

Multipurpose forage seed and vegetive material systems in Malawi:

Seed business models for forage cultivation and use

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Published by International Institute of Tropical Agriculture (IITA)

July 2024

The [Sustainable Intensification of Mixed Farming Systems Initiative](#) aims to provide equitable, transformative pathways for improved livelihoods of actors in mixed farming systems through sustainable intensification within target agroecologies and socio-economic settings.

Through action research and development partnerships, the Initiative will improve smallholder farmers' resilience to weather-induced shocks, provide a more stable income and significant benefits in welfare, and enhance social justice and inclusion for 13 million people by 2030.

Activities will be implemented in six focus countries globally representing diverse mixed farming systems as follows: Ghana (cereal–root crop mixed), Ethiopia (highland mixed), Malawi: (maize mixed), Bangladesh (rice mixed), Nepal (highland mixed), and Lao People's Democratic Republic (upland intensive mixed/ highland extensive mixed).

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Contents

Abbreviations and acronyms	ii
Definitions	ii
SUMMARY	1
1. INTRODUCTION	4
1.1 Study background	4
1.2 Overview of the Malawi seed industry	4
2. DATA COLLECTION AND ANALYSES	6
3 RESULTS AND DISCUSSION	7
3.1 State of forage and vegetative material in Malawi.....	7
3.1.1 Forage seed system in Malawi: SWOT Analysis.....	7
3.1.2 Current and previous projects in forage value chains	11
3.1.3 Multipurpose forage and fodder tree varieties availability.....	17
3.1.4 Promotion and uptake of forages seed and biomass.....	23
3.1.5 Malawi's capacity to produce forage seed and biomass.....	28
3.1.6 Forage seed policy and regulatory frameworks.....	33
3.1.6 Aligning crop, pasture, and seed production policies with other sectors.....	35
3.1.7 Institutional structures and procedures for import and release.....	35
3.2 Market pull entities for forage seed and biomass production	36
3.2.1 Demand for forage seed and biomass in Malawi	36
3.2.2 Seed company investments in forage value chain	49
3.3 Entry points for establishing forage businesses in Malawi	50
3.3.1 Existing and potential forage-related business opportunities.....	50
3.3.2 Forage seed and biomass business investment models: Case studies.....	53
4 CONCLUSIONS.....	56
5 RECOMMENDATIONS	57
APPENDIX	59

Abbreviations and acronyms

Alliance-CIAT	Alliance of Bioversity International and CIAT
APES	Agriculture Production Estimates Survey
ATCC	Agriculture Technology Clearing Committee
CBBP	Community Based Breeding Programme
CEMPA	Central Region Milk Producers Association
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CISANET	Civil Society Agriculture Network
CISONECC	Civil Society Network on Climate Change
COMESA	Common Market for Eastern and Southern Africa
DAHLD	Department of Animal Health and Livestock Development
DAES	Department of Agricultural Extension Services
DARS	Department of Agriculture Research Services
DFID	Department for International Development
DUS	Distinctness, Uniformity and Stability
EPA	Extension Planning Areas
FAO	Food and Agriculture Organization
FICA	Federal Insurance Contributions Act
FISP	Farm Input Subsidy Program
GHGs	Greenhouse Gases
ha	hectare
GoM	Government of Malawi
ICRAF	World Agroforestry Center
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
IRR	Internal Rate of Return
LUANAR	Lilongwe University of Agriculture and Natural Resources
MBG	Milk Bulking Group
MDFA	Mpoto Dairy Farmers Association
MFS	One CGIAR Initiative Mixed Farming Systems
MoU	Memorandum of Understanding
NLDP	National Livestock Development Policy
NPV	Net Present Value
NVRC	National Variety Release Committee
PBP	Pay Back Period
SADC	Southern African Development Community
SIDA	Swedish International Development Cooperation Agency
SSU	Seed Systems Unit
STUM	Seed Trade Association of Malawi
TLU	Tropical Livestock Unit
TTO	Technology Transfer Office

USAID	United States Agency for International Development
VCU	Value for Cultivation and Use
VPM	Vegetative propagated material
WFP	World Food Programme

Definitions

Commercial farmer	A farmer that produces agricultural products intended for the market to be delivered, sold or stored at commercial structures and/or sold to end consumers (feedlots, poultry farms, dairies, etc.), fellow farmers and direct exports. The farmer generally use high levels of inputs.
GHG	Greenhouse Gas (GHG) is a gas that trap heat in the atmosphere such as carbon dioxide, methane, nitrous oxide, and fluorinated gases. In Agriculture, domestic livestock such as cattle, swine, sheep, and goats produce methane as part of their normal digestive process and when animal manure is stored or managed methane is produced.
Market demand	The total volume of a product or service that would be purchased by a specific group of buyers, in a specific geographic area and in a defined period of time, in a specific marketing environment and within a specific marketing program.
NPV	Net present value (NPV) is used to determine whether or not an investment, project, or business will be profitable down the line. The NPV of an investment is the sum of all future cash flows over the investment's lifetime, discounted to the present value.
Penetrated market	Set of consumers who, in fact, purchase the product or service.
Potential market	Set of consumers who show interest in the market supply.
QDS	Quality Declared Seed (QDS) is a seed system in which 10 percent of the seed produced and distributed is checked by a certifying agency.
Seed	A botanical structure that contains at least one ripened ovule with or without accessory parts and may also include any plant or plant part used as propagation material such as: fruit, root, rhizomes, corm, stem, sprout, tree seedling and leaf capable of regenerating crops, trees, shrubs and pastures that is true to its type.
Smallholder farmer	A farmer that manages area varying from less than one hectare to 10 hectares characterised by family-focused motives such as favouring the stability of the farm household system, using mainly family labour for production, and using part of the produce for family consumption.
TLU	Tropical Livestock Unit (TLU) is a measure of livestock numbers converted to a common unit. An increased number of animals per adult available to support the household, indicates improved food security and household resilience. Relative changes to the TLUs provide a direct indicator of food security risk.
VPM	Vegetative propagated material (VPM) refers to any plant or plant part used as propagation material such as: fruit, root, rhizomes, corm, stem, sprout, tree seedling and leaf capable of regenerating crops, trees, shrubs and pastures that is true to its type.

SUMMARY

Livestock productivity in Malawi is low across species. To address this, the Alliance-Bioversity International and CIAT (Alliance-CIAT), International Livestock Research Institute (ILRI), Department of Agricultural Research Services (DARS), and the Lilongwe University of Agriculture and Natural Resources (LUANAR), under the CGIAR Mixed Farming Systems Initiative (MFS) explored the viability of improving the availability and use of forage seeds and vegetative material in Malawi. This aimed to address the challenge of inadequate feed quality and quantity, particularly during the long dry season. Feeds and feeding are critical factors affecting livestock productivity.

This study generated evidence to support the development of economically driven business models to strengthen forage seed systems and the production of improved cultivated forages in Malawi. Consultations were conducted in Lilongwe, Kasungu, Mzimba, Balaka, and Thyolo districts, revealing the following key findings:

Weak forage seed system: The forage seed system in Malawi is weak, with poorly coordinated stakeholders and inconsistent policies. Forage utilization and seed focus on exotic species, native forage species are not adequately recognized. Despite this, there are significant opportunities, if strategically addressed, for competitive forage seed systems.

Isolated initiatives: Few multipurpose forages and agroforestry initiatives are being implemented, often in isolation and with donor support. These aim to address livestock productivity challenges, improve soil health, and enhance farmers' resilience to floods and droughts.

Start-up seed availability: Malawi has start-up seeds for various grasses, legumes, and multipurpose fodder trees. Major producers and suppliers are research institutions (Chitedze, Bvumbwe, and LUANAR), whose primary mandate is not forage seed production and distribution.

Stakeholder interest: Research institutions, development agencies, and the private sector show strong interest in promoting improved forages and legume fodder trees, provided the benefits over existing varieties are clear. They offer technical and advisory support, including training on forage cultivation and usage, agroforestry, and soil conservation.

Limited production capacity: Malawi's capacity to produce forage seed and biomass is limited. Research institutions lack specialized forage breeders, and current seed inspectors are crop-specialized, necessitating capacity building to support forage seed producers effectively.

Policy framework: Malawi's 2018 Seed Policy, 2022 Act, and regulations, aligned with SADC and COMESA seed harmonization, support a competitive forage seed system.

The 2021 National Livestock Development Policy and the 2023 National Livestock Strategic Master Plan emphasize the need for forage seed systems but require alignment with irrigation and land resource policies.

Import and release procedures: Existing structures for importing and releasing new crop and legume varieties apply to forages, though not specific to them.

High demand, low uptake: Despite high demand for forage seed and biomass, uptake among smallholder farmers, commercial farmers, and development agencies remains low. A market-driven approach, including the establishment of well-structured livestock markets, and awareness creation on feeding benefits, is recommended to stimulate investment in forages and legume fodder trees.

Market challenges: Limited market penetration for forage seeds disincentivizes seed companies, restricting accessibility and utilization among smallholder farmers. Although the number of seed companies in Malawi has increased, certified forage and quality declared seeds (QDS) are not yet produced locally, presenting a business opportunity.

Smallholder potential: Smallholder farmers can engage in forage seed production, basic seed multiplication, hay, and silage to support livestock production. Agro-dealerships offer additional business opportunities, particularly for young farmers. Given the average small landholding size of 0.6 ha, mixed farming systems integrating forages which can be used as feedstuffs are recommended.

Profitability of legume forages: For smallholder farmers with less than 1 ha, legume forage production is more profitable than grasses. Farmers can achieve a return on investment in forage production in 2.5 years, with an internal rate of return exceeding 35%. However, adhering to mixed farming principles is advised for those with limited land.

In light of these findings, several priority actions and responsibilities for forage value chain actors are suggested to strengthen Malawi's forage seed systems

Suggested Priority action	Responsibility
- Continue sensitising and promoting forage and legume fodder production and utilisation through integration of forage messages in the agricultural extension system to create knowledge and awareness of best forage practice among smallholder farmers. - Train livestock farmers in appropriate land management practices to support grazing and improved pasture production practices. - Train, recruit and maintain forage breeders in research institutions in Malawi.	NGOs, Research institutions, Extension Agents, Department of Agricultural Extension Services (DAES), DARS, Alliance-CIAT LUANAR, DARS, DAHLD

Suggested Priority action	Responsibility
▪ Train new and/or capacitate existing seed inspector on forage seed standards and requirements	DAHLD, LUANAR, DARS, NGOs
▪ Conduct sensitisation efforts on existing procedures for importing forage seed and release.	DAES, LUANAR, DARS, DAHLD, NGOs, Alliance-CIAT
▪ Develop protocols for managing land for grazing animals and planting pasture/fodder trees and information, education, and communication (IEC) materials.	Research institutions, NGOs, DAHLD, DAES
▪ Increase funding towards research and innovation in forage seed systems.	Ministry of Finance, Donors, NGOs, LUANAR, DARS, Mwapata Institute, DAHLD, CIAT
▪ Incentivize farmers and private companies to get involved in the forage seed value chain	Ministry of Agriculture, DAHLD, Seed Companies, Ministry of Trade, Research Institutions
▪ Lobby for inclusion of forage seed in FISP programme to complement the package for livestock subsidy	CISANET, CISONECC, DAHLD, Alliance-CIAT
▪ Conduct stakeholders' consultation to justify the need to establish a QDS system as a step towards a full forage seed certification in Malawi	DAHLD; Ministry of Agriculture, NGOs, Alliance-CIAT, LUANAR
▪ Establish a forage technical working or pillar group to spearhead initiatives for strengthening the Malawi forage seed system	Alliance-CIAT, Ministry of Agriculture, DAHLD, Research Institutions, DAES, Civil Society Organization
▪ Update the national forage variety catalogue of officially released forage varieties in Malawi	Research institutions, NGOs, DAHLD, DAES, ATCC

1. INTRODUCTION

1.1 Study background

The multi-purpose forage seed or vegetative material systems assessment study in Malawi was funded by the Consultative Group on International Agricultural Research (CGIAR) Mixed Farming Systems (MFS) initiative. It was implemented by the Alliance of Bioversity International and International Center for Tropical Agriculture (CIAT) (Alliance-CIAT) in collaboration with the Department of Agriculture Research Services (DARS) and Lilongwe University of Agriculture and Natural Resources (LUANAR). The goal of this study was to understand the conditions necessary for improving the functioning of integrated multi-purpose forage seed or vegetative material systems along selected livestock value chains (beef, dairy, and goats). The study aimed to develop viable forage-oriented business models and sustainably establish and upscale the access and utilization of cultivated forages.

Livestock productivity in Malawi is low, with feeds and feeding challenges being significant contributing factors. Therefore, the Alliance-CIAT, DARS, and LUANAR sought to explore the viability and practicality of enhancing forage seed or vegetative material availability and use in Malawi. To achieve this, the study analyzed the demand for seed systems, identified stakeholders in the forage seed and vegetative material value chains, examined links to the commercialization of selected livestock value chains (specifically small ruminants, dairy farming, and beef fattening), and identified bottlenecks preventing the creation of an enabling market, institutional, and policy environment.

1.2 Overview of the Malawi seed industry

The Malawi seed industry has grown in the number of seed companies and the types of crops produced, largely due to government and donor initiatives and support¹. At the time of this study, 25 seed companies were registered with the Seed Trade Association of Malawi (STAM), with much of their produce taken up by government programs, particularly the Farm Input Subsidy Program (FISP). The increase in seed production has also led to a rise in the number of agro-dealers handling the increased seed volume due to the FISP program. To manage the increased demand for certification services, the government trained para seed inspectors to ensure adequate inspection of seed fields. Additionally, there are proposals to accredit licensed private seed inspectors to further ease the workload and maintain high-quality seed production in Malawi².

¹ McKnight Foundation, Global Collaboration for Resilient Food Systems. Last accessed 9th March 2024.

² Seed Trade Association of Malawi, 2024. Seed Industry Information. Last accessed 10th March 2024.

Among the key crops for which seed is produced in Malawi are maize, soybean, groundnuts, cotton, beans, pigeon peas, cowpeas, cassava, and sweet potato vines³. According to STAM, maize, beans, and groundnuts are the main crops whose seeds are bought in large volumes by smallholder farmers. About 80% of smallholder farmers however use seed saved from their own harvest, sourced from neighbors, or obtained from local markets. Government policy does not support the use of farmer-sourced seed, which is considered inferior compared to certified seed.

Although the local seed industry plays a critical role in food crop production and is a major contributor to national food security, the multi-purpose forage seed and vegetative material component, essential for livestock production, has not been prioritized. Current efforts in the Malawi seed industry focus on food crops and legume seeds, but not on forage seed production. Consequently, the 2021 National Livestock Development Policy (NLDP) highlights the establishment of pasture seed systems as a critical strategy for improving livestock productivity⁴. This is further detailed in the 2023 livestock sector strategic plan, which operationalizes the 2021 NLDP⁵.

Against this background, this study was conducted to generate evidence supporting the development of economically driven business models to strengthen forage seed systems and the production of improved cultivated forages in Malawi.

³ Makoko Sangwani, Kamanga Naomi, Maereka Enock and Borman Gareth, 2017. Report of the workshop proceedings on strengthening seed systems for legumes in Malawi. Crossroads Hotel and Conference Centre, Lilongwe, Malawi.

⁴ Government of Malawi, 2021. National Livestock Development Policy. Department of Animal Health and Livestock Development. Lilongwe, Malawi.

⁵ Government of Malawi, 2023. National Livestock Development Strategic and Master Plan. Department of Animal Health and Livestock Development. Lilongwe, Malawi.

2. DATA COLLECTION AND ANALYSES

Data for this study was gathered through a literature search and interviews. A total of 37 interviews with strategic actors along the forage systems value chains were conducted via face-to-face meetings, Zoom, and phone calls from January to February 2024. A summary of the interviews is presented in Table 1, with a detailed list available in Appendix 1. Interview guides with open and closed-ended questions were used during consultations. For selected individual private farms, the interviews focused on collecting data needed to compute financial ratios and establish the scale of pasture production.

Data for profiling the agro-ecosystem zones in Malawi was sourced through literature searches. This information helped identify potential high-yield forage production sites and the distribution of selected livestock value chains (beef, dairy, and goats) that could drive forage commercialization, including in areas prone to drought and floods. Stakeholders interviewed were drawn from Lilongwe, Kasungu, Mzimba, Balaka, and Thyolo districts.

Quantitative and qualitative analytical methods were used to analyze the data in Microsoft Excel. A SWOT analysis was conducted to identify the strengths and weaknesses (internal drivers), and opportunities and constraints (external drivers) associated with the forage seed systems in Malawi. Financial investment analysis models were computed using data reported during interviews and from literature to estimate Net Present Value (NPV) and Payback Period (PBP) for the production of forages on a hectare (ha) of land as a pure stand. Further comparisons were made between smallholder and commercial farmer investments, with the latter differentiated based on the scale of production (at least 1 ha) and their initial investment in forage production assets including investments in a tractor, hay harvester, and hay baler in addition to initial land investment).

Table 1: Summary of stakeholders consulted between January and February 2024

CATEGORY	NUMBER	PERCENTAGE	APPROACH USED
Academic Institution	1	2.7	Face to Face
Development Agency	2	5.4	Face to Face
Forage and forage seed producers	1	2.7	Online
Farmer Associations	4	10.8	Face to Face
Farmer Organisation	1	2.7	Face to Face
Government Institutions	17	45.9	Face to Face and Online
Individual Private Farms including private Company	9	24.3	Face to Face and Online
Regulatory Body	2	5.4	Online
Total	37	100	

3 RESULTS AND DISCUSSION

3.1 State of forage and vegetative material in Malawi

3.1.1 Forage seed system in Malawi: SWOT Analysis

The forage seed system in Malawi is currently weak, with poorly coordinated stakeholders and inconsistent policy support. Despite these challenges, there are significant opportunities within Malawi's forage seed system that, if strategically addressed, could create a competitive and robust system.

Table 2 presents the strengths, weaknesses, opportunities, and threats (SWOT) for the forage seed system in Malawi. For smallholder farmers, one of the key weaknesses is the small average landholding size of 0.6 ha. This small size limits the economies of scale necessary for profitable farming⁶. These farmers often face limited access to essential inputs such as seeds, fertilizer, knowledge, skills, credit, and markets. However, there are regional variations in land access or ownership. For instance, in the central region, particularly in Kasungu district, some smallholder farmers can utilize more than 5 ha of land due to access to idle estate farms. In the northern region, the majority own between 2 to 5 ha, while in the southern region, most own less than 1 ha⁷.

The SWOT analysis highlights gaps in the Malawi forage seed system at all levels, from farmers to policymakers. This underscores the need for well-coordinated efforts among forage seed value chain stakeholders, including policymakers, development agencies, seed producers and distributors, researchers, regulatory bodies, and farmers.

⁶ MwAPATA Institute, 2020. [The Past, Present, and Future of Land Use in Malawi: A Background Review](#).

⁷ Milu Muyanga, Zephania Nyirenda, Yanjanani Lifeyo & William J. Burke, 2020. The Future of Smallholder Farming in Malawi. MwAPATA Institute.

Table 2: Strengths and weaknesses, opportunities and threats for the Malawi forage seed systems.

STRENGTHS:	WEAKNESSES:
• Availability of research institutions to conduct research and release forage varieties. • Local availability of startup forage seed and vegetative material varieties ideal for livestock production and soil fertility improvement. • Existence of structures and procedures for forage importation, evaluation protocol and production manuals for forages. • Existence of dairy farmers who have, at small scale in southern and central region, adopted the production and usage of forages in their farming production system thus creating a platform for farmer-farmer learning. • Growing interest from farmers to keep livestock in drought and flood prone areas as a risk mitigation measure. • Availability of land for forage production e.g., in Kasungu district where there are idle estates which can be leveraged by either opening a new field for pure exotic pastures or fortification of natural pastures. • Livestock production is still a profitable enterprise, it integrates well in mixed farming systems and there is a growing political will to address the chronic challenge of low livestock productivity. • Availability of policy and regulatory frameworks to facilitate strengthening and creation of a competitive forage seed system.	• Low livestock productivity across species evidenced by e.g., low production performance levels and high mortality rates. • Skewed support and resource allocation by government policies in favor of crops, against livestock and forages. • Uncoordinated efforts among stakeholder such as promotion of land restoration programs that promote soil and water conservation measures and agroforestry, without adequate integration of forages e.g., promotion of vetiver grass. • Knowledge gap among farmers on livestock production, forage husbandry practices and utilization and livestock production a commercial business. • Poor coverage and lack of capacity of the livestock extension and veterinary services due to high ratio of veterinarian to farmers estimated at 1: 14,139 in 2022. • Lack of functional and structured livestock markets and infrastructure to motivate farmers investment in forages such that current returns do not reward farmers investment in forages. • Low effectiveness of livestock input support and restocking schemes, given farmers lack basic husbandry knowledge, extension and veterinary services underserved, reflected in high mortality rates. • Weak forage seed value chain characterized by poor awareness of forage users, unavailability of reliable seed suppliers, insufficient forage breeders and inspectors, and lack of both forage market infrastructure • Lack of locally adapted variety release system for forages.

	• Limited funding towards research in the forage value chains resulting in no release of new forage varieties for the past decade. • Lack of interest from seed companies to produce forage seed due to unavailability of viable market (low demand for certified forage seed). • Weak forage seed distribution system resulting in unavailability of forage seed in most of the districts in Malawi. • No coordinated efforts among stakeholder when implementing forage promotion initiatives and that forage issues becomes second thought in livestock programs. • Lack of ownership among smallholder farmers when introduced to forages through a project which affects sustainability of the investment after a project phases out. • Lack of direct correlation between investment in forage production and economical returns from livestock. • High Greenhouse Gases (GHG) emission intensity from livestock, compromising possible impacts of forage production as carbon sink. • Free grazing policy that does not allow smallholder farmers to protect their forage fields against animals or other famers. • High dependence on natural pasture and crops residues resulting in low uptake on improved forage varieties. • Projects promoting fodder trees have strong emphasis during pasture tree establishment stage unlike utilization as most legume fodder trees reach harvesting stage when the project has phased out or changed focus. • Limited capacity to release forage varieties in Malawi.
OPPORTUNITIES:	THREATS

• Increasing number of stakeholders especially development agencies willing to promote access and utilization of forages and vegetative material among smallholder farmers. • Increasing demand for livestock and livestock products. • More development actors sensitized about the importance of livestock in food systems, income diversification and nutrition. • Increase in livestock cooperatives and mega farms who have a high potential to create a viable demand for forage seed and forage related products. • The growing demand for forage and vegetative material among farmers especially smallholder, commercial farmers and developing agencies. • Availability of commercial farmers who can act as models or sites for smallholder farmers experiential learning. • Increase in number of livestock in Malawi through livestock programs such as pass-on program for different livestock species such as dairy and goats. • Availability of land for forage production among farmers and research institutions that could quickly drive the need for investment in forage seed system. • Interest from development agencies to promote forage related interventions in relation to livestock production, climate change and soil conservation. • Most of the forages which are ideal for livestock feeding can also be used for soil improvement and energy supply thereby creating a	• Prevalence of tangible negative impacts of the climate change on feed availability in both quantity and quality. • Declining availability of natural pasture sources, due to encroachment of cultivation, and people selling wet land. • Poor and declining quality of indigenous pasture species which are generally rough and easily dry up. • Decrease in household landholding size among smallholder farmers due to human population growth, hence less space for forages as crops are being prioritized. • Illegal importation of forage seed by private entities. • Forages and fodders risks such as weeds infestation, hiding poisonous insects that can cause death to animals when fed, loss in biodiversity, and creation of competition for land with crop enterprises. • Lack of enforcement of seasonal burning control to prevent farmers from destroying biomass. • Limited resource allocation and finance to promote forage seed and biomass production and research.
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better platform for high adoption of the forages. • There is conducive climate for forage production in Malawi. • Readily availability of manure for forage production hence reducing the cost of production. • Existing local partnerships among government departments, farmer organizations, development agencies such as CGIARs, and academia thus ensuring continued research efforts on forages. • Drive towards farming systems research approaches which promote crops and livestock enterprises integration among stakeholders. • Available business entry points for selling forage seed and biomass such as hay forage bails and in long term trading in carbon sequestration. • Increase in government programs encouraging livestock production such as Agricultural Commercialization (AGCOM) project. • Availability of feedlots who needs forages in large quantities.	
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3.1.2 Current and previous projects in forage value chains

Few multipurpose forages and agroforestry initiatives are being implemented in Malawi, primarily with financial support from donors. These initiatives are often carried out in isolation and lack coordination. They aim to:

- a) address livestock productivity challenges (specifically in beef, dairy, and goat value chains),
- b) improve soil health, and
- c) serve as adaptive measures to build farmers' resilience against floods and droughts.

In this study, 14 projects were reported, with seven projects already completed and seven still being implemented (see Table 3). The donors for these projects include the Adaptation Fund, World Food Programme (WFP), World Agroforestry Center (ICRAF), Alliance-CIAT, International Maize and Wheat Improvement Center

(CIMMYT), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Livestock Research Institute (ILRI), European Union (EU) through the International Fund for Agricultural Development (IFAD), Swedish International Development Cooperation Agency (SIDA), Government of Flanders, Food and Agriculture Organization (FAO), World Bank, We-Effect, Royal Norwegian Embassy through Norwegian Church Aid, Federal Insurance Contributions Act (FICA), Department for International Development (DFID), and United States Agency for International Development (USAID).

Table 3: Past and present projects along forage seed value chains.

Projects	Year of operation	Focal Districts	Implementing organization	Funding Source	Key Activities Related to Forages	Livestock Value Chain
Economic Empowerment and Financial Inclusion of Women and Youth through Dairy Agribusiness	2022 - 2028	Dowa, Mchinji	CREMPA	Swedish Int. Devpt Coop Agency (SIDA)	- Forage production - Feed formulation using forages	Dairy
GAIN project	2021 - 2025	Mzimba	Heifer International	Flanders Government	Forage production and utilisation	Beef
Adaptation Fund Project	2021 - 2025	Blantyre, Chiladzulo, Balaka	DARS, DAHLD	Adaptation Fund	Production and promotion of multipurpose forages as Cyclone Response Initiative	Goat
One CGIAR Mixed Farming Systems initiative	2022 - 2024	Kasungu, Mzimba, Balaka, Zomba, Mbawa	Alliance-CIAT, CIMMYT, IITA, DARS	One-CGIAR fund	Evaluation of four brachiaria species, crotalaria, mucuna pruriens, dual purpose maize and groundnut varieties, nutritive value analyses	Beef, dairy, goat
Malawi Dairy Value Chain Project	2021 - 2024	Dowa, Dedza, Lilongwe,	CREMPA, We-Effect	We-Effect	- Forage production - Feed formulation	Dairy

Projects	Year s of ope- ra- tion	Focal Districts	Implemen- ting organiza- tion	Funding Source	Key Activities Related to Forages	Livestock Value Chain
		Mchinji, Ntchisi			n using forages ▪ Soil conservatio n	
K2 Tigwiranema nja AIDS Support Organisation (K2 TASO)	Sinc e 2022	Kasungu	K2TASO	K2 - USA	Promotion of forages and multipurpose fodder trees	1. Dairy 2. Goat 3. Chicke n
Sustainable Agricultural Production Programme (SAPP)	2011 - 2024	Balaka, Lilongwe East, Lilongwe West, Chiladzul o, Blantyre, Khotakot a, Chitipa	IFAD, DAHLD, DARS	IFAD	▪ Legume pastures and multipurpo se production ▪ Promotion of livestock and crop production systems (feeding trials)	1. Goat 2. Chicken
Enhancing The Resilience of Agro- ecological Systems Project (ERASP)	2017 - 2022	Karonga, Machinga , Phalomb e	DARS	IFAD	Forage production promotion	1. Goat 2. Chicken
KULIMA project	2017 - 2022	Mzimba, Rumphi	Plan Internation al Malawi	FAO, EU	▪ Forage production and utilisation ▪ Soil conservatio n	Dairy
VUNA project	2017 - 2018	Lilongwe, Mchinji, Dedza, Dowa, Mzimba, Nkhataba y	MMPA	DFID	▪ Forage production and utilisation ▪ Feed formatio n using forages	Dairy

Projects	Year s of ope- ra- tion	Focal Districts	Implemen- ting organiza- tion	Funding Source	Key Activities Related to Forages	Livestock Value Chain
Scaling Up Dairy Production in the Central Region	2016 - 2019	Lilongwe, Mzimba, Nkhataba y	MMPA	FICA	- Forage production and utilisation - Feed formulatio n using forages	Dairy
Malawi Agroforestry Tree Programme	2000 - 2004	Central and Sourthen region	TLC	USAID via Washingto n State university	Land Resource sources different tree species and forage seeds and sells	
TRANSFORM Programme	2020 - 2021	Rumphi, Mzimba, Kasungu, Dowa, Mchinji	AICC, AG Care, CADECOM, ACM, Nyama World, MUSCCO, NFYD, TAPP, TLC, CEPA, FYF, BCI, LUANAR	Royal Norwegian Embassy through Norwegian Church Aid	- Forage production - Promoting climate-smart agriculture: Mixed cropping, irrigation, mulching - Promoting livestock productiv ity through pass-on programm e	Goat
CLIMM project	2017 - 2021	Balaka, Chiradzulu, Thyolo	ICRISAT, ILRI, SSLLP	EU	- Forage production and utilization - Forage evaluation	1. Dairy 2. Goat

From the ongoing initiatives, several key lessons have been learned:

- The Adaptation Fund Project demonstrates that multipurpose fodder trees provide a platform for building resilience among smallholder farmers in drought and flood-prone areas.
- The One CGIAR Mixed Farming Systems initiative provides evidence that the choice of forage or fodder to be promoted should aim to achieve dual or multiple benefits, such as providing animal feed and contributing to soil conservation, and should be integral to the entire farming system.

- The GAIN project shows that the selection of forage to be promoted among smallholder farmers should address both food and feed needs of the targeted smallholder farming households (refer to the case study in Box 1).
- For research institutions such as LUANAR and DARS, the key lesson is the need to increase funding for forage seed production and forage-related research to stimulate the release of new varieties, innovations, and technologies.
- CREMPA projects indicate that forages and multipurpose fodder trees can be instrumental in mainstreaming gender in livestock projects.

Box 1: GAIN Project Case Study on *Brachiaria ruziziensis*

- Heifer International Malawi is implementing the Groundnut and Beef Value Chain (GAIN) improvement project aimed at supporting smallholder farmers to access inclusive and well-functioning markets, achieve better income, and build more resilient livelihoods.
- In Mzimba, Heifer International Malawi is assisting smallholder beef farmers by distributing *Brachiaria* grass seed (165 x 50kg bags of root and stem cuttings) to lead farmers for demonstration plots. However, the performance of the *Brachiaria* grass was reported to be poor due to the negligence of smallholder farmers. It was later understood that smallholder farmers were not motivated to invest the necessary time and effort to properly establish the *Brachiaria* grass.
- Most lead farmers maintained just enough pasture for the demonstration plots but did not save enough seed to expand their plots for adequate cattle feed. The following year, the Heifer International team decided to distribute groundnuts instead of *Brachiaria* grass. The groundnuts (700 kg of CG9) were chosen because they provide both food and feed benefits. This dual-purpose crop is expected to be more readily adopted by smallholder beef farmers due to its multiple advantages.
- Additionally, the project plans to regulate livestock marketing by implementing auctions and purchasing animals by weight. Market-driven strategies have proven effective in motivating beef production in the project's impact area, and this regulatory approach aims to enhance these efforts further of these multiple benefits to the smallholder beef farmers.
- Regulation of livestock marketing such as auction and purchasing of animals by weight is one of the additional approaches to be implemented since market driven strategies appears to be effective in motivating beef production in the impact area for the project.

Lessons from phased-out projects

- Policy alignment for synergy: Effective promotion of production technologies in livestock, irrigation, and land resources sub-sectors requires aligned policies to enhance synergy. For instance, during the SAPP project, feeding trials conflicted with the promotion of conservation agriculture. This issue was resolved by conducting forage seed multiplication demonstrations at

Extension Planning Areas (EPAs) offices and with Lead Farmers instead of using individual farmers' fields as initially planned.

- Integration of forage production with livestock productivity: The ERASP project highlighted that promoting livestock productivity must go hand in hand with forage production to achieve sustainable improvements in livestock performance. Without adequate forage production, efforts to enhance livestock productivity are not sustainable.
- Sustainable business models: The TLC project, which phased out in 2004, continues to distribute multipurpose fodder tree seeds as a business. This underscores the importance of integrating business models into agricultural programs to ensure their sustainability beyond the implementation period.
- Collaboration and coordination among partners: The TRANSFORM project demonstrated that collaboration and coordination among implementing partners in Malawi is feasible and can result in substantial impacts beyond the project implementation period. Effective partnerships can enhance the scalability and sustainability of agricultural innovations (refer to Box 2 for more details).
- Market-driven approaches to enhance feed technology uptake: The CLIMM project revealed the connection between goat auction markets and stimulating farmer investment in forage production. Goats sold through auctions fetched, on average, 6% higher prices than those sold through conventional sales. Conventional market sales did not cover the cost of feed. Thus, improving feed technology alone was insufficient; the auctioning instrument provided a simple and effective extension tool that motivated farmers to adopt better feed technologies.

Box 2: TRANSFORM Project Case Study on Integrated/Mixed Farming System to Promote the Goat Value Chain

1. **Training on husbandry practices:** The TRANSFORM project provided comprehensive training to goat farmers on essential husbandry practices. This included instruction on pasture management, specifically on cultivating desmodium and napier grass, implementing a Community Based Breeding Programme (CBBP) for goats, and enhancing goat marketing strategies.
2. **Integrated farming techniques:** Smallholder farmers were encouraged to plant desmodium between maize rows to help repel pests, while napier grass was promoted for goat feed. This integration of crops and forage improved overall farm productivity and sustainability.
3. **Innovative livestock breeding:** LUANAR introduced innovative livestock breeding techniques aimed at improving the productivity of local goat breeds. This innovation involved selecting goats with desirable traits for breeding at a common breeding center. Goats with undesirable traits were either castrated or sold for meat, ensuring the quality of the breeding stock.
4. **Adoption of improved husbandry practices:** After a series of trainings facilitated by organizations such as Find Your Feet, Total Land Care, Biodiversity Conservation Initiative, and Trustees of Agricultural Promotion Programme, with technical support from the Department of Animal Health and Livestock Development, farmers adopted improved husbandry practices. These included building raised goat houses, selecting breeding animals, and improving animal feeding practices.
5. **Widespread integration of livestock components:** It was reported that more than 51% of smallholder farmers registered under the TRANSFORM project successfully integrated livestock components into their farming systems. This integration has contributed to better farm productivity and increased resilience for these farmers.

3.1.3 Multipurpose forage and fodder tree varieties availability

Malawi has a start-up seed bank of at least 20 different varieties of multipurpose grasses, legumes, and fodder trees. The primary producers and suppliers of forage seeds accessible to smallholder farmers in Malawi are research institutions, specifically Chitedze, Bvumbwe, and LUANAR.

In this study, we consulted thirteen sites dedicated to forage and fodder production. These consultations revealed the availability of 20 different types of forage and fodder trees introduced, released and accessible in Malawi, as detailed in Table 4. Among the most accessible species from at least eight of the consulted forage seed producers were Rhodes grass, Napier grass, and Brachiaria grass species. This list is not exhaustive of all forage varieties

released in Malawi and there is need for further initiative to update the list of forage varieties released in Malawi.

Table 4: Forages and fodders reported to be released and available on 13 producers consulted

Nr.	Forage/Fodder Name	Sites Present	%
1	Rhodes grass	10	77
2	Napier grass	8	62
3	Brachiaria grass	8	62
4	Guatemala grass	4	31
5	Leucaena	4	31
6	Centrosema	3	23
7	<i>Panicum maximum var Ntchisi</i>	2	15
8	<i>Acacia angustissima</i>	2	15
9	<i>Gliricidia sepium</i>	2	15
10	Guinea grass	2	15
11	Lucerne /Alfalfa	2	15
12	<i>Neonotonia Wightii</i>	1	8
13	Calliandra	1	8
14	Smut grass	1	8
15	Buffalo grass	1	8
16	Star grass	1	8
17	Buffel grass	1	8
18	Stylosanthes	1	8
19	Mombasa guinea grass	1	8
20	Mucuna	1	8

Most of the forages reported are exotic but smallholder farmers do use native varieties of forages. However, there is no comprehensive profiling of the native forage varieties. There is need to identify, characterize and validate native forage species for release in Malawi.

Forage seed sourcing in Malawi

Smallholder farmers, commercial farmers, and non-governmental organizations (NGOs) in Malawi primarily source their forage and fodder seeds locally. The main sources include their own production, government research stations such as Chitedze and Bvumbwe Research Stations, the Land Resources Department, and academic institutions like LUANAR (Lilongwe University of Agriculture and Natural Resources) (Table 5).

Some forages, such as Brachiaria, Mulato II, Alfalfa, and Super Napier, were imported through formal channels into Malawi in 2004, 2009, and 2022, respectively (Table 6). Recently, additional varieties of Brachiaria have been imported by Alliance-CIAT. Private individuals, particularly commercial farmers, also play a significant role in sourcing forages independently when specific varieties are not available locally. This indicates the existence of informal channels for importing forage seeds in Malawi.

Table 5: Research and seed material multiplication producers consulted between January and February 2024

Forage Producer	District	Scale of Production (ha)		Forage and Fodder Varieties Grown	Reasons for Forage Varieties Grown	Seed Source	Clients	Irrigated
		Current	Target					
LUANAR	Lilongwe	2.0	5	- Centrosema - Lucerne /Alfalfa - Rhodes grass	Research	Own farm and Chitedze	- Own farm use - Farmers - NGOs	No
Chitedze Research Station	Lilongwe	6.4	18	- Brachiaria grass - Buffer grass - Centrosema - Gliricidia sepium - Guatemala grass - Napier grass - Star grass	Research	Own farm and LUANAR	- Own farm use - Farmers - NGOs	No
Bvumbwe Research Station	Thyolo	4.3	10.7	<i>Acacia Angustissima</i> - Brachiaria grass - Calliandra - Centrosema <i>Gliricidia sepium</i> - Guinea grass - Guatemala grass - Leucaena - Mucuna - Napier grass <i>Neonotonia Wightii</i> - Rhodes grass - Stylosanthes	Research	Own farm, Alliance-CIAT, and Chitedze	- Own farm use - Farmers - NGOs	No
Lunyangwa Research Station	Mzimba	2.0	6	- Brachiaria grass - Guatemala grass - Lucerne /Alfalfa - Napier grass - Guinea grass (<i>Panicum maximum var Ntchisi</i>)	Research	Own farm, Alliance-CIAT and Bvumbwe	- Own farm use - Farmers	No

Forage Producer	District	Scale of Production (ha)		Forage and Fodder Varieties Grown	Reasons for Forage Varieties Grown	Seed Source	Clients	Irrigated
		Current	Target					
Mbawa Research	Mzimba	2.6	5	- Brachiaria grass - Leucaena - Napier grass - Rhodes grass	Research	Own farm, Alliance-CIAT, Chitedze, Lunyangwa	Own farm use	No
Toleza Farm	Balaka	128	-	- Buffalo grass - Mombasa guinea grass - Napier grass - Rhodes grass - Smut grass	Dairy, beef and goat farming	Balaka District	Own farm use	Yes
Ekhaya Farm	Chikwa wa	6.9	-	- Brachiaria grass - Napier grass - Rhodes grass	Cattle feedlot	Bvumbwe	Own farm use	Yes
Demetre Farm	Balaka	40.0	136	<i>Acacia angustissima</i> - Brachiaria grass - Leucaena - Rhodes grass	Cattle feedlot	Bvumbwe	Own farm use	Yes
OG Isa Farm	Blantyre	0.2	30	- Brachiaria grass - Guatemala grass - Guinea grass - Napier grass - Rhodes grass	Cattle beef and dairy farming	Bvumbwe	Own farm use	Yes
Gala Farm	Zomba	300	-	Natural Pastures	Beef farming	-	Own farm use	No
MacFyson Farm	Mchinji	400	-	Rhodes grass	Beef farming	Own farm	- Own farm use - Farmers - NGOs	No
Likasi Farm	Lilongwe	8.0	20	Rhodes grass	Cattle farm Biomass, seed	Own farm and Chitedze	- Own farm use - Farmers - NGOs	no

Forage Producer	District	Scale of Production (ha)		Forage and Fodder Varieties Grown	Reasons for Forage Varieties Grown	Seed Source	Clients	Irrigated
		Current	Target					
Kalinga Farm at Lisasadza	Kasungu	1.5	6	▪ Brachiaria grass ▪ Leucaena ▪ Napier grass ▪ <i>Panicum maximum</i> var Ntchisi ▪ Rhodes grass	Dairy and goat farming	Chitedze	Own farm use	no

Table 5: List of forage varieties formally imported into Malawi since 2004 as reported by DARS

Varieties Imported	Volume Imported (kgs)	Countries Imported From	Year Imported	Client Imported
Mulato II grass (<i>Brachiaria ruziziensis</i>)	10	Kenya	2004	Alliance-CIAT
Alfalfa/Lucerne (<i>Medicago sativa</i>)	-	South Africa	2009	LUANAR
Super Napier (<i>Pennisetum purpureum</i>)	-	United States of America	2022	Private
Crabgrass (<i>Digitaria</i>)	1	United States of America	-	Private
Crotalaria	10	Kenya	2023	Alliance-CIAT
<i>Brachiaria mulato II</i>	10	Kenya	2023	Alliance-CIAT
<i>Brachiaria hybrido cobra</i>	10	Kenya	2023	Alliance-CIAT
<i>Brachiaria hybrido cayman</i>	10	Kenya	2023	Alliance-CIAT
<i>Brachiaria hybrido Camello</i>	10	Kenya	2023	Alliance-CIAT

3.1.4 Promotion and uptake of forages seed and biomass

Research institutions, development agencies, and the private sector working with smallholder farmers in livestock value chains are increasingly interested in incorporating improved forages and fodder trees into their portfolios. This promotion is driven by the proven benefits of new forage or fodder tree species over existing ones in the communities they serve. These stakeholders also provide technical and advisory support, including training on how smallholder farmers can cultivate and use these forages as animal feed. Additional training covers aspects of agroforestry and soil conservation within the context of mixed farming systems.

Most smallholder farmers access forages through development agencies and government programs. Various organizations consulted in this study are promoting different forages and fodder trees among smallholder farmers in beef, dairy, and goat value chains (Table 7). These forages include Dwarf Napier Grass, Guatemala Grass, Centrosema, Silverleaf, Panicum grasses, and Leucaena spp. Lunyangwa Research Station has shown interest in Sericea lespedeza, although it is currently not locally available.

Presently, organizations source their forages from LUANAR, Chitedze, and Bvumbwe research stations located in the Lilongwe and Blantyre agricultural district divisions. The stakeholders consulted, who are keen to add improved forages and fodder tree species to their portfolios, are listed in Table 8. They promote new forage varieties based on their advantages over existing varieties and their suitability for the livestock species they support.

These organizations typically support smallholder farmers who are part of organized groups within the three livestock value chains. This suggests that initiatives focusing on promoting forages among smallholder farmers are more effective when conducted through organized groups, as it facilitates reaching a larger number of smallholder farmers.

By emphasizing collaboration and organized efforts, these initiatives ensure that smallholder farmers receive the necessary support and resources to adopt and benefit from improved forage and fodder varieties. This collaborative approach not only enhances livestock productivity but also contributes to sustainable farming practices and improved livelihoods for smallholder farmers in Malawi.

Table 6: Organizations promoting forage production in beef, dairy and goat value chains

Organi-sation	Forage and fodder type and varieties	Main clients	Quantity	Purpose	Geographical area (districts)
CREMPA	Rhodes grass	Smallholder dairy farmers (MBGs)	40 kg of seed (5 MBGs, 8kg/MBG)	Dairy production	Dedza (Magomero MBG) Dowa (Mpasa MBG) Ntchisi (Mpalo MBG) Mchinji (Ludzi MBG) Lilongwe (Mapuyu MBG)
	Centrosema	Smallholder dairy farmers (MBGs)	10 kg of seed (5 MBGs, 2kg/MBG)	Dairy production	Dedza (Magomero MBG) Dowa (Mpasa MBG) Ntchisi (Mpalo MBG) Mchinji (Ludzi MBG) Lilongwe (Mapuyu MBG)
	Leucaena	Smallholder dairy farmers (MBGs)	494 seedlings (13 MBGs, 112 Seedlings of Leucaena and Gricidia/ MBG) (13 MBGs under the 2 projects)	Dairy production	Dedza (Magomero MBG) Dowa (Mpasa; Mponela; Gondoli; Malou MBGs) Ntchisi (Mpalo MBG) Mchinji (Ludzi; Navikale; Mikundi; Bua; Chiosha MBGs) Lilongwe (Mapuyu MBG)
	<i>Gliricidia sepium</i>	Smallholder dairy farmers (MBGs)	962 seedlings (13 MBGs, 112 Seedlings of Leucaena and Gricidia/ MBG) (13 MBGs under the 2 projects)	Dairy production	Dedza (Magomero MBG) Dowa (Mpasa; Mponela; Gondoli; Malou; Mphwadzi MBGs) Ntchisi (Mpalo MBG) Mchinji (Ludzi; Navikale; Mikundi; Bua; Chiosha MBGs) Lilongwe (Mapuyu MBG)
MDFA	Rhodes grass	Smallholder dairy farmers (MBGs)	5kg of seed	Dairy production	Nkhata-bay and Mzimba north

Organi- sation	Forage and fodder type and varieties	Main clients	Quantity	Purpose	Geographical area (districts)
	<i>Griricidia sepium</i>	NGOs (i.e., SAPP, Self-Help Africa, NASFAM) Department of Forestry Department of Land Resource Mulanje Mountain Conservation	2 tonnes of seedlings	Dairy production	Nkhotakota Salima Dedza Nkhotakota
Land Resource Department	Leucaena	Farmers and non- governmental organisation	1 tonne of what	Beef, dairy and goat production Soil and water conservation	Central and Southern region
	<i>Sesbania sesban</i>		500 kg of seed		
	<i>Faidherbia Albida</i>		2 tonnes of seed		
Heifer International	Brachiaria grass	Lead farmers	165 bags (50 Kg bags by volume of root and stem cuttings)	Beef production	Mzimba
	Groundnuts (CG9)	Lead farmers	700 kg seed	Beef production	Mzimba
TAPP, LUANAR	<i>Desmodium intortum</i> and Napier grass	Smallholder farmers		Goat production	Rumphi, Mzimba, Kasungu, Dowa, Mchinji

Despite the efforts of a few organizations producing and supplying forage seeds and biomass, smallholder farmers in Malawi primarily access these resources through development agencies. Smallholder farmers do not typically make deliberate efforts to acquire forage seeds for improved pasture on their own. One significant reason for this is the distance between the locations of major suppliers. For instance, LUANAR and Chitedze Research Stations are situated in Lilongwe, while Bvumbwe Research Station is in Thyolo, providing only two primary access points in the country. Additionally, agro-dealers have not yet begun participating in the forage seed value chain, further limiting accessibility.

The study revealed that the uptake of forage seeds in Malawi is relatively similar among smallholder farmers, commercial farmers, and development agencies. All three groups were, on average, ranked 3 in terms of forage seed uptake. This indicates a consistent level of interest and engagement across different types of farmers and organizations, though it also highlights the need for broader distribution networks and increased accessibility.

Table 8 provides a list of forages and fodder trees that consulted organizations are interested in adding to their portfolios. Most of these are locally available, except for *Sericea lespedeza* (*Lespedeza cuneata*), which is not currently accessible within the country.

By improving the distribution networks and encouraging agro-dealers to participate in the forage seed value chain, the accessibility of these vital resources to smallholder farmers can be significantly enhanced. This will facilitate the broader adoption of improved forages and fodder trees, leading to better livestock productivity and more sustainable farming practices across Malawi.

Table 7: List of forages and fodder trees the consulted organizations are interested to add to their portfolio

Name of forage and release status (*=released as forage)	Organizations interested to add to their portfolio	Reasons for selecting the forage *
Rhodes grass (<i>Chloris gayana</i>)	▪ CREMPA, TAPP	▪ Good seed production ▪ No need to establish pasture plot every year because it is self-propagating ▪ Good roughage for animals because it produces very good dry matter which smallholder farmers can make hay from ▪ High biomass yield from second year of production ▪ Widely adapted ▪ Easily established ▪ Spreads by runners ▪ Very drought tolerant ▪ Tolerates heavy grazing ▪ Few pests or diseases of economic importance ▪ Nematode resistance in cultivar 'Katambora'
Panicum grasses (<i>Megathyrsus maximus</i>)	▪ MDFA	▪ Used for pasture, silage and hay ▪ Prevent soil erosion since it provides rapid ground cover
Napier grass i.e., Dwarf napier	▪ CREMPA, Mzimba North District, MDFA	▪ Used as an animal feed ▪ Used for controlling soil erosion when planted around crop fields
Centrosema (<i>Centrosema pubescens</i>)	▪ CREMPA, Mzimba North District, MDFA, TAPP	▪ Reliable seed production ▪ High quality feed (high protein and moderate-high dry matter digestibility) ▪ Persistent under high stocking rates ▪ Moderate shade tolerance ▪ No anti-nutritional factors
Calliandra	▪ CREMPA, MMPA, LUANAR	▪ Browsed or cut-and-carried to livestock ▪ Soil improver, erosion control and afforestation ▪ Mitigation of methane emissions by ruminants
Lucerne /Alfalfa	▪ LUANAR	▪ Dual purpose (grazing and hay) ▪ Highly productive ▪ High nutritive value ▪ Perennial, year round production ▪ Responds quickly to spring and summer rainfall (or irrigation)
Guatemala grass (<i>Tripsacum andersonii</i>)	▪ Mzimba North District	▪ High biomass yield ▪ It regenerates easily ▪ It is a perennial grass
Silverleaf desmodium (<i>Desmodium uncinatum</i>)	▪ Mzimba North District, TAPP	▪ High nutritive legume ▪ Ideal for natural pasture fortification ▪ Easily established in Malawi

Name of forage and release status (*=released as forage)	Organizations interested to add to their portfolio	Reasons for selecting the forage *
<i>Brachiaria ruziziensis</i>	Mzimba North District, TAPP, LUANAR	- Well-adapted to acid and neutral soils of moderate to low fertility - Tolerates high soil aluminium levels - Very persistent, even under seasonally dry conditions - Productive, capable of sustaining high stocking rates and grazing pressures - High nutritional value for ruminants - Maintains green leaf of relatively high nutritional value into seasonally dry periods - Responds well to nitrogen fertiliser - Push pull grass
<i>Leucaena</i> spp.	MMPA, LUANAR, TAPP	- Used as feed ingredient in cattle ration formulating - Source wood and timber - Very high nutritive quality for ruminant livestock - Extremely drought tolerant - Retains leaf during dry periods - Soil enrichment through nitrogen fixing
<i>Gliricidia sepium</i>	MMPA	- Leaves are used as animal feed - Source wood and timber - Ideal for agroforestry to bring back vegetative cover and in the face of land degradation, deforestation, overpopulation - Soil enrichment through nitrogen fixing
<i>Moringa oleifera</i>	MMPA, TAPP	- Used as feed ingredient in cattle ration formulating - Perform well along the lakeshore in Malawi
<i>Sesbania sesban</i>	MMPA	- Leaves are used as animal feed - Source wood and timber - Soil enrichment through nitrogen fixing
<i>Faidherbia albida</i>	MMPA	- Leaves are used as animal feed - Soil enrichment as it is Nitrogen fixing - Source wood and timber
<i>Neonotonia wightii</i>	Lunyangwa Research Station	- Used for pasture, silage and hay - Soil improver, pests and weed controller - Fallow crop, cover crop and intercrop
<i>Stylosanthes</i>	Lunyangwa Research Station	- Easily established from seed or cutting - Good growth habit for cut-and-carry - Leaf stays green into dry season
<i>Sericea lespedeza</i> (<i>Lespedeza cuneata</i>)	Lunyangwa Research Station	- Produces a good bulk of forage in its second year - Drought resistant

* Source for some of the benefits of the forage or fodder listed [Pasture Australia Fact Sheet Index page](#), [Feedipedia](#) and Alliance-CIAT publications, [Tropical Forages](#).

3.1.5 Malawi's capacity to produce forage seed and biomass

Malawi's capacity to produce forage seed and biomass is currently limited and requires strategic interventions to strengthen different actors along the forage seed

value chain. Notably, research institutions in Malawi lack specialized forage breeders, and the current seed inspectors are primarily trained in crop inspection. Although these inspectors can inspect forage seed, their limited knowledge in this area may restrict their effectiveness unless they receive additional training.

Key actors along the forage seed value chain are essential for enhancing Malawi's capacity to produce forage seed and biomass:

Seed importers: Malawi has regulations and procedures, described in section 3.1.6, that permit institutions and individuals to import forage seed. The Department of Agricultural Research Services (DARS) reported that Alliance-CIAT, LUANAR, and individual commercial farmers are importing seed, which must undergo an official technology release process before widespread use. Some actors bypass existing regulations, necessitating sensitization efforts to ensure that farmers, research institutions, and development partners adhere to relevant importing procedures.

Forage breeders: The number of forage breeders in Malawi is alarmingly low, consisting of only two retired civil servants. These breeders are crucial for producing breeder seed and are mainly found in research institutions. There is an urgent need to train, recruit, and retain forage breeders in institutions such as LUANAR and DARS to bolster Malawi's forage seed production capacity.

Seed inspectors: Malawi has 18 public and 26 private seed inspectors, with plans to recruit more. The majority of private seed inspectors are based in the central (12) and southern (11) regions, with only three in the northern region. Of the 44 seed inspectors, only four are youths (18 to 35 years old), with one public and three private inspectors. They charge an affordable fee of MWK3,000 (USD1.50) per ha. However, these inspectors are trained primarily in crop seed inspection, highlighting the need to equip them with skills specific to forage seed value chains.

Seed multiplication and suppliers of forage seed: Currently, the three major formal suppliers of forage seed (Chitedze, Bvumbwe, and LUANAR) utilize only 38% (12.7ha) of their available land (33.7ha) for forage seed and biomass production (refer to Table 5). Development agencies (NGOs) consulted in this study reported that the supply of forage seed is limited and unreliable. However, private commercial farms are producing forages on a large scale, cultivating between 128 ha and 400 ha, using both rainfed and irrigation systems. These commercial farmers also have the capacity to source forage seed from outside Malawi. For instance, OG Isa Farm has plans to import Alfalfa seed.

Photo 1 shows one of the Rhodes grass pasture fields at Likasi Farm, which produces hay and seed on a large scale. In the 2022/2023 growing season, the farm produced approximately 400 kg of Rhodes grass seed and 60,000 kg of hay, resulting in about 4,000 bales weighing 15 kg each. The farm plans to increase Rhodes grass seed production, primarily sold to smallholder farmers. Currently, the farm utilizes 40% (8 ha) of the total 20 ha available for Rhodes grass production. This total land area exceeds the combined capacity of the three main suppliers of forage seed (Chitedze, Bvumbwe, and LUANAR) in Malawi.



Photo 1: One of the Likasi Farm Pasture Fields in Mchinji District

Researchers: LUANAR, Chitedze Research Station, and Bvumbwe Research Station are the major research institutions involved in forage value chains in Malawi. These institutions focus on research initiatives, serving as key sources of livestock technologies and innovations, genetic resources, knowledge, information, and data. According to the Agriculture Technologies Clearing Committee (ATCC) records covering a 19-year period, Malawi has released only three forage technologies since 2012 (Table 9)⁸. This low number of released forages is attributed to limited funding towards research in forage seed systems.

Strategic interventions are required to address these gaps and enhance Malawi's capacity to produce forage seed and biomass. This includes training specialized forage breeders, capacitating seed inspectors, expanding seed multiplication efforts, and securing reliable supply chains to support smallholder and commercial farmers alike.

⁸ Chisama B. (2021). Compiled List of Selected Agricultural Technologies Released through the ATCC from 2012 to 2020. Technology Transfer Unit, Department of Agricultural Research Services.

Table 8: Forage value chain related technologies released through ATCC since 2012

Technology name	Type of technology	Scientist	Date of release	Institution	Main attributes related to forages
Push-pull technology	<i>Brachiaria</i> , <i>Desmodium</i> , Napier as component in Integrated and Soil Fertility Management	Dr. D. Kayira	July 2020	DARS	Push-pull is one the recent innovative cropping systems addressing the principal yield-limiting factors through the improvement of soil fertility and reduction of field pests Striga and stemborers. This increases productivity and sustainability of maize-based production system. It involves spatial intercropping a cereal crop with repellent intercrop (push) with an attractive Napier or Bracheria as trapplant sown as a border crop around the intercrop. <i>Desmodium intortum</i> acts as a groundcover that has an allelopathic effects on striga. It is economically viable and alternative to livestock feed.
MH 37 (MA 7007)	Maize variety	Dr. K. Kaonga	August 2013	DARS/AGRA	Retain green plant colour to harvesting time and are good for livestock fodder.
MH 38 (MAO 9140):	Maize variety	Dr. K. Kaonga	August 2013	DARS/AGRA	Retain green plant colour to harvesting time and are good for livestock fodder.

Dissemination and distribution of forage seed

Government institutions and development agencies are leading efforts to disseminate forage seed to smallholder farmers through demonstration plots at Extension Planning Areas (EPAs) and lead farmers. However, there is a need for increased efforts, particularly in providing farmers with user-friendly forage seed production manuals and other information, education, and communication (IEC) materials. Chitedze and Bvumbwe research stations also conduct farmer field days, where farmers are invited to learn about various available forages and their applications in promoting sustainable farming. Additionally, the Land Resource Centre Trust and Hopmac are private companies involved in distributing legume fodder tree seeds. Incentivizing private companies to participate in the forage seed value chain is essential to bolster the capacity for disseminating and distributing forage seed.

Technical extension and knowledge support

Stakeholders working with smallholder farmers often provide technical and advisory support through training on the establishment of pasture plots. These plots showcase different types of pastures and varieties through demonstration plots, allowing farmers to learn how to grow forages effectively. Smallholder farmers receive further training on how to best use pasture and fodder trees as feed, including preparation and conservation techniques. Where fodder trees are promoted, additional training is provided on using these trees for agroforestry and soil conservation purposes.

Soils and climate

Malawi has favorable agro-climatic conditions to produce a variety of forage and fodder across its four agro-ecological zones, as presented in Table 10.

Table 9: Malawi's agro-ecological zones⁹

Zone	Districts	Altitude (m)	Rainfall (mm year ⁻¹)	Growing Season	Major Crops
Lower Shire valley (altitude below 200 m.a.s.l),	Chikhwawa	57	792.5 mm	October to April	Tobacco and cotton as cash crops. Maize, beans, soya beans and other pulses.
	Nsanje	53	750 mm	October to April	Maize, sorghum, groundnuts, beans, soya beans
Lake shore plains, middle and upper Shire valley (>200 to 760 m.a.s.l)	Salima	503	1461 mm	November to April	Maize, soybean, ground nuts, cowpeas and rice
	Karonga	544	700 mm	November to May	Maize, groundnuts, sweet potatoes, rice in dambos and vegetables.
	Mangochi	646	1330 mm	November to April	Tobacco, cotton and maize on the upper

⁹Guide to Agriculture Production in Malawi 2020 and Kampanje-Phiri et al. 2019.

Zone	Districts	Altitude (m)	Rainfall (mm year ⁻¹)	Growing Season	Major Crops
					regions while rice is grown in the marshy dambo lands.
Mid-altitude plateaus and highlands (>760 to <1300 m.a.s.l)	Mzimba south	1210	1143 mm	November to April	Maize, groundnuts, beans and other pulses and tobacco as main cash crop
	Lilongwe	1083	900 mm	November to April	Tobacco as cash crop, other crops are maize, soya, groundnuts, cassava, common beans
	Kasungu	987	830 mm	November to April	Tobacco as cash crop, other main crops are maize, groundnuts, soya beans
Highlands (>1300 m.a.s.l)	Blantyre	1221	1127 mm	October to May	Tobacco (cash crop), maize, beans, groundnuts, soya beans and pigeon peas.
	Mzimba north	1335	1487 mm	November to May	Coffee (Mzuzu), tobacco, maize, groundnuts, beans and other pulses
	Dedza	1553	1168 mm	November to May	Maize, Irish potatoes, sweet potatoes, groundnuts, beans and soybeans
	Mulanje	1320	1021 mm	November to May	Tea, maize, groundnuts, beans, soya beans, pigeon peas and other pulses

3.1.6 Forage seed policy and regulatory frameworks

Malawi has established a 2018 Seed Policy and a 2022 Seed Act with accompanying regulations awaiting operationalization. These are aligned with the Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA) harmonized seed regulations, aiming to create a competitive forage seed system. The 2021 National Livestock Development Policy (NLDP) and the 2023 National Livestock Strategic Master Plan further emphasize the need to establish robust pasture seed systems. However, these policies must be aligned with irrigation and land resource sub-sector policies to consistently support forage seed and biomass access and utilization.

Policies relevant to the forage seed industry

The 2023 Department of Animal Health and Livestock Development (DAHLD) National Livestock Development Strategic and Master Plan targets 50,000 ha of land

to be under pasture production by 2030. Achieving this will require complementary strategies and policy support, including:

- a) Adapting existing protocols used for other crops for forage seed registration.
- b) Developing protocols and bylaws for managing land for grazing animals and planting pasture/fodder trees.

Forage seed registration

Certification protocols for sweet potatoes and cassava can be adapted for vegetative material and pastures. The seed registration process typically takes three to four weeks. Intellectual Property (IP) for forages, like any other agricultural commodity in Malawi, is safeguarded under the National Intellectual Property Policy. The Technology Transfer Office (TTO) at the Department of Agricultural Research Services (DARS) ensures breeders' rights to their technologies and serves as the secretariat for the Agricultural Technology Clearing Committee (ATCC).

The Government of Malawi (GoM) is responsible for ensuring that appropriate forages become available to livestock farming communities through evaluation studies and endorsement by the ATCC. The ATCC is mandated to approve and release all agricultural technologies, including forage seed varieties, for use by farmers in Malawi. Figure 1 illustrates Malawi's variety release and registration system as reported by Mathagu A. and Wavomba E. (n.d.).

In addition to approving and releasing agricultural technologies, there are plans for the officially released crop and forage varieties to go into a national register managed by the ATCC through its Secretariat. This will be managed by a yet to be established National Variety Release Committee (NVRC).

Quality declared seed (QDS) protocol

Malawi does not currently have a QDS protocol, a seed system where 10 percent of the seed produced and distributed is checked by a certifying agency. However, it does have protocols for the production of certified maize seed. This suggests that it is possible to produce certified forage seed using existing protocols in accordance with the 2018 Seed Policy, Act, and regulations. The revised Seed Act of 2022 is awaiting operationalization. Malawi also adheres to the SADC and COMESA harmonized seed regulatory systems and guidelines.

The QDS system provides a mechanism for producing seed that meets at least a minimum standard of quality without formal inspection by the official seed certification system. The intent behind QDS is to assure farmers of seed quality while reducing the burden on government agencies responsible for seed certification. The QDS scheme is designed to complement, not compete with, the existing conventional quality control system, ensuring greater access to quality seed for farmers. This scheme is permitted in some countries like Tanzania, Uganda, and Ethiopia (for selected crops), and for vegetatively propagated materials (VPG) in Kenya. Since Malawi does not have a formal forage seed system, producing quality declared forage seeds could be a starting point. The first step would be conducting a stakeholder consultation exercise to ascertain and affirm the need for QDS.

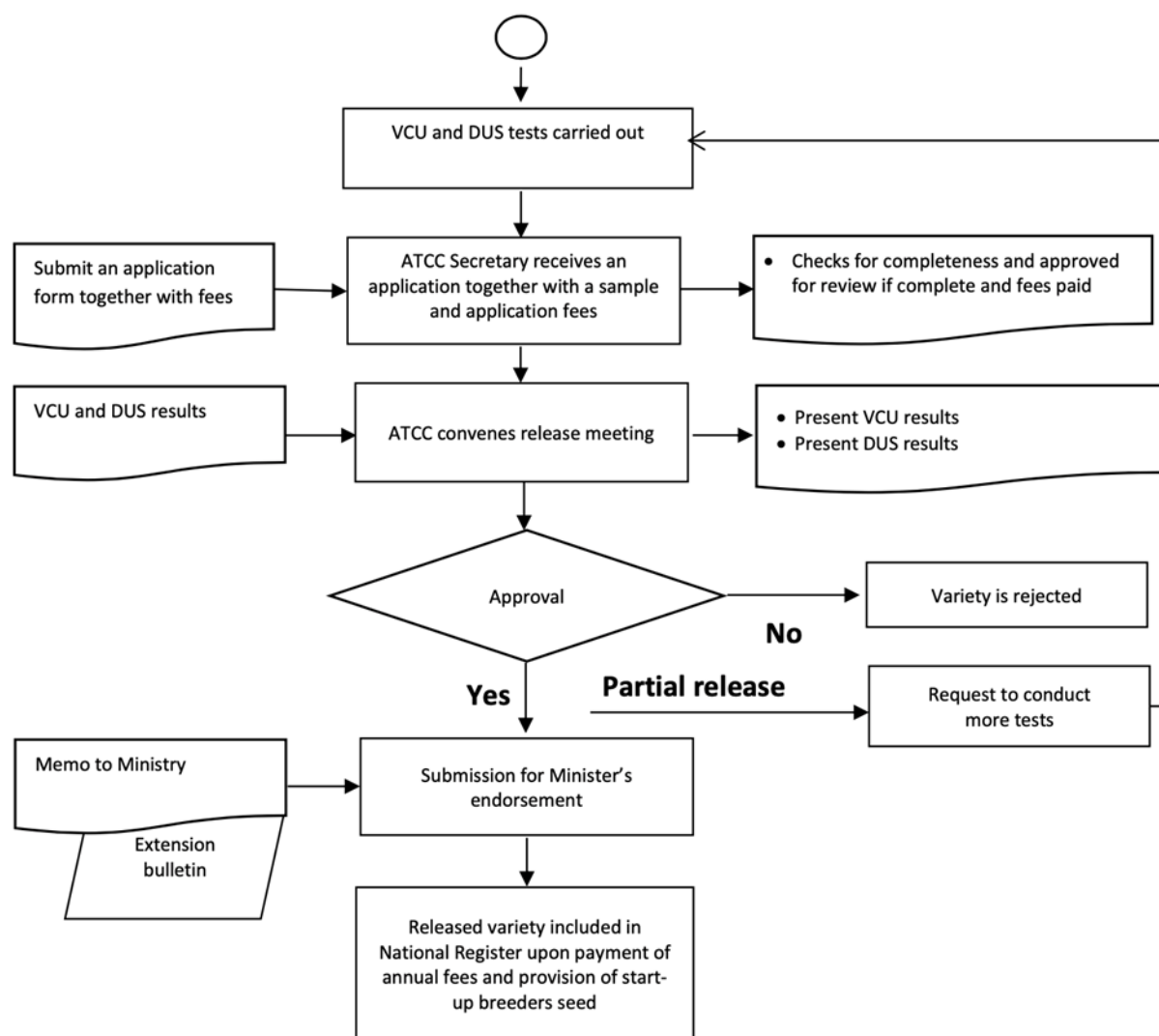


Figure 1: Malawi's variety release and registration system. VCU = Value for Cultivation and Use; DUS = Distinctness, Uniformity and Stability; ATCC = Agriculture Technologies Clearing Committee. Source: Mathagu A. and Wavomba E. (n.d.)

3.1.6 Aligning crop, pasture, and seed production policies with other sectors

The National Livestock Development Policy (NLDP) and the 2023 National Livestock Strategic Master Plan emphasize the need to establish pasture seed systems. However, aligning these national policies with those of the irrigation and land resources sub-sectors is crucial to enhance synergy among implementing partners. Such alignment can guide forage-related strategies, improve livestock productivity, and increase livestock's contribution to climate change mitigation and resilience.

3.1.7 Institutional structures and procedures for import and release

Malawi has established structures and procedures for importing and releasing new crop and legume varieties, which are also applicable to forage seed systems.

The same procedures are used for crops, legumes, and forages. When importing seed, the first step is where the Malawi government issues a certificate for importation. If a private entity imports a new forage seed variety and wants it screened, it is a must that a memorandum of understanding (MoU) is signed. The government, through DARS, conducts screenings for diseases, particularly those affecting maize, and assesses growth performance through on-farm and on-station trials, in collaboration with the plant pathology section. The MoU also protects the commercial interests of the private entity by restricting the government from selling the forage seed after the screening process is completed and approved.

However, it has been reported that these processes are often bypassed in the forage seed systems, with individuals or entities importing and introducing new varieties without adhering to the procedures. This affects the monitoring of forage seed variety releases by DARS and limits how the Technology Transfer Office (TTO) can enforce intellectual property rights for new forage varieties and technologies.

Key government institutions, including DARS, the Department of Animal Health and Livestock Development (DAHLD), and the Ministry of Trade, play the following roles:

- a) Issuing certificates for the importation of forage seed.
- b) Evaluating new forage seed varieties under Malawian conditions.
- c) Releasing forage seed varieties.
- d) Breeding and maintaining forage seed.
- e) Distributing forage seed to farmers.
- f) Regulating the forage seed industry.
- g) Certifying forage seed.
- h) Regulating the trading of forage seed and biomass.
- i) Providing technical support to farmers.
- j) Marketing breeder's forage seed.

3.2 Market pull entities for forage seed and biomass production

3.2.1 Demand for forage seed and biomass in Malawi

While the demand for forage seed and biomass in Malawi is likely high, the uptake among smallholder farmers appears to be low. A market-driven approach is recommended to create a viable and sustainable forage seed demand and supply system. Establishing or strengthening well-functioning and structured livestock markets can stimulate improved livestock productivity across species. However, due to the lack of specific client-based demand statistics in this study, estimates are presented based on national census data.

3.2.1.1 Potential Demand

Analysis of the Malawi Agriculture Production Estimates Survey (APES) data showed that the average annual growth rate for dairy cattle, beef cattle, and goat populations in 2022 was 10%, 4%, and 7%, respectively. The higher increase in the number of dairy cattle and goats compared to beef cattle is due to pass-on schemes

and the importation of dairy animals. It is not surprising that stakeholders reported a growing demand for forage seed over the past decade, evidenced by increasing feed shortages and the need for supplementary feeding using improved fodder or forage-based rations.

Further analysis of APES data indicated that since 2015, the average annual growth rate for the national total Tropical Livestock Units (TLUs) is 14%, and the national household average total TLUs is 1.93. This implies an increasing demand for feed, which has long been inadequate in both quality and quantity in Malawi.

Factors contributing to the growing demand for forage seed and biomass include:

- a) An increase in livestock populations, as demonstrated by the production trends of major crops and livestock (Figure 2).
- b) A decrease in available land and fodder resources for livestock due to the expansion of cropland and unsustainable land management practices.
- c) The unavailability of well-functioning livestock markets.

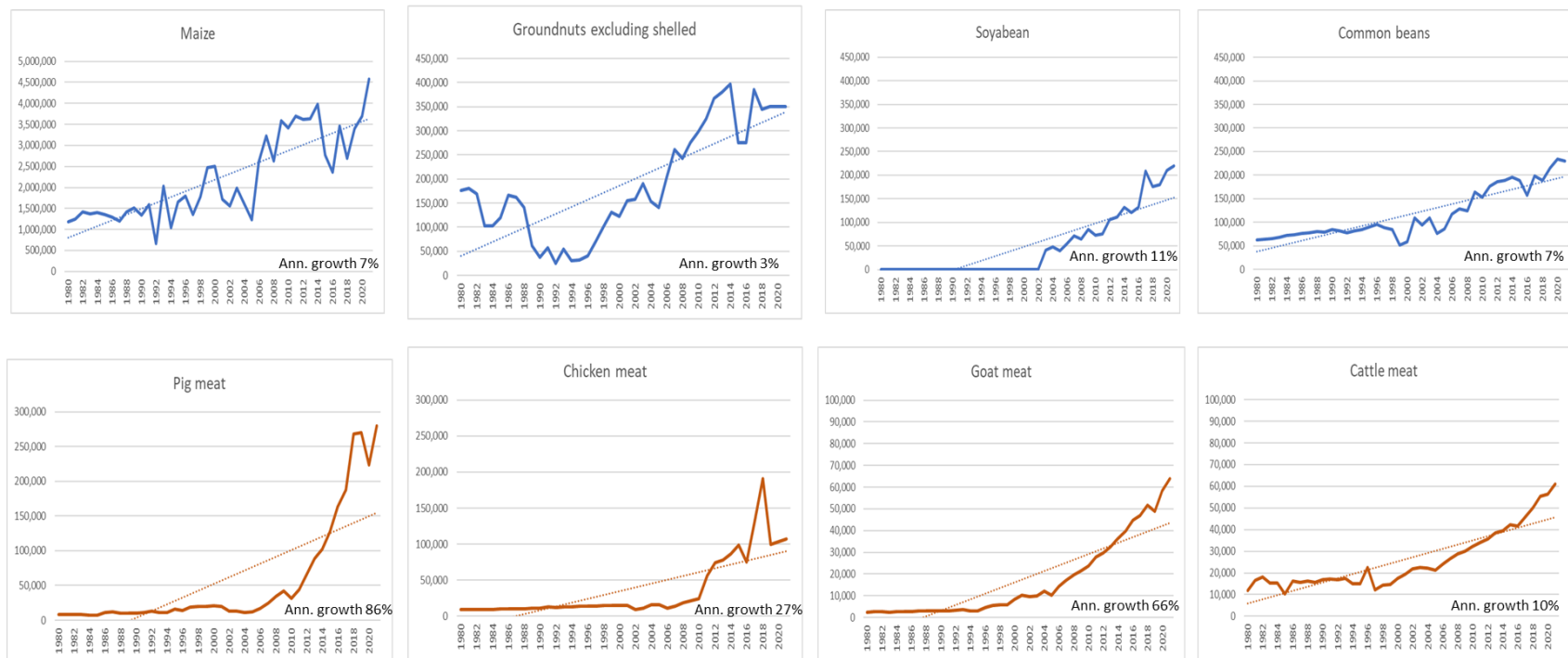


Figure 1: Crop and livestock production trends in Malawi (t, 1980 – 2020)

Forage demand based on cattle and goat population trends

Based on trends in cattle and goat populations, the demand for forage in Malawi is significantly high. Cattle and goats require daily forage intake equivalent to 1-3% of their live body weight. According to the APES data for 2022 (DAHLD, 2023), the total annual forage biomass demand for Malawi is estimated at 776.31 million kgs for the dairy value chain, 6.99 billion kgs for the beef value chain, and 3.1 billion kgs for the goat value chain (Table 11).

If we assume that all forage biomass is provided using Rhodes grass, the required amount of seed would be approximately 1,362,224 kgs. This high demand underscores the necessity for robust forage seed production systems and effective distribution networks to meet the needs of the livestock sector.

Table 11 and 12 illustrate the substantial forage biomass needed to support the dairy, beef, and goat value chains in Malawi and the corresponding Rhodes grass seed required to produce this biomass.

Table 11: Estimated Annual Forage Biomass and Seed Demand in Malawi (2022)

Value Chain Annual Biomass Demand (kgs) Required Rhodes Grass Seed (kgs)		
Dairy	776,309,786	151,262
Beef	6,994,578,950	1,362,224
Goat	3,126,906,601	603,738

Table 12: Projected potential national annual demand for forage seed and biomass for cattle and goats

Specie	National Population (2022)	Average Mature Live Weight (kg)	Estimated Annual Biomass Demand (Dry Matter Intake)(kg)	Estimated Seed Demand (i.e., Rhodes Grass) (kgs)	Land Required (ha) (i.e., Rhodes Grass)
Dairy cattle	137,885	617	776,309,786	97,039	48,519
Beef cattle	1,916,323	400	6,994,578,950	874,322	437,161
Goats	12,238,382	28	3,126,906,601	390,863	195,432
Total			10,897,795,337	1,362,224	681,112

Forage seed demand and household livestock units

Given the national household average of 1.93 Tropical Livestock Units (TLUs) and an average live weight of mature cattle at 400 kg, a livestock farmer keeping either one cattle or six goats needs approximately 8,453 kg of forage biomass per year to meet the dry matter intake nutritional requirements. This translates to about 1.1 kg of seed to produce the necessary biomass.

According to 2022 APES data, Malawi has 7 million livestock farmers. This result in a potential annual forage seed demand of more than 7.7 million kgs (Table 13).

Thus, the key assumptions used in the calculation of forage biomass and seed demand are:

- Average TLU per household: 1.93
- Average live weight of mature cattle: 400 kg
- Daily forage intake (1-3% of live body weight): 4-12 kg per day for cattle
- Annual forage biomass requirement per livestock farmer: 8,453 kg
- Seed required to produce the needed biomass: 1.1 kg

Table 13. Estimated annual forage biomass and seed demand for 7 million farmers

Parameter	Value
Number of livestock farmers	7,000,000
Annual forage biomass requirement per farmer (kg)	8,453
Annual forage seed requirement per farmer (kg)	1.1
Total annual forage biomass requirement (kg)	59,171,000,000
Total annual forage seed requirement (kg)	7,700,000

This substantial demand for forage seed highlights the need for a robust forage seed production and distribution system in Malawi. Key actions include:

- Strengthening seed production: Increasing the capacity of local seed producers, including research institutions and private sector players.
- Enhancing distribution networks: Developing efficient channels to ensure forage seeds reach smallholder farmers across the country.
- Policy and support systems: Aligning policies related to livestock, irrigation, and land use to support forage production and utilization.
- Farmer training and awareness: Providing technical support and training to farmers on effective forage cultivation and utilization practices.

Addressing these areas will be crucial for meeting the forage needs of Malawi's livestock sector, improving livestock productivity, and supporting the livelihoods of smallholder farmers.

3.2.1.2 Available demand

The primary clients for forage seed and biomass in Malawi are smallholder farmers, who own most of the agricultural land and livestock. Dairy and goat production are almost entirely smallholder-driven, whereas a few commercial beef cattle producers also exist. This distribution impacts the development of effective market and value chain systems, given the large number of farmers with low-income generating capacity. Consequently, there is poor uptake of forage technologies, exacerbating feed shortages in both quantity and quality, especially during the long dry season (October to December).

Strategic interventions are essential to create a market pull for forage seed and biomass. Specifically, there is a need to establish functional beef cattle and goat

markets and regulate milk prices. Improving these markets is necessary to reward farmers' investments in livestock productivity, particularly for cattle and goats. In this study, we present the available demand for forages reported for cattle zones in Malawi (Table 14, Table 15). While goat production stretches across the entire country, data for goat-specific concentration zones were not available.

Table 14. List of institution with their respective forages demand

Institution	Name of a forage/fodder	Main Reason
CREMPA	Rhodes grass (<i>Chloris gayana</i>), Napier grass i.e., Dwarf napier, Centrosema (<i>Centrosema pubescens</i>), Calliandra	Distribution to smallholder dairy farmers
MDFA	Centrosema (<i>Centrosema pubescens</i>), Panicum grasses (<i>Megathyrsus maximus</i>), Napier grass i.e., Dwarf napier, Brachiaria grass, Guatemala grass (<i>Tripsacum andersonii</i>), Silverleaf desmodium (<i>Desmodium uncinatum</i>)	Distribution to smallholder dairy farmers
TAPP	Rhodes grass (<i>Chloris gayana</i>), Centrosema (<i>Centrosema pubescens</i>), Brachiaria grass, Leucaena spp., <i>Moringa oleifera</i>	Distribution to smallholder goat farmers and promoting mixed-farming systems
MMPA	Calliandra, Leucaena spp., Gliricidia sepium, <i>Sesbania sesban</i> , <i>Faidherbia albida</i>	Distribution to smallholder dairy farmers
LUANAR	Lucerne /Alfalfa, Calliandra, Leucaena spp., Brachiaria grass, <i>Moringa oleifera</i>	Research, forage seed and biomass production
Lunyangwa Research Station	<i>Neonotonia wightii</i> , Stylosanthes, Sericea lespedeza (<i>Lespedeza cuneata</i>)	Research
OG Isa farm	Lucerne /Alfalfa	Beef cattle, forage seed and biomass production

Table 15: Cattle zones and forage demand

Cattle zone	Main forage demand
Lower Shire	High demand for drought-resistant forages
Lilongwe-Mzimba zone	Moderate demand due to mixed farming systems
Lakeshore Plains	High demand due to extensive grazing areas
Middle and Upper Shire	High demand during the dry season

Table 16 and 17 show the dairy zones in Malawi, indicating the distribution of available demand for forage seed and biomass among smallholder dairy farmers. The highest number of dairy animals is in the southern region (Blantyre Milk Shed Area), followed by the Lilongwe Milk Shed Area and then the Mzuzu Milk Shed Area. This is evidenced by the higher number of milk bulking groups (MBGs) registered in the Malawi Milk Producers Association (MMPA) in the southern region (55) compared to the central (52) and northern regions (14).

The three beef zones in Malawi are presented in Table 18 and 19. These are the Lower Shire, Lilongwe-Mzimba zone, and the Lakeshore Plains, middle, and upper Shire

Valley. Commercial beef farmers are mainly in the Lower Shire, while smallholder beef farmers dominate the latter two beef zones.

Table 16: Dairy zones and forage demand

Dairy zone	Number of dairy animals	Number of MBGs
Blantyre Milk Shed Area	Highest	55
Lilongwe Milk Shed Area	Moderate	52
Mzuzu Milk Shed Area	Lowest	14

Table 17: Dairy zones in Malawi

Malawi Milk Shed Areas	Districts hosting milk bulking groups (MBGs)	Climate/topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production systems	Feed base and best vet interventions
Blantyre milk shed Area	Blantyre	Milk shed lies in a hilly area; it has varied topography ranging from an elevation of about 780 to 1,612 m above sea level.	Ferruginous (Acrisols and Ferralsols), strongly acid to acid. Low fertility. Crop production	Medium to high population density	The smallholder dairy farmers are organized by Shire Highlands Milk Producers Association (SHMPA) and locally by milk bulking groups (MBGs) sell milk to processors. Over 80% of smallholder farmers use this marketing channel	Dairy animals raised on cut-and-carry feeding system. Forage cut from dambos/roadside and little from intentionally planted fields. Some do supplement with concentrates	Crop residues are gathered, used as beddings and feed to dairy animals in dry season. Dairy farming generally allocated little allocated land for pasture production
	Thyolo			Medium population density because of plantations			
	Mulanje						
Lilongwe Milk Shed Area	Lilongwe	Elevation between 870-1055 m above sea level, Tropical wet and dry or	Ferruginous (Lixisols) and Calcimorphic alluvials	High to medium population density	Dairy smallholder farmers are governed by Central Region Milk Producers Association (CREMPA), at	Dairy animals raised on cut-and-carry feeding system. Forage cut from dambos/roadside and little from	Crop residues are gathered, used as beddings and feed to dairy animals in dry season.
	Mchinji			Moderate population density			

Malawi Milk Shed Areas	Districts hosting milk bulking groups (MBGs)	Climate/topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production systems	Feed base and best vet interventions
	Dowa	savanna climate. Average yearly temperature is 26.1°C	(Fluvisols). Moderate to high fertility. Major crops maize, tobacco and legumes	Moderate population density	community level operate in MBGs. Milk is collected by processors	intentionally planted fields. Some do supplement with concentrates	Dairy farming generally allocated little allocated land for pasture production
	Dedza	Elevation of 1,580m above sea level, a subtropical highland climate	Ferralsols and Regosols, generally acidic. Vegetable crops, maize and some legumes	Moderate population density			
Mzuzu Milk Shed Area	Nkhata-bay west	Elevation of 1102 -1279 m above sea level	Ferruginous (Acrisols and Ferralsols), strongly acid to acid. Low fertility. Grow bananas, cassava, maize	Low population density	Dairy smallholder farmers are governed by Mpoto Dairy Farmers Association (MDFA), at community level operate in MBGs. Currently no processor buying their milk	Dairy animals raised on cut-and-carry feeding system. Forage cut from dambos/roadside and little from intentionally planted fields. Some do supplement with concentrates	Crop residues are gathered, used as beddings and feed to dairy animals in dry season. Dairy farming generally allocated little allocated land for

Malawi Milk Shed Areas	Districts hosting milk bulking groups (MBGs)	Climate/topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production systems	Feed base and best vet interventions
	Mzimba North	Elevation of 1275 m above sea level	Ferruginous (Lixisols and Luvisols). Various crops are grown - maize, g/nuts, tobacco, soybean	Low population density			pasture production

Table 18: Beef zones and forage demand

Beef zone	Main clientele	Forage demand characteristics
Lower Shire	Commercial beef farmers	High demand for quality forages
Lilongwe-Mzimba zone	Smallholder beef farmers	Moderate to high demand
Lakeshore Plains	Smallholder beef farmers	High demand for adaptive forages
Middle and Upper Shire	Smallholder beef farmers	High demand during dry seasons

Table 19: Beef zones in Malawi

Beef Cattle Zones (by agro-ecologies)	District prominent in cattle rearing/farming	Climate/Topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production Systems	Dominant Feeding Systems
Lower Shire	Chikwawa	Wet season lasts 4 months, from November to March, with January receiving most rains of the year. The dry season lasts 8 months, from April to October/November.	Vertisols, high to moderate acidic. Moderate to high fertility, but intractable montmorillonitic clays	Low to medium density, low incomes. Has some commercial beef farms	Smallholder farmers sell to commercial beef farms. Major beef market is commercial city of Blantyre through city abattoirs	Extensive grazing, dominated by Malawi Zebu seconded by crosses of Mw Zebu and Brahman, Commercial farmers have herd ranging 200 - 15,000 cattle	Use of crop residues mostly in dry season, natural pastures, ranches and feedlot by commercial farms while smallholder farmers use communal feeding
Lilongwe-Mzimba zone	Mzimba, Rumphi	Elevation range of 860-1310 m above sea level, has a tropical wet and dry or savanna climate. Average annual rainfall of 179	Calciumorphic alluvials (Fluvisols). Low fertility to moderate and high in some areas	Low density, attach cattle farming to cultural values	Unstructured cattle markets (through visiting vendors) and some few government-set rural markets e.g.	Extensive grazing of Malawi Zebus, individual farmers owning herd ranging from 1 to 200, use night kraals	Use of crop residues, natural pastures, dominated by smallholder farmers who follow extensive

Beef Cattle Zones (by agro-ecologies)	District prominent in cattle rearing/farming	Climate/ Topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production Systems	Dominant Feeding Systems
		mm, with about 205 days without rains in a year			Phazi, Embangweni, Rumphu markets	after day communal grazing, little or no control grazing land	management system with night kraals. No forage production effort
	Lilongwe, Dowa, Mchinji	Elevation range of 910-1198 m above sea level, has a tropical wet and dry or savanna climate. Average annual rainfall of 121 mm, with about 223 days without rains in a year	Ferruginous (Lixisols and Luvisols. Clay soils of Kaolinite and halloysite, Fe and Aloxiodes. Moderate to high fertility productive to variety of crops (grasses and legumes)	Lilongwe has high density while Dowa and Mchinji have medium to low density. Cattle farming is mostly subsistent activity	Unstructured cattle markets, significantly rely on vending	Extensive grazing of Malawi Zebus, individual farmers owning herd ranging from 1 to 30, use night kraals after day communal grazing, little or no control grazing land	Use of crop residues, natural pastures, dominated by smallholder farmers who follow extensive management system with night kraals. No forage production effort

Beef Cattle Zones (by agro-ecologies)	District prominent in cattle rearing/farming	Climate/ Topography	Soils and Land Use	Social & Demographic Characteristic	Markets & Infrastructure	Production Systems	Dominant Feeding Systems
Lake shore plains, middle and upper Shire valley	Karonga	Elevation of 486 m above sea level, has a tropical wet and dry or savanna climate. Average annual rainfall of 181 mm, with about 202 days without rains in a year	Calciumorphic alluvials (Fluvisols). Low fertility to moderate and high in some areas. Maize, rice are common	Low to medium density, low incomes	Unstructured cattle markets, mostly through vendors	Extensive grazing of local zebus, household herd ranges 1 to 60, use night kraals after day communal grazing, tethering cattle is common	Use of crop residues and natural pastures, dominated by smallholder farmers on extensive management system with night kraals. No forage production effort
	Salima	Elevation range of 484-510 m above sea level, has a tropical wet and dry or savanna climate.	Eutric Fluvisols, most crops grown include maize, rice, cotton	Medium density, low incomes		Extensive grazing of local zebus and crosses, use night kraals after day communal grazing, no control grazing land	Use of crop residues and natural pastures, smallholder farmers follow extensive management system with night kraals. No forage production effort
	Mangochi	Average annual rainfall of 114 mm, with about 225 - 240 days without rains in a year	alluvial and/or lacustrine, low permeability	Medium density, low incomes			

Implications for forage seed and biomass markets

The data highlight the significant demand for forage seed and biomass among smallholder farmers, particularly in dairy and beef production areas. The following actions are recommended to meet this demand effectively:

- *Market development:* Establish and enhance livestock markets to facilitate the sale of beef cattle and goats. Regulate milk prices to provide stable income for dairy farmers.
- *Forage technology Adoption:* Promote the adoption of improved forage technologies to address feed shortages during the dry season.
- *Infrastructure support:* Develop infrastructure to support the distribution of forage seed and biomass, ensuring it reaches smallholder farmers effectively.
- *Policy alignment:* Align national policies with irrigation and land resources policies to create synergy among implementing partners and support the forage seed system comprehensively.
- *Training and capacity building:* Provide training and technical support to farmers on forage cultivation and utilization to improve livestock productivity.

By addressing these areas, Malawi can create a sustainable and efficient forage seed system that meets the needs of its livestock sector, thereby enhancing productivity and supporting smallholder farmers' livelihoods.

3.2.2 Seed company investments in forage value chain

The lack of a penetrable market for forage seed disincentivizes seed companies from investing in forage seed production and marketing. This limitation restricts accessibility and utilization of improved forage seed among smallholder farmers. Despite an increase in the number of seed companies in Malawi over the past decade, the country has not yet started producing certified forage and QDSs, presenting a business opportunity for seed companies.

Although the number of seed companies in Malawi has increased over the past decade, none of the 25 seed companies registered with the Seed Traders Association of Malawi (STAM) at the time of this study invested in forage seed. One reported challenge is that once a farmer purchases seed, they do not return for more, affecting customer retention rates for seed companies. Given that the agricultural sector is predominantly driven by smallholders, seed delivery systems need to be adjusted to accommodate the multitude of resource-constrained farmers, who each require small quantities of forage seed. Similar to food crops and legume seed production interventions, including forage seed in the Farm Input Subsidy Programme (FISP) as a complementary package to the livestock package could potentially stimulate the uptake of forage seed. Therefore, it is not surprising that research institutions, rather than the private sector, are taking a leading role in producing forage seed.

Malawi also does not produce certified or quality declared forage seeds. These are business opportunities for seed companies to venture into the production of

certified and quality declared forage seed. Considering the business model of the Malawi Union of Smallholder Farmers (MUSECO), which engages smallholder farmers in the production of certified seeds for crops such as maize, groundnuts, and soybeans, smallholder farmers could similarly be engaged in the production of certified forage seed. Developmental agencies, which support smallholder farmers with seed, represent an important intermediary for seed multiplication and can aid seed companies in strengthening the forage seed systems.

3.3 Entry points for establishing forage businesses in Malawi

3.3.1 Existing and potential forage-related business opportunities

Smallholder farmers in Malawi have the potential to participate in the production of forage seed, basic seed, multiplication of certified and QDS, hay, and silage to support beef, dairy, and goat production. Agrodealer businesses are another attractive opportunity, particularly for young farmers.

A total of 17 forages and fodder trees are reported to be on the market, comprising seven grasses, four legume creepers, and six legume fodder trees (Table 20). These forages and fodder trees are sold either as seed or vegetative material. Legume forages are relatively expensive, with an average price of MWK12,214 (\$6.1) per kilogram, compared to the average price for grasses (MWK9,480 or \$4.7) and fodder trees (MWK4,989 or \$2.5) per kilogram.

Table 20: Unit prices for forages and fodders reported in January and February 2024

Nr.	Forage/Fodder	Recommended seed rate (kg per ha)	Source	Unit	Unit Price (MWK)	Unit Price (USD)
1	Brachiaria grass cuttings	5 – 10 kg	Chitedze, Bvumbwe & Lunyangwa	50kg Bag	10,000	5.0
	Brachiaria grass seed		Chitedze Research Station	kg	7,500	3.8
2	Buffer grass seed	20 kg	Chitedze Research Station	kg	7,500	3.8
3	Guatamara grass cuttings	800–3,000 kg (cuttings)	Bvumbwe & Lunyangwa	50kg Bag	10,000	5.0
	Guatemala grass seed		Chitedze Research Station	kg	7,500	3.8
	Guatemala grass seed		Lunyangwa Research Station	kg	10,000	5.0
4	<i>Panicum maximum</i> (Napier grass) (Gold Cost) seed	9 -10 kg	Chitedze Research Station	kg	7,500	3.8
	Napier grass (Gold Cost) seed		Lunyangwa Research Station	kg	10,000	5.0
	Napier grass (Gold Cost) sticks		Chitedze Research Station	Sticks	100	0.1
	Napier grass hay		Bvumbwe & Lunyangwa Research Stations	50kg Bag	10,000	5.0
5	Ntchisi grass seed	3 - 5 kg	Lunyangwa Research Station	kg	10,000	5.0
6	Rhodes grass hay	12 kg	Chitedze & Lunyangwa	50kg Bag	10,000	5.0
	Rhodes grass hay		MacFyson Farm	Bale	37,500	18.8
	Rhodes grass seed		Lunyangwa Research Station	kg	6,000	3.0
	Rhodes grass seed		Chitedze Research Station	kg	7,500	3.8
	Rhodes grass seed		Bvumbwe Research Station	kg	10,000	5.0
	Rhodes grass seed		Likasi Farm - Smallholder Farmers	kg	3,500	1.8
	Rhodes grass seed		Likasi Farm - Commercial Farmers	kg	5,500	2.8
	Rhodes grass seed		LUANAR	kg	12,000	6.0
7	Star grass seed	6 - 8 heads	Chitedze Research Station	kg	7,500	3.8
8	Centrosema hay	4 - 6 kg	Chitedze & Bvumbwe	50kg Bag	10,000	5.0

Nr.	Forage/Fodder	Recommended seed rate (kg per ha)	Source	Unit	Unit Price (MWK)	Unit Price (USD)
	Centrosema seed		Chitedze Research Station	kg	7,500	3.8
	Centrosema seed		Private vendors	kg	25,000	12.5
	Centrosema seed		LUANAR	kg	13,000	6.5
9	Mucuna seed	35-40 kg	Bvumbwe Research Station	kg	10,000	5.0
10	<i>Neonotonia Wightii</i> seed	110 - 1000 kg	Bvumbwe Research Station	kg	10,000	5.0
11	Stylosanthes seed	20-25 kg	Bvumbwe Research Station	kg	10,000	5.0
12	<i>Acacia Angustissima</i> seed	830 trees	Bvumbwe Research Station	kg	10,000	5.0
13	Caliandra seed	2,500 trees	Bvumbwe Research Station	kg	10,000	5.0
14	<i>Faidherbia albida</i> seed	100 trees	Local communities	kg	1,500	0.8
15	<i>Gliricidia sepium</i> seed	4,000 to 10,000 trees	Land Resource Centre Trust	kg	3,500	1.8
	<i>Gliricidia sepium</i> seedling		Private (Hopmac)	Seedling	400	0.2
16	Leucaena spp. seed	1.5–3.0 kg	Land Resource Centre Trust	kg	2,000	1.0
	Leucaena spp. seed		Lunyangwa Research Station	kg	6,000	3.0
	Leucaena spp. seed		Bvumbwe Research Station	kg	10,000	5.0
17	<i>Sesbania sesban</i> seed	125,000 plants	Land Resource Centre Trust	kg	1,500	0.8

Table 21 highlights potential business entry points available to smallholder farmers, commercial farmers, researchers, and public and private entities in the forage seed value chains. Four broad business areas have been identified that smallholder farmers, including young farmers, can explore to start viable businesses. These include the production of basic seed, certified seed, QDS (if introduced in Malawi), forage-based products (hay and silage), and the supply of production inputs including equipment.

The urgency to promote and build capacity to leverage these potential business entry points is evident among individual farmers and farmer organizations (clubs and cooperatives). For instance, in the dairy sector, 15% of the members of Milk Bulking Groups (MBGs) do not have dairy animals but are on a waiting list to receive a dairy animal through a pass-on program. These members could venture into some of these businesses to produce biomass for those keeping cattle and goats in their community.

Table 21: Business entry points available along the forage seed value chains

Business Opportunity*	Smallholder Farmers	Commercial Farmers	Researchers	Public Entities	Private Entities
Production of breeders' seed			X		
Production of basic and QDSs	X	X	X	X	X
Multiplication of certified seed	X	X	X	X	X
Production of forage biomass including forage-based products (especially hay and silage)	X	X		X	X
Forage production inputs	X			X	X
Supply of production machinery					X
Forage production credit finance				X	X
Forage production insurance				X	X

*Seed where applicable includes vegetative material

3.3.2 Forage seed and biomass business investment models: Case studies

Considering the average small landholding size of less than 1 ha per household among smallholder farmers, investing in legume forage production proves to be more profitable than grasses on a pure stand plot. Smallholder farmers can generate a return above their initial investment in forage production within 2.5 years, with an Internal Rate of Return (IRR) exceeding 35% on 1 ha of pure forage stand. However, smallholder farmers should be encouraged to adhere to principles of mixed farming systems as they participate in forage seed value chains, given that the majority of smallholder farmers in Malawi practice mixed farming systems.

Common forages on the market: The most common forages reported to be on the market for both seed and biomass (hay) production include Rhodes grass, *Centrosema pubescens*, and *Brachiaria mulato II*. Investment analyses for these three forages based on a 1 ha (2.5 acres) scale of production indicate that investing in *Centrosema pubescens* would be more profitable compared to Rhodes grass and *Brachiaria mulato II* (Table 22). The estimated annual profit for *Centrosema pubescens* (\$1,943) is higher than the respective net profits for *Brachiaria mulato II* (\$1,340) and Rhodes grass (\$1,176).

Comparison of smallholder and commercial farmers: Further comparison between smallholder and commercial farmers shows that, at a commercial scale, production of seed and biomass includes the cost of machinery (tractor, hay harvester, and hay baler) and annual recurring fixed costs. On 1 ha of land, smallholder farmers can generate a return above their initial investment within two and half years: at least MWK7,832,927 (\$4,476) from *Centrosema pubescens*, MWK3,374,308 (\$1,928) from *Brachiaria mulato II* and MWK 2,190,637 (\$1,252) from Rhodes grass. The IRR for *Centrosema pubescens* is estimated to be higher (101%) than that for *Brachiaria mulato II* (51%) and Rhodes grass (35%) due to reduced fertilizer requirements during production. Legumes require less or no fertilizer compared to grasses to achieve optimal yields.

Due to low yield and prices per kilogram for the grasses, achieving economies of scale requires relatively more land than the legumes. Smallholder farmers would need to invest in more than 0.9 ha of land to make a profit from the grasses, whereas large commercial farmers would need at least 15 ha. Given the small average landholding size of 0.62 ha among smallholder farmers in Malawi, investment in legumes appears to be more feasible and profitable than in grasses. Alternatively, the best investment option for smallholder farmers could be through mixed farming systems to leverage the multiple benefits forages offer beyond financial rewards.

Recommended minimum land size for pure stand forage production: The recommended minimum land size for profitable investment of sole forage production was determined based on the size of land that would result in a positive Net Present Value (NPV) within 5 years of investment. For both *Brachiaria mulato II* and Rhodes grass, 0.9 ha and 1.0 ha, respectively, are at minimum required. In contrast, *Centrosema pubescens* minimum land requirement for profitable investment is 0.6 ha. While the current average landholding size for smallholder farmers in Malawi is below 1 ha, farmers with livestock tend to have more land, and can also integrate forages into their systems.

For commercial farmers the recommended minimum land size to invest in pure stand for *Centrosema pubescens* is 10ha, and for *Brachiaria mulato II* 15 ha .

These findings provide evidence that investment in forage seed and biomass production is a viable business case among smallholder and commercial farmers, with significant economic benefits in addition to the environmental and social advantages that forages offer.

Table 22: Financial investment analyses for forages on a ha of land assuming pure stand production (Rhodes grass, *Centrosema pubescens*, *Brachiaria mulato II*)

Description	Rhodes grass	<i>Centrosema pubescens</i>	<i>Brachiaria mulato II</i>
<u>Revenue</u>			
Seed/Cuttings (USD)	600	1,519	521
Biomass Dry Matter (Hay) (USD)	1,500	1,200	1,700
Gross Revenue (USD)	2,100	2,719	1,221
<u>Cost of Goods (COGS)(USD)</u>			
Seed	72	26	30
Gross Profit (USD)	2,028	2,693	2,191
<u>Variable costs (USD)</u>			
Land preparation	63	63	63
Planting	4	4	4
Fertiliser application	288	213	288
Weeding	4	4	4
Harvesting and packaging	38	30	43
Administration costs including marketing	35	35	35
Personnel	300	300	300
15% contingency	120	101	115
Total Variable Costs (USD)	852	750	851
Operating Gross Profit	1,176	1,943	1,340
Operating Gross Margin	56 %	71%	60%
Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA)	-	-	-
Net Profit	1,176	1,943	1,340
<u>Investment Ratios</u>			
Net Present Value (NPV) (USD)	1,252	4,476	1,928
Pay Back Period (PBP) (Years)	1.9	0.8	1.5
Discounted PBP (Years)	2.5	1.1	2.0
Internal Rate of Return (IRR)	35%	101%	51%
<u>Recommended Minimum Land Size to Invest (ha)</u>			
Smallholder farmer	1.0	0.6	0.9
Commercial farmer	17	10	15

4 CONCLUSIONS

The study has identified multiple business opportunities within the forage seed systems, many of which are viable for smallholder farmers. These opportunities include the production of basic and certified seeds, biomass in the form of hay, and inputs such as organic manure. Local demand for forage seed and biomass is increasing, driven by the rising cattle and goat populations. Effective development of this sector should be supported by well-functioning markets for livestock and livestock products. Encouraging diversification and integration of crops and livestock in mixed farming systems among smallholder farmers is a strategic pathway to improve productivity and nutrition while reducing environmental trade-offs. Promoting access to and utilization of improved forage and fodder varieties in Malawi can support this goal.

However, the forage seed system in Malawi is weak, and the livestock markets are poorly developed. Farmers have limited information and capacity to invest, stakeholders lack coordination, and policies do not consistently support the transition of the smallholder system. Coordinated efforts among stakeholders are needed to leverage existing opportunities, strategically address these weaknesses, and create a competitive forage seed system that includes smallholder farmers.

5 RECOMMENDATIONS

The following priority actions would enable the creation of a competitive forage seed system and value chains in Malawi.

Seed systems development

- a) Create an inventory of existing forages and pastures by agro-ecological zones, adaptation to contexts and user values, to establish the status of native and exotic forages, forage seed, and fodder adoption systems. This could later support efforts to purify available forage varieties in Malawi.
- b) Conduct stakeholder consultations on the viability and need to advocate for the introduction of a QDS system in the forage industry in Malawi.
- c) Strengthen the forage seed systems for native and exotic species, and enforce relevant policies and regulations for harmonized QDS and forage seed imports.
- d) Promote forage seed production, such as basic seed, as a business venture among smallholder farmer cooperatives, groups, or individual farmers.
- e) Lobby for increased financial investment in high-value forage seed and maintenance, with a higher number of forage breeders and inspectors.
- f) Lobby for the inclusion of forage seed in the Farm Input Subsidy Programme (FISP) to lower entry barriers for farmers in the livestock value chain.
- g) Produce guidelines on forage seed production, specified for native and exotic species, including recommendations based on agro-ecological zones.
- h) Support local seed multiplication and certification by promoting the establishment of targeted funding mechanisms and forging public-private partnerships between research institutions and the private sector to develop, maintain, and upscale forage seed production to commercial quantities.

Enabling environment

- i) Establish a coordinating platform or multistakeholder working group to advance evidence generation for forage system development and policy advocacy, aligned with the pillar 1, Malawi's Vision 2063.
- j) Develop forage production and utilization business models that support optimal land utilization.
- k) Leverage the National Livestock Policy to establish structured, functional livestock markets and value chain models to create market-driven demand to propel the forage industry.

- l) Promote the use of public-private partnership (PPP) models along the forage seed and forage biomass value chains, including seed variety release, biomass production, processing, and marketing.
- m) Engage large-scale commercial farmers in pasture seed production and seed banking, as well as feed and fodder processing and marketing.
- n) Support the integration and use of forages to promote quality inputs for livestock production, improve soil health, and enhance environmental quality, such as through carbon sequestration.

Capacity development

- o) Sensitize smallholder farmers on the benefits and nutritional value of native and exotic forage and pasture species to help them make informed decisions.
- p) Encourage stakeholders, such as development agencies, to include forage and pasture seed and vegetative material as part of livestock and restoration packages.
- q) Promote the integration of crops and forage/multipurpose trees, especially among smallholder farmers with limited land in the southern region of Malawi.
- r) Build the capacity of smallholder farmers in feed formulation using locally available forage varieties and fodder trees (both native and exotic).
- s) Enhance the integration of crops, livestock, and natural resources in government, extension, and research initiatives.
- t) Develop and roll out a training package for sensitizing and building the capacity of actors in the forage value chains on procedures and protocols for forage seed importation, registration, and commercialization.
- u) Equip extension workers to train livestock farmers in appropriate land management practices to support grazing and improved pasture production practices.

APPENDIX

Appendix 1: List of stakeholders consulted.

Nr.	ORGANISATION	POSITION	CATEGORY	MAJOR ROLE
1	Balaka District	District Animal Health and Livestock Development Officer	Government Institution	Promotion
	Balaka District	Senior Assistant Land Resources Conservation Officer	Government Institution	Promotion
2	Balaka Phalula Extension Planning Area	Agricultural Extension Development Coordinator (AEDC)	Government Institution	Promotion
	Balaka Phalula Extension Planning Area	Agricultural Extension Development Officer (AEDO)	Government Institution	Promotion
	Balaka Phalula Extension Planning Area	Agricultural Extension Development Officer (AEDO)	Government Institution	Promotion
3	Bvumbwe Research Station	Assistant Agriculture Research Officer for Livestock and Pasture	Government Institution	Production
4	Central Region Milk Producers Association (CREMPA)	Managing Director	Farmer Association	Promotion
5	Chitedze Research Station	Livestock Commodity Team Leader	Government Institution	Research and Production
6	Heifer International		Development Agency	Promotion
7	Kasungu District	District Animal Health and Livestock Development Officer	Government Institution	Promotion
8	Land Resource Centre Trust		Government Institution	Distribution
9	Likas Farm	Veterinary Officer	Government Institution	Production
	Likasi Farm	Farm Manager	Government Institution	Production and Distribution
10	Lilongwe University of Agriculture and Natural Resources (LUANAR)	Senior Lecturer	Academic Institution	Research and Production
11	LUANAR TACE AgriBiz Hub	Livestock Junior Consultant	Entrepreneur	Production and Distribution
12	Lunyangwa Research Station	Pastures Commodity Team Leader (CTL)	Government Institution	Production and Distribution
13	Malawi Milk Producers	Managing Director	Farmer Association	Promotion

Nr.	ORGANISATION	POSITION	CATEGORY	MAJOR ROLE
	Association (MMPA)			
14	Malawi Seed Systems Unit (DARS)	Commodity Team Leader	Regulatory Body	Quality control
15	Mbawa Research	Chief Agricultural Research Scientist	Government Institution	Production and Distribution
16	Mpoto Dairy Farmers Association (MDFA)	Managing Director	Farmer Association	Promotion
17	Multi Seeds Company Limited (MUSECO)	Production Manager	Private Company	Distribution
18	Mzimba North District	District Animal Health and Livestock Development Officer	Government Institution	Promotion
19	Mzimba South District	District Animal Health and Livestock Development Officer	Government Institution	Promotion
20	Nema Farm Seed	Managing Director	Private Company	Distribution
21	Seed Trade Association of Malawi	<u>Director</u>	Regulatory Body	Quality control
22	SeedCo Malawi	Marketing Officer	Private Company	Distribution
23	Agriculture Technologies Clearing Committee (ATCC) (DARS)	Technology Transfer Officer (TTO)	Government Institution	Regulatory body
24	Trustees Of Agricultural Promotion Programme (TAPP)	Staff	Development Agency	Promotion
25	Shire Highland Milk Producers Association (SHIMPA)	General Manager	Farmer Association	Production and Distribution
26	Thunga Milk Bulking Group	Chair	Farmer Organisation	Utilisation
27	Toleza Farm	Staff	Private Company	Production
28	Ekhaya Farm	Staff	Private Company	Production
29	OG Isa	Staff	Private Company	Production

Nr.	ORGANISATION	POSITION	CATEGORY	MAJOR ROLE
30	Gala Farm	Staff	Private Company	Production
31	MacFyson Farm	Staff	Private Company	Production
32	Kalinga Farm at Lisasadza	Staff	Private Company	Production
33	Mbawa Research	Chief Agricultural Research Scientist	Government Institution	Research and Production



cgiar.org/initiative/mixed-farming-systems

