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Forage Seed Systems in Kenya

CIAT Working Paper

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Solomon Mwendia
An Notenbaert
Birthe Paul



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Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture
Headquarters and Regional Office for Latin America
Km 17 Recta Cali–Palmira 763537
Apartado Aéreo 6713
Cali, Colombia
Phone: +57 2 4450000
Fax: +57 2 4450073
Website: www.ciat.cgiar.org

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Authors

Solomon Mwendia, Post-doctoral Forage Agronomist, Tropical Forages Program, CIAT-Kenya.
s.mwendia@cgiar.org

An Notenbaert, Crop-Livestock System Specialist, Tropical Forages Program, CIAT-Kenya.
a.notenbaert@cgiar.org

Birthe Paul, Farming Systems Scientist, Wageningen University, Farming Systems Ecology; Tropical Forages Program, CIAT-Kenya.
b.paul@cgiar.org

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Pennisetum purpureum



Chloris gayana

Introduction

The demand for livestock products in developing countries, Kenya included, is projected to double by the year 2050 (Delgado et al., 2001). This includes milk and meat from cattle among other products and livestock species, and provides an opportunity for livestock keepers to raise their incomes.

Low livestock productivity, however, undermines this potential. One of the major challenges for increasing livestock productivity is the lack of enough high-quality livestock feed, especially during the dry season. To address this, integrating more planted forages in the farming systems is a promising solution. However, forage coverage at the farm level still remains low owing to various reasons, including availability of forage seeds/planting materials.

Forage species that contribute to the livestock basal feeds are grasses that provide the roughage, supplemented with forage legumes or commercial concentrates. Among the most popular forage grasses in Kenya are Napier grass (*Pennisetum purpureum*), Kikuyu grass (*Pennisetum clandestinum*), and Rhodes grass (*Chloris gayana*) in wet highlands. In relatively dry and semi-arid lands, important grasses include *Cenchrus ciliaris* L. (Buffel grass/African foxtail grass) and *Eragrostis superba* Peyr. (Masai love grass) (Mganga et al., 2013). Use of forage legumes is not widely adopted, albeit some species have the potential and are used to some extent. These include among others vetch (*Vicia sativa*) and Lucerne (*Medicago*

sativa) in the highlands, and lablab (*Lablab purpureus*) in the relatively dry areas. Currently there are efforts to promote use of other grasses and legumes to broaden the forage basket (Rao et al., 2014). This is in the view of recent forage diseases affecting the widely used Napier grass and also to mitigate the effects of climate change (Mwendia et al., 2007).

Forage seed availability comprise formal and informal channels. The formal channel relates to forage seeds that undergo and attain regulations by Kenya Plant Health Inspectorate Services (KEPHIS) and private sector/companies licensed to trade the approved varieties. The process entails two main activities: (a) National Performance Trial (NPT) and (b) Distinctiveness, Uniformity and Stability (DUS) tests. The NPT involves planting the species suggested for release in the areas expected to adopt, and conducting scientifically randomized trials by KEPHIS for at least two seasons. The DUS test is also conducted by KEPHIS to confirm the descriptor of the particular variety, i.e., distinctiveness, uniformity, and stability.

Both undertakings are paid for to KEPHIS by the party interested in having the varieties released. Informal channels entail seeds that do not necessarily pass through the regulations. These mainly include forages that are propagated by use of vegetative parts. However, if the materials are procured outside the country, they require quarantine to ascertain pest- or disease-free status.

The availability of and access to seed and planting material already poses an important bottleneck, likely to be exacerbated by the increase in forage demand arising from increased consumption of animal products. Interventions that are likely to support forage seed availability would be preferable.

This report focuses on the current state of forage seed systems in Kenya under both formal and informal sectors and seeks to provide useful information for farmers and development actors looking or likely to engage in tropical forage seeds, especially in Kenya.

Methodology

Information on forage seed systems in Kenya was gathered from a variety of sources where both formal and informal channels were captured. Where possible, information was gathered through phone or e-mail contacts.

Table 1. Summary of seed sources contacted.

Forage seed source	Contact	Forage seed source	Contact
Western Seed Company	054 30994	Hygrotech EA Limited	0722205148
Pannar Seed (K) Limited	20 2405805	Ikinyukia CBO	0724492456
Kenya Seed & Simlaw	20 2215067	KALRO-Muguga	0722328562
Freshco Seeds	0712110849	Tropical Seeds	www.tropseeds.com
AgriSeedco	0721332863	Continental Seeds	0775115704
Pioneer Hi-Bred K Ltd	20 2614386	Leldet Kenya Ltd	0722 811790
Cooper K-Brand Ltd	0722209840		

The first step involved a literature search. Reports not older than 5 years were synthesized, and information on forage seed summarized. The information was further discussed with known groups dealing with forage seeds where possible. Information on availability

and prices of forage seeds and material was confirmed through telephone enquiries with the respective suppliers. Lastly, insights were included from a forages meeting held from 26 to 28 May 2015, covering Eastern and Central Africa, where nine countries (Kenya, Tanzania, Rwanda, Uganda, Sudan, Eritrea, Democratic Republic of Congo, Cameroon, and Ethiopia) were represented.

Findings

The forage seed system in Kenya operates at both formal and informal levels. Unlike the maize seed system – which is most developed in Kenya, since maize is the main staple crop – the forage seed system is underdeveloped, which could be a result of various reasons.

According to the forages meeting held at the International Livestock Research Institute (ILRI) in May 2015 (ILRI, 2015), one of the main challenges has been the lack of stable demand for forage seeds. This arises as a result of the perennial nature of most grasses whereby, with good management, several re-growths can be made from the same crop over several seasons. This is unlike in annual crops, such as maize, which are established from seeds seasonally, for a harvest or crop to be obtained. However, with projected increases in demand for livestock products and emerging fodder markets, there is a developing interest in forage seeds. This has encouraged companies to try out the forage seed business.

For example, Advanta Seeds Company from India is promoting growing of fodder sorghum and is currently doing demos. In addition, Tropical Seeds Company is exploring the sale of *Brachiaria* hybrid seeds in Kenya and currently works on modalities of *Brachiaria* seed production or importation. Some companies have been in forage seed production for much longer than others. For example, Kenya Seed Company has been producing Boma Rhodes forage seeds, which have been quite popular in Kenya. The use of this grass to produce commercial hay has contributed to an increased demand for its seed production over time.

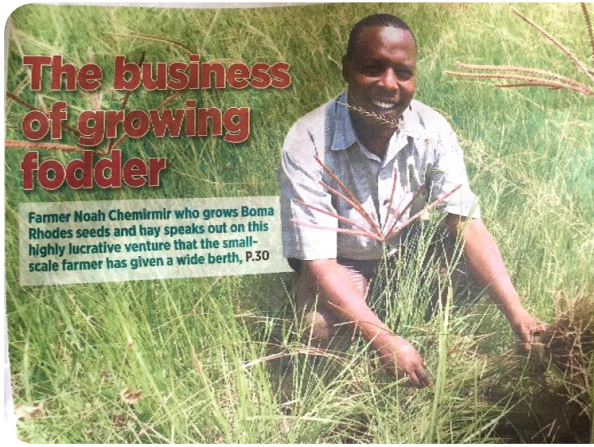


Figure 1. Local newspaper (Daily Nation on 4 July 2015) depicting growing Rhodes grass for sale.

From the seed companies listed in Table 2, only the Kenya Seed Company has had substantial forage seed production and marketing. Other companies largely specialize in cereal crops, e.g., AgriSeedco Ltd. (maize, wheat, sorghum, cowpea) and Pannar Seed companies (dual-purpose sorghum). Freshco Company deals with maize seeds primarily, while Lucerne is the only forage seed available from Pioneer Seed Company.

The informal seed system is largely driven by farmer groups, Kenya Agricultural and Livestock Research Organization (KALRO) and Agricultural Training Center (ATC). The forages vegetatively propagated include Napier grass, sweet potato vines, while seed-producing ones include vetch, lupin, *Desmodium*, fodder trees and *Lablab*. Figure 2 summarizes the observed sources and flow of either formal or informal forage seed to livestock keepers in Kenya.

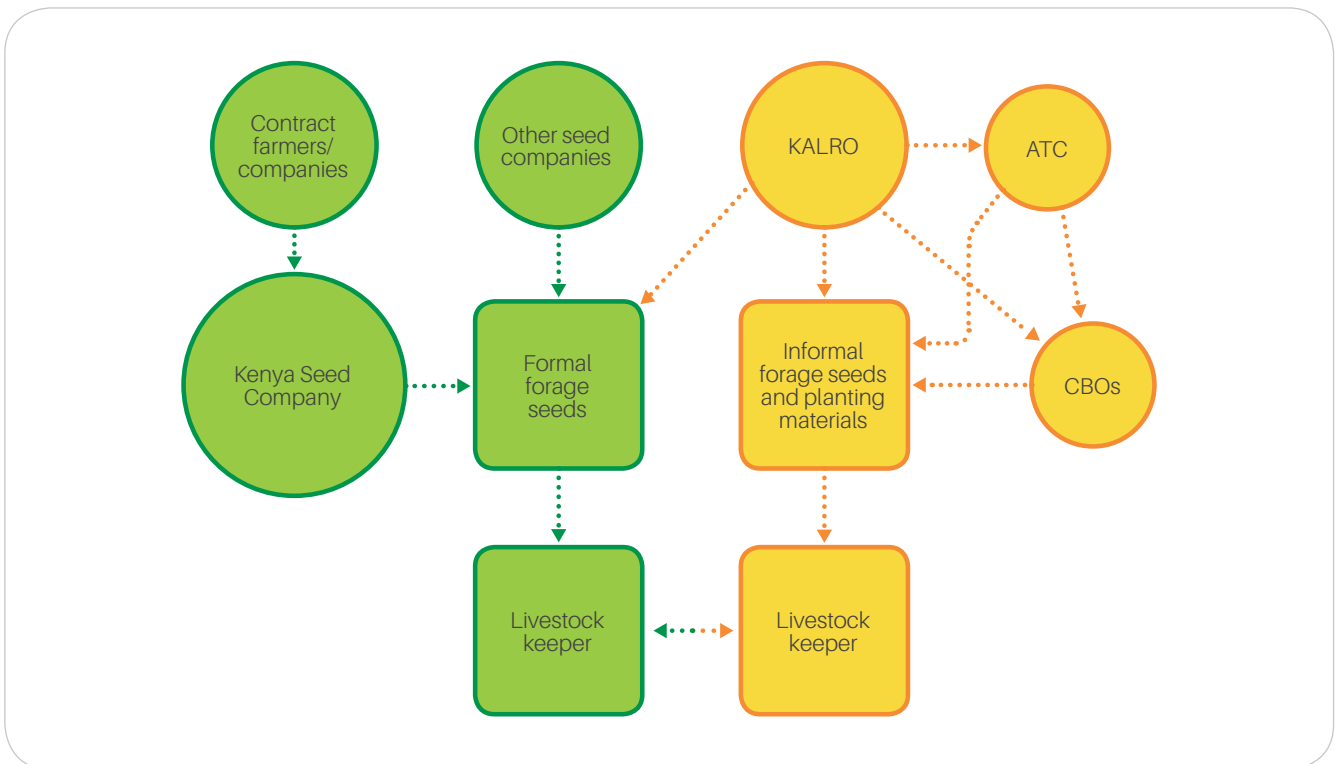


Figure 2. Conceptual model of formal and informal forage seed systems in Kenya.

ATC Agricultural Training Center **CBOs** Community-based organizations **KALRO** Kenya Agricultural and Livestock Research Organization.

Table 2. Seed companies in Kenya, forage seed status and their websites.

	Company	Forage seed	Head office	Website
1	Simlaw Seeds Company	Lucerne, Boma Rhodes, Elmba Rhodes	Nairobi - Kijabe Street	www.simlaw.co.ke
2	East African Seed	No forage seeds	Nairobi - Dakar Rd, Industrial Area	www.easeeed.com
3	AgriSeedco. Ltd	No forage seeds	Nairobi - Mombasa Rd	www.seedcogroup.com
4	Pannar Seed(K) Ltd	Dual-purpose sorghum	Nairobi - Mombasa Rd	www.pannar.com
5	Freshco Seeds	No forage seeds	Nairobi - Muthaiga	www.freshcoseeds.co.ke
6	Pioneer Hi-Bred K Ltd	Lucerne	Nairobi - Mlolongo	www.pioneer.com
7	Kenya Seed Company	Lucerne, Boma Rhodes, Elmba Rhodes	Kitale info@kenyaseed.co.ke 0800 2210 555	www.kenyaseed.com
8	Western Seed Company	<i>Desmodium</i> , Lucerne	Kitale	www.westernseedcompany.com
9	Monsanto (K) Ltd	No forage seeds	Nairobi - Mombasa Rd	www.monsanto.com
10	Syngenta EA Ltd	No forage seeds	Nairobi - Matumbato Rd	www.syngenta.com
11	Savannah Seeds Ltd	No forage seeds		www.savannahseeds.com
12	Amiran (K) Ltd	No forage seeds	Nairobi - Old Airport North Rd	www.amirankenya.com
13	Hygrotech EA Ltd	Lucerne, Kowkandy	Tigoni Center, Limuru Road	www.hygrotech.co.ke/
14	VetAgro/ Griffatton	No forage seeds	Nairobi - Tom Mboya Street	http://vetagroinfo.com
15	Continental Seed Company Ltd	No forage seeds	Nairobi	http://continentalseeds.com
16	Kenya Highland Seed	No forage seeds	Nairobi - Enterprise Rd	www.royalseed.biz
17	Leldet Kenya Ltd	Fodder sorghum	Nakuru - Rajwera Farm	http://afsta.org
18	Tropical Seeds	<i>Brachiaria</i>	Nairobi	www.tropseeds.com
19	Advanta	Fodder sorghum	Indian Company with fodder sorghum trials in Kenya with farmers (currently trials on fodder sorghum)	http://2scale.org/775
20	Cooper K-Brands Ltd	Lucerne	Coopers K-Brands agro-business section is exploring trading with forage seeds. Lucerne is one of the forage crops the company selected to trade, procure and sell seeds (contact Agro-Business Leader- 0722209840)	http://www.coopers.co.ke/

Source: Adapted from SNV/Kenya Netherlands Development Organisation (2013).

Table 3. Suppliers of forage seeds against current prices (2015).

No.	Fodder seeds stocked		Supplier / Stockists	Price range (KES/kg)
(a)	<i>Desmodium</i> (silver & Green leaf)	<i>Desmodium uncinatum</i>	Kenya Seed, Simlaw Seeds (seeds) KALRO -Lanet & Ol Joro Orok (vines)	4,445
(b)	Tree Lucerne		KALRO - Ol Joro Orok	2,000
(c)	Purple Vetch	<i>Vicia</i> spp	KALRO - Lanet & Ol Joro Orok	600
(d)	Lupin	<i>Lupinus angustifolius</i>	KALRO - Ol Joro Orok	200
(e)	Lucerne	<i>Medicago sativa</i>	Kenya Seeds & Simlaw	2,190
(f)	Boma Rhodes	<i>Chloris gayana</i>	Kenya Seeds & Simlaw	695
(g)	Elmba Rhodes	<i>Chloris gayana</i>	Kenya Seeds & Simlaw	695
(h)	Oat	<i>Avena sativa</i>	Kenya Seeds & Simlaw	120
(i)	Fodder sorghum	<i>Sorghum bicolor</i>	Kenya Seeds & Simlaw	350 (2 kg)
(j)	Common vetch	Vetch (<i>Vicia sativa</i>)	Ikinyukia farmers group (Njabini)	2,000
(k)	Lupin	<i>Lupinus angustifolius</i>	Ikinyukia farmers group (Njabini)	1,000
(l)	Barley	<i>Hordeum vulgare L</i>	Ikinyukia farmers group (Njabini)	100
(m)	Sorghum	<i>Sorghum bicolor</i>	Ikinyukia farmers group (Njabini)	1,000
(n)	<i>Brachiaria</i> cvv Mulato II, Cayman, Cobra grass	<i>Brachiaria</i> varieties	Tropical seeds	Not available yet 1,700
(o)	Fodder sorghum	<i>Sorghum bicolor</i> (E6518)	Leldet Kenya Ltd	300 (2 kg)

Table 4. List of informal pasture/fodder multipliers, species produced, scale of operation and their collaborators.

	Site/name of multiplier	Species	Current scale of operation	Collaborators	Contact
Public farms/offices					
1	KALRO-Naivasha	Naivasha star grass (natural), Napier French Cameroon, Bana grass, Kakamega 1, Kikuyu grass, Edible canna, Forage sorghum, Sudan grass, Boma Rhodes grass, Silver and Green leaf desmodium, vetch, Lupin	Small scale	Farmers/farmers groups, MoA, MoLD, agricultural institutes/colleges	Tel: + 020 2390930 director.dri@kalro.org
2	KALRO -Kiboko	<i>Cenchrus ciliaris</i> , <i>eragrostis superba</i> , <i>Enteropogon microstachyus</i> , <i>Chloris roxburghiana</i>	Small–medium scale	KAPALIG CBO, KEPHIS, MoA, MoLD, Farmers/farmers groups, agricultural institutions/colleges	Tel: +254 20353 4232 director.arlri@kalro.org
3	KALRO -Mtwapa	Bana grass, Giant Panicum, ex-Tozi Rhodes, <i>Gliricidia sepium</i> , <i>Clitoria ternatea</i> , <i>Leucaena</i> , Siratro, <i>Mucuna</i> , <i>Lablab purpureus</i> cv Rongai	Small scale	Mtwapa ATC, MoA, MoLD, seed companies, agro-chemical companies, animal feed companies, farmers/farmers groups, agricultural institutions/colleges	Tel: +020 202475 1 director.icri@kalro.org
4	KALRO -Kisii	Certified Boma Rhodes and uncertified Green leaf Desmodium and Bana grass	Small scale	Kenya Seed Company, MoLD, MoA, farmers/farmers groups, agricultural institutions/colleges	Tel: +020 2029637 director.fcrl@kalro.org
5	KALRO -Muguga South	Napier Kakamega 1 & 2	Small scale	MoA, MoLD, farmers/farmers groups, agricultural institutions/colleges, KEFRI	Tel: +020 2029637 director.fcrl@kalro.org
6	KALRO -Mariakani	Certified seeds of Ex-Tozi Rhodes, <i>Clitoria</i> and <i>Lablab purpureus</i>	Small–medium scale	MoA, MoLD, farmers/farmers groups, agricultural institutions/colleges	Tel: +020 8044936 director.bri@kalro.org
7	KALRO-Matuga	Ex-Tozi Rhodes, Napier Bana grass, <i>Clitoria Ternatea</i>	Small scale	KALRO-Mtwapa, MoA, MoLD, farmers/farmers groups, agricultural institutions/colleges	Tel: +020 2055038 director.hri@kalro.org www.kalro.org
8	KALRO -Kakamega	Napier grass, desmodium	Small scale	ILRI, ICIPE, KALRO Centers, Heifer International, MoA, Bukura ATC, farmers/farmers groups	Tel: +020 2619792 director.nrri@kalro.org
9	KALRO -Lanet	Napier Kakamega 1 & 2, Desmodium, Sweet potato, and certified Fodder Sorghum (E6518)	Small–medium scale	KEPHIS, MoA, MoLD, Egerton University, farmers/farmers groups	Tel: + 020 8044936 director.bri@kalro.org
10	KALRO -Kitale	Certified seeds for Rhodes (Boma, Mbarara, Pokot), Silver and Green leaf Desmodium, Lupin and uncertified seeds/planting materials of Napier, Sweet potato, <i>Calliandra</i> and <i>Leucaena</i>	Small–medium scale	KEPHIS, Kenya Seed Company, KALRO centers, MoA, MoLD, farmers/farmers groups, agricultural institutions/colleges	Tel: +020 2029637 director.fcrl@kalro.org

(continues)

(continued)

Site/name of multiplier	Species	Current scale of operation	Collaborators	Contact	
Public farms/offices					
11	ADC Kitale regions office (7 large scale farms)	Certified Boma Rhodes seeds (698 acres)	Large scale	Kenya Seed Company, KEPHIS	Tel: +254 54 20811 Fax: +254 54 20340 ktt@adc.co.ke
12	Nomotio Livestock Improvement Centre	Uncertified Boma Rhodes seed production	Medium–large scale	KALRO, MoLD, ARID Lands, World Vision	†
13	Oyani Livestock Improvement Centre	Boma Rhodes for seed production	Small scale	Kenya Seed Company, University of Nairobi, MoA, MoLD, farmers/ farmers groups, KEPHIS	†
14	Njabini ATC	Napier Kakamega I & II, Elmba Rhodes, Colored Guinea, Kow candy, Giant Setaria, Lucerne	Small scale	Ikinyukia SHG, Kenya Seed Company, agro-chemical companies, animal feed companies, farmers/farmers groups, MoA, MoLD	†
15	OI Joro Orok ATC	Napier Kakamega I, Sweet potato, Fodder sorghum, Lucerne, Desmodium, Vetch	Small scale	Seed companies, agro-chemical companies, farmers/farmers groups, MoA, MoLD, KALRO-OI Joro Orok	†
16	Wambugu ATC in Nyeri	Napier Kakamega I, II & III, <i>Calliandra</i> , <i>Leucaena tricandra</i> , <i>Tithonia</i> , Boma Rhodes	Small scale	KARI-Embu, DGAK, dairy cooperatives, farmers/farmers groups, KALRO-Muguga, MoA, MoLD	†
17	East College in Embu	Napier Kakamega I & II, <i>Calliandra</i> , <i>Sesbania</i> , <i>Leucaena</i> , Mulberry	Small scale	KALRO-Embu, farmers/farmers groups, MoA, MoLD	†
18	Kaguru ATC in Meru	Napier Kakamega I & II, Bana grass, Nandi Setaria, Green leaf Desmodium, <i>Glicicidia</i> , <i>Calliandra</i> , Mulberry, <i>Sesbania</i> , <i>Leucaena</i> , Sweet potato (Musinya and ex-Mukurueini)	Small scale	KEPHIS, KALRO-Thika, farmers/farmers groups, MoA, MoLD	†
19	Kenyatta ATC in Maragua	Napier Kakamega I and Ex-Githuguri, Sweet potato, green leaf Desmodium, Elmba Rhodes, <i>Calliandra</i>	Small scale	KALRO-Embu, Kenya Seed Company, DGAK, farmers/farmers groups, MoA, MoLD	†
20	Kamweti ATC in Kirinyaga	Napier Kakamega I, Sweet potato (Musinya), <i>Calliandra</i>	Small scale	KALRO-Embu, farmers/farmers groups, CBOs, dairy cooperatives	†
21	Mabaga ATC in Bungoma	Growing Bana grass, which is affected by stunting disease, Boma Rhodes, <i>Calliandra</i> and <i>Leucaena</i> but no seed bulking activities	Small scale	Kenya Seed Company, Moi University, agro-chemical companies, farmers/farmers groups, MoA, MoLD	†

(continues)

(continued)

	Site/name of multiplier	Species	Current scale of operation	Collaborators	Contact
Public farms/offices					
22	Mtwapa ATC	Napier grass	Small scale	Farmers/farmers groups, MoA, MoLD, Osho chemicals	†
23	Bukura ATI in Kakamega	Napier grass	Small scale	KALRO, MoA, MoLD, farmers/farmers groups	†
24	Sang'alo Institute of Science and technology	Napier Clone 13, Bana grass, Napier Uganda hairless, Desmodium growing naturally in the wild	Small scale	MoA, MoLD, KALRO centers	†
Private farms/companies					
1	Gicheha farm in Ruiru	Maize for silage, Boma Rhodes, Lucerne, Colored Guinea (natural)	Medium–large scale	Seed companies, Brookside dairies, agro-chemical companies, agricultural institutions/colleges	†
2	Leldet ltd farm in Nakuru	Certified fodder forage Sorghum E6518 (250 acres), grain Sorghum BJ28, dual-purpose Sorghum (Kinyaruka)	Medium–Large scale	Kenya Seed Company, Technoserve, Farm Import Promotion Services (FIPS), MoA, KEPHIS	Tel: +254 722811790 leldet@leakygroups.co.ke
3	Ngongongeri farm in Egerton Njoro	Certified Rhodes grass and maize seed	Large scale	Kenya Seed Company, KEPHIS, Egerton University, KALRO	†
4	Pembeni farm in Moi's Bridge	Certified Boma Rhodes (200 acres) and fodder Sorghum (100 acres)	Large scale	Kenya Seed Company, KEPHIS	†
Organized farmers groups (CBOs)					
1	Ikinyukia Self-Help Group in Njabini, consisting of 23 members (about 15 acres under seed production, CBOs)	Broad purple vetch, Siratro, Lupins, Oats, Napier Kakamega 1 & 2, Elmba Rhodes, Colored Guinea, Kow Candy, Giant Setaria, Tree Lucerne, fodder sorghum, fodder maize HAC (high-altitude composite) from KALRO Ol Joro Orok, and maize varieties (22, 46) from Olerai farm (have now opened agrovet)	Small scale	KALRO, MoA, MoLD, Kenya Seed Company, Hygrotech, Njabini ATC, dairy farmers	Tel: 0724 492 456 (Bernard Muturi)

Source: Adapted from Njunie et al., 2010.

Note: With the re-organization of former KARI (Kenya Agricultural Research Institute) to KALRO (Kenya Agricultural and Livestock Research Organization), the various KALRO centers are now coordinated from the contacts given under Institute directors.

† Implies contacts not obtained and appears under county governments.

ADC Agricultural Development Corporation **ATC** Agricultural Training Center **CBO** Community-based organization **DGAK** Dairy Goats Association of Kenya **ICIPE** International Centre of Insect Physiology and Ecology **KALRO** Kenya Agricultural and Livestock Research Organization **KAPALIG** Kavatini Pasture and Livestock Improvement Group **KARI** Kenya Agricultural Research Institute **KEFRI** Kenya Forestry Research Institute **KEPHIS** Kenya Plant Health Inspectorate Service **MoA** Ministry of Agriculture **MoLD** Ministry of Livestock Development **SHG** Self-Help Group.

Table 5. Strengths, weaknesses, opportunities and potential threats in forage seed systems in Kenya.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Vibrant and growing dairy sector that requires forages • Growing demand for animal products also associated with expanding middle class in Kenya • Various companies in Kenya dealing with agricultural seeds • Various agro-ecological zones that could support variable forage resources • There is a wide range of forage seeds that could be exploited for various agro-ecological zones • Kenya has strong collaboration with international research organizations and NGOs dealing with forages • Kenya has eager farmers demanding new ideas and technologies, especially client-oriented productive agricultural innovations 	<ul style="list-style-type: none"> • Lengthy process for regulating new forage seeds. National performance trials take long and are expensive • Perennial nature of most forages reduce demand for forage seeds as planting is not required annually, as in most food crops • Most forages can be established from vegetative material thus reducing opportunity for trading that is easily done with seeds • Largely small land holdings with mechanization not viable thus reduced efficiency of operations and production • Some forage seeds require extra care, especially during establishment where weed control is a challenge
Opportunities	Threats
<ul style="list-style-type: none"> • Fodder markets emerging: farmers growing forage for sale to other farmers, especially those practicing cut-and-carry under intensified systems • Fodder market exerting demand for forage seeds, e.g., farmer-based organizations are now trading with forage seeds • Kenya has extended agricultural extension structure that support use of forages up to farm level. Agricultural Training Centers, offering farmer training, are also available • Planting forages contributes to ecosystem services by improving soil cover and sequestering carbon 	<ul style="list-style-type: none"> • Forage diseases, e.g., Napier smut, oat rust • Climate change with erratic rainfall reduces forage performance



Lablab purpureus

Discussion

Although it was difficult to quantify the seed volumes from the information sources used to compile this report, it was clear that both formal and informal seed systems are important in Kenya. Demand for forage seed is likely to increase and be met by either of the systems, largely due to increasing demand for livestock products that in turn has to be supported by robust forage and fodder availability. This may explain the observed interest in new companies (Tropical Seeds Company, Advanta) in venturing in forage seed trading in Kenya. The emerging fodder marketing adds a new twist unlike before, where livestock keepers largely relied on producing fodder for their livestock, especially those practicing dairy.

With development of the fodder markets, farmers may be able to produce milk by relying on fodder and forage bought off farm. This stratification on farmers specializing in milk or meat production and others on forage production is likely to be beneficial as each entity complements the other. However, farmers with relatively large farms would be the most suited to produce forage and, as such, drive forage seed demand and especially the formal one.



Cenchrus ciliaris

Conclusions

- Forage seed entrepreneurship is likely to grow based on the growing demand for animal products projected to double by 2050.
- Both formal and informal forage seed systems remain profoundly important for the Kenyan livestock sector.
- Specialization of forage production entrepreneurs versus those in livestock husbandry and production, especially dairy, is likely to spur and give impetus to the forages value chain growth.

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**Headquarters and Regional
Office for Latin America and the
Caribbean**

Km 17 Recta Cali-Palmira
Apartado Aéreo 6713
Cali, Colombia
Phone: +57 2 4450000
Fax: +57 2 4450073
General e-mail: ciat@cgiar.org

CONTACT

Carolina Navarrete, Coordinator
✉ c.navarrete@cgiar.org

Regional Office for Africa

c/o ICIPE
Duduville Campus,
Off Kasarani Road
P.O. Box 823-00621
Nairobi, Kenya
Phone: +254 20 8632800 / +254 719
052800 / 721 574967
Fax: +254 20 8632001

CONTACT

Robin Buruchara, Regional Director
✉ r.buruchara@cgiar.org

Regional Office for Asia

c/o Agricultural Genetics Institute (Vien
Di Truyen Nong Nghiep), Vietnam
Academy of Agricultural Sciences
(VAAS), Pham Van Dong Street, Tu
Liem (opposite the Ministry of Security
- Doi dien voi Bo Cong An)
Hanoi, Vietnam
Phone: +844 37576969

CONTACT

Dindo Campilan, Regional Director
✉ d.campilan@cgiar.org



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