Working Paper No. 1

"Enhancing Farmers' Access to Improved Forage Seed in Kenya"

Recommendations for policy change and operational advancement of the regulatory framework for forage seed

Nairobi, Kenya, 15 July 2024

UNIVERSITY OF NAIROBI

Table of Contents

Abbreviations

ABC	Alliance of Bioversity International and CIAT
ASALs	Arid and Semi-Arid Lands
CGIAR	Consultative Group on International Agricultural Research
COMESA	Common Market for Eastern & Southern Africa
DUS	Distinctness, Uniformity and Stability
EAC	East African Community
EGS	Early Generation Seed
FAO	Food and Agriculture Organization
FWG	Forage Working Group
GDP	Gross Domestic Product
IGAD	Intergovernmental Authority on Development in Eastern Africa
ILRI	International Livestock Research Institute
IP	Intellectual Property
ISTA	International Seed Testing Association
KALRO	Kenya Agricultural and Livestock Research Organization
KARI	Kenya Agricultural Research Institute
KEPHIS	Kenya Plant Health Inspectorate Services
KIT	Koninklijk Instituut voor de Tropen (Royal Institute for the Tropics)
KSC	Kenya Seed Company
MoALD	Ministry of Agriculture and Livestock Development
NCVL	National Crop Variety List
NEADAP	Netherlands East African Dairy Partnership
NPPO	National Plant Protection Organisation
NPT	National Performance Trial
NVRC	National Variety Release Committee
OECD	Organisation for Economic Cooperation and Development
OIC	Orange ISTA Certificate
PBAK	Plant Breeders Association of Kenya
PIP	Plant Import Permit
PRA	Pest Risk Analysis
RVO	Netherlands Enterprise Agency
SADC	Southern Africa Development Community
SAPLING	Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion Initiative
SDLD	State Department for Livestock Development
SNV	SNV Netherlands Development Organisation
STAK	Seed Trade Association of Kenya
UNCTAD	United Nations Trade and Development Organisation
UON	University of Nairobi
VAT	Value Added Tax

1. Preface

This Working Paper reflects on the required actions for increasing availability, affordability and accessibility to certified seed of improved forages in Kenya, in relation to the regulatory framework for forage seed listing, release and commercialisation. The key objective of this paper is to fast-track the release of forage varieties and the diversification of certified forage seed options available in Kenya. This is a necessary building block for increasing feed availability, livestock productivity, food security; while addressing environmental concerns, sustainability and resilience of livestock keeping systems - including use of Kenya's rangelands.

The recommendations relate to policy issues and operational advancements as regards to the regulatory framework for forage seeds and the regulator, the Kenya Plant Health Inspectorate Services (KEPHIS). The call for action is directed to the Ministry of Agriculture and Livestock Development (MoALD) through KEPHIS https://kilimo.go.ke/ and https://www.kephis.go.ke/ .

Realisation of the objective can be achieved faster if the Government actively promotes, facilitates and initiates partnerships (bilateral or multilateral) between Government, donors, research institutions, development organisations, farmer organisations and KEPHIS. As such, the Government can unlock funding and expertise to strengthen KEPHIS' capacity to exercise its mandate in the forage sub-sector more effectively, and – also - to fund local or regional seed improvement programmes.

Furthermore, to complement and reinforce affirmative action at the level of the regulatory framework and forage seed systems, it is advised that collaborations are established between Government, public and private research institutions, donors, development partners and international research organisations with private seed companies – local and international.

The aim of this collaboration is to lower financial and logistical barriers for forage variety release and market development. The latter especially for demonstration in the field of novel varieties, farmer-training on good agronomic practices (fodder crop production, harvesting and conservation), as well as good feeding practices and ruminant nutrition, for enhancing the adoption of novel forage technologies by farmers.

2. Introduction

The livestock sector in Kenya contributes up to 42% of the agricultural GDP (ILRI, 2021) and plays a significant role in the livelihoods, food and nutrition security, and incomes of rural households. However, livestock performance – both in the dairy and red meat value chain - is constrained by lack of year-round supply of good quality and adequate quantity of feed. This results in reduced productivity and growth of the sector and high emission of greenhouse gases per unit of livestock output (Leitner et al 2021).
In Kenya's arid and semi-arid lands (ASALs), frequent lack of forage causes high mortality rates amongst livestock and makes pastoralist and agro-pastoralist communities economically and nutritionally vulnerable, against the backdrop of climate change and degradation of landscapes.

Since livestock sector growth is key in supporting Kenya's GDP, there is a need for congruent growth in support systems, one of which is improved feeding. Feed resources account for more than 55% of cattle and other ruminant production costs kept in more intensive livestock production systems (Odero-Waitituh, 2017). Low quality and quantity of forages, which form the bulk of ruminant diets, limit productivity and profitability of ruminant livestock production enterprises in all agro-ecological zones.
This calls for Government to adopt new - or enhance current - policies and strategies that assure that livestock is feed-secure and to consider forages key for food security at the national level.

The cultivation of improved forages enables livestock producers to sustainably and competitively increase milk and meat production; both in high and low potential agricultural zones. Reseeding and managing the degraded

landscapes in ASALs offers livestock producers further opportunity to improve livestock productivity, livelihoods and enhance provision of ecosystem services. In addition, permanent grasslands and use of improved forages contribute to reduced environmental and carbon footprint.

However, for livestock and commercial forage producers, one of the most pressing challenges is access to affordable and suitable quality - and sufficient quantity - of forage seed for the prevailing agro-ecological conditions. This becomes more precarious in a sector that is commercializing fast.

In the last few decades, forage development - which involves selection, germplasm collection, characterization, evaluation, breeding, multiplication, and adaptation - has received little attention, contrary to earlier times in the 1960-70s (e.g., Boonman, 1993; Bogdan 1949-1977). Subsequently, government emphasized more on food crops and forages were not considered key for food security at policy level, with the exception of Napier grass that was promoted for smallholder livestock keepers and is vegetatively propagated.

Up to 2015 only 6 grass varieties were listed in the National Crop Variety List (NCVL) comprising of 3 Rhodes (*Chloris gayana*) grasses, 2 Setaria (*Setaria sphacelata*) grasses and 1 Panicum (*Megathyrsus maximus*) grass. In addition, a number of multi-purpose legumes were listed and released mainly by the Kenya Agricultural Research Institute (KARI)/Kenya Agricultural and Livestock Research Organization (KALRO), Kenya Seed Company (KSC), or Universities (e.g., sweet potato vines, cowpeas (*Vigna unguiculata*), Dolichos lablab (*Lablab purpureus*)). For a number of these listings Early Generation Seed (EGS) has not been maintained and/or the varieties were not taken to commercial levels.

From 2015 onwards progress was made with the listing of 23 new grass varieties, including Brachiaria CV (6 in 2021) and hybrids (3 in 2016), Panicum Siambaza CV (1 in 2021), Lucerne (5 in 2015), Range grasses (4 in 2021), fodder sorghum (3 in 2016/2019) and fodder millet (1 in 2019). In addition, 2 sweet potato dual purpose varieties (2015, 2019), 5 cowpea dual purpose varieties (2017, 2019), 1 oat fodder variety (2018), 1 soya bean dual purpose variety, and 1 Triticale fodder variety (2021) got listed. See Annex 1 for the listed dual purpose and forage crops in the NCVL, 2023.

However, diversity in terms of forage species and varieties (which include tropical grasses and all other species of forages), variety maintenance and seed availability, remain a major problem. The latter, amongst others, due to low and fluctuating demand, high costs of importation and keeping stocks, and weak seed systems - including lack of maintenance of Early Generation Seed. Limited awareness amongst livestock keepers of the new varieties, their productivity enhancing properties, and access to seed also contribute to low and fluctuating demand.
The private sector is best positioned to sustainably drive improved access to forage seeds, but constructive collaboration with research, government and development partners/donors is essential. Considering the paucity of forage options in the market and the danger of monoculture, at least for the coming years, it is important to increase the diversity of forage options for the various livestock keeping systems and agro-ecological zones in the country.

This can be done through registration of suitable pest and disease-free forage seed varieties that are introduced through local and/or regional seed improvement programmes or initiatives (either through selection or breeding). This would also enhance constructive competition in the market and allow livestock producers to make choices in terms of preferred species, varieties and suppliers.

Therefore, efforts to enhance availability and use of improved forage seeds and planting material cannot be over-emphasized, and part of the solution lies in reviewing the regulatory framework for forage variety release and listing. Kenya Government is currently reviewing the National Seed Policy 2010, which includes a process of public participation as enshrined in the Constitution.

This Working Paper and the Policy Brief that has been extracted from it, contribute to this process. They aim specifically to enhance the forage seed sub-sector, by sharing expert views from the research and development sectors and gaps identified by stakeholders from the public and private sector, including seed companies and livestock producers. Hence there is need to align these documents and the National Seed Policy.

3. Forage seed regulatory framework

In Kenya, seed certification and variety release is regulated by the Kenya Plant Health Inspectorate Service (KEPHIS) through implementation of the Seed and Plant Varieties Act (CAP 326) and its implementing Regulations (LN 150/Dec 2016 and LN 220/Dec 2016). According to CAP 326 the specified forage species are listed in Schedules 1 and 2 (Table 1 below).

The Regulation stipulates 14 grasses (most but not all) at the genus level and 9 legumes in Schedule 1 and eligible for release. Amongst these, 7 grasses and 7 legumes (Schedule 2) are subject to mandatory certification (Kenya Law, Legal Notice caption 220, December 2016).

Table 1. Forage species categorized under Schedules I and II according to the Seed and Plant Varieties (Seeds) Regulation 2016

All prescribed forages set out in the **First Schedule** are eligible for certification. Seeds of crops set out in the **Second Schedule** are under compulsory certification and should officially be released in accordance with the relevant Regulations.			
Prescribed forages (First Schedule)		**Forage Seed under compulsory certification (Second Schedule)**	
Grasses	**Pasture legumes[1]**	**Grasses**	**Pasture legumes**
Blue stem grass	Centrosema	Setaria grass	Centrosema
Buffel grass	Clover	Rhodes grass	Stylosanthes
Cock's foot grass	Greenleaf Desmodium	Sudan grass	Desmodium
Colored guinea grass	Leucaena	Congo signal grass	Clover
Columbus grass	Lucerne	Panicum spp	Lucerne
Congo signal grass	Lupins	Buffel grass	Siratro
Kikuyu grass	Silverleaf Desmodium	Columbus grass	Lupins
Napier grass	Siratro		
Paspalum grass	Stylosanthes		
Rhodes grass			
Rye grass			
Setaria grass			
Sudan grass			
Love grass			

The forages in the First and Second Schedule above are derived from the list of Scheduled Crops (First Schedule) of the Crops Act, Chapter 318, Revised Edition 2022.
https://acrobat.adobe.com/id/urn:aaid:sc:EU:2db42e50-2bc8-4962-b2b0-a2268892ba6a

The First Schedule was arrived at, based on the category, use and importance of the crop and helps to classify varieties that require official release (Second Schedule). The First Schedule in the Crops Act and the First Schedule in the Seed and Plant Varieties (CAP 326) Regulation 2016 contain a partial or limitative list of respectively genuses and varieties, and ought to be updated regularly based on potentially suitable novel forage crops for Kenya. However, this has not been done since its publication. In practice, importation may not

[1] This should actually read forage legumes as not all the legumes may always be grazed.

be denied by virtue of the variety not being included in the Schedules. The general principle is for all forage crop varieties to undergo official registration or listing and release, as they are food security crops.

Before listing of forage varieties on the NCVL, National Performance Trials (NPTs) and Distinctness, Uniformity and Stability (DUS) tests need to be conducted, all at the cost of the applicant. However, if the variety has to be imported into the country the process is preceded by a Pest Risk Analysis (PRA), for cases where phytosanitary requirements for importation of the species from the specified source do not exist.

This process is lengthy, especially the PRA. The PRA is carried out at species level. In some cases, species within a genus share pests, even across genera, but information has to be per species. Shortening the PRA process is crucial for fast-tracking availability of novel forages in Kenya.

The PRA data are usually obtained from the National Plant Protection Organisation (NPPO) in the country of origin. Fast-tracking of PRA may be done through follow-up with relevant NPPOs, including country-to-country (bilateral) diplomatic engagements. Under the umbrella of the East Africa Community (EAC) or the Common Market for East and Southern Africa (COMESA), PRAs are being shared with KEPHIS by some member states, but regional harmonization is not yet (fully) institutionalised.
PRA information can also be obtained from relevant research data shared by seed companies and/or research institutes. Generally, PRAs in countries in the same agro-ecological zones can be shared and used between countries, as occurrence of pests and diseases are usually the same within one zone.

Entities aiming to register forage varieties need to apply for NPT online and this is compulsory for the Schedule II forages. The NPT data collected over two seasons from at least three different sites is usually enough to release the varieties. The NPT/DUS process may be accelerated by leveraging regional harmonization provisions on sharing of varietal data and reports.

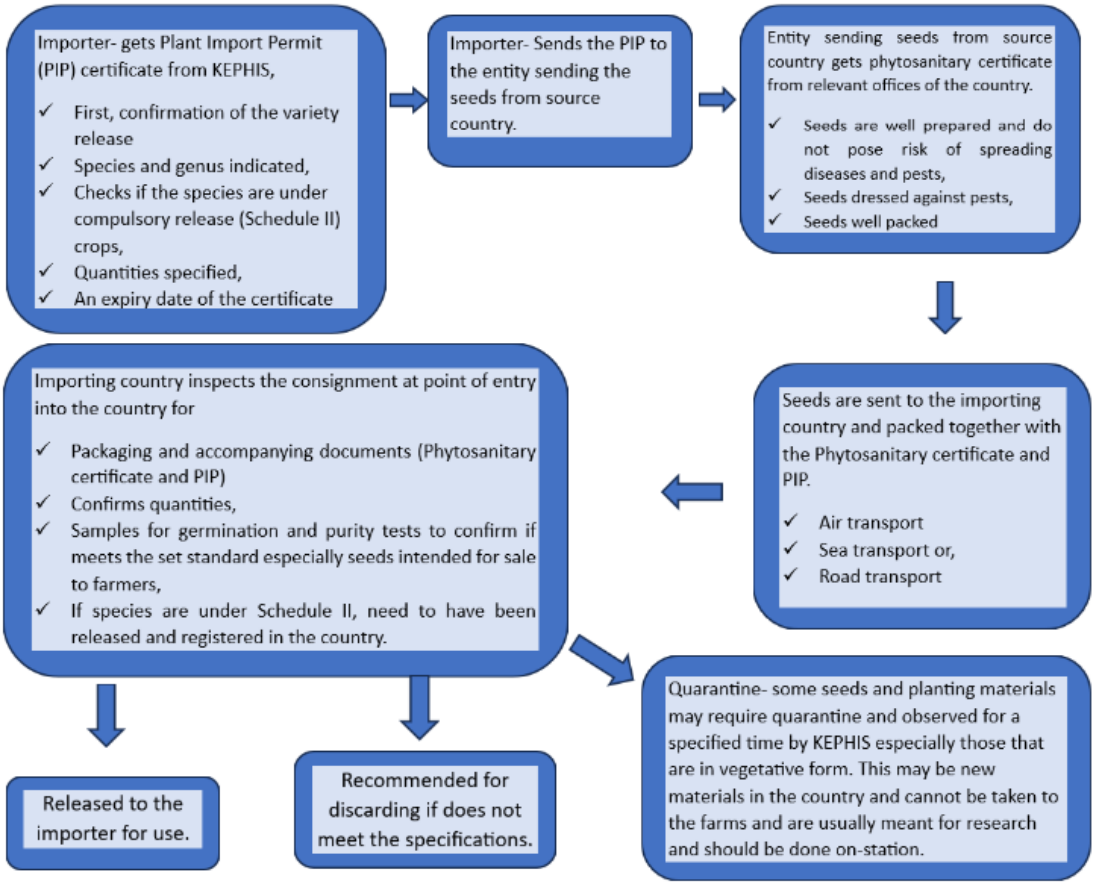
Within EAC and COMESA it is possible to share and use NPT/DUS data from one member-state to another member state, to speed up the release period. This can shorten the release process depending on the similarity of agro-ecological zones between the source country and the importing country. The NPT is only required for one season if NPT data are available from another member state and may be exempted if the variety is released in two member states of the regional block.

This implies that the regulatory body in the importing country ought to obtain relevant data from the corresponding regulatory body in the source country, at a stipulated fee. This avenue needs to be communicated to relevant stakeholders, as it will increase efficiency by avoiding duplication and saving time and money.

Imported forage seeds need to be inspected to confirm they do not pose disease or pest risks, and a phytosanitary certificate is then provided. On application by the importer, the recipient country issues a Plant Import Permit (PIP) that specifies the importation conditions, including freedom from regulated pests and diseases, species and quantity of seeds in question, and the duration for which the permit is valid.

The country of origin inspects the seeds and issues the phytosanitary certificate, confirming that the conditions specified in the PIP have been met. An Orange ISTA Certificate (OIC) showing seed germination and purity results of each imported batch is also required.
Reciprocally, seeds exported from Kenya follow the same procedure whereby KEPHIS, upon receipt of a PIP containing phytosanitary requirements from the recipient country, inspects/tests - as per the requirements of the importing country - the seeds that are being exported, and issues a phytosanitary certificate.

Figure 1. Steps for seed importation into Kenya [2]



4. Perceived gaps and recommendations for improvements

During several stakeholder consultations in Kenya in the past few years, including workshops at KEPHIS in August 2022 and April 2024, key stakeholders in the forage seed sub-sector highlighted areas in the regulatory framework that are deemed challenging for the development of a vibrant forage seed sector. This concerned both registration and commercialisation of imported forage seed varieties and development of improved forage seed through either selection or breeding.

As regards importation of suitable forage seed varieties versus locally improved seed varieties, both are crucial. Local seed improvement programmes e.g., by research institutes are especially instrumental where private sector has no commercial interest to invest as a result of limited market and/or where the preservation of native grasses/eco-types and biodiversity is a national priority to conserve and preserve Kenya's rangelands and landscapes.

On the other hand, relying only on local seed improvements programmes will not result in closure of the gap in seed availability and diversity within a reasonable timespan. Besides, especially in breeding, generally investments are large and require an equally large regional or international market to make the investments economically viable; in addition, seed production of some varieties cannot be economically done in Kenya (e.g.,

[2] The duration i.e., expiry date of the certificate sometimes becomes an issue - depending on form of shipping (air or sea freight) and duration of processing paperwork on the export documents, e.g., phyto certificate.

as a result of day length on the equator as seed production of some forages is photoperiod sensitive). Despite these limitations, it is prudent for Kenya to develop a national forage improvement programme and build on previous successful efforts (Boonman, 1993, Bogdan, 1977).

Collaborations between local and international seed companies and research can be instrumental for example to scale-up seed multiplication and production, and to commercialize improved forage seed varieties listed by local research institutes.

The challenges or gaps identified by the stakeholders and the authors of this Working Paper (GAP 1-12) were discussed and validated by KEPHIS in the course of 2023/24. They are summarized in Table 2 below which also includes recommendations for improvements (REC 1-12), remarks/actions and responsible entity for implementation.

The recommendations in the table include both policy issues and operational advancements, with the cells highlighted in orange referring to policy issues. The latter are also presented in a separate Policy Brief. KEPHIS proposes the formation of a Forage Working Group (FWG) to be domiciled under MoALD with KEPHIS holding the Secretariat, to guide and facilitate implementation of some of the recommendations and actions referred to in Table 2.

Table 2. Gaps (GAP) and recommendations (REC) for enhancing the forage seed regulatory framework

GAP/REC	RECOMMENDATIONS	REMARKS/ACTIONS	RESPONSIBLE
GAP 1	**Forages are neglected considering the importance of livestock in Kenya's economy and the need to make livestock feed secure to achieve food security at national level.**		
REC 1.a	Give high priority and allocate more (long term) funding to forage research and development initiatives and programmes.	Policy Brief	FWG, MoALD
REC 1.b	Domicile forages in the State Department of Livestock Development (SDLD) and involve forage experts rather than food crop experts.	Policy Brief	FWG, MoALD
REC 1.c	Develop a forage sub-sector improvement strategy for Kenya, including a study of market size and demand, an inventory of suitable forages for Kenya's agro-ecology and (transforming) livestock production systems, and a strategy for local (or regional) seed improvement programmes.	Policy Brief	MoALD, FWG
REC 1.d	Develop and pass a Forage Bill.	Policy Brief	MoALD
GAP 2	**The First Schedule in the Crops Act, 2022 and Schedules I and II in the Seed and Plant Variety Regulation, 2016 are limitative and not regularly updated. For example in Schedule I of the Seed and Plant Variety Regulation other forage varieties could be included - e.g., vetch, canavalia beans, velvet beans, radish, turnips, fodder beet, chicory, pigeonpea, crotalaria, brachiaria and panicum. In practice, importation may not be denied by virtue of the variety not being included in the Schedule I or II; the general principle is for all forage species to undergo official release and listing in the NCVL. The use of the Schedules I and II is a source of confusion and misinterpretation by stakeholders.**		
REC 2.a	-The Cabinet Secretary Agriculture and Livestock Development to update regularly and revise the First Schedule of the Crops Act, 2022 and the Schedules I/II of the Seed and Plant Varieties (Seeds) Act Regulation 2016, to include more eligible for ages. -The Cabinet Secretary Agriculture and Livestock Development to consider replacing the Schedules I and II, by incorporating	Polic Brief	KEPHIS, MoALD

	into the Seed and Plant Varieties (Seeds) Regulation 2016 a general article or provision, stating that all forage varieties need to undergo official listing and release.		
REC 2.b	-To facilitate revision of the Schedules, make an inventory and prioritization of forages (at genus and species level) that are suitable and promising for Kenya based on pre-agreed criteria, both for importation and for local/regional seed improvement programmes. Combine this with a needs assessment amongst stakeholders involved in livestock production, commercial fodder production and landscape restoration or management. -Make use of existing credible sources incl. scientific reports and feed libraries e.g Tropical Forages; https://feedipedia.org	Compile inventory, link-up with Forage Africa Network, benchmark with Australia and South Africa.	KEPHIS, FWG, SDLD.
REC 2.c	In the Schedules I and II of the Seed and Plant Varieties (Seeds) Act Regulation 2016, consistently and uniformly differentiate species listed at genus level. See the example of Desmodium in Schedule I and II that leads to confusion. As much as practicable, listing should be at species level.	Include during Regulation review.	MoALD, KEPHIS, FWG.
REC 2.d	Clearly and consistently enshrine in the Crops Act, the Seed Policy Act, Regulations and NCVL, internationally used definitions for genus, species and varieties as well as for feed, forages, pasture, and other commonly used terminology like fodder and roughage (nomenclature).	Policy Brief, include during Regulation review.	MoALD, KEPHIS, FWG.
REC 2.e	Consider withdrawal (temporary or indefinitely) of varieties from the NCVL if parent stock seed is not maintained.	Review and clean NCVL list annually	NPTC, KEPHIS
GAP 3	**There is a lack of timely and clear communication and information on the regulatory framework for forage variety listing, release and commercialization.**		
REC 3.a	Publicize on KEPHIS' website, a manual with information and guidelines for all relevant steps, procedures and protocols for forage variety listing and release, commercialisation and importation. This should include references to relevant Acts, Regulations and Registers and a visualization of the steps to be taken through a flow-diagram. Inform stakeholders timely and fully of any (proposed) changes in the forage seed regulatory framework and update the manual accordingly.	Compile document and upload.	Forage Working Group (FWG), KEPHIS.
REC 3.b	Pegged on this manual, develop a training package for sensitization and capacity building of players that are not (fully) familiar with the existing procedures and protocols.	Compile and upload.	FWG, KEPHIS.
REC 3.c	Make clear on the KEPHIS website how relevant stakeholders can obtain access to the Plant Breeders' Rights Register (PBR) and that any interested person can inspect the PBR.	Compile and upload.	KEPHIS.
REC 3.d	Publicize and keep updated a list of countries and forage species for which PRAs have been concluded and NPTs can be carried out.	Compile document and upload.	KEPHIS.
GAP 4	**For species coming from a country not yet appraised by KEPHIS, the PRA appraisal process can take 4-5 years. This limits access to seed technologies that have been proven to work elsewhere, and thus should also benefit livestock production in Kenya (without the need of being (fully) re-evaluated).**		

REC 4.a	Increase the capacity of KEPHIS to access data from the source-NPPO and fast-track PRA-appraisal of seeds sourced from countries with suitable forages for the tropics with no history of prior importation.	Enhance capacity of KEPHIS	MoALD, KEPHIS
REC 4.b	Maximize the use of regional trade blocks (EAC, COMESA, IGAD & SADC) on sharing of PRA and other data (i.e., NPT, DUS) to facilitate fast tracking for listing and release. Seek bilateral engagements with countries of interest outside these regional blocks.	Utilize relevant data from EAC, COMESA, IGAD & SADC members; Bilateral engagements.	KEPHIS, MoALD, FWG.
REC 4.c	Based on the recommended list of novel forages as referred to under REC 2 (b) and preceding NPT applications - focus and fast-track PRAs on prioritized forages and countries of origin or interest (possibly with support from donors).	Fast-track PRAs for promising novel forage varieties.	KEPHIS, FWG.
REC 4.d	-Consider a window for large scale forage crop producers to pilot, grow and utilize novel forage crops prior to taking the seed through NPTs, provided the seed/material has a history of value to farmers and only when the materials have ready PRA data that comply with KEPHIS requirements. -Take the commercialization of such varieties for sale of seed through the normal release process once variety value and use has been identified.	-Formalize current practice of NPT exemption. -Consider referring to pre-commercial stage or expanded adaptability tests, quarantine farms. -Determine quantities of seed based on piloting at scale and seeding rates per acre. -Monitor the performance of such varieties based on agreed parameters.	KEPHIS, FWG
GAP 5	**The COMESA Variety Catalogue (CVC) does not include forage crops, which prevents seed companies to make optimal use of the provision that once a crop is registered in 2 member states, it may be exempted from NPT in the new country of listing and release.**		
REC 5.a	Include forage crops in the COMESA Variety Catalogue (CVC) that are registered in 2 or more member states.	Raise with COMESA Secretariat, with justification of utilization among member states.	KEPHIS, MoALD COMESA.
REC 5.b	Similar to what is proposed for the NCVL (see REC 5 below), create in the CVC a separate section for forages.	Raise with COMESA Secretariat.	KEPHIS, MoALD COMESA.
REC 5.c	Across COMESA and other regional blocks to use the same release nomenclature.	Regional blocks member states	Regional blocks
REC 5.d	Keep a regional perspective on forage crop registration and commercialisation both for exchange of information on PRA and NPT data, but also as regards creating a larger and more attractive market for private sector to invest.	Actively promote harmonization amongst COMESA, EAC, IGAD, SADC member states and help create a common market for forage seed.	KEPHIS, MoALD

GAP 6	**Forage crops are merged with food crops in one National Crop Variety List (NCVL) referring to the scientific name (with the exception of a category defined as "pasture (brachiaria spp), see entry 42 [3]. This is not consistent and user-friendly. It may lead to misinterpretation by the user for species that have varieties specifically bred for either food or forage (e.g., sorghum, millet, maize, sweet potato vines and cow peas).**		
REC 6.a	Create separate sections in the NCVL for food crops and forage crops at species level. Within the section for forages further differentiate between legumes, grasses, root crops and fodder shrubs/trees.	Review and revise.	KEPHIS, FWG, KEFRI
REC 6.b	Add in the NCVL the source of the material. This should be the applicant, who may be an individual or an institution. The person may/may not be the owner of the variety (ownership is handled under plant breeder's rights).	Include source column in NCVL.	KEPHIS, FWG.
REC 6.c	-Give information for each variety in the NCVL on the specific attributes and characteristics used for performance appraisal in NPTs, consistently. For example drought/cold tolerant, tolerant to waterlogging or saline soils, to be primarily used as green manure or cover crop, or specifically to be used for erosion control or landscape rehabilitation. -Give the rating or score for each variety based on the results of NPTs or where applicable the measured outcome of the special attribute so that the user can compare varieties on specific attributes.	Include in/update NVCL.	KEPHIS, FWG.
REC 6.d	Stimulate seed companies through the Seed Trade Association of Kenya (STAK) and other stakeholders, i.e. KALRO, ILRI, KEFRI, etc. to develop a forage catalogue with factsheets and good agronomic practices for production, harvesting, conservation and feeding. Provide a link in the NCVL and/or on KEPHIS website to such a catalogue which is the responsibility of the seed companies/suppliers.	Promote through STAK.	STAK, Breeders, seed companies, Research organisations
GAP 7	**Standards for tropical grasses, including native grasses, are not always realistic as regards to purity thresholds, germination rates and seed dormancy. This does not stimulate sector players to engage and invest in registration/listing of a new variety.**		
REC 7.a	Develop species-specific standards for purity, uniformity and germination for different grass species/varieties – based on research and scientific data from Kenya or abroad - rather than applying one blanket standard for all grasses. This may include standards for blending (and mixtures) of two or more grasses that meet the standards individually.	Review of standards to be part of review of Regulations.	KEPHIS, FWG.
REC 7.b	In doing so, focus on those forages or grasses recommended by the FWG (see REC 2.b) and develop workable models with experts from public and private sector.	As above.	KEPHIS, FWG.
REC 7.c	Seed companies and/or researchers to share relevant information and benefits of multi-lines (closely related lines within the same species), variety mixtures within the same species, or seed mixtures of different species within or between genera marketed by seed companies;	Adjust the Regulation for seed mixtures.	MoALD, KEPHIS

[3] In addition to Brachiaria Hybrids, this category includes Sugargraze and Nutrifeed which are not pasture grasses and cv Siambaza which is not a Brachiaria. On the other hand, Cayman, Cobra and Mulato II under entry 42, could also be listed under entry 51. National Urochloa List.

	-KEPHIS should develop protocols for such seed mixtures (refer to/benchmark with OECD systems for seed mixtures).		
REC 7.d	In addition to recent provisions such as authorized private sector inspectors and a Standard Seed class, consider - with relevant sector stakeholders and experts - a less costly certification system for grasses which are key in maintaining biodiversity and adequate cover in the Kenya's rangelands.	-Develop separate certification system for range grasses.	KEPHIS, FWG.
REC 7.e	Government to support local seed multiplication and certification by (promoting) the establishment of targeted funding mechanisms and forging of PPPs between research and private sector, to develop and maintain EGS/vegetative planting material and upscale this to commercial quantities.	Polic Brief	MoALD
REC 7.f	As NPT applies to grass species/varieties for feed-use only, there is need to provide criteria to determine whether a grass species or variety is considered for feed or other use, and also to clarify which categories are exempted from NPT, e.g., lawn grasses, grasses for erosion control, water purification, etc. NB: Kikuyu grass is used for feed and non-feed purposes. It is sold as lawn grass and is not registered as a forage in the NCVL but seed is commercially available in the market.	Set criteria to determine whether a grass variety is for feed or non-feed-use. Close loopholes	KEPHIS, FWG.
GAP 8	**Knowledge and practices of the regulatory body (KEPHIS) as regards to appraisal of new entries (i.e., specific attributes) for NPTs and how to weigh these, can be improved.**		
REC 8.a	Enhance capacity (forage expertise) within KEPHIS and within its Committees for the development of protocols, standards for testing, performance appraisals and other relevant fixed and specific parameters (attributes) of forages in the NPTs.	Policy Brief. Develop capacity building trajectory.	KEPHIS, FWG.
REC 8.b	Inform applicants duly and timely to declare the (measurable) attributes to be tested, cutting stage and the recommended agro-ecologies and make a protocol for testing/measuring of fixed parameters and additional parameters.	Compile and share.	KEPHIS, Breeder/seed companies.
REC 8.c	Rely on wet-chemistry testing of forages for NPTs by an accredited laboratory. Near infra-red spectroscopy (NIR) can only be indicative and may not be reliable as most NIR-equipment available in Kenya use calibration lines for forages in temperate climates (except ILRI in Nairobi and other laboratories equipped with ILRI calibration lines).	Use only wet chemistry for NPTs. If using NIRs assure that calibration lines for tropical forages are used.	KEPHIS, FWG.
REC 8.d	Make available a list of laboratories for forage testing recommended by KEPHIS.	Compile and share on request	KEPHIS, FWG
REC 8.e	Clarify/agree when entering a forage variety for NPTs, protocols for sample collection (e.g., cutting stage, stubble height) for feed testing, the parameters to be tested, weighing of parameters.	Review existing procedures and protocols for sample and data collection. Review breeder's proposal when applying for NPT.	KEPHIS, FWG.
GAP 9	**The maintenance of Early Generation Seed (EGS) is the responsibility of the breeder. However, many breeders do not maintain EGS resulting in varieties listed in the NCVL that cannot be commercialized, or seed being produced from low quality EGS. Such seed is of poor quality which can lead to reduced purity, uniformity, germination rates, yield and forage quality.**		

REC 9.a	-KEPHIS should strictly audit that marketed forage seed conforms with EGS standards and that sufficient quantity of EGS is maintained by the seed company who owns the seed. -KEPHIS may add additional classes and standards upon industry requests and based on technical conditions of the variety.	-Ensure that sufficient quantity of EGS is maintained. -Support public breeders to maintain their varieties and produce quality EGS	KEPHIS, Breeders/seed companies.
REC 9.b	-For vegetative material of unknown origin, KALRO or other research organisations (e.g., ILRI) could characterize and register them, e.g., Super Napier grass with a defined origin. -Consider the disease and pest challenges that are currently been noticed with Pakchong and Juncao.	-Characterize and register vegetative material of unknown origin. -Consider susceptibility to pests and diseases	KALRO, MoALD, ILRI
GAP 10	**The lack of regulations for vegetatively propagated materials creates a risk for spread of diseases and pests, while for distributed vegetative planting material it is not easy to identify if the material is original and genuine. This is not supportive to a sector that wishes to grow and prosper.**		
REC 10.a	KEPHIS to follow through the process of public participation and enactment for the development of regulations for vegetatively propagated materials and implement effectively, See: The Seeds and Plant Varieties Act (Cap 326); The Seeds and Plant Varieties Act (Vegetatively Propagating Seeds) Regulations 2023.	Regulations are at and advanced stage, public participation process underway.	KEPHIS, MoALD
REC 10.b	Align the recommendations in this Working Paper with the (new) regulation on vegetatively propagated materials and the National Seed Policy.	Alignment of existing and new regulations and policies with the Working Paper's recommendations.	KEPHIS, MoALD
REC 10.c	Develop, disseminate, implement and enforce standards and protocols on the propagation of vegetative materials (splits, cuttings and seedlings) and clarify the release procedures to reduce risk of disease-spreads and planting material of different genetics than claimed by the seller.	Develop or refine standards and protocols.	KEPHIS, MoALD, FWG.
GAP 11	**The need to clarify and enhance adherence to the Law by seed sector stakeholders as regards Intellectual Property (IP) rights.**		
REC 11.a	The genetic material currently brought (legally) into Kenya through NPTs is often "old" (but new to Kenya and most of Africa), meaning it was developed more than 15-20 years ago and it is therefore unlikely that the material can still claim IP rights. To encourage private sector investments, it is however important to maintain an updated inventory of already-registered forage species, with clear indications of which are public goods and those which are not. It is also important to provide clear guidance if there is IP-protection and whether royalties are required to be paid.	Update and avail IP protection information.	KEPHIS, Breeders/seed companies.
REC 11.b	In addition, there is need to have a mechanism of ensuring the entity that introduced the 'free' variety and took it through NPTs is compensated for this effort.	Develop compen-sations mechanism	NVRC/KEPHIS, FWG

REC 11.c	For materials under IP there is a need for clear communication who can import, produce and commercialize. This needs to align with international agreements in which Kenya is a signatory, i.e. UPOV - the international Union for the Protection of New Varieties of Plants.	See above.	KEPHIS, Breeders/seed companies.
REC 11.d	The reference in the NCVL to ownership should be reviewed and corrected. It has no legal basis in respect to property rights, but merely indicates who applied for NPT. Ownership should refer to the initial breeder or that entity that has been given the responsibility to maintain stock.	Proposals to be forwarded to the National Variety Release Committee (NVRC).	KEPHIS, FWG, NVRC, Breeders/seed companies.
REC 11.e	Materials eligible for intellectual property (IP) protection relate to those bred, e.g. forage hybrids. Those that fall under public good exist naturally with no breeding effort e.g. accessions, ecotypes, cultivars. Within a single species, there could be materials under IP as well as those under public good categories and regulation should help to discern this to interested parties without difficulty, by providing a catalogue that is updated as changes happen. This could be the case e.g. for hybrid grasses that can also be vegetatively propagated (although they will lose hybrid vigour over time). It is common to exempt smallholder farmers from IP-protection and royalties if they propagate vegetative planting materials for own use and this can be formalized by law.	See above.	KEPHIS, NVRC, FWG.
REC 11.f	-Prevent or address unfair competition and maintain a level playing field in the forage seed sector. -Create more staff capacity in KEPHIS to protect the interest of seed companies and suppliers that make effort and incur costs to comply with the legal requirements and to register their seed. There is need for more enforcement and banning of sales of (packed) uncertified seed by traders/merchants. This requires extra funding of KEPHIS and also includes sensitization of development partners, donors and County Governments that fund seed distribution and seed multiplication by local groups, without consideration of quality control issues, legal requirements and IP-rights.	Both policy and an operational issue.	MoALD, KEPHIS
GAP 12	**VAT and levies on forage seed, multiple payments for business licenses of seed companies in every County, cess on bulked seed, hay and silage being traded, all have a negative impact on growth of the forage seed market and on forage commercialisation.**		
REC 12.a	The forage seed sector is still an emerging yet critical market for (increased) livestock production, food, income and employment. Government (national and counties) should consider reducing or waving VAT and levies on forage seeds, and on sales of commercial conserved forages such as hay and silage. This will stimulate growth of the forage seed sector and forage supply chains and helps to address current challenges of access and cost of forage seeds, encountered by livestock and commercial forage producers.	Policy	MoALD

5. Acknowledgments

We recognize and appreciate the contributions from farmers, seed companies, research institutions, development partners, the Kenya Plant Health Inspectorate Service (KEPHIS), and the Ministry of Agriculture and Livestock Development (MoALD) through participations in workshops and other fora, which have contributed immensely to this Working Paper. A final draft of the Working Paper was presented at a multi-stakeholder workshop on 23 April 2024 for a last round of multi-stakeholder consultation and relevant feedback was included.

Through several rounds of consultation and validation, KEPHIS made corrections in earlier versions of the Working Paper and gave important insights in the process of forage seed certification and variety release. It contributed to several sections including Table 2 that lists gaps and recommendations. In particular, we appreciate the support by KEPHIS Department of Seed Certification and Plant Variety Protection represented by its Acting Director Mr Simon Maina and by Mr Jacob Cheptaiwa, Acting Deputy Director Plant Variety Testing & Protection.

We also appreciate the support from CGIAR (the International Group on International Agricultural Research) through the Sustainable Animal Productivity Initiative, and from the Forage Working Group (FWG) that was established under leadership of KEPHIS and gave input on the Working Paper, with members drawn from Ministry of Agriculture and Livestock Development (MoALD), Kenya Plant Health Inspectorate Service (KEPHIS), KEPHIS' National Performance Trial (NPT) and National Variety Release (NVR) Committees, Kenya Agricultural and Livestock Research Organization (KALRO), Alliance of Bioversity International and CIAT (ABC), International Livestock Research Centre (ILRI), SNV Kenya -Netherlands Development Organisation (SNV Kenya), Plant Breeders Association of Kenya (PBAK), Seed Trade Association of Kenya (STAK), University of Nairobi (UoN), Food and Agriculture Organization Kenya (FAO Kenya) and the representative of the private sector Leldet Seed Company Ltd.

6. About the authors

The Alliance of Bioversity International and CIAT (ABC), ILRI (International Livestock Research Centre) and KIT (Royal Tropical Institute in the Netherlands), contributed to this Working Paper through the project "Improving access to quality feed and forage seeds for the dairy sector in Kenya and Uganda." This project is part of the NWO Dutch Research Council/Netherlands Government funded NL-CGIAR research programme "Seed systems development: "Enabling and scaling genetic improvement and propagation materials", led by Royal Tropical Institute (KIT) from the Netherlands. ILRI and ABC also collaborate in the Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion initiative (SAPLING). Dr Solomon Mwendia and Dr Ben Lukuyu are the main contributors on behalf of respectively ABC and ILRI.

SNV Kenya/Netherlands Development Organisation (SNV) contributed to this paper through the project "Integrated & Climate Smart Innovations for Agro-Pastoralist Economies and Landscapes in Kenya ASALs" (ICSIAPL), funded by the European Union and the Netherlands Government. This project is implemented in partnership with KALRO.

Dr David Miano and Dr Simon Kuria contributed on behalf of the Kenya Agricultural and Livestock Research Organization (KALRO) which is a partner in ICSIAPL. KALRO is the institute responsible in Kenya for promotion, streamlining, coordination and regulation of national research in crops, livestock, genetic resources, and biotechnology, to expedite equitable access to research, information, resources, and technology, and to promote the application of research findings and technologies in the field of agriculture.

Contributions were also made through the project "Netherlands East Africa Dairy Partnership" (NEADAP-2), funded by the Netherlands Government, in which SNV and ProDairy EA are two of the partners that gave input to this Working Paper. Besides, inputs were received from a Netherlands Government funded RVO-project for farmer-field-trails of improved forages in Kenya implemented in 2022/23 [4].

https://ciat.cgiar.org/ https://alliancebioversityciat.org/alliance-accelerated-change-preserve-and-protect-our-environment https://www.kit.nl/ https://www.ilri.org/ https://snv.org/ https://www.kalro.org/ https://english.rvo.nl/

7. References

Bogdan, A.V., (1977) Tropical Pastures and Fodder Plants, Longman.

Boonman J.G., (1993) East Africa's Grasses and Fodders: Their Ecology and Husbandry, Kluwer Academic Publishers pp 343.

Creemers J., Maina D., Opinya F., Maosa S.; Report of a Scan of Forage Seed Suppliers in Kenya (Private Companies & Research Institutions), ICSIAPL project, SNV Kenya/KALRO, Nairobi, August 2021.

Creemers J.J.H.M, Opinya F.A; "Report on Forage Seed Commercialisation, Distribution and Adoption by Farmers," ICSIAPL /NEADAP, SNV Kenya/KALRO, Nairobi, December 2023.

DeSIRA Lift, Seed Laws Harmonisation in Africa https://www.desiralift.org/seed-laws-harmonisation-in-africa/#maps https://www.desiralift.org/wp-content/uploads/2022/11/161122-DeSIRA-LIFT-Current-Developments-in-Seed-Laws-Harmonisation-in-Africa.pdf

Dey B., Notenbaert A., Makkar, H., Mwendia S., Sahlu Y., Peters M.; Realizing economic and environmental gains from cultivated forages and feed reserves in Ethiopia, CABI Reviews 2022-17, 010.

IGAD, Seed Systems Analysis in the IGAD Region, 30 June 2022.

ILRI (2021) https://www.ilri.org/news/kenya-livestock-master-plan-process-initiated-enhance-sustainable-development-and-investment (Accessed 5th December, 2022) Kenya Law, Legal Notice Caption 215 (2016) published in December 2016 Kenya Law http://kenyalaw.org/kl/Seeds and Plant Varieties Act Cap 326 - Legal Notice.pdf (infotradekenya.go.ke)

KEPHIS/SNV ICSIAPL (2022) proceedings of the Forage Seed Registration and Commercialization Sensitization Workshop 30th August 2022, Nairobi, Kenya.

Leitner, S., Ring, D., Wanyama, G.N., Korir, D., Pelster, D.E., Goopy, J.P. Butterbach-Bahl, K. and Marbold, L. 2021. Waste Management 126:209-220.

Mwendia S., Amuhuza R., Waluse K., Misoi S., Odhiambo R., Dhamankar M. and Mourik T. van (2021), Forage Seed Systems Stakeholders' Workshop in Kenya.

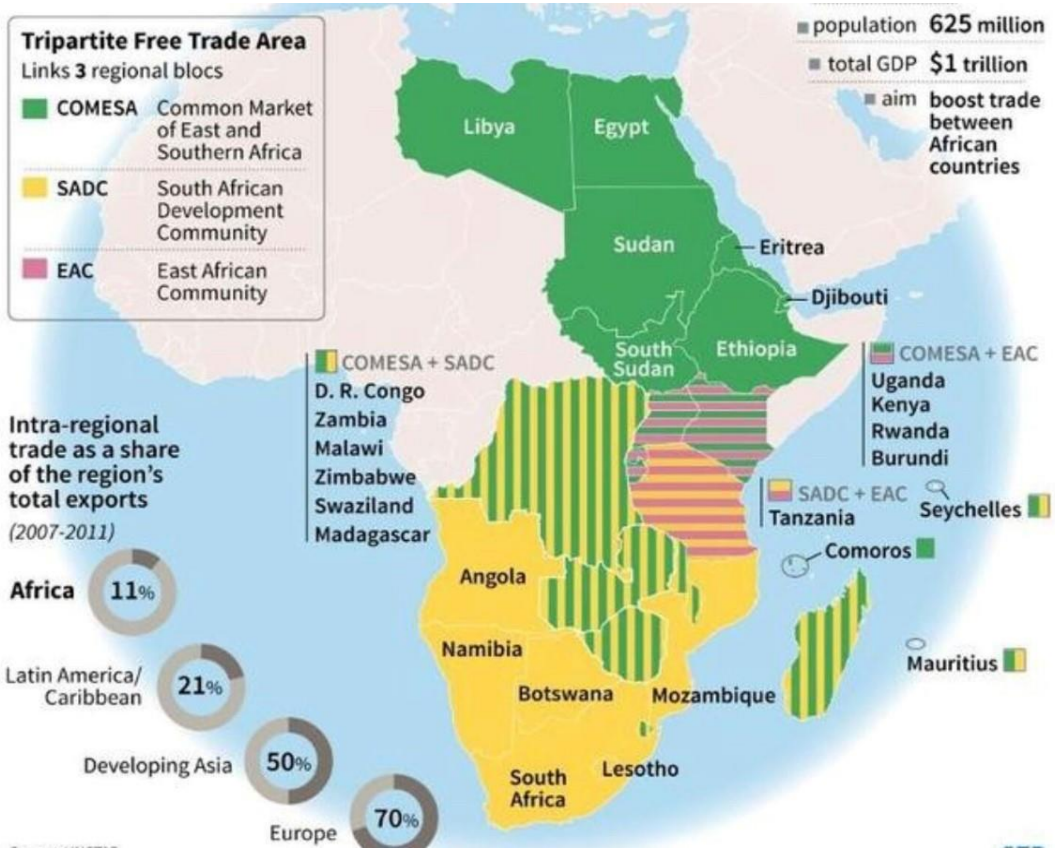
NCVL, 2023, National Crops Variety List, Kenya.

Odero-Waitituh J.A. 2017. Smallholder dairy production in Kenya: A review. Livestock Research for Rural Development. 29, Article #139 accessed on 3rd July 2017 from http://www.lrrd.org/lrrd29/7/ atiw29139.html.

Report, Alliance of Bioversity International and CIAT, ICIPE Duduville Campus, 23-24 November 2021: https://cgspace.cgiar.org/bitstream/handle/10568/119952/Forage%20Seed%20Workshop%20Report%20Kenya%20November%202021.pdf?sequence=1&isAllowed=y#:~:text=The%20workshop%20on%20seed%20systems,forage%20production%20in%20the%20country

[4] RVO stands for Netherlands Enterprise Agency

Figure 2. COMESA, SADC and EAC regional trade blocks (source UNCTAD)



Annex 1. Abstract from the National Crop Variety List, 2023 - Listed dual purpose crops and forage crops

Listed in green >= 2015

4. National Sweet Potato Variety List

Species: Ipomea batatas - 32 varieties (all KARI/KALRO)

Sweet potato vines (dual purpose)

11. KAP0084, 2010, KARI
13. Mwavuli-1, 2011, KARI
25. NASPOT-1, Double Double, 2015, KALRO
30c.Shock 5, Shock 5, 2019, KALRO

9. National Maize Variety List

Species: Zea Mays. 421 varieties no specific forage varieties

16. National Sorghum Variety List

Species: Sorghum bicolor - 46 varieties.

Dual purpose (6) forage variety (1):

3. BJ28, 1978, KARI
8. Ikinyaluka, 1996 (fodder only), KARI
12. E1291, 2000, KARI
14. Sila, 2006, AgriSeedCo Ltd, SeedCo Zambia
18. Karia SH 12, 2008, KARI
19. Kibuyu, 2011, Leldet
34. KS Sweet Sorg 14, 2016, ICRISAT/Kenya Seed Company
38. EUSS10, 2016, Egerton University

24. National Cow Pea Variety List

Species: Vigna Ungulculata L. Walps - 19 varieties (KALRO and Simlaw, 1 for Western Seed)

Dual purpose varieties (9):

2. 27-1, 1989, KARI
6. Machakos66, 1998, KARI **(promoted by KALRO as forage crop)**
7. K80, 2000, KARI
10. Kunde 1, ND, Western Seed Co
13. 1002/1005/3 Kunde Faulu, 2017, KALRO
14. 1005/1002/1, Kunde Tamuu, 2017, KALRO
15. 1005/1003/3, Kunde KAT, 2017, KALRO
16. 1005/1002/1/1/1, Kunde Soho, 2017, KALRO
17. 1005/1004/3, Kunde Timaini, 2019, KALRO

25. National Dolichos Bean Variety List

Species: Dolichos pupureum - 7 varieties (4 University of Eldoret and 3 KARI)

Dolichos Lab lab (dual purpose, promoted as forage)

3. KAT/DL-3 1995, KARI

27. National Rhodes Grass Variety List

Species: Chloris guyana - 3 varieties

1. Mbarara Rhodes, 1960), KARI/KSC, maintainer seed source KSC
2. Boma Rhodes, 1975, KARI/KSC
3. Elmba Rhodes, 1976, KARI/KSC

28. National Setaria Grass Variety List
Species: Setaria sphacelata – 2 varieties
1. Nandi setaria (1956) KARI/KSC
2. Nasiwa setaria (ND) KARI/KSC (KSC maintainer)

29. National Pannicum Grass Variety List
Species: Pannicum spp – 1 variety
1. Coloured Guinea (1955) KARI/KSC
(KSC maintainer)

30. National Soya Bean Variety List
Species: Glycine max – 12 varieties (2 dual purpose)
6. DPSB 19, 2010, KARI/ITTA
7. DPSB 8, 2020 KARI/ITTA

36. National Lucerne Variety List
Species: Lucerne (*Medicago sativa*) – 5 varieties
(all KALRO of which 2 brought in by Forage Genetics)
1. WL625HQ, 2015, KALRO; 2. WL414, 2015, KALRO
3. KKS9595,2015,KALRO; 4. SA Standard,2015,KALRO
5. KKS 3864, 2015, KALRO

42. National Pasture Variety List
Species: Pasture (Brachiaria spp) – 6 varieties

Variety name/code	Release name	Year release	Owner	Maintainer/Seed Source
1 Cayman hybrid	Cayman	2016	Advantage Seeds	ACL /Tropical Seeds LLC
2 Cobra hybrid	Cobra	2016	Advantage Seeds	ACL /Tropical Seeds LLC
3 Mulato II hybrid	Mulato II	2016	Advantage Seeds	ACL /Tropical Seeds LLC
4 Forage Sorghum (Sugargraze)	Sugargraze	2019	Advanta Seeds	Advanta Seed Internat.
5 Forage Pearl Millet (Nutrifeed)	Nutrifeed	2019	Advanta Seeds	Advanta Seed Internat.
6 Mombasa (Panicum maximum)	Siambasa	2021	Advantage Seeds	ACL//Tropical Seeds LLC

49. National Oat List
Species: Oat (*Aven sativa)* – 2 varieties (of which one dual purpose)
1. 011 A06, KS Oat16B, 2018, Kenya Seed Company

50. National Triticale List
Species: Triticale (*Triticosecale)* 1 variety
1. Foddatriticale, 2021, suitable for silage and grazing

51. National Urochloa List
Species Urochloa (Urochloa sp.) – 6 varieties

Variety name/code	Release name	Year release	Owner	Maintainer & Seed Source
1. Urochloa decumbens	Basilisk	2021	KALRO	KALRO
2. Urochloa brizantha	Piata	2021	KALRO	KALRO
3. Urochloa brizantha	Toledo	2021	KALRO	KALRO
4. Urochloa brizantha	MG4	2021	KALRO	KALRO
5. Brachiaria brizantha cv KISII	KS1	2021	KALRO	KALRO Lanet
6. Bracharia brizantha cv BUSIA	BS1	2021	KALRO	KALRO Lanet

52. National Horsetail grass list
1. Horse grass (Chloris roxburghiana, var. CHROX-KBK), 2021, KALRO

53. National Bushrye grass list
1. Bushrye grass (Enteropogon macrostachyus, var. ENMA-KBK), 2021, KALRO

54. National Buffel grass list Buffel grass
1. Buffel grass (Cenchrus ciliaris, var. MGD-1), 2021, KALRO
2. Buffel grass (Cenchrus ciliaris, var. TVT-3), 2021, KALRO