# DETERMINANTS, CHALLENGES AND OPPORTUNITIES IN CULTIVATING UNDERUTILIZED CROPS: CASE OF MOMBEZI EXTENSION PLANNING AREA IN CHIRADZULU DISTRICT, MALAWI

**MSc. THESIS (TRANSFORMATIVE COMMUNITY DEVELOPMENT)**

**COURTNEY NALIVATA**

**MZUZU UNIVERSITY**

**JANUARY 2026**

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**MSTCD/18/22**

**BSc IN TRANSFORMATIVE COMMUNITY DEVELOPMENT**

**A THESIS SUBMITTED TO THE FACULTY OF ENVIRONMENTAL SCIENCES, DEPARTMENT OF AGRI-SCIENCES IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER OF SCIENCE DEGREE IN TRANSFORMATIVE COMMUNITY DEVELOPMENT**

**MZUZU UNIVERSITY**

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# DECLARATION

I declare that this thesis titled, *"Determinants, Challenges and Opportunities in cultivating underutilized crops: Case of Mombezi Extension Planning Area in Chiradzulu district, Malawi"* is my original work and record of my research. All citations, references, and borrowed ideas have been duly acknowledged. This thesis is being submitted in fulfillment of the requirements for the award of a Master's Degree of Science in Transformative Community Development of the Mzuzu University.

None of the work has been submitted previously for any degree or examination in any other University.

Signature:  Date: 05 January 2026

**Student's name:** Courtney Nalivata

## CERTIFICATE OF APPROVAL

I certify that this thesis is a result of the author's own work, and that to the best of my knowledge, it has not been submitted for any other academic qualification within the Mzuzu University or elsewhere. The thesis is acceptable in form and content, and that satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate through an oral examination held on 20th October, 2025.

Signature:  Date: 05 January 2026

**Major Supervisor:** Frank Mnthambala, PhD

# DEDICATION

I dedicate this research thesis to my parents Mr. Kingsley Nalivata and Mrs. Grace Nalivata.

Your prayers, advices, financial and physical support have kept me moving always.

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First of all, I am indebted to God for everything, He has always been wonderful to me. All Thanks and Glory to Him.

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# PUBLICATIONS DECLARATION

From this research thesis, the following publications have been produced:

**Conference Paper**

**Nalivata, C.,** Mnthambala, F., Jere, Z., Tembo, M., Determinants of the Cultivation of Underutilized Crops in Mombezi Extension Planning Area, Chiradzulu District. Presented Research Findings at the National Commission for Science and Technology (NCST) Research Dissemination held at BICC from 26th to 28th August 2025

**Nalivata, C.,** Mnthambala, F., Jere, Z., Tembo, M., Determinants of the Cultivation of Underutilized Crops in Mombezi Extension Planning Area, Chiradzulu District. Presented Research Findings at the Mzuzu University National Research Dissemination held at Mzuzu University CODeL Complex from 3rd to 4th September 2025

# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ACENUB | African Centre of Excellence in Neglected and Underutilized Biodiversity |
| CAADP | Comprehensive Africa Agriculture Development Programme |
| EPA | Extension Planning Area |
| FGD | Focus Group Discussion |
| KIIs | Key Informant Interviews |
| MZUNIREC | Mzuzu University Research Ethics Committee |
| NGOs | Non-Governmental Organizations |
| NUS | Neglected and Underutilized Species |
| SDG | Sustainable Development Goal |
| SPSS | Statistical Package for Social Sciences |
| SSA | Sub-Saharan Africa |

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# ABSTRACT

Cultivation and utilization of underutilized crops is gaining attention globally, including in Malawi, due to their diverse benefits to humans and the environment. Despite this potential, their mainstreaming faces several challenges. This study investigated the challenges and opportunities in cultivating underutilized crops in Mombezi EPA, Chiradzulu District, Malawi. An explanatory sequential design was employed, combining quantitative and qualitative data collection through questionnaires and interviews. A total of 268 respondents were interviewed, with quantitative data analysed in SPSS version 27 and qualitative data coded using NVivo version 14. Findings revealed that farmers in Mombezi EPA cultivate a range of underutilized crops including Velvet beans (20.9%), Elephant beans (18.5%), Cowpeas (16.9%), Sorghum (16.1%), Garbanzo beans (15.7%), Hyacinth beans (15.3%), Pigeon peas (14.1%), Bambara nuts (13.7%), Millet (12.0%), Coco yams (3.6%), Okra (2.8%) and Amaranthus (2.0%). Farmers identified major challenges hindering production such as limited seed access (M=4.18), lack of knowledge in processing and value addition (M=3.85), inadequate extension services (M=3.97), poor access to affordable credit (M=4.41), and insufficient land (M=3.60). On the other hand, they noted opportunities including structured markets (M=3.69), high consumer demand (M=3.97), available labour (M=3.80), increasing food demand (M=4.34), fertile soils (M=3.49), and contributions to nutrition security (M=4.46). Chi-square analysis indicated significant associations between gender and cultivation of Bambara nuts ($p=0.026$) and Hyacinth beans ($p=0.012$), while awareness influenced cultivation of Velvet beans ($p=0.047$). Taste preferences significantly affected the cultivation of Velvet beans ($p=0.021$) and Coco yams ($p=0.024$). Labour availability was linked to Pigeon peas ($p=0.039$), Garbanzo beans ($p=0.049$) and Coco yams ($p=0.021$). The study concludes that strengthening land allocation, seed access, extension services, farmer training and credit facilities is essential. It further recommends integrated strategies involving awareness campaigns, cooperatives,

gender-sensitive policies and infrastructure improvements to sustainably enhance underutilized crop production in Mombezi EPA.

**Key Words:** *Challenges, Determinants, Food and Nutrition Security, Opportunities, Underutilized crops*

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

Underutilized crops are defined as useful crop species which are marginalized, if not entirely ignored, by researchers, breeders and policymakers (Padulosi et al. 2013). The crops are being often presented as new species though they have been used by local populations in traditional ways for many centuries. Their novelty is thus not related to their introduction to new areas but rather to how old and new uses are being re-addressed to meet today's needs (Padulosi et al. 2014).

Cultivation and use of underutilized crops such as American yambean (*Pachyrhizus spp.*), Finger millet (*Eleusine coracana*), Amaranthus (*Amaranthus spp*.), Blackjack (*Bidens pilosa*), Bambara groundnut (*Vigna subterranea*), Pearl millet *(Pennisetum glaucum)*, Okra *(Abelmoschus esculentus),* African eggplant *(Solanum aethiopicum)* just to mention a few, are gradually popularizing in many countries since they create several benefits for man and the environment (Malkanthi et al. 2014). As in many other countries, a large number of useful underutilized crop species are available in Malawi as well, but they have not been documented at the district level. These species include *Eleusine coracana* subsp. *Coracana (Mawere), Vigna subterranean (Nzama), Sorghum bicolo,r (Mapila), Pennisetum glaucum (Mchewere), Vigna radiata (Mphodza), Amaranthus hybridus (Bonongwe), Cleome gynandra (Luni), Dioscorea bulbifera (Chinkhowe), Plectranthus esculentus (Buye), Cicer arietinum (Nchana), Sesamum indicum (Chitowe) and Cucurbita maxima (Dzungu)* (Government of Malawi, 2007). The diversity of these underutilized crops is decreasing considering that their production and cultivation has become non-competitive and unattractive compared to selected few major crops which leads to poor documentation of these crops (Chivenge et al. 2015).

Neglected and Underutilized Species (NUS) have gained increasing global attention for their potential to enhance food and nutrition security, improve resilience to climate change and support sustainable agricultural practices (Padulosi et al. 2013). These crops encompass nutrient-rich cereals, legumes, roots, and vegetables that have been traditionally cultivated by local communities but remain marginalized in terms of research, market access and policy frameworks (Mabhaudhi et al. 2017). In Malawi, despite the nation's rich agrobiodiversity, agricultural production is predominantly centered around a few major crops, primarily maize, rice and groundnuts, while many locally adapted species such as sorghum, millet, amaranth, and Bambara nuts remain underutilized (Government of Malawi 2007; Mondo et al. 2021). The Malawi 2063 Agenda underscores the importance of agricultural diversification and climate resilience, yet the potential of underutilized crops continues to be largely undocumented at the local level.

Underutilized crops are associated with low yields and productivity especially when compared to modern, commercial varieties thereby affecting their production levels (Giuliani et al. 2009). This makes it difficult for underutilized crops to benefit from economies of scale which has negative implications in terms of the organisation and development of their value chains as they are either disorganized or non-existent (El Bilali et al. 2023). In Malawi, this can be vividly observed in the commercialization of most NUS which is still very informal, making it difficult to get reliable information on production volumes. NUS farmers make much less investment in land and inputs while ensuring a certain crop yield (Mondo et al. 2021).

Padulosi et al. (2014) highlighted that many underutilized crops are nutritionally rich and are adapted to low-input agriculture. The erosion of these species can have immediate consequences on the nutritional status and food security of the poor. Nevertheless, growing market opportunities for such species may generate additional income to those poor farmers in less favored environments. According to El Bilali et al. (2023) climate change, degradation of

land and water resources have led to growing interest of crops and species that are adapted to stresses and difficult environments. Many of these species are neglected and underutilized and their use is restricted to the niches where they are maintained by unprivileged farming communities in marginal environments such as high mountains, desert margins and poor soils.

Numerous obstacles such as genetic erosion, lack of local expertise, farmers' lack of enthusiasm, lack of technical information, restricted germplasm availability, customized national laws, marketing and climatic change impede the mainstreaming of underutilized crops despite different opportunities associated with their cultivation (Mabhaudhi et al. 2019). Animashaun et al. (2016) further state that cultivation of these underutilized crops depends on a number of factors to fully realize their potential. Research must be conducted in order to identify and extensively assess the barriers preventing these crops from becoming mainstreamed (Baldermann et al. 2016). Therefore, research, innovation, and development are crucial (Mabhaudhi et al. 2017), particularly in developing nations like Malawi.

## 1.2 Problem Statement

Cultivation and use of underutilized crops is gradually popularizing in many countries since they create several benefits for man and the environment. Just as in other countries, these crops are also being cultivated in different parts of Malawi, although most of these underutilized crops are not documented at the district level (Chivenge et al. 2015). Although many of these crops still exist as niche crops in Malawi and, if still cultivated at all, are seen as of *low status*, often, it is women who cultivate them for subsistence purposes, while men prefer to cultivate the major cash crops (Mayes et al. 2012). Amidst several challenges faced when cultivating underutilised crops but there are also opportunities embedded in cultivating these crops.

The current generation has moved away from using them due to lack of understanding and interest, knowledge and land despite the fact that traditional people had used them extensively in many various aspects of their lives (Malkanthi et al. 2014).

Despite the recognized nutritional, economic, and environmental benefits of underutilized crops, their cultivation in Malawi is still limited and poorly documented, particularly at the EPA level. While advocates highlight the potential of these crops for sustainable agricultural development, there is still a scarcity of rigorous research addressing various aspects of their cultivation (Mabhaudhi et al. 2016). Furthermore, critical to the cultivation of these crops is an understanding of the households' socio-economic and farm-specific parameters that influence their cultivation by farmers(Animashaun et al. 2016). Hence, this research aims to study the challenges and opportunities in cultivating underutilized crops in Mombezi EPA.

## 1.3 Objective of the Study

The overall objective of the study was to assess the determinants, challenges and opportunities in cultivating underutilized crops in Mombezi EPA.

### 1.3.1 The Specific Objectives

The study intends to analyze the following specific objectives;

1. To assess the underutilized crops found in Mombezi EPA
2. To analyse the challenges and opportunities in cultivating underutilized crops
3. To examine the determinants of cultivating underutilized crops

### 1.3.2 Research Questions of the Study

The study intends to answer the following questions:

1. What are the underutilized crops found in Mombezi EPA?
2. What are the challenges and opportunities in cultivating underutilized crops?

3. What are the determinants of cultivating these underutilized crops?

## 1.4 Justification

The study revealed some of the underutilized crops that are available in the country. Therefore, will make local authorities such as extension workers and farmers to be aware of these crops to ensure that they are valued and given the necessary attention hence contributing to nutrition and food security once they have been cultivated at a high scale which is in line with Pillar number 1 of Malawi Vision 2063 and Sustainable Development Goals number 1, 2 and 3.

The study also intended to reveal the obstacles encountered in cultivating underutilized crops. Its findings will provide valuable insights to policymakers and plant breeders, guiding them in disseminating relevant information and developing enhanced varieties. Ultimately, this will support the realization of Malawi Vision 2063, particularly enabler number 1, by promoting a shift in mindset. It further shed light on the promising advantages of cultivating underutilized crops. By doing so, Malawi can better recognize the untapped potential of these crops and seize the opportunity to grow more of them on both small and large scales. This, in turn, will boost the adoption rate of cultivating underutilized crops and benefit the country as a whole.

The study was grounded in the need to address persistent challenges of food and nutrition security, climate resilience, and agricultural biodiversity in Malawi. Underutilized crops, though often well-adapted to local agro-ecological conditions, remain marginal in mainstream agricultural systems due to limited market visibility, inadequate extension support, and prevailing socio-cultural perceptions. Understanding the socio-economic and demographic factors that influence farmers' decisions to cultivate these crops is essential for designing effective interventions that can diversify production systems and enhance rural livelihoods.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Underutilized Crops

Food systems in sub-Saharan Africa (SSA) and globally are increasingly vulnerable to water scarcity, climate change and persistent malnutrition, challenges exacerbated by dependence on a limited set of staple crops such as maize, rice and wheat. Underutilized and neglected crop species (NUS) spanning cereals, legumes, roots/tubers and indigenous vegetables have been promoted as sustainable, resilient alternatives capable of enhancing food and nutrition security, diversifying incomes and supporting agroecological transformation. Recent systematic reviews and syntheses have consolidated fragmented evidence about these crops' multi-dimensional benefits and constraints, though significant knowledge gaps particularly for Malawi remain (Ndlovu et al. 2024; Mabhaudhi et al. 2019).

Plants of all hues and types have been used as sustenance by humans and animals for eons. Numerous thousands of crops have also been used historically as a source of food, medicine, and nourishment. Approximately ten thousand (10,000) native food species are regularly consumed by both humans and non-human animals worldwide (Agulanna 2020). These crops include American yambean (*Pachyrhizus spp.*), Finger millet (*Eleusine coracana*), Amaranthus (*Amaranthus spp*.), Blackjack (*Bidens pilosa*), Bambara groundnut (*Vigna subterranea*), Pearl millet *(Pennisetum glaucum)*, Okra *(Abelmoschus esculentus),* African eggplant *(Solanum aethiopicum)* just to mention a few, are gradually popularizing in many countries since they create several benefits for man and the environment (Malkanthi et al. 2014).

Similar to other countries, a large number of useful underutilized crop species are available in Malawi as well although they have not been documented at the district level. These species include *Eleusine coracana* subsp. *Coracana, Vigna subterranean, Sorghum bicolo,r, Pennisetum glaucum, Vigna radiata, Amaranthus hybridus, Cleome gynandra, Dioscorea*

*bulbifera, Dioscorea rotundata, Plectranthus esculentus, Cicer arietinum, Sesamum indicum and Cucurbita maxima* (Government of Malawi, 2007). However, many of the plant species that are grown for food around the world have mainly gone unnoticed, unacknowledged, or underutilized (Agulanna, 2020). Aboagye et al. (2007) described underutilized crop species as crops whose potential contribution to the national economy has not been adequately explored due to the decreased attention to their production, consumption, and utilization.

A robust body of review literature confirms that underutilized cereals, legumes, roots/tubers, and indigenous vegetables demonstrate superior or complementary macro and micronutrient profiles compared to major staples (Akinola et al. 2020). Comprehensive meta-analyses highlight that these crops are rich in protein, fiber, minerals (e.g., iron, zinc, calcium), and vitamin A, while providing health-promoting bioactive compounds such as polyphenols and carotenoids (Ali & Bhattacharjee, 2023). For example, amaranth, mung bean and drumstick tree are high in essential nutrients and micronutrients and feature frequently as nutrient-dense species with potential to address deficiencies (Ebert 2014).

African orphan legumes including Bambara groundnut, African yam bean, and Kersting's groundnut are documented as protein-rich and vital sources of iron and zinc, which are of particular importance in SSA given high Hidden Hunger Indices (Popoola et al. 2022). Mgwenya et al. (2025) note the role of indigenous vegetables and orphan legumes in enhancing dietary diversity and reducing micronutrient deficiencies, especially among resource-poor, rural communities. Notably, while nutritional superiority is well-supported at the compositional level, a recurring limitation is that many reviews stop short of examining nutrient bioavailability and the real-world health outcomes linked to increased consumption, especially for roots/tubers and African indigenous vegetables (Mabhaudhi et al. 2016).

All over the world, indigenous and underutilized crops promote food security, enhance nutrition, help farmers in the generation of income for the rural poor, help farmers deal with negative climatic conditions and economic challenges (Godfray et al. 2010). Underutilized crop species have been identified as valuable for sustainable agricultural productivity (Kahane et al. 2013). According to Chivenge et al. (2015), the cultivation of underutilized crops provides greater genetic biodiversity, and can potentially improve well-being of the society.

Evidence from recent systematic and narrative reviews indicates that many underutilized crops are highly adapted to marginal environments, with superior tolerance to drought, heat and poor soils traits increasingly critical under accelerating climate change in Africa (Mabhaudhi et al. 2022). For instance, multiple reviews describe these species as climate-smart, emphasizing their resilience under water-scarce and semi-arid conditions and their capacity to maintain yield stability where mainstream staples often fail (Mabhaudhi et al. 2016, 2017; Ndlovu et al. 2024). Agronomic performance is frequently characterized by yield stability and flexibility in low-input and mixed/intercropping systems, though not always by high absolute yield (Mabhaudhi et al. 2017). The genetic diversity of NUS constitutes a valuable resource for targeted crop improvement, ecosystem services, and the broader resilience of agroecosystems (Mabhaudhi et al. 2022). However, Popoola et al. (2022) underscore persistent constraints such limited breeding, lack of improved varieties, poor seed systems and ongoing research gaps suppress the productivity and commercial scalability of these crops. Special emphasis is placed on the potential of storable neglected species for disaster-prone Southern Africa, where storability aligns with resilience to drought and food system shocks (Winstead & Jacobson, 2022). At the same time, the importance of expanding research to optimize agronomic practices for indigenous vegetables, including plant density, nutrient management, and improved post-harvest handling is noted.

Socio-economic analysis is a central pillar in recent literature reviews, which consistently affirm the capacity of underutilized crops to diversify rural livelihoods, improve household food security, and empower women especially via indigenous vegetables and local value chains (Akinola et al. 2020). Women play predominant roles both in production and informal marketing of these species and the income-generating potential of orphan crops is documented for both vegetables and grain legumes (Mabhaudhi et al. 2016). Recent ecosystem services and food systems-focused reviews emphasize a holistic understanding of the roles underutilized crops play across provisioning, supporting, regulating and cultural ecosystem services. Integrative syntheses map NUS contributions onto the pillars of sustainability nutritional, ecological, economic and socio-cultural aligning with SDG and CAADP priorities for the region (Mabhaudhi et al. 2022). Countries such as Malawi are included as regional exemplars but rarely form the core of analysis (Ndlovu et al. 2024).

The policy landscape is mixed as several reviews document a worrying trend of marginalization for NUS within research, extension and seed systems, despite increasing recognition of their role in resilience and food sovereignty (Mabhaudhi et al. 2016). Policy and institutional blockages, such as restrictive certification or lack of market incentives, are reported to hinder upscaling contrasting with growing calls for transformative approaches and reorientation of research investments**.** Integration into dietary guidelines, school feeding and biofortification programs is advocated but insufficiently developed in most contexts (Ali & Bhattacharjee, 2023).

### 2.2 The Challenges in Cultivating Underutilized Crops

Despite their long-standing resilience and nutritional importance, underutilized crops continue to face significant agronomic constraints. Systematic reviews highlight chronic limitations such as the scarcity of improved germplasm, the lack of formal seed supply systems and persistent low yields, particularly for indigenous legumes and leafy vegetables (Ndlovu et al.

2024). The predominance of informal or traditional seed sources perpetuates genetic bottlenecks and restricts varietal improvement (Shayanowako et al. 2021)**.** Furthermore, pests and diseases affecting these species remain largely unexplored, and extension and research investments into management packages are limited (Tadele & Assefa, 2012)**.** Recent attention from research communities has begun to apply modern genetic and genomic tools to some of these crops, but coverage remains patchy and typically lags far behind that for major staples (Abberton et al. 2022).

Socioeconomic barriers represent a persistent challenge to the scaling of underutilized crops. These species are often stigmatized as "poor people's crops," with strong associations to gender norms women are frequently the primary custodians, yet also bear disproportional labor burdens and limited commercial benefits (Ndlovu et al. 2024). Weak and fragmented value chains exacerbate these constraints: for example, African leafy vegetables (ALVs) in southern Africa are predominantly traded through informal markets, with little penetration into formalized marketing channels due to poor product positioning, lack of demand forecasting, and limited postharvest infrastructure (Shayanowako et al. 2021). Similarly, broader reviews emphasize that the economic advantages of underutilized crops such as adaptability to marginal lands and low input requirements are not fully realized without targeted interventions to address market integration, consumer acceptance, and value addition. Loss of traditional knowledge and low generational transfer further erode the socioeconomic potential and continuity of these crops (Knez et al. 2023).

A strong consensus emerges regarding the inadequacy of current policy and institutional support for underutilized crops across SSA (Ndlovu et al. 2024). Despite rhetorical inclusion in high-level agricultural and nutrition strategies, these crops are marginalized within research, extension, and market development efforts. More critically, recent systematic reviews highlight that even well-intentioned policies and especially regulatory frameworks, can inadvertently

reinforce the dominance of a narrow range of major staples while hindering the development or scaling of underutilized species (Mabhaudhi et al. 2022). The lack of explicit policy support for breeding, seed certification, value chain investment and quality standards for these crops perpetuates systemic neglect. There is also little evidence of substantial policy reforms moving beyond rhetoric to substantive institutional commitment, particularly at the country level; Malawi is referenced as part of the broader southern African policy terrain, but no included review offers detailed national policy analysis for Malawi specifically (Chivenge et al. 2015)

Underutilized crops are widely recognized for their role in supporting environmental sustainability and resilience, especially under climate change (Abberton et al. 2022). Their adaptation to marginal soils and variable rainfall makes them valuable components of production systems seeking to reduce vulnerability to climate shocks (Agulanna, 2020). In addition, many such species contribute to agro-biodiversity and ecosystem services, including soil fertility and household food security during periods of stress (Ndlovu et al. 2024). Importantly, the storability of certain neglected crops provides a key advantage for risk reduction in disaster-prone or drought-affected contexts. However, detailed analyses of environmental trade-offs or quantification of ecosystem impacts remain largely absent even from the more rigorous reviews (Okigbo et al. 2021).

A cross-cutting theme in the literature is the intersecting role of gender, nutrition and social dynamics. Women often serve as the primary cultivators and custodians of underutilized crops, but their agency is frequently constrained by broader structural and market dynamics (Shayanowako et al. 2021). Narrative reviews emphasize that food-based, women-centered strategies are recommended to close nutrient gaps, enrich diet diversity and improve food security for vulnerable populations in SSA. However, entrenched gender discrimination in land and resource access, combined with weak institutional support, limits women's empowerment via underutilized crop value chains. These issues are particularly acute in rural communities,

where the loss of traditional knowledge and eroding roles of indigenous food systems undermine both equity and nutritional outcomes (Conti et al. 2019).

Although there has been a recent rise in the consumption of underutilized crops in many African nations, most people still prefer their overutilized counterparts, particularly in urban settings. Customers' preference for other crops over underutilized ones may be mostly influenced by a lack of scientifically supported information or understanding regarding these underutilized crops (Darkwa & Darkwa 2013). The nutritional composition or nutrition value, proper preparation and/or cooking techniques, and nutrient bioavailability are a few examples of the kinds of information that may be insufficient or absent in relation to underutilized crops. A study carried out by Asase and Kumordzie (2019) on the availability, cost and popularity of African leafy vegetables in Accra markets in Ghana showed that even though the demand was high, only a small number of the indigenous vegetables were available for sale.

Due in large part to consumer ignorance of the nutritional worth of underutilized foods and the unfavorable perception that results from westernization culture, which is spreading throughout emerging nations, these crops are neither farmed in large quantities nor substantially consumed (Meldrum et al. 2018). Dweba and Mearns (2011) claim that the primary cause of most underrated crops' underutilization is the global decline in traditional knowledge of these crops. Many farmers grow large cash crops and stable foods since they yield more and are more generally recognized by customers as food. This is the main reason for their lack of interest in underutilized crops (Van Rensburg, 2004).

Their production and consumption are primarily found in rural areas, especially among the elderly, especially women (Chivenge et al. 2015). The younger generation and urban residents shun them as traditional food for the old, the "uncivilized" village dwellers, and as food to be used during times of food insecurity, which further contributes to their reduced cultivation

(Matenge, 2012). The consumption intensity of Indigenous and underutilized leafy vegetables was found to be higher in rural Kenya than in urban areas, according to a recent study by Gido et al. (2017). This finding may be consistent with findings from other comparable nations. The availability and delivery of underutilized crops to locations where they are in high demand are severely impacted by postharvest losses. It is one of the main obstacles to the commercialization and cultivation of these crops, which causes losses that are both qualitative and quantitative (Smith & Eyzaguirre 2007).

According to a 2004 study by Weinberger and Msuya, there is an inverse relationship between family wealth and the consumption of underutilized species. This implies that the wealthier a household is, the less likely its members are to eat or cultivate these species, like native vegetables, perhaps because they prefer having exotic vegetables. However, given the intense efforts being made to encourage the cultivation and use of underutilized resources, this tendency is certain to alter in the near future.

### 2.3 The Opportunities in Cultivating Underutilized Crops

The cultivation of underutilized crops presents significant opportunities for diversifying agricultural production, enhancing food security, and promoting sustainable agricultural practices.

Systematic and narrative reviews consistently highlight underutilized crops' resilience to marginal environments such as drought- and nutrient-poor soils, making them particularly relevant to SSA's climate risk profile (Ndlovu et al. 2024). These crops have evolved under generations of landrace agriculture, resulting in traits like low input requirement, stress tolerance and adaptability to marginal and diverse agro-ecologies (Mabhaudhi et al. 2016). Ndlovu et al. (2024) and Mabhaudhi et al. (2019) underscore the argument that mainstreaming NUS can promote climate adaptation strategies, while van Zonneveld et al. (2023) project

significant potential for “forgotten food crops" to diversify current staples and enhance climate resilience by 2070 within SSA. At a landscape scale, Mabhaudhi et al. (2022) demonstrate that NUS provide a broad spectrum of ecosystem services including provisioning (food/fodder), regulating (carbon, water, pollinators) and supporting cultural roles thus contributing simultaneously to ecological sustainability and human well-being. However, despite repeated calls for their adoption, these opportunities remain largely hypothetical; field-level implementation and adoption rates are not systematically quantified in the review literature (Mabhaudhi et al. 2019).

Underutilized crops have the ability to contribute to agro-biodiversity and sustainable agriculture, which makes them one of the main opportunities linked with their cultivation. In addition to showing how underutilized crops can support the maintenance of genetic diversity and the advancement of sustainable farming techniques, research by Altieri (2002) highlights the significance of agro-biodiversity in strengthening the resilience and adaptability of agricultural systems. Furthermore, research by Jarvis et al. (2008) has shown how underutilized crops might support agricultural systems' resilience against environmental issues such as resource scarcity and climate change by offering substitute food sources.

Nutritional and health benefits are another important opportunity associated with cultivating underutilized crops. Reviews by Mabhaudhi et al. (2022), Akinola et al. (2020), and Winstead and Jacobson (2022) consistently demonstrate that many NUS are nutrient-dense, providing higher concentrations of micronutrients and bioactive compounds compared to major staples. Their inclusion in smallholder or subsistence diets is associated with improved dietary diversity, reduced micronutrient deficiencies and enhanced food and nutrition security, with potentially significant implications for “hidden hunger” in SSA (Mabhaudhi et al. 2016). Several reviews note that these benefits are not purely theoretical examples from regional case studies, including within Southern Africa which indicate improved community-level nutrition

where NUS are embraced (Winstead & Jacobson 2022). The nutritional importance of underutilized crops has been highlighted by Padulosi et al. (2002), who emphasize their rich content of key nutrients and potential benefits to alleviating dietary deficits and malnutrition, particularly in resource-constrained settings. Moreover, Johns and Eyzaguirre (2006) highlighted the potential of underutilized crops to enhance overall food and nutrition security, support dietary diversity and improve public health and well-being. However, detailed, longitudinal data on nutrition outcomes especially disaggregated for specific countries like Malawi are not comprehensively synthesized in the literature (Akinola et al. 2020).

The economic potential of underutilized crops, such as income diversification, employment creation and value addition, is recognized but less robustly supported in the literature compared to agronomic or nutritional benefits. Mabhaudhi et al. (2016) and Akinola et al. (2020**)** note that the unique adaptation and cultural value of these species can be leveraged for niche markets and local enterprise, especially in rural and marginal communities, with special emphasis on women's roles in production and trade. Winstead and Jacobson (2022), focused on storable Southern African NUS and found that these crops have market and economic value suitable for scaling up to enhance household and regional resilience. Although some success stories are described, coverage is typically case-based or anecdotal rather than systematically quantified. More often, reviews point to the potential for market and livelihood gains if value chains are strengthened and structural barriers addressed (Akinola et al. 2020).

Cultivating underutilized crops also presents opportunities for market development and the creation of value-added products. The market potential of underutilized crops has been brought to light by research by Sthapit and Upadhyay. (2003), especially in the niche and specialty food industries. In order to meet consumer demand for innovative and wholesome food options, the study highlights the importance of diversifying agricultural production through the cultivation of underutilized crops. This can result in the development of distinctive and high-value goods.

Additionally, studies conducted by Frison et al. (2006) have highlighted the possibility of utilizing underutilized crops to produce value-added goods like nutraceuticals, functional foods, and natural ingredients for the cosmetic and pharmaceutical industries, which would support rural development and create jobs.

Underutilized crop production presents chances for environmentally friendly land use and sustainable land use. Underutilized crops have the potential to improve agroecological diversity and ecosystem services like soil fertility, pest control, and biodiversity protection, according to Padoch and Sunderland (2014). Furthermore, research by Meldrum et al. (2015) has highlighted the potential of underutilized crops to support sustainable land management techniques like intercropping and agroforestry, which can enhance soil health, retain water, and sequester carbon, all of which are beneficial to environmental sustainability.

To conclude, the review of the literature has shed light on the variety of advantages that come with growing underutilized crops. These opportunities include the potential benefits to market development, nutritional and health benefits, agro-biodiversity, sustainable agriculture, value-added goods, and sustainable land use that underutilized crops may offer. Through the utilization of these opportunities, interested parties can encourage the growth of underutilized crops, thereby supporting economic development, food security, agricultural diversification, and environmental sustainability. To fully exploit the potential benefits of underutilized crops and address the issues related to their cultivation and utilization, more research and focused interventions are necessary.

### 2.4 The Determinants of Cultivating Underutilized Crops

There is a strong research consensus that the uptake and sustained cultivation of underutilized crop species in sub-Saharan Africa are shaped by a complex interplay of socioeconomic, agronomic, market, policy, and environmental determinants. Several systematic reviews most

notably the comprehensive synthesis by Ndlovu et al. (2024), highlight the fragmentation of knowledge and persistent marginalization of these crops in agricultural research, policy, and market development. While underutilized crops are increasingly recognized for their potential to underpin climate change adaptation and dietary resilience, especially in marginalized environments, their actual adoption is hindered by lack of coherent research investment, policy support, and integration into mainstream food systems (Mayes et al. 2012).

Underutilized and neglected crops are frequently stigmatized as poor people's food or associated with women's work, which dampens their appeal for both farmers and policymakers. Gendered norms and restricted access to productive resources such as land, extension, and credit disproportionately affect women, who are nonetheless principal cultivators and market actors for many indigenous vegetables and legumes. Smallholder farmers often lack the necessary resources and information to diversify away from major staples and where diversification does occur, it is commonly driven by strategies for risk mitigation and household consumption smoothing (Mabhaudhi et al. 2016).

From an agronomic and biophysical perspective, underutilized crops often possess notable resilience traits, including drought and heat tolerance and sometimes superior nutritional profiles. However, production is constrained by insufficient access to improved varieties, a poorly developed or altogether absent formal seed supply system, and limited research on pest and disease management. Most farmers rely on informal seed saving and investments in crop improvement and extension support remain limited compared to major crops (Shayanowako et al. 2021). On the market and value-chain side, the dominance of thin and informal markets, minimal price incentives, high post-harvest losses and weak value chain development collectively suppress the commercial viability of underutilized crops. Even where there is growing demand, as for African leafy vegetables, producers struggle to access improved seed,

reach formal markets, or benefit from value addition due to infrastructural and informational shortfalls (Asase & Kumordzie 2019).

Policy and institutional factors further reinforce these limitations. Reviews consistently report a contradiction between policy rhetoric promoting crop diversification and actual policy implementation, with most public investment and institutional attention remaining focused on a small set of staple crops. Regulatory bottlenecks such as restrictive variety release processes and inadequate seed regulations especially hamper dryland cereals and legumes, further limiting crop diversity in farming systems. Weak coordination among stakeholders and poor alignment between breeders, policy implementers, and farmers persist as critical challenges (Templer et al. 2025).

Environmental and ecosystem considerations are consistently cited as both a rationale for promoting underutilized crops and as under-researched determinants of adoption. Spatial suitability mapping demonstrates considerable potential for these crops to thrive in marginal environments, but actual uptake lags behind this agroecological potential, indicating the need for a more integrated systems approach to research and intervention (Ndlovu et al. 2024).

Hegde (2009) emphasizes the importance of elite germplasm selection, domestication, and demand creation, while Knez et al. (2023) highlights the need for a comprehensive understanding of the reasons for reduced cultivation and consumption. Jena et al. (2018) underscores the role of genetic resources exploration, awareness of nutritional and medicinal importance, and production techniques. Gruère et al. (2006) identifies economic factors and proposes a conceptual framework for successful commercialization, including demand expansion, supply efficiency, and supply control. These studies collectively suggest that a combination of genetic, economic, and market-related factors can drive the cultivation of underutilized field crops.

Kumar et al. (2017) further stated that several factors affect the cultivation of underutilized field crops. These include the market's desire for underutilized field crops, which can have a big influence on cultivation choices. If there is an increasing market demand for these crops, farmers are more likely to cultivate them. Subsidies, rewards, and extension services are examples of supportive government policies that might motivate farmers to plant underutilized field crops. Having access to insurance and credit is another factor that can help to encourage cultivation. The availability of research and development initiatives centered on underutilized field crops, such as improved variety breeding, pest and disease control, and agronomic techniques, can make growing these crops more alluring. Climate and soils that are suitable for cultivating particular field crops are more likely to encourage farmers to cultivate several underutilized crops (Padulosi et al. 2014). Furthermore, adoption rates can be influenced by farmers' knowledge of their agricultural practices and the community's cultural acceptance of underutilized field crops. Programs for capacity-building and training can aid in enhancing knowledge and abilities. On the other hand, if growing neglected field crops is more financially feasible than growing traditional crops, farmers must be able to perceive the financial returns and profitability potential of planting these crops (Simin & Janković 2014).

Despite the advances in systematic review methods and the clustering of evidence around these domains, notable gaps remain, particularly with respect to policy impact evaluation, gender-disaggregated outcomes, consumer demand analysis and context-specific especially Malawi-focused synthesis. Recent high-quality reviews call for more rigorous, targeted, and cross-domain interventions, emphasizing that the promise of underutilized crops will only be realized if multifaceted barriers are simultaneously addressed (Templer et al. 2025).

### 2.5 Theoretical Framework

The study was underpinned by two key theories: the Diffusion of Innovations Theory and the Sustainable Livelihood Framework. The intersection of these frameworks within the study is

found in the way household resource endowments and structural contexts influence the adoption of underutilized crops. The Diffusion of Innovations Theory elucidates how farmers in the Mombezi EPA become aware of, assess, and make decisions about cultivating these crops, guided by perceived attributes and social communication processes. In contrast, the Sustainable Livelihoods Framework situates these decisions within the context of available human, social, natural, physical, and financial capital. In practice, the adoption of these crops is not merely about awareness or perceived advantages; it also depends on whether farmers have the necessary resources and enabling conditions such as land, access to seeds, market connections, and institutional support required to experiment with and sustain cultivation. Thus, these theories converge to illustrate that the successful adoption of underutilized crops relies on both the behavioral diffusion processes and the structural livelihood capacities that facilitate or hinder the adoption of innovation.

### 2.5.1 Diffusion of Innovation Theory

The Diffusion of Innovations Theory, introduced by Everett Rogers in 1962, suggests that the adoption of new ideas, practices, or technologies within a social system occurs through a process influenced by several factors, including the perceived characteristics of the innovation, communication channels, time, and the social system itself. The theory outlines five key attributes that affect adoption rates: relative advantage (the extent to which an innovation is viewed as superior to its predecessor), compatibility (the alignment with existing values, experiences, and needs), complexity (the ease of understanding and use), trialability (the degree to which the innovation can be tested on a limited basis), and observability (the visibility of results to others). Adoption generally progresses through various categories of adopters, including innovators, early adopters, early majority, late majority, and laggards, influenced by interpersonal communication, institutional support, and socio-cultural norms (Simin & Janković 2014).

In the context of this study, underutilized crops such as Bambara nuts, sorghum, and elephant beans serve as "innovations" that are either being reintroduced to mainstream farming or promoted for broader acceptance. Determinants identified in the study, such as awareness, taste preferences, access to seeds, extension services, and market linkages, correspond with Rogers' attributes of innovation. For example, limited awareness and seed scarcity diminish the observability and trialability of these crops, while inadequate market access undermines their perceived relative advantage. Additionally, cultural perceptions that regard underutilized crops as "poor people's food" hinder their compatibility with prevailing social norms, delaying adoption (Dearing 2009). Consequently, this theory is particularly relevant as it provides a behavioral and communication-based framework to understand why, despite demonstrated agronomic and nutritional benefits, adoption remains slow in the Mombezi EPA. It also underscores potential intervention points, such as enhancing extension services and improving demonstration plots, to facilitate farmers' progress along the adoption curve.

### 2.5.2 Sustainable Livelihood Framework (SLF)

The Sustainable Livelihoods Framework (SLF), popularized by the UK Department for International Development (DFID) in the late 1990s, conceptualizes livelihoods as the combination of capabilities, assets, and activities necessary for sustaining a means of living. It categorizes assets into five types of capital: human (skills, knowledge, health), social (networks, relationships, trust), natural (land, water, biodiversity), physical (infrastructure, tools, equipment), and financial (savings, credit, income) (Natarajan et al. 2022). Livelihood strategies are influenced by these assets and shaped by vulnerability contexts, such as climate variability, market fluctuations, and policy environments. The framework highlights the interaction between resource availability, institutional structures, and the outcomes sought by individuals, including income generation, food security, and resilience.

This study examined various determinants including land size and tenure, labour availability, income sources, education level, access to credit, market access, and cultural preferences within the SLF asset categories. For instance, natural capital is represented through land ownership patterns, while physical capital pertains to market infrastructure. Human capital is reflected in awareness and farming skills, financial capital in the accessibility of affordable credit, and social capital in community attitudes towards specific crops. The SLF's acknowledgment of external factors, such as policy decisions and institutional support, aligns with the study's findings on policy neglect and inadequate extension services as significant barriers (Van Rijn et al. 2012). Additionally, underutilized crops play a crucial role in enhancing livelihood outcomes by improving food security, dietary diversity, and climate resilience. By utilizing the SLF, this study provides a comprehensive explanation of how structural and resource-based constraints interact with socio-economic and cultural factors to shape farmers' decisions regarding the cultivation of underutilized crops in Mombezi EPA.

# CHAPTER THREE: METHODOLOGY

## 3.1 Study area

This study was conducted in Chiradzulu District, an area in the Southern Region of Malawi that spans 767 km² and is home to a population of 356,875. The predominant economic activity among residents of Mombezi is agriculture. Despite the area's fertile soils and advantageous climatic conditions, agricultural practices are largely characterized by the cultivation of a limited number of staple crops, particularly maize. This focus on a narrow range of crops has resulted in the neglect of various potentially valuable underutilized species that could contribute to agricultural diversity and food security (Malkanthi et al. 2014). Consequently, a thorough exploration of these underutilized crops offers the community an opportunity to enhance agricultural biodiversity and bolster food security.

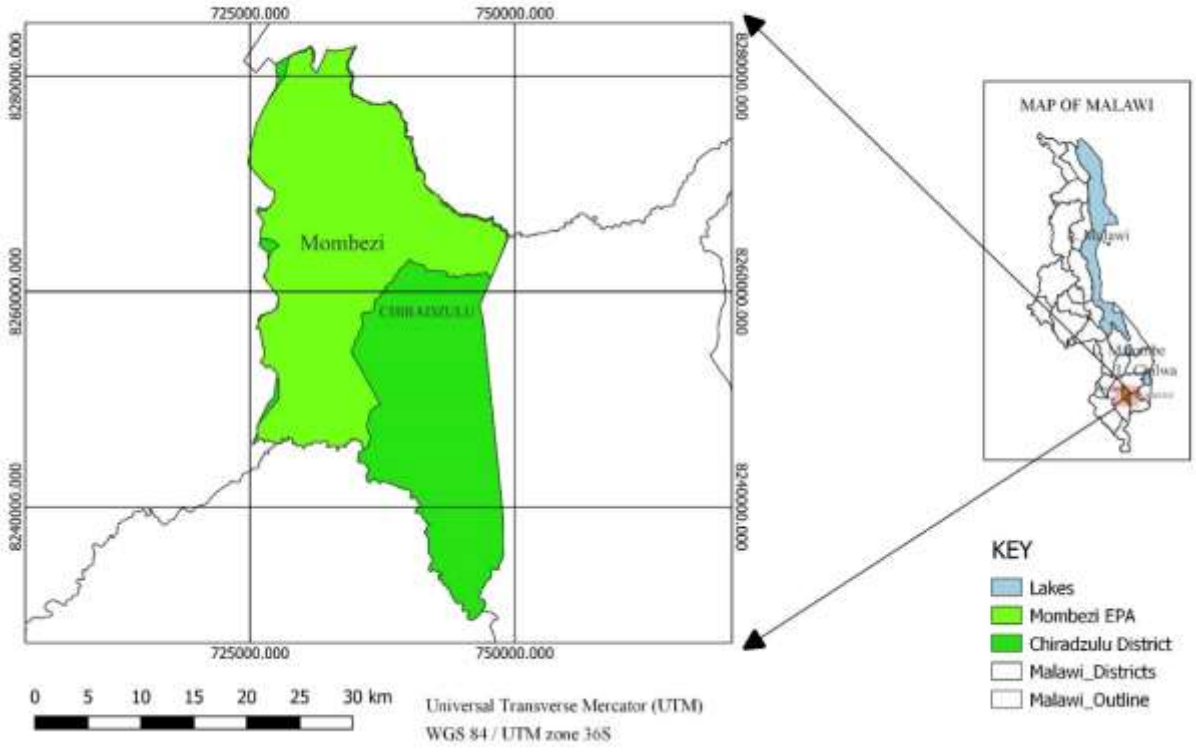


*Figure 1: Map of Mombezi EPA in Chiradzulu District*

### 3.2 Study design

This research employed an explanatory sequential design, initiating the study with the collection of quantitative data, which was subsequently enhanced through the incorporation of qualitative methodologies. This approach facilitated a comprehensive understanding of the research problem by integrating both statistical analysis and in-depth qualitative insights (Creswell & Plano 2017).

### 3.3 Sampling Technique and Sample Size Calculation

To identify the respondents, a sampling method consisting of three stages was utilized. Simple random sampling and purposive sampling was employed. Sections where underutilized crops are cultivated, Traditional Authorities and villages in Mombezi EPA were purposively sampled while farming households within the villages were sampled randomly. To determine the sample size of the study respondents, a simplified formula provided by Woodbury (2002) was used because the population size of the underutilized crops farmers was not known. The formula is given as below:

$$n = \frac{z^2 pq}{e^2} \quad (1)$$

where:

$z$ = the value of standard variate at 95% confidence level, z = 1.96

$p$ = population estimate of 80%

$q$ = 1-p

$e$ = precision level of ±5%

Punching the figures in the formula above, the population sample was 246. Adding 10% for non-response (25), the sample size totals 271 respondents. However, due to non-response, a total of 268 respondents were interviewed.

### 3.4 Data Collection and Analysis

The information required for this research consisted of both quantitative and qualitative data. The quantitative data was collected using a questionnaire survey that was programmed in Kobo Toolbox. In contrast, qualitative data were gathered through the use of structured interview guides during Key Informant Interviews (KIIs), involving a total of six key informants.

#### 3.4.1 To determine the underutilized crops found in Mombezi EPA

This objective captured data about the classification of the underutilized crops such as cereals, legumes, vegetables, roots and tubers. It also captured data about cultural beliefs, usage, and utilization. The questions included were related to the types of crops grown in the EPA; types of cropping systems used when growing the crops; the reason why the farmers grew the crops that they grew and the production level of the cultivated crops at that time. This data was collected using a questionnaire and KIIs. Based on the respondents' responses, the data was further be analyzed using descriptive statistics to come up with frequencies and percentages using SPSS version 27. Data from the KIIs was analyzed using NVivo version 14, where codes were generated. The qualitative data was used to triangulate with the quantitative findings of the objective.

#### 3.4.2 To investigate the challenges and opportunities in cultivating underutilized crops

This objective captured data on seed access; knowledge of processing and value addition; access to affordable credit; extension services; competition from modern crops; consumer preferences; market facilities; availability of land for cultivation; availability of labor; farmers attitudes; increasing demand for food production; soil fertility; nutrition; pests and diseases.

The questions included were related to their understanding of the challenges and opportunities faced in cultivating the underutilized crops. A scoring exercise was conducted to select the challenges and opportunities associated with the cultivation of the crops. The respondents were assigned a score of 1 to 5 using a Likert scale, where 1 represents Strongly Disagree and 5 represents Strongly Agree. Then all scores were aggregated to come up with the higher aggregated score identifying a challenge and an opportunity. Cronbach`s Alpha was employed to assess the internal consistency and reliability of the Likert scale items used. A Cronbach Alpha value above 0.70 was generally considered acceptable, indicating that the items consistently measured the same underlying construct. The data was captured using a questionnaire and interview guide. This data was analyzed using descriptive statistics to come up with frequencies, percentages, mean and standard deviation. NVivo version 14 was used to generate codes and analyze the qualitative data to triangulate with the quantitative findings of the objective.

### 3.4.3 To examine the determinants of cultivating underutilized crops

This objective captured data about age, employment status, ethnic group, education level, awareness level, markets, land, labor, taste and preference. The questions were centered on farmers' awareness of how to effectively grow and harvest underutilized crops. They also explored farmers' preferences for cultivating these lesser-known crops compared to more commonly grown modern crops. Additionally, the questions addressed challenges related to land availability, market access and the availability of labor. This data was analyzed using descriptive statistics (frequency and percentage) and inferential statistics which used the Chi-square test. The Chi-square test was used to show the relationship between cultivating underutilized crops and conceptualized variables to test the research question. The data was collected through questionnaires.

## Methodology matrix

Table 1: Methodology matrix

| Objective | Variables | Method of data collection | Data collection tools | Analysis |
|---|---|---|---|---|
| 1. Determine the underutilized crops found in Mombezi EPA | • Cereals<br>• Legumes<br>• Root<br>• Tubers<br>• Vegetables<br>• Usage and utilization<br>• Cultural beliefs | • Individual interview<br>• Key informant Interview | • Semi-structured questionnaire<br>• Interview guide | • Frequency<br>• Percentage<br>• Narrative analysis |
| 2. Investigate the challenges and opportunities in cultivating underutilized crops | • Seed access<br>• Knowledge of processing & value addition<br>• Access to affordable credit<br>• Extension services<br>• Competition from modern crops<br>• Consumer preferences<br>• Market facilities<br>• Land for cultivation<br>• Availability of labour<br>• Farmer`s attitude<br>• Increasing demand for food<br>• Pests and diseases<br>• Soils fertility<br>• Nutrition | • Individual interviews<br>• Key informant Interview | • Semi-structured questionnaire<br>• Interview guide | • Frequency<br>• Percentage<br>• Mean<br>• Std Deviation<br>• Narrative analysis |
| 3. Examine the determinants of cultivating underutilized crops | • Gender<br>• Age<br>• Education level<br>• Ethnic group<br>• Awareness level<br>• Preference | • Individual interviews | • Semi-structured questionnaire | • Frequency<br>• Percentage<br>• Mean<br>• Chi-square test |

- Taste
- Markets
- Land
- Labor

### 3.5 Ethical consideration

Ethical approval was obtained from the Mzuzu University Research Ethics Committee (MZUNIREC), and permission was also secured from the relevant authorities at the study site. Application letters were submitted to both the District Commissioner and the Traditional Authority. The researcher ensured that consent was acquired from all study participants. In research, it is crucial that consent is provided willingly hence voluntary consent was obtained after providing a comprehensive explanation of the research process.

To ensure clarity, the researcher took steps to confirm that participants fully understood what was being asked of them and that they had the capacity to give informed consent. This entails that participants must be adequately informed about the study, be able to comprehend the provided information, and possess the autonomy to make an informed decision about their participation. Agreement to participate in this study was obtained only after a detailed explanation of the research procedures. Additionally, to address concerns regarding voluntary participation, informed consent, and safety, the researcher clarified to participants that their involvement in the study was entirely voluntary, that they could withdraw at any time without any negative repercussions, and that they would not face any harm resulting from their participation or lack thereof in the study.

### 3.6 Study limitations

Time is an essential resource in the realm of academic research, particularly for master's level projects that are subject to evaluation. Effective time management is therefore critical to ensure that all aspects of the research process are completed efficiently and to a high standard. The researcher had to plan the time for each and every activity in consultation and coordination with the supervisor to mitigate time management challenges.

The other limitation was costs of doing the research. There is always limited availability of resources, which may help for the running of the research. Research participants (farmers) were expecting some form of token of thanks to give research feedback as they are largely exposed to tokens and allowances by government and NGOs. Especially, when they consider the nature of research in underutilized crops the researcher's respondents were tempted to demand something as they would think it's a particular project. To mitigate the challenge the researcher had to be neutral and use negotiating skills to manage the situation.

# CHAPTER FOUR: RESULTS

## 4.1 Demographic Characteristics

The results presented in Table 2 indicate that a majority of the respondents (77.6%) were female, while 22.4% were male. The respondents' highest education qualifications varied, with most having completed Primary education (57.8%), followed by Secondary education (26.9%), and 15.3% having never attended school. Regarding ethnicity, a significant portion was identified as Lhomwe (54.9%), followed by Ngoni (30.2%), with 7.5% identifying as Chewa and Yao. The study revealed that the primary source of income for 48.1% of respondents was casual labour, while 31.0% earned income through farming. Other sources of income included businesses (10.1%), petty trading (4.1%), remittances (3.0%), skilled employment (2.1%), and formal employment (1.5%). Furthermore, the majority of respondents (88.8%) inherited their land from their parents, while 6.3% rented land, and 4.9% purchased land.

Table 2: Socio-demographic Characteristics of the Respondents

| | | Frequency (n) | Percentage (%) |
|---|---|---|---|
| **Gender of the respondent** | Male | 60 | 22.4 |
| | Female | 208 | 77.6 |
| **Highest education qualification** | Never attended | 41 | 15.3 |
| | Primary | 155 | 57.8 |
| | Secondary | 72 | 26.9 |
| **Tribe** | Lhomwe | 147 | 54.9 |
| | Chewa | 20 | 7.5 |
| | Yao | 20 | 7.5 |
| | Ngoni | 81 | 30.2 |
| **Main source of income** | Farmer | 83 | 31.0 |
| | Business | 27 | 10.1 |
| | Formal employment | 4 | 1.5 |
| | Skilled employment | 6 | 2.2 |
| | Petty trader | 11 | 4.1 |
| | Casual labour | 129 | 48.1 |
| | Remittances | 8 | 3.0 |
| **Acquisition of land** | Inherited from parents | 238 | 88.8 |
| | Bought | 13 | 4.9 |
| | Rented | 17 | 6.3 |

Table 3 shows that the average age of the respondents was 40±16 years, with an average monthly income of MWK 38,281±49354. Additionally, respondents had an average of 17±13 years of farming experience and cultivated an average of 0.9±.95 acres of land.

Table 3: Socio-economic characteristics of the Respondents

| | **Mean** | **Minimum** | **Maximum** | **Standard Deviation** |
|---|---|---|---|---|
| Age of the respondent | 40 | 18 | 85 | ±16 |
| Monthly income | 38281 | 0 | 600000 | ±49354 |
| Years of farming | 17 | 1 | 69 | ±13 |
| Size of the land for cultivating crops | .90 | .20 | 10.00 | ±.95 |

### 4.2 The Underutilized and Neglected Crops

#### 4.2.1 Types of Underutilized and Neglected Crops Found in Mombezi EPA

The results in Figure 2 show the underutilized and neglected crops found in Mombezi EPA, which included Velvet beans (Kalongonda), Elephant beans (Kamumpanda), Cowpeas (Khobwe), Sorghum (Mapila), Garbanzo beans (Nchana), Hyacinth beans (Mkhunguzu), Pigeon peas (Nandolo), Bambara nuts (Nzama), Millet (Mawere), Coco yams (Coco), Okra (Thelele lobzyala) and Amaranthus (Bonongwe). The results further reveal that the majority of respondents reported growing crops as follows: Velvet beans (20.9%), Elephant beans (18.5%), Cowpeas (16.9%), Sorghum (16.1%), Garbanzo beans (15.7%), Hyacinth beans (15.3%), Pigeon peas (14.1%), Bambara nuts (13.7%), Millet (12.0%), Coco yams (3.6%), Okra (2.8%), and Amaranthus (2.0%).

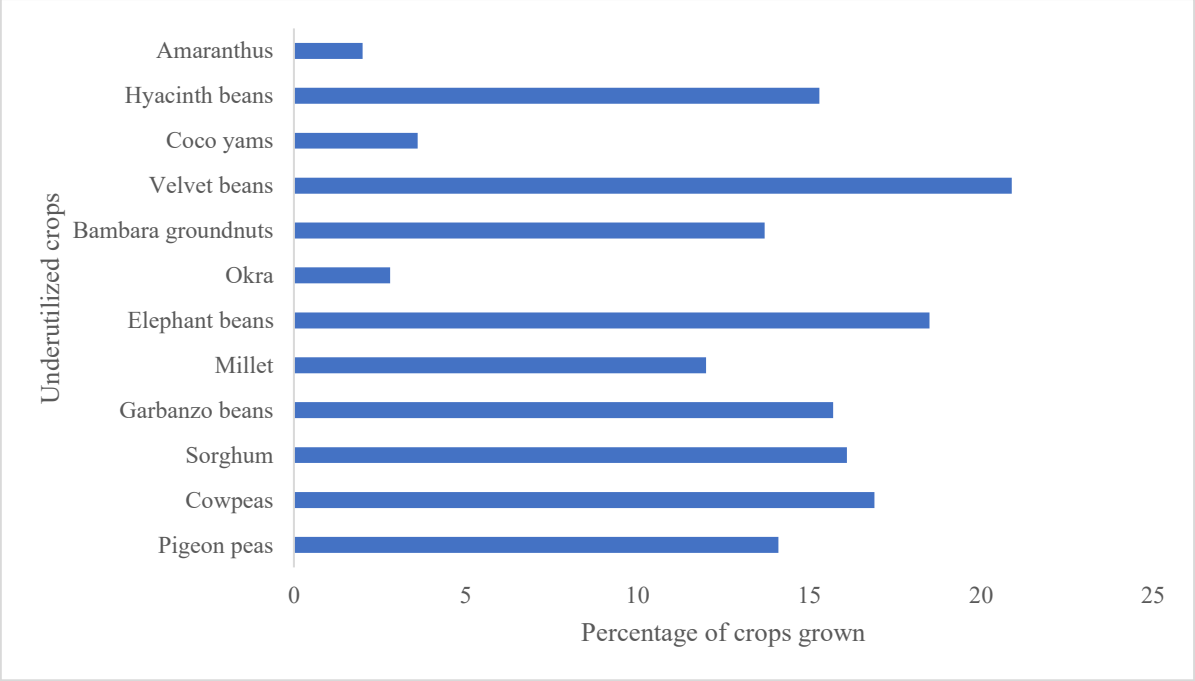


*Figure 2: Underutilized crops grown in Mombezi*

Results from the qualitative research further supported the quantitative finding as key informant narrated that:

> *"Crops that are underutilized in Mombezi include Bambara nuts, Garbanzo beans, Cowpeas, Sorghum, Velvet beans, and Hyacinth beans. Most of these underutilized crops are legumes."* [KII CZ01]

> *"The production trend of these underutilized crops is generally decreasing. However, there is one exception: elephant beans, also known as Kalongonda, which is experiencing an increase in production. This growth can be attributed to its strong market performance and its role as a source of energy and carbohydrates in the face of the ongoing hunger crisis. While elephant beans are thriving, the production levels of the other underutilized crops continue to decline."* [KII CZ02]

### 4.2.2 Categories of Underutilized and Neglected Crops Grown

The findings illustrated in Figure 3 reveal a landscape of underutilized crops, where legumes dominate, comprising 58.3% of cultivated underutilized and neglected crops. In contrast, cereals and vegetables contribute to 16.7% of the total crop varieties grown. Meanwhile, tubers, representing 8%, underscore their rarity in the current categories of underutilized crops.

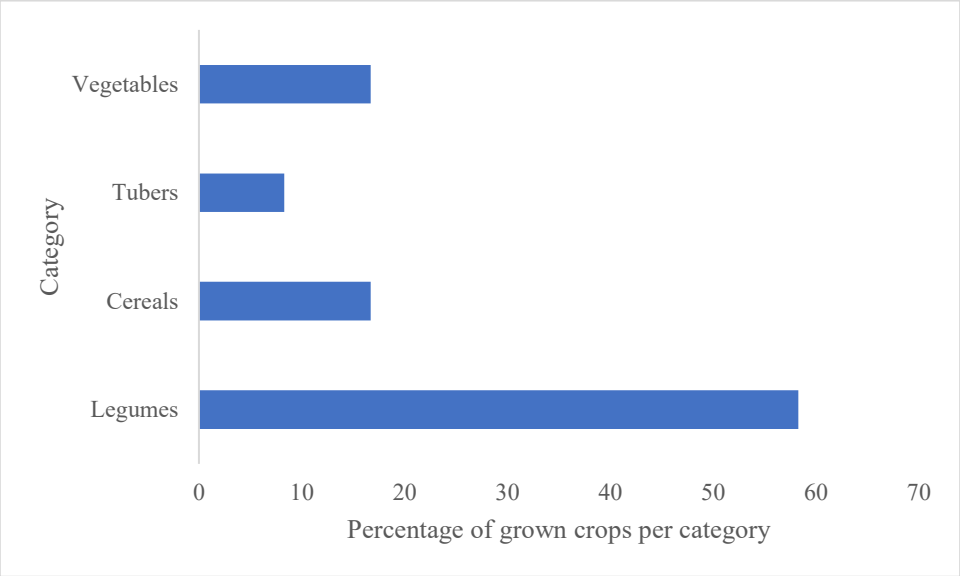


*Figure 3: Categories of underutilized crops grown*

### 4.2.3 Methods of Cropping Used

The results in Table 4 indicate that the majority of respondents (72.5%) employ mixed cropping methods when cultivating these underutilized crops. In contrast, a smaller percentage use monocropping (27.5%).

Table 4: Methods of cropping

| Methods of cropping | Frequency (n) | Percent (%) |
|---|---|---|
| Monocropping | 80 | 27.5 |
| Mixed cropping | 211 | 72.5 |

Figure 4 illustrates the crops cultivated through mixed cropping as opposed to monocropping. The results show that the predominant crops grown in monocropping systems were Sorghum (22.5%), Millet (22.3%), Cowpeas (11.5%), Elephant beans (10.7%), Garbanzo beans (10.7%), and Velvet beans (9.3%). In contrast, the crops least associated with monocropping include

Bambara nuts (6.2%), Hyacinth beans (3.7%), Pigeon peas (2.8%), Coco yams (0.3%), and Okra (0.2%). Conversely, the most commonly cultivated crops in mixed cropping systems were Garbanzo beans (16.5%), Cowpeas (16.5%), Velvet beans (14.8%), Okra (14.3%), Hyacinth beans (12.7%), Bambara nuts (10.5%), and Pigeon peas (7.2%). The crops grown least in mixed cropping were Millet (3.4%), Sorghum (3.0%), Coco yams (0.8%), and Elephant beans (0.4%).

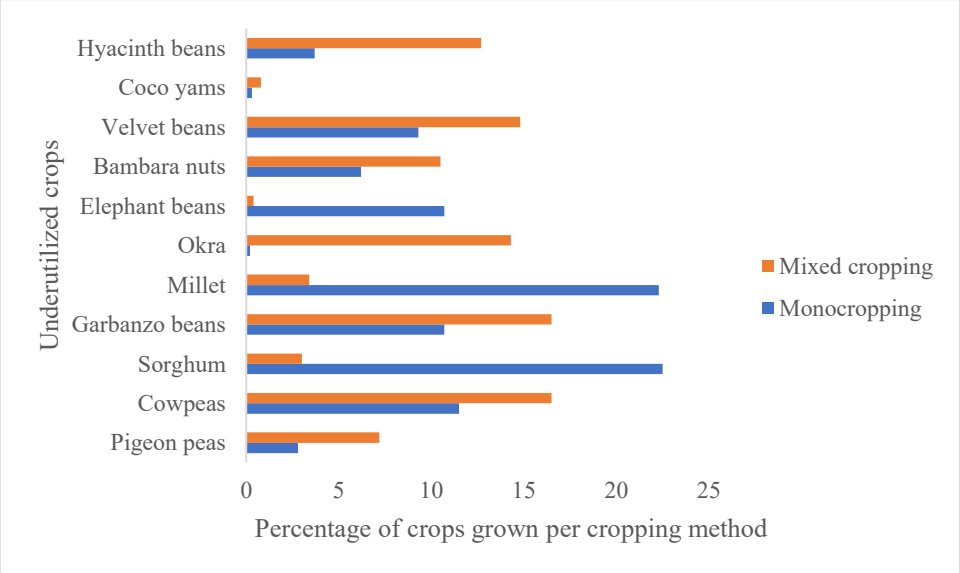


*Figure 4: Methods of cropping used per crop cultivated*

### 4.3 Challenges and Opportunities in Cultivating Underutilized Crops

#### 4.3.1 Challenges in cultivating underutilized crops

This section illustrates the challenges faced in cultivating underutilized crops which included: limited access to seeds; lack of knowledge regarding processing and value addition for these crops; lack of extension services; limited access to affordable credit; competition from modern crops; poor market structure and facilities; inadequate land for cultivation; negative attitude towards underutilized crops; pets and diseases; and poor soils. According to the results in Table 5, 53.7% of respondents strongly agreed that there is limited access to seeds for underutilized crops. Additionally, 41.0% strongly agreed that there is a lack of knowledge regarding processing and value addition for these crops. Furthermore, 42.9% indicated that there is a lack of extension services available for underutilized crops, while 56.75% reported having limited access to affordable credit. Moreover, 36.2% of respondents acknowledged that competition

from modern crops hinders the cultivation of underutilized crops. In contrast, 37.3% and 40.3% of the interviewed individuals disagreed that poor market structure and facilities, as well as low consumer demand, are significant challenges they face. A majority of respondents (41.0%) strongly agreed that inadequate land for cultivation is a concern. However, 37.7% disagreed that labor scarcity is a challenge. Additionally, 34.0% of farmers disagreed with the notion that they hold a negative attitude towards underutilized crops. The survey also revealed that 32.5% agreed that pests and diseases contribute to the reduced cultivation of these crops, while 26.1% strongly disagreed that poor soil quality is a challenge that leads to decreased cultivation of underutilized crops.

Table 5: Challenges in cultivating underutilized crops

| # | **Challenge** | | **SD** | **D** | **N** | **A** | **SA** |
|---|---|---|---|---|---|---|---|
| 1 | Limited access to seeds | F | 18 | 14 | 13 | 79 | 144 |
| | | % | 6.7 | 5.2 | 4.9 | 29.5 | **53.7** |
| 2 | Lack of knowledge of processing and | F | 32 | 21 | 13 | 92 | 110 |
| | value addition | % | 11.9 | 7.8 | 4.9 | 34.3 | **41.0** |
| 3 | Lack of extension services | F | 17 | 29 | 14 | 93 | 115 |
| | | % | 6.3 | 10.8 | 5.2 | 34.7 | **42.9** |
| 4 | Limited access to affordable credit | F | 7 | 8 | 6 | 95 | 152 |
| | | % | 2.6 | 3.0 | 2.2 | 35.4 | **56.7** |
| 5 | Competition from modern crops | F | 37 | 42 | 33 | 97 | 59 |
| | | % | 13.8 | 15.7 | 12.3 | **36.2** | 22.0 |
| 6 | Poor market structures and facilities | F | 81 | 100 | 12 | 46 | 29 |
| | | % | 30.2 | **37.3** | 4.5 | 17.2 | 10.8 |
| 7 | Low demand from consumers | F | 70 | 108 | 9 | 53 | 28 |
| | | % | 26.1 | **40.3** | 3.4 | 19.8 | 10.4 |
| 8 | Inadequate land for cultivation | F | 40 | 45 | 8 | 65 | 110 |
| | | % | 14.9 | 16.8 | 3.0 | 24.3 | **41.0** |
| 9 | Scarcity of labour | F | 64 | 101 | 17 | 68 | 18 |
| | | % | 23.9 | **37.7** | 6.3 | 25.4 | 6.7 |
| 10 | Negative attitude of farmers towards these | F | 38 | 91 | 33 | 78 | 28 |
| | crops | % | 14.2 | **34.0** | 12.3 | 29.1 | 10.4 |
| 11 | Pests and diseases | F | 35 | 42 | 37 | 87 | 67 |
| | | % | 13.1 | 15.7 | 13.8 | **32.5** | 25.0 |
| 12 | Poor soils | F | 70 | 48 | 21 | 63 | 66 |
| | | % | **26.1** | 17.9 | 7.8 | 23.5 | 24.6 |

*Note: F=Frequency %=Percent, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly agree*

The findings presented in Table 6 illustrate the mean (M) and standard deviation (S.D), which provide insight into farmers' perceptions regarding the most significant challenges encountered in the cultivation of underutilized crops. These challenges include: limited access to seeds (M=4.18, S.D=±1.17), lack of knowledge regarding processing and value addition (M=3.85, S.D=±1.35), insufficient extension services (M=3.97, S.D=±1.22), limited access to affordable credit (M=4.41, S.D=±0.88), and inadequate land for cultivation (M=3.60, S.D=±1.51) as shown in Table 6. A Cronbach`s alpha of 0.765 indicates high internal consistency among the 12 challenges on respondents' perceptions.

Table 6: Farmers' perception regarding the challenges encountered in cultivating underutilized crops

| # | | n | Mean | Std. Deviation | Cronbach Alpha |
|---|---|---|---|---|---|
| 1 | Limited access to seeds | 268 | 4.18 | ±1.171 | 0.765 |
| 2 | Lack of knowledge of processing and value addition | 268 | 3.85 | ±1.353 | |
| 3 | Lack of extension services | 268 | 3.97 | ±1.221 | |
| 4 | Limited access to affordable credit | 268 | 4.41 | ±0.884 | |
| 5 | Competition from modern crops | 268 | 3.37 | ±1.350 | |
| 6 | Poor market structures and facilities | 268 | 2.41 | ±1.359 | |
| 7 | Low demand from consumers | 268 | 2.48 | ±1.342 | |
| 8 | Inadequate land for cultivation | 268 | 3.60 | ±1.517 | |
| 9 | Scarcity of labour | 268 | 2.53 | ±1.282 | |
| 10 | Negative attitude of farmers towards these crops | 268 | 2.88 | ±1.267 | |
| 11 | Pests and diseases | 268 | 3.41 | ±1.358 | |
| 12 | Poor soils | 268 | 3.03 | ±1.566 | |

Note: Mean Scores of 1.00-1.48=Strongly Disagree, 1.50-2.48=Disagree, 2.50-3.48=Neutral, 3.50-4.48=Agree, 4.50-5.00=Strongly Agree, #=Serial Number, N= Frequency

A key informant articulated the challenges faced in the cultivation of underutilized crops, noting that:

> *"Most farmers do not cultivate these crops because they are considered to be of low importance. In Chiradzulu, our land holdings are very small, so farmers see the cultivation of these underutilized crops as a potential loss. Additionally, there is a lack of extension services available to them.*

*While some crops, like Millet, could provide good income, farmers are not fully aware of their potential. Another challenge is the availability of seeds; farmers have difficulty finding seeds for crops like Bambara nuts and Garbanzo beans, among others."* [KII CZ03]

### 4.3.2 Opportunities in cultivating underutilized crops

This section is comprised of the opportunities associated with the cultivation of underutilized crops which included: easy access to seeds; the availability of extension services; easy to access affordable credit; availability of well-structured markets and facilities; high consumer demand; availability of land for cultivation; availability of labour, positive attitude among farmers; increasing demand for food; access to fertile soils and contribution to nutritional security. Results presented in Table 7 indicate that 37.7% of respondents disagreed with the notion that there is easy access to seeds for these crops. Additionally, 30.2% expressed disagreement regarding the availability of extension services, and 37.7% strongly disagreed that it is easy to access affordable credit. In contrast, a majority of the respondents (50.4%) agreed that well-structured markets and facilities exist for underutilized crops. Moreover, 57.8% acknowledged a high consumer demand for these crops. The findings also revealed that respondents agreed on several positive aspects as 31.0% noted the availability of land for cultivation, 55.6% confirmed the availability of labour, and 36.2% highlighted a positive attitude among farmers towards these crops. Furthermore, 53.7% of respondents recognized the increasing demand for food. In terms of resources, 30.6% strongly agreed that they have access to fertile soils and 50.0% agreed that underutilized crops contribute to nutritional security.

Table 7: Opportunities in cultivating underutilized crops

| # | Opportunity | | SD | D | N | A | SA |
|---|---|---|---|---|---|---|---|
| 1 | Easy seed access | F | 56 | 101 | 13 | 23 | 75 |
| | | % | 20.9 | **37.7** | 4.9 | 8.6 | 28.0 |
| 2 | Availability of extension services | F | 61 | 81 | 18 | 45 | 63 |
| | | % | 22.8 | **30.2** | 6.7 | 16.8 | 23.5 |
| 3 | Easy access to affordable credit | F | 101 | 81 | 10 | 28 | 48 |
| | | % | **37.7** | 30.2 | 3.7 | 10.4 | 17.9 |
| 4 | Well-structured markets and facilities | F | 18 | 31 | 26 | 135 | 58 |
| | | % | 6.7 | 11.6 | 9.7 | **50.4** | 21.6 |
| 5 | High demand from consumers | F | 12 | 15 | 14 | 155 | 72 |
| | | % | 4.5 | 5.6 | 5.2 | **57.8** | 26.9 |
| 6 | Availability of land for cultivation | F | 64 | 57 | 14 | 83 | 50 |
| | | % | 23.9 | 21.3 | 5.2 | **31.0** | 18.7 |
| 7 | Availability of labour | F | 15 | 22 | 23 | 149 | 59 |
| | | % | 5.6 | 8.2 | 8.6 | **55.6** | 22.0 |
| 8 | Positive attitude of farmers towards | F | 19 | 54 | 68 | 97 | 30 |
| | these crops | % | 7.1 | 20.1 | 25.4 | **36.2** | 11.2 |
| 9 | Increasing demand for food | F | 2 | 4 | 7 | 144 | 111 |
| | | % | 0.7 | 1.5 | 2.6 | **53.7** | 41.4 |
| 10 | Access to fertile soils | F | 21 | 62 | 31 | 72 | 82 |
| | | % | 7.8 | 23.1 | 11.6 | 26.9 | **30.6** |
| 11 | Contribution to nutrition security | F | 1 | 1 | 6 | 126 | 134 |
| | | % | 0.4 | 0.4 | 2.2 | 47.0 | **50.0** |

*Note: F=Frequency %=Percent, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly agree*

The results depicted in Table 8 elucidate the mean and standard deviation, which offer a comprehensive analysis of farmers' perceptions concerning the most salient opportunities linked to the cultivation of underutilized crops. These opportunities include: well-structured markets and facilities (M = 3.69, S.D. = $\pm$1.14); high consumer demand (M = 3.97, S.D. = $\pm$0.98); availability of labour (M = 3.80, S.D. = $\pm$1.05); increasing demand for food (M = 4.34, S.D. = $\pm$0.68); access to fertile soils (M = 3.49, S.D. = $\pm$1.34); and contributions to nutrition security (M = 4.46, S.D. = $\pm$0.60), as shown in Table 8. A Cronbach's alpha of 0.787 signifies high internal consistency among the 11 opportunities regarding respondents' perceptions.

Table 8: Farmers' perceptions regarding the opportunities associated with cultivating underutilized crops

| # | | n | Mean | Std. Deviation | Cronbach Alpha |
|---|---|---|---|---|---|
| 1 | Easy seed access | 268 | 2.85 | ±1.551 | 0.787 |
| 2 | Availability of extension services | 268 | 2.88 | ±1.522 | |
| 3 | Easy access to affordable credit | 268 | 2.41 | ±1.512 | |
| 4 | Well-structured markets and facilities | 268 | 3.69 | ±1.135 | |
| 5 | High demand from consumers | 268 | 3.97 | ±0.975 | |
| 6 | Availability of land for cultivation | 268 | 2.99 | ±1.494 | |
| 7 | Availability of labour | 268 | 3.80 | ±1.050 | |
| 8 | Positive attitude of farmers towards these crops | 268 | 3.24 | ±1.114 | |
| 9 | Increasing demand for food | 268 | 4.34 | ±0.675 | |
| 10 | Access to fertile soils | 268 | 3.49 | ±1.342 | |
| 11 | Contribution to nutrition security | 268 | 4.46 | ±0.601 | |

Note: Mean Scores of 1.00-1.48=Strongly Disagree, 1.50-2.48=Disagree, 2.50-3.48=Neutral, 3.50-4.48=Agree, 4.50-5.00=Strongly Agree #=Serial Number, N= Frequency

In alignment with the insights derived from the quantitative data, a key informant articulated that:

> *"As we have seen when we were moving around the villages the households seem not to have fertilizer and neither do they have seeds for the crops which they rely on the most such as maize such that they are in need of food which entails that once these underutilized crops are promoted, they surely will be taken as a substitute of other crops with the rising demand for food. In addition, the farmers have access to markets as the Tomasi market is just within the EPA further to that they have the household labour readily available at their disposal."* [KII CZ04]

### 4.4 Determinants of cultivating underutilized crops

This section examined the determinants influencing the cultivation of underutilized crops, focusing on various socio-economic and demographic factors. Key determinants identified include Gender, Age, Educational Attainment, Ethnic Background (Tribe), Awareness of the crops, Preference for these crops, Taste, Market Access, Land Access, and Labor Availability.

Each of these factors plays a significant role in shaping farmers' decisions and behaviours regarding the cultivation of underutilized crops.

Table 9 presents the results of a chi-square test examining the factors influencing the cultivation of various underutilized crops. The findings indicated a statistically significant relationship between gender and the cultivation of Bambara nuts and Hyacinth beans, with p-values of *0.026* and *0.012*, respectively. Additionally, a significant relationship between awareness and the cultivation of Velvet beans was observed, with a p-value of 0.047. The results further demonstrated significant relationships between taste and the cultivation of both Velvet beans and Coco yams, yielding p-values of *0.021* and *0.024*, respectively. Moreover, labour was found to have a significant relationship with the cultivation of Pigeon peas (*p=0.039*), Garbanzo beans (*p=0.049*) and Coco yams (*p=0.021*). Conversely, the chi-square test revealed no statistically significant relationships between age, market access, preferences, land access, tribe and education concerning the cultivation of the underutilized crop.

Table 9: Determinants of underutilized crops cultivation

| **Variable** | **Pigeon Peas** $x^2$ | **Cowpeas** $x^2$ | **Sorghum** $x^2$ | **Garbanzo beans** $x^2$ | **Millet** $x^2$ | **Velvet beans** $x^2$ | **Okra** $x^2$ | **Bambara nuts** $x^2$ | **Elephant beans** $x^2$ | **Coco yams** $x^2$ | **Hyacinth beans** $x^2$ | **Amaranthus** $x^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gender | 0.357 | 2.612 | 0.026 | 2.207 | 0.133 | 2.384 | 0.083 | **4.969*** | 0.036 | 0.850 | **6.372*** | 1.611 |
| Age | 64.698 | 47.261 | 80.765 | 62.112 | 50.223 | 53.110 | 57.551 | 42.260 | 57.205 | 39.490 | 49.518 | 66.711 |
| Awareness | 1.605 | 0.006 | 1.113 | 2.977 | 0.404 | **3.940*** | 0.139 | 0.578 | 0.306 | 0.350 | 0.768 | 0.052 |
| Preference | 0.205 | 1.400 | 2.359 | 1.171 | 0.561 | 0.013 | 0.334 | 0.205 | 0.074 | 0.014 | 0.700 | 0.379 |
| Taste | 0.184 | 0.001 | 0.017 | 2.742 | 0.293 | **5.297*** | 1.454 | 0.020 | 0.278 | **5.104*** | 0.580 | 1.030 |
| Market Access | 0.082 | 1.025 | 0.001 | 1.163 | 2.403 | 0.960 | 1.259 | 1.204 | 0.159 | 1.932 | 2.128 | 1.683 |
| Land access | 2.314 | 0.001 | 0.630 | 1.416 | 2.374 | 1.418 | 0.033 | 0.404 | 0.012 | 0.196 | 2.128 | 1.683 |
| Labour | **6.512*** | 0.717 | 1.161 | **6.015*** | 1.580 | 0.978 | 0.982 | 0.506 | 2.151 | **7.754*** | 0.974 | 0.498 |
| Tribe | 0.045 | 5.531 | 1.555 | 2.599 | 2.774 | 0.816 | 5.369 | 2.271 | 0.626 | 1.940 | 1.001 | 3.560 |
| Education | 0.207 | 0.707 | 3.611 | 2.114 | 1.083 | 4.418 | 5.301 | 1.405 | 3.251 | 1.681 | 1.071 | 1.910 |

*$p \leq 0.05$** significance level Chi-square values are presented by $x^2$

# CHAPTER FIVE: DISCUSSION

## 5.1 Introduction

This chapter provides an in-depth discussion of the findings on the challenges and opportunities in cultivating underutilized crops in the Mombezi Extension Planning Area (EPA) in Chiradzulu District, Malawi. The analysis follows key themes derived from the results, examining the types and categories of underutilized crops, cropping methods used, challenges faced by farmers, opportunities for expansion, and the determinants influencing cultivation decisions. These findings are critically evaluated in relation to existing literature to provide a comprehensive understanding of underutilized crop cultivation in the region. Through this discussion, it becomes evident that while farmers encounter numerous constraints, there exist significant opportunities that, if leveraged properly, could transform underutilized crop cultivation into a viable and sustainable agricultural practice.

## 5.2. Underutilized Crops Found in Mombezi EPA

The findings from the study in Mombezi EPA highlight a critical underutilization of diverse, nutritious crops despite their ecological and nutritional advantages. The predominance of legumes in Mombezi EPA as shown in Figure 3 aligns with regional patterns where underutilized legumes are commonly prioritized for their nutritional value, drought tolerance and soil-fertility benefits. For example, Bambara groundnut is widely documented across Malawi and southern Africa as an important neglected legume with high resilience and nutritional potential (FAO 2010; Mabhaudhi et al. 2018). Similarly, reviews of African underutilized crops report that Bambara groundnut, cowpea, pigeon pea and other underutilized legumes are repeatedly identified as priority species for food-security and livelihood interventions, while velvet bean is often reported as an underutilized leguminous cover or food crop in several regions (Tan et al. 2020; Samal et al. 2023). This prevalence reflects a recognition among farmers of legumes agronomic benefits such as nitrogen fixation which

improves soil fertility and supports sustainable agricultural systems (FAO 2019; Mabhaudhi et al. 2019). However, their cultivation remains low overall pointing to systemic issues in scaling production and market integration.

Cereals such as sorghum (16.1%) and millet (12.0%), although resilient to semi-arid conditions and climate variability, are cultivated by a limited number of farmers (17%). This low adoption rate is particularly striking considering Malawi's ongoing climate change challenges and past government efforts to promote drought-tolerant cereals. Historical policy preferences for maize have marginalized these alternatives, diminishing their visibility and attractiveness to farmers despite their nutritional value and environmental adaptability (Faucher 2019; Kerr 2014).

Moreover, tubers which constitute only 8% of cultivated underutilised crops, reflect an even greater level of neglect. With crops such as coco yams (3.6%) having historically served as staples for food security (Nanbol & Namo 2019), their minimal presence raises concerns likely linked to cultivation challenges and lack of commercial development opportunities (Epping & Laibach 2020).

A closer analysis of cropping patterns reveals that some crops are consistently intercropped, while others are more frequently cultivated as sole crops (Table 4), which aligns with Gwenambira-Mwika (2021), who found that approximately 50% of cropped fields on smallholder farms in Malawi are intercropped. This distinction has significant implications for land allocation, food security, and income strategies. For instance, Sorghum and Millet, which are primarily grown as monocrops, are staple cereals that require substantial space. Their cultivation may reflect their vital role in household food security strategies, particularly in terms of caloric intake and resilience to drought (FAO 2019). The emphasis on these crops in monocropping indicates that they require considerable land allocation primarily for food security rather than for generating market income. This practice, in turn, contributes to a decline

in biodiversity, as extensive areas are devoted to a single crop. Consequently, this can result in the depletion of soil nutrients and ultimately lead to soil degradation.

In contrast, Garbanzo beans, Cowpeas, Velvet beans, and Okra are predominantly grown under mixed cropping systems (Figure 4). These crops, especially legumes like Cowpeas and Garbanzo beans, enhance soil fertility through nitrogen fixation. Their inclusion in intercropping systems demonstrates an efficient use of limited land, aimed at boosting overall productivity and household nutrition (Snapp et al. 2010). Intercropping these legumes with cereals or other crops improves dietary diversity and resilience to market or climatic shocks, thereby indirectly supporting income stability and food security (Iahtisham-Ul-Haq & Shahid, 2025).

The consistent practice of intercropping these legumes and vegetables underscores farmers' strategies to maximize land productivity while minimizing risk, in alignment with traditional agroecological knowledge (Altieri 2002). Mixed cropping facilitates staggered harvests and diverse outputs, which are essential for smallholders with limited land. Conversely, the monocropping of cereals may be associated with cultural preferences, post-harvest storage practices and bulk production for household consumption, indicating the trade-off farmers navigate between income generation and subsistence needs (Beedy et al. 2010).

### 5.3 Determinants of Cultivating Underutilized Crops

The cultivation of underutilized crops is influenced by a complex interplay of socio-economic and agronomic factors, with gender serving as a significant determinant (Table 9). This is particularly evident in the cultivation of Bambara nuts and hyacinth beans, where the role of women in conserving agrobiodiversity is paramount. Decision-making power, preferences, and traditional knowledge among women guide the integration of these crops within farming systems, thus positioning gender as a critical consideration in interventions aimed at promoting

crop diversification. Research indicates that women play a crucial role in the selection and persistence of lesser-known crops, contributing to household food security and cultural heritage (Padulosi et al. 2013).

In addition to gender, awareness is a pivotal factor that significantly affects the cultivation of velvet beans. Awareness encompasses not only knowledge of agronomic practices but also the nutritional benefits and market opportunities associated with these crops. A lack of awareness constitutes a well-documented barrier to the adoption of underutilized species, as farmers are often reluctant to cultivate crops, they do not understand or perceive as valuable. Mabhaudhi et al. (2017) emphasized that effective knowledge dissemination through extension services and community-based initiatives is vital for increasing the adoption rates of underutilized crops. Consequently, awareness acts as a vital bridge linking traditional knowledge with contemporary agricultural development efforts.

Furthermore, taste emerges as a significant influence on the cultivation of velvet beans and coco yams, underscoring the importance of consumer perception in shaping agricultural choices. Farmers are inclined to prioritize crops that align with local dietary habits and culinary traditions. As noted by Hunter et al. (2019), the sensory qualities of underutilized crops can significantly affect their acceptance and sustained use in households, thus impacting both production and consumption dynamics. Therefore, taste considerations extend beyond consumer preferences to become an integral driver of cultivation decisions, reinforcing the necessity of incorporating end-use preferences in strategies aimed at promoting crop diversification.

Labor availability also significantly affects the cultivation of pigeon peas, garbanzo beans and coco yams. This aspect interacts closely with gender roles and levels of awareness, as labour demands often disproportionately burden women, while awareness of labour-saving practices

tends to be limited. These align with Mgalamadzi et al. (2024), who stated that women in Malawi often bear a disproportionate share of agricultural labour, which can limit their capacity to adopt labour-saving practices. This imbalance underscores the need for targeted interventions that address these gendered dynamics to enhance agricultural productivity and equity. The labour-intensive nature of underutilized crops, exacerbated by a lack of mechanization and optimized agronomic packages, renders them less appealing to farmers who face labour constraints. Massawe et al. (2016) argued that despite the critical role of underutilized crops in enhancing food security, their labour intensity can inhibit their adoption unless appropriate technologies and practices are introduced to facilitate cultivation.

Together, these findings highlight the necessity for a holistic approach in promoting underutilized crops, one that integrates gender-sensitive programming, comprehensive awareness campaigns, consideration of sensory appeal, and the introduction of labour-saving innovations. By addressing these interconnected factors, stakeholders can enhance the adoption and sustainability of underutilized crops, thereby contributing to improved food security, nutritional diversity, and climate resilience within agricultural systems.

### 5.4 Challenges and Opportunities in Cultivating Underutilized Crops

Several significant barriers hinder the widespread cultivation of underutilized crops (Table 6). Limited access to seeds emerged as a primary challenge, with 53.7% of farmers reporting difficulties in obtaining quality seeds. According to Williams and Haq (2002), access to good-quality planting materials is a major constraint for farmers. There should be sustainable sources for the supply of quality seeds/planting materials. This finding supports previous research by Giuliani et al. (2009), who highlighted the inadequacy of formal seed systems for underutilized crops. Without reliable access to quality seeds, farmers struggle to scale up production, leading to inconsistent yields and lower profits. Additionally, a substantial proportion of farmers (41.0%) cited a lack of knowledge on processing and value addition, which restricts their ability

to commercialize these crops. Farmers require capacity-building programs to enhance their understanding of post-harvest handling and value-chain development. Malkanthi et al. (2014) stated that rural farmers don't have a good level of know-how on the value addition of underutilized crops. Such that the lack of knowledge in value addition leads to limited income for the farmers (Roy et al. 2013).

Another critical challenge is inadequate extension services, with 42.9% of farmers stating they receive little to no extension support. Without proper extension services, farmers remain unaware of best agronomic practices, leading to suboptimal yields. Underutilized crops receive little attention from research, extension services, farmers, policy and decision-makers, donors, technology providers and consumers (Williams & Haq, 2002). Furthermore, financial barriers are a major constraint, as 56.7% of respondents reported limited access to affordable credit. The lack of financial assistance prevents farmers from investing in essential inputs such as improved seeds and irrigation. This aligns with Malkanthi et al. (2014) findings that the majority of small-scale farmers and processors face a variety of problems when seeking credit, including lack of information, high interest rates, lack of collateral, bureaucratic difficulties and misunderstandings, and lack of government support in accessing credit. Competition from modern cash crops (36.2%) also discourages farmers from growing underutilized crops, as they perceive them to be less profitable. Consumers use underutilized crops less because these crops get less attention than other crop species (Padulosi et al. 2002). The farmers (41%) also cited inadequate land for cultivation as a concern, since the singular piece of land owned is primarily utilized for the cultivation of maize, a staple food essential for household consumption. This reliance on maize cultivation presents significant challenges in prioritizing the cultivation of underutilized crops, particularly in the context of ongoing food shortages at the household level, this aligns with (Knez et al. 2023) who found that legume yield capacities have been limited because of their demotion to marginal lands where numerous abiotic stresses frequently

occur. Lastly, 32.5% of the farmers highlighted that pests and diseases contribute to reduced cultivation of underutilized crops as they demonstrated a greater proficiency in cultivating and treating modern crops that are frequently grown due to their increased access to extension services which facilitates the effective management of these crops, as their knowledge and resources regarding underutilized crops are comparatively limited. This concurs with what FAO (2022) found that pests and diseases are a severe threat to food security, trade and livelihoods globally such that every year, up to 40 percent of crops are lost due to pests and diseases. To address these challenges, the government and stakeholders must develop policies that facilitate access to credit, strengthen extension services, and create awareness about the long-term benefits of underutilized crops.

Despite the challenges, the findings reveal numerous opportunities that could be harnessed to promote underutilized crops (Table 8). High consumer demand (57.8%) indicates a growing awareness of the nutritional benefits of these crops. This aligns with research by Chen et al. (2014), which highlighted that the demand for edible wild plants has been increasing as local and natural food. Additionally, well-structured markets (50.4%) provide a promising avenue for commercialization, allowing farmers to generate higher incomes. In contrast, Gruère et al. (2006) identified that underutilized plant species possess significant public value, primarily due to their contributions to agricultural biodiversity and their role in supporting economically disadvantaged farmers. Additionally, these species hold potential private value, yet their utilization remains limited, often attributable to prevailing market failures. The availability of labour for cultivation (55.6%) implies that most households at least have a readily available family labour which reduces costs. This is consistent with the findings of Malkanthi et al. (2014), who reported that there was adequate labour for a variety of agricultural activities, including clearing land, planting, safeguarding, and harvesting underutilized crops.

Additionally, they rarely hired labourers for the cultivations and instead adopted the "Attam" system, which involves aiding one another when necessary.

A significant opportunity lies in the rising global demand for food, currently at a remarkable 53.7%. This shift in consumer needs presents underutilized crops as a viable alternative to mainstream agricultural products. Additionally, the market for mushrooms is witnessing robust growth year after year, highlighting the increasing popularity of these versatile fungi (Durst & Bayasgalanbat, 2014). The expanding interest in both underutilized crops and mushrooms reflect a broader movement toward diversifying our food sources. The study findings indicated that underutilized crops contribute to nutrition security (50.0%) which alludes to Durst and Bayasgalanbat, (2014) study which highlighted that the conservation and promotion of indigenous crop species can enhance nutrition security for poor and marginalized rural populations, as many of these underutilized crops are highly nutritious. By promoting these crops as climate-resilient and nutritionally superior, stakeholders can enhance food security. The study further emphasizes the availability of fertile land (30.6%), suggesting that the cultivation of underutilized crops could be facilitated. Fertile soils are critical for enhancing crop productivity because they supply essential nutrients, support better root development, and improve water retention, thereby directly influencing potential yields. Several studies demonstrate that higher soil fertility levels are associated with increased productivity and resilience of both staple and underutilized crops. For instance, Havlin et al. (2014); Tittonell and Giller (2013) highlight that soil fertility management is fundamental in realizing yield potential, while Sanginga and Woomer (2009) note that fertile soils significantly improve legume productivity in African farming systems. Conversely, issues such as declining soil fertility, insufficient soil moisture, soil salinity/sodicity, soil compaction, and the formation of hardpans are significant factors contributing to low land productivity (Negassi 2002). This, in turn, manifests as poor crop yields, reduced farm incomes, and an increase in rural poverty.

With the right incentives, more farmers could be encouraged to cultivate underutilized crops, reducing dependency on maize and other staples. To capitalize on these opportunities, governments should establish farmer cooperatives and link smallholder farmers to broader markets.

In conclusion, this discussion underscores the dual nature of underutilized crop cultivation while challenges such as seed access, financial constraints, and lack of extension services persist, there are significant opportunities in market expansion, consumer demand, and nutritional benefits. Addressing these issues through targeted policy interventions, capacity-building programs, and improved financial access will be crucial in enhancing the adoption of underutilized crops. By capitalizing on these opportunities, Malawi can foster a more diverse and resilient agricultural system that supports both economic development and food security.

# CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

The study was conducted in Mombezi EPA in Chiradzulu District, Malawi. The purpose of the study was to assess the challenges and opportunities in cultivating underutilized crops in Mombezi EPA. The specific objectives of the study were to assess the underutilized crops found in Mombezi EPA; analyze the challenges and opportunities in cultivating underutilized crops; and examine the determinants of cultivating underutilized crops.

The study highlights the presence of a diverse range of underutilized crops in the Mombezi EPA, with legumes prominently dominating the landscape. Velvet beans (20.9%), elephant beans (18.5%), cowpeas (16.9%), and Bambara nuts (13.7%) collectively account for the majority of NUS cultivation in the area. Although cereals such as sorghum and millet, along with a smaller assortment of roots, tubers, and vegetables, are also found, they are considerably less prevalent. This suggests both the agro-ecological suitability of legumes and the enduring presence of niche cultivation patterns for other non-traditional crops.

Farmers have identified several key constraints that include limited seed access, insufficient knowledge of processing and value addition, inadequate extension services, restricted credit, and limited land availability. These factors systematically hinder the broader adoption and development of value chains for neglected and underutilized species. However, there are also clear opportunities to explore, such as well-structured local markets, evident consumer demand, available labour, fertile soil, and significant nutritional benefits. By strategically leveraging these opportunities through targeted extension services, improved seed systems, and better financing, the production and commercialization of underutilized crops could see substantial growth.

Cultivation decisions are influenced by socio-economic factors and individual preferences. Chi-square tests have revealed statistically significant relationships indicating that gender,

awareness, taste, and labour availability play key roles in the cultivation of specific crops. For instance, gender impacts the cultivation of Bambara nuts and hyacinth beans; awareness is significant for velvet beans; taste affects the uptake of velvet beans and coco yams; and labour availability influences the cultivation of pigeon peas, garbanzo beans and coco yams. These findings suggest that interventions should be tailored gender-sensitive, focused on awareness and education, and appropriate in terms of labour rather than one-size-fits-all, to effectively promote crop adoption.

## 6.2 Recommendations

Based on the findings of the study, the following recommendations are made:

1. To enhance the conservation and utilization of underutilized crops identified in Mombezi EPA such as velvet beans, elephant beans and sorghum, the government, in collaboration with agricultural research institutions and local extension services, should develop a community-based crop documentation and promotion strategy. This should include participatory crop profiling and farmer-led seed banks. By formally recognizing the role of these crops in food security and ecological resilience, this approach would support agro-biodiversity conservation while increasing farmer access to context-appropriate species.
2. Considering the identified constraints such as limited access to quality seeds, inadequate extension services, and poor availability of affordable credit, it is essential for policymakers and stakeholders to create an integrated support program for underutilized crops. This program should address systemic barriers by establishing farmer field schools, fostering microfinance linkages, and implementing decentralized extension services specifically tailored to these crops. Furthermore, in light of the observed market demand and nutritional advantages, strategic investments should focus

on developing value chains and agro-processing enterprises to enhance both profitability and sustainability.

3. Acknowledging that gender, awareness, preferences, and labour availability play a crucial role in cultivation decisions, future programming must embrace a socio-culturally inclusive and gender-responsive approach. Specifically, targeted awareness campaigns and training modules should be collaboratively developed with women farmers who are essential for preserving agrobiodiversity to enhance knowledge regarding the agronomic and nutritional benefits of underutilized crops. Additionally, the introduction of labour-saving technologies and culturally preferred crop varieties can increase adoption rates, particularly within labour-constrained households.

### 6.3 Area of further study

Further study should be conducted to analyse the viability and profitability of underutilized crops, as this study primarily focused on types, cultivation patterns, determinants, challenges and opportunities of underutilized crops without evaluating economic returns. Understanding profitability is crucial for informing farmer decisions, guiding policy interventions and attracting investment. Evidence on yield performance, market competitiveness and value addition potential would enable smallholder farmers to make informed choices and help transition underutilized crops from subsistence to commercial production. Such analysis is key to unlocking their full potential in enhancing livelihoods and promoting sustainable agricultural diversification.

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**APPENDICES**

**APPENDIX 1: Ethical Clearance Letter from MZUNIREC**

MZUZU UNIVERSITY

DIRECTORATE OF RESEARCH

Mzuzu University
Private Bag 201
Luwinga
Mzuzu 2
MALAWI
TEL: 01 320 722
FAX: 01 320 648

**MZUZU UNIVERSITY RESEARCH ETHICS COMMITTEE (MZUNIREC)**

**Ref No: MZUNIREC/DOR/24/92** **14/10/2024.**

Courtney Nalivata,

Mzuzu University,
P/Bag 201, Luwinga,
Mzuzu 2.

Email: courtney.nalivata@gmail.com

Dear Courtney,

**RESEARCH ETHICS AND REGULATORY APPROVAL AND PERMIT FOR PROTOCOL REF NO. MZUNIREC/DOR/24/92: CHALLENGES AND OPPORTUNITIES IN CULTIVATING UNDERUTILIZED CROPS: CASE OF MOMBEZI EXTENSION PLANNING AREA IN CHIRADZULU DISTRICT, MALAWI.**

Having satisfied all the relevant ethical and regulatory requirements, I am pleased to inform you that the above referred research protocol has officially been approved. You are now permitted to proceed with its implementation. Should there be any amendments to the approved protocol in the course of implementing it, you shall be required to seek approval of such amendments before implementation of the same.

This approval is valid for one year from the date of issuance of this approval. If the study goes beyond one year, an annual approval for continuation shall be required to be sought from the Mzuzu University Research Ethics Committee (MZUNIREC) in a format that is available at the Secretariat. Once the study is finalised, you are required to furnish the Committee with a final report of the study.

The Committee reserves the right to carry out compliance inspection of this approved protocol at any time as may be deemed by it. As such, you are expected to properly maintain all study documents including consent forms.

Wishing you a successful implementation of your study.

Yours Sincerely,

Wanangwa K. Msowoya
**MZUNIREC Secretariat**
**FOR: MZUNIREC CHAIRPERSON**


Mzuzu University Research Ethics Committee
Directorate of Research
Mzuzu University
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**APPENDIX 2A: Mzuzu University Research Ethics Committee Informed Consent Form (English)**

**Mzuzu University Research Ethics Committee (MZUNIREC)**

**Informed Consent Form for Research in Agri-Sciences**

## Introduction

I am **Courtney Nalivata** from the Department of Agri-Sciences in the Faculty of Environmental Sciences at Mzuzu University. We are doing research on the **Challenges and Opportunities in Cultivating Underutilized crops: A Case of Mombezi EPA in Chiradzulu District.** This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of another researcher.

## Purpose of the research

This research aims to assess the challenges and opportunities in cultivating underutilized crops.

## Type of Research Intervention

This research will involve your participation in answering an individual interview**.**

## Participant Selection

You are being invited to take part in this research because of your capacity as an actor in the agriculture sector

## Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you choose not to participate, nothing will change. You may skip any question(s) and move on to the next question.

## Duration

The research takes place from the month of May 2024 to July 2024.

## Risks

You do not have to answer any question or take part in the discussion/interview/survey if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

## Reimbursements

You will not be provided any incentive to take part in the research.

## Sharing the Results

The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. Following, we will publish the results so that other interested people may learn from the research.

## Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact: Dr. Frank Mnthambala (supervisor), Mzuzu University, Private Bag 201, Luwinga, Mzuzu 2. Phone: 0999036237, Email: mnthambala.f@mzuni.ac.mw; or you can contact Dr. Ulemu Msiska (Postgraduate Coordinator), Department of Agri-Sciences, Mzuzu University, Private Bag 201, Luwinga, Mzuzu 2. Phone: 0994954025

This proposal has been reviewed and approved by Mzuzu University Research Ethics Committee (MZUNIREC) which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find out more about the Committee, contact Mr. Gift Mbwele, Mzuzu University Research Ethics (MZUNIREC) Administrator, Mzuzu University, P/Bag 201, Luwinga, Mzuzu 2, Phone: 0999404008/0888641486

Do you have any questions?

**Part II: Certificate of Consent**

*I have been invited to participate in research about the* **Challenges and Opportunities in Cultivating Underutilized crops.**

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it, and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

***If illiterate*** [1]

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has consent freely.

Print name of witness_____ Thumb print of participant

**Signature of witness _____**

**Date _____**

**Day/month/year**

**Statement by the researcher/person taking consent**

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands the research project. I confirm the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent_____

Date _____ Day/month/year

[1] A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb print as well.

**APPENDIX 2B: Mzuzu University Research Ethics Committee Informed Consent Form (Chichewa)**

**Mzuzu University Research Ethics Committee (MZUNIREC)**

**Informed Consent Form for Research in Agri-Sciences**

**Mau oyamba**

Ine ndine **Courtney Nalivata** kuchokera ku gawo la maphunziro la Agri-Sciences mu nthambi ya Environmental Sciences ku Mzuzu University. Tikuchita Kafukufuku Wowona ***Mavuto Ndi Mwayi Wolima Mbeu Zakumunda Zogwiritsidwa Ntchito Mochepa/Pang'ono.*** Kalata ya chilolezoyi itha kukhala ndi mau oti simukutha kuwavetsa bwino. Chonde muzindiuza kuti ndiime ndifotokozele pamene tikuchita kafukufukuyu. Ngati muli ndi mafuso ena, funsani ineyo kapena azanga omwe ndikuchita nawo kafukufukuyu.

**Cholinga cha kafukufuku**

Kafukufukuyu akufuna kuunika mavuto ndi mwayi wolima mbeu zakumunda zogwiritsidwa ntchito mochepa/pang'ono.

**Mtundu wa kafukufuku**

Kafukufukuyu akudalila kutengapo gawo kwanu poyankha mafuso amene ndikufuseni mkucheza kwathu.

**Mchifukwa chani mwasankhidwa?**

Mwasankhidwa kuti muchite nawo kafukuyu potengela udindo wanu ngati wamkulu oona za ulimi.

**Kutengapo gawo pa kafukufuku mosakakamiza**

Kutengapo gawo kwanu pa kafukufukuyu mkosakakamiza. Muli ndi ufulu kutengapo gawo kapena ayi. Mukasankha kusachita nawo kafukufukuyu palibe icho chisinthe. Muli ndi ufulu kusiya mafuso ena osayankha mkuyankhako ena.

**Kafukufukuyu atenga nthawi yotalika bwanji?**

Kafukufukuyu atenga miyezi itatu kuyambila meyi mpaka julaye chaka chomwe chino.

**Zodzetsa Nkhawa**

Simukuyenera kuyankha mafuso kapena kutengapo mbali mkucheza ngati mukuona kuti mafuso ena salibwino kapena simunasangalare nawo.

**Cholowa/Kulipidwa**

Kutenga nawo gawo pa kafukufukuyu ndi kwa ulere ndipo simudzalandira kalikonse.

**Kugawana zotsatila za Kafukufuku**

Zotsatila za kafukukuyu zidzagawidwa kwa inu amene mutengepo mbali ndi anthu a mdela lanu zisanagawidwe ku mtundu wose wa a Malawi. Zotsatila za kafukufukuyu zidzasindikizidwa mu m'buku kuti anthu onse ofuna kumva zambiri za kafukufukuyu athe kutero.

**Oti mungathe kulumikizana nawo**

Ngati muli ndi mafuso, mutha kufunsa panopa kapena nthawi ina. Ngati mukufuna kudzafunsa nthawi ina chonde alembeleni kalata a Dr Frank Mnthambala omwe ndi aphuzitsi ku Mzuzu University pa adilesi iyi: Private Bag 201, Luwinga, Mzuzu, kapena aimbileni foni pa 0999036237. Mutha kutumizaso kalata ku imelo adilesi iyi: mnthambala.f@mzuni.ac.mw. Mutha Kulembelaso Dr Ulemu Msiska (Postgraduate Coordinator), Department of Agri-Sciences, Mzuzu University, Private Bag 201, Luwinga, Mzuzu 2. Foni: 0994954025, Imelo adilesi: msiska.u@mzuni.ac.mw.

Kafukufukuyu waunikidwa ndi kuvomerezedwa ndi a Mzuzu University Research Ethics Committee (MZUNIREC) yomwe ndi komiti yoonetsetsa kuti ochita nawo kafukufuku ndi otetezedwa mu njira ina iliyose. Ngati mukufuna kumva zambili za komitiyi lumikizanani ndi a Gift Mbwele pa adilesi iyi: Mzuzu University Research Ethics (MZUNIREC) Administrator, Mzuzu University, P/Bag 201, Luwinga, Mzuzu 2, Ma nambala awo a foni: 0999404008/0888641486

Muli ndi mafuso Lirilonse?

**Gawo lachiwiri: Kalata yovomereza**

*Ndaitanidwa kuti ndichite nawo kafukufuku pa mavuto ndi mwayi wolima mbeu zakumunda*

*zogwiritsidwa ntchito mochepa/pang'ono.*

Ndawelenga komaso andiwelengera zonse zoyenera pa kafukufukuyu. Ndinapatsidwa mwayi oti ndifunse mafuso pa kafukufukuyu ndipo mafuso onse ndinafusa andiyankha mogwira mtima. Ndikuvomereza kuchita nawo kafukufuyu mwakufuna kwanga

Dzina la ochita nawo kafukufuku_____

Signature _____

Tsiku_____ Tsiku/Mwezi/Chaka

***Ngati ali osatha kulemba ndi Kuwelenga*[2]**

Ndaonelela kuwerenga kolondola kwa kalata ya chivomerezo kwa otenga nawo mbali pa kafukufuku. Ndipo otenga nawo mbaliyu anapatsidwa mwayi ofusa mafuso. Ndikutsimikizira kuti otenga nawo mbaliyu wavomereza yekha kutenga nawo mbali pa kafukufukuyu.

**Dzina la mboni_____Otenga nawo mbali a*dinde ndi chala apa*** ☐

**Signature ya mboni _____**

**Tsiku _____ Tsiku/Mwezi/Chaka**

**Ndemanga ya wofufuza/munthu yemwe akuvomereza**

Ndawerenga molondola pepala lachidziwitso kwa omwe angatenge nawo mbali, ndipo momwe ndingathere ndinaonetsetsa kuti otenga nawo mbali amvetsetsa ntchito yofufuza. Ndikutsimikizira kuti otenga nawo mbaliyo adapatsidwa mwayi wofunsa mafunso okhudza kafukufukuyi, ndipo mafunso onse omwe adafunsidwa ndi wotenga mbaliyo adayankhidwa

[2]Mboni yodziwa kulemba imusainile uyu ochita nawo kafukufuku (ngati mkotheka mboniyi isankhindwe ndi uyu ochita nawo kafukufuku osati awo ochititsa kafukufuku). Ochita nawo kafukufuku omwe sadziwa kulemba adindeso ndi chala.

molondola komanso momwe ndingathere. Ndikutsimikizira kuti munthuyo sanakakamizidwe kupereka chilolezo, ndipo chilolezo chaperekedwa mwaufulu komanso mwaufulu.

Siginecha ya Wofufuza /munthu akutenga chilolezo _____

**Tsiku _____(Tsiku/mwezi/chaka)**

**APPENDIX 3: Data Protocol**


**DATA COLLECTION PROTOCOL FOR RESEARCH PROPOSAL SUBMITTED IN PARTIAL FULFILMENT FOR AWARD OF A MASTERS' DEGREE IN TRANSFORMATIVE COMMUNITY DEVELOPMENT**

**28th May 2024**

**DATA COLLECTION PROTOCOL**

**CHALLENGES AND OPPORTUNITIES IN CULTIVATING UNDERUTILIZED CROPS**

**BY**

**MR. COURTNEY NALIVATA, BSc**

**STUDENT ID: MTCD1822**

**DATA COLLECTION PROTOCOL FOR RESEARCH PROPOSAL SUBMITTED IN PARTIAL FULFILMENT FOR AWARD OF A MASTERS' DEGREE TRANSFORMATIVE COMMUNITY DEVELOPMENT**

## OBJECTIVE 1: TO ASSESS THE UNDERUTILIZED CROPS FOUND IN MOMBEZI EPA

<table>
<tr><td>Definition</td><td>This objective will assess the underutilized crops found in Mombezi EPA. To assess means to evaluate or estimate the nature, ability, or quality of something. It often involves examining or analyzing a situation or object in order to make a judgment or determine value, performance, or significance. Underutilized crops are plant species that are grown and consumed to a lesser extent compared to more commonly cultivated crops, despite their potential for food security, nutrition, and income generation. These crops are an essential part of agriculture and provide food, feed, fiber, and other raw materials for various industries. These crops are typically cultivated for commercial purposes and include staple food crops such as maize, rice, soybeans and groundnuts, as well as cash crops like cotton, sugarcane, and tobacco.</td></tr>
<tr><td>Respondents/Data source</td><td>• Farming households<br>• Government agricultural officials (AEDOs, AEDC)<br>• Village heads</td></tr>
<tr><td>Data type</td><td>• Cereals<br>• Legumes<br>• Root<br>• Tubers<br>• Vegetables<br>• Production levels<br>• Usage and utilization<br>• Cultural beliefs</td></tr>
<tr><td>Method of data collection</td><td>• Survey, key informant interviews, document reviews<br>• Literature review</td></tr>
<tr><td>Sampling procedure</td><td>• Cluster sampling will be employed and randomly select respondents.</td></tr>
<tr><td>Sample size</td><td>• 271 respondents will participate in the questionnaire survey.</td></tr>
<tr><td>Data collection site</td><td>• Mombezi EPA</td></tr>
<tr><td>Data collection tools</td><td>• Questionnaire<br>• Interview guide</td></tr>
<tr><td>Question to be included in the tool</td><td><u>SURVEY QUESTIONNAIRE</u>
<table>
<tr><th>#</th><th>Questions</th><th>Responses</th><th>Skip Logic</th></tr>
<tr><td>1</td><td>Gender of respondent</td><td>1=Male<br>2=Female</td><td></td></tr>
<tr><td>2</td><td>Age of the respondent?</td><td>----------</td><td></td></tr>
<tr><td>3</td><td>What is your educational level?</td><td>1=Never attended<br>2=Primary<br>3=Secondary<br>4=Tertiary<br>5=Adult school</td><td></td></tr>
<tr><td>4</td><td>What is your tribe?</td><td>1=Lhomwe<br>2=Chewa<br>3=Yao<br>4=Tonga<br>5=Ngoni<br>6=Ngonde<br>7=Lambya</td><td></td></tr>
</table></td></tr>
</table>

| | | | |
|---|---|---|---|
| | | 8=Tumbuka<br>9=Sena<br>10=Other | |
| 5 | What is your main source of income? | 1=Farmer<br>2=Business<br>3=Formal employment<br>4=Skilled employment<br>5=Petty trader<br>6=Casual labour<br>7=Other | If 1 go to Q6 |
| 6 | How many years have you been farming? | ---------- | |
| 7 | What is your monthly income? | ---------- | |
| 8 | What is your household size? | ---------- | |
| 9 | What type of crops are grown in your area? | /…/ | |
| 10 | What crops do you grow? | /…/ | |
| 11 | How are the above-mentioned crops grown? | 1=Monocropping<br>2=Mixed cropping<br>3=Crop rotation<br>4=Intercropping<br>5=Other | |
| 12 | How much yield of *above-mentioned crop(s)* did you harvest per acre during the previous growing season? *(In kgs)* | _____ | |
| 13 | Why do you grow these crops? | 1=For food<br>2=For manufacturing cooking oil<br>3=For medicinal purposes<br>4=For commercial/business purposes<br>5=For traditional purposes<br>6= Other | |
| 14 | Are there any crops that are grown less frequently? | 1=Yes<br>2=No | If 1, go to Q24 |
| 15 | What are the crops that are grown less frequently in your area? | /___/ | |
| 16 | Are there any crops that have been abandoned in your area? | 1=Yes<br>2=No | If 1, go to Q26 |
| 17 | What are the crops that have been abandoned in your area? | /___/ | |

**INTERVIEW GUIDE**

| | |
|---|---|
| | 1. What categories and specific underutilized crops are grown in your area?<br>2. What has been the trend in terms of production of these crops? Has it increased or decreased? And why? *Probe for more*<br>3. Why do farmers cultivate these crops? For what reason?<br>4. What are the reasons for not cultivating and underutilization of these crops?<br>5. Are there any cultural beliefs associated with the cultivation of these crops? Which crops are those? |
| Enumerators | 3 |
| Denominator | Total number of respondents |
| Data analysis | **Quantitative:** Descriptive statistics will be used to analyse the quantitative data using frequencies, percentages and charts. Descriptive statics will be done in Statistical Package for Social Sciences and Microsoft Excel (2021).<br><br>**Qualitative:** Transcribing, coding, grouping into sub themes, themes answering to research objectives |

## OBJECTIVE 2: TO ANALYSE THE CHALLENGES AND OPPORTUNITIES IN CULTIVATING UNDERUTILIZED CROPS

| | |
|---|---|
| Definition | The objective aims to investigate the challenges and opportunities in cultivating underutilized crops. To analyse means to examine something in detail in order to understand it better or to draw conclusions from it. Challenges in this context refer to factors that may hinder the production or marketability of these underutilized crops. These factors include but are not limited to limited access to seeds, inadequate knowledge of processing and value addition, limited access to affordable credit, lack of extension services, stiff competition with modern crops, inadequate land for cultivation, scarcity of labour and pests and diseases. On the other hand, the opportunities in this study refer to favorable circumstances, situations, or possibilities that can lead to positive outcomes or benefits. These include the availability of extension services, easy seed access, availability of knowledge in processing and value addition, availability of structured markets and facilities, availability of land, increasing demand for food and contribution to nutrition security. |
| Respondents/Data source | • Farming households<br>• Government agricultural officials (AEDOs, AEDC)<br>• Village heads |
| Data type | • Seed access<br>• Knowledge of processing & value addition<br>• Access to affordable credit<br>• Extension services<br>• Competition from modern crops<br>• Consumer preferences<br>• Market facilities<br>• Land for cultivation<br>• Availability of labour<br>• Farmer`s attitude<br>• Increasing demand for food<br>• Pests and diseases<br>• Soils fertility<br>• Nutrition |
| Method of data collection | • Survey, key informant interviews, document reviews<br>• Literature review |

| | |
|---|---|
| Sampling procedure | Cluster sampling will be employed and randomly select respondents. |
| Data collection site | Mombezi EPA |
| Sample size | 271 respondents will participate in the questionnaire survey. |
| Data collection tools | • Questionnaire<br>• Interview guide<br>• Checklist |
| Question to be included in the tool | **Questionnaire** |

| # | Questions | Responses | Skip Logic |
|---|---|---|---|
| 1 | Do you have access to crop seeds you grow? | 1=Yes<br>2=No | If 1, go to Q2, Q3 |
| 2 | What kind of seed crops do you have access to? | /___/ | |
| 3 | Where did you get them? | 1=Received from Government extension workers<br>2=Received from NGOs<br>3=Received from friends<br>4=Bought<br>5=Other | |
| 4 | Do you know how to process these crops after harvesting? | 1=Yes<br>2=No | |
| 5 | Do you add value to these crops? | 1=Yes<br>2=No | If 1, go to Q6 |
| 6 | How do you add value to these crops? | 1=Packaging<br>2=Branding<br>3=Processing<br>4=Marketing<br>5=Other | |
| 7 | Do you have access to extension services? | 1=Yes<br>2=No | If 1, go to Q8 |
| 8 | Who provides these extension services? | 1=Government<br>2=NGOs<br>3=Private extension workers<br>4=Other | |
| 9 | Do you have access to credit? | 1=Yes<br>2=No | If 1, go to Q10 |
| 10 | Where do you get the credit? | 1=Government loans<br>2=Microfinancing institutions<br>3=Cooperative credit societies<br>4=VSLA | |

| | | | |
|---|---|---|---|
| | | 5=Friends<br>6=Other | |

11 The challenges you face in cultivating these crops are?

| Challenge | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| Limited access to seeds | | | | | |
| Lack of knowledge of processing and value addition | | | | | |
| Lack of extension services | | | | | |
| Limited access to affordable credit | | | | | |
| Competition from modern crops | | | | | |
| Poor market structures and facilities | | | | | |
| Low demand from consumers | | | | | |
| Inadequate land for cultivation | | | | | |
| Scarcity of labour | | | | | |
| Negative attitude of farmers towards these crops | | | | | |
| Pests and diseases | | | | | |
| Poor soils | | | | | |

12 The opportunities in cultivating these underutilized crops are?

| Opportunity | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Easy seed access | | | | | |
| Availability of extension services | | | | | |
| Easy access to affordable credit | | | | | |
| Well structured markets and facilities | | | | | |
| High demand from consumers | | | | | |
| Availability of land for cultivation | | | | | |
| Availability of labour | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Positive attitude of farmers towards these crops | | | | | |
| | | Increasing demand for food | | | | | |
| | | Access to fertile soils | | | | | |
| | | Contribution to nutrition security | | | | | |

**Interview**

1. What are the challenges farmers face when cultivating these underutilized crops?
2. What kind of opportunities are there when cultivating these underutilized crops?
3. What recommendations would you propose to counter the challenges and harness the opportunities?

| | |
|---|---|
| Enumerators | 3 |
| Denominator | Total number of respondents |
| Data analysis | Quantitative: Descriptive statistics (frequencies, tables and graphs) and ANOVA<br>Qualitative: Thematic analysis |

## OBJECTIVE 3: TO EXAMINE THE DETERMINANTS OF CULTIVATING UNDERUTILIZED CROPS

| | |
|---|---|
| Definition | The objective will examine the determinants of cultivating underutilized crops. To examine refers to scrutinizing something closely in order to understand, evaluate, or analyze it. The determinants in this context refer to factors or variables that influence or determine the outcome, behavior, characteristics, or properties of a system, process, or phenomenon. These factors can be internal or external, direct or indirect, and may interact with each other to produce a specific result or effect. Based on the study, the determinants of cultivating these underutilized crops are age, employment, ethnic group (tribe), education level, awareness level, market availability, land access, availability of labour and taste and preference. |
| Respondents/Data source | • Farming households<br>• Government agricultural officials (AEDOs, AEDC)<br>• Village heads |
| Data type | • Age<br>• Employment<br>• Ethnic group<br>• Education level<br>• Awareness level<br>• Markets<br>• Land<br>• Labor<br>• Taste and preference |
| Method of data collection | • Survey, key informant interviews, document reviews<br>• Literature review |

<table>
<tr><td>Sampling procedure</td><td>• Cluster sampling will be employed and randomly select respondents.</td></tr>
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<tr><td>Question to be included in the tool</td><td><u>Questionnaire</u><br><br>
<table>
<tr><th>#</th><th>Questions</th><th>Responses</th><th>Skip Logic</th></tr>
<tr><td>1</td><td>Are you aware of how to grow and harvest these crops?</td><td>1=Yes<br>2=No</td><td></td></tr>
<tr><td>2</td><td>Do you prefer growing these crops as compared to their modern counterparts?</td><td>1=Yes<br>2=No</td><td></td></tr>
<tr><td>3</td><td>Do you like the taste of the crops you grow?</td><td>1=Yes<br>2=No</td><td></td></tr>
<tr><td>4</td><td>Do you have access to markets after harvesting the crops?</td><td>1=Yes<br>2=No</td><td></td></tr>
<tr><td>5</td><td>Do you have access to land?</td><td>1=Yes<br>2=No</td><td>If 1, go to Q7</td></tr>
<tr><td>6</td><td>What is the size of the land you have for cultivating crops?</td><td>/…/</td><td></td></tr>
<tr><td>7</td><td>How did you acquire that piece of land?</td><td>1=Inherited from parents<br>2=Bought<br>3=Rented<br>4=Other</td><td></td></tr>
<tr><td>8</td><td>What kind of labour do you use?</td><td>1=Family labour<br>2=Hired labour<br>3=Both</td><td></td></tr>
</table>
<br><u>Interview Guide</u><br><br>1. What are the factors that enable one to cultivate underutilized crops?<br>2. What support does the government give towards the cultivation of these crops?<br>3. What should be done to ensure that an enabling environment for growing these crops has been created?</td></tr>
<tr><td>Data analysis</td><td>Quantitative: Descriptive statistics (frequencies, tables and graphs), Chi-square and ANOVA<br>Qualitative: Thematic analysis</td></tr>
</table>