



BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE
DEPARTMENT OF AGRICULTURE ECONOMICS AND SCIENCE

AN ANALYSIS OF THE EFFECTIVENESS OF PFUMVUDZA ON AGRICULTURE PRODUCTION "PFUMVUDZA" A CASE OF DOMBOSHAVA IN WARD 5 POTE VILLAGE, ZIMBABWE.

SUBMITTED BY

RONALD MANDIZVIDZA

B192627B

A DESSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT OF A BACHELOR OF SCIENCE IN AGRICULTURE ECONOMICS

AND MANAGEMENT

MAY 2023



BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE
DEPARTMENT OF AGRICULTURE ECONOMICS, EDUCATION, AND
MANAGEMENT

RELEASE FORM

SURNAME AND NAME OF THE AUTHOR: MANDIZVDZA RONALD

TITLE OF DISSERTATION: AN ANALYSIS OF THE EFFECTIVENESS
OF PFUMVUDZA ON
AGRICULTURAL PRODUCTION A CASE
OF DOMBOSHAVA WARD 5
POTE VILLAGE.

DEGREE PROGRAMME: BSc: AGRICULTURAL ECONOMICS
AND MANAGEMENT.

YEAR OF AWARD: 2023

The Bindura University Science Education Library has been granted permission to publish just one print for private academic or research purposes. The project and lengthy extracts from it are prohibited from being printed or otherwise reproduced without the author's express permission. The author retains no additional publication rights.

SIGNED: *JKE* **DATE:** 30 MAY 2023



BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE
DEPARTMENT OF AGRICULTURE ECONOMICS, EDUCATION, AND
MANAGEMENT

Approval Form

The foregoing individuals attest the fact that they possess reviewed the dissertation titled "An analysis of the effectiveness of Pfumvudza on agricultural production: a case of Domboshava, Ward 5 Pote village," and have endorsed it for endorsement to the Bindura University of Science Education.

SUPERVISOR _____ *JKE* _____ Date _____

[Signature]

COORDINATOR _____ Date _____

[Signature]

CHAIRPERSON _____ Date _____

[Signature]

Declaration

By endorsing this document, Ronald Mandizvidza assures that this dissertation is an original work that reflects his research on an analysis of the effectiveness of Pfumvudza on agricultural production. I worked real to make sure that the information here accurately reflects what I examined, the drawbacks I encountered, and my desired recommendations.

Student Signature..... **Date**.....

Dedication

I dedicated this project to my parents (Valeria and Percy Mandizvidza) for their unconditional support towards my educational endeavours. I also dedicated the work to my girlfriend and my three sisters, namely Sister Silvia, Memory, Shupikai and Kudakwashe. I also dedicated this project to my friends Brandon and Robert. Without their generosity of them, all the study would have remained a mystery.

Reconnaissance

I would desire to convey my gratitude to the supervisor, Doctor Chimvuramabwe, Doctor Musemwa the chairperson of the department and the research co-ordinator Doctor Mafuse, and my fellow students. Particularly Mr. and Mrs. Musindo, the extension agents at Pote village. To my family and peers, I also say thank you for your unwavering support. My co-students were equally invaluable as we shared notes and helped each other cope with the overwhelming experience of hands-on experience. I equally laud the various relatives from my family who were always at hand to assist me in all my inquiries about how certain things ought to be done and on adapting to the internal 'politics' that characterized organizational tone and climate.

Abstract

The analysis of the effectiveness of Pfumvudza on agricultural production was carried out in Ward 5 in Domboshava of Mashonaland West, Zimbabwe. A sample size of 75 was used to gather information from respondents through questionnaires, focus group discussions and eye observations. The sample was calculated using the Solvin method. The researcher used pie charts and bar graphs to present the finds from gathered information. The results showed that Pfumvudza is very effective in supplying the nation with food. Between the year it was first introduced, 2020, and the year after that, 2021, there was a 35.72% increase in output, and it is anticipated that this year's output will increase by over 35.7%. Due to its high yields per unit area, accessibility of free inputs, lack of draught power, and poverty, this lead people to adopt Pfumvudza. Based on the results, it was concluded that Pfubvudza is very effective in providing food-security for the nation. Furthermore, the Researcher recommended that distribution of inputs should be done in time, and the programme should include the Youth.

KEY WORDS

Analysis; Effectiveness; Pfumvudza programme; Agricultural production; Food security

Table of Contents

RELEASE FORM	i
Approval Form	ii
Declaration	iii
Dedication	iv
Reconnaissance	vi
Abstract	vii
List of figures	xii
List of appendix	xii
Chapter 1: Introduction	1
1.0 Introduction	1
1.1 Background to the study	1
1.2.2 Objectives	4
1.2.3 Questions to be asked to the farmers	4
1.2.4 The hypothesis of the study	4
1.2.5 Significance of the study	4
1.3 Delimitation	4
1.4 Location of the study	5
1.5 Rainfall records: Rainfall-Domboshava, Zimbabwe	7
1.6 Vegetation	7
1.7 Temperature for Domboshawa	7
1.8 Altitude	8
1.9 Summary	8
Chapter 2: Literature Reviews	9
2.0 Introduction	9
2.1 Definition of terms	9
2.1.1 Pfumvudza	9
2.1.2 Food security	9
2.1.3 Climate Smart Agriculture /CSA	9
2.1.4 Conservation Agriculture/CA	10
2.1.5 Effectiveness	10
2.1.6 Pfumvudza Farming	10
2.2 Benefits of Pfumvudza	12
2.2.1 High yield	12
2.2.2 Reduced cost	12

2.2.3 Labour saving.....	12
2.2.4 Organic matter increases.....	13
2.2.5 Moisture and soil conservation	13
2.2.6 Improve food security	13
2.2.7 The plots can be irrigated.....	13
2.2.8 Enables early planting	13
2.2.9 Improves nutritional diet.....	13
2.3 Challenges.....	14
2.3.1 Shortage of mulching materials	14
2.3.2 Digging hard ground.....	14
2.3.4 Shortage of organic manure.....	14
2.4 Income generation activities in Domboshava Ward 5 Pote Village Zimbabwe.....	14
2.4.1 Growing horticulture crops.....	14
2.4.2 Vending	14
2.4.2 Bricks production.....	15
2.5 Summary.....	15
3.0 Chapter 3: Research Methodology	16
3.1 Introduction.....	16
3.3 Research Design	16
3.3.1 Population and Sample.....	17
3.3.2 Population.....	17
3.3.3 Target population.....	17
3.3.4 Sample and Sample Size	17
3.3.5 Sample size.....	17
3.5 Ethical	18
3.5.1 Informed Consent	19
3.5.2 Free From Harm	19
3.6 Data Collection Procedures.....	19
3.7 Primary Data	20
3.7.1 Questionnaires.....	20
3.7.2 Interviews or Informant	21
3.7.3 Focus Group Discussion	21
3.6.4 Secondary Data	21
3.7.5 Observation	21
3.7.7 Data Analysis and Presentation.....	22
3.8 Conclusion	23
Chapter 4: Results Presentations and Discussion	24

4.0 Introduction	24
4.1 Biography of the area	24
4.2 The distribution of the information of the respondents	25
Main objective:	25
4.3 Objective 1:	27
4.4 Objective 2:	27
4.5 Objective 3:	28
4.6.1 Shortages of Mulching Materials	30
4.6.2 Failure to Dig the Hard Dry Ground	31
4.6.3 Early Dug Holes Being Closed by Animals	31
4.6.4 Late Supply of Inputs	31
4.7 Discussion of the Findings	31
4.7.1 Level of Pfumvudza	31
4.7.2 Climate Change	32
4.7.3 Free Inputs and Reduced Income	32
4.7.4 Lack of Draught Power	33
4.7.5 Improved Yield Food Security	33
4.8 Contribution of Pfumvudza to effective agricultural maize production	33
4.9 Challenges Faced by Pfumvudza Farmers	34
Conclusion	35
Chapter 5: Summary, Conclusion and Recommendations	36
Introduction	36
Summary	36
Conclusion	36
Recommendations	37
References	39
Appendices	44
Appendix: 1	44
Questionnaire for Pfumvudza Farmers	44
Appendix: 2	46
Interview guide for elderly Pfumvudza farmers	46
Appendix 3:	47
Informed consent form	48

List of Tables

Table 1 Response Rate 1 1.....Error! Bookmark not defined.

List of figures

<i>Figure 1.1 Domboshava map</i>	<i>6</i>
<i>Figure 2 Shows rainfall records for Domboshava extracted from (Manatsa, 2012).....</i>	<i>7</i>
<i>Figure 3 Pfumvudza plot</i>	<i>11</i>
<i>Figure 4 Pfumvudza plot picture adopted from V.I Tanyanyiwa et al.....</i>	<i>11</i>
<i>Figure 5 marital status</i>	<i>24</i>
<i>Figure 6 Output of farmers</i>	<i>26</i>
<i>Figure 7 Level of participation.....</i>	<i>27</i>
<i>Figure 8 Level of Experience of farmers</i>	<i>27</i>
<i>Figure 9 Comparing yields</i>	<i>30</i>

List of appendix

Appendix 144

Appendix 246

Appendix 347

Appendix 448

Chapter 1: Introduction

1.0 Introduction

Various efforts have been put in place by the country to reduce the food crisis hindering Zimbabwe's progression as a nation. So it is vital to assess the effectiveness of all projects that the government is implementing as a way to reduce food insecurity in the nation. "Pfumvudza" is currently one of the major projects some of them include Command Agriculture, Maguta and Contract farming are among Zimbabwe's top priorities in its effort to curb food insecurity among smallholder farmers in Zimbabwe.

1.1 Background to the study

The proportion of food-insecure Zimbabweans surged by almost by estimated 50% to 8.6 million (or 60% of the population) by the end of 2020 due to the drought and economic recession (FAO 2017). The maize crop yield of season 2019/20 constituted less than half of the national requirement of maize staple cereal. The dire situation led to the government's introduction of Pfumvudza through the Government's Agriculture Recovery Plan, initially as an initiative to improve food security at household level. Furthermore, the concept aligns with National Development Strategy 1 (NDSI) and Vision 2030 vision of ensuring food security, eradicating hunger and poverty. The world is facing a myriad of challenges that are causing severe problems in its effort to alleviate a hunger-free planet due to wars, disease outbreaks (covid19), and ever-changing climate caused by global warming. Although efforts are made by funding researchers to improve seeds that are drought tolerant and hybrid breed seeds that produce high output on a small area of land given all the requirements of water, nutrient, weeding, and chemical to prevent the attack by insects and diseases. Malnutrition diseases are one of the diseases that are affecting Zimbabwe, especially the poor people who can't afford to buy goods to feed themselves. Nearly 67% of Zimbabweans suffer from malnutrition diseases and this has triggered the government and independent institutions to fund many key sectors of the economic programs aimed at improving food availability in the economy such as command agriculture, Eco farmer, contract farming, and "Pfumvudza" or Zero tillage.

Soaring temperatures, maladies, flooding, droughts, shifting agro-ecosystem curbs, exotic species, ailments, and pests are just a few of the negative effects of climate change that are already being seen (ZCATF 2009). The Food and Agricultural Organisation (2020) reports that due to the effects of climate change, crop yields in Southern Africa have plunged by roughly 15% as rainy seasons have gotten shorter and shorter, leaving numerous individuals in need of food aid to survive. The globe will need to produce virtually 70% more food by 2050 in order to nourish approximately 9 billion people (FAO et al., 2019), making the food security dilemma evermore difficult to manage. This is consequence of the notion that it is challenging to set aside funds for and anticipate climate change precisely because it is difficult to foresee how it will express itself; it may take the form of floods or a phenomenon else entirely. As noted in FAO's 2020 reveal, 33% of rural dwellers in Africa are already impoverished. This indicates that the majority of farming households cannot afford to sustain themselves off the land they are cultivating.

A variation of CA (Conservation Agriculture) was established by Concern Worldwide in 2006 and is perfect for farmers without draught capability (Wagstaff and Harty, 2010). This is based on manually constructed holes (planting pits), a method used by Sahelian farmers, in three semi-arid communal areas in the low veld districts of Gokwe North, Gokwe South, and Nyanga, which had been abandoned during colonial and post-colonial times. The FAO (the UN Food and Agriculture Organisation) and DFID (the UK Government Department for International Development) stipulated the vast majority of the funding for the CA component, which was part of an initiative that also distributed food aid, instruments, seeds, and fertilizer, and fostered vegetable gardens (Wagstaff and Harty, 2010).

CA is based on three fundamental tenets: low soil turbulence, long-term covering of soil, and crop rotation, according to FAO (2007). The exercise of CA is viewed as particularly beneficial for smallholder farmers, particularly those with personnel and input exceptions in the dry tropics, based on research by CIMMYT (2016). The practice possibilities ties in all farm sizes and a variety of ecological circumstances. Gundu Jakarasi, Veronica The drought-resilient Zimbabwe has serious concerns regarding the effects of climate change on rural populations in particular, stated to the acting deputy director of the Ministry of Environment, Water, and Climate, which is why it is making attempts to take proactive steps. The Zimbabwean government (2015) unveiled a programme to adapt to climate change in order to lessen the repercussions on communities as weather and climate trends continue to change (Moyo, 2015). The remediation plan, claimed to the acting deputy director at the Ministry of Environment,

Water, and Climate, aims at enhancing food security in the altered Zimbabwean areas. Pursuant to the tactics, the government will promote farmers' use of early maturity and drought-resistant crop varieties, including sorghum and millet. Farmers ought to be instructed on how to collect rainwater for irrigation.

The Pfumvudza is a distinctive kind of conservation agriculture that was implemented by the government in 2019 (Maseva, 2020). In order enhance the administration of a limited amount of land, farmers assure the best possible utilisation of resources under the Pfumvudza agricultural production enhancement execution.

1.2 Problem statement

The consequences of climate change that the world as a whole is facing has caused the world to take drastic action to counter the ever-changing climate. Zimbabwe is currently facing food insecurity caused by low rainfall. The early findings from Zimbabwe's 2022 population and housing census include, among other things, that the country's population has grown by 16.2% since the last census in 2012, when it stood at 13 million, and is now at 15.1 million. This results in a population growth rate of 1.5% annually. The population data for 2022 indicates that there were 3818992 households, with an average of 4 people per household. A land area of 390,757 square kilometres and a population density of 39 people per square kilometre resulted. Therefore 39 people per 100hectares, which means one person occupies 2.56hectares if it is shared accordingly but due to the way land is distributed in a rural area some land is reserved for people's animal cattle grazing areas, and goats, schools, churches, growth point, wetlands clinics and mounts. This will leave each person with approximately 0.34 hectares to use for crop production. Harare remains the most populous province with 16% of the total population and Domboshava is in Harare province. This has caused a shortage of land for agriculture in rural areas especially (Domboshava) due to its moderate rainfall. Domboshava lies in Region 2 which receives rainfall ranging between 750 to 1000mm/year. Pfumvudza came as a solution to the long going problem due to its ability to use a small piece of land to produce high yield (16m by 39m) piece of land (plot) can yield approximately one tonne of maize(Mujere,2022).

1.2.1 Main objective

To determine the contribution of "Pfumvudza" towards food security.

1.2.2 Objectives

1. To determine the determinants of participation in the "Pfumvudza" programme.
2. To evaluate whether the level of experience in farming affects the yield in farming under Pfumvudza.
3. To compare conventional with conservation tillage yield for the past two years.

1.2.3 Questions to be asked to the farmers

1. Which one yields the best yield between comparing "Pfumvudza" and conventional?
2. What can be done by the government to make sure that the "Pfumvudza" program yields the most desired output to the smallholder farmers?
3. What are the problems encountered by farmers in the area that affect them to be effective in their production?
4. Which crops grow well in this area?

1.2.4 The hypothesis of the study

1. H_0 "Pfumvudza" is effective in providing food for the nation.
2. H_1 "Pfumvudza" is not effective in providing food for the nation.

1.2.5 Significance of the study

My research findings will help to correct the problem highlighted by the farmers in the Domboshava region that prevent them to attain maximum yield for themselves and the whole nation at large. If I get the chance to explain it to the AGRITEXT top task force I will help them to solve this fundamental problem hindering progress for farmers. I will also upload the research findings on the internet so that everyone can access them worldwide. The researcher also exhumed the benefits of Pfumvudza to achieve sustainable agricultural practices in relation to nature friendliness. Siltation of rivers and exacerbating of galley formation has been reduced due to Pfumvudza farming as they is high infiltration rate as compared to runoff. This has been attributed to the use of mulching in fields by farmers.

1.3 Delimitation

The study's primary projection concerns the impact of "Pfumvudza" zero-tillage farming on crop yield. My research was done in Domboshava Ward 5 with the help of the extension agents working in that area to fetch data from the smallholder farmers in that area. Ward 5 whose name is Pote constitutes many sections each under village heads. There are 8 villages each

ruled by village heads and each village head has 30-40 families. Some of the farmers use both conventional and zero tillage and some operate either under conventional or zero tillage.

1.4 Location of the study

Pote is located in the western direction of Domboshava Mountain. The diagram in fig1.1 shows Pote Primary with a red plus sign and Pote Secondary with a red box sign. Pote River is seen with a blue line. The river is used for supplementary irrigation by the farmers in the area. Domboshava is located 30 kilometres west of Mverechena Growth Point and on the Borrowdale/Domboshava Road. The distance between Domboshava to Harare Domboshava is 40 Km by road. Pote village is 32km away from the Town of Harare. The distance from Harare to Pote village via Domboshava road is 43km.

Fig 1.1. Domboshava communal lands. Source Surveyor General: June 2014

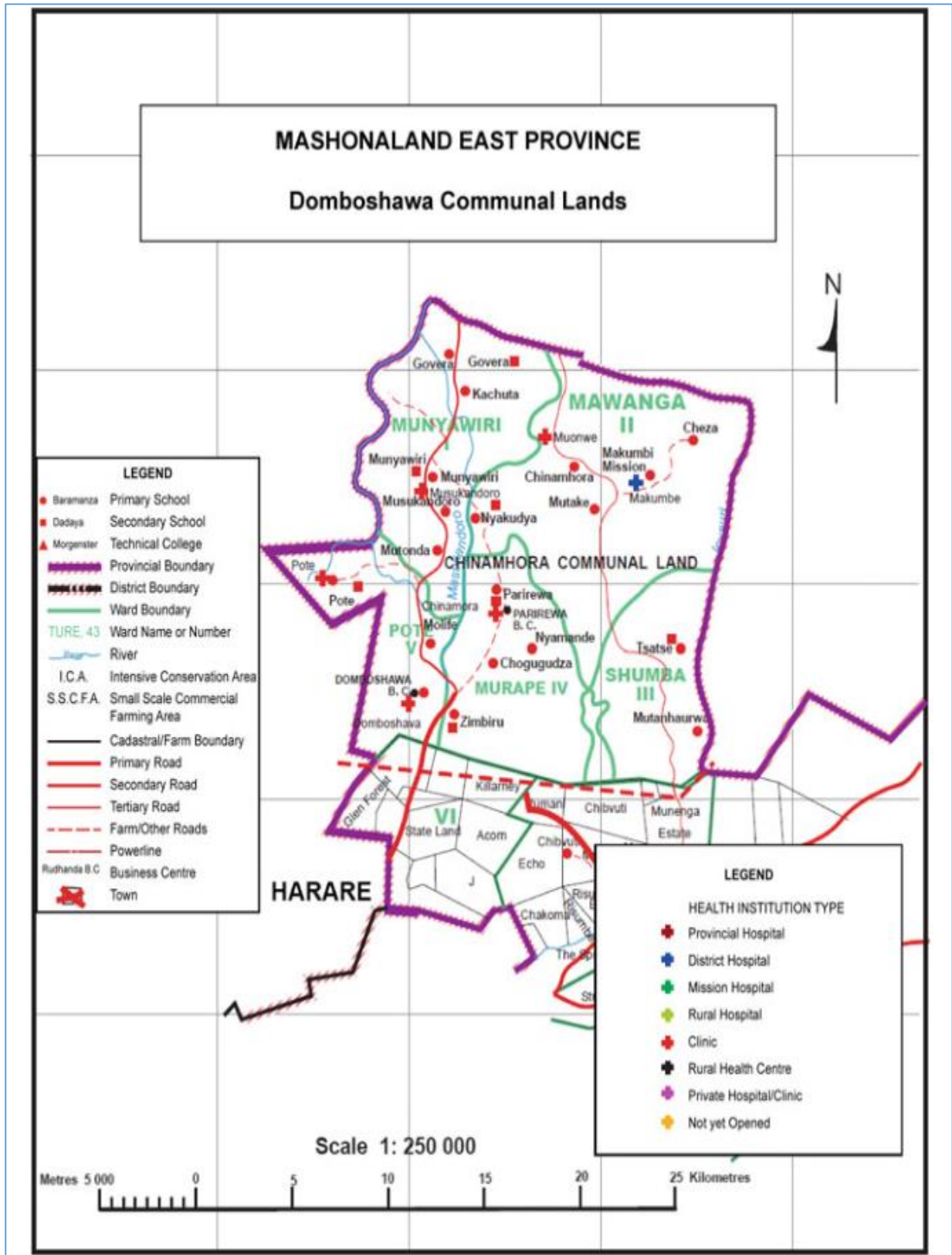


Figure 1.1 Domboshava map

1.5 Rainfall records: Rainfall-Domboshava, Zimbabwe

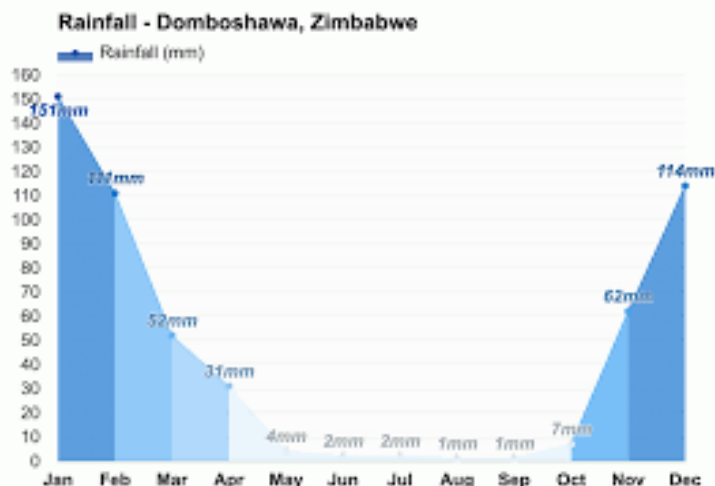


Figure 2 Shows rainfall records for Domboshava extracted from (Manatsa, 2012)

January is the month that records the highest rainfall with 151mm of rainfall recorded in the month of January alone. Fig 1.2 also shows that February and December recorded the same rainfall of 114mm of rainfall. As for the winter they are little or no rainfall received starting from May to September with 2mm or 1mm of rainfall recorded. Manatsa et al. (2012) Domboshava is in Region 2 where the annual rainfall ranges from 800 mm-1000 mm a year. With most of the rainfall is received from the middle of November to April.

1.6 Vegetation

Domboshava's forest is widely covered by various indigenes plants which include Musasa, Munhondo, Muhacha, acacia, muzhanje, muunze, etc.

1.7 Temperature for Domboshawa

In Domboshawa, the lowest average temperature is 22 °C in June and the highest average temperature is 30 °C in October. In the summer, Domboshava typically has warm temperatures in the range of 22 to 30 °C. The coldest parts of the year, however, can reach freezing points. The weather in Domboshava is generally temperate; the summers bring a lot of rain, and the winters are largely dry. Domboshava experiences 260-degree yearly temperatures on average, and it receives 511 millimeters of precipitation annually. An average humidity of 63%, a UV index of 5, and 228 days of dryness per year are present.

1.8 Altitude

Zimbabwe's Domboshava is there. From Cape Town, it is 2,213 kilometres away on a direct line. Domboshava can be found at these coordinates:

- Latitude: -17.601271
- Longitude: 31.13627
- The GPS location is located at 17° 36' S and 31° 8'

1.9 Summary

The first chapter examined the study's history, statement of issues, objectives, inquiries into the study, and the study's essentials. The study's weaknesses were also examined. The second chapter will give an overview of the investigation's literature.

Chapter 2: Literature Reviews

2.0 Introduction

The effectiveness of Pfumvudza on agricultural production has been studied in various literature to provide information on the impact of this farming program in Zimbabwe. Pfumvudza is a government-led initiative aimed at enhancing food production and improving food security in Zimbabwe. In this chapter the researcher is going to explain definitions of terms of this question understudy and other literatures of different authors who wrote about Pfumvudza.

2.1 Definition of terms

2.1.1 Pfumvudza

Pfumvudza is a term used in the Zimbabwean dialect to describe the springtime blooming of fresh leaves that heralds the start of a new farming season. It was created by a neighbourhood non-profit entity called the Foundation of Farming. It was developed utilizing a trio of fundamental tenets: minimal perturbation of the soil (or tillage); only planting holes were dug; organic mulch provided persistent soil wrap-around crop rotations; and intercropping cover crops with primary crops (Agri Horti Res, 2022).

2.1.2 Food security

Nutritional security, as defined by Elliot M. Berry, is attained whenever individuals from all socioeconomic backgrounds had constant physical, social, and economic access to adequate, secure, and nourishing food that satisfies their nutritional requirements and tastes for an active and healthy lifestyle (FAO, 2004)

2.1.3 Climate Smart Agriculture /CSA

CSA is a comprehensive way for overseeing environments, including woodlands, aquaculture, beef production, and agriculture, with the goals of enhancing perseverance, achieving enhanced and sustainable productivity, and lowering pollution levels. By establishing sustainable development goals, the global community has made a commitment to accomplishing three goals by 2030: eradicating poverty, ending hunger, and taking swift action to tackle climate change and its effects. In the years before 2030, agriculture and how we manage it will play a significant role in determining whether or not these goals are accomplished. Agriculture has been and continues to be a key tool in the fight against poverty, starvation, and all types of malnutrition. The CSA is an approach to agricultural development that aims to address the

intertwined challenges of food security and climate change (Lipper and Campbell, 2014; Steenwerth et al, 2014)

2.1.4 Conservation Agriculture/CA

CA is based on three practices promoted as a means for sustainable agricultural intensification and these include minimum tillage, mulching with crop residue, and crop rotation (Brouder and Gomez-Macpherson, 2014). As stated by Reicosky,(2015) is defined as an amalgamation of land management principles and an agriculture-focused technology characterized by zero or minimal- tillage, permanent organic soil cover, and crop rotations. Growing calls for a reduction in emissions from the change in land use within the international climate policy discussions have seen the emergence of CA as a mitigation farming solution. The international agriculture and development community widely advocated for CA due to the supply of plentiful, sustainable, high-quality lifestyles to the world's populace.

2.1.5 Effectiveness

In general, effectiveness is the extent to which stated objectives are met or the policy achieves what it intended to achieve. The goal can be as broad or as narrow as is deemed appropriate for example the core business of this project is to analyse the effectiveness of zero tillage on agricultural production.

2.1.6 Pfumvudza Farming

Pfumvudza in English is called Zero tillage. A Pfumvudza plot is a rectangular land measuring 16m by 39m, which represents 0.06hacter or 624m²(Agri Horti Res, 2022and Mujere, 2021). The longer side preferably extends down the slope. Three maize seeds are evenly placed in each of the 1456 planting stations in the plot. Each of the 52 planting rows with 28 planting stations in the plot. Each plant after thinning at germination. Inter-row spacing is 75cm and the in-row spacing of the planting station across the slope is 60cm. (Agri Horti Res, 2022and Mujere 2021). The dimension of each planting station is 15cm deep, 15cm wide and 15cm long. In each row, 56 maize cobs (a staple crop in Zimbabwe) each weighing 300g on average, are expected to be harvested from the 56 maize plants, This gives a 20kg bucket of shelled kernels which when ground provides adequate mealy-meal to feed a family of six for a week. This means the 52-grain buckets from 52 plant rows feed a six-member family for 532 weeks or one year. If the plot is well managed, should give approximately one tonne of maize grain.

This translates to a maize yield of 15t/ha (Agri Horti Res, 2022 and Mujere 2021). The farmer needs to also dig pits 5cm deep with the addition of mulch, while seeds and fertilizer (Compound D and ammonium nitrate (AN) top dressing) are the government provisions.

Fig 2.0. Pfumvudza plot



Figure 3 Pfumvudza plot

Figure 2.0 Layout plot from (Edward, 2013:4)

Fig 2.1 below is a diagram of a farmer with a wheelbarrow putting manure in individual holes of a Pfumvudza plot. It also shows a hoe used in digging holes and the spacing between rows and columns.

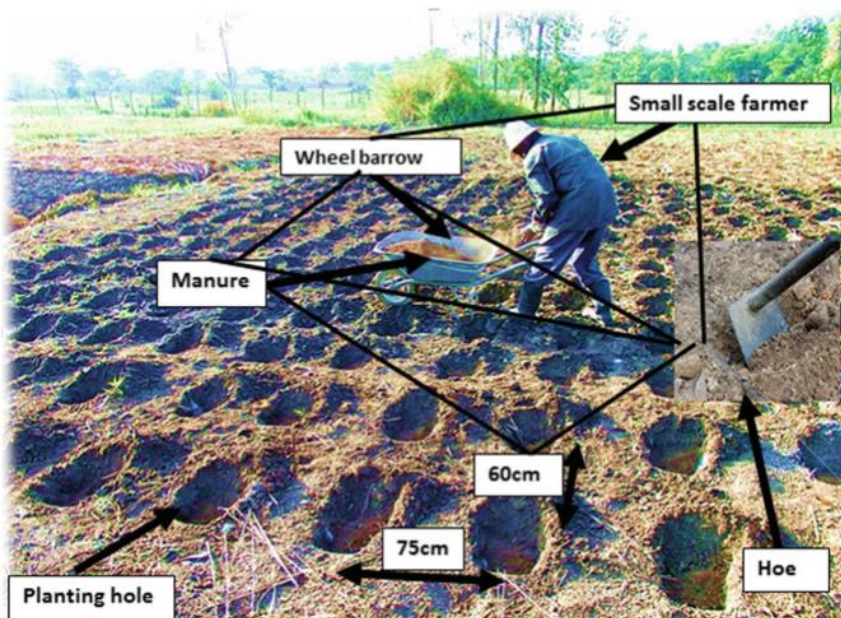


Figure 4 Pfumvudza plot picture adopted from V.I Tanyanyiwa et al.

2.2 Benefits of Pfumvudza

In the study by Mafa et al. (2021), the authors evaluated the impact of Pfumvudza on yield, food security, and income for smallholder farmers in Zimbabwe. The study showed that Pfumvudza significantly increased crop yields, improved food security, and increased the income of smallholder farmers. The authors noted that Pfumvudza could increase the resilience of smallholder farmers in Zimbabwe.

2.2.1 High yield

In a study by Mupangwa et al. (2021), the author evaluated the effects of Pfumvudza on crop yields and income for smallholder farmers in Zimbabwe. The study showed that smallholder farmers had higher crop yields and incomes after implementing the Pfumvudza farming technique compared to those who used the conventional farming practices. The authors attributed this to the use of optimal planting density, targeted fertilization, and the use of organic materials in the soil through mulching.

High yield is attained when all proper procedures are followed from the beginning to the day of harvesting. For Pfumvudza to be successful farmers should have the notion that time is a factor in accomplishing goals. To counter the growth of weeds farmers should prepare the plot before the rainy season starts. Organic matter should be put in hoes before the rain starts. CSA is an integrated method of managing landscapes, including forests, fisheries, livestock, and agriculture, with the goals of enhancing resilience, achieving enhanced and sustainable productivity, and lowering emissions. By establishing sustainable growth goals, the global community has devoted to accomplishing three goals by 2030: eradicating poverty, ending hunger, and taking swift action to tackle climate change and its effects. In the years before 2030, agriculture and how we regulate it will play a significant role in determining whether or not these goals are accomplished. Agriculture has been and continues to be a key tool in the fight against impoverishment, starvation, and all types of malnourished.

2.2.2 Reduced cost

Conservation agriculture is so attractive because it allows a reduction in production cost, and a reduction of time and labour, particularly at times of peak demand such as land preparation and planting (FAO, 2021). Mugwara (2022) agrees that the concept also helps with minimizing cost since all items needed for preparation are within everyone's reach.

2.2.3 Labour saving

Soil tillage is among all farming operations the single most energy-consuming. By not tilling the soil, farmers can save 30 and 40% of time and labour.

2.2.4 Organic matter increases.

Organic matter is full of nutrients needed by the plant to grow perfectly which are nitrogen, potassium, phosphorus, sulphur, calcium, magnesium, etc. These nutrients are relevant for the crop to grow. The absence of one of these nutrients causes poor growth, low yield, and complete plant failure. Lack of nitrogen results in chlorosis of the entire plant to a light yellowing of order leaving the plant to become spindly and stunted. Phosphorus deficiency results in purple or bronze colouring on the underside of older leaves due to the accumulation of the pigment and anthocyanin NParks (Buzz, 2020).

2.2.5 Moisture and soil conservation

As stated by Blavet et al, (2009), the main core use of mulching is to conserve moisture in the soil and prevent direct heat from the sun to reach the soil and prevent evaporation to happen from the soil. Thereby increasing the time frame of moisture in the soil and preventing the soil from wilting in the period of high temperatures and low rainfall or of periodical rainfall patterns. Mulching also helps in weed-preventing growth. As stated by Dube and Manengwa (2021) Pfumvudza essentially enhanced maize production, reduced the rate of soil erosion, increased soil fertility. Mulching prevents soil erosion to occur (Sadeghi et al., 2015).

2.2.6 Improve food security

Research shows that, compared to conventional farming, Pfumvudza has great potential to contribute towards household food security and reducing carbon emissions implemented following the stipulated recommendations by Mujeres (2021).

2.2.7 The plots can be irrigated

In the event of intermittent rainfall crops need supplementary irrigation for them to survive and prevent wilting or poor yield. Since all crops are grown in individual holes irrigation is easier using engines and pipes or manually using buckets.

2.2.8 Enables early planting

Pfumvudza needs an early plant since they are no ploughing done to disturb weeds' growth. Early planting helps to counter the growth of weeds in the field.

2.2.9 Improves nutritional diet

Crop rotations, mixed farming, and inter-cropping involving cereal and legumes under Pfumvudza help to improve soil fertility, reduce pest infestations and diseases, and minimizes total crop loss during severe weather occurrences. Legumes also provide a protein source to complement cereals (Thierfelder and Wall, 2009). Thus, farmers spread risks associated with

climate change and variability. Thus diversification helps if one crop fails the farmer will survive on the other crop.

2.3 Challenges

2.3.1 Shortage of mulching materials

Pote village is widely affected by wildfire that destroys all the grass and little that is useful to the farmers. Despite the farmer's efforts of fireguards during heavy winds days the fire can jump the fireguard and affect the protected area or hatred in the community in one absent person an enemy can light the fire to fix the person.

2.3.2 Digging hard ground

Domboshava Ward 5 Pote village has different types of soil which are clay soil, sandy soil and sandy loam soil. Clay soil is very difficult to dig whilst it is completely dry so most families do their land preparation after harvesting whilst the ground is not completely dry or wait for the first rains to fall down and then start preparing.

2.3.4 Shortage of organic manure

In the year 2019-2020, many cattle kraal has been completely closed due to the outbreak of a disease. Due to poor funding of veterinary research in the area, little effort has been carried out to see the actual root causes of the death of thousands of people's cattle. The government name it (January disease). This has caused organic manure to become scarce as most households rely on goats, poultry compost manure and forest little as their source of manure which is difficult to gather in large amounts to meet the standards requirements of a plot. Most families own a few goats as goats rearing is difficult especially in the rainy season as they survive through tethering. On average families own 5 goats or fewer.

2.4 Income generation activities in Domboshava Ward 5 Pote Village Zimbabwe.

2.4.1 Growing horticulture crops

Domboshava is well known for horticulture. It is the large distributor of tomatoes consumed in Harare and areas surrounding Harare. Other marketable produce grown are vegetables such as rape, cabbage and Tsunga. They get income from selling these crops to make ends meet. Their main place are Showground, Mverechena growth point, Hatecliff and Mbare market in Harare.

2.4.2 Vending

Vending in Domboshava is most commonly done by women and youth. They normally sell vegetables, fruits, tomatoes and clothes. They sell their products at the village level, growth

points, Harare streets and Artisanal gold mines. This is a source of income for women and most of them are excelling well thanks to the credit institutions that allow women to borrow money for start-up capital (Mavambo group).

2.4.2 Bricks production

Bricks production is one of the activities that are benefiting the youth in the Pote area to generate income for their survival. Although brick production causes divesting problems to the entire world such as massive deforestation and land degradation caused by open pits left by the youth. Little has been done to minimize or to stop that because of the prolonged high unemployment rate in the country. Bricks production and the need for firewood in the area have resulted in severe deforestation in Domboshava, this has been caused by migration and an increase in population in the area because of the good climate for agriculture.

2.5 Summary

The literature reviewed indicates that Pfumvudza is an effective program that improves crop yields, food security, income, and soil fertility for smallholder farmers in Zimbabwe. The clue of what Pfumvudza is, how to grow crops under this farming type, spacing, the benefits it provides to the farmers and the nation at large, and drawbacks facing farmers in Domboshava. Definition of terms and climate-smart agriculture all this has been exhausted in this chapter 2.

3.0 Chapter 3: Research Methodology

3.1 Introduction

The researcher will concentrate on the research design and justification of the methodology in this chapter, which was used to collect data in order to use both quantitative and qualitative methods to address the research questions and achieve the goals of the study mentioned in chapter one. This study's method tries to Pfumvudza's impact on agricultural output in Domboshava Ward 5 Pote village should be the subject of this study. In this chapter, the researcher will also provide a thorough explanation of the methodology he employed for this study, including the sampling strategy, data gathering methods, sample size, and the safeguards required to preserve it.

3.3 Research Design

Research design was defined by Kothari, 2004; and Cresswell, 2012) as a conceptual framework for data collection, measurement, and analysis that blends relevance and economy. It also includes the techniques and methods used to carry out scientific investigations. As a framework for the planning, execution, and analysis of research (Kothari, 2004), a study design also provides a direction within which a decision on the data collection methods must be made.

By gathering numerical data and utilizing mathematically based analysis techniques, quantitative research explains phenomena (Muijs, 2004). This method places a strong emphasis on measuring goals and analysing data in a number of ways, including numerically, mathematically, and statistically.

A qualitative technique is also used by the researcher to learn more about the Pfumvudza farmers in the Domboshava Ward 5 Pote community. As stated by Denzin and Lincoln (1998), qualitative research uses an interpretive and naturalistic paradigm. In order to decode or extrapolate meaning from phenomena, the researcher examines things as they appear in nature meanwhile considering what farmers contribute to those occurrences. The benefit of qualitative research is that the researcher can directly interview individuals to obtain information (Miles and Huberman, 2003).

Despite the qualitative technique's virtues in gaining insight into social phenomena, it has drawbacks that the aforementioned quantitative approach resolves. The fundamental drawback of the qualitative technique is that it lacks sufficient reliability and validity (Hughes, 2006; Mhonyiwa, 2014). In order to respond to this scrutiny, the researcher tailored quantitative

techniques and triangulation. To enhance the data's credibility, key informants and questionnaires were used.

There were quantitative and qualitative approaches executed. While using various procedural ways to ensure quality, both qualitative and quantitative research methodologies place an emphasis on accuracy, consistency, application, and neutrality (Harwell, 2011). To confirm the accuracy of the conclusions, the data were triangulated by using one method for verification, debunking, and supporting each inference.

3.3.1 Population and Sample

3.3.2 Population

In the opinion of Smith (2003, 2003), the term "population" refers to the entire collection of potential components that could be encompassed in any investigation. The population is the total number of people in Domboshava Ward 5 Pote village where the sample was collected (Bush and Burn, 2010). As defined by Hassan (2014), population is also a group of attributes being studied from which inferences will be made. For the 2019–2022 growing seasons, the researcher's study was geared towards Pfumvudza farmers in Ward 5 Pote village. These farmers include widows, and single, married and divorced farmers of a different gender.

3.3.3 Target population

"Population refers to all individuals who have a specific attribute that makes them identifiable as a group," argues Charles (1958, 88). The term "target population" encapsulates a set of individuals or things that a researcher has a curiosity in while crafting an assertion.

3.3.4 Sample and Sample Size

As stated by Kitambara (2013), a sample is a tranche of the population from which the characteristics of the population will be inferred. When pitching it for inspection, it is occasionally referred to as a representative portion, a single item from a big whole, or a finite subset of a statistical population, the attributes of which are investigated to acquire knowledge more about society as a whole for example in this scenario I'm studying the effectiveness of Pfumvudza programme on agricultural production. The researcher has a population of 1200 farmers who registered to grow crops under the Pfumvudza programme.

3.3.5 Sample size

From a population of 3000 farmers in Domboshava who grow crops using Pfumvudza. There are 10 villages in the area so the researcher group the villages into strata and computed the sample size using the Slovin data sampling formula. Given a population size (N) and an error

margin (e), it is used to compute the sample size (n). Equation (2) was used to calculate the sample size for this random sampling strategy, which resulted in 75. So after computed results using the Slovin formula the researcher used strata sampling method and random sampling methods to obtain results. Each strata had 8 people participating in the research from all villages in the area.

$$n = \frac{N}{1 + N\epsilon^2} = 300 / [1 + 300(0.1)^2] = 75 \dots \dots \dots (2)$$

3.4 Sampling Procedures

Zimkund (2003) classified sampling as the technique of using certain items (people) from a large population to derive inferences about that society. The researcher utilized a strategy called purposeful sampling. The purposive sampling method is a non-probability sampling technique in which the researcher selects the subjects for the sample based on an assortment of aspects such as their capacity or willingness to participate in the study or their expert knowledge of the research topic (Oliver and Jupp, 2006). Based on who they reckon would be an appropriate match for the study, the researcher prioritizes the sample for example the poorest Pfumvudza farmers, the middle and the rich to obtain the most valid results. The purposive sampling method was chosen because it has the advantages of being inexpensive, saving time due to accessibility, and allowing one to choose eligible individuals with the necessary qualities (Kothari, 2004). Kothari (2004) asserts that deliberate sampling is prone to bias and is exposed to a great deal of prejudice.

The sample was chosen by the researcher because it was convenient and close by. The researcher was living in the Ward centre and data collection location at the same time. He was born in the same ward as the study, so he was able to observe that the chosen population had first-hand knowledge, had completed the Pfumvudza in tandem with that, and was enthusiastic to share their experiences. To examine the effect throughout the entire population, several age groups and susceptibility have been chosen.

3.5 Ethical

A setting where everyone's freedom is respected is what Udell (2012) refers to as an ethical environment. The researcher adhered fervently to the highlighted ethics listed below.

3.5.1 Informed Consent

Informed consent, as defined by McMillan and Schumacher (2006), entails that potential research volunteers must consent to participate after being fully informed of the procedure and associated hazards. This study followed ethical guidelines; participants were informed of the study's goals before engagement, giving them the opportunity to choose whether to participate or not with the help of assurances from their leader and extension agent, Mr. and Mrs. Musindo, who described the main goals of the study. Respondents gave their consent to engage in the research, and the researcher treated participant information with the utmost respect and secrecy. To respect the secrecy concept, the participants filled out the questionnaire in an anonymous fashion. Possibility: The study was able to be completed because the researcher had enough time. The research was able to conduct face-to-face interviews with key informants and administer questionnaires to individuals who were easily available. The researcher was able to complete the study project without being forced thanks to the university supervisor's assistance in research.

3.5.2 Free From Harm

Regardless of Trochim (2006), researchers are forbidden from placing subjects in any circumstances that could put them at danger of damage as a result of taking part in the study. In order to avoid frightening or offending individuals, it is necessary to take precautions to prevent both bodily and psychological harm (Udell, 2012). In the opinion of Bryman and Bell (2011), harm can take many different forms, including physical harm, harm to participants' self-esteem, and inciting them to commit deplorable behaviours.

3.6 Data Collection Procedures

In the opinion of most (2003), data collection is the process of acquiring and measuring information on relevant variables in a predetermined and systematic way so that one may respond to the stipulated research questions and assess the results. Dr. Musemwa, chair of the Department of Agricultural Economics and Management, gave the researcher a consent note for tapping into in his study of the efficiency of agricultural maize production in Domboshava Ward 5 of Pote village. The researcher's admittance at Bindura University of Science Education is verified by the letter. The researcher took the letter with him and went to the regional AGRITEX Extension Officer to ask for permission to conduct the study under their purview. In order to get permission, the researcher went to the District AGRITEX Extension Office. Additionally, the researcher asked his local supervisor for authorization to conduct the study.

He started conducting the study by gathering pertinent data after being given permission. Data was gathered using surveys and interviews. To ensure that data collecting was successful and unhindered, the researcher took various actions and adhered to some protocols. The AGRITEX agent, Mr. Musindo, administered the questionnaire. Simple questions were posed. As stated by O'Leary (2004), the respondents are free to provide whatever information or voice any opinions they like, despite the amount of space provided may be limited. Both closed- and open-ended questions were included. While closed-ended questions obligated the respondents by asking them to provide clarification like "yes" or "no," open-ended questions eligible for the respondents to react to the questions in their own terms and language. The questionnaire was created in a way that permissible respondents to respond anonymously and use pseudonyms to conceal their identity. Therefore, this tool was appropriate when dealing with delicate issues.

The researcher conducted interviews with the elderly in a bid to learn more from their expertise of various farming practises. He cautioned them to feel free to share the insight they had received from their experiences because it was utterly confidential. The notebook was used to keep track of each interview session, and after the final interview, the data was scrutinised.

3.7 Primary Data

Open-ended questionnaires, in-depth interviews, and observational methods were utilised to collect the primary data, which was then converted into other forms.

3.7.1 Questionnaires

It is a piece of writing that solicits information from every person in a sample by asking them questions, which the respondents then independently respond to (Borg and Gall, 1996; Shumbayaonda, 2011). The questionnaires give the researcher the opportunity to acquire the required data objectively. In the opinion of Kothari (2004), the researcher utilised questionnaires because they are devoid of the researcher's prejudice, the responses are in the respondents' own words, and the respondents are able to provide well-considered answers because they complete the questionnaires on their own time. Questionnaires had a big disadvantage in that they can only be used where respondents can give well-thought-out answers since they complete the questionnaires during their own time. Questionnaires had a big disadvantage in that they can only be used where respondents are educated Kothari, (2004).

As noted by Kothari (2004), one more flaw with surveys is the low rate of return of duly completed questionnaires from certain participants who purposefully do not submit the questionnaires. To overcome this difficulty, the researcher gave participants two days to

complete the questionnaire before visiting each participant's house to collect the completed forms. All of the administered questions were returned due to this strictness. The married, widowed, single, and divorced participants in the study were given the specially created questionnaires to complete.

3.7.2 Interviews or Informant

One-on-one interviews like this are useful for exposing underlying motives and attitudes towards important subjects. Four individuals who were chosen as important informants were interviewed: the village chiefs, the chairperson, and the counsellor. Face-to-face interviews allow me and the respondents to communicate directly. The interviews are semi-structured to act as a guide for the interviewer, but the interviewer is free to deviate from the stated structured interview questions and ask respondents to elaborate further on the local situation if they like.

The interviewees might even go farther and disclose some of the questions that won't be asked; this will help to reveal some information that the study might not have thought to ask. The flexibility and wide range of values they produce are the main benefits of depth interviews.

3.7.3 Focus Group Discussion

Tegan (2021) defines a focus group as a study technique that gathers a small number of farmers to respond to questions in a controlled environment. The group is picked based on predetermined demographic characteristics, and the questions are created to provide light on an interesting subject. It is one of four different interview formats. They are viewed as largely a confirmatory research approach. In other words, their conversation-heavy environment is best for reiterating or disproving previously held opinions. They are therefore excellent for carrying out explanatory research, in which you investigate why something occurs when there is little evidence available.

3.6.4 Secondary Data

The researcher also engaged in document analysis of related literature. Published and unpublished books, dissertations, thesis, journal articles, research papers as well as reports were considered. Electronic material, magazines, newspapers and newsletters were also used to get current information on Pfumvudza maize production and the use of farm inputs. This enables the researcher to generate background and contextual information on resource use effectiveness in Pfumvudza maize production by smallholder farmers in Domboshava.

3.7.5 Observation

Here, the researcher conducted a tour of the research region while noting noteworthy challenges that were pertinent to the investigation. In an effort to gain a better picture of the

area, the researcher toured the neglected ward, visiting their farms, rivers, boreholes, homes, kraals, vegetable gardens, and the entire area in general. He then combined the data from interviews and questionnaires. The observations in the fields are the result.

3.7.7 Data Analysis and Presentation

In the opinion of Gioia, et al. (2013) as the cordiality of results and data of a study. Marshall and Rossman (1999) in Mhonyiwa (2014) defines data analysis as the process of data reduction and interpretation. Data analysis is the process of developing answers to questions through examination and interpretation of data (Chambers and Skinner, 2003). As stated by Marshall and Rossman (1999) in Mhonyiwa (2014), data reduction means bringing down amounts of collected data into manageable units while interpretation is the process of attaching meaning and insight to the words and acts of the participants in the study. Data was presented under the research questions.

Bar graphs, pie charts and tables were used to present data. Table were used to condense large amount of data and bring out patterns in data enabling comparisons to be easily made among classes of data (Adedayo, 2000). The researcher used tables because they are the simplest way to summarize data. As stated by Chambers and Skinner (2003) both pie charts and bar graphs are simple, easy and quick to construct, they can clearly show categories dominating and have a visual impact which tables lack. Adedayo (2000) went on to say that pie charts can easily show how different categories relate to the whole and bar graphs have the ability to prevent two or more data sets thus enabling trends to be easily highlighted. Explanatory notes were used to explain data presented in the form of graphs, pie charts and tables.

The data was analysed by means of descriptive statistics which organized data in tables, frequencies, and percentages. An analytical technique known as the thematic system were used to analyse qualitative data such as the textural material generated in interviews. The findings were then narrated by using tables and graphs. Boyatzis (1998) defines thematic analysis as the process of encoding qualitative information. Braun and Clarke (2006) add on that thematic analysis is a method of identifying, analysing and reporting patterns (themes) within data. Thematic analysis were done to qualitative data because it is flexible and it offers an accessible and theoretical approach to analysing qualitative data (Braun and Clarke, 2006). Boyatzis (1998) says thematic analysis enables researchers to develop a deeper appreciation for the group or situation they are researching.

Data for farmer socio-economic information gathered using questionnaires were entered into a database system using Microsoft Excel (2013) program for analysis. Coded data from both structured and unstructured questions were processed using Microsoft Excel 2013.

3.8 Conclusion

In chapter 3, the researcher's techniques for gathering information from the Domboshava Ward 5 Pote Village area under study were described. Information for the study under inquiry was gathered using both qualitative and quantitative methods by the researcher. Additionally, the researcher describes the steps required to collect the data, such as obtaining permission from the local authority figure to conduct the study without interruption. The researcher also describe how he is going to analyse data using bar graphs, pie chart and tables.

Chapter 4: Results Presentations and Discussion

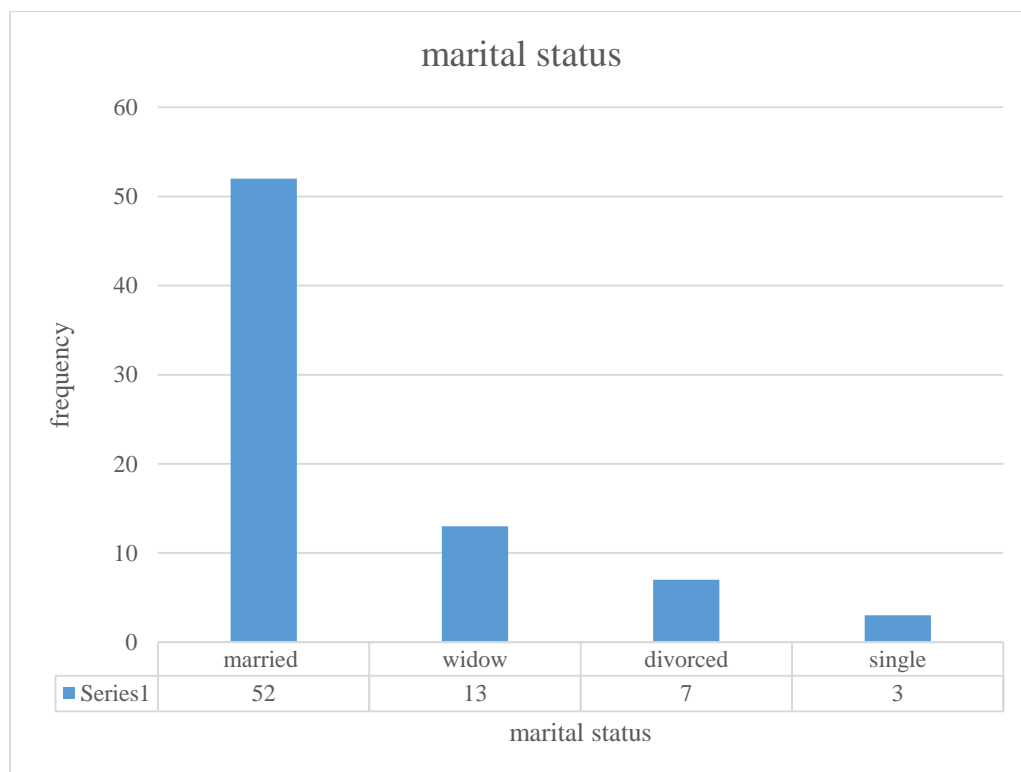
4.0 Introduction

The results of the research on Pfumvudza's impact on maize yield and productivity before and after adoption are provided in this chapter. It goes further by displaying the outcomes of the data analysis techniques used to examine the data acquired through questionnaires, focus groups, and interviews, and this includes graphs, tables, and pie charts. The various outcomes collected will then be outlined in detail through an in-depth debate.

4.1 Biography of the area

Fig shows the biography of the area under study. It shows that married people dominated the study with 52 respondents, 13 widows, and 7 divorced and 3 single farmers.

Figure 5 marital status



4.2 The distribution of the information of the respondents

Table 1. The distribution of the information of the respondents

Table 4.2 shows how farmers responded to various methods used to gather information such as questionnaires, interviews and Focus groups. It also shows crops grown by farmers in the area in their numbers. The table in fig 4.0.2 shows that many farmers like to grow beans, maize, groundnuts and sorghum. Very few farmers grow soya beans and Roundnuts.

NAME OF CROP	BEANS	SOYA BEANS	MAIZE	GROUNDNUTS	ROUNDNUTS	SORGHUM
Number of farmers who grow the crop	52	27	75	42	34	50
interviews	8	7	15	6	10	5
Focus group	10	10		10	4	15
questionnaires	34	10	60	26	20	30

1 Response Rate 1 1

Main objective:

To determine the contribution of "Pfumvudza" towards food security. As was stated earlier in the literature review, food security is attained when people from all walks of life have constant physical, social, and economic access to sufficient, secure, and nourishing food that satisfies all dietary needs and preferences for active and healthy life (FAO, 2004). Fig. 4.1's findings show that farmers have equitable access to maize, the country's main food source. In the bar graph above, different types of crops that were raised by farmers during the rainy season under Pfumvudza are displayed. It demonstrates that all 75 respondents took part in the Pfumvudza (growing maize) process. That's because, in my native Zimbabwe, maize is a basic diet.

Two-thirds of farmers also grow beans apart from maize. Beans provide proteins required by the body to repair cells and make new ones.

Sorghum has also been grown by 48 farmers as a supplement for maize or to create traditional beers/alcohol.

Groundnuts are mainly used for creating peanut butter or as food which is highly nutritious as it is rich in many nutrients needed by our body for its survival such as fat, potassium, and proteins. Due to the increase in prices for cooking oil, most farmers are substituting cooking oil with peanut butter in most rural areas of Zimbabwe. Failure to buy cerevita and other corn flex etc. has made the demand for groundnut increase in rural areas as the mothers use peanut butter to cook porridge for their kids.

Roundnuts are also a valued crop as it is rich in proteins, fats, carbohydrates, folate etc. Roundnuts help promote heart health, treat anaemia, managing of diabetes, and prevent arthritis and many other benefits.

Soya beans are also grown by a few farmers. Soya beans are used for a variety of reasons such as the creation of hen feed, oil manufacturing and many other benefits. I thank the department of the AGRITEX board and its task force for the job well done to encourage farmers to engage in diversification to spread the risk that when one crop fails to reach maturity due to uncertainty the farmers will rely on other crops such as sorghum, and groundnuts.

Farmers in years of good harvest sell surplus food to any potential buyer by generating income to meet other dietary needs and the cover family problems such as fees and medication.

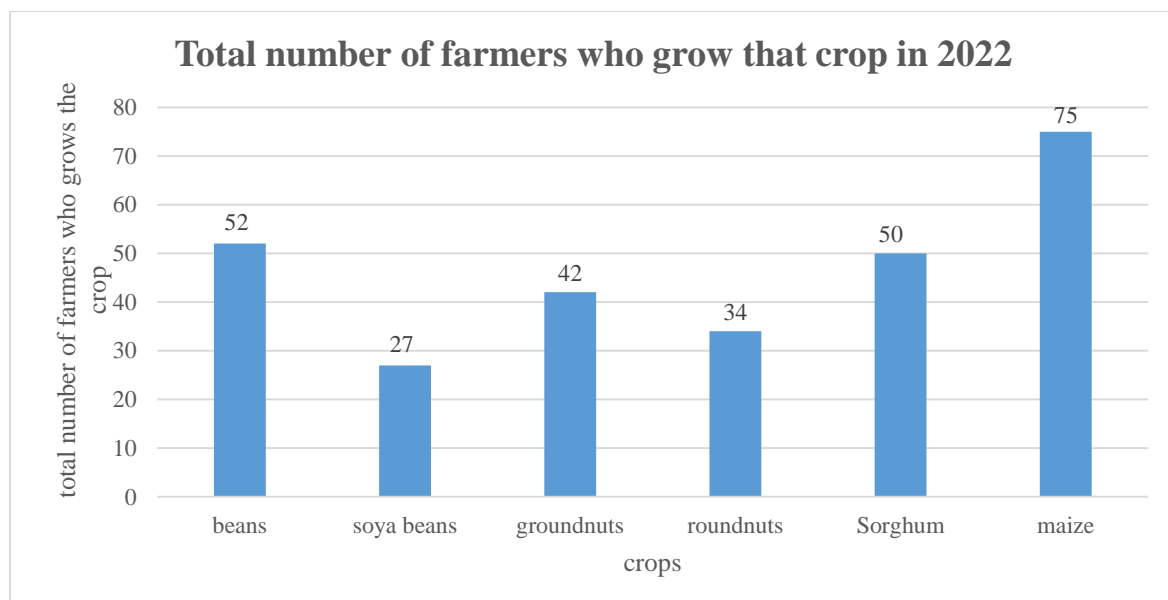


Figure 6 Output of farmers

4.3 Objective 1:

To determine the determinants of participation in the "Pfumvudza" programme by farmers of all age groups and different gender of farmers. Based on the results of the pie charts above in figure7 show that of the 75 farmers who participated in this research 51% were females and 49% were males. Since most women's duties are cleaning, cooking, washing and taking care of children. They're the ones who are usually seen in public while men will be busy looking for additional income for the family through building, mining and gardening. It's hard to see men without appointments so their response was less to the women. Elderly people between the ages of 40 to 70 years had the highest response rate of 64% as compared to youth 36%. This is because the elder people are mostly retired government workers. The youth are those who are 19 to 39 years old. Most of the youth in the area between 19 to 27 are still under the rule of their parent or are still dependent on their parents and don't own anything. Some of them are still at school in colleges and universities that's why their response is very low as compared to the elder people.

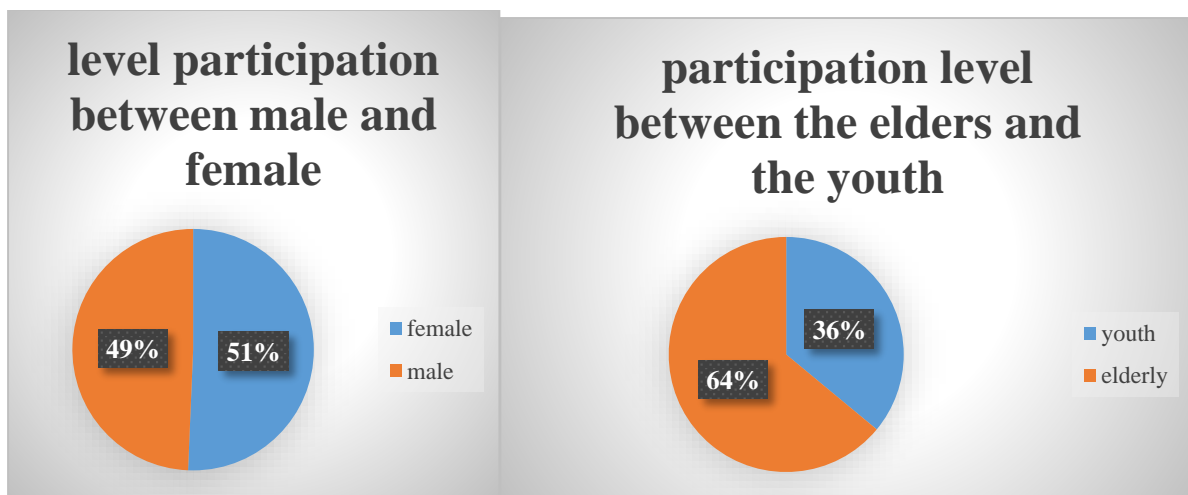


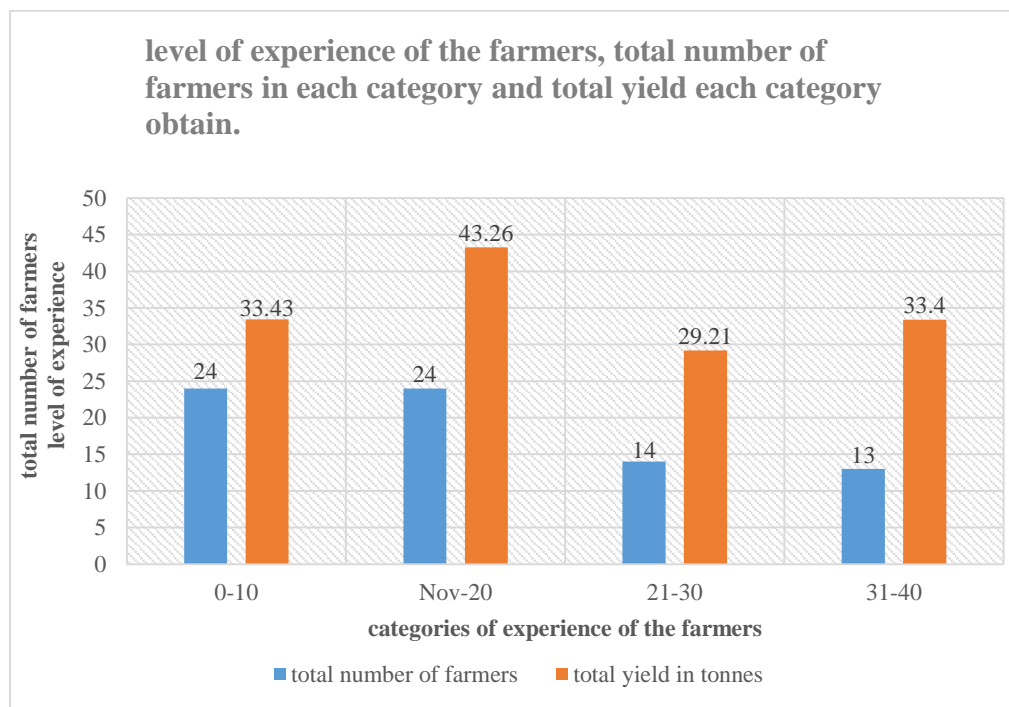
Figure 7 Level of participation

4.4 Objective 2:

Figure 8 Level of Experience of farmers

To evaluate whether the level of experience in farming affects the yield in farming under Pfumvudza. Fig 8 shows the level of experience and the yield obtained by farmers in the Pote village.

The bar graphs in fig 8 above try to assess whether the level of experience contributes to the rise in the yield of a farmer. Based on the results above it shows that the level of experience has a significant contribution to the farmer's total output as evidenced by the first and second bar graph. There are 24 farmers with 0-10years experience and they add up to 24 same number compared to those who are in 11-20years experience, if you compare their yield it shows that farmers with 11-20years experience have a higher yield of 43.26t and has a range of 9.83t.s. It is also proven by the bar graph above shows by the last categories shows that yield of 14 farmers is low than that of the last 13 farmers. So my conclusion is that experience plays a significant role in the number of tonnes one person can get on a piece of land holding other things constant (Ceteris Paribas).



4.5 Objective 3:

To compare the output of maize grown under Pfumvudza and conventional tillage for the past four years. Fig 9 Comparison bar graph for Pfumvudza yield in tonnes. Fig 9 shows the yield of 75 farmers before and after adopting Pfumvudza. In 2021 farmers produced 103.29 tonnes of maize as shown above on the bar graph. This was the first result in tonnes

that the 75 farmers obtain altogether first year after adopting Pfumvudza, on average each farmer has a yield of 1.3772tonnes in the first year of 2021 so with an average household of 4 members shows that the farmers had enough food to feed themselves and a large surplus to use for sale or bata trade. Basing on Mjere's (2020) conclusion that a family of six need one tonne of maize to survive the whole year.

The second year after adopting Pfumvudza 2022 is represented by the tallest bar on the bar graph in fig 9 it shows a sharp increase in yield from 103.29t the previous year to 140.19 the following year. They are a significant increase in yield of the same 75 farmers by 36.9t from the previous year. This shows that farmers are well adapting to Pfumvudza farming and we are expecting to see much improvement in this year's yield as farmers were encouraged to increase the number of plots to three in the 2022 to 2023 farming season. If we turn 36.9ts into a percentage we so that they are a 35.72% increase in production from 2021 to 2022. It shows that farmers are now able to utilise the resources they have in a very effective way without waste.

In 2018 farmers obtained a good harvest of 99.91ts which was quite good for their survival based on Mujere's (2020) survey and conclusion. However, the output started to decline in 2019 following the outbreak of cattle disease which left several households without a single cattle. The death of cattle negatively affected farmers as they greatly rely on cattle manure, income for survival and payments for family problems such as sickness, fees and inputs. The cattle generated income for the farmers through transporting other people's goods using scotch cut and also used for hiring to plough fields for those who don't have cattle. So after the huge losses followed by the hyperinflation in the country and the reduction in the income of workers the output starts to fall. If the government had not intervened in helping farmers through this programme many people would have died of poverty and other related illness such as kwashiorkor and other malnutrition diseases. Prices in recent years have gone up due to sanctions imposed on the nation making it difficult to survive for smallholder farmers. A bag of fertilizer costs between 35 to 45 USA dollars and 10kg of the seed ranges from 20 to 50 USA dollars depending on the size and quality of the seed.

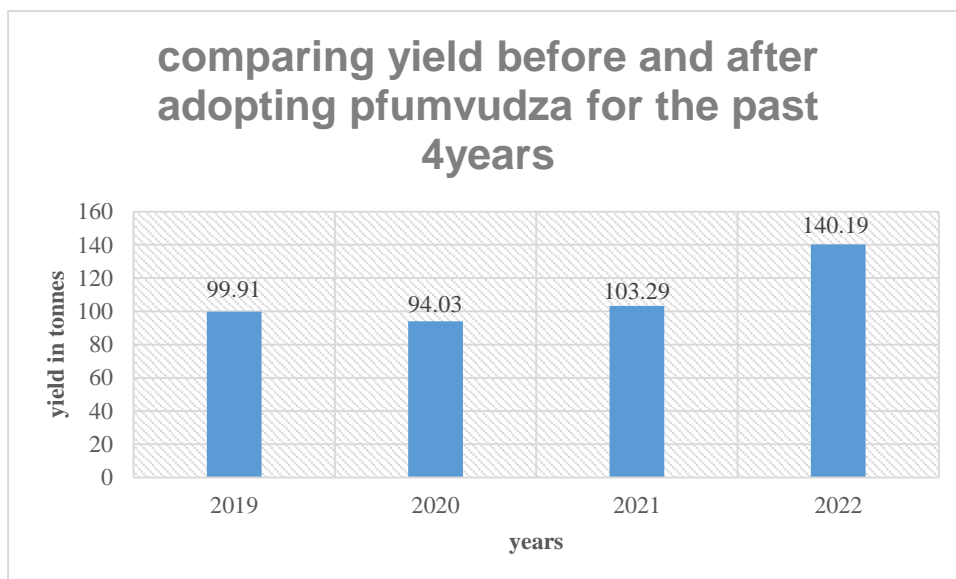


Figure 9 Comparing yields

4.6 Challenges

The farmers through interviews and questionnaires highlighted problems that are hindering them to obtain the maximum yield they anticipated accomplishing. They are all away of the philosophy behind the Pfumvudza of different writers of a yield of one tonne per hectare. Some of the major reasons are highlighted below.

4.6.1 Shortages of Mulching Materials

The research findings above indicate that 46.7% of the farmers who replied did not mulch their property since there was not enough grass to do so. Pote village is prone to frequent wildfires which burnt all the litter which people fetched to use for the mulching purpose. According to eye observation by the researcher, it shows that almost every farmer in that area has a hurt thatched with grass. They are also high demand for thatching grass to roof the hurts of people because it's cheap and readily available. The roofs made of grass need constant renewal since the grass decay over time. Each year farmer renovates their houses with grass. This makes the grass a very scarce resource for farmers. Another issue is over rowdiness of people due to the rapid increase in population. Most people adore Domboshava due to its high rainfall and moderate temperatures plus it is very close to the city of Harare around 50km from the capital city Harare so those who like farming are coming to hire land to use to grow crops.

Some of the farmers give the reason for termite invasion into the maize field destroying crops. So a farmer who lives in an area with a myriad of termites finds it unprofitable to mulch the crops.

4.6.2 Failure to Dig the Hard Dry Ground

The elderly people those who are 50 years and above said, "Their body is now too weak to be able to dig on the dry land so they hired the abled youth to do it for them and give them maize or money. The youth or the active population said, "Clay soil is very difficult to dig when it is too dry in the winter". Some of the active farmers those who are 40 and below said, "They lost hoes due to breakdown dig the dry ground". The majority of the farmer turns to wait for the first rains to start digging plots to avoid breaking down tools and staining their body.

4.6.3 Early Dug Holes Being Closed by Animals

Cattle and goats' movement across the fields and fighting for intimacy in the fields causes the holes dug by farmers to close up. Chickens in search of worms and other soil-living organisms scratch out the applied manure or compost.

4.6.4 Late Supply of Inputs

Over 90% of the farmers responded that said government delays the distribution of inputs both seeds and fertilizers. The inputs come in groups of 300 bags of compound. Most farmers rely on buying fertilizer on their own and if by chance they later get the one for free they store it for the future rainy season. The last group to receive fertilizer get it on 15 January 2023. Yet they were supposed to receive it in June or the beginning of October to catch up with the rainy season. By the time the researcher finished gathering information, none of the farmers had received a bag of ammonium nitrate at the end of January yet most of the maize in the area was at the flowering stage.

4.7 Discussion of the Findings

4.7.1 Level of Pfumvudza

Pfumvudza is a conservation farming technique that uses minimal tillage, crop rotation, and soil cover (mulching) on a very small area. It has the potential to end hunger because one plot (0.06 hectare) provides enough food for a family of six for the full year. At the household level, the effort aims to lessen hunger and poverty. In Pote village, statistics taken from Mr and Mrs Musindo's book of records revealed that 1200 farmers receive training every year to gain expertise utilizing the Pfumvudza farming technology and have three seasons to develop their crop using the new idea. Every skilled farmer had a minimum of one plot of maize only a few have an additional plot of maize and legumes. By ordering a study from the FAO in 2020, the

government took the initiative to find out how many households had gotten training, maize seed, and fertilizer inputs by August 2020. Hence, a sizable number of farmers have embraced the idea. Farmers also pledged to expand their fields by 50%, and those who were unable to plant their legumes because of a shortage of timely inputs committed to doing so the next growing season. This demonstrates that Pfumvudza implementation in the district is quite high, with the effect that every farmer will be on board.

4.7.2 Climate Change

Due to the agricultural sector's heavy reliance on rain-fed food production (caused by rising temperatures and declining rainfall), continuing droughts occur frequently. In Mujeres (2021), it is discovered that the prolonged dry seasons and shorter cropping seasons have significant adverse direct and indirect effects on agricultural output, food security, and nutrition, compelling Zimbabwean farmers to switch to a new farming technique. The Domboshava district is not exempt from the research by Mazodze (2013) on the consequences of climate change on food security, which is particularly concerning for underprivileged, disadvantaged community farmers. As shown on Figs. 1.1 and 2, the region experienced 700mm and 1000mm of rain from October to May in the seasons of 2020 and 2021, respectively. If this erratic, inconsistent, and unequal rainfall distribution results in a severe mid-season drought like that seen during the 2020–2021 season, farmers will now need to utilize Pfumvudza to preserve food security. This was supported by Mazodze (2013), who said in his paper titled "Determinants of Conservation Agriculture by Community Farmers in Masvingo District" that "climate change adaptation strategies must be recognized as the major concern in Zimbabwe." to guarantee the food security of community members who primarily make their living from agriculture. To counteract the negative effects of climate change, conservation agriculture (Pfumvudza) was adopted.

4.7.3 Free Inputs and Reduced Income

Interview data revealed that most farmers were convinced to utilise Pfumvudza because the government provided free inputs through AGRITEX, according to the information gathered. These results concurred with Zenda (2020), who came to the conclusion that Zimbabwe's agriculture sector suffers from a number of complications, including low or reduced productivity attributable to inadequate access to inputs and technology, a preponderance of under-resourced smallholder farmers, disorganised value chain systems, and an unfavourable regulatory environment. To address the lack of inputs, antiquated equipment, under-resourced smallholder farmers, chaotic value chain networks, and unhelpful policy environments.

Farmers were therefore driven to embrace everything that came their way with inputs for free since they sought input and not practises, which made it difficult for them to deal with the availability of inputs.

4.7.4 Lack of Draught Power

Due to the widespread deaths of cattle brought on by the local illness outbreak. The owners of the majority of closed-up kraals are left without ox-drawn power to cultivate their property. As agricultural costs rise, people begin to use Pfumvudza instead of conventional tillage.

4.7.5 Improved Yield Food Security

The issue of increased yield or high production in a small area that is sufficient of feeding a family of six for the entire year, assuring food security, is another aspect emphasized by farmer Fig. 5.7 that led a significant number of farmers to implement Pfumvudza. FAC (2008), throughout a three-year farming period (inclusive of 2005-2007), conservation agriculture yields grew by an average of 15-300% in more than 15000 farm households, with the yield increase depending on farm type and region by soil type, soil fertility, and rainfall regime.

A yield of 1.0 t/ha and 7.8 t/ha, respectively, of sandy clay loam is obtained on tilled and tilled land, based on FAO's evaluation from 2020. In addition, farmers who adopted the Pfumvudza practises of full mulch cover, fertiliser application levels, timely crop planting, crop spacing, ideal plant populations, pest and disease management, and decreased pesticide use generated almost 800% more yields in comparison to conventional farming using ox-drawn ploughs (FAO, 2020). Hence, the literature AGRITEX uses in their lessons ensures the security of household cereal, which lured farmers into Pfumvudza to also have returns on a small area.

4.8 Contribution of Pfumvudza to effective agricultural maize production

When conservation agriculture (CA) is practised in accordance with the rules, a plot is intended to ensure food security for a typical household of six people for the duration of a year. Because not all of the suggestions were implemented, as demonstrated by the table in Fig. 10 (FAO, 2020), the data from Fig. 4.4 demonstrate that the Pfumvudza idea is growing by 35.72% when compared to conventional approaches. For example, some farmers did not mulch their land completely, prepared the land late, reduced the number of plants, and applied less fertilizer. The findings from Fig. 5 indicate that there are families in the area where the majority of families have an average of 5 homes and 1.87 tons of maize, which is a good output that can

let a family exist for a year while making money from selling the surplus. Interviewees claimed that consumption of other maize cobs as green maize also reduced output. According to Mujeres (2021), who reached the same conclusion, the notion means that crops will mature and be harvested without incurring losses from pests, sickness, or the environment. The presumptions are oversimplified due to the fact that a sizable portion of the maize crop is consumed as green maize, which reduces harvests. It's also vital to note that maize cultivars have different grain yields each year. Pfumvudza can be viewed as being extremely speculative and based on numerous false assumptions due to being tested in a variety of soil types and rainfall patterns.

4.9 Challenges Faced by Pfumvudza Farmers

In Pote village, the vast majority of Pfumvudza farmers are living in utter poverty. They are dependent on government assistance. All of the rivers in the area are seasonal, even though Pote River Images is situated in Pote Village. In that area, about 90% of farmers practice rain-fed agriculture. If the government does not help, most people will go hungry in years with little rain. One of the issues was the absence of litter mulching. Since there wasn't enough wood or timber available locally to make fires during the winter, maize stalks were utilized instead of firewood. The lack of labour to construct a storage facility for corn and maize stalks is far from fire and wildlife since the best men are too busy supporting their families through artisanal gold mines and the brick industry.

The usage of grass in the area has already been mentioned in this charter for the construction of restrooms, Dura-halls for gardens, and kitchen roofs. This supports Donovan's (2020) research, which noted that farmers use crop wastes for a variety of purposes, including fuel, fencing, roofing, and feed. But, when there aren't many crop residues, farmers usually use them as fodder first, which can leave fewer residues for soil cover. In that instance, farmers will not be able to benefit from moisture conservation, resulting in a lower yield than anticipated. A couple of interviewees talked about how, despite finding additional plots ahead of schedule as advised and applying manure, when it was time to add compound D, all the holes they had excavated had been filled in by animals. Farmers were forced to dig the hole when they were ready to plant because if they dug the hole too early, they would have to redo it. Hence, having the holes dug early in the winter will remain impractical because the majority of rural farmers' fields are not fenced.

Conclusion

A 75-person sample size from questionnaires, focus groups, and farmer interviews was used for the data analysis in chapter four. The results above are displayed as bar graphs, pie charts, and tables made from descriptive data that was analysed using the Microsoft ware Excel 2013. The Pfumvudza programme is proceeding well, as seen by the sharp rise in yield in tonnes from the first to the second year, which was 35.72%, to sum up the information above. Based on the results, it was concluded that Pfubvudza is very effective in providing food-security for the nation.

Chapter 5: Summary, Conclusion and Recommendations

Introduction

This chapter's primary goal is to provide a concise overview of the entire endeavour while highlighting the key moments. Based on the data the researcher acquired using both quantitative and qualitative methods, and backed up by computations of the results, the conclusion Last but not least, the researcher will also make recommendations after contrasting their results with those of other researchers.

Summary

The agenda of the study was to analyse the effectiveness of Pfumvudza on agricultural production. The purpose of the study was:

1. To determine the contribution of "Pfumvudza" towards food security
2. To determine the determinants of participation in the "Pfumvudza" programme.
3. To assess the variation of "Pfumvudza" output for the past four years.
4. To compare conventional with conservation tillage yield for the past four years.

Conclusion

Based on the findings it shows that Pfumvudza can provide nutritional requirements for the farmers in the area as 90% of the people interviewed said yes to the question which asked that, 'Are the crops under Pfumvudza able to cover your nutritional requirements' So many say yes and very few say know.

Most farmers grow beans, maize, groundnuts and pumpkins which helped them to cover the nutrient requirement of their bodies.

Farmers adopted Pfumvudza because of free inputs given to them by the AGRITEX, its ability to produce enough food at a small scale 0.06hecters is enough to feed a family of six for the whole year, so due to overpopulation of the area farmers so it as a way to rectify their problems of shortage of land for farming some farmers say the push factor was the death of their cattle due to dies which left them without draught power to cultivate their land.

Farmers in Pote village had a dependent syndrome, they have largely depends on inputs from the government and donor funds for a long period. If the government decides to cut the budget for them they will be a sharp decrease in yield from the farmers.

The interviewed farmers all agreed that they received adequate training from the extension agents about how to grow crops using Pfumvudza.

Research information obtained shows that farmers are failing to comply with the recommendation from Mjere (2020) about the emphasis on mulching the plots giving various reasons to support their failures such as shortage of grass, wildfire and termites invasion in the field.

Concluding the figs above show that Pfumvudza is very effective to solve the problem of food insecurity which the nation is suffering from as it shows a significant increase in yield from the year it started 2019 up to today.

Recommendations

The farmers in Domboshava show that they have a possibility of attaining the most desired output if they get the necessary inputs in time. AGRITEX should distribute inputs in the period between August and September to boost their preparation morale. Based on the interviews carried out with farmer's shows that many farmers failed to maximize the area of production due to a shortage of inputs. One of the interviewed people said she used the seed from the previous harvest and she had some trouble with the germination of the seed. This will only be avoided if the seed comes in time.

There is also a need to identify and scale a gender-sensitive lens to Pfumvudza solutions that prioritize investment and sustainable financial instruments structures such as green bonds and blended financing. Increased youth engagement and technology access and use should be prioritised to promote agri-business entrepreneurial solutions aimed at the Pfumvudza programme beyond the input or production stages of the agro-food value chain. These strategies may go a long way in ensuring livelihoods improvement and poverty reduction.

Basing on the information gathered from respondents it shows that the government is failing to fulfil its promise to farmers due to financial crisis it is facing. This is evidence by inputs being given to farmers in phases and the period between a phases is very long. The last phase received maize seed in February and based on rain-fed agriculture in the area the farmer cannot be successful if he/she grows crops in February. Apart from the rainfall problem delaying growing crops will cause difficulties in harvesting the crop before it dries up as other people in

the area will be stubborn to look after their animals. The norms and beliefs of people in that area is that on one June people will free their goats and cattle they move freely without anyone monitoring them and some people frees their cattle before that date arrives. So for programme to continue to strive they is need for honesty and commitment by both players the government and its people.

The area is also prone to armyworm attacks so if possible when giving farmers inputs the farmers should also be given pesticides. Armyworms reduce yield in maize production.

The farmers should engage in competitive activities such as green shows to motivate them to improve yield and give farmers gifts to those who follow the correct Pfumvudza recommendation from experts.

Promote the use of organic and bio-fertilizers to replace inorganic fertilizers. The use of organic fertilizers should be accompanied by farmer training on proper fertilizers treatment to enhance quality.

The major goal of this portion is to provide a concise summary of the entire project while highlighting the key moments. Conclusion based on data obtained by the researcher using qualitative as well as quantitative techniques, and backed up by calculations based on the results. The researcher will also make suggestions after comparing their results to those of other researchers. Therefore, in order to foster ownership, farmers should be encouraged to buy input packs at a reasonable price for themselves. Farmers are more likely to use these resources responsibly and effectively if they are incentivized to purchase their inputs. It is possible to stop the problems of input sales diversion.

Preliminary observations also show that farmers in Pote village have a donor-dependent syndrome. This leads some of them to sell inputs, as they know that they will get free food from donations, so they are reluctant to work for themselves; they are very lazy. Stiff penalties needed to be given to those culprits who misuse funds given to them with the aim of poverty alleviation. Preliminary observations also show that farmers in Pote village have a donor-dependent syndrome. This leads some of them to sell inputs, as they know that they will get free food from donations, so they are reluctant to work for themselves; they are very lazy. Stiff penalties needed to be given to those culprits who misuse funds given to them with the aim of poverty alleviation.

References:

- Adedayo, O.A (2000). Understanding statistics. Lagos JAS
- Bell, A., & Jones, K. (2015). Explaining fixed effects: random-effects modelling of time-series cross-sectional and panel data. *PSRM*, 3(01), 133-153. Ministry of Agriculture, M. A. (2014). Goat Statistics. Crop and Livestock Assessment.
- Bandura University of science education student paper Rofina Ngunguzela 2022
- Bhattacharjee, A. (2012). Social science research: Principles, methods, and practices 4. Birkhaeuser, D., Evenson, R. E., & Feder, G. (1991). The economic impact of agricultural extension: A review. *Economic development and cultural change*, 39(3), 607-650.
- Burns, E., & Groove, W. (2014). Research method. *Ergonomics*, 32(3), 237-248
- Braun, V. & Clark, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*
- Boyatzis, R.E (1998). Transforming Qualitative Information. Thematic analysis and code development. Thousand Oaks, CA: Sage.
- Burns, A.C & Bush, R.F. (2010). Basic Marketing Research using Microsoft Excel data analysis. Florida: Prentice hall Press.
- Chambers, R.L. Skinner, C.J (2003). Analysis of Survey Data. U.K John Wiley and sons.
- CIAT; World Bank. (2017). Climate-Smart Agriculture in Zimbabwe. CSA Country Profiles for Africa Series. International Center for Tropical Agriculture (CIAT); Washington, D.C 24p.
- Cresswell, W. (2012). Research Design Qualitative, Quantitative and Mixed Methods Approaches. London: Sage.
- C (1992) The agricultural systems in Mutanda resettlement area, Manicaland, Zimbabwe.
- FAO (2007), "Adaptation to climate change in agriculture, forestry and fisheries: perspective, framework and priorities", FAO Interdepartmental Working Group on Climate Change, Rome: FAO <ftp://ftp.fao.org/docrep/fao/009/j9271e.pdf> (accessed 10vJanuary 2022)

FAO (2017) Country gender assessment series: Zimbabwe national gender profile of agriculture and rural livelihoods. Accessed at <http://www.fao.org/3/i6997en/i6997en.pdf>

CIMMYT. (2016). Building a sustainable future: A history of conservation agriculture in Southern Africa Retrieved on <https://www.cimmyt.org/category/news>. Accessed

Denzin N. and Lincoln, YS. (Eds.) (1998) *Collecting and Interpreting Qualitative Materials*. Newbury Park: Sage.

FAO (2017) Country gender assessment series: Zimbabwe national gender profile of agriculture and rural livelihoods. Accessed at <http://www.fao.org/3/i6997en/i6997en.pdf>

Fergusson R, Parry D, Campbell BM, Balebereho S, Cotterill F, Cunliffe R, Tafangenyasha.

Edwards, D. 2013. Pfumvudza. FAO Agriculture Coordination and Inform

Giller KE, Witter E, Corbeels M, Tittonell P (2009) Conservation agriculture and smallholder. Farming in Africa: the heretics' view. *Field Crop Res* 114(1):23–34

Gioia, D. A., Corley, K.G. & Hamilton, A.L. (2013). Research Methods. Seeking Qualitative Rigor. In *Inductive Research Notes on the Gioia Methodology*, 16(1), *0.

Grass mulching effect on infiltration, surface runoff and soil loss of three agricultural soils in Nigeria

Government of Zimbabwe (2015a) Nationally Determined Contribution (NDC) of Zimbabwe to the United Nations Framework Convention on Climate Change (UNFCCC). Available at: <http://www4.unfccc.int>

Hove M, Gweme T (2018) Women's food security and conservation farming in Zaka District-Zimbabwe. *J Arid Environ* 149:18–29. <https://doi.org/10.1016/j.jaridenv.2017.10.010>

He, D., Wang, Z., Yang, L., & Dai, W. (2017, August). Study on missing data imputation and modelling for the leaching process. *Chemical Engineering Research and Design*, 124, 1– 19. <https://doi.org/10.1016/j.cherd.2017.05.023>

J Arid Environ 149:18–29. <https://doi.org/10.1016/j.jaridenv.2017.10.010>

J Agri Horti Res, 2022 www.opastonline.com Volume 5 | Issue 2 | 7

Jaros L (2000) Understanding agri-food networks as social relations. *Agric Hum Values* 17(3):279–283

Kitambara, J. (2013). Comparison of Simple Random Sampling and Stratified Sampling. Capacity Building Program. Tanzania.

Kothari, C.R., (2004). *Research Methodology: Methods and Techniques*. New Delhi: New Age International.

Maseva, E. (2020). What is Pfumvudza and how will the nation benefit. Retrieved on <https://statupbiz.co.zw.category/blog/business-news>. Accessed on 28/01/2022.

Mafa, T., Muchenje, V., Mutenje, M., & Mhazha, T (2021). An Assessment of the impact of the Pfumvudza Programme on Food security, Income and Yield Among Smallholder Farmers in Zimbabwe. *Sustainability*, 13(2), 865. Doi: 10.3390/su13020865, x

Mazodze, F. (2013). Determinants of Adoption of Conservation Agriculture by Communal Farmers in Masvingo District, Zimbabwe. University of Zimbabwe.

McMillan, J.M & Schumacher, S (2009) *Research in Education*: Pearson Education.

Miles, M.B and Huberman, M.A. (1994). *Qualitative Analysis: An expanded sourcebook* (2nd Ed) Thousand oaks, CA: Sage.

Mhonyiwa, J.M.(2014). Factors Influencing Poor Examination Performance in Commercial Subjects in Tanzania Ordinary Level Secondary Schools: A case study of Ijala Municipality. (Doctoral dissertation, The open University of Tanzania)

Mass this, E., & Vranken, L. (2001). Human capital, gender and organisation in transition agriculture: measuring and explaining the technical efficiency of Bulgarian and Hungarian farms. *Post-communist economies*, 13(2), 171-187

<https://www.future-agricultures.org/blog/can-the-pfumvudza-conservation-agriculture-programme-deliver-food-security-in-zimbabwe/> K.O. Adekalu et al.

https://www.resiedearchgate.net/profile/Thulani-Ningi-2/publication/362332321_Coping_Strategies_and_Determinants_of_Food_Availability_Amid_Climate_Change_in_Rural_Communities_of_Raymond_Mhlaba_Local_Municipality_Eastern_Cape_Province_South_Africa/links/635eea2112cbac6a3e0d1611/Coping-Strategies-and-6.Determinants-of-Food-Availability-Amid-Climate-Change-in-Rural-

[Communities-of-Raymond-Mhlaba-Local-Municipality-Eastern-Cape-Province-South-Africa.pdf#page=329](#)

Mediel Hove, Thomas Gweme. "Women's food security and conservation farming in Zaka District-Zimbabwe", *Journal of Arid Environments*, 2018.

Muijs, D. (2004) *Doing Qualitative Research in Education with SPSS*. London: SAGE Publication.

Mujere, N. (2021). Assessing the potential contribution of Pfumvudza towards climate smart agriculture in Zimbabwe. A review. doi:10.20944/preprints202101.0619.v1

Mupangwa, W., Twomlow, S.J., Walker, S., & Hove, L. (2021). Does the Pfumvudza Programme of Zimbabwe Enhance Crop Yield and Income for Smallholder Farmers? *Agriculture*, 11(6), 513. Doi:10.3390/agriculture11060513

Reicosky DC (2015) Conservation tillage is not conservation agriculture. *J Soil Water Conserv* 70(5):103A-108A

Shumbayawonda, W.T (2011). *Research Methods, Module PGDE 105*. Harare: Zimbabwe Open University.

"Sustainable Agriculture and Food Security", Springer Science and Business Media LLC, 2022

Thierfelder, C, Mombeyarara, T, Mango, N. and Rusinamhodzi, L. 2013. Integration of conservation agriculture in smallholder farming systems of southern Africa: Identification of key entry points. *International Journal of Agricultural Sustainability*

Thierfelder, C. and Wall, P.C. 2009. Effects of conservation agriculture techniques on infiltration and soil water content in Zambia and Zimbabwe. *Soil and Tillage Research*, 105, 217-227.

Trochim, M.K (2006). *The Research Methods Knowledge Base (2nd Ed)*. Cincinnati: Atomic Dog.

Wagstaff, P and Harty, M. (2010). The impact of conservation agriculture on food in three low veld districts of Zimbabwe. *Trocaire Development Review* 2010, pp.67-84, ISSN 090-940.

Rigour, in *Inductive Research Notes on the Gioia Methodology*, 16(1), 80

Shumbayawonda, W.T. (2011). Research Methods, Module PGDE105. Harare: Zimbabwe Open University.

Zina. O'Leary. (2004).The Essential Guide to Doing Research. Vistaar Publication. PP 226.

Zikmund, W.G. (2003) Business Research Methods. 7th Edition, Thomson/ South-Western.

Appendices

Appendix: 1

Questionnaire for Pfumvudza Farmers

The Bachelor of Science in Agricultural Economics and Management is the degree I'm pursuing at Bindura University of Science Education. My name is Ronald Mandizvidza, and I'm a Part 4 (final year) student there. In order to conduct my investigation into Pfumvudza's impact on agricultural output, I've picked the Domboshava Ward 5 Pote Village. Please allow me to react depending on your perspective on my questions as I respectfully ask for your assistance. Please feel free to comment; we promise to keep your information private and to use it solely for scholarly purposes. It is much appreciated that you worked with us. Please tick in the boxes provided or complete the spaces provided as appropriate.

1. Gender Male Female
2. Age 20 30 40 50 60 70
3. How many years have you been in farming?
4. Marital status Single Married Divorced Widow
5. How many are you in your family?
6. If so, when did you start growing crops using the Pfumvudza concept?
.....
7. Are you mulching the fields or plots? Yes no
8. If the response to the above question is NO, give a reason for failing to mulch
.....
.....
.....
9. What were your yields for the past 2 years using Pfumvudza year 1 year 2
10. What were your yields before adopting Pfumvudza year year 2
11. What are the challenges you face in digging holes for Pfumvudza plot.....
.....
.....
12. Besides maize what are other crops you grow under Pfumvudza?
.....
.....
.....

13. From your experience on Pfimvudza farming, are you thinking of improving the number of plots and by what level? Improving yes no if yes byplots.

14. Can you suggest reasons why other farmers aren't practising Pfumvudza?
.....
.....
.....

15. What are the challenges you are facing as a Pfumvudza farmer that prevent you from having the maximum benefits of the farming practice?
.....
.....

16. Are the crops under Pfumvudza able to cover your nutritional requirements? Yes
no

17. What factors led you to adopt Pfumvudza?
.....
.....
.....

Appendix: 2

Interview guide for elderly Pfumvudza farmers

My name is Ronald Mandizvidza. I am a part 4 (final year) student at Bindura University of Science Education studying for a Bachelor of Science Degree in Agricultural Economics and Management. I am currently researching the effects of Pfumvudza on agriculture production. I am kindly requesting your time to respond to the few questions I have prepared.

The information you provide will be used for academic purposes only and is confidential.

1. For how long have you been in farming?
2. When did you start growing crops using the Pfumvudza farming concept?
.....
3. What crops did you grow
4. Can you highlight more on the varieties you are using in Pfumvudza?
.....
.....
5. Understand you have been growing crops for many years now, what has made you adopt Pfumvudza?
6. This new method of farming called Pfumvudza?
7. What can you say about the yield from Pfumvudza?
8. When do you start digging planting holes?
9. How are you managing the mulching of the plots?
10. Have you ever had a challenge of holed being closed by animals, if so, how did you manage it?
11. Can you comment on Pfumvudza towards ensuring food security at the household level?
.....
.....

Appendix 3:

AGRITEX Office

Pote Primary

P.O Box 2862

Harare

10 January 2023

The DAEO

Harare AGRITEX

Box 62 Harare

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO CARRY OUT A RESEARCH TASK IN YOUR DISTRICT

Please grant me permission to do research in your neighbourhood (Pote Ward 5). I am presently enrolled at the Bindura University of Science Education, where I'm pursuing an honours Bachelor Degree of Science in Agriculture Economics and Management.

The study examines how well Pfumvudza affects agricultural production. The research was limited to a case study of Ward 5 Pote village. The subject of my study will be:

- Level of participation in Pfumvudza in the ward
- Factors that had led to the adoption of Pfumvudza
- Effects of Pfumvudza on agriculture production
- Challenges faced by Pfumvudza farmers

I would prefer to have Pfumvudza farmers participate in the research. I'll be taking charge of informing the willing participants concerning the research task and making sure their responses are kept confidential. Only academic use shall be made of the research findings.

I sincerely appreciate your help and look forward to your reply.

Profound gratitude

Mandizvidza Ronald

B192627b

Appendix 4:

Informed consent form

Thank you for agreeing to participate in this study that will take place in your ward. This form outlines a description of your involvement and rights as a participant. The purpose of this study is to analyse the effectiveness of Pfumvudza on agriculture production: a case of Ward 5 Pote in Domboshava under Goromonzi district.

- I voluntarily agree to participate in a research project conducted by Mandizvidza Ronald, an undergraduate student at the Bindura University of Science Education.
- I understand the study is entitled: an analysis of the Effectiveness of conservation tillage on agricultural production "Pfumvudza" in Domboshava in Ward 5, Zimbabwe. I understand that my anonymity will be maintained and the information I provide will be kept confidential.
- I am informed that there are no anticipated risks or no benefits to me. Further, the information gained from this study can be used to assist the government and other stakeholders on the current state of Pfumvudza implementation in Region II.
- I understand that I have the right to withdraw from participating in the research at any time without the possibility of a penalty.
- I understand that if I have a question or require additional information regarding the research, I may freely contact the researcher Ronald Mandizvidza contact him on cell No. 0775935901. Participant's

Signature.....date..... Researchers

signature.....date.....