit the participants?.....

.....

20. What kind of support do you think would nurture and develop you as NGOs to be more effective in promoting food security in Zaka and Zimbabwe at large?.....

.....  
.....  
.....

21. What are the successes, challenges and the causes of both?.....

**APPENDIX III  
HOUSEHOLD QUESTIONNAIRE**

1.

- i) Date.....  
.....
- ii) District  
name.....  
.....
- iii) Ward Number and Name  
.....  
.....  
.....
- iv) Village Name  
.....

**2. Household demographics**

Sex of the Respondent		1. Male		2. Female	
Age		Years			
Age of Household Head		Years			
Total number of household members		Male		female	
Number of members in a household	Age range	Male		Female	
	Less than 5				
	5-15				
	16-35				
	Above 35				
		Total		Total	

**3. Conservation agriculture principles**

Who introduce Conservation Agriculture

.....  
 .....  
 .....  
 .....  
 .....

Question ( <i>Tick where appropriate</i> )	YES	NO
Are you applying mulching (3cm thickness?)		
Have you carried out land preparation ( planting basins) on time before August		
Have you carried out continuous weeding on Conservation Agriculture plot		
Have you applied manure at planting basins before seed planting		
Have you realized yield increase		

4. When do you start Conservation Agriculture

.....  
.....  
.....

5. What is your perception on Conservation Agriculture in relation to Food Security.....

.....  
.....  
.....  
.....  
.....

6. What are three main challenges you face in practicing conservation Agriculture

i.).....  
.....  
ii.).....  
.....  
iii.).....  
.....

7. Two main crops you mainly grow using Conservation Farming technology

i.).....  
.....  
ii.).....  
.....

8. Five indicators of climate change in your area

i.).....

- ii.).....
- iii.).....
- iv.).....
- v.).....

9. Do you want to increase size of Conservation Agriculture plot next season?  
 ..... (Yes/No)

b.If the above answer is no ,why

.....

.....

.....

.....

.....

**10. Maize production under Conservation Agriculture during 2008- 2013 seasons (fill in)**

Year	Size of a Plot	Mulching	Crop rotation	Basins	Yield in KGs
2008-9					
2009-10					
2010-11					
2011-12					
2012-13					