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Delivery of diverse and resilient forage planting material in multifunctional landscapes in the Omo–Gibe Basin, Ethiopia

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Progress Report



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1. Introduction

The Multifunctional Landscapes (MFL) is one of the CGIAR 2025–2030 Research and Innovation Portfolio programs, operating across Eastern Africa, Latin America, Northern Africa, Southern Africa, South Asia, Southeast Asia, and Western Africa. The program promotes integrated and sustainable management of food systems, land, water, and ecosystems across multiple spatial, temporal, and institutional scales. By bringing together agricultural production, natural resource management, biodiversity conservation, and livelihood development, MFL program aims to enhance agricultural productivity, strengthen resilience, conserve biodiversity, restore degraded landscapes, and improve the livelihoods of farming and livestock-keeping communities (CGIAR, 2025).

The MFL Initiative is organized around five Areas of Work (AoWs) addressing complementary dimensions of multifunctional landscape development. The work on diverse and resilient forage planting material is implemented under Area of Work 1 (AoW1): Solutions and Innovations—Agroecology, Nature-Positive, Regenerative, and Nutrition-Sensitive Systems. Within this framework, the initiative in the Omo–Gibe and Lake Victoria basins seeks to improve the availability, accessibility, diversity, quality, and use of forage planting materials that are locally adapted and capable of supporting productive and resilient livestock systems under changing climatic and environmental conditions.

Access to appropriate and sufficient forage planting material is an important foundation for improving livestock feed availability and strengthening crop–livestock systems. Yet forage species and varieties are often inadequately represented in conventional seed and planting-material systems, leaving farmers with limited access to quality and diverse materials. Strengthening local and community-based approaches for the production, multiplication, conservation, exchange, and dissemination of forage planting material can help address these gaps while complementing formal research, gene bank, seed, and extension systems. Such approaches can also support the conservation and sustainable use of plant genetic diversity and increase farmers' capacity to select and manage materials suited to their local production environments (McGuire & Sperling, 2016).

Against this background, “Delivery of diverse and resilient planting material in multifunctional landscapes” is an ongoing effort in the Omo–Gibe and Lake Victoria basins. The work focuses on facilitating access to diverse, high-quality, locally adapted, and improved forage planting materials, including both seed- and vegetatively propagated species. The approach supports the identification and selection of suitable forage species, local multiplication and conservation, storage and management of planting materials, farmer-to-farmer exchange, demonstrations, capacity development, and linkages with research, extension, gene banks, producer organizations, and other relevant actors.

The emphasis on diversity is important because different forage species and varieties provide complementary agronomic, nutritional, environmental, and livelihood benefits. A wider portfolio of forage resources can enable farmers to select materials suited to different soils, altitudes, rainfall regimes, production objectives, and livestock feeding systems. It can also reduce dependence on a narrow range of forage resources and provide greater flexibility in responding to seasonal variability, drought, changing production conditions, and other environmental stresses. Diversification of forage resources is therefore an important component of building more resilient crop–livestock systems (FAO, 2025).

Forage development within multifunctional landscapes also extends beyond livestock feeding. Improved availability and use of forage can contribute to livestock productivity, soil fertility management, erosion control, restoration of degraded land, efficient utilization of crop residues,

biodiversity conservation, and income diversification. Forage species can provide biomass for livestock while also supporting soil cover, nutrient cycling, and other ecosystem functions. In mixed crop–livestock systems, better integration of forage production with crops and natural-resource management can improve the efficiency with which land, nutrients, water, and biomass are used.

The approach recognizes that the sustainable delivery of forage planting material depends on more than simply making materials available. It requires a functioning forage innovation and delivery system involving farmers, community groups, extension services, research institutions, gene banks, cooperatives, seed and planting-material producers, private-sector actors, and other partners. Strengthening these linkages can facilitate the movement of planting materials, knowledge, technologies, and services across communities and landscapes and can create more sustainable pathways for multiplication and scaling.

This report documents the approaches used to improve the delivery of diverse and resilient forage planting material in the Omo–Gibe and Lake Victoria basins, the progress achieved, and the experiences generated through implementation. It presents key lessons related to the identification and selection of suitable forage materials, local multiplication and management, farmer capacity development, community-based delivery mechanisms, partnerships, and linkages with formal and informal forage innovation systems. It also identifies opportunities and recommendations for consolidating, validating, scaling, and sustaining approaches for the delivery and use of diverse and resilient forage planting material across multifunctional landscapes.

Ultimately, the initiative aims to move beyond short-term provision of forage planting materials toward locally embedded and sustainable systems that enable farmers and livestock keepers to continuously access, multiply, conserve, exchange, and use a diverse portfolio of high-quality forage resources. By strengthening these systems and linking them with research, extension, gene bank, private-sector, and market actors, the initiative can contribute to improved livestock productivity, landscape restoration, diversified livelihoods, biodiversity conservation, and enhanced resilience of smallholder farming and livestock-keeping communities.

2. Objectives

- To document the approaches and mechanisms used to establish and operationalize farmer group-based systems for the production, management, and delivery of diverse and resilient forage planting materials in the Omo–Gibe Basin.
- To synthesize progress, key achievements, and lessons learned in establishing and operationalizing farmer group-based systems for forage planting-material production and delivery.
- To identify priority actions and strategic considerations for strengthening the production, delivery, utilization, and scaling of diverse and resilient forage planting materials through farmer groups in multifunctional landscapes.

3. Approaches employed

The ABC-CIAT and IWMI coordination teams organized a series of meetings and workshops to introduce the Omo–Gibe Basin and its selected living landscapes and to engage key stakeholders in the implementation of the Multifunctional Landscapes Science Program (MFL-SP). These efforts included national and sub-regional launch workshops for the MFL-SP in the Omo–Gibe

Living Landscapes of Ethiopia. The meetings and workshops provided a valuable platform to enhance understanding of the biophysical and socio-economic context of the basin, strengthen partnerships with government institutions, non-governmental organizations, and other key stakeholders, and foster collaboration for the effective implementation of the program.

Initial engagement was undertaken with key local partners operating within the Omo–Gibe Basin to establish collaborative arrangements for implementing farmers' group–based forage seed production and utilization activities. Discussions were initiated with the Terepeza Development Association (TDA) and local agricultural extension offices to identify opportunities for collaboration and to define implementation modalities in selected districts of the midstream Omo–Gibe living landscape. TDA is a local non-governmental organization (NGO) working in Southern Ethiopia to promote sustainable livelihoods, natural resource management, and community development, making it a strategic partner for community-based interventions.

Subsequently, a series of virtual meetings was held with TDA to discuss the objectives of the collaboration, review the draft action plans prepared by ILRI, and clarify the roles and responsibilities of each partner. These discussions resulted in a jointly agreed implementation plan that outlined priority activities, timelines, and coordination mechanisms. The agreed activities have since been implemented in a phased manner, ensuring effective coordination among partners and alignment with local priorities and the objectives of the Multifunctional Landscapes Program.

4. Progress made

4.1. Site and farmers selection

Terebeza Development Association (TDA) successfully completed the selection of the target woreda (district), kebeles, villages, and participating farmers while closely monitoring farmers' land preparation for for forage establishments (Figure 1). Kebele is the lowest admin structure in the Ethiopian Federal government structure. The team selected 45 smallholder farmers, 30 from Gamo Fogale Village in Hanaze Kebele, Kindo Koyisha Woreda/district and 15 from Mehal-Molticho village in Molticho Kebele, of the total selected farmers 20 are women, demonstrating a strong commitment to promoting women's participation (Photo 1). TDA's senior program team conducted the selection process in close collaboration with the woreda agriculture office, the woreda forage development coordinator, the kebeles chairpersons, and development agents.

The team applied well-defined selection criteria to identify suitable farmers and sites for forage planting material production. These criteria included accessibility for regular technical support and supervision, proximity to road infrastructure, potential contribution to the restoration and development of the Omo–Gibe Basin landscape, farmers’ willingness, and interest in cultivating improved forages and producing forage seed and planting materials, availability of adequate land, livestock holding, and the suitability of the allocated land for multipurpose forage development and seed production.

Based on these criteria, 45 farmers were selected and organized into four farmer groups, with three groups comprising 10 members each and one group comprising 15 members. Each group selected a focal person to facilitate communication and coordination among members, support regular group meetings and experience sharing, and serve as a link between the farmer group and the project team. To guide the functioning of the groups, terms of reference for group focal people and members together with agreed internal rules and responsibilities will be developed and discussed collectively with the group members. These will provide a common framework for

group coordination, participation, forage production, planting-material multiplication, and sharing experiences and responsibilities.

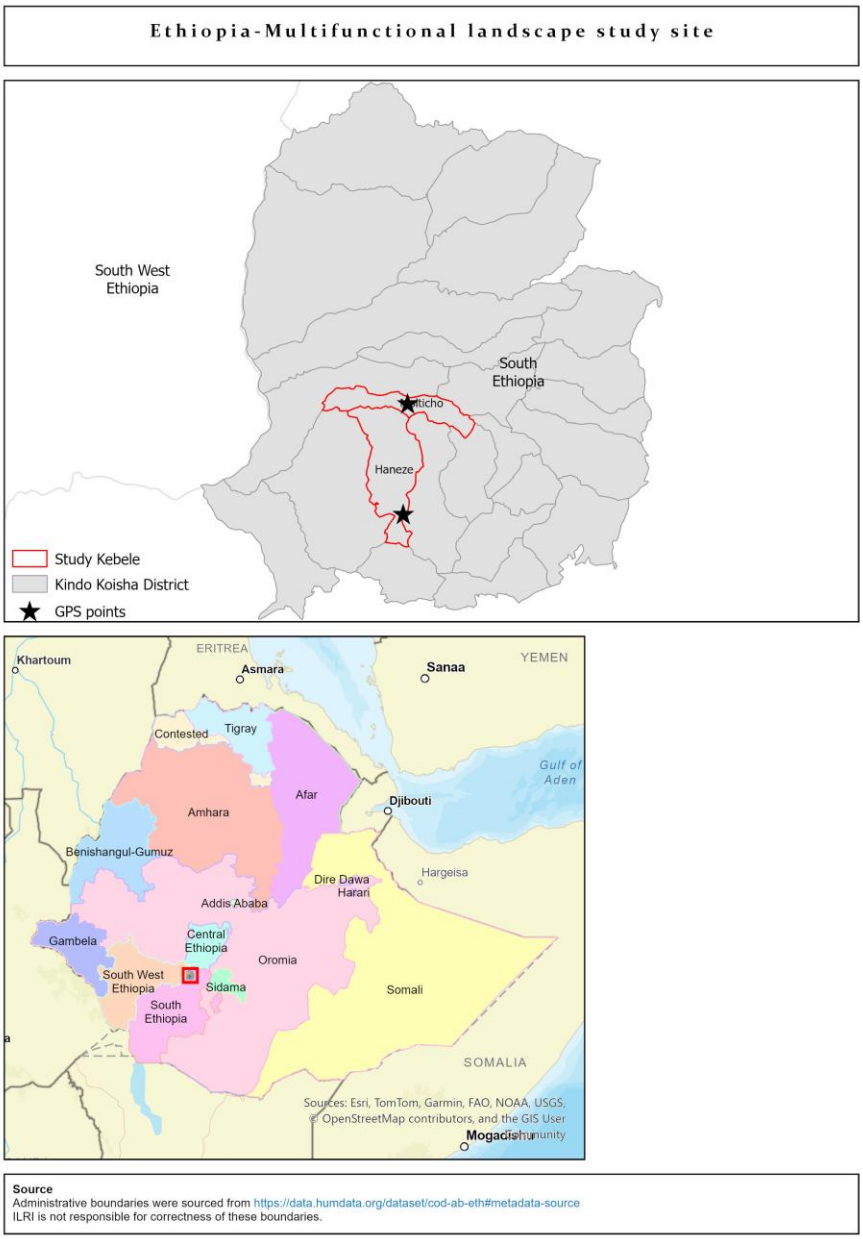


Figure 1. Map of study site locations in the Middle Landscape of the Omo-Gibe Basin, southern Ethiopia.



Photo 1: Women training participants on forage and seed development in Hanaze 01 kebele, Kindo Koyisha woreda, Ethiopia.

The selected two kebeles within the Kindo Koyisha Woreda/ district are slightly different in terms of closeness to road and access to some infrastructures as well as location, land and livestock holding and other features (Table 1).

Table 1. Farming System Characteristics of Hanaze 01 and Molticho Kebeles in Kindo Koyisha Woreda, Woliata Zone, Southern Ethiopia.

Features	Hanaze 01 Kebele	Molticho Kebele
Region	Southern Ethiopia	Southern Ethiopia
Zone	Woliata	Woliata
Woreda/ district	Kindo Koyisha	Kindo Koyisha
Number of participant farmers in farmers group-based forage seed production and utilization	30 (grouped into three and each composed of 10 members)	15 (this is one group of farmers)
Percent (%) of women farmers selected for farmers group-based forage seed production and utilization	57	20
Landholding (ha)	0.70	2.45
Livestock holding (TLU)	1.56	4.58
Access to road (km)	9	1.5

Access to market (km)	9	2
access to irrigation	No	Yes
Dominant livestock species	Cattle, small ruminants (goat), poultry and equines and	Cattle, small ruminants (goat), poultry and equines
Dominant crop-livestock system	Casava- livestock mixed system	Casava- livestock mixed system
Dominant crops	Cassava, maize, haricot bean, sweet potato, and banana	Cassava, maize, teff, haricot bean, sweet potato, and banana
Temperature (°C)	21-24	26-30
Altitude (masl)	1600	1200
Soil type	Clay loam	Loam
Rainfall (mm)	1200-1800	800-1200

Following the farmer and site selection process, TDA organized a half-day orientation and familiarization session involving the selected farmers, government development agents, kebele administration representatives, and technical experts from the woreda agriculture office. The session introduced participants to the objectives of the consortium project and highlighted the economic, livelihood, and environmental benefits of promoting improved forage varieties and strengthening farmer-led forage seed and planting-material production. Participants also shared and discussed their existing experiences, opportunities, and challenges related to forage development, seed production, and planting-material multiplication. These discussions provided important insights into the local context and helped inform subsequent project implementation and technical support. Discussions with the woreda head of agriculture resulted in a commitment to assign a dedicated technical expert to provide regular technical support, facilitate coordination with the farmer groups, and monitor the implementation of forage production and planting-material multiplication activities.

4.2. Exploration of forage seed from different sources

Access to quality forage seed and planting materials is fundamental for improving forage production, strengthening local seed systems, and enhancing livestock productivity. To support these efforts, the ILRI Gene bank supplied two cowpea (Vigna unguiculata) accessions (9334 and 12688) and one lablab (Lablab purpureus) accession (147) for evaluation and multiplication (Photo 2). In addition, sweet lupin (Lupinus angustifolius, variety Sanabor) was sourced from the ILRI site in Hossana, Central Ethiopia, where it had originally been introduced from the Amhara Agricultural Research Institute (ARARI) in Bahir Dar.

Planting materials of Desho grass (Pennisetum glaucifolium, variety ArekaDZF590) and Napier grass (Cenchrus purpureus, variety 16984) were also obtained from **ILRI** for multiplication and distribution. These improved forage species will serve as foundational planting materials for establishing demonstration plots, strengthening farmers group-based forage seed and planting material production and utilization systems, and expanding farmers' access to high-quality forage technologies across the target landscapes.



Photo 2: Lablab and cow pea forage seed accessed from ILRI Gene bank in Addis Ababa, Ethiopia.

4.3. Preparation of data collection survey instruments

A survey instrument has been developed and administered to characterize participants and establish baseline information for the farmer group-based forage seed and planting material production and utilization initiative. The survey assesses farmers' capacity, experience, and readiness to engage in forage seed production, forage cultivation, nursery management, and tree seedling production. It captures household characteristics, land and livestock resources, existing feed sources, and seasonal feed shortages as well as farmers' knowledge, training, and practical experience in these activities. It also examines access to essential resources including irrigation, nursery sites, labor, storage facilities, and membership in cooperatives or farmer groups. In addition, the survey identifies farmers' interest and commitment to forage seed, biomass, and tree planting material production; examines the major technical, institutional, and market constraints; and documents their plans for expanding these enterprises. Key baseline indicators include the area under improved forages, the diversity of forage and fodder tree species, annual forage seed and tree seedling production, livestock holdings, and the duration of seasonal feed shortages. These data provide evidence for selecting suitable participants, tailoring capacity-building and technical support, addressing production and market constraints, and monitoring progress and impacts over time.

Experienced and qualified enumerators were recruited to conduct the survey. Prior to field deployment, they received comprehensive training on the survey objectives, the content of the questionnaire, interview techniques and research ethics, the use of the Kobo Toolbox Collect mobile application, and data quality assurance procedures. Data were collected using smartphones, enabling offline interviews, GPS recording, photo capture, and built-in validation features that minimize data entry errors and enhanced data accuracy.

Completed questionnaires were reviewed and managed by the ILRI site coordinator, who conducted routine quality assurance checks to identify and resolve incomplete records, inconsistencies, duplicate entries, and outliers, ensuring a high-quality dataset for analysis. The survey data was analyzed to generate evidence on farmers' capacity, experience, and readiness to engage in forage seed and tree planting material production. These findings synthesize the

baseline report on 45 farmers engaged in forage and tree seedbank development and management in the Omo-Gibe Basin Landscape.

4.4. Organization and provision of training for the farmers

Theoretical and practical training was organized in Hanaze Kebele of Kindo Koyisha Woreda on 14 July 2026 to enhance the capacity of farmers and local stakeholders on sustainable forage seed and planting material production and utilization, farmers group formation, and improved livestock feeding practices (Photo 3). The training brought together farmers, kebele, woreda, and regional extension experts, local government representatives, Terebeza Development Association (TDA) staff, and the ILRI site coordinator. The training was conducted in Amharic to facilitate better understanding, interaction, and knowledge sharing among participants. The main objective was to improve participants' awareness and practical skills on the importance of quality forage seed and planting material production, conservation, and utilization for improving livestock productivity and strengthening local feed resource systems. The training covered key topics including the major challenges and opportunities in the Omo-Gibe Basin, the concept and role of forming groups and producing forage seeds, forage and tree seed/seedling multiplication, selected forage varieties for 2026 cropping season, major livestock feed sources, and the importance of forage production and supplementation.



Photo 3: Practical training participants on forage and seed bank development in Hanaze 01 kebele , Kindo Koyisha woreda, Ethiopia.

The training also provided practical guidance on land-use planning for forage development, the benefits of improved livestock feeding technologies such as improved feeding troughs, and approaches for organizing farmers into groups to produce and manage forage seed and planting materials. Participants discussed practical approaches for producing quality forage seed and planting materials, maintaining their quality, and developing sustainable mechanisms for their storage, management, and distribution to other farmers. The training emphasized the role of farmer-led forage seed and planting-material systems in improving access to quality forage resources, reducing dependence on external sources, and promoting the wider adoption of improved forage technologies. Through this capacity-building effort, farmers and local partners were better equipped to establish and manage functional farmer-led forage production and planting-material multiplication systems and contribute to sustainable livestock feed development in the Omo–Gibe Basin.

4.5. Facilitating access to quality planting materials through farmer groups

Quality planting materials have been prepared for five priority forage species, comprising three forage legumes-cowpea, lablab, and sweet lupin and two perennial forage grasses - Napier grass and Desho grass. Seeds of the forage legumes and vegetative planting materials (splits) of Napier and Desho grasses have been distributed to members of the participating farmer groups through a revolving seed and planting-material supply mechanism. This approach is intended to improve farmers' access to quality forage planting materials while establishing a sustainable, farmer-led system for their production, multiplication, and distribution.

Under this arrangement, each participating farmer has received the required seed and planting materials during the 2026 planting season. Following the establishment, harvesting, and multiplication of the forage materials, farmers will return 50% of the seed or planting materials they initially received to ILRI/TDA in the 2027 cropping season. The returned materials will subsequently be made available to additional farmers in the target areas, enabling the benefits of the intervention to expand progressively without relying on continuous external supply. This revolving mechanism is expected to strengthen the local availability of quality forage seed and planting materials, promote farmer ownership and collective responsibility, and enhance the sustainability and scalability of forage production.

By improving access to diverse and resilient forage species, the initiative is expected to accelerate the adoption of improved feed and forage technologies, enhance livestock feed availability and productivity, strengthen household resilience, and contribute to sustainable landscape restoration and management. The forage species to be supplied, together with their recommended agronomic practices and proposed land allocation for each participating household, are summarized in Table 2.

Table 2: Agronomic practices and land allocation for for forage planting material production.

No.	Forage variety	Seed rate/ha and Splits/ ha	Plant spacing	DAP (Kg/ha)	Urea (Kg/ha)	Minimum area required per farmer (m2)	Seed amount (kg) and required number of splits for each farmer
1	Lablab	25 kg	80cm x 30 cm	100kg	0	400	1
2	Cow pea	25kg	80cm x 30 cm	100kg	0	200	0.5
3	Sweet Lupin	80kg	30cm x 7 cm	100kg	0	31.25	0.25
4	Elephant grass	40000 splits	50cm x50 cm	100kg	50	25	100
5	Desho grass	20000 splits	50cm x 50cm	100kg	50	50	100
	Total area					706.25	

5. Findings from the Key Informants and group discussions

The survey engaged 45 respondents, comprising 25 men (55.6%) and 20 women (44.4%). Respondents had an average age of 39.8 years, an average household size of 6.8 members,

and an average landholding of 1.28 ha. On average, households allocated only 0.11 ha to forage and tree-seed related activities, indicating limited land availability for feed and planting material production. Livestock production played a central role in household livelihoods. Nearly all respondents (95.6%) kept cattle, while poultry and goat production were practiced by 68.9% and 53.3% of households, respectively. Farmers relied predominantly on communal and private grazing lands (97.8%) and crop residues (64.4%) as their main livestock feed resources.

The assessment revealed limited access to capacity-building opportunities. Very few farmers had received training related to forage or tree-seed production, and none had participated in field days or exchange visits. This limited exposure has likely constrained the adoption of improved production practices and technologies. Respondents identified several challenges affecting forage seed, forage biomass, and tree seedling production. Lack of access to quality seed emerged as the most critical constraint, reported by 88.9% of respondents forage seed production and forage biomass production, and by 82.2% for tree seedling production (Figure 2). Farmers also highlighted inadequate water access, limited nursery facilities, poor storage infrastructure, shortage of finance, insufficient technical skills, and weak extension support as major barriers to production and commercialization.

Despite these challenges, farmers demonstrated strong interest in expanding forage and tree-based enterprises. More than four-fifths of respondents (82.2%) expressed willingness to join forage seed production groups. All respondents indicated plans to increase forage production within the next five years, while 97.8% planned to engage in forage seed production and 84.4% intended to establish or expand tree nurseries. These findings reflect a strong demand for improved forage and tree-seed interventions and suggest significant opportunities for scaling production if farmers receive adequate access to quality planting materials, technical training, infrastructure, and institutional support.

The baseline assessment further revealed a pronounced seasonal feed shortage. Farmers reported that feed scarcity peaked in March, affecting 93.3% of households, followed by February (75.6%) and January (51.1%). Smaller proportions of respondents experienced feed shortages in April (20.0%), December (17.8%), and November (2.2%) (Figure 3). The concentration of feed shortages during the dry season underscores the urgent need to strengthen forage production systems, promote hay and feed conservation practices, and improve feed storage mechanisms to ensure a more reliable year-round supply of livestock feed.

Overall, the findings show strong farmer interest in forage and tree-seed production but also highlight critical bottlenecks related to quality planting materials, technical capacity, infrastructure, and support services. Addressing these constraints will be essential for improving feed availability, enhancing livestock productivity, and strengthening the sustainability of crop-livestock systems in Kindo Koyisha woreda.

6. Early establishment and performance indicators of the forages planted in main rainy season of 2026

6.1. Farmer Group scoring of forage species performance

Field observations assessed forage establishment, vegetative growth, plant vigor, stand condition, and the overall performance of the demonstrated forage accessions under farmers' field conditions. Preliminary assessments indicated that most forage species established successfully, survived well, and exhibited vigorous growth and healthy physical appearance (Photos 4, 5, 6, and 7).

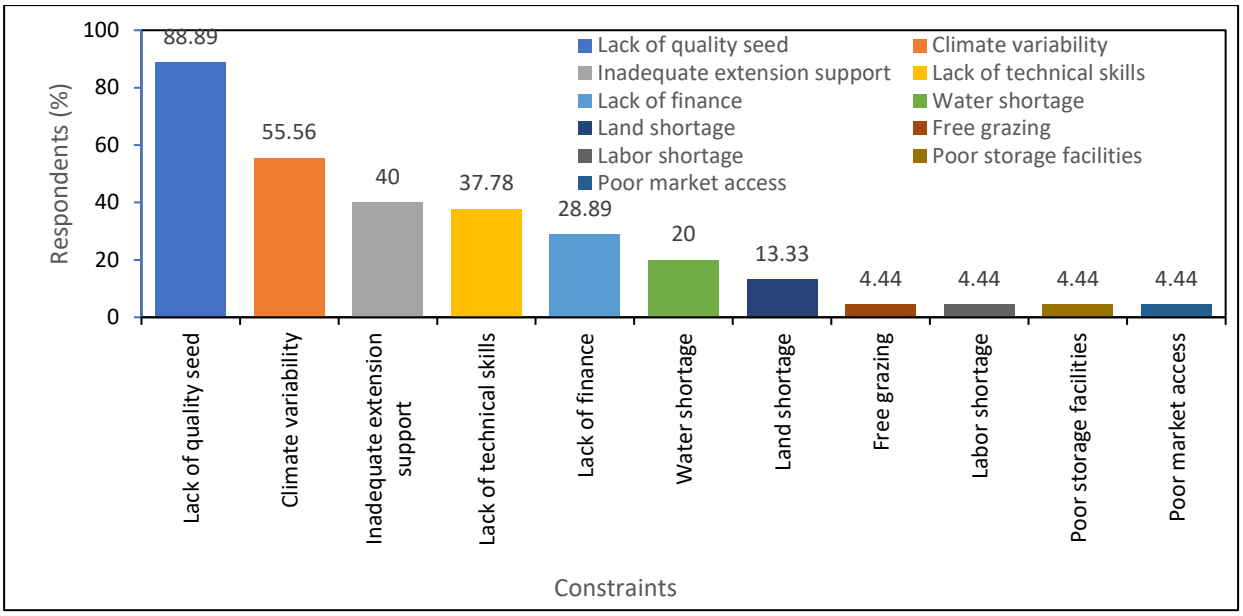


Figure 2: Constraints limiting forage seed production in Kindo Koyisha woreda, Ethiopia.

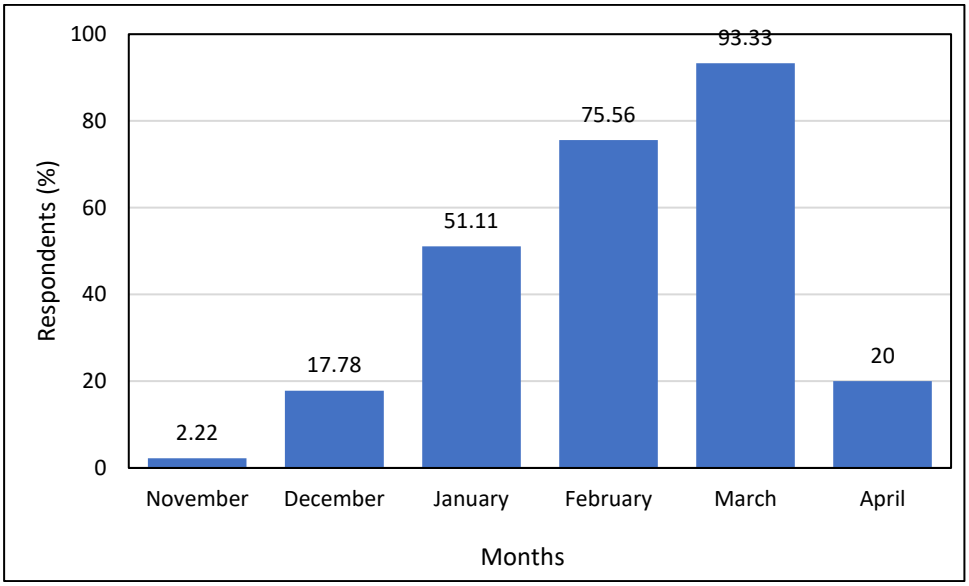


Figure 3. Months of feed shortage in Kindo Koyisha woreda, Ethiopia.

Regular field inspections also helped identify crop management requirements, including weed control and nutrient management, as well as the early detection of potential pest and disease symptoms. These observations enabled timely interventions to support plant establishment and development. In addition to these field observations, the four farmer groups evaluated forage performance during the vegetative growth stage, providing a farmer-based assessment of the relative performance of the demonstrated forage species under local growing conditions.

The four farmer groups evaluated forage performance during the vegetative growth stage based on their field observations and experiences. More than 90% of farmers across the four groups assigned the highest performance scores to lablab and cowpea (Table 3), indicating that these two forage legumes established well under the prevailing growing conditions. Their strong early growth may reflect the suitability of the local growing environments for these species, together with the advantages of using seeds as planting materials, which can support relatively rapid germination and establishment under favorable conditions. In contrast, farmers

consistently assigned the lowest performance scores to sweet lupin across all four groups. This observation suggests that sweet lupin faced greater challenges in establishing and growing in the study areas. The relatively high temperatures and soil conditions in the two kebeles may have contributed to its poor performance, although further assessment of soil properties, temperature conditions, and species-specific adaptation is needed to confirm the factors responsible.

Farmers generally ranked Napier grass third in performance across most of the groups, suggesting moderate establishment during the assessment period. However, the performance of Napier and desho grass should be interpreted in the context of the planting materials used and the timing of the assessment. Both species were established using vegetative splits rather than seeds, and the splits may require sufficient time to develop roots, produce new shoots, and establish a vigorous stand after planting. Consequently, the performance observed during the vegetative growth stage may not fully reflect their potential under the study conditions. We therefore expect the growth and performance of Napier and desho grasses to improve as the plants become more established, provided that moisture, soil conditions, and crop management remain favorable. Follow-up assessments at later growth stages will be important to determine whether their performance improves over time and to compare their establishment, biomass production, and suitability with those of lablab, cowpea, and sweet lupin.

Table 3. Farmers' scoring of forages based on vegetative growth, and resistance to drought and pest and disease infestation.

Forage species	**Group 1 farmers**			**Group 2 farmers**		
	Vegetative growth	Disease and pest infestation	Drought tolerance	Vegetative growth	Disease and pest infestation	Preference based on growth
Lablab	3	3	3	3	3	3
Cow pea	3	3	3	2	3	3
Sweet lupin	1	1	1	1	1	1
Napier	2	2	2	3	3	2
Desho	2	2	2	2	2	1
Forage species	Group 3 farmers			Group 4 farmers		
	Vegetative growth	Disease and pest infestation	Preference based on growth	Vegetative growth	Disease and pest infestation	Preference based on growth
Lablab	3	3	3	3	3	3
Cow pea	3	3	3	3	3	3
Sweet lupin	1	1	1			
Napier	3	3	3	3	3	3
Desho	2	2	2			
Score: 1= Poor; 2= Good; and 3= Very good						
Note: Groups 1, 2, and 3 each comprise 10 farmers, while Group 4 consists of 15 farmers. Groups 1, 2, and 3 are in Hanze Kebele Administration, whereas Group 4 is based in Moinchio Kebele Administration.						

6.2. Performance of forages based on vegetative growth

We collected preliminary data on plant height, tiller and branch numbers, stand establishment, and other relevant growth and performance indicators during the vegetative growth stage. We assessed lablab, cowpea, and napier grass on selected farmers' fields in the two Kebeles. Table 4 presents the average number of branches per plant, plant height, dry matter (DM) content (%), and dry matter yield (DMY, t ha^{-1}) recorded for the three forage species. These measurements provide an initial indication of how the forage species established, developed vegetatively, and produced biomass under farmers' field conditions.

The DM content of fresh cowpea and lablab forage recorded in the two kebeles was broadly comparable to published reference values. Heuzé et al. (2015, 2016) reported mean DM contents of 20.9% for fresh cowpea aerial forage (n = 9 samples) and 22.1% for fresh lablab aerial forage (n = 23 samples), respectively. These reference values provide a useful basis for interpreting the findings from the Omo–Gibe Basin, although they do not specifically represent forage harvested at the vegetative growth stage under Ethiopian conditions. Similar DM contents observed for cowpea and lablab suggest that the two species had comparable proportions of dry matter in their fresh biomass. Nevertheless, the observed values for each species and kebele should guide interpretation, particularly when considering differences in growing conditions and plant maturity.

Cowpea produced a higher estimated DM yield per hectare than lablab during the data collection period (Table 4), indicating greater biomass production per unit area under the observed field conditions. The estimated DM yields of both species were broadly consistent with values reported in previous forage studies, including studies conducted in Ethiopia (Habte et al., 2023; Teshome et al., 2024; Tulu et al., 2023). However, comparisons across studies should account for differences in agroecological conditions, forage accessions, soil fertility, crop management practices, harvesting stage, and harvest frequency, all of which can influence biomass production. Furthermore, because the present findings are based on data collected during the vegetative growth stage from selected farmers' fields, they represent preliminary estimates rather than definitive measures of seasonal productivity. Further measurements of total biomass and DM yield at harvest, together with analyses of forage nutritional quality, will provide a more comprehensive assessment of the productivity and feed value of cowpea and lablab under the prevailing conditions in the Omo–Gibe Basin.

In the next phase, we will measure seed yield, total biomass yield at harvest, and the nutritional quality of the forage species. These measurements will help us compare their productivity and feed value and assess their suitability for integration into smallholder crop–livestock systems in the Omo–Gibe Basin. We will also conduct follow-up measurements as the plants mature to determine whether the differences observed during the vegetative growth stage persist through the final harvest.



Photo 4. Agone Asha harvesting mature cowpea in Moltico Kebele, Kindo Koyisha Woreda, southern Ethiopia, 2026



Photo 5. Belaynesh Mara cowpea plot in Hanaze 01 Kebele, Kindo Koyisha Woreda, southern Ethiopia 2026.



Photo 6. Manture Mazano's lablab plot in Hanaze 01 Kebele, Kindo Koyisha Woreda,southern Ethiopia, 2026.



Photo 7. Semayat Mune harvesting elephant grass in Molticho Kebele, Kindo Koyisha Woreda, southern Ethiopia, 2026.

Table 4. Plant height and dry matter biomass yield of forage species evaluated on farmers' fields in the Omo–Gibe basin Kindo Koysha District, Wolaita Zone, South Ethiopia Region, Ethiopia, 2026.

No.	Kebele	Farmer's Name	Sex	Forage species	Sampling area (m2)	Average Branch number	Average plant height (cm)		DM (%)	DM yield (t ha-1)
1	Molticho	Endrias Erasho		Lablab	1	13.00	122.00		22.46	3.73
				Cow pea	1	42.20	118.80		19.30	10.06
2	Molticho	Semayat Mune		Lablab	1	16.80	147.40		24.07	5.37
				Cow pea	1	44.00	121.40		20.19	5.49
3	Molticho	Agone Asha		Lablab	1	13.00	176.00		20.48	4.55
				Cow pea	1	11.80	114.00		19.37	5.23
4	Molticho	Maikelu Yoanis		Lablab	1	16.20	121.40		21.08	1.17
				Cow pea	1	17.60	74.40		18.55	1.94
5	Molticho	Eyasu Hizikel		Lablab	1	17.40	137.80		20.92	3.24
		Average Lablab			**1**	**15.28**	**140.92**		**21.80**	**3.61**
		Average Cow pea				**26.18**	**113.90**		**19.84**	**5.27**
				Cow pea	1	30.80	100.60		17.34	3.17
1	Hanaze 01	Uriche Bafe		Lablab	1	11.00	116.60		23.88	1.53
				Cow pea	1	27.60	124.60		17.39	6.02
2	Hanaze 01	Date dawato		Lablab	1	15.00	120.20		22.56	2.05
				Cow pea	1	38.40	102.20		16.38	4.95
3	Hanaze 01	Genetu Loha		Lablab	1	15.20	99.00		25.90	2.68
				Cow pea	1	24.00	90.00		19.88	4.74
4	Hanaze 01	Belaynesh Mara		Lablab	1	19.40	130.80		23.40	6.20
				Cow pea	1	32.40	128.40		19.38	4.27
5	Hanaze 01	Zemachu Madebo		Lablab	1	21.40	146.60		21.93	2.57
				Cow pea	1	24.40	112.00		20.51	3.63
6	Hanaze 01	Manture Mazano		Lablab	1	23.80	142.40		16.73	3.85
				Cow pea	1	32.60	108.60		21.24	4.57
7	Hanaze 01	Negash Teferedegn		Lablab	1	16.60	106.20		26.54	2.67
				Cow pea	1	29.00	83.20		21.71	5.56
		Average Lablab			**1**	**17.49**	**123.11**		**22.99**	**3.08**
		Average Cow pea			**1**	**29.77**	**107.00**		**19.50**	**4.82**

7. Priority actions and strategic considerations

Continuous technical backstopping and regular monitoring will be provided to farmers participating in the local forage planting-material production initiative established within the Omo-Gibe Living Landscape. Field staff and project partners will conduct periodic visits to

assess forage establishment, monitor crop performance, identify production constraints, and provide timely technical advice on forage management, seed production, harvesting, storage, and utilization. This continuous support will help ensure successful establishment and management of the forage multiplication activities, improve the quality and availability of planting materials, and strengthen farmers' technical capacity for sustainable production and utilization.

Field days and learning events will be organized during the growing season to showcase the performance of improved forage species and demonstrate progress in local forage planting material production. These events will bring together farmers, extension personnel, local government officials, development partners, researchers, and other stakeholders to observe successful practices, exchange experiences, and promote wider adoption of improved forage technologies. The events will also provide opportunities to share practical knowledge on forage establishment, seed, and planting-material multiplication, harvesting, storage, and livestock feeding practices.

Experiences and lessons generated during the 2026 pilot implementation will be systematically documented and synthesized to identify good practices, operational challenges, and opportunities for improvement. The evidence generated will inform refinement of the local forage planting-material production and supply approach and provide practical recommendations for scaling the approach across the Omo-Gibe Living Landscape, throughout the basin, and in other regions with similar agroecological conditions.

To ensure long-term sustainability, the forage planting-material production initiative will be linked with local government institutions and agricultural extension services. Strong engagement with district and kebele agricultural offices will facilitate integration of forage multiplication and planting-material access into existing extension programs, strengthen local ownership, and support continued expansion beyond the project period. Capacity building of extension personnel and participating farmers will further strengthen local technical capacity and institutional support for sustained forage production and dissemination.

The project will also strengthen collaboration with the Terebeza Development Association (TDA), relevant government agencies, non-governmental organizations, and CGIAR centers working in the landscape. These partnerships will promote coordinated planning, efficient use of resources, knowledge sharing, and complementary investments, thereby maximizing the overall impact of the initiative and strengthening linkages among forage production, livestock development, and natural resource management. Finally, opportunities will be explored to integrate the forage planting-material production initiative with livestock value-chain interventions, including dairy production, cattle fattening, and poultry enterprises. Improved farmer access to quality forage seed and vegetative planting materials will contribute to year-round feed availability, increased livestock productivity, improved animal health and reproductive performance, and higher production of milk, meat, and eggs. This integrated approach is expected to contribute to improved household food and nutrition security, increased farm income, employment generation, and resilient and sustainable rural livelihoods, while supporting improved natural resource management and landscape resilience.

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