Assessment of the forage seed sector in Kenya and Uganda

ILRI RESEARCH REPORT

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Assessment of the forage seed sector in Kenya and Uganda

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Abbreviations and acronyms

ATC	Agricultural Training Centre
DUS	Distinctiveness, uniformity and stability
FAO	Food and Agriculture Organization of the United Nations
ILRI	International Livestock Research Institute
KALRO	Kenya Agricultural and Livestock Research Organization
KEPHIS	Kenya Plant Health Inspectorate Service
NARO	National Agricultural Research Organization (Uganda)
NGO	Non-governmental organization
NSCS	National Seed Certification Service (Uganda)
NWO	Dutch Research Council
QDS	Quality Declared Seed

Executive summary

Dairy production in east Africa is crucial for rural development, poverty reduction and food and nutrition security. Dairying has increased recently due to the high demand for milk and value-added milk products by a growing population and an expanding urban middle class. The sector contributes to more than 9% of the gross domestic product in Kenya and Uganda. However, suboptimal feeding forms a major constraint for further growth and development of the dairy sector. As feeding represents 65% of production costs, improved forage productivity will greatly increase milk production efficiency and thus reduce the production costs and price of milk. Currently, farmers mainly rely on grazing poor pastures, feeding crop residues and collecting feeds. As a result of a poorly functioning forage seed value chain, promising and demanded species and varieties which provide high-quality forage for Kenya and Uganda remain under-utilized. To promote forage production, a study was conducted to assess constraints and opportunities in forage seed production in Kenya and Uganda. The study used desk reviews and key informant interviews with sellers of forage planting material and seed companies, using a sample of 16 seed companies and entities to assess existing production and marketing business models for different forage species considering the biophysical and socio-economic contexts of Kenya and Uganda.

Preliminary findings from the key informant interviews indicate that more than 50% of seed transfers and sales to farmers are conducted through the informal sector. The most commonly traded propagation materials are of grasses and leguminous forages. The seed quality certification standards are limited more to large-sized companies, and thus small- and medium-sized companies often trade in uncertified seed and planting material. The study concludes that in order to create demand for improved forages, there is a need to raise awareness and improve knowledge through innovative promotion pathways for forages and extension among farmers. There is also a need to develop the nascent informal seed sector by supporting and developing quality declared seed standards. This will increase seed availability and reduce cost of seed for smallholder farmers. Lastly, there is a need to harmonize seed policies in Kenya and Uganda to allow smooth importation of forage seed.

1

Introduction

Population growth, urbanization and a shift in consumer dietary preference inclined towards increased consumption of livestock products are reshaping livestock systems globally (White et al. 2013; Bosire et al. 2016). Livestock remains a major source of food and income for most rural households in sub-Saharan Africa (ILRI 2019; Baltenweck et al. 2020). Demand for livestock products in Kenya and Uganda is likely to double by 2050 (FAO 2017, 2019). Thus, doubling the demand for livestock products presents a means of improving the welfare of farmers in the region. This raises concerns about the capability of the sector to increase production sustainably while avoiding negative impacts on the environment and promoting ecosystems benefits. Therefore, there is an impetus to enhance availability, affordability and accessibility of sustainable feed sources to support any commercial livestock production, including dairy.

Livestock production is hampered by limited feed resources characterized by suboptimal quantities and lower nutritional contents (McKune et al. 2015; Lugusa et al. 2016; Paul et al. 2020). Increased climate variability characterized by high temperatures and prolonged drought negatively affects forage quality and quantity, thus reducing livestock productivity (Dawson et al. 2014). Additionally, the variation threatens the sustainability of the sector by increasing cost of feed and reducing livestock productivity (Gachuiri et al. 2017). Consequently, feed scarcity increases the burden of work on all household members, and especially women, who are already constrained by time poverty (Tangka and Jabbar 2010; Bain et al. 2018). Women are responsible for feed-related activities in addition to other household activities. Thus, feed scarcity creates undue stress in sourcing for feeds. Therefore, the success of any programmes or policies to expand the dairy sector will require an adequate and constant supply of high-quality feed. It is projected that future demand for livestock products will be supplied by peri-urban and intensive farms, with an increase in demand for forages (FAO 2019), although rising cost of production with constant or even declining real milk price may limit the uptake.

Current feeding regimes are characterized by suboptimal feeding that hinders further professionalization and development of the dairy sectors in Kenya and Uganda. In Kenya, for instance, smallholder farmers supplement on-farm forages by buying fodder (Creemers and Adolfo 2019a). Medium- to large-scale farmers with sufficient land for fodder production often encounter shortages during the dry season and wastage in the rainy season (Creemers and Adolfo 2019a; Maina et al. 2020). Therefore, the current feed regimes increase the cost of feed, which accounts for more than 50% of the costs of production (SNV 2013).

Introduction and promotion of improved forages and their management can reduce the cost of production among farmers and mitigate seasonal scarcities. This will increase efficiency in milk production and stabilization of the milk supply and related prices. Improvement in forages through research and innovation is a key strategy in increasing livestock productivity through a constant supply of quality forages (Chakravarti 1987; Peters and Lascano 2003: Lukuyu et al. 2017).

Figure 1: Forage seed refers to both true seed and vegetative planting material for forages.

Photo credit: Seeds for Africa.

However, access to forage seed and planting material for improved forages remains limited for smallholder dairy farmers in Kenya and Uganda. The Dutch Research Council (NWO) funded "*Feed and forage seed business models project*" aims to bridge this gap by providing insights on how to effectively invest private and public resources in fostering production, marketing, promotion and use of high-quality planting materials (both seed and vegetative material) for farmers.

The project aims to develop viable business models for forage seed production and marketing to sustainably provide farmers access to high-quality forages in Kenya and Uganda.

Development partners in collaboration with national and international research institutions have over time developed and disseminated different improved forages to bridge the gap. However, the uptake of the interventions on feed has often been low (Murage et al. 2015; Baltenweck et al. 2020). Access to planting material for improved forages has been cited as one of the factors underlying low uptake of improved forages (Chakoma et al. 2016; Chakoma and Chummun 2018). Additionally, competition for land for alternative uses such as the production of high-value crops and the development of real estate has contributed to the reduction in forage production (Lugusa et al. 2016; Njarui et al. 2016; Gachuiri et al. 2017).

A competitive and vibrant seed sector results in the availability of affordable high-quality seeds for farmers (Waithaka et al. 2019). However, feed and forage value chains remain undeveloped, and thus untapped agribusiness opportunities are foregone, denying the expansion and development of the livestock sector. Chakoma and Chummun (2019) note that existing forage seed value chains in eastern and southern Africa hinder accessibility to improved forage seeds by smallholder farmers. Feed remains the largest factor in the development and expansion of the dairy sector, thus underscoring the need to increase uptake of improved forages by increasing access to forage seed.

Therefore, the current study aimed at answering the overarching question of how to realize forage seed production and marketing in a commercially sustainable manner through a desk review and key informant interviews of forage seed companies in Kenya and Uganda. The study was premised on the following research questions:

- What types of suppliers of forage planting material operate in the project focus areas?
- Which public–private collaboration configurations can strengthen the business case for commercial production and/or marketing of forage planting material?
- What kind of configuration between international, national and local producers of planting material and traders best serves the needs of the diversity of dairy farmers?
- How can employment opportunities in the forage seed business be optimized, with a specific focus on women and youth employment?

2

Approach and data methodology

In order to answer the research questions, the study gathered literature on the forage seed systems in Kenya and Uganda. After securing ethical approval from ILRI's Institutional Research Ethics Committee (ILRI-IREC 2020–2038), key informant interviews were subsequently undertaken with seed producers and sellers in Kenya and Uganda (see checklist in Annexe 2). These included public and private entities involved in the production and marketing of forage planting material in Kenya and Uganda, especially of new varieties. The relevant entities were identified through a systematic screening of all actors in the countries' seed sectors, selecting actors with a substantial engagement in forages. Out of 20 companies identified and targeted (11 in Kenya and 9 in Uganda), we were able to interview 16 (7 in Kenya and all 9 in Uganda). Additionally, three seed sellers were interviewed during a larger community survey that was conducted as part of the project activities. In Kenya, five companies that were interviewed were private registered companies, while one was a public institution and one a farmer group/cooperative, as shown in Table 1.

Table 1: Types of seed entities interviewed in Kenya and Uganda.

Type of seed entity	Kenya (target sample size)	Kenya (actual number interviewed)	Uganda (target sample size)	Uganda (actual number interviewed)
Private national/ local company	9	5	4	4
International company	0	0	2	2
Cooperative society	0	0	1	1
Farmer group	1	1		
Community-based organization			1	1
Public institution	1	1	1	1

In Uganda, there were four local private companies and two international companies. Additionally, a cooperative society, community-based organization and a public institution were interviewed.

Due to confidentiality and data privacy issues, we did not get data on prices or sales volume of forage seed from private seed companies.

3

Key findings

3.1 Forage seed sector in Kenya and Uganda

Some public institutions such as NARO Holdings in Uganda and farmer groups such as Dream Farm Kiruhura, Kazo Dryland and Ikinyukia are registered as seed enterprises supplying certified forage seeds and planting materials in the more formalized sector.

The seed industry in Uganda and Kenya consists of two systems: a formal and informal seed sector. As defined by the Food and Agriculture Organization of the United Nations (FAO), the informal seed sector refers to a system whereby farmers produce, obtain, maintain and supply seed/planting material from one growing season to another (Waithaka et al. 2019). Farmers rely on informal means of accessing improved forage where quality is uncertain (Chakoma and Chummun 2019). The sector is characterized by farmers sharing seed and planting material as gifts or through sale. Quality standards in this sector are not controlled, and more often than not farmers rely on indigenous knowledge and standards established by social structures that exist within the local farming society. However, research institutes such as the Kenya Agricultural and Livestock Research Organization (KALRO), National Livestock Resources Research Institute (NaLiRRI), Agricultural Training Centers (ATCs) and ILRI that operate within the legal framework use their own set of quality standards that mirror the requirements of the Kenya Plant Health Inspectorate Service (KEPHIS) and Uganda's National Seed Certification Service (NSCS), but might not be registered as commercial suppliers of certified forage seeds – i.e. the forage varieties are not registered in the national crop variety list (Creemers and Adolfo 2019a; Waithaka et al. 2019).

The formal seed sector, on the other hand, refers to a system within which certified seeds are marketed. The quality standards are set and monitored by the respective government agencies, such as NSCS under Uganda's Ministry of Agriculture, Animal and Fisheries and KEPHIS in Kenya. The formal seed sector in Kenya started in the early 20th century through research support on food, industrial and export crops (Government of Kenya 2010). This sub-sector mainly comprises privately registered seed companies (both local and international) and registered seed enterprises of research institutions such as KALRO, the ATCs and Uganda's National Agricultural Research Organization (NARO). The seed enterprises in the formal sector mainly focus on the evaluation of improved varieties, multiplication and breeding.

3.2 Forage seed companies and forage status in Kenya and Uganda

Table 2 highlights the types of business approaches used by the seed companies interviewed in Kenya and Uganda.

Table 2: Types of business models used by forage seed companies in Kenya and Uganda.

Type of business model/operation	Kenya	Uganda
Private local company importing and reselling seed	4	2
Private local company buying locally and reselling seed	1	0
Private local company buying locally, multiplying and selling seed	0	2
Farmer group buying locally, multiplying and selling seed	1	2
Individual farmers buying locally, multiplying and selling seed/splits	0	3
International company importing and reselling seed	0	2
Public institution buying locally, multiplying and selling seed	1	1

There are private companies that mainly import and resell seeds in both Kenya and Uganda. Some private companies buy locally and resell, as in the case of Kenya; others buy locally, multiply and sell, as in the case of Uganda. Local companies such as SPEN Youth Group in Kenya and Robran Holdings and Itungo Pastures in Uganda also provide extension services to farmers. Public institutions and farmer groups buy planting material locally, multiply and sell to farmers.

3.3 Forage seed production, certification and trend in demand

3.3.1 Forage seed production

In Kenya, the study identified 18 entities involved in production and supply of seed and planting material for forages. Out of this, seven entities were interviewed due to some non-response from contacted seed enterprises. Half of the entities interviewed are classified as part of the informal seed sector. In Uganda, there are more than 18 entities involved in the supply of seed and planting material. Half of the 18 entities identified were interviewed, in addition to three seed sellers contacted during the community survey. More than half of the entities interviewed represented the informal seed sector. Out of the 16 seed entities and three seed sellers interviewed, only four entities in Kenya and four in Uganda are licenced by KEPHIS and NSCS respectively to produce seed and planting material.

A similar study conducted by SNV in 2019 identified about 20 companies in Kenya that supply certified forage seed. Out of the 20 seed companies, 9 had stocked certified forage seeds; whereas only 7 had multiplication sites. Additionally, there were ,more than 20 informal seed/ planting material suppliers in Kenya including ATSc. In Uganda, there were 23 seed companies and none of the private companies had seed multiplication sites.

(Creemers and Adolfo 2019a, 2019b)

Most entities that are involved in seed production in Kenya and Uganda do not contract other farmers to produce seed. For instance, Ikinyukia and Kazo Dryland produce forage seed through their member farmers. As noted by the chairperson for Ikinyukia:

> *'We have about 23 members whom we train on seed production. We usually do not recruit new members but prefer to replace deceased members with suitable family members.'*

In Uganda, only six entities engage individual farmers and farmer groups in contractual agreements (mostly informal, verbal agreements) for the production of seed. This implies that the contracts are verbal and are difficult to enforce in case of a breach.

For most private companies in Kenya, most seeds are imported; many of the certification processes are performed in the country of origin and counter-checked by KEPHIS officials for conformity. Farmer groups in Kenya such as Ikinyukia also have their seeds certified by KEPHIS. In Uganda, five out of nine seed entities are involved in seed production (both own production and through farmers) and certification, as shown in Table 3.

Table 3: Seed production entities (both formal and informal) identified in Kenya and Uganda.

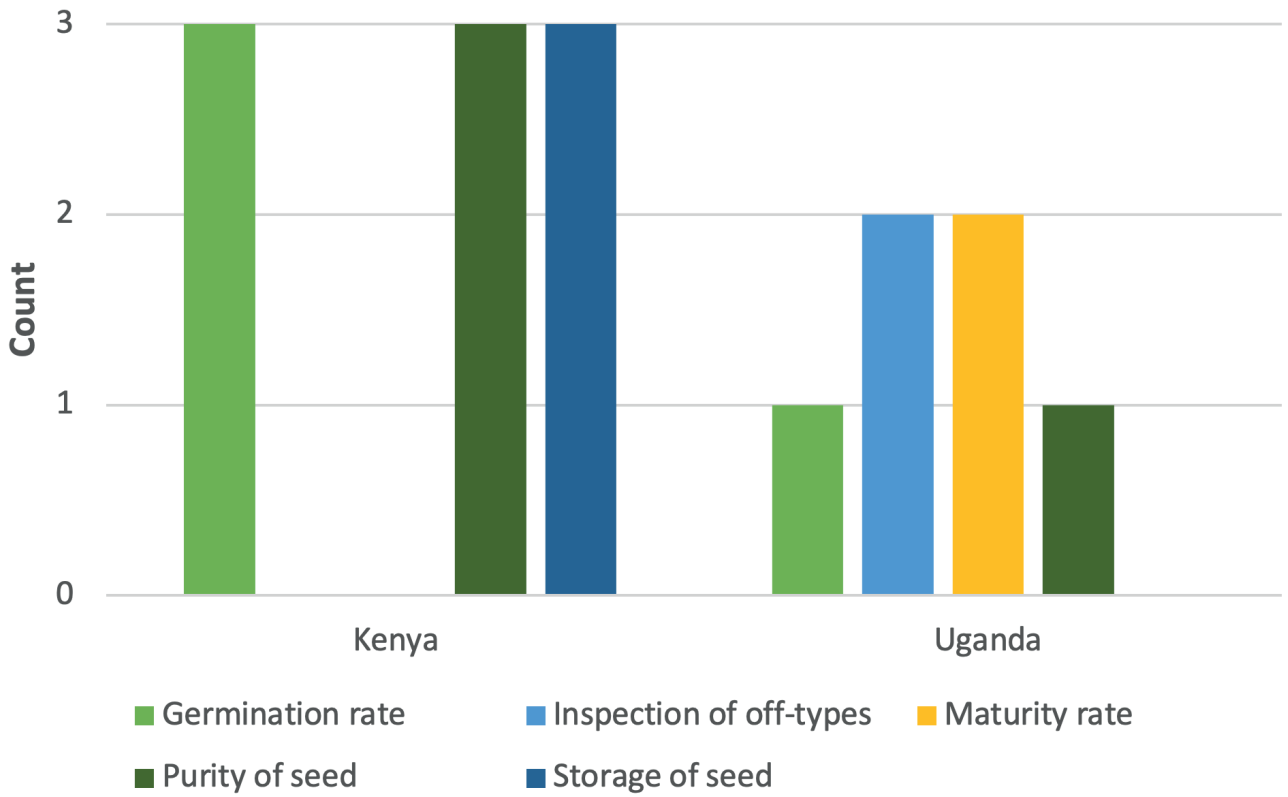
Seed production entities and their characteristics	Kenya	Uganda
Total number of entities involved in production and/or supply of seed/planting material for forages	18	20
Number of entities interviewed	7	9
Number of entities involved in seed certification, whether seed is imported or produced locally (out of those interviewed)	2	5
Number of entities involved in seed production through farmers or farmer groups	0	2
Number of entities producing seed in own multiplication sites and facilities	0	3
Number of entities involved in seed processing (out of those interviewed)	6	6

Some of the aspects considered in seed production and certification include inspection of off-types, maturity rate of the seed, purity of seed, germination rates of the seed and storage of seed (moisture content). As quoted by some importers of improved forage seeds:

> 'When testing the germination rates for *Brachiaria*, KEPHIS applies a generalized rate. However, the germination rate varies between local and improved varieties for *Brachiaria*. Therefore, most improved *Brachiaria* varieties fail the test at KEPHIS.'

This translates into losses, as this seed cannot be distributed to farmers.

Figure 2: Aspects considered in seed certification in Kenya and Uganda.



However, there are challenges in seed certification for the two countries. For instance, seed companies in Kenya indicate that there is a lack of a clear certification criteria, especially for grasses. For example, the germination rate for grasses is set to be above 50%, whereas most germination rates for grasses are below 40%. Similarly, *Brachiaria* varieties also differ in germination rates; thus, when set standards by KEPHIS are adhered to, certain varieties fail to pass and are considered not fit. One of the recommendations is to have harmonized KEPHIS forage seed standards that are adaptable and applicable to specific varieties.

In Uganda, the majority of informal seed sources do not undergo any quality control procedures (including informal quality declaration). Lack of training and awareness contributes to this. However, some farmer groups such as Kazo Drylands have undergone training through the Integrated Seed Sector Development project and are now producing quality declared seed (QDS) of rhodes grass (Chloris gayana). Decentralization of the seed certification services in Uganda to the district level has increased the number of farmers, farmer groups and private entities that have their seed certified, including forage seeds. Currently two farmer groups are producing QDS of rhodes grass.

Variety registrations of new forage varieties in Kenya undergo two main processes:

» National performance trials (NPTs)

» Distinctiveness, uniformity and stability (DUS) tests.

The two processes combined take about 2–3 years, with an estimated cost of USD 3,000 per variety.

In Uganda, the process involves national performance trials that are conducted by the breeders. The DUS tests are conducted by the NSCS. The total time to go through the process in Uganda is about 1 year (2 seasons).

The majority of seed companies in Kenya and Uganda engage in seed processing, which includes sorting, drying, seed treatment, packaging and labelling. However, smaller entities such as start-up companies and farmer groups lack enough capacity in terms of equipment to process forage seed. Additionally, the level of technical know-how is still low and would require capacity building.

Figure 3: A moisture meter for forage seeds. **Figure 4:** An automated packaging machine.

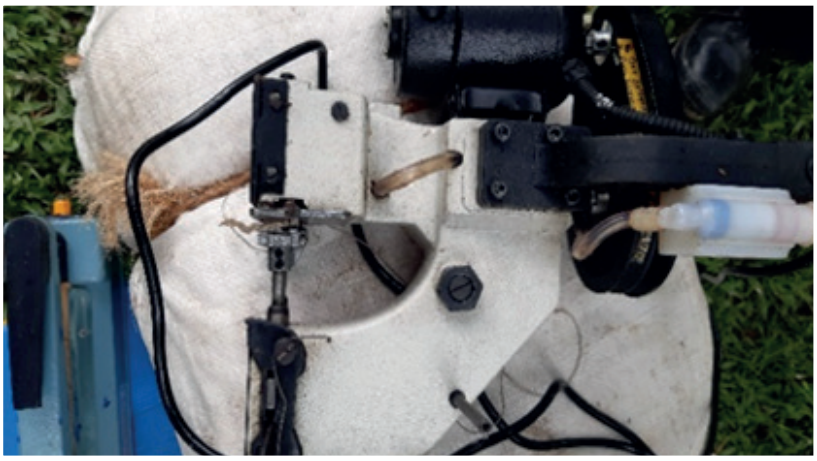
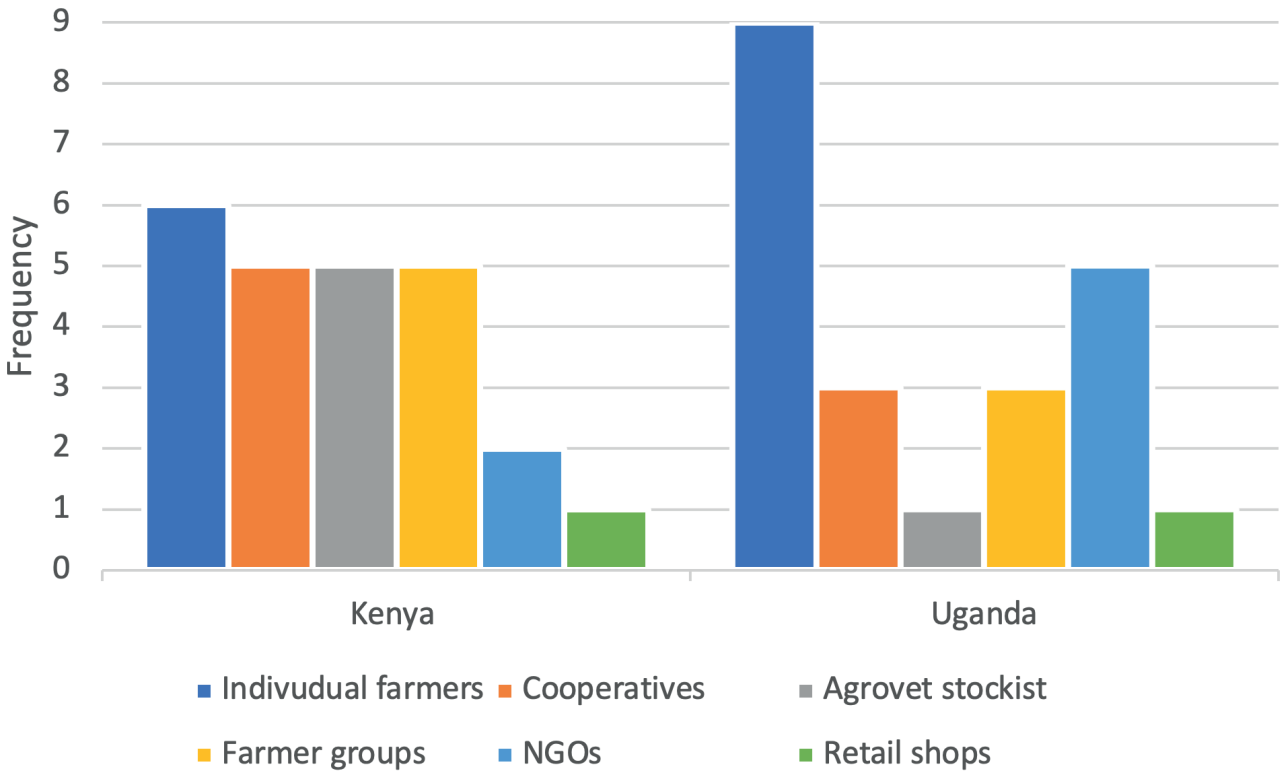


Photo credit: ILRI/Kevin Maina.

3.3.2 Forage marketing

The majority of forage customers are individual farmers in both Kenya and Uganda, as shown in Figure 5.

Figure 5: Major forage seed customers in Kenya and Uganda.

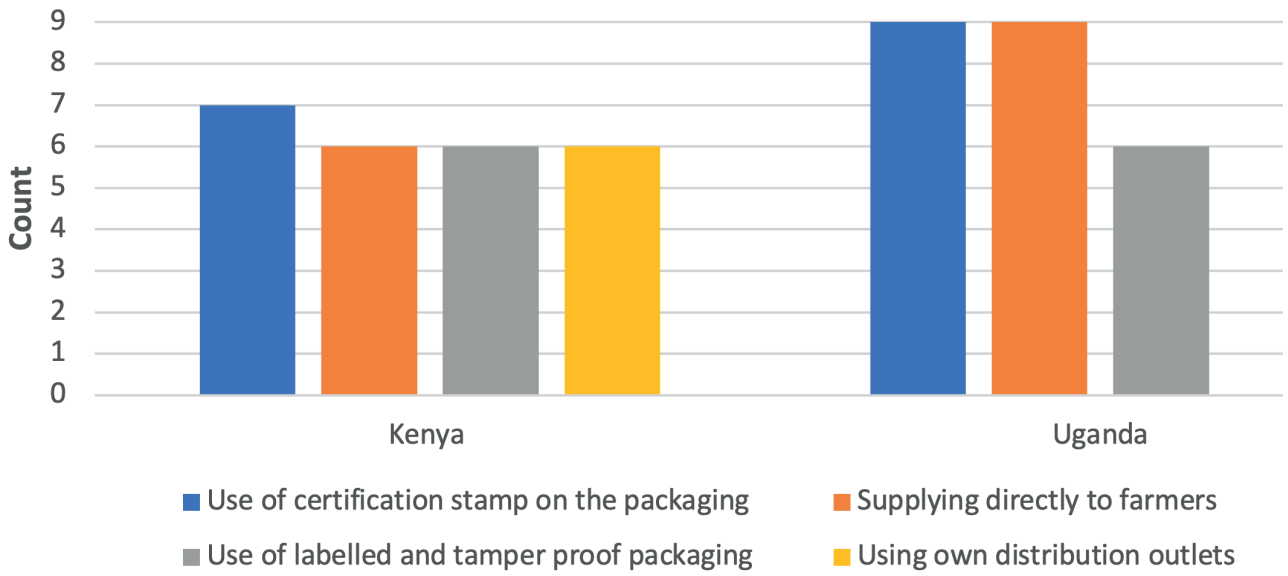


Farmer groups, cooperatives and non-governmental organizations (NGOs) buy forage seeds for multiplication and redistribution to either their members, if a farmer group, or to target beneficiaries of a project in the case of NGOs. Additionally, findings from the interviews with sellers of planting material in Uganda indicate that individual farmers are the main customers for vegetative planting materials.

To cater to the needs of most customers, the majority of the seed entities have varying packaging sizes starting from as low as 2-10 kg depending on the needs of the customers. Small package sizes often increase the accessibility and uptake of forages as opposed to scenarios where farmers are forced to buy specific large quantities.

Most businesses have adopted various measures to ensure the end users acquire seed that is of high quality, as shown in Figure 6.

Figure 6: Quality control measures in forage seed marketing in Kenya and Uganda.



Seed companies that supply directly to farmers sometimes establish fodder plots as a form of quality assurance. They provide farmers with agronomic support, as in the case of Itungo Pastures and Robran Holdings in Uganda and Ikinyukia and SPEN Youth Group in Kenya. Formal companies such as Simlaw, East Africa Seed, Hygrotech and Advantage Crops Ltd have their distribution outlets across the countries. Additionally, the use of labelled and tamper-proof packaging with certification stamps assures the quality of seed.

Figure 7: Examples of packaging material for forage seeds in Kenya and Uganda.

Photo credit: ILRI/Kevin Maina.

3.3.3 Trends in forage demand

An assessment of forage demand for the last three years i.e. 2018, 2019 and 2020 is presented in Table 4. Demand and sales of *Brachiaria* varieties and most leguminous forages (e.g. Lucerne, *Centrosema*) have been increasing as a result of improved marketing coupled with promotion by development projects. For instance, demand for *Brachiaria* in Kenya is a result of promotion through the United States Agency for International Development's Feed the Future Accelerated Value Chain Development project, the climate-smart push-pull[1] technology being promoted in the western region in Kenya, and the Grass to Cash programme in e.g. western Kenya and Meru. At a localized level, the demand for the traditional forage grasses such as Napier grass (*Pennisetum purpureum*) has reduced in favour of other improved forages.

> *'Farmers tend to share planting materials especially Napier grass amongst themselves as gifts. In a similar fashion, promotion of more nutritious forages such as Brachiaria has reduced the demand for improved Napier grass. Farmers now prefer Brachiaria to Napier grass' as noted by some respondents.*

Centrosema (*Centrosema molle*) and alfalfa/lucerne (*Medicago sativa*) can be planted together with rhodes grass (*Chloris gayana*) and enrich the hay with protein. This has increased their demand especially among dairy producers in Uganda as mentioned during the interviews.

Demand for some forages such as High Altitude Composite (HAC) maize fluctuates due to seasonality. The same applies for cases where the forages are perennial. Another factor that might affect demand for seed is the use of vegetative materials such as splits and cuttings. Farmers often get vegetative materials as gifts from their fellow farmers and this might affect the aggregate demand for seed in the market.

Table 4: Demand trend of main forages traded between 2018 and 2020 in Kenya and Uganda, based on survey data on seed companies.

	Name of forage	Trend in sales (Kenya)	Reasons for trend	Trend in sales (Uganda)	Reasons for trend
1.	*Brachiaria* (Mulato)	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
2.	*Brachiaria* (Cayman)	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
3.	*Brachiaria* (Cobra)	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
4.	Alfalfa/lucerne	Fluctuates	Increased competition and low demand	Increasing	Increase in demand
5.	*Calliandra*	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
6.	*Centrosema*	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
7.	Rhodes grass	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing

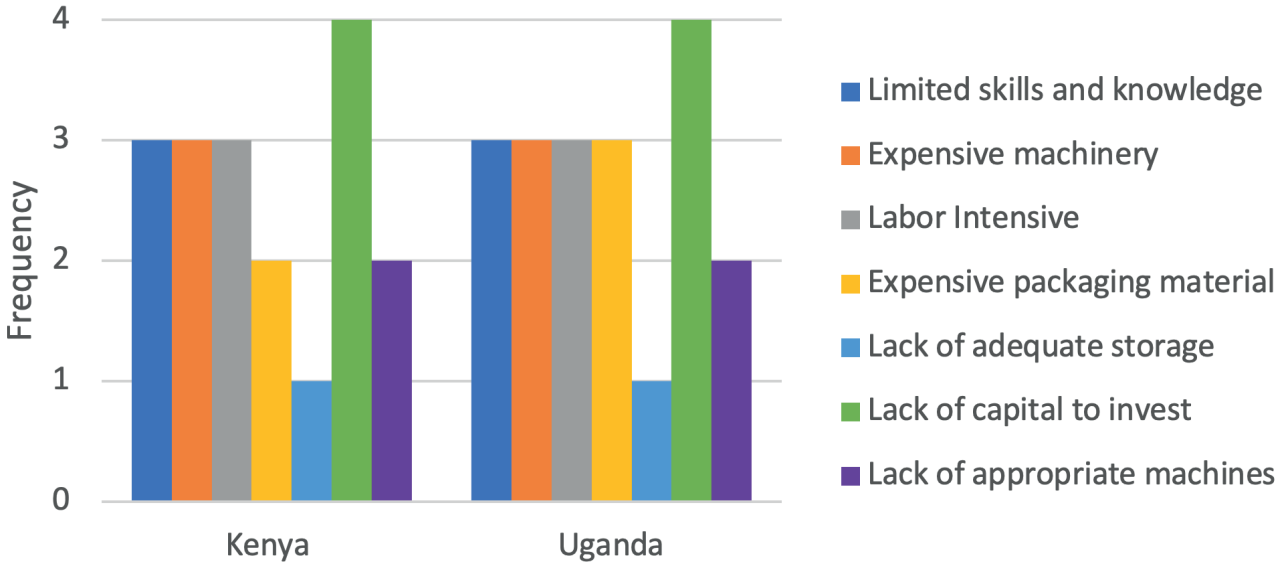
1 Push-Pull is a conservation agriculture technology developed by the International Centre for Insect Physiology and Ecology to control maize stem borer and striga weeds in maize production. It involves intercropping maize, *Desmodium* and forage grass (napier grass or *Brachiaria*).

	Name of forage	Trend in sales (Kenya)	Reasons for trend	Trend in sales (Uganda)	Reasons for trend
8.	*Desmodium*	Static/fluctuates	Increased competition	Increasing	Increased awareness
9.	Lablab	Decreasing/ increasing	Increased competition, Increase in demand and improved marketing	Increasing	Increase in awareness and demand and improved marketing
10.	Double bean	Static	Low demand	N/A	
11.	Fodder barley	Increasing	Improved marketing	N/A	
12.	Fodder beet (Mangels)	Static	Low demand	N/A	
13.	Fodder pea	Static	Low demand	N/A	
14.	Forage millet (Nutrifeed)	Increasing	Increase in demand and improved marketing	Decreasing	Low demand
15.	Forage sorghum	Increasing	Increased awareness and marketing	Static	Low demand
16.	HAC maize	Fluctuates	Seasonality	N/A	
17.	Kikuyu grass	Increasing	Increase in demand and improved marketing	Static	Increase in demand, improved marketing and increased competition
18.	Lupin	Fluctuates	Increased competition and low demand	N/A	
19.	Maize forage	Increasing	Increase in demand and improved marketing	Increasing	Increased awareness and demand
20.	Mucuna	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
21.	Napier grass	Fluctuates	Increased competition and a perennial crop	Increasing	Increased quality, demand and marketing
22.	Oat	Fluctuates	Low demand	N/A	Low demand
23.	*Panicum*	Static	Current demand is low but increasing gradually	Decreasing	Low quality especially for *Panicum maximum*
24.	Purple Vetch	Increasing	Increase in demand and improved marketing	N/A	
25.	*Sesbania*	Static	Low demand and increased use of vegetative material as opposed to seed	Increasing	Increase in demand and improved marketing
26.	Sorghum (Sugar graze)	Increasing	Improved marketing	Increasing	Improved marketing
27.	Tree lucerne	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing
28.	Yellow maize	Increasing	Increase in demand and improved marketing	Increasing	Increase in demand and improved marketing

3.4 Forage production and marketing challenges

Forage seed producers often face numerous challenges especially those in the informal seed sector. The majority of them lack enough capital to invest in technologies. Additionally, the process of seed production is labour intensive and requires some level of technical expertise as shown in Figure 8.

Figure 8: Forage seed production constraints in Kenya and Uganda.



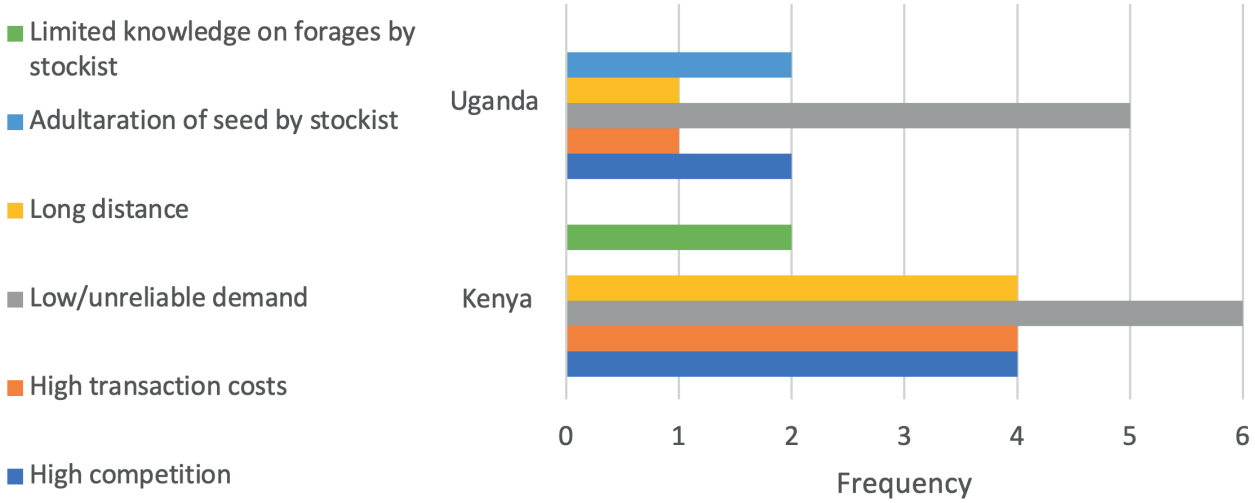
Some of the entities lack appropriate machines to process seed citing high costs. Moreover, others lack technical capacity in terms of human capital. Existing entities such as farmer groups highlighted limited skills and knowledge in seed production and processing as a challenge to their operations in the forage seed business. Seeds are sensitive and require proper handling and thus, proper storage is important. Lack of adequate storage, as well as high cost of packaging materials, affects the production and processing of forage seeds.

Figure 9 indicates that low/unreliable demand affects the marketing of forages. There is a lack of farmer awareness on the existence and importance of improved forages for increased animal production and productivity of the enterprise. Additionally, stockists lack knowledge on the agronomic and nutritional information on forages.

> *'Most stockist are more knowledgeable on food crops as opposed to forages. Therefore, when farmers ask about forages they are not able to give informed feedback' as noted by some respondents.*

In Uganda, most seed companies often do not stock a lot of forage varieties due to low demand. Individual entities such as Itungo pastures have resorted to marketing forages by having weekly adverts on a local newspaper and use of social media platforms.

Figure 9: Major challenges in marketing forage seeds in Kenya and Uganda.



Marketing was also affected by the COVID-19 pandemic as most companies rely on agricultural shows and farmer field days which were not possible during most of 2020. Additionally, there is a high transaction cost in the delivery of forage seed especially vegetative materials. Ikinyukia group in Kenya piloted new ways of propagating and selling Napier grass through splits/shoots as opposed to cuttings[2]. This reduced the cost of transport and increased the amount of Napier grass that can be packaged especially when the package is being delivered to distant customers.

There is also high competition among the entities, especially in the formal seed sector. The pool of farmers who access seed through the formal sector is smaller compared to those accessing through the informal sector. The informal sector is able to attract farmers by offering relatively lower prices of seed compared to the formal sector. For example in Kenya, the price of *Desmodium* (both green and silver leaf) is about Kes 3,600 per Kg in the informal sector whereas it is Kes 5,685 per Kg in the formal sector.

Traders in the informal seed sector access seeds locally. The seeds/planting materials do not undergo the rigorous process of certification by KEPHIS or NSCS

2 Splits are preferred over cuttings because one can pack more splits than cuttings e.g. 90 Kg sack can carry as much as 4000 splits as opposed to 1500 cuttings. Additionally, cuttings are bulky and adds on to transportation charges.

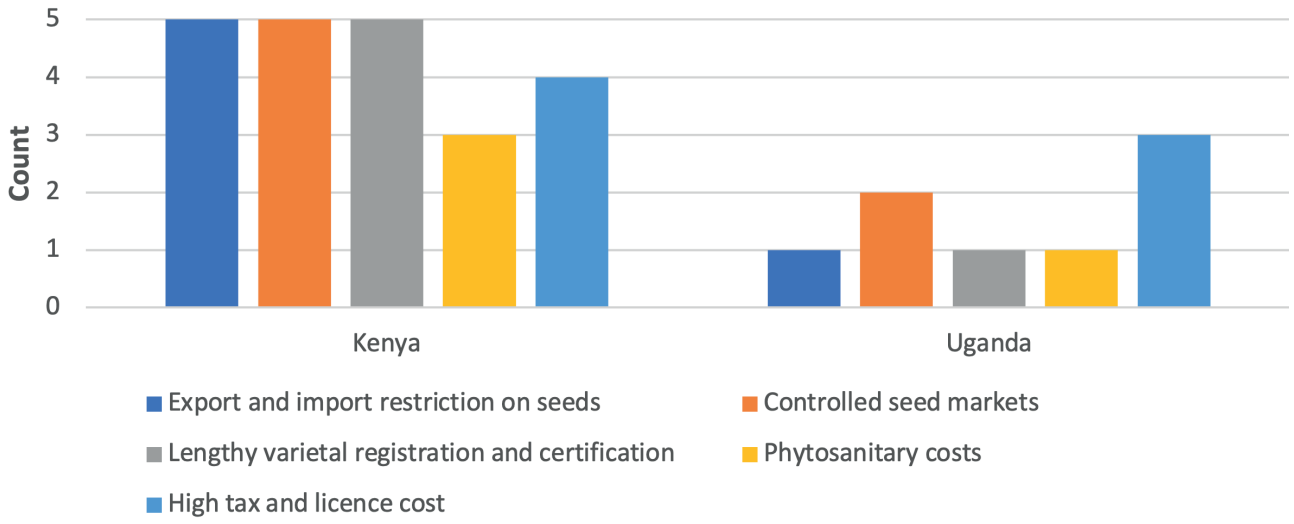
3.5 Government policies affecting forage production and marketing

Figure 10 shows some of the government policies that affect forage production and marketing in Kenya and Uganda. High taxes/levies and licence costs affect forage production and marketing. For instance, getting the KEPHIS certification stamp on the seed package costs about Kes 4 per label in Kenya. Additionally, phytosanitary costs are high during registration of forage seeds and the process takes long delaying the introduction of varieties on the market.

> *'If I import seeds, the process of verification takes long (about 90 days) for the seeds to be cleared. At the end of the day I am not able to adequately meet demand due to the delays. I prefer sourcing seeds locally from farmers as this does not go through the rigorous certification proces' sentiments share by one of the respondents.*

Thus, most companies in the informal seed sector would prefer to remain unregistered and trade in uncertified seeds. Therefore, there is need for government and seed certification agencies to bundle, decentralize or aggregate services to reduce the transaction cost and increase the number of entities utilizing the certification services.

Figure 10: Government policies affecting the production and marketing of forage seeds in Kenya and Uganda.



Length varietal registration and certification, as well as import and export restrictions on seeds, affect inter-regional trade on improved forage seeds, especially in Kenya. To import/export new seed between Kenya and Uganda one has to undergo a rigorous process in obtaining permits and going through seed certification such as national performance trials. Mwendia et al. (2016) note that such processes are expensive and take longer. Sometimes companies are unable to deliver on orders due to these processes.

3.6 Women and youth gap in the forage enterprise: what next?

Women and youth play an important role in the forage value chain, providing labour in production of forages. While their level of participation in the formal seed sector did not come out clearly, insights from the informal seed sector indicates lower levels of involvement. The sector remains unattractive especially women and the youth, due to their limited access to land and productive resources, as well as unfavourable household level task division and gender norms. As noted during the interviews:

> *'Seed production requires some level of skills and patience. The youth you see around prefer enterprises such as boda boda. They do not see value in production not only of forage seeds but also forages.'*
>
> *'Women have to choose between household chores and forage production. Besides they also do not own land. They only provide labour and tend to the farms.'*

Results from discussions with the forage seed/planting material sellers indicate that forage seed production is interesting for women and youth, provided that they receive some initial support for accessing land and training, because:

- There is continued increase in demand for forages
- It generates money and thus, a good source of income

There exist gender gaps within the forage seed systems especially in determining how seeds are used and who gains from the benefits that are realized. Therefore, good information on constraints for women and youth is essential to enable an inclusive business model for forage seeds and the forage and dairy value chain as a whole. This refers to a private-sector approach in providing goods and services, in this case, improved forages, on a commercial basis to people at the base of the pyramid; women and youth in the context of forages (Mangnus 2019). Integration of the informal and formal seed system can increase women and youth participation. Moreover, the informal seed system can reach out more to women and youth (Kramer and Galie 2020).

It is imperative to take into consideration the barriers that limit youth and women participation in the forage value chain. For instance, women and youth have limited access to enabling productive resources such as land and finance. Additionally, they have limited knowledge and awareness of the significance of improved forages on livestock systems and the agribusiness opportunity in forages (both seed & feed). Literacy levels among women are lower compared to youth thus, affects their participation in forage production and marketing. Similarly, youth are more inclined to agricultural enterprises that have a high rate of return to investment and shorter time to recoup profits such the horticultural and poultry sector. However, forage production and marketing enterprise is different in the sense that the benefits may not be realized in the short run. Moreover, it is characterized by limited markets that are uncoordinated. Women, on the other hand, are constrained by time as they are food producers, and this may limit their involvement in forages.

The youth and women gap can be bridged by increasing training and sensitization among this group on forages and the untapped agribusiness opportunities. This can be done through mass media and social media. The farmer field schools should also increase the number of women and youth that are trained. Increasing access to finance can also bridge this gap. Stakeholder engagement with financial institutions can result in the development of financial packages that are suited to agribusiness ventures on forages and seed production. Promotion of value addition activities such as the making of hay and silage can create an additional source of employment for youth.

4

Conclusion

There exist formal and informal seed systems in Kenya and Uganda with the latter dominating. Most livestock producers access forage planting materials from the informal system by either buying or as gifts. There is an opportunity for reducing the cost of seeds by promoting local seed production and reviewing of the cost associated with certification for locally produced seeds/planting materials. Additionally, the registration process of new varieties imported varieties should be revised and the expected period expedited in terms of timelines to increase the rate of varietal release to farmers. There is potential to upscale the adoption of improved forages, increasing business volumes for seed companies, and an overall improvement in the productivity of livestock by having targeted awareness campaigns on the importance of improved forages and sources of seed. This can be done using mass media especially the local vernacular media as well as social media that targets youth and urban farmers. Additionally, there is a need to develop seed systems to be more inclusive and optimize employment opportunities for women and youth. This can be done by integrating formal and informal seed systems. QDS certification standards can be adopted to formalize the seed businesses that operate within the rural areas and are farmer-led. This will create space for women and youth to actively participate in the value chain and evolve towards formal businesses.

5

Next steps

Due to confidentiality and data privacy issues, the study proposes four case studies for the business models in order to capture the relative cost and revenues from different business models in Kenya and Uganda namely:

- The farmer group model (multiplying certified seeds/QDS)
- International companies (importing seed and selling locally)
- Local companies (producing certified seeds locally)
- Individual farmers/group (multiplying non-certified seeds locally)

This will enable a business case cross-comparison of the business models in operation in Kenya and Uganda. The list can be drawn from already interviewed seed entities in Kenya and Uganda.

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Annexe 1

List of forage seed companies/entities contacted and the type of forages stocked in Kenya and Uganda

Seed company	Website	Country	Type of institution
SPEN Youth Group	spen.com	Kenya	Private
Pannar Seed (K)	pannar.com	Kenya	Private
East Africa Seed Co. Ltd	easeed.com	Kenya	Private
Hygrotech	hygrotech.co.ke	Kenya	Private
Kalro-Muguga		Kenya	Public
Ikinyukia Resources Center		Kenya	Private
Advantage Crop Limited/Tropical Seed Ltd/Papalotla	aclseeds.com	Kenya	Private
Coopers K Brand	coopers.co.ke	Kenya	Private
Simlaw Seed/Kenya Seed	simlaw.co.ke	Kenya	Private
Amiran	baltoncp.com/amirankenya	Kenya	Private
Royal Seed Africa	royalseed.biz	Kenya	Private
Kenya Highland Seed Co. Ltd	accesstoseeds.org/index/eastern-southern-africa/company-scorecards/kenya-highland-seed	Kenya	Private
Advanta Seeds		Kenya	Private
Victoria Seeds	victoriaseeds.com	Uganda	Private
Simlaw Seeds Uganda	simlawseeds.ug	Uganda	Private
East Africa Seed (U) Ltd	easeed.com	Uganda	Private
Rhino Seeds Africa Ltd	rhinoseeds.net	Uganda	Private
National Forestry Authority (National Tree Seed Centre)	nfa.go.ug	Uganda	Public
ROBRAN Holdings Ltd	robranholdings.org	Uganda	Private
Itungo Pastures		Uganda	Private
Dream Farm Kiruhura		Uganda	Private
Kazo Drylands Ltd		Uganda	Private

Contact	Type of planting material	Forage varieties
0712515285 0728632109	Seed, vegetative material	Yellow maize, *Desmodium*, *Calliandra*, lupin, tree lucerne, lucerne, *Sesbania*, boma rhodes
0728601260	Seed	Yellow maize
+254734333161 +254722207747	Seed	Sorghum (Sugar graze), millet (Nutrifeed), lucerne, *Desmodium*, fodder beet (Mangels), fodder pea, Sudan grass
0722 205 148	Seed	Sorghum (Cow candy), lucerne
0721422978	Vegetative material	Napier (Kakamega 1 & 2)
0724492456	Seed, vegetative material	Vetch, lupin, barley, sorghum, napier, HAC maize
0729152473 0711489550	Seed	*Panicum* (Mombasa, Mulato II, Cobra)
0734330044 0722753851	Seed	Purple vetch, tree lucerne, alfalfa/lucerne
0739034729	Seed	Oats, pasture beet, boma rhodes, elmba rhodes, Columbus grass, Sudan grass, *Desmodium*, tick clover, alfalfa/lucerne
800720720	Seed	*Brachiaria* (Mulato, Cayman)
0734257635 0725549997	Seed	Alfalfa/lucerne
+2542652031 +254265229/ 30	Seed	Alfalfa/lucerne
0717403637	Seed	
	Seed	*Panicum*, *Brachiaria*, rhodes grass
782323334	Seed	Rhodes grass, alfalfa/lucerne, sorghum (Sugar graze), millet (Nutrifeed), *Desmodium*
772583783	Seed	Alfalfa/lucerne
702363165	Seed	Millet, maize, sorghum
781519433	Seedling	*Calliandra*, lucerne, *Sesbania*
+256753456298 +256789491350	Seed, vegetative material	Giant *Panicum*, *Desmodium*, kikuyu grass, *Brachiaria* (Mulato), napier grass, rhodes grass, lablab, mucuna
	Seed, vegetative material	*Desmodium*, *Centrosema*, alfalfa, yellow maize, Sorghum (Sugar graze), napier grass, *Calliandra*, rhodes grass, *Brachiaria* (Mulato), *Brachiaria ruziziensis*
+256772637373	Seed, vegetative material	Rhodes grass
+256783976368	Seed, vegetative material	*Glycine*, lablab, *Centrosema*, napier grass, sugar napier, *Brachiaria* (Mulato), rhodes grass, *Calliandra haematocepha*

Annexe 2

Key informant interview guide for sellers of forage planting materials in Kenya and Uganda

NWO Feed and Forage Seed Business Models

Key Informant Interview guide for sellers of forage planting material in Kenya and Uganda

General info

Village	Name:	ID: .....
Date:	...../...../.....	
Type of business	☐ agro vet shop	
	☐ farmer – seller	
	☐ milk cooperative	
	☐ other:	
Seller Name:	.....	
Seller ID:	.....	
Sex	☐ male	
	☐ female	
Age:	.....	
Year started business:	.....	
Is selling forage seed/planting materials your main activity?	☐ yes	
	☐ no	

What other seed/planting material do you sell?

What other income-generating activities do you have?

Forage planting materials specifics

	Forage 1	Forage 2	Forage 3
Forage name:	.....	.....	.....
Type of PM (seed-split-other):	.....	.....	.....
Source of PM (own production, purchase from whom, specify):	.....	.....	.....
Buyers of PM (cattle keepers, medium scale etc):	.....	.....	.....
Volumes traded in 2019 (kg/bundles):	.....		
Demand trend	☐ ↑ ☐ ↓ ☐ →	☐ ↑ ☐ ↓ ☐ →	☐ ↑ ☐ ↓ ☐ →

Prospects

Do you think your business will grow in the next 2 to 5 year? ☐ yes ☐ no

Why/why not?

3 top opportunities

3 top challenges

Statements

"This business is perfect for youth": do you agree? ☐ yes ☐ no

Why/why not?

"I would advise my sister or daughter to go into this business": do you agree? ☐ yes ☐ no

Why/why not?

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