



FEED THE FUTURE

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FEED THE FUTURE: BUILDING CAPACITY FOR AFRICAN AGRICULTURAL TRANSFORMATION (AFRICA LEAD II)

Assessment to Support the Promotion of Regional Seed Trade in East Africa

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ACRONYMS

AATF	African Agricultural Technology Foundation
ACTESA	Alliance for Commodity Trade in East and Southern Africa
AGRA	Alliance for a Green Revolution for Africa
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASTI	Access to Seeds Index
ASYCUDA	Automated System for Customs Data
BMGF	Bill and Melinda Gates Foundation
CAADP	Comprehensive Africa Agriculture Development Program
CBD	Convention on Biological Diversity
CIAT	International Center for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
COMESA	Common Market for Eastern and Southern Africa
COMSHIP	COMESA Seed Harmonization Implementation Plan
COMSIS	COMESA Seed Information System
DFID	Department for International Development (United Kingdom)
DRC	Democratic Republic of Congo
DUS	Distinctiveness, uniformity, and stability
EAC	East African Community
EATIH	East Africa Trade and Investment Hub
ECOWAS	Economic Community of West Africa States
EGS	Early Generation Seed
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization of the United Nations
FISP	Farm Input Subsidy Program
GDP	Gross domestic product
HaSSP	Harmonized Seed Security Project
IARC	International agricultural research center
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
INGO	International non-governmental organization
IPPC	International Plant Protection Convention
IPR	Intellectual property rights
ISSD	Integrated Seed Sector Development
ISTA	International Seed Testing Association
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
KCEP	Kenya Cereal Enhancement Program
KEPHIS	Kenya Plant Health Inspectorate Service
MAAIF	Ministry of Agriculture, Animal Industries and Fisheries, Uganda
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
MLN	Maize Lethal Necrosis
MNCs	Multinational companies
MT	Metric tons
NAADS	National Agricultural Advisory Services
NAIVS	National Agricultural Input Voucher Scheme
NARS	National Agricultural Research System
NSCS	National Seed Certification Service (Uganda)
NSTA	National seed trade association
OECD	Organization for Economic Cooperation and Development
OPV	Open Pollinated Variety
OSBP	One Stop Border Post
PASS	Program for Africa's Seed Systems

PIP	Plant Import Permit
QDS	Quality declared seed
RAB	Rwanda Agriculture Board
REC	Regional economic community
ReSAKSS	Regional Strategic Analysis and Knowledge Support System
RICA	Rwanda Competition and Regulatory Authority
RSA	Republic of South Africa
SADC	Southern African Development Community
SANSOR	South African National Seed Organization
SCCI	Seed Certification and Control Institute (Zambia)
SDC	Swiss Agency for Development and Cooperation
SFSA	Syngenta Foundation for Sustainable Agriculture
SPS	Sanitary and Phytosanitary
SSA	Sub-Saharan Africa
SSSN	Seed Security Network Project
STA	Seed trade association
STAK	Seed Trade Association of Kenya
TASAI	The African Seed Access Index
TMEA	TradeMark East Africa
TOSCI	Tanzania Official Seed Certification Institute
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
USTA	Uganda Seed Trade Association
VCU	Value for cultivation and use
ZARI	Zambia Agricultural Research Institute
ZASTA	Zambia Seed Trade Association

I. EXECUTIVE SUMMARY

This assessment investigated the regional trade in certified seed of major staple food crops in Kenya, Uganda, Rwanda, Tanzania, and Zambia to determine whether trade barriers limiting growth in the exchange of new crop varieties needed to boost crop productivity to support food security. The impetus for this assessment was the general perception that seed trade was not growing steadily despite substantial regional, national, and development partner investments to reduce barriers throughout East Africa. These parties have made investments for more than a decade to harmonize the regulations governing seed trade among member states of the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), and the Southern Africa Development Community (SADC), the dominant Regional Economic Communities (RECs) in the region.

The study seeks to: confirm or refute the perception that seed trade was growing slower than supply and demand trends should support; identify the trade barriers slowing seed trade; and, identify stakeholder-supported recommendations for actions to rapidly improve regional trade in seed.

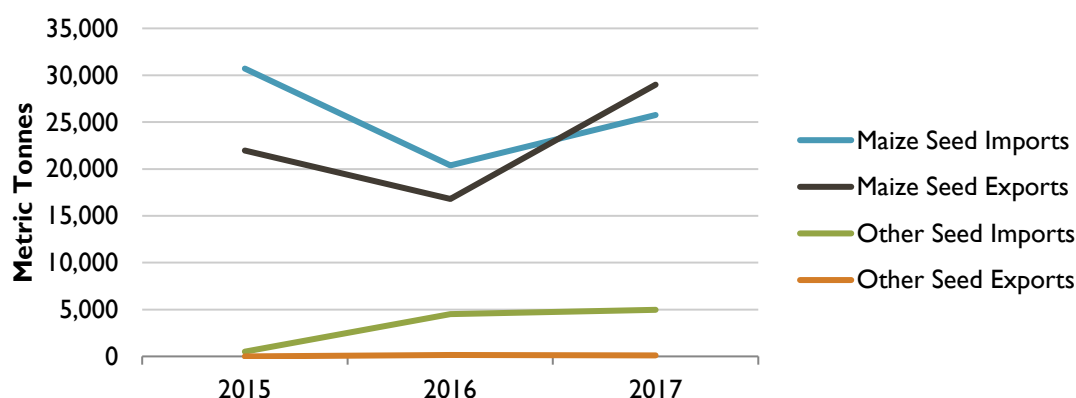
The five focus countries of this study: (1) encompass a significant volume of the current seed trade flow in eastern and southern Africa; (2) represent a trade corridor with great opportunity for growth; and, (3) share border points. Maize, sorghum, groundnut, Irish potato and soybean were selected as focus crops for the assessment based on their (1) high potential for trade; and (2) varietal release listing in regional catalogues that make them eligible for commercial trade in all COMESA and SADC member states.

Alongside a literature review, key informant interviews (KII) were deemed the most appropriate data collection approach due to the specialized nature of seed production, certification, and trade. Between March 2nd and April 26th, 2018, the team interviewed 105 key informants across the five countries and ten border points. The interviews covered regional and national public regulators, development partners, and private sector stakeholders. Representatives of twenty-eight seed companies were interviewed. Seed trade data covering 2015-2017 was requested from all countries; however, Uganda provided no data and Tanzania provided no export data. Significantly, 2016 was a deep drought year that depressed seed production and trade. Issues with Irish potato seed trade data led to its exclusion from trade volume analysis.

KEY FINDINGS:

In general terms, **regional maize seed exports increased from 2015 to 2017 with a dip during the 2016 drought year, while maize seed imports declined over the same period.**

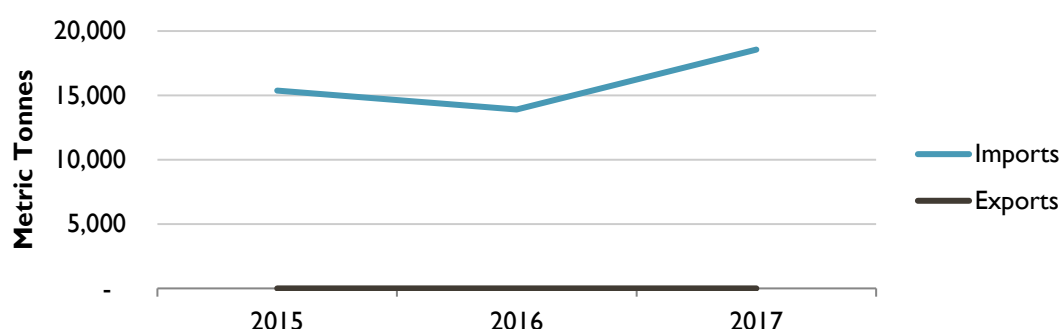
Yearly Imports and Exports (Kenya, Rwanda, Tanzania, Zambia) for Maize compared with the combined total for Sorghum, Soybean, and Groundnuts (Other Seed below)



Current trade volumes in the focus crops and countries are shaped primarily by the extent to which local seed demand is satisfied, as well as national policies that target increasing maize productivity through the substitution of maize hybrids for open-pollinated maize varieties (OPVs). In addition, the durability, strength, and quality of the seed industry, whether dominated by public (Kenya) or private (Zambia) ownership, greatly affects demand responsiveness. The other three crops studied have issues that currently limit volumes traded, specifically, low transportability over long distances under general cargo conditions of fragile groundnut seed, short-viability soybean seed, and perishable seed potatoes. Kenya alone maintains a small but steady export trade in sorghum seed.

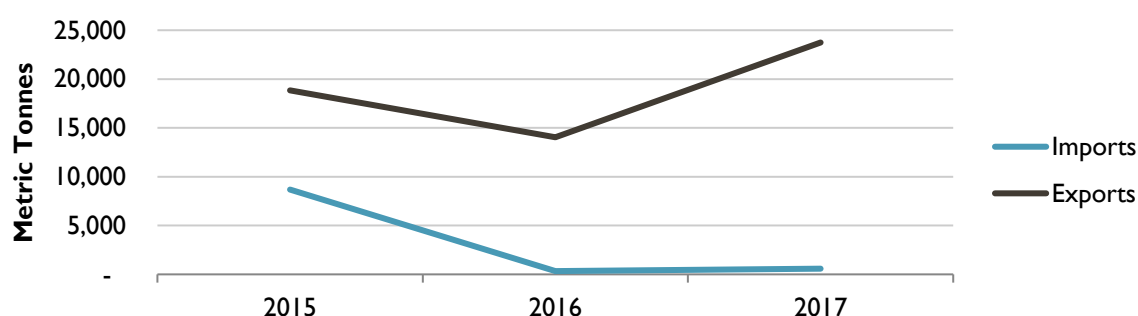
Rwanda's policy decision to move to hybrid maize intensification, coupled with its low capacity to produce hybrid seed has created an import demand that will be sustained for as long as Rwanda can support the expense. **Tanzania's similar policy has created the single largest import demand pole for certified maize seed in the region (see the graph below).** Its shift towards hybrids has greatly outstripped its seed industry's ability to supply the seed, in large measure because of the poor business environment, including a *de facto* ban on the export of seed. Importantly, Tanzania belongs to SADC and EAC but not COMESA, creating a discontinuity in seed trade harmonization efforts in EAC and COMESA that are otherwise converging.

Tanzania's Maize Seed Yearly Imports and Exports



Of the two net maize seed exporting countries, Kenya and Zambia, the former, a hub for African maize public crop breeding, is by far the smaller exporter and has more of a westward focus on Uganda and Rwanda than a southern orientation towards the large market in Tanzania. Zambia, the largest exporter of maize seed to the rest of Africa (see graph below), and the largest commercial maize breeding hub outside South Africa on the continent, has a strong seed export industry cluster. **Zambia's system of decentralized third-party buyers and sellers and self-certification, enables its seed industry to grow a quality-controlled seed industry faster and more easily than Kenya's heavily centralized, state-based seed certification and testing system.** Zambia's reduction in maize seed imports may reflect a maturation of its national maize seed production capacity.

Zambia's Maize Seed Yearly Imports and Exports



Supply and demand trends, individual country crop policies, national budgetary allocations to subsidy programs that emphasize hybrid maize varieties with fertilizer supply, and accelerating food demand in rapidly urbanizing countries have been relatively more important than harmonization of regional seed trade policies and regulations to the growth of the maize seed trade in ESA. This is partly confirmed by approximately two-thirds of the 28 private seed companies interviewed who felt that, in the long term, producing seed outside the country of sale or in countries that have good production potential would be a viable model and could assist in countering climate-related shocks. Respondents suggested that an import model is likely for East African countries that require seeds and do not have local production, including Burundi, the Democratic Republic of Congo (DRC), and South Sudan. A majority of seed companies report an 80 percent likelihood of starting seed export or increasing their existing seed exports. Several national companies are looking to capture niche markets, such as drought tolerant varieties and legumes. A number of these companies are already reaching out to local companies in neighboring countries with similar interests, with the goal of sharing germplasm and working on joint variety releases. **The demand-driven and competitive technology positioning plans of seed companies will move forward. However, seed companies will move forward faster if their risks and costs of market entry and trade are reduced through regional harmonization.**

Regional trade harmonization efforts that have focused on establishing and improving the operations of One-Stop Border Posts (OSBPs) and improving general trade regulations have reduced trading risks and transport delays at the border with positive effects on the seed trade. It is harder to draw the conclusion that investments in building seed-specific regulatory capacity has been the driving factor in reducing the seed import and seed export times that are vital to seed companies, their distributors, and farmers. **While The African Seed Access Index (TASAI) surveys show a trend towards reductions in seed import times and export times, import times are generally still higher than export times, likely reflecting a mix of protectionism and technical quality control issues.** Kenya, with a dominant public seed enterprise, has stringent import controls that require on average 38 days to fulfill. In the same period of time, a company could enter seed into Tanzania (12 days), Uganda (six days), and Zambia (12 days), and still have time to get the same lot into Uganda again. Uganda, which has cut its days to import (48 to six) and export (18 to nine) the most of any focus country since 2013, also is seen by many informants to have low capacity to enforce quality control and phytosanitary standards.

There is a level of mistrust among seed agencies and phytosanitary authorities on the quality and reliability of their trading partners' seed certification, seed testing, and phytosanitary surveillance, detection, and quarantine capacities that slow implementation of harmonized rules, and that calls into question the ability of trading partners to enforce harmonized seed trade rules. This mistrust is mainly based on different country gaps in supplying the facilities, equipment, personnel, and operating budgets needed to meet the international accreditation standards to which regional harmonization regulations are aligned. Lack of International Seed Testing Association (ISTA)-accredited labs in Uganda is an example of this challenge. The costs of levelling-up investments are substantial and progress is slow. National recurrent budget allocations to maintain personnel, facilities, and equipment are insufficient as evidenced by visits at border posts and seed company interviews

The lack of high-quality seed trade data and seed lot traceability (seed certificates, seed test results, and phytosanitary certificates) makes it difficult to demonstrate good systemic quality control, impedes the suppression of counterfeit seed, and makes public and private seed trade decision-making riskier and more difficult. Among the focus countries, only Zambia has started an automated, internet-based, seed-plot-to-seed-lot-to-sales disposition information system. This system links to phytosanitary certification. Its integration with export licensing and fee payment is lauded by seed companies. No country has anonymized

information on seed exports and seed imports by seed class that is readily accessible and up-to-date. Regional seed trade data in some trade databases appears to be off by as much as an order of magnitude because of commodity miscoding that tags grain or potatoes as seed for planting.

Private seed companies, including those who have registered crop varieties on the COMESA and SADC catalogues, some as early as 2014, give high marks to regional authorities for their legislative achievements and gazettement of domesticated and regionally-aligned seed laws, but give a score of zero to COMESA and SADC on implementation. These companies have paid registration fees and are paying annual varietal maintenance fees, but have received little value from their investment. When queried what private seed companies want as value, they offered that they want to see seed lots of varieties that are authorized for regional release trading to REC member states without national authorities requiring additional field tests. They want to be able to market and start selling those varieties now. While trade tests of small lots of seed with COMESA and SADC seed tags are planned for 2018, the wait has been long and communications on progress by the RECs to the industry partial and slow. **Seed companies and development partners may have had unrealistic expectations about the timing of commercial trade results because the COMESA/COMSHIP effort started in 2014 projected a 7- to 14-year period before full member state implementation.**

Funding of seed harmonization efforts has been done primarily by development partners, including funding of REC seed staff and their operating budgets. The private sector sees this creating an unsustainable system that is biased toward development partners', rather than national regulatory and seed company priorities. Also, the work required to operate the REC-harmonized seed regulatory apparatus takes more than the one technical staff and an assistant that are currently funded under harmonization projects. The private sector and the public sector recognize that the lack of regular funding of RECs by member states leads to a state of "projectization of the harmonization effort" (i.e. harmonization led by development projects). Tighter linkage of REC seed center operations to their crop and market priorities is essential.

RECOMMENDATIONS

This section outlines the most important recommendations to promote expanded regional seed trade. Recommendations include long-term (five year) activities, as well as interventions that can be undertaken in the short-term (less than one year).

SHORT-TERM RECOMMENDATIONS

- Reorient COMSHIP from the current perceived focus on harmonizing legislation and regulations to include a stronger focus on supporting and measuring the impact of implementation
- Establish a regional platform for regulatory dialogue(s), with strong private sector participation to ensure collaboration and progress in implementing seed policy harmonization
- Increase qualified staff at the seed technical office within RECs
- Embed the position of Seed Coordinator within REC formal structures so that it is a permanent position and not project-linked
- Explore opportunities to enhance the efficiency of information and communication technology (ICT) systems used for clearance of shipments at borders and reduce delays
- Initiate urgent dialogue with the private sector to review their approach to regional variety catalogues, including fees, provision of information, and numbering conventions

LONG-TERM RECOMMENDATIONS

- Establish a platform for development partner dialogue to strengthen seed trade
- Support exploration and development of tripartite agreements between COMESA, EAC, and SADC to harmonize and implement REC seed protocols, with strong private sector input and emphasis on an enabling environment
- Support the development of a digital information portal in each country for access to information on seed trade volumes, import and export requirements for seed, information on regionally-released varieties, downloadable forms, and more
- Build the capacity of “mission critical” public officials in national regulatory agencies and at border posts
- Support seed trade associations (STAs) to play key advocacy roles in seed trade, including the implementation of harmonized seed laws in their individual countries
- Actively seek to minimize the negative effects of political economy behaviors by: 1) increasing efforts to enlighten heads of state of focus countries on the critical need for seed trade and the benefits to their countries; and 2) increasing efforts to ensure countries abide by signed agreements.

II. INTRODUCTION

High quality seed of improved varieties is widely recognized as one of the most important determinants of a nation's agricultural productivity. Across sub-Saharan Africa (SSA), crop yields lag far behind other regions of the world. There are many contributing factors to this issue, including agronomic management practices and fertilizer availability and usage. However, one of the key reasons is low availability and lack of farmer access to high quality seed of improved varieties that are well adapted to farmers' agroecologies. Estimates of the percentage of arable crop land in SSA that is planted with quality seed of improved varieties ranges from a low of 10 percent to a high of approximately 20 percent.

Cross-border seed trade in Africa offers largely untapped potential to: 1) increase quality seed availability for Africa's farmers; 2) reduce production risks for seed companies by permitting seed production in areas with stable rainfall; and 3) disseminate new and improved crop varieties. Varieties with climate-resilience traits, e.g. drought tolerance, make them candidates for growth through trade.

Seed and seed trade are complex topics. Countries have their own laws, regulations, institutions, sovereign visions of self-sufficiency, and scales and maturity levels of private sector seed companies. In addition, SSA countries are dealing with novel seed borne diseases (Maize Lethal Necrosis Disease) and new quarantine pests (Fall Army Worm) that oblige new phytosanitary procedures for trade.

Seed trade should be showing signs of growth as certified seed demand exceeds national supply in key Eastern and Southern African states. However, seed trade volumes and the diversity of crop seed traded appear to be growing slowly, despite efforts by development partners and regional bodies to harmonize seed trade in ESA through the COMESA Seed Harmonization Implementation Project (COMSHIP) and parallel efforts in SADC.

STUDY OBJECTIVES

This assessment seeks to understand why seed has not been moving between surplus and deficit countries at steadily growing levels and to make practical and implementable recommendations to catalyze an increase in regional seed trade.

Specific Objectives:

The specific objectives of the assessment are to:

1. Assess regional seed trade barriers, focusing on both public and private sector experiences and perceptions.
2. Assess the effectiveness of existing programs supported by development partners to reduce seed trade barriers and increase regional seed trade.
3. Assess current organizational capacity, and particularly the seed-related capacity of entities working to facilitate regional seed trade and policy.
4. Highlight potential partners and possible partnerships for promoting regional seed trade that needs to be developed and/or strengthened.
5. Develop realistic and stakeholder-supported recommendations to rapidly improve regional seed trade.

III. STUDY METHODOLOGY

The study was done in three phases: 1) preparation and a literature review; 2) field work and the development of a draft assessment; and 3) peer review, stakeholder validation, and production of the final assessment.

PREPARATION AND LITERATURE REVIEW

Five countries were chosen as the focus for this assessment: Kenya, Rwanda, Tanzania, Uganda and Zambia. These countries were selected because they: 1) represent a significant volume of the current seed trade flow in eastern and southern Africa; 2) constitute a trade corridor with great opportunity for increased trade flow, including to neighboring, non-focus countries such as the DR Congo; and 3) share common border points, which facilitated interviews with customs and other border officials on both sides of the borders. Figure 1 shows the countries and border points of focus. Annex 7 provides individual country profiles, seed demand and seed trade analysis.

Map of Countries and Border Points of Focus

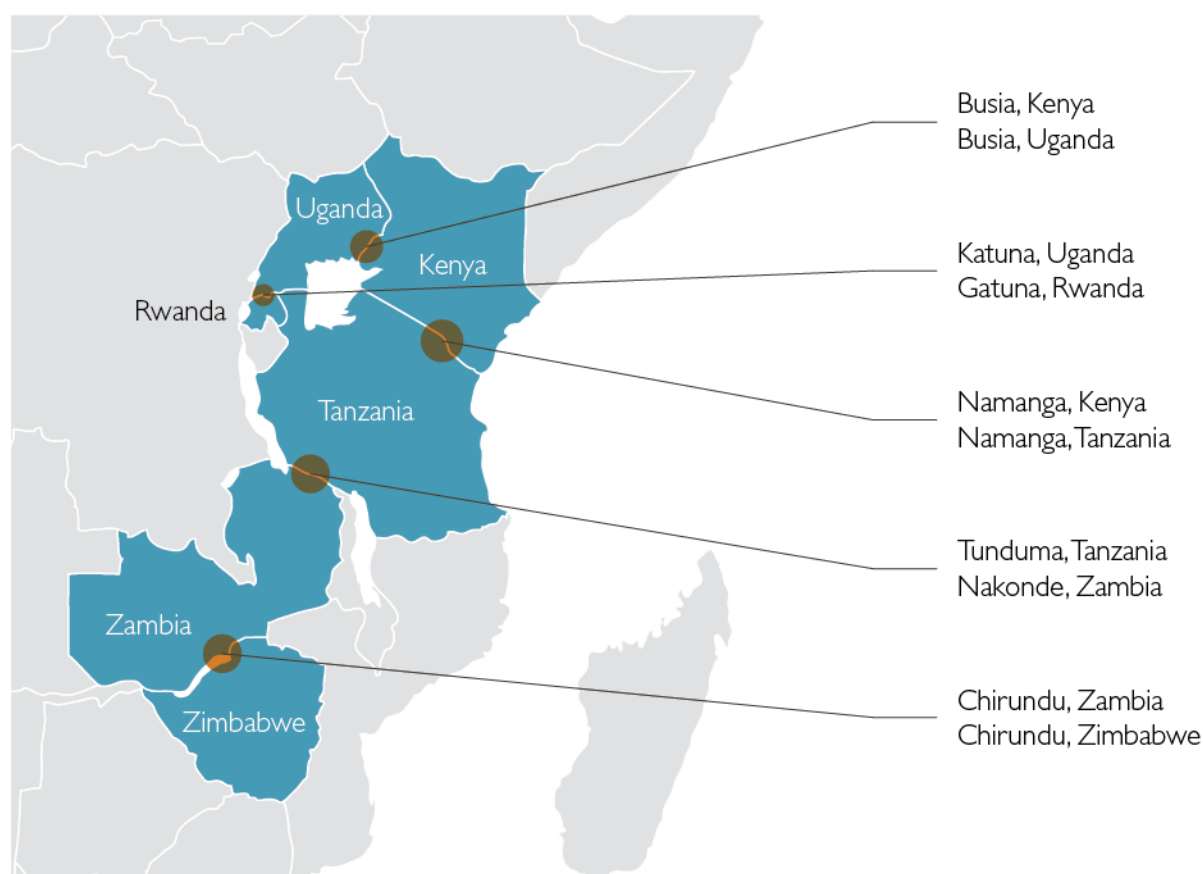


Figure 1: Map of Countries and Border Points of Focus

The focus crops selected for the assessment were maize, sorghum, groundnut, Irish potato, and soybean. These crops were selected because of their importance as staple food crops, their high potential for seed trade, and their listing in regional COMESA and SADC variety catalogues to speed their commercial release for distribution and sale in all member states.

The study team reviewed a selection of available grey literature and peer-reviewed articles on regional seed trade in eastern and southern Africa. A full list of all documents reviewed with short content summaries is provided in Annex 1.

FIELD WORK AND DEVELOPMENT OF ASSESSMENT REPORT

KIs were deemed the most appropriate data collection technique due to the specialized nature of seed production, certification, and trade. The team interviewed 105 key informants across the five countries between March 2nd and April 26th, 2018, as summarized by country in Figure 2. The interviews were done with 31 public sector policy makers, 33 private sector representatives, seven Regional Economic Communities (RECs) officials, five development partner officials, seven regulatory body officials, 18 border post officials, and four subject matter experts. The full list of key informants is included in Annex 2.

Number of Key Informant Interviews Conducted by Country

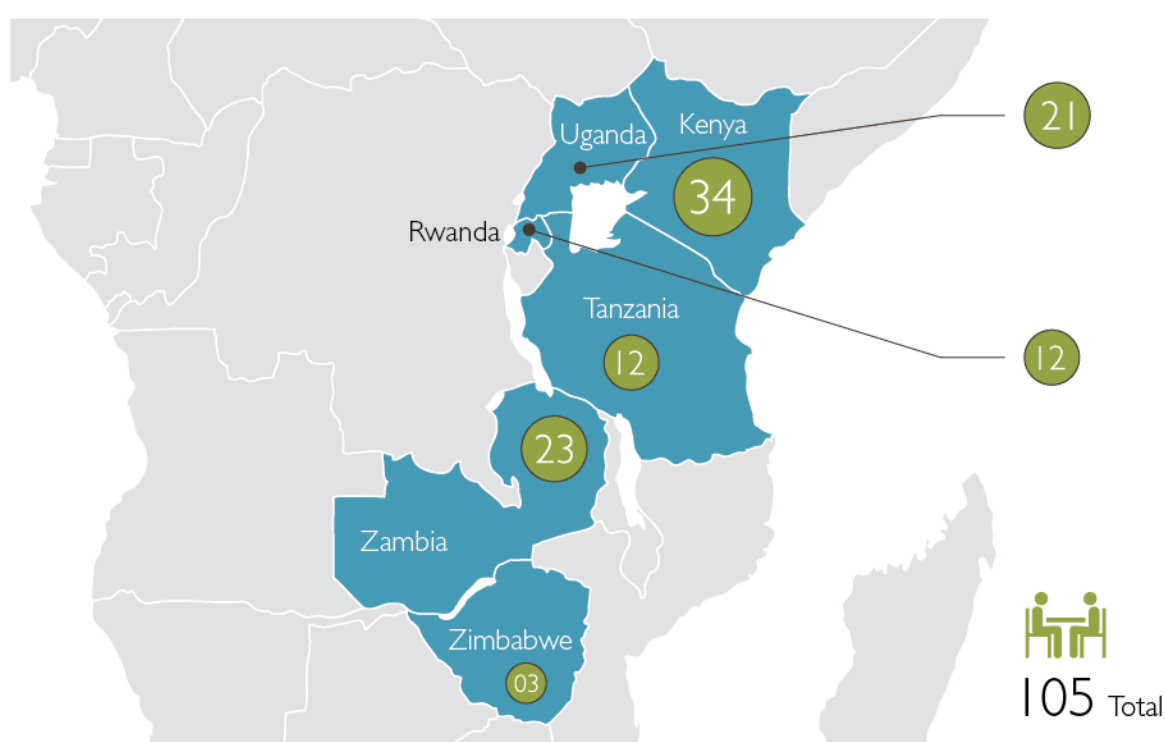


Figure 2: Number of Key Informant Interviews Conducted by Country

The team conducted 18 interviews at the ten border posts, as shown in Figure 1 with the status of development as One-Stop Border Posts (OSBPs) given in Annex x. The OSBP between Zambia and Zimbabwe at Chirundu was included to assess the import/export issues encountered from the Zimbabwean, regionally important as the first SSA country other than South Africa to permit third-party and self-certification with public seed authority audit and as the headquarters of the Seed Co. Group, which operates with subsidiary companies in staple food crop seed throughout ESA.

The main study limitations were lack of access to official seed trade data in some countries, and a period of field data collection which coincided with the planting season when many stakeholders were doing intensive field work.

PEER REVIEW AND STUDY VALIDATION

The stakeholder validation meeting for the study was held on May 30th, 2018 in Nairobi. Participants included representatives of the EAC and COMESA, national regulatory authorities, the African Seed Trade Association (AFSTA) and national seed trade authorities, seed companies, and development partners. A full list of participants is provided in Annex 2. In addition, the study findings and recommendations were also presented to participants in the Seed Assure meeting organized by AGRA and CIMMYT who provided addition feedback on the study.

IV. BACKGROUND INFORMATION

This sections provide background on the seed regulatory and institutional frameworks, regional seed trade harmonization, and country seed system status to identify factors that help or hinder trade.

REGULATORY AND INSTITUTIONAL FRAMEWORK

The countries studied are all members of the World Trade Organization (WTO) and bound to notify the WTO of tariff schedules and mandatory technical regulations imposed on imported products. These regulations are generally developed in harmony with international recognized standards. The technical standards of importance to the seed industry are those that regulate phytosanitary inspection and certification (the International Plant Protection Convention - IPPC), biodiversity, biosafety, and some intellectual property rights and benefit sharing from intellectual property (the Convention on Biological Diversity – CBD, and the International Treaty on Plant Genetic Resources for Food and Agriculture - ITPGRFA), and standards on plant breeder rights intended to incentivize the development and commercialization of new crop varieties (the International Union for the Protection of New Varieties of Plants - UPOV). In addition, international standards for seed testing (ISTA) and traded seed quality (OECD seed systems) are recognized as reference standards for the regulation and audit of the quality of seed systems.

Annex 8 describes these conventions and the standard systems for the countries in this study. It is important to note that:

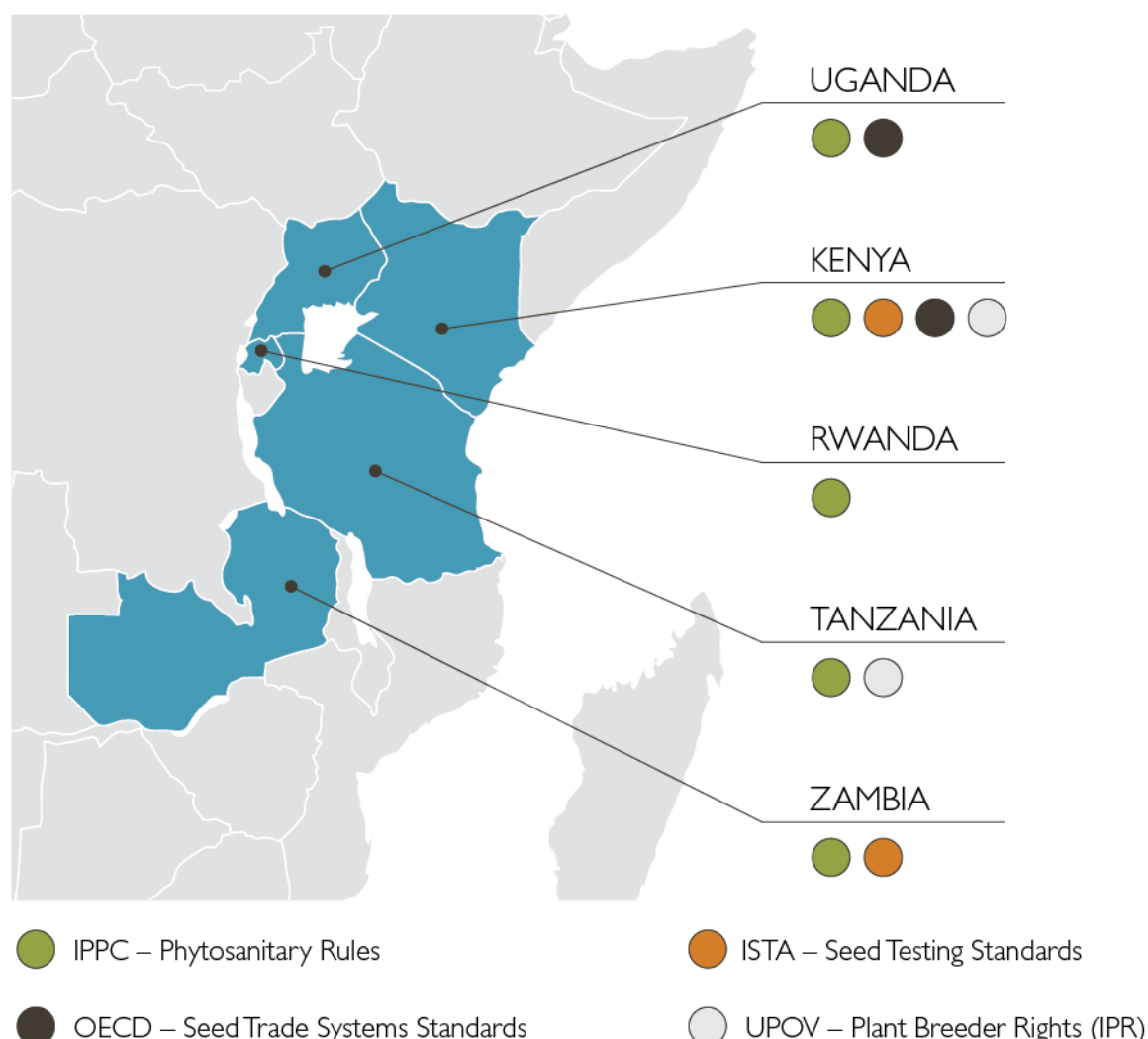
- Membership in treaties carries investment and operating costs borne by the governments, the private sector, and the public at large;
- Most member states align their technical regulations and standards enforcement procedures in ways that reflect national public and private interests;
- Membership in technical standards organizations requires that the public sector meet audit and performance standards for facilities, personnel, equipment, consumables, and reporting, in addition to annual fees. Private companies that opt in must also meet the standards. These costs are not small and require seed regulators and companies to make choices about which crops and which standards systems will be adopted and how to pay for their enforcement.
- These conventions and standards change as trade changes, and as new scientific and technical information evolves, often requiring re-investment and adjustment of official fees.

Different countries ratified treaties and became members of conventions and standards bodies at different times. They therefore have different capacities and experience in the application and enforcement of treaties and standards. Figure 3 below shows the current status of membership in international treaties and standards organizations important to the seed industry.

Today, none of the focus countries share the same set of global treaties in crop variety release regulation, plant variety protection, or application of international standards of seed testing. While all belong to the IPPC treaty, none of the focus countries recognize the equivalence of the other states' plant quarantine and phytosanitary regulatory institutions and enforcement capacity. An illustrative example would be Kenya's phytosanitary authority KEPHIS's refusal to accept seed from countries declared free of Maize Lethal Necrosis (MLN) Disease without duplicate sampling and testing in KEPHIS laboratories.

Figure 3:

Status of Focus Countries Relative to International Seed Treaties and Conventions



COUNTRY	COMMENTS
KENYA	UPOV membership since 1997 with updating to UPOV 1991 standards in 2016.
RWANDA	National Plant Variety Protection (PVP) law in place aligned with UPOV.
TANZANIA	Working towards ISTA accreditation. UPOV is very recent (2016) and OECD membership has recently been announced (2018).
UGANDA	Initiated procedure for acceding to UPOV. National PVP law (2015).
ZAMBIA	Working towards OECD membership, has initiated procedure for acceding to UPOV.

The differences among national laws, regulations, and enforcement capacity represent barriers to seed trade. One major constraint is the mosaic of different national requirements for the commercial release of new crop varieties, followed by varying seed certification and labeling requirements, layered with different national phytosanitary practices and competencies at national borders. Countries subscribe to the international principles, e.g. the Rwanda and the Uganda Plant Variety Protection

laws that align to UPOV standards, but retain enough differences in their application to complicate and add time, cost, and risks for seed companies who want to trade seed and license crop varieties for commercial sale between those countries.

Public and privately-bred seed varieties that are commercially released in one country must undergo duplicative testing for two to three years before they can be approved for listing in the national varietal catalogue and varietal release in a neighboring state. To use an extreme example, a maize variety adapted to 10 COMESA member states could require 20 to 30 testing years (either simultaneous or consecutive)—along with the costs associated with each test—before it could become accessible to farmers in the 10 member states, either via national production of the seed variety in each state or production in one or more COMESA member states for export to the others. This has been the status quo for the seed trade for many decades, slowing the rate of crop variety development and release and narrowing the range of crop varieties released for trade in each country because of the time, direct costs and opportunity costs, and the market risk incurred.

Most international seed companies, even the largest ones, in practice tend to focus varietal registration on a few larger and more seed business-friendly markets, where they see good chances of sustainable and profitable scaling of seed sales. For example, the lifespan of a hybrid maize variety in a competitive market in SSA after commercial release is about seven-10 years, meaning that returns on investment must be generated over that time period. The CGIAR research centers (CIMMYT, ICRISAT, CIAT, IRRI, and others) have a mission to improve crop productivity to increase food security globally and apply a different logic, yet they too have to have varieties approved by national release committees in each country. Their effective reach and their program fund-use efficiency are reduced in the current process for varietal release. These issues provide the rationale for regional seed regulatory harmonization.

REGIONAL SEED HARMONIZATION AND ITS POTENTIAL IMPACT

RECs have worked for many years to harmonize varietal release and labeling, seed quality testing, and phytosanitary regulations and policies to facilitate and boost seed trade (see Annex 4). Harmonization efforts have the potential to cut variety testing time and costs to that required for official release in two countries. For example, 10 COMESA countries sharing at least one common agro-ecosystem would cut official testing-years and costs for commercial release from 20-30 to four-six years, resulting potentially in a five-fold increase in accessible markets, whether for private or publicly-owned varieties. If implemented, this degree of change would greatly improve the viability and returns from public and private investment in crop variety improvement by broadening the range of varieties that enter the formal seed trade and become available to the region's farmers.

The earliest REC to begin this work was the Southern African Development Community (SADC), which started talks on regional seed harmonization in the mid-1980s (Kuhlmann, 2015). In 2006, these talks were built on by the Seed Security Network Project (SSSN I). SADC approved a Memorandum of Understanding (MoU) by member states followed by the adoption of a harmonized seed regulatory system in 2014 and the establishment of the SADC Seed Centre. In 2014 SADC facilitated the importation of MRI 514 seed consignment from Zambia to Swaziland to test the system and unearth bottlenecks to regional seed trade. Other RECs, including the East African Community (EAC), the Economic Community of West Africa States (ECOWAS) and the Common Market for Eastern and Southern Africa (COMESA), followed suit and are currently in the process of creating and adopting harmonized seed rules, all aligning with international standards but with important differences in how they handle regional catalogue development and crop variety release for commercialization.

For example, applications to COMESA for varietal release must be made through national seed authorities who supply applications and trail data using electronic dossiers. SADC applications must be made by the variety owner/maintainer using paper submissions to the SADC Seed Center. As the

latest REC to begin this harmonization work, COMESA's efforts have been guided by the experience of the other RECs (Keyser, 2013) and have moved relatively faster towards implementation under the COMSHIP led by ACTESA. All regional seed trade harmonization efforts take time to implement because: national capacities differ; national political economies influence the pace of legal domestication and regulatory alignment; and, new seed regulatory implementation requires new information flow in administrative notices and in the day-to-day operations of export licensing, import licensing, tax and customs payment, and border police operations. COMSHIP was estimated to require seven to 14 years before full implementation would be possible across the majority of member states (Sikinyi, 2016).

However, two major points should be noted:

- Harmonized REC seed trade regulations lead to a REC-specific seed label that is a voluntary standard, not a mandatory label for all seed traded by member states. Member states operate and permit seed trade using existing national regulations and voluntary seed standards such as OECD seed systems. In the future, where a single state is a member of more than one REC, the seed trade will choose between two or three voluntary standards.
- Regional harmonization can also create new burdens for the seed trade between and with RECs. Public seed authorities will maintain closely aligned, but separate systems using different seed certification procedures, package labels, and different audit requirements, and, potentially, different pest lists for phytosanitary certification. Seed companies in Zimbabwe and Zambia will have to decide whether they will register their varieties under COMESA, SADC, and/or the national catalogue, each with its own application fee and annual varietal maintenance fee. Then they have to decide each year under which standard their seed will be certified and exported, choices that will be driven by how much value they believe that these standards deliver (e.g. will they speed export and import or improve the total sales and/or marketing margins at equal or lower risk than their current method).

The complexity of these issues is similar to trade in other products that have REC-specific technical regulations and voluntary standards. Member states of EAC, COMESA, and SADC have agreed in principle to pursue a Tri-Lateral Free Trade Area that would unify regulations; however, this process is likely to take as long as or longer for countries to implement as current harmonization efforts.

In addition to the RECs framework, there exist a number of bilateral trade agreements that are used to facilitate seed trade between countries like the bilateral agreement between Tanzania and Rwanda, and Zambia and Angola. Some of this agreement face challenges from time to time but stakeholder holds consultations to address the issues arising.

COUNTRY STATUS

Seed systems in the focus countries are at various stages of development. They are strongly shaped by the respective national government's view of how to develop its seed sector. The growth and sophistication of the seed sector in Zambia has been strongly influenced by its policy to support private sector investment in seed. Rwanda's seed sector, on the other hand, is strongly influenced by centralized government planning and implementation. Kenya has a blended public and private sector seed system, but public seed companies still dominate seed market share. Tanzania and Uganda fall somewhere in between. A more detailed overview of the development status of the seed sectors in the countries of focus is included in Annex 5. The African Access to Seed Index (TASAI) provides indicators from pilot and annual surveys for the focus countries except for Rwanda. TASAI indicators relevant to regional trade are shown in Table 2.

Table 2: Selected TASAI Indicator Scores Relevant to Regional Seed Trade (adapted from <https://tasai.org/wp-content/uploads/TASAI-Appendix-CURRENT.pdf>)

Country		Kenya		Tanzania		Uganda		Zambia		Zimbabwe	
Year		2015		2016		2015		2016		2016	
Time taken to import/export seed from neighboring countries (days)	Import seed (days)	38		12		6		11		30	
	Import score (out of 100)	50		63		71		55		44	
	Export seed (days)	14		-		9		12		35	
	Export score (out of 100)	69		-		65		60		27	
Quality of seed law/regulation	Score (out of 100)	63		70		55		77		86	
Quality of enforcement systems	Score (out of 100)	61		70		42		68		77	
Market share of government parastatal(s)	Crop 1	Maize	68%	Maize	1%	Maize	0%	Maize	0%	Maize	3%
	Crop 2	Sorghum	28%	Beans	4%	Sorghum	0%	Rice	0%	Beans	3%
	Crop 3	Beans	64%	Soybean	43%	Beans	0%	Groundnut	0%	Soybean	4%
	Crop 4	Cowpea	86%	Pigeon pea	0%	Millet	0%	Beans	0%	Sorghum	6%

Color Codes:

Extremely Poor (0-19.99)	Poor (20-39.99)	Fair (40-59.99)	Good (60-79.99)	Excellent (80-100)
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These indicators show how important the history of the seed industry and national context is to the way that seed trade is regulated. Kenya's domestic market is dominated in maize and beans by state seed companies and appears to protect that market through the complexity (time and cost) of seed import. Tanzania and Uganda are net seed importers with fast import times, but the Tanzanian government restricts seed produced domestically from export given its net seed deficit. It has a *de facto* seed export ban. Uganda has a private sector dominated seed market, but its lower quality of seed regulation and enforcement is a brake on exports of seed to neighbors with higher levels of seed quality assurance capacity and regulatory enforcement. Export sales to DRC, the Central African Republic (CAR), and South Sudan are easier for Uganda to make than sales made elsewhere. Zambia clearly is a seed exporting nation, with balanced requirements for imports and exports. Zimbabwe also has balanced import and export requirements with strong seed regulations and good enforcement, but its seed export and import procedures take a lot of time, because the country's economic problems increase the time needed for foreign currency transactions. Zimbabwe's ability to hold private seed stocks in reserve for public need also slows exports. These differences among the focus countries slow implementation of the harmonized seed regulations and slow seed trade.

V. KEY FINDINGS

The key findings from the field work, literature review, and data analysis are presented in this section. If literature reported a particular status that was then contradicted by findings on the ground, such as the timing of receipt of testing results, the KII is the version that has been presented. The findings are organized according to the study objectives.

1.0 REGIONAL SEED TRADE AND TRADE BARRIERS

REGIONAL SEED TRADE

Although seed trade plays a meaningful role in the five focus countries, the relative importance of imports versus exports varies. Three-year cumulative totals (2015 – 2017) for the grain and legume crops of focus illustrate higher rates of imports than exports across four of the five countries (Zambia shows a higher export rate), suggesting that there is either unfilled seed demand. See Figure 4 below.

Total Imports and Exports of Maize, Sorghum, Soybean and Groundnuts in Kenya, Rwanda, Tanzania and Zambia, 2015 - 2017

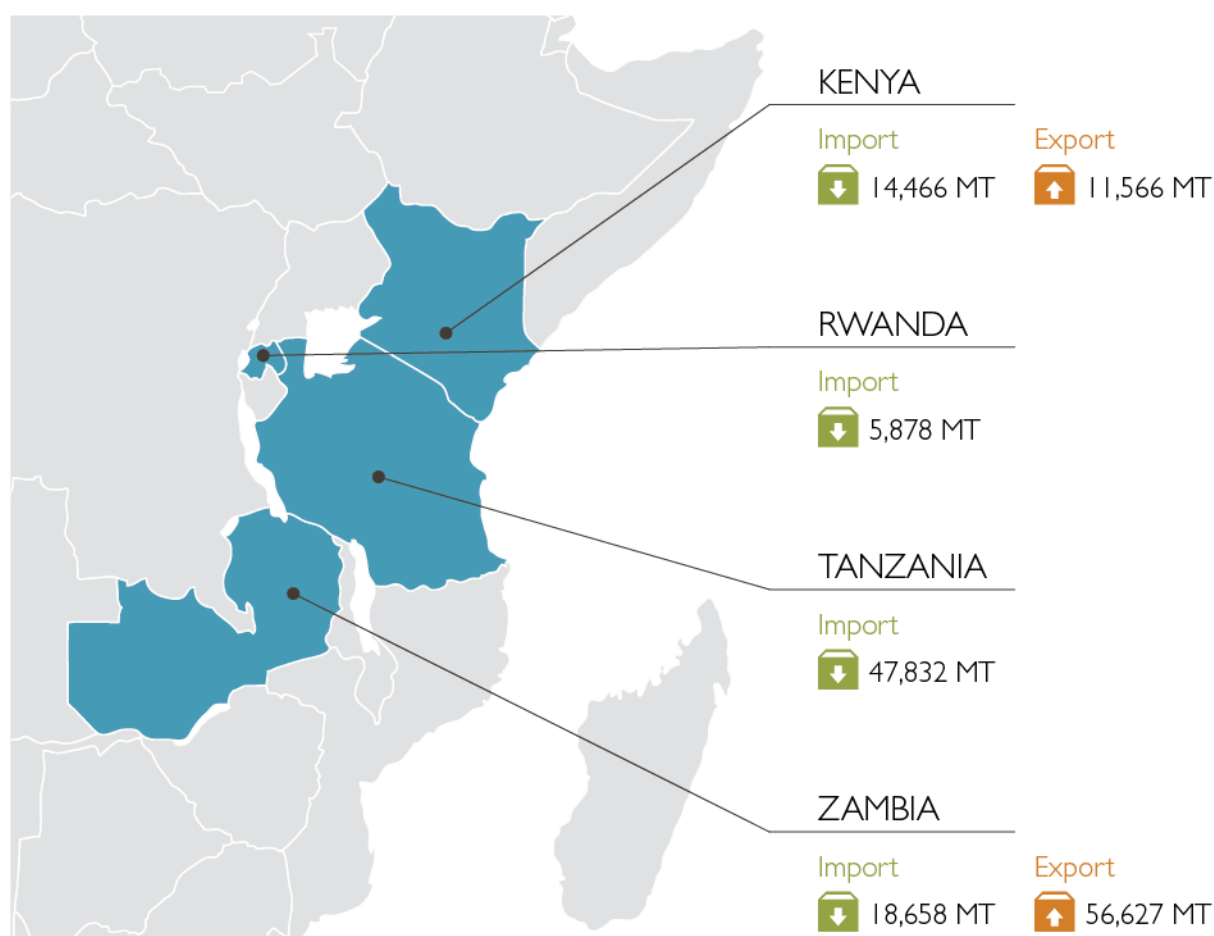
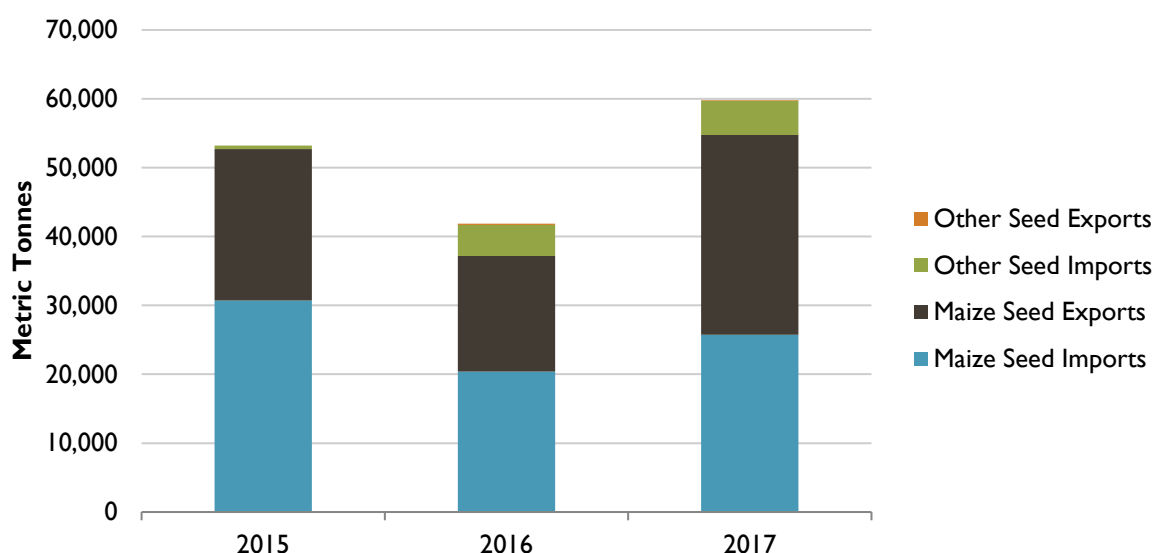


Figure 4. Source: KEPHIS, RAB, SCCI, TOSCI. (Uganda did not provide data). Note that Irish potato has been excluded from the totals above as the weight of Irish potato seed distorts the grain and legume totals.

Looking at data for the last three years separately in Graph 1 below, there are three main points. First, seed trade for the period of the study was at low levels for crops other than maize. Second, the lack of data from Uganda, a significant exporter of both certified and quality declared seed, makes generalizations about overall seed trade difficult. Seed trade data needs to be much more comprehensive and accurate to be interpretable. See Annex 3 for the full data table. The 2015-2017 period holds the very deep drought year of 2016 that depressed seed trade as countries and seed companies protected stocks as a conservative emergency response measure. The year 2017 started the recovery of informal and formal seed systems from that deep drought shock. Third, import and export data needs to extend over a longer period of time to trace the trade trends and relate them to the overall seed supply and demand in each country. Subsequent studies should use a period extending back to at least 2005, before the start of the global food and input price spikes that shifted continental, regional, and national agricultural policies and investment in the sector by national governments, companies, development partners, foundations, and non-governmental organizations.

Graph 1:

Yearly Imports and Exports (Kenya, Rwanda, Tanzania, Zambia) for Maize and Other Seeds (sorghum, soybeans, groundnuts) Traded



There are multiple reasons for the dominance of maize seed in the seed trade. First, maize seed, especially hybrid maize seed, is more profitable to trade. Second, hybrid maize seed requires high levels of plant breeding and seed production skills to maintain quality. Countries with long traditions of hybrid maize breeding and seed production (Zambia and Kenya in this sample, but more broadly including Zimbabwe and South Africa) have better track records as maize seed suppliers.

The low level of trade in the other focus crop seeds is driven by financial, logistical, biological and phytosanitary constraints. Soybean, bean and groundnut seed have much lower profitability than maize seed. Groundnut seed is both fragile and bulky to transport. Soybean seed is very susceptible to transport damage and poor handling and in unrefrigerated storage starts losing germination levels and vigor after about six months. Seed potatoes are bulky and very expensive to transport, don't stand up well in long-distance transport unless in refrigerated containers or ship holds, and are tightly controlled by phytosanitary authorities. For example, Kenya blocked imports of seed potatoes (other than in vitro plantlets) up to 2012 and has allowed seed potato imports under a tightly-controlled program since that time, initially as an emergency response to the collapse in domestic seed potato quality and then as a potato seed stock rebuilding effort after the appearance of the Potato Cyst Nematode (PCN) quarantine pest at a time of rapid expansion of potato consumption in Kenya.

Seed trade volume in the region is the result of national certified seed supply falling short of domestic certified seed demand along with the factors discussed above. Demand estimation is complicated by

the fact that certified seed systems require investment for a minimum of three seasons before they generate cash sales. They have to produce the breeder seed in Season One and grow out the foundation seed in Season Two, before multiplying the foundation seed in Season Three that can be sold as certified seed to farmers for crop production the following season – Season Four. Companies tend towards conservative estimates of demand because of the risks inherent to three-year demand projections, balancing positive and negative factors. Their perspectives on the factors that shape the prospects for regional seed trade are given in the next section.

SEED COMPANY PERSPECTIVES ON REGIONAL SEED TRADE DEMAND

The seed companies interviewed point to a number of dynamics currently playing out that may increase or decrease traded volumes in the region.

- Zambia's maize seed export business represents the majority of maize seed production in Zambia at over 55 percent. Export volumes are large (approximately 45,000 MT) relative to seed production volumes in the region. For example, Zambia's export volume is approximately equal to the total volume of certified seed produced in Kenya. Zambia has the land and technical expertise to further increase production. However, interviewees said that climate change may reduce the attractiveness of Zambia as a production location, if the incidence of drought increases. Increased local production in other countries in the region also may reduce demand for seed from Zambia. Road infrastructure and both formal and informal regulation of cargo truck movement plays an important role in trade by Zambia, which is a landlocked country. It exports seed by road to Kenya and Rwanda over large distances and through at least four border posts. Transiting seed from South to North becomes an issue, complicated by road route restrictions put on seed transiting Tanzania.
- Tanzania is a major importer of maize seed, largely from Zambia. However, the government of Tanzania is currently focused on building local seed production. Seed exports in Tanzania are rarely permitted due to high, unfulfilled demand for certified seed, creating a *de facto* ban on the export of locally produced seed.
- Kenya is importing 10-15 percent of total certified seed volumes at present, primarily maize seed from Zambia, which is imported to supply Kenyan subsidiaries of MNCs (e.g. SeedCo, Pioneer, Pannar, and Monsanto). If trade barriers ease, some Kenyan companies/subsidiaries may begin to increase production in Tanzania and Uganda to access production areas with more reliable rainfall and access to irrigation that are closer than Zambia. This may reduce seed imports from Zambia.
- Rwanda currently imports most of its available maize seed each year. The imported volume is tied to national policy and budget allocation, not inherent farmer demand. Rwanda also wants to increase local seed production, but a lack of available land and hybrid seed capacity may keep local seed production volumes at low levels for the foreseeable future.
- Most of Uganda's seed exports are in response to large tenders from international NGOs, and are destined for South Sudan. However, the quality of the seed that goes into this market is difficult to ascertain. There are claims that certified seed production by Ugandan seed companies falls short of exported volumes, raising questions about the authenticity of exported seed, and even seed sold for local use. A handful of serious Ugandan seed companies have come together to establish and utilize private certification, working with development partner support, in an effort to improve trust in their brands and the Ugandan origin. Uganda is also a high potential candidate for increased local seed production for domestic import substitution given its land and water resources.

The nature of these shifts in seed demand, and sources of funding for seed purchase, creates four main seed trading categories as described by the private sector in Table 4.

Table 3:

Categories of Seed Traded by the Private Sector

Category	Prominence of Trade Volume and Examples of Practitioners	Comments
1. Seed produced by a large company in optimized production location, for sale in another country or in support of company expansion	- Largest volume of seed traded. - Practitioners are primarily MNCs (Pioneer/Pannar, Monsanto, SeedCo, Syngenta/MRI, etc.)	Generally maize. Production location optimized for rainfall and/or irrigation, proximity to sophisticated processing plant, levels of stored or carryover seed
2. Seed produced in response to a tender for supply outside home country	- Second largest category of seed traded. - Participating companies include most large Ugandan companies, Kenya Seed Company, etc.	Tenders usually issued by large international organizations (e.g. FAO, WFP), foreign governments (e.g. Rwanda), or NGOs. Tenders often raised after production plans are set.
3. Seed exported by a local company for business expansion purposes	- Estimated to be the third largest category of seed traded, but still relatively small compared to #1 and #2. - Examples include Western Seed Company (Kenya, expanding into Tanzania), NASECO (Uganda, expanding into Burundi and DRC), and Kamano (Zambia, expanding into DRC)	Local companies expanding seed sales to a neighboring country can be through independent sales or sales in collaboration with a partner in the country of import. Variety exported must be released in country of import. Local demand creation in country of import is a key issue for private sector.
4. Seed traded as Early Generation Seed (EGS) or for research purposes	- Estimated to be the smallest category. - Practitioners include large MNCs sending parent seed for certified seed production in another country, CGIAR Centers, etc.	This is an important trading category, particularly for EGS being produced off-season in another location, or that was produced earlier and maintained in cold storage.

Source: Authors' Summary

Approximately two-thirds of the 28 companies felt that in the long term, producing seed outside the country of sale or in countries that had good natural production potential, such as Tanzania and DRC, would be a viable model and could assist in countering climate-related shocks.

Several national companies were looking to capture niche markets, such as drought tolerant varieties and legumes. A number of these companies are already reaching out to local companies in neighboring countries, with the goal of sharing germplasm and working on joint variety releases.

The majority of interviewees said that their likelihood of engaging in seed exports, or increasing their seed exports if already exporting, is above 80 percent. They viewed the export market as a business

growth opportunity where commercial markets and government policies have stimulated seed demand beyond the likely growth rate in local seed production capacity (e.g. Rwanda and Tanzania). Many participants also mentioned the East African countries that require seeds and do not have significant local production, including Burundi, DR Congo, and South Sudan. Realizing these opportunities through trade will require reducing the barriers that prevent or slow the movement and sale of seed of new crop varieties across national boundaries.

Seed sector actors have seen and appreciate the investments made to upgrade overall trade support infrastructure at many border posts (see section on Border Operations). These changes have improved seed import and export times as indicated in Table 5. Private sector respondents to TASAI indicated a small improvement in import delivery times in Kenya and very large changes in both import and export clearing times in Uganda. They also provided baselines for Tanzania and Zambia, although updates for these countries have not yet been collected by TASAI. (Rwanda is not yet covered by TASAI). However, according to the RALIS, it takes approximately 14 days to both import and export seeds from neighboring countries.

Table 4:
Import/Export Times for the Focus Countries as Reported by Private Sector Companies Trading Seed

	Kenya		Tanzania		Uganda		Zambia	
	2013	2017	2013	2017	2013	2015	2013	2017
Days to Import Seed	43	38	N/A	12	48	6	N/A	11
Days to Export Seed	N/A	14	N/A	N/A	18	9	N/A	12

Source: TASAI (www.tasai.org) Note: Rwanda is not covered by TASAI, and TASAI coverage for Tanzania and Zambia has only started recently.

The data provided was gathered by TASAI surveying private sector companies that import or export seed and is based on actual private sector experiences and responses. These improvements are welcome reductions to the time, costs, and risks of all trade, carrying seed with them. However, the remaining barriers to seed trade are substantial.

REGIONAL SEED TRADE BARRIERS

The first and historically biggest barrier to seed trade in the region has been the long and expensive process to register a variety for commercial release in each country, even when the countries share the same agro-ecological zones. Moving to streamlined regional release among the member states' RECs would greatly expand seed companies' abilities to rationalize their seed production operations and sell new varieties throughout the region. Even when the same crop varieties are registered in more than one country, seed trade is slowed by bilateral mistrust in regulatory capacities, lack of clarity in certification and trade procedures, inefficiency of border operations, lack of seed testing capacity for importation, perceived private sector risks, lack of quality seed trade data to guide decision-making, the national political economy, and seed subsidies that crowd out private firms.

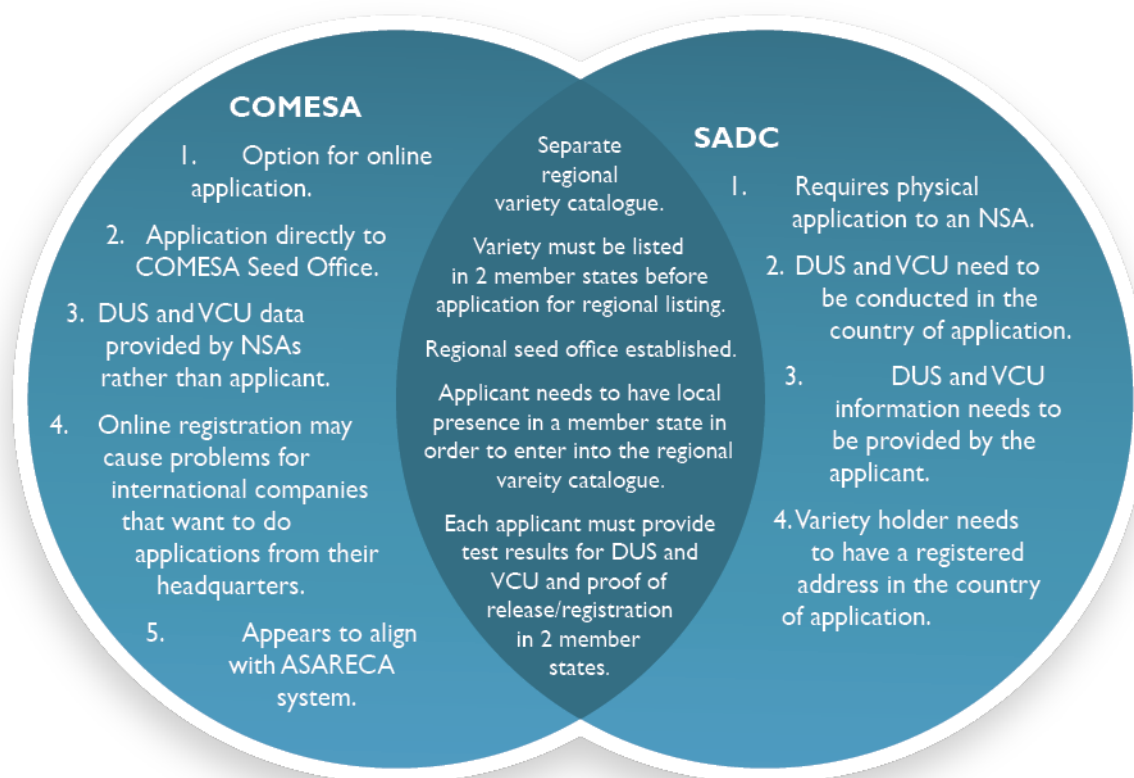
SLOW PROGRESS TOWARDS IMPLEMENTATION OF THE REGIONAL SEED HARMONIZATION REGULATIONS

Parallel regional processes were identified as causing confusion and negatively impacting readiness for implementation of seed harmonization. An illustrative example of this is differing REC rules for variety

entry into regional catalogues. Figure 5 outlines the similarities and differences between release approaches with the COMESA and SADC Regional Variety Catalogue.

Figure 5:

Comparison of COMESA and SADC Regional Variety Catalogues



Source: New Markets Lab, 2017

All but a few of the seed company respondents were aware of the regional seed catalogues. However, many of them felt that after the initial meetings to develop the catalogues, the momentum to translate catalogue listing into improved trade slowed considerably.

Most of the companies interviewed that had already listed their varieties in a regional catalogue were frustrated. They did not see material increase sales, and saw the regional catalogue listing as a sunk cost that had not increased revenue. Despite this reaction, other local seed companies are interested in listing their varieties in the regional seed catalogues in the future and are making enquiries about the process. However, the promise of regional release will not be met until COMESA and SADC have completed the development and testing of seed lots with regional seed tags that are recognized by both border authorities and internal regulators as valid for distribution and sale nationally.

Another key issue is that regional catalogues were set up to register varieties using a variety name or number that is common across the region. However, outside of multinational company varieties, varieties released in the countries of focus are almost always released under different names in each country. The result of this is that there are currently no Consultative Group on International Agricultural Research (CGIAR or CG for short)-bred varieties registered in a regional catalogue and

available for multiple company licensing, despite significant potential for regional adoption of many CG-bred varieties. This issue was explored and recommendations were made in the recent USAID-commissioned study, *Facilitating Seed Variety Registration in East and Southern African Regional Seed Catalogues through Usage of Variety Identification Numbers* (Agri Experience, 2017). As a result of this work, CIMMYT has already changed its variety numbering approach to ease regional variety catalogue registration in the future. It is possible that other CG Centers will follow CIMMYT's lead.

In general, seed companies, whether they have already listed varieties in regional catalogues or not, want COMESA/COMSHIP and the SADC Seed Centre to increase their focus on implementation, ensuring that seed varieties listed in the catalogues will be recognized as commercially released by all member states except those with science-based reasons to deny release.

MISTRUST AROUND THE CERTIFICATION PROCESS AND QUALITY ASSURANCE CAPACITY OF TRADING PARTNERS

The regulators interviewed were concerned about the different stages that countries were at in the alignment and domestication of their quality assurance, seed testing, and phytosanitary capacities to agreed international standards. This concern, especially from countries with more developed seed certification systems, results in skepticism about whether some trading partners could and would meet the quality seed standards. A key example used was Uganda, where there is a lack of government capacity to meet international accreditation standards, as evidenced by the absence of an ISTA-accredited government seed-testing lab in country.

Regulators also doubted the ability of some countries to effectively carry out pest surveillance and disease monitoring/testing, with the implication being that information shared would not be deemed trustworthy. Kenya, Zambia, and Rwanda regulators were concerned that some of their regional seed trade partners didn't have the capacity to detect and prevent the introduction of new pests and diseases. Member states were cited to lack enough seed experts at the border posts forcing them to use untrained custom officials to inspect seeds. As a result, Kenyan regulators resort to applying very stringent measures to keep new pests and diseases from entering the country.

Private sector companies cited the frequency of complex and unnecessary export and import procedures as significant contributors to their trading risk. For example, most exporting countries will consider the requirements of the importing country when issuing a Plant Import Permit (PIP). However, interviewees cited cases where more stringent rules were applied by the exporting country even when not required by the importing country. An example of this is Kenya, which requires ISTA certification for all exported seed, even if this is not a requirement of the importing country. Another case is the requirement by countries such as Kenya and Uganda to have MLN-free testing certificates from countries that are already declared to be MLN-free.

Lack of adequate funding for infrastructure upgrades, inadequate staffing levels and capacity for field inspections and border monitoring, and manual systems for information capture were all cited by public sector officials as huge challenges. Public sector officials know that all of these improvements were needed, but stated that they did not have the funds to carry them out.

LACK OF CLARITY AND EFFECTIVENESS OF TRADE AND CERTIFICATION PROCEDURES

The private sector is concerned about the lack of transparency around trade requirements and inefficiencies in trade regulations and procedure implementation. They viewed regional seed regulation harmonization as a process that was happening on paper only. Without consistent and reliable implementation, they saw little potential for positive impact on business. Private sector companies already felt that seed trade was often, if not always, fraught with challenges and risk. In

addition, they felt that some border officials lacked awareness or adequate information on regional regulations and procedures that their countries have signed or are a party to (e.g. COMESA Seed Regulations). Still, some informants felt that the process of import and export approval process in some countries still need to be shortened. For example, the process of obtaining import and export licenses in Zambia needs approval from five different institutions (Customs International and Policy Office, ZARI, SCCI, RAB and ZRA).

Some public officials felt that private seed companies did not always fully study or understand documentary requirements for seed export and import. However, they acknowledged that information about new phytosanitary requirements sometimes lagged the measures rapidly put into place to combat new pests and diseases when these appeared, and that the list of requirements was constantly evolving (UG99 Wheat Rust, MLND, Cassava Brown Streak Disease, PCN, Fall Armyworm, and others). They also acknowledged the potential for abrupt changes to import and export administrative requirements that may not have been thoroughly communicated to the private sector, but which may represent non-tariff barriers to seed trade.

Seed Company Example of Non-Tariff Barriers Contributing to Risk

A big concern for the private sector companies trading seed is the lack of clarity on requirements for import and export processes. For example, a seed company could be told that the original Plant Import Permit (PIP) should be sent to the national regulatory headquarters, but once the truck loaded with seed was at the border, the border official would insist on getting the original PIP.

EFFICIENCY OF BORDER OPERATIONS

Most private seed companies in Zambia, Rwanda and Uganda stated that they had challenges with trade documentation and material delays for seed despite overall improvements at regional borders. The implementation of the One Stop Border Post (OSBP) has greatly enhanced overall trade operations and dialogue between border officials from different countries. The 2016 USAID East Africa Report stated that 10 out of the 13 planned OSBPs are in operation, which has translated to a significant reduction in transit times (USAID, 2016). Time to cross borders was reduced by 58 percent. Respondents confirmed this improvement. Officials on opposing sides of the border knew each other and had each other's telephone contacts. Most of them addressed issues together, and at periodic bi-lateral and regional meetings.

Innovation in information technology is also speeding transit times. For example, at the Rwanda/Uganda border of Gatuna, transit takes no more than one day unless there are issues with the cargo. The border clearance system at Gatuna is an automated, intraregional (single window) system; once the clearing agent pays for the goods at the point of departure, the shipment is not inspected by Rwandan authorities until it is at the bonded warehouse in Kigali. Overall, the combination of innovations has eased transit tremendously.

However, overall improvements in trade efficiency do not always translate directly to improvements in seed trade. The private sector sees key challenges in the actual testing protocols and practices, the availability and functionality of supporting equipment, and testing documentation. Ideally, all testing should be successfully completed and documented before the seed is shipped from the warehouse. When conflicts over the accuracy of documentation arise, there is often low capacity at the border to resolve conflicts, which may cause further delays. For example, this can cause seed shipments to be delayed until the company can work with central and/or border post officials to resolve the problem. There appears to be little capacity at the borders to resolve issues independently, without consulting headquarters.

Another challenge relating to border operations is low human resource capacity. This low capacity was evident to the study team at almost all border posts, many of which are managed by only one officer, who is often on call after regular working hours. All border officials expressed genuine interest in receiving additional training related to regional seed trade.

Some countries have made specific efforts to improve the knowledge and capacity of border officials dealing with seed. The sidebar to the right highlights efforts in Zambia.

Equally, the electronic single window system in Zambia randomly selects seed shipments to undergo physical examination, with approximately 20 percent of shipments selected. This adds more time for clearance at the Nakonde border, where trucks must be inspected seven kilometers away from the border post. The officers are also required to set aside specific time for the physical inspections. This due diligence results in the department needing more officers at the Nakonde border.

Another challenging issue at the Nakonde border is the frequent breakdown of the electronic Automated System for Customs Data (ASYCUDA, <https://asycuda.org/aboutas.asp>). There are outages approximately 30 percent of the time due to internet fluctuations, breakdowns, and power interruptions. During these times, seed cargo trucks must wait for the system to begin functioning again. The system has been problematic since it was first introduced in 2014.

Finally, respondents mentioned the lack of coordination between government offices operating at border posts. The single window systems were aimed at enhancing efficiency by reducing the average number of processes in import/export applications, as well as reducing the number of documents required, time taken to process, and time taken to make payments available electronically. Seed officers are not formally and reliably linked to the OSBP MIS system and, thus, are often unaware that a seed shipment is crossing the border. They may only learn about the shipment if there is an issue or it has been randomly selected for further inspection, for example as practiced in Zambia.

Example of Building Capacity of Border Officials in Zambia

Zambia's Seed Certification and Control Institute (SCCI) periodically trains border officials from SCCI and the Zambia Agriculture Research Institute (ZARI). Border officials are trained to understand issues related to seed quality and phytosanitary issues, the unique attributes of seed, and handling to maintain seed viability.

CAPACITY FOR SEED TESTING FOR IMPORTATION

Most African countries require internationally traded seed to be accompanied by an Orange International Seed Lot Certificate or a Blue International Seed Sample Certificate issued by an ISTA-accredited laboratory (Keyser, 2013). However, focus countries in this assessment appear either to lack the necessary and accredited testing equipment to adequately test seed for trade purposes, or to have sufficient equipment at their central locations to rapidly carry out testing at peak seed testing trade seasons of the year. In addition, for general certification purposes, there were low numbers of inspectors in most countries for many years (Miti, 2014). Both public and private sector interviewees confirmed that the deficit continues.

Public and private sector respondents also cited problems with national level capacity to do quality control and sanitary and phytosanitary (SPS) testing. Private sector interviewees felt that seed testing should be done at well-equipped and staffed centralized locations in each country, and that appropriate documentation should be issued. However, several officials declared that they were required to hold seed loads up for additional testing before crossing the border, and other border posts selected samples for testing. These administrative requirements are generally not supported with basic seed testing equipment being readily available at border posts. For example, at Tunduma on the Tanzanian border, samples had to be taken over 110 kilometers away from the border post

for testing to Uyo Agricultural Research Institute in Mbeya. Equally Zambia still has major gaps in the availability of seed-related facilities, infrastructure and expertise.

PRIVATE SECTOR PERCEPTIONS OF RISK

The 28 seed companies interviewed conveyed consistent messages about risks that hinder market expansion to other countries. Although most private seed companies engaged in seed trade acknowledged that there have been some recent improvements, they still considered non-tariff barriers to be a significant hindrance to regional seed trade depending on the country in question. Kenya and Tanzania were cited as countries where officials frequently imposed unclear, *ad hoc* rules. These risks included erratic government policies as well as elaborate, incremental, inconsistent, and costly certification and importation procedures.

The major fear for companies when trading seed was having a truck loaded with valuable inventory delayed for an indeterminate length of time, and possibly rejected for transit at a border crossing. For example, the cost of missed revenue from a 25-ton truck carrying hybrid maize seed is USD \$50,000 at USD \$2/kg of seed. This represents a very significant loss to a seed company. However, there was evidence of efforts to overcome non-tariff barriers and reduce perceptions of risk. Figure 6 below shows a notice posted at the OSBP in Busia, Kenya, advertising a website where people can register complaints on non-tariff barriers to trade.

An additional risk for seed companies is related to farmer acceptance of a traded variety. This is particularly relevant when a seed company is introducing a new variety into the importing country. Seed companies stated that they conduct extensive research about market potential and risk levels before investing in expanding exports, as they cannot afford the cost of a failed export expansion initiative. This research is critical due to the number of seasons required to test farmer acceptance of a new variety.

The average amount of time before launching and scaling a new variety is four to six seasons for hybrids, and at least two to three seasons for non-hybrid products. The length of time required to bring a product to market and scale it can strain a seed company's finances, particularly a mid-sized or smaller company. The time commitment is significant, and seed companies will not risk this extensive investment on trade in a foreign market without strong assurances that trade can be conducted very efficiently. The time required to scale adoption of a new variety has an impact on trade volumes; trade volumes for newly introduced varieties will generally increase slowly and steadily. In addition, high cost of transport is also a hindrance to cross border seed trade. Studies show that in landlocked countries transport costs are a main constraint to competitiveness. Estimated cost of importing a key input, indicating the landed price of inputs is between 25% and 43% higher relative to regional competitors. Overall the link between COMSHIP implementation framework and the private sector is weak resulting in missed opportunities to leverage the private sector's comparative advantage to operationalize the harmonized regional policy. In Zambia 55% of the seed companies and seed traders interviewed were still not aware of requirements for regional seed trade under the SADC and COMESA system.



Figure 6: Poster at Busia Border Post

AVAILABILITY, QUALITY, AND USE OF SEED TRADE DATA FOR EFFECTIVE DECISION MAKING

Availability of seed import and export data proved to be a major challenge. Getting the data either on a timely basis or getting it at all was a serious problem in most focus countries. However, countries such as Kenya and Zambia have better data availability than others.

Seed trade data is typically collected at various borders and sent to the main office periodically, where it may or may not be collated. This indicates that the data is not used to make decisions at the national level regarding seed trade. Uganda provides a good example of this. Officials at the Busia border had their own local data, but it was not possible to get consolidated data from the Ministry. The Tanzania Official Seed Certification Institute (TOSCI) is collecting some data, but they were not able to provide export data upon request. In Kenya, Zambia and Rwanda, the collated data that is available is based largely on issued permits and is usually available within two weeks to a month.

The Uganda Seed Trade Association and the seed certification department have explored the possibility of collating seed trade data jointly. Notably, the Uganda National Seed Certification Service (NSCS) has begun piloting an online system through which companies will be able to request export permits for seed. This system will make it easier to access export data, although a respondent from the private sector in Uganda noted that the roll out of the online system has created further complications in obtaining an export permit. The process is now more cumbersome for the private sector, and requires multiple steps. The full benefits of an online system have not yet been realized.

In Zambia, the Seed Certification and Control Institute (SCCI)'s MIS for Seed Certification system is now operational and is able to collect real-time data. The Feed the Future Southern Africa Seed Trade Project is planning to support the development of similar systems in Mozambique and Malawi. KEPHIS received support for an online system over a year ago from TradeMark East Africa (TMEA), with the intent of significantly increasing seed trade efficiency and data collection. However, development and deployment of this system in Kenya is problematic, as construction of the system appears to be delayed.

Private sector focus on trade volumes was demonstrated by the fact that when seed companies were asked about their import/export volumes, all except one company had the figures readily at hand and willingly shared the import/export volumes for the last three years. This stands in significant contrast to the experience of getting data from the public sector.

POLITICAL ECONOMY AS A BARRIER TO SEED TRADE

Many key informants cited political economy behavior as a major deterrent to increasing seed trade. The causes of this were viewed as ranging from: 1) territorial protectionism; 2) elite revenue capture, particularly related to grain imports in the face of food insecurity; 3) lack of government allocation of funds to establish functional institutions/entities to facilitate seed trade; and/or 4) lack of government recognition regarding the significant benefits of strong regional trade in seed.

The main sentiment from interviewees regarding the influence of political economy in seed trade was that political will at the head of state level was a major barrier, and that support was needed to address this from the regional bodies and development partners.

The extent or lack thereof to which governments are willing to implement what they have formally agreed to at the regional level came out very strongly in the interviews. Harmonizing seed trade is seen as a positive effort and is supported by selected stakeholders. However, in practice, countries often prefer to operate independently of harmonized protocols and view their seed systems as sovereign despite having assented to harmonized laws. This translates to how much information is passed down to implementers including seed inspectors and border officials, and what resources are

actually set aside by countries to facilitate regional seed trade. In addition, many implementing officials are in dire need of capacity development and are under-resourced to carry out their work effectively.

Governments in the region often focus on increasing local production for seed that they are currently importing, rather than facilitating imports. There are often good reasons for this prioritization. For example, during the 2016 drought in southern Africa, Zambia banned maize grain exports. Due to misunderstandings about the differences between grain and seed, large shipments of maize seed destined for the East Africa export market were delayed, impacting the countries depending upon seed imports from Zambia. Additional sovereign concerns cited by governments included the introduction of pests and diseases, which become costly to manage, and impact yields and national food security.

Another aspect of political economy is the unreasonable requirements from importing countries, which restrict seed movement. For instance, Tanzania introduced new measures on consumer protection requiring seed transported into or through Tanzania to be offloaded to verify the weights of the packages. Similarly, only Tanzanian trucks can transport seed on Tanzanian territory, and that if specific seeds can be produced in Tanzania, then a levy is imposed on such seed if it is imported. Similarly, Kenya only allows importation of untreated seed from Zambia, which restricts movement of seed that has been treated, a common operation in seed production and processing.

In response to political economy fears by regulators, both private and public interviewees suggested that regulators need to harmonize their requirements and talk more with each other to ensure common compliance. It was even suggested that joint certification could help improve regional seed trade by building trust and a collaborative approach to resolving trade issues.

SEED SUBSIDIES

Seed company respondents regularly cited the adverse effects of seed subsidy programs on trade. All five focus countries have some form of seed subsidy or seed distribution program. Annex 6 provides a high-level overview of the seed subsidy programs in the focus countries. For example, in Rwanda, the Rwanda Agriculture Board (RAB) is the main seed buyer, with almost all seed being imported and distributed directly by the government to farmers.

While studies have shown that national seed subsidy programs can help to make seed more affordable and promote the adoption of improved varieties, interviewees felt that they also distort normal market systems, with the degree of distortion tied to the design, and size, of the subsidy program. Distortion impacts seed trade because: 1) the government is a large buyer, which impedes normal market growth, innovation and maturation; 2) subsidy programs often stipulate package size, pricing, and other factors, preventing importing seed companies from effectively participating; and 3) governments often make subsidy payments to seed companies extremely late, which constricts both local and foreign seed companies' capacity to operate. The more basic point is the nature of the subsidy program. It tends to concentrate demand around a limited range of crops and varieties to simplify procurement and procurement supervision.

Subsidy programs often deal with a small number of selected private sector companies. This impacts competition and, by extent, innovation and efficiency. Subsidy programs that are viewed overly bureaucratic or risky may also squelch interest from seed producers in other countries that may wish to export to the subsidy country. Many subsidy programs also lack a clear exit plan, making seed distribution increasingly dependent on government involvement, and discouraging normal market behavior. Studies conducted in sub-Saharan countries show the crowding out effect of agricultural input subsidy programs on the private sector (Mason and Ricker-Gilbert, 2012; Jayne et al., 2013; Mather and Jayne 2018). These have often focused on fertilizer subsidy programs, but seed is occasionally included with the same conclusions. Subsidy programs are often not well-targeted to those who need the inputs most, and as a result the private sector loses opportunities for business.

2.0 EFFECTIVENESS OF EXISTING SEED PROGRAMS SUPPORTED BY DEVELOPMENT PARTNERS TO REDUCE TRADE BARRIERS AND INCREASE REGIONAL TRADE

The current implementation landscape is characterized by multiple development partner programs, including USAID. Interviewees referenced a surprisingly large number of development partners and development-funded programs involved in efforts to improve regional seed trade.

However, interviews with development partners indicated that most of them were largely unaware of activities outside of their respective scopes of work. Programs funded by USAID, in particular, were not able to easily and clearly articulate the key elements and accomplishments of sister programs.

Key informants cited 14 development partners, development projects, or partners with whom they have interacted in recent years to promote regional seed trade, often in more than one project. As referenced above, USAID has been the most consistently and broadly involved development partner. USAID implements a wide range of Feed the Future (FtF) activities in the region, about half of which have seed components. The USAID East Africa Trade and Investment Hub (EATIH) boosts trade and investment with and within East Africa Community countries-Burundi, Kenya, Rwanda, Tanzania and Uganda – and in Ethiopia, Madagascar, and Mauritius (East Africa Trade Hub, 2017). EATIH work included the development of regional protocol, capacity building of specialists from national seed authorities as well as work with inform cross-border traders. Hub supported Rwanda to adopt a TBT and SPS notification submission system and an ePing electronic alert system and also partnered with Rwanda's Private Sector Federation (RPSF) to strengthen trade and regional integration. Similarly The USAID Southern Africa Trade and Investment Hub facilitated SADC comprehensive trade program, supported SADC online variety catalogue and harmonized seed protocol, developed SCCI new data management system, and supported Umlimi Lokhonile seeds company to release Syngenta MRI of Zambia variety in Swaziland. TradeMark East Africa (TMEA) also supported by USAID support infrastructural development to enhance regional trade. Notable TMEA achievement is the development of electronic single window system.

AGRA's Program for Africa Seed Systems (PASS I and II) and the USAID-funded Seed Systems and Technologies Partnership (SSTP) have helped to create 107 new SSA seed companies and scale them in several core countries through links to agro-dealer networks, NGOs and community-based organizations, and supply chain operators, while pushing for seed regulatory policy change. AGRA also supported a number of local upcoming seed companies to be operational but this has faced challenges due to the inherent lack of capacity in Rwanda. The FAO works across a wide range of seed policy and regulatory harmonization issues. The CGIAR centers (i.e. CIMMYT, ICRISAT, CIAT, and CIP) are all active in crop variety development with national agricultural research institutes, regional transfers of breeding lines and materials with pest and disease tolerant traits, along with climate change resilience traits.

The World Bank operates the Opening Seed Markets in the East African Community project. The International Finance Corporation (IFC) supports the development of financial and insurance projects to finance seed companies and seed trade. The Syngenta Foundation/S2B works with regional seed catalogues and with seed companies to increase the licensing and transfer of promising crop varieties across borders. In Rwanda IFC/World Bank and Syngenta Foundation for Sustainable Agriculture, have supported the review of the seed policy, seed law and regulations with a view of improving the business environment and to encourage the private sector participation in the seed and agri-input sector in Rwanda. This facilitated the alignment of the laws and regulations to the EAC and COMESA regulations to promote regional seed trade. Belgium Technical Cooperation has for a long time supported the Rwanda Agricultural Board in the development of seed production capacity by training the producers and supporting the seed inspection and certification department.

The United Kingdom's Department for International Development (DFID) supports a wide variety of market systems projects to increase smallholder access to improved crop varieties and supports the management of the African Enterprise Challenge Fund to facilitate the scaling of new seed companies and seed services.

The Bill and Melinda Gates Foundation (BMGF) is a major supporter of seed system improvements and enabling policy throughout the region. Food Trade East and Southern Africa (DFID) supports the implementation of the COMSHIP program by ACTESA to accelerate COMESA's regulatory domestication and alignment by member states and to set up the COMESA Seed Committee for regional varietal release.

The Swiss Agency for Development and Cooperation (SDC) has supported national and regional policy harmonization efforts in a number of countries. The Dutch government provides technical support, facilities development, and research in seed systems, including the African Union Commission's (AUC) Integrated Seed Sector Development (ISSD) program to develop pluralistic seed systems in Africa. Finally, TradeMark East Africa supports policy harmonization, standards development, and capacity development. See Annex 5 for a detailed description of major seed trade initiatives by development partners.

When private sector interviewees were asked about development partners and projects working in the area of seed trade, responses were vague. This indicated that they were aware of meetings but were unclear of the objectives and achievements of many development partner-funded programs. The single most positive change cited was progress made at border crossings to ease movement of seed consignments, activities funded largely by USAID and DFID.

3.0 ORGANIZATIONAL CAPACITY OF INSTITUTIONS FACILITATING REGIONAL SEED TRADE AND POLICY

COMESA/ACTESA, EAC and ASARECA directly support ESA regional seed trade. Their work in seed trade was explored through interviews with staff at these institutions, national authorities, and seed trade stakeholders.

In general, regional institutions were acknowledged for progress to date; however, doubts remain about their technical and operational capacity to carry out the next stages of work without continuing development partner support. Key capacity gaps exist in the following areas: 1) technical expertise for facilitating solutions to operational trade problems; 2) understanding how private sector evaluates seed trade risk; and 3) capacity for program design and implementation that focuses on their key role in the trade and policy process.

One of the challenges with regional institutions is programming and implementation capacity. In particular, reliable and consistent implementation of harmonized regulations has been slow. There is currently no proof of concept that varieties can be released, put into production, and certified based on regional variety release approaches, although trials of seed lots under the COMESA and the SADC seed labels are planned for later in 2018.

COMESA's ability to mobilize governments to domesticate their seed laws is viewed as admirable, and a key to further progress. If trade is to increase, however, informants felt that the key strategic objective must now shift to implementation of the regulations at regional and national levels. Most interviewees stated that new tools, especially management information systems (MIS), and more staff with seed skills are needed. There is also a limitation when it comes to coordination with the COMESA Business Council that handles trade disputes to address trade barrier issues in specific member countries.

All three institutions cited serious capacity challenges in terms of specialized staffing for seed trade. Most offices are staffed with one technical officer who is responsible for a wide portfolio of regional trade issues. According to one seed company interviewed, the number of technical expertise in ACTESA is severely limited considering the regional scope and extent of its mandate. For example, COMESA has one technical Seed Trade Coordinator and an Assistant. For EAC, specialization on seed issues is limited to one staff member. EAC staff in the agriculture unit are: Head of Directorate, Seed and Policy Lead, Livestock Lead, and Project Assistant.

REC positions are typically funded under development partner projects focused on seed, as opposed to being part of core REC activities. This means that once the development partner funding cycle ends, positions and staff contacts are terminated. This disrupts seed operations and effective program implementation.

In addition, development partner projects have specific areas of focus that impact the overall focus of the REC office and staff. Many interviewees highlighted that in order to attract funding, REC seed trade programs may not necessarily focus on priority areas that move regional seed harmonization forward, but rather on areas that are backed by development partner funding. In their opinion, RECs frequently focused on direct implementation of specific development partner-driven projects instead of playing the role of facilitators, coordinators, and capacity builders for member countries. REC driven priorities, including priorities informed by deep discourse with the private sector, is an area that is particularly weak and needs to be addressed.

The lack of national funding for the RECs is a major issue. Member countries may sign treaties and agree to terms, but then not contribute funds for implementation. For seed harmonization, development partner involvement may allow member governments to avoid allocating resources to the implementation of harmonization. It is unclear to interviewees whether governments understand the scale of national funding and budgetary implications that are necessary to accede to the harmonized protocols, or if they have plans to commit the required resources. Based on lack of current budgetary support, it seems doubtful that they plan to make that commitment. Budget allocation should go hand-in-hand with implementation of regional harmonized seed regulations, and this is an area where there is little observable commitment. The key question is, how can members be made accountable for contributing money to actualize the signed agreements related to seed harmonization, with development partners only supplementing and playing a facilitative role?

VI. RECOMMENDATIONS

This section outlines recommendations to promote expanded regional seed trade. They include short term (less than one year) and long-term (five-year) interventions.

SHORT TERM RECOMMENDATIONS

1. **Reorient COMSHIP from the current perceived focus on harmonizing legislation and regulations to include a stronger focus on supporting and measuring the impact of implementation**

- *Update the strategic objectives of COMSHIP to focus on creating an enabling environment for private sector seed trade, accomplished through open dialogue with the private sector. This should include establishing clear priorities for implementing regional variety release, COMESA seed lot certification, and testing of trade in COMESA tagged seed lots across member-state borders. COMSHIP should track and report on the actual seed trade expansion by country with National Seed Authorities and Customs, engage strong private sector collaboration, and solicit feedback from both public seed regulators and private seed trade actors.*

- *Establish a seed company trade hotline to support early identification of trade challenges, border issues, and private sector experiences that discourages future seed trade.*

2. Establish a bilateral and regional platform for regulatory dialogue(s), with strong private sector participation to ensure collaboration and progress in implementing seed policy harmonization

- *Support regular forums for stakeholders to meet and agree on common processes and standards, brief each other on progress towards implementation, address concerns, and find solutions to specific seed trade related issues. Government and development partners should focus on identification of, and progress towards solving both systemic constraints and ground-level implementation issues. These forums should take full advantage of currently scheduled REC technical, ministerial and Heads-of-State Meetings, national STA meetings and AFSTA congresses, and technical/professional meetings on seed certification, testing, phytosanitary, and technical barriers to trade (TBT) at national and regional levels.*
- *Incorporate regional learning trips when appropriate to learn about and aid implementation of specific quality control processes, and to observe best practices from other countries.*

The SADC Seed Secretariat has convened regulators and implemented some of these suggestions and could be a good source of practical advice. COMESA is the logical convener, if strategic objectives are reoriented and seed trade associations or seed companies are the key voices for the private sector and/or member interests.

3. Increase qualified staff at the seed technical office within RECs

- *Advocate for an additional person to be employed at the seed technical office within RECs. It is not sufficient to have one technical person responsible for handling all issues of regional seed trade. This will need to be addressed promptly to build the confidence of companies engaging in seed trade.*

4. Embed the position of seed coordinator within REC formal structures so that it is a permanent position and not project-linked

- *Advocate for a permanent REC budgetary allocation for the position of Seed Coordinator, and development partners should consider withdrawing funding support for this position. The seed sector and seed trade is an essential component of REC economic growth. Harmonization of regional seed trade is a long-term undertaking that requires consistent technical capacity. With the current structure, the Seed Coordinator only exists if there is funding, which disrupts implementation. Institutional memory and seed trade expertise is lost when the position is not consistently funded. A consultation between RECs and development partners on the most sustainable strategy is required.*

5. Explore opportunities to enhance efficiency of ICT systems used for clearance of shipments at borders and reduce delays

- *Explore cost-effective ways to ensure back-up power to minimize system delays, and viable, cost-effective approaches to deal with the periodic lack of connectivity.*
- *Build partnerships with specialized ICT firms that do work in remote locations where systems outages and fluctuations in internet connectivity are regular occurrences.*

6. Initiate urgent dialogue with the private sector to review their approach to regional variety catalogues, including fees, provision of information, and numbering conventions

- *Conduct a review with RECs and private sector participants to take a fresh look at the current REC approaches to regional variety catalogues. The review should focus on the cost*

of registration and maintenance, and how regional catalogue registration is recognized by national regulators.

- *Explore potential solutions with private sector concerns* including waiving the registration fee in the COMESA catalogue, establishing a grace period for payment that starts with registration and ends when the variety starts trading. The level of regional and layered national maintenance fees should be reviewed with the private sector as well as regional and national regulators.
- *Utilize Variety Identification Numbers to track varieties* that are traded in different countries under different names, and enable wider and faster availability of registered varieties. Clarify ownership of publicly-bred varieties, varietal licensing and breeder payments, and work with NSTAs on advocacy and awareness creation on variety identification numbering.
- *Assess information dissemination on varieties listed in regional catalogues*, and undertake a campaign to fill critical information gaps of varietal descriptions and national public and private performance trials. Improve the level of awareness by seed companies on the content standards for varietal descriptions and performance trial standards.

LONG-TERM RECOMMENDATIONS

1. Establish a platform for development partner dialogue around the issue of seed trade

- *Establish quarterly development partner dialogue, supported by a dashboard relaying key metrics.* This will fill an important void existing around development partner dialogue and collaboration to work towards long-term goals and sharing metrics on progress. Development partners working at cross purposes, or who are unaware of the work of other development agencies and RECs can unintentionally slow the rate of systemic change with respect to seed trade. A formal platform for dialogue can help to mitigate this risk. Potential partners include the World Bank, FAO, USAID, DFID, the Dutch government, GIZ, Swiss Development Cooperation, BMGF, Syngenta Foundation, and the African Agricultural Technology Foundation (AATF).

2. Support exploration and development of tripartite agreements to harmonize and implement REC seed protocols, with strong private sector input and emphasis on an enabling environment

- *Support tripartite agreements to ensure that gains made by one REC bloc are easily and quickly replicated*, although duplication should be avoided as it will only make seed production more expensive and seed companies less likely to expand trade beyond minimal levels. A key example is the proliferation in voluntary labels (COMESA, SADC) under that assumption that seed companies will simply continue to cross-register all varieties under each system and pay, which they will not do in the absence of a clear value proposition.

3. Support the development of a digital information portal in each country for access to information on seed trade volumes, import and export requirements for seed, information on regionally released varieties, downloadable forms, and more

- Support the NSTA for countries with a functional seed trade association (e.g., Kenya, Uganda) to include the digital portal as a tab on their website and update the information annually. For countries without a functional seed trade association (e.g. Zambia), consider working with the regulator to include the portal on its website and update the information annually, migrating the portal if the NSTA reaches a greater level of maturity. Centralized collection and sharing of seed trade data will aid in developing advocacy positions, mitigating bottlenecks, and supporting growth in the sector.

4. Build the capacity of “mission critical” public officials in national regulatory agencies and at border posts

- Ensure that public officials fully understand regional seed harmonization protocols and how to implement them in their home country by strengthening capacity through training and mentoring of relevant officials to:
 - Identify and access the most up-to-date regulations
 - Understand and work with approved documentation
 - Understand correct processes and procedures
 - Link appropriately to customs officials to ensure awareness of seed consignments crossing the border
 - Raise issues and link appropriately to responsible parties to resolve challenges on a timely basis
 - Receive updates when regulations and/or processes change
- *Engage institutions with training expertise* in seed inspection, seed certification, seed testing, and seed trade documentation, such as SANSOR, SCCI or KEPHIS, and private sector firms to develop a country-specific curriculum and offer training on an on-going basis.

5. Support seed trade associations (STAs) to play key advocacy roles in seed trade, including in the implementation of harmonized seed laws in their individual countries

- *Develop plans to support STAs, including AFSTA, to gather data and advocate for an enabling environment for private sector seed trade.* STAs could be assisted to build a prioritized advocacy strategy and institutional framework for feedback to regulatory and other government agencies involved in regional seed trade to ensure that public seed plans are grounded in strong supply and demand principles and distorting policies or regulatory practices are modified. An example would be an STA tracking system that details challenges faced by members, and then initiates dialogue with regulators and other public officials to solve these issues.

6. Actively seek to minimize the negative effects of political economy behaviors by: 1) increasing efforts to enlighten heads of state of focus countries on the critical need for seed trade and the subsequent benefits to their countries; and 2) increased efforts to ensure countries abide by signed agreements

- *Develop a well-articulated program to educate heads-of-state about the critical importance of expanded seed trade, particularly in the face of climate change, as well as pest and disease pressures.* Identify areas where countries are creating non-tariff barriers and address non-compliance issues at senior governmental levels, including national and regional authorities. Encourage states to move quickly to implement domesticated laws and regulations and set aside required budget support for implementation.

VII. REFERENCES

- African Union. 2014. Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods. Addis Ababa; African Union Commission.
- Agri Experience. 2016. Reaching More Farmers with High Quality Seed for Drought Tolerant Crops. Vuna Research Report. Pretoria: Vuna. Online: <http://www.vuna-africa.com>
- Cardno. 2014. Preliminary report: Regional access to seeds index for Eastern Africa. Prepared for Access to Seeds Foundation.
- COMESA and ACTESA. 2014. COMESA Seed Harmonization Implementation Plan (COM-SHIP). Lusaka; Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA).
- COMESA and ACTESA. 2016. The 2nd COMSHIP Mutual Accountability Progress Review Meeting. Workshop Report prepared by PICO-Eastern Africa. September 5-6, 2016. Nairobi.
- Grossman, T., A. Linnemann, and H. Wierema. 1991. Seed Industry Development in a North-South Perspective Pudoc, Wageningen
- <http://afsta.org/wp-content/uploads/2017/03/8-d-Kalipwochi-AFSTA-Congress-2017.pdf>
- Jayne TS, Mather D, Mason N, Ricker-Gilbert J. 2013. How do fertilizer subsidy programs affect total fertilizer use in sub-Saharan Africa? Crowding out, diversion and benefit/cost assessment. *Agricultural Economics* 44(6): 687-703.
- Keyser JC. 2013. Opening up the markets for seed trade in Africa (English). Africa trade practice working paper series; no. 2. Washington DC; World Bank.
- Kuhlmann K. 2015. Harmonizing Regional Seed Regulations in Sub-Saharan Africa: A comparative assessment. Seeds2B initiative; Syngenta Foundation for Sustainable Agriculture.
- Mason NM, Ricker-Gilbert J. 2012. Disrupting demand for commercial seed: Input subsidies in Malawi and Zambia. Lusaka: Indaba Agricultural Policy Research Institute.
- Mather DL, Jayne TS. 2018. Fertilizer subsidies and the role of targeting in crowding out: evidence from Kenya. *Food Security* 10: 397-417.
- Miti F. 2014. COMESA Seed Harmonization Implementation Plan (COMSHIP): A synthesis report for cluster A countries. PowerPoint presentation, unpublished.
- Mujaju, C. 2018. Identifying Leading Seed Companies in Eastern and Southern Africa: Landscaping study for the Regional Access to Seeds Index for Eastern & Southern Africa. Commissioned by the Access to Seeds Foundation.
- Ngaboyisonga C, Nyombayire A, Gafishi MK, Nizeyimana F, Uwera A, Ndayishimiye T, Karemera FX, Mutanyagwa P, Gumisiriza G, Gahakwa. 2016. Adaptability and genotype by environment interaction of maize commercial hybrid varieties from East African seed companies in Rwandan environments. *Global Journal of Agricultural Research* 4(2): 32-40.
- O'Connor Funk, A. and A. Karimi Wamache. June 2012. Kenya Seed Industry Study
- OECD. 2012. OECD seed schemes: A synthesis of international regulatory aspects that affect seed trade.
- RENAPRI, 2015. Anticipating the Future of Agriculture in the Region: Outlook for Maize, Wheat, Sugar and Rice;

- Sikinyi, Evans. 2016. "Seminar on the enforcement of Plant Breeders Rights under the UPOV Convention: Experiences of PVP implementation and Enforcement in Africa. Hanoi, Viet Nam, Sept 7 – 8, 2016
- Seeds2B Africa. n.d. Seeds2B Project: Scaling the Seeds2B Africa initiative. Project brief.
- TASAI. 2017. Country briefs. The African Seed Access Index.
- TechTrans. 2017. Improving access to publicly bred varieties: Debunking the myths on intellectual property and technology transfer. USAID and AGRA.
- UNCTAD. 2009. Economic Development in Africa: Strengthening Regional Economic Integration for Africa's Development. Geneva; United Nations Conference on Trade and Development.
- UPOV. 2005. UPOV report on the impact of plant variety protection. International Union for the Protection of New Varieties of Plants: Geneva, Switzerland.
- USAID. 2016. 2016 East Africa: Report to the people. United States Agency for International Development (USAID): Nairobi, Kenya.
- Waithaka M, Nzuma J, Kyotalimye M, Nyachae O. 2011. Impacts of an improved seed policy environment in Eastern and Central Africa. Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).
- Zhou Y. 2017. Seed Regional Harmonization: Country Case Studies and Regional Test Cases. Presentation at the Seed Policy Meeting, Dakar, February 28, 2017. Syngenta Foundation for Sustainable Agriculture

VIII. ANNEXES

KENYA

SEED TRADE ANALYSIS | COUNTRY PROFILE



KEY STATS

- 25 active crop seed companies
- 75% of land planted with maize is certified maize seed.
- Percentage of land planted with improved seed is vastly lower for other crops (Irish Potato, 2-5%; common bean, < 20%)
- 70% of seed market share is controlled by the parastatal Kenya Seed Company.
- 85-90% of certified crop seed sold is from local production. 10-15% is imported crop seed.

Kenya has a relatively well-developed seed sector within sub-Saharan Africa. For its main staple crop maize, approximately 75% of the land planted with maize is planted with certified seed. On average, 3 – 20% of all seeds for a limited number of crops (mainly maize and rice) are supplied through formal systems. The percentage of land planted with improved seed is, however, vastly lower for other crops. Estimates for Irish potato are 2 - 5% of improved seed, and for common bean less than 20% of improved seed. A key reason for this is that certified seed is less available for these and other crops such as sorghum, groundnuts, and soybeans. The formal sector is dominated by the Kenya Seed Company, a parastatal which has about 70% of the market share, with many other local, regional, and multinational companies (MNCs) also selling in the market. There are approximately 25 active crop seed companies in the country, with many others registered but not currently active, or focusing primarily on vegetable seed trade.

The national seed regulator in Kenya is the Kenya Plant Health Inspectorate Service (KEPHIS), which has high technical capacity compared to other countries in the region. Due to stringent adherence to standards, seed produced in Kenya has a good reputation within the region for being high quality and is often sought-after by farmers in neighboring countries.

Information from a seed sector baseline conducted in Kenya in 2010 shows that crop seed production in Kenya increased from less than 25,000 metric ton (MT) in 1999 to approximately 44,000 MT in 2009 (Sikinyi, 2010). However, by 2016, seed production in Kenya had dropped to roughly 37,000 MT according to KEPHIS data, which is attributed to challenges such as drought, changing weather patterns, Fall Armyworm (FAW), Maize Lethal Necrosis (MLN), and other pest and disease challenges. Additional underlying factors that contribute to the decline include the market domination of government parastatals that dissuades private sector investment, and the challenge of low levels of public sector supply of early generation seed (EGS) to the private sector for non-maize crops.

Kenya is a member of the Organisation for Economic Co-operation and Development (OECD) seed schemes and has an International Seed Testing Association (ISTA) accredited lab at KEPHIS that can issue orange and blue certificates for export. Kenya also is a member of COMESA and is involved in COMSHIP harmonization processes. By the end of 2016, Kenya had completed the process of alignment of national seed laws. The seed law has been changed to allow for private inspection and

self-regulation. Kenya joined the International Union for the Protection of New Varieties of Plants (UPOV) convention in 1999 and provides plant breeder's rights within the country. The membership to these organizations has enabled Kenya to be an active player in the international standard setting process for seeds and provides a predictable and conducive environment for investments.

Maize seed sold in Kenya is primarily from local production, at 85-90% of total crop seed certified annually, with imports contributing the remaining 10-15%. Crops that are imported include maize, and the main source for maize seed is Zambia. Other crops, particularly vegetables, contribute minor amounts by volume to the import totals. Kenya is also an exporter of seed to other countries, particularly Uganda, Rwanda, and Tanzania for maize.

Importation of seed is undertaken under the provisions of the Seeds and Plant Varieties Act and the Plant Protection Act. Seed import permits must be obtained from KEPHIS prior to any importation, and upon arrival, shipments undergo routine seed testing for pests and diseases, including MLN to ensure compliance. KEPHIS has a zero-tolerance standard for MLN. In addition, routine post-control tests are undertaken for each lot of seed imported.

The main industry voice related to seed trade in Kenya is the Seed Trade Association of Kenya (STAK) (which sometimes links up with the Plant Breeders Association of Kenya (PBAK)). STAK is a member-based association that has been revived in recent years through targeted development partner support. Among other roles, it serves as a liaison institution between individual seed companies and KEPHIS and the government of Kenya. Member companies are given a unified voice through STAK to negotiate and advocate on new policies and regulations proposed for the seed industry, especially policies impacting seed trade. KEPHIS recognizes STAK as the voice of the private sector.

Development partner funding for the seed sector in Kenya comes from a variety of sources, each of which have targeted geographic, crop, and market actor focuses. For example, the World Bank provides support to national agricultural research programs, while DfID has focused on market systems change in the formal sector. Private sector investment also plays a key role in seed sector growth. Examples include AgriCo, the largest European seed potato exporter, which is investing heavily in establishing seed potato production facilities in Kenya to meet the high demand locally and regionally, and SeedCo's Kenya subsidiary (called AgriSeed), which is investing in seed production expansion through a new plant in Kitale.

Kenyan Seed Market Analysis

Table I below shows the very long process of the shift to certified maize seed adoption in Kenya, which seems to be stabilizing around a formal seed market share of about 78 - 80% from the 1970s - 1980s levels (when it was 55%). The increasing formal market share seems to be leading to a trade pattern of relatively balanced imports and exports as shown in the past three years of trade data in Graph I. Seed companies looking at these long-trends in sectoral growth rates, their own sales trends, those of competing varieties and distribution structures (public and private), and the business and policy environment will be conservative in their planning of production, marketing, and sales efforts. In addition, they will also watch for big structural demand disruptors, such as subsidy programs, demographic transitions to a majority urban population that shifts food consumption, or a chronic disease threat like MLN that changes the areas where seed can be reliably produced to avoid quarantine restrictions.

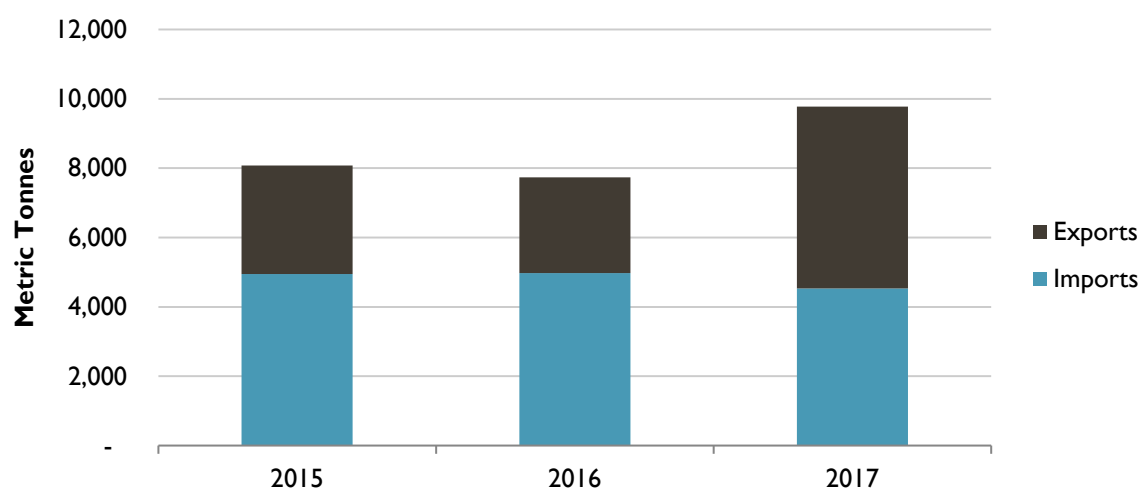
Table 5: Kenya's Formal Market Share for Maize Seed

Year	Acreage Planted	Seeding Rate	Total Seedling Requirement	Domestic Seed Sales (certified)	Formal Market Share (%)
2024*	2,400,000	0.025	60,000	46,804	78%
2015	2,124,489	0.025	53,112	41,431	78%
2010	1,933,675	0.025	48,342	34,323	71%
2005	1,760,000	0.025	44,000	27,500	62%
76/77-86/87	1,200,000	0.0275	33,000	18,000	55%

Data Sources: RENAPRI, 2015. *Anticipating the Future of Agriculture in the Region: Outlook for Maize, Wheat, Sugar and Rice*; A. O'Connor Funk and A. Karimi Wamache. June 2012. *Kenya Seed Industry Study*; and, T. Grossman, A. Linnemann, and H. Wierema. 1991. *Seed Industry Development in a North-South Perspective* Pudoc, Wageningen

Graph 1:

Kenya's Maize Seed Yearly Imports and Exports



Despite successful alignment of national seed laws, Kenya still face a lot of challenges in the implementation stage. The following challenges have been outlined as the barriers to COMSHIP implementation in the country.

1. Inadequate awareness on COMESA Seed Trade Harmonization Regulations, and on application of the COMESA variety catalogue.
2. Gaps in capacity building support for reference samples, cold rooms, variety testing equipment, and the production of COMESA Certification documents, certificates, and labels.
3. There are also emerging pests and diseases in Kenya, notably Maize Lethal Necrosis Disease (MLN) and Fall Army Warm (FAW), that threaten seed crop.
4. Inadequate commercial (export) and foundation seed volumes compared to other member states.
5. An ever increasing population is leading to fragmented land for seed production.
6. Implementation challenges on cases where harmonized standards are lower than the national standards (seed certification standard schedules).
7. Other challenges include additional costs in the national variety catalogue (list) versus regional variety catalogue related to printing seed labels and certification certificates for COMESA.

RWANDA

SEED DEMAND AND SEED TRADE ANALYSIS | COUNTRY PROFILE



KEY STATS

- 8 active crop seed companies, 100 cooperatives, and 350 individual producers
- 65% of land planted with maize is certified maize seed (43% hybrid & 22% OPV)
- Percentage of land planted with improved seed is vastly lower for other crops (Common bean; Irish Potato)
- Kenya seed Rwanda, SeedCo Rwanda, DowDupont (Murphy Chemicals), Tubura (One Acre Fund) and Western Seed are the dominant seed companies. Rwanda Agricultural Board (RAB) is responsible for producing breeders and pre-basic seeds.
- 22% certified (maize) crop seed sold is from local production; 78% are imports.

The Rwanda seed industry is nascent, and as a result local seed supply especially for maize is vastly lower than total supply. According to the 2016 Rwanda Country Early Generation Seed (EGS) study (which cites the 2009 Alliance for a Green Revolution in Africa (AGRA) Baseline Study), farmer adoption of improved varieties is very low, at between 7% and 13%. However, after the introduction of a subsidy program of hybrid and certified seed in 2012 - 2013, use of improved varieties has drastically improved, whereby currently over 65% of maize seed is from improved varieties. This same trend also applies to wheat and soybean. There are four dominant seed systems in Rwanda which including a farmer-saved system, mixed public-private intermediary system focusing on quality declared seed, a public system, and a private system as shown below.

Figure 7: Summary of Rwanda's Seed Sector Characterization

Criteria	Farmer saved	Intermediary	Public System	Private
Type of crops	Local food crops	Food and cash crops	Major food and cash crops	High-value crops
Crops	Beans, (sweet) potato, cassava, local vegetables, banana	Irish potato, (OPV) maize, (soy) beans	Maize, soybean, wheat, rice, Irish potato	Hybrid maize, vegetables, Irish potato
Type of varieties	Local varieties	Mostly improved	Improved	Improved / Hybrids
Seed quality	Farmer selected	C2, QDS	Certified	Certified
Distribution & marketing	Farmer saved and exchanged and local sales	Local sales and markets	CIP (Subsidized)	CIP (imports), agrodealers

The formal seed system in Rwanda, especially for maize, is dominated by public sector stakeholders and the use of Open Pollinated Varieties (OPVs) (RAB, 2015). As a result, Rwanda has been a major importer of seed, distributing it through a subsidy program for the last decade. As with other sectors of Rwanda's centrally planned economy, driven by top down policy and performance contracts, seed importation is centrally controlled. There is government interest, however, in encouraging more local seed production. In 2016, Rwanda passed a National Legislative Framework for Seeds which included a reviewed seed policy, a reviewed law, and a new institutional structure called the Rwanda Seed Roadmap 2016 - 2020 to support the implementation of the law and guide the seed industry.

The Roadmap outlines how the government proposes to exit direct seed production, procurement, and marketing activities over time and encourage private sector investment in the sector. Local production of hybrid maize, at present, is almost negligible, but Rwanda has initiated seed initiatives in soybean and potato. In addition, the Rwanda government is a major producer of seed for climbing beans. Rwanda is also one of the first five countries to harmonize their national seed regulations with COMESA's regulations.

A key challenge to seed importation in Rwanda is unfavorable weather conditions in southern Africa, which has negatively impacted seed quantities available from seed exporting countries such as Zambia. In addition, late ordering by the government puts a lot of pressure on importing companies and causes delays in delivery. The second main challenge is reference of international organizations such as ISTA, OECD, or UPOV for relevant regulations is not possible since Rwanda is not yet a member of these associations. Equally, the institutional arrangements to implement the law are still in an infancy stage limiting effectiveness, and the capacity of the regulators and the seed producers is still low. There are only eight seed inspectors in Rwanda. Although the three main regional seed companies that supply the bulk of imported hybrid seed have made several attempts to produce locally, they have faced numerous challenges including the low capacity of producers and a lack of equipment, facilities, adequate land for seed production, and processing plants. Seed subsidies by the government also constitute a significant impediment to the development of an effective private sector.

While Rwanda has aspirations to build their local seed supply and reduce dependence on imports, significant work is still needed in order to build a robust and private sector focused seed system. As a first step, Rwanda is in the process of establishing an independent seed quality control service, the Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA), whose mandate is to oversee variety testing and release, among other duties. The government is also keen on supporting seed production under irrigated land in the Eastern Province, although the mechanisms of accessing this land are not yet clear. The isolated production location of this region is also a problem.

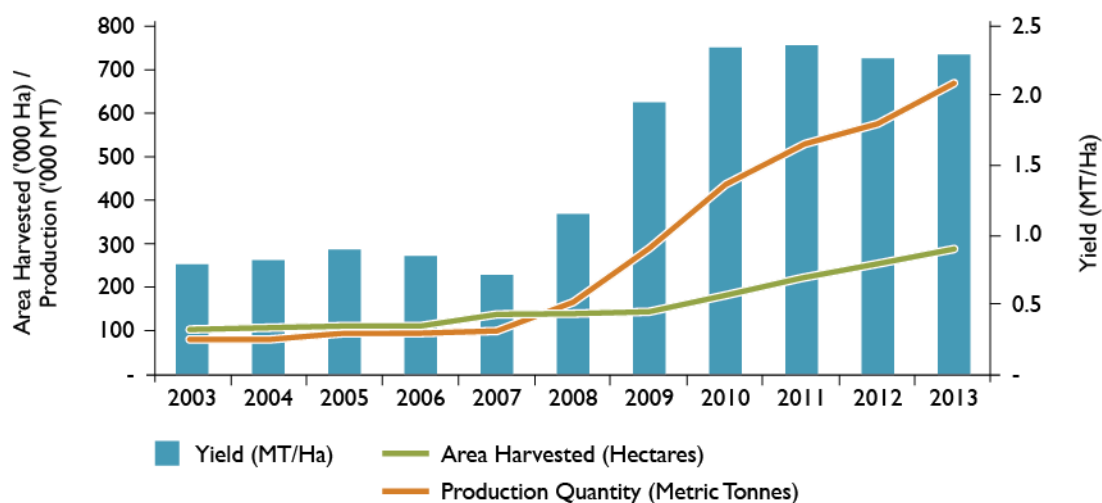
On the demand side, there are limited distribution outlets for seed, and most farmers will either plant seed provided in the subsidy program or their own farm-saved seed. Seed is procured according to the government's annual budget allocation (hence volumes remain more or less the same). Effective demand of seed is unknown as virtually all seed procured by government is distributed to farmers, and there is no understanding of how many additional farmers might have wanted to procure formal sector seed.

Rwandan Seed Market Analysis

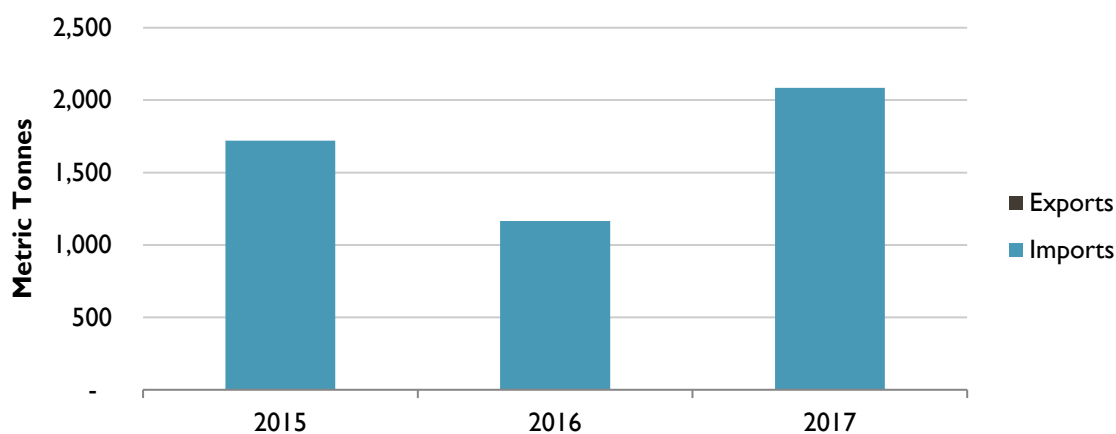
The national maize strategy shifted in 2007 from public-sector supplied open-pollinated maize varieties (OPVs) to a hybrid maize and fertilizer productivity intensification strategy that has required the importation of all hybrid seed. See Graph 2 below that shows a rough concordance between the shift in strategy and its impact on crop yield and production. The nature of the Rwandan maize seed demand shifted to around a 70 percent hybrid adoption rate that the Rwandan government wants to push to 90 percent within three to five years (*Rwanda Early Generation Seed Study*, 2016). Rwanda is currently a commercial seed market with importation and distribution supported by a national subsidy program. By some estimates, the policy change created a new regional opportunity for seed

trade in the 5,000 metric tons (MT) range that will persist for as long as Rwanda sustains its national funding for hybrid inputs and as long as its domestic hybrid seed production capacity remains small. The pattern of this trade is shown over the past three years in Graph 3.

Graph 3:
Rwanda Maize Production and Yields (2003 - 2013)



Graph 3:
Rwanda's Maize Seed Yearly Imports and Exports



TANZANIA

SEED DEMAND AND SEED TRADE ANALYSIS | COUNTRY PROFILE



KEY STATS

- 63 active crop seed companies
- 28% - 35% of land planted with maize is certified maize seed.
- Percentage of land planted with improved seed is vastly lower for other crops (Pigeon pea 50%, Sorghum 38%)
- SeedCo, Monsanto, and the Beula Seed Company are the dominant seed companies by market share.
- 58% of certified crop seed sold is from local production, while 42% is imported crop seed.

Seed production in Tanzania is increasing, but the country is still a net importer of seed and seed demand is high. The Government of Tanzania does not have an official ban on crop seed exports, but for all practical purposes a de facto ban is in place as they want to ensure sufficient local supply. The existence of a de facto ban is supported by the fact that Tanzania did not provide any export data, and in a The African Seed Access Index (TASAI) study in 2017, private sector companies did not provide data on the length of time to export seed. Tanzania does allow transit seed (e.g. from Zambia to Kenya), but private sector companies from neighboring countries have raised complaints about non-tariff barriers in Tanzania, such as specific roads that must be followed that significantly increase travel distances.

Regulatory capacity is fairly weak, but steps are currently underway to improve it. The Bill and Melinda Gates Foundation (BMGF) has recently undertaken an extensive seed sector study in Tanzania at the government's request, but has not yet shared it with external partners. The results have not yet been made public. It is clear, however, that Tanzania is now emphasizing seed sector development, and is trying to strengthen the Tanzania Official Seed Certification Institute (TOSCI), which regulates seed production and distribution. Tanzania was admitted to the OECD seed schemes in 2016 and the TOSCI National Seed Testing Lab at Morogoro was accredited to ISTA May 2018. In March 2018, key personnel from TOSCI were trained by an ISTA-certified expert on seed sampling, laboratory quality assurance and analysis, in readiness for anticipated ISTA-accreditation. This effort was supported by the East Africa Trade and Investment Hub.

Unlike the other four focus countries, Tanzania is not a member of COMESA, but of SADC and EAC. This is interesting as Tanzania is the key entry point of seed from southern Africa (Republic of South Africa (RSA), Zambia and Zimbabwe) into eastern Africa. The potential for Tanzania to become a major seed producer for the export market is huge, due to their land size, land productivity, rainfall, and borders with seven neighboring countries. However, the government of Tanzania should ensure sufficient local production before allowing seed to be exported.

Tanzania is also one of the few countries that officially recognizes quality declared seed (QDS). QDS requires a lower level of testing and sampling than certified seed, but can be sold only within an authorized ward close to the production location. Many farmer groups and cooperatives engage in production of QDS seed. QDS seed does not qualify for international trade due to the lower level of quality assurance.

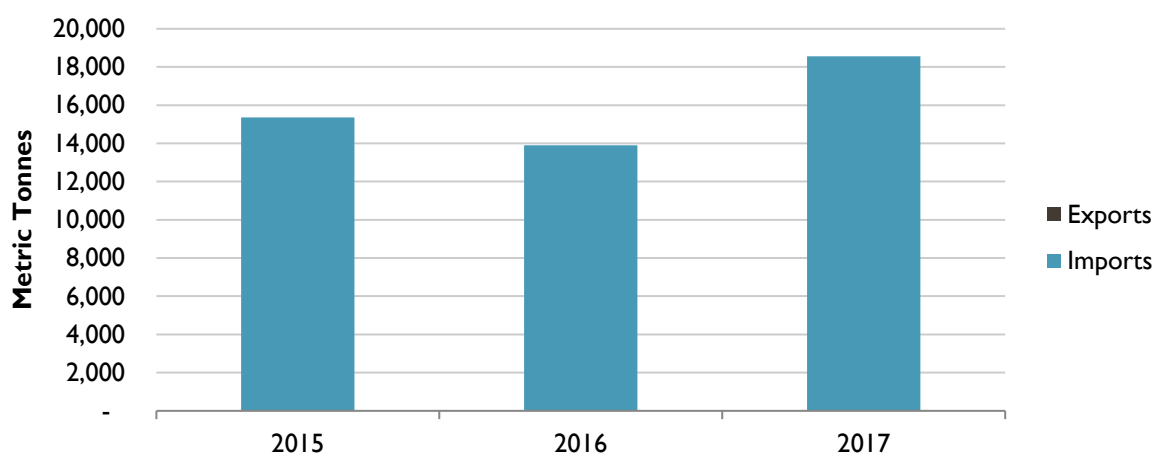
Several respondents cited Tanzania as having many issues regarding documentation, implementation of regulations, and local challenges such as transporting seed across the country (where travel routes that are unnecessarily longer are officially prescribed and make transportation more expensive). Tanzania also requires all seed sold locally to have a Tanzanian label affixed to it, irrespective of any other labelling that may accompany it.

Tanzanian Seed Market Analysis

For Tanzania, similar policy changes also supported by national subsidy programs have increased the demand for certified OPV and hybrid maize seed above the rate of development of national seed production capacity, creating the largest regional market for seed trade. In more mature markets with lower seed subsidies and well-established seed industries (public, private, and mixed public-private), the balance of demand and supply, market, and other risks leads to slower changes in total seed demand for certified seed (OPV and hybrid) from the formal market as opposed to recycled seed from saved crop seed, local markets, family, friends, and NGOs.

Graph 5:

Tanzania's Maize Seed Yearly Imports and Exports



UGANDA

SEED DEMAND AND SEED TRADE ANALYSIS | COUNTRY PROFILE



KEY STATS

- 23 active crop seed companies
- 44% of land planted with maize is certified maize seed.
- Percentage of land planted with improved seed is vastly lower for other crops (Irish Potato, 2-5%; Common bean, < 20%)
- NASECO, Equator Seed Co, and FICA are the most dominant seed companies by market share.
- 85-90% certified crop seed sold is from local production; 10-15% is imported crop seed.

Uganda's formal seed sector is liberalized and there are currently 23 companies that operate as seed producers and/or sellers (USTA, 2018). Seed certification is handled through the National Seed Certification Service (NSCS), which is a unit within the Department of Crop Protection in the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF). The NSCS is stretched thin, however, with only seven inspectors to cover the whole country at present. Plans are underway to add more inspectors and recruitment has been completed, but the training process will take several months to a year to complete.

Given the lack of resources (human, resources, and infrastructure) to carry out inspections, there are challenges in ensuring quality certification services across Uganda, and problems of counterfeit seed and low-quality seed permeate the sector. As a result, the reputation of Ugandan seed is low among other countries in the region, and this leads to significant concerns about importing seed from Uganda. The NSCS reports that it is receiving support to upgrade its laboratory and achieve ISTA accreditation, but government interviewees declined to discuss specifics, including the timeline to completion.

To combat the challenge of poor government certification capacity, a private verification company has been formed, supported by development partner funding including USAID and funding from the AgResults initiative, a consortium of international development partners. AgVerify offers fee-based private seed inspections and quality verification. In the first growing season of 2018, eight companies are using its services. AgVerify is affiliated with, and utilizes, an independent ISTA-accredited laboratory in Uganda.

A key challenge for AgVerify and the companies using it, however, is that the government of Uganda had not yet agreed to delegate authority to AgVerify to issue the necessary blue or orange certificates needed for seed export, or even to issue local certification labels. Discussions are on-going to allow AgVerify and its affiliated ISTA-accredited lab to perform seed certification on behalf of the government, with the NSCS performing an auditing role. If agreed upon, this would be similar to the approach used in South Africa, where the government has authorized the national seed trade association, the South African National Seed Organization (SANSOR), to certify seed, with the government playing an oversight role.

If seed quality and the reputation of seed from Uganda can be improved, there is great potential in the country for seed production. Eighty percent of Uganda is arable land, but only 30% of land is

currently farmed (Cardno, 2014). Uganda's warm climate and high levels of rainfall make it a high potential area for agricultural production, and the highlands have bimodal rainy seasons, fertile soil, and abundant water resources, which are conducive to seed production. Having borders with Kenya, South Sudan, DRC, Rwanda, and Tanzania, Uganda has multiple potential export markets, and can also be a preferred production location for seed companies based in neighbouring countries. One Ugandan company is already selling to retail markets in DRC and Burundi, while another company is selling to FAO and other international non-governmental organizations for distribution in South Sudan.

Seed is imported into Uganda for sale to local farmers. Maize, bean, sunflower, and vegetable seeds are the common imports, and primarily come from Kenya (maize and beans), China and Europe (vegetables), and South Africa (sunflower).

The Phytosanitary Inspection Unit of the Department of Crop Protection within MAAIF is responsible for issuing import permits for seed, and it maintains this data but not in a form that is accessible by outsiders. The lack of a data management system for seed imports was documented in a Uganda seed sector baseline report (Sebuliba, 2010) and was reconfirmed during the field work conducted for this study. However, according to NSCS, the issue is being addressed at present through the roll-out of an online system for import and export permits. In the future, it should be easy to collect import and export data from the online system.

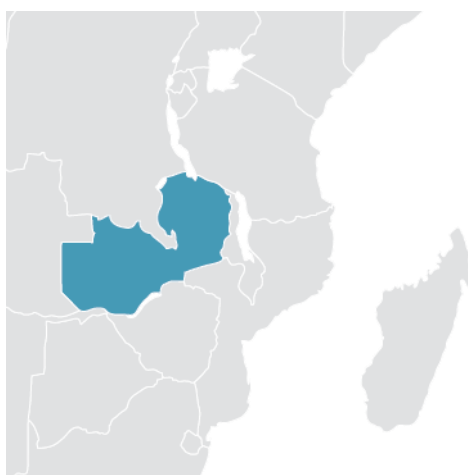
The Uganda Seed Trade Association (USTA) is an important organization comprised of all 23 crop seed companies in the country. USTA is playing a strong advocacy role within the government and acts as a bridge between the private sector and the government. It has lobbied with parliamentary committees for favourable policies and liaises between MAAIF and its members. The Executive Officer of USTA plans to work with MAAIF to collect seed import and export data from the ministry and share it with USTA members for planning purposes.

Uganda has been involved with seed policy and regulation harmonization since the 1990s up to the current COMSHIP activities. Uganda was among the first five COMESA countries to harmonize their seed regulations in 2017. The challenge is now how to make harmonized regulations operational, taking into consideration the weak public regulatory framework and lack of adequate infrastructure and resources in Uganda.

Implementation of legislation in Uganda has been slow because the seed certification and phytosanitary regimes are at different levels of development which affects implementation of COMSHIP; the seed certification and phytosanitary authorities are within the government ministries and not independent authorities which slows down decision making; and inadequate infrastructure and human resource development poses a serious challenge to seed certification services.

ZAMBIA

SEED DEMAND AND SEED TRADE ANALYSIS | COUNTRY PROFILE



KEY STATS

- 21 active crop seed companies
- 62% - 81% of land planted with maize is certified maize seed.
- Percentage of land planted with improved seed is vastly lower for other crops (groundnuts 57%; soybeans)
- SeedCo, Zamseed, DowDuPont, and Syngenta MRI are the largest maize seed producers.
- 85% - 90% of certified crop seed sold is from local production; 10-15% is imported crop seed.

Zambia is one of the two largest seed exporters in East and Southern Africa by tonnage to the region. Zambia's extensive production land, generally favorable climate, access to both local and Zimbabwean seed production expertise, in addition to a favorable and progressive regulatory environment have led to extensive private sector investment in Zambia for seed production. Critically, Zambia borders eight countries, placing it in a strategic position for regional seed trade.

Zambia's Seed Control and Certification Institute (SCCI) certifies approximately 80,000 MT of seed annually, of which 45,000 MT is exported with the rest retained for local use. Zambia has a relatively strong regulatory capacity and is moving towards OECD systems. SCCI started accrediting private seed inspectors in 1991, following reforms in the seed sector from revision of the Plant Variety and Seeds Act (Cap 236) that liberalized the sector, decentralized seed production, and also saw the enactment of plant variety protection law. This liberalization was largely driven by political developments in neighboring Zimbabwe, and the movement of large commercial farming operations from Zimbabwe to Zambia.

Policy liberalization in Zambia encouraged substantial private sector investment in seed production. Most major seed production multinational companies (MNCs) now have operations in-country. Zambia is also increasingly moving toward a significant degree of self-regulation in the seed sector. SCCI has established multiple satellite seed laboratories and three private laboratories, including an ISTA certified laboratory in Lusaka, which issues Orange International Certificates.

In the last few years, SCCI has developed and begun to use an online system to facilitate seed certification and trade, including the provision of testing results and seed labels. Private sector companies can access their own data in the system to check the status of seed lot testing, permits, and payments. They are also able to initiate transactions online, such as applying for permits. The Zambian model has been of interest to regulatory agencies in the region, and as a result Zambia has hosted visits from Kenya, Uganda, and Tanzania. After their visit to Zambia, Kenya moved ahead and adopted accreditation of private inspectors, utilized relevant portions of the Zambian training curriculum, and sent seed inspectors and analysts to participate in a Zambian training for learning purposes.

Zambia is currently adopting the use of a label for seed destined only for local markets, which will most likely involve compliance with lower certification standards, possibly lowering the cost of seed in local markets.

Zambia belongs both to COMESA and SADC. Seed control at border crossings is overseen by two institutions—SCCI for quality control and the Zambia Agricultural Research Institute (ZARI) for plant health and phytosanitary issues. Officers from both institutes cover for each other, especially since there are fewer ZARI officers.

Seed companies in Zambia produce for both the local market and the export market. The export market is primarily maize seed distributed to eastern Africa, with export volumes produced primarily by large regional and multi-national companies. Smaller local companies produce some maize for export, but focus mostly on non-maize crops such as groundnuts, soybean and Irish potato. Seed exports of other crops go to DRC, Botswana, Angola, Mozambique, and Zimbabwe. Zambia imports Irish potato, soybean, and groundnuts from South Africa and Malawi. Several companies import early generation seed (EGS) from Zimbabwe.

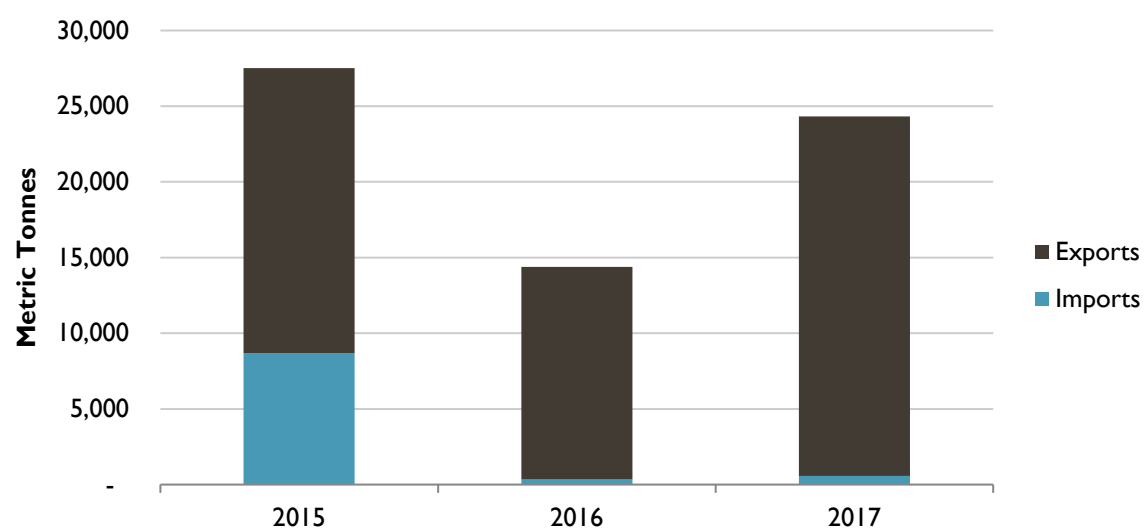
The export process for the most part is viewed as working very well, with a few exceptions. The exceptions cited were insufficient personnel from both SCCI and ZARI to staff borders, and a need for capacity building, equipment, and periodic audits on how the system works. Public sector budget issues are a key reason for the lack of capacity.

Zambia Seed Market Analysis

When disruption in neighboring Zimbabwe shifted commercial farmers to Zambia, the Zimbabwe seed industry started to shift assets to supply them, and MNCs and South African regional companies joined in to establish operations closer to emerging and frontier Sub-Saharan Africa markets. These moves capitalized off of established private maize breeding programs in white maize in Zambia to rapidly build a large base of seed production with a strong domestic base of sales for commercial, emerging, and national subsidy programs and for unmet maize seed demand in the region. Zambia is a member state of both COMESA and SADC and has access and tariff advantages not held by South Africa (which belongs to SADC, but not COMESA).

Maize seed trade in Zambia also reflects that export orientation as shown in Graph 6 below. Since the late 1990s, Zambian maize seed production capacity has rapidly been increasing and may be structurally catching up with the domestic and export markets that are currently addressable on a risk-weighted basis, especially as MNC seed companies restructure their global operations and their subsidiary company and brand strategies. The drop off in Zambian maize seed imports in 2016 and 2017 could be the result of one or a combination of the following: maturation of breeding and seed production capacities among the Zambian firms; an increase in demand for seed in the home country of regional seed companies (Zimbabwe and South Africa) that have subsidiaries in Zambia; the availability of a more profitable alternative export market; or a shift in the class of maize seed that is sent to Zambia. For example, a company may send seeds of parent lines for crossing to produce certified hybrids in Zambia rather than sending certified seeds for sale to distributors and farmers. More detailed data on the class of seed that is traded would be very useful in establishing the certified seed supply available for crop production or re-export versus national seed production capacity expansion.

Graph 6:
Zambia's Maize Seed Yearly Imports and Exports



ANNEX 2: LIST OF KEY INFORMANT INTERVIEWS

#	Country	Category	Organization	Surname	First Name	Title	Designation
1	Kenya	Border Official	Kenya Bureau of Standards - Busia, Border Control	Cheruiyot	Charles	Mr	Assistant Inspection Technician
2	Kenya	Border Official	Kenya Revenue Authority - Namanga, Border Control	Khabuli	Evans	Mr	Senior Customs Officer
3	Kenya	Border Official	Kenya Bureau of Standards - Namanga, Border Control	Matheka	Mark	Mr	Assistant Inspection Technician
4	Kenya	Border Official	Kenya Plant Health Inspectorate Service - Namanga, Border Control	Muteti	Ken	Mr	Seed Inspector
5	Kenya	Border Official	Kenya Plant Health Inspectorate Service - Namanga, Border Control	Mwiti	Susan	Ms	Seed Inspector
6	Kenya	Border Official	Kenya Plant Health Inspectorate Service - Busia, Border Control	Wabwayi	Ndadila	Mr	Seed Inspector
7	Kenya	CG Centre	International Maize and Wheat Improvement Centre	Fehlenberg	Kate	Dr	Program Manager – DTMASS
8	Kenya	Ministry	National Biosafety Authority	Kushindi	Wilson	Mr	
9	Kenya	Ministry	Ministry of Agriculture, Livestock & Fisheries	Ombalo	David	Mr	Principal Agriculture Officer, Policy Directorate
10	Kenya	Ministry	Agriculture and Food Authority	Wangwe	Herbert	Mr	
11	Kenya	County Govt	County Government of Busia	Asikoye	Vincent	Mr	County Trade Officer
12	Kenya	National Research Organization	Kenya Agricultural & Livestock Research Organization (Katumani)	Leley	Philip	Dr	Centre Director (Katumani), Breeder - Maize
13	Kenya	National Research Organization	Kenya Agricultural & Livestock Research Organization (Kitale)	Malinga	Joyce	Dr	Ag. Director, Food Crops Research Institute
14	Kenya	National Research Organization	Kenya Agricultural & Livestock Research Organization (Tigoni)	Nyongesa	Moses	Dr	Breeder - Irish Potato
15	Kenya	Non-Governmental Organization	East Africa Trade and Investment Hub	Assefa	Yohannes	Dr	Director, Agriculture and Agribusiness
16	Kenya	Non-Governmental Organization	East Africa Trade and Investment Hub	Ngunguru	Nelly	Ms	Sector Analyst

17	Kenya	Non-Governmental Organization	Alliance for a Green Revolution in Africa	Bigirwa	George	Dr	Regional Head, East and Southern Africa
18	Kenya	Non-Governmental Organization	Scaling Seed & Technologies Partnerships in Africa	Jones	Richard	Dr	Chief of Party
19	Kenya	Non-Governmental Organization	African Agricultural Technology Foundation	Omanya	Gospel	Dr	Senior Manager, Projects Management and Deployment
20	Kenya	Other	County Government of Busia	Asikoye	Vincent	Mr	County Trade Officer
21	Kenya	Other	One Acre Fund	Canter	Rowan	Mr	Seed Systems and Supply Chain Lead
22	Kenya	Other	One Acre Fund	Root	Alison	Ms	Policy & Expansion Director
23	Kenya	Other	The African Seed Access Index	Mugoya	Mainza	Mr	Regional Coordinator
24	Kenya	Other	Busia Border Control	Ouma	Kevin	Mr	Clearing Agent
25	Kenya	Regional Body	Africa Seed Trade Association	Gitu	Grace	Ms	Technical Manager
26	Kenya	Regulator	Kenya Plant Health Inspectorate Service - Headquarters	Maina	Simon	Mr	Head, Seed Certification & Plant Variety Protection
27	Kenya	Seed Company	Agrico East Africa Limited	Dolleman	Willem	Mr	Managing Director
28	Kenya	Seed Company	Western Seed Company Limited	Esmail	Saleem	Mr	Managing Director
29	Kenya	Seed Company	Freshco Seeds Limited	Karanja	James	Capt	Managing Director
30	Kenya	Seed Company	Dryland Seeds Limited	Kimotho	Ngila	Mr	Managing Director
31	Kenya	Seed Company	DuPont Group - Pannar/Pioneer	Kiruyae	Humphrey	Mr	Managing Director - Kenya
32	Kenya	Seed Company	DuPont Group - Pannar/Pioneer	Mutema	Charles	Mr	Marketing Manager
33	Kenya	Seed Company	AgriSeedCo Limited	Owino	Kassim	Mr	Managing Director
34	Kenya	Seed Company	QualiBasic Seed Company	Watt	Andy	Mr	Managing Director
35	Kenya	National Research Organization	Kenya Agricultural & Livestock Research Organization (Katumani)	Otsyula	Reuben	Dr	Breeder - Beans
36	Rwanda	Border	Rwanda Standards Board –	Ntaganzwa	Bosco	Mr	Animal Products Inspector

		Official	Gatuna				
37	Rwanda	CG Centre	International Centre for Tropical Agriculture	Sindi	Kirimi	Dr	Country Manager/Senior Scientist -Rwanda
38	Rwanda	Development Partner	United States Agency for International Development	Hakizimana	Patrice	Mr	Deputy Chief of Party
39	Rwanda	National Research Organization	Rwanda Agricultural Board	Musoni	Augustine	Dr	Coordinator of Research in Eastern Province/Zone
40	Rwanda	National Research Organization/Regulator	Rwanda Agricultural Board	Ndabamenye	Telesphore	Mr	Head of Crop Production and Food Security Department
41	Rwanda	National Research Organization	Rwanda Agricultural Board	Ngaboyisonga	Claver	Dr	Head of Cereal Program, National Focal Person of ITPGRFA
42	Rwanda	National Research Organization	Rwanda Agricultural Board	Rukundo	Placide	Dr	Breeder - Irish Potato
43	Rwanda	Regulator	Rwanda Agriculture Board	Ngerero	Gervais	Dr	Head of Seed Unit
44	Rwanda	Seed Company	AgriSeedCo Limited	Banage	Kasaija P. W.	Mr	Country Representative – Great Lakes
45	Rwanda	Seed Company	Rwanda Improved Seed Company Limited	Muvara	John	Mr	Managing Director
46	Rwanda	Seed Company	Win Agritech Limited	Nyiringabo	Ignace	Mr	Managing Director
47	Rwanda	Seed Trade Association/Seed Company	National Seed Association of Rwanda	Birungi	Martha	Ms	Vice - Chairperson Seed Trade Association of Rwanda
48	Tanzania	Border Official	Border Control - Tunduma	Sindamenye	John Daudi	Mr	Plant Health Services Officer
49	Tanzania	CG Centre	International Centre for Tropical Agriculture	Rubyogo	Jean-Claude	Dr	Seed Systems Specialist
50	Tanzania	Ministry	Ministry of Agriculture, Livestock and Fisheries	Njohole	Twalib	Dr	Ag. Head of Seed Unit
51	Tanzania	National Research Organization	Agricultural Research Institute	Mrema	Emmanuel	Dr	Breeder - Sorghum
52	Tanzania	National Research Organization	Agricultural Research Institute (Ilonga)	Mushongi	Arnold	Dr	Breeder - Maize
53	Tanzania	Non-Governmental Organization	Alliance for a Green Revolution in Africa	Rweyendela	Vianey	Mr	Country Coordinator

54	Tanzania	Regional Body	East African Community	Wafula	David	Mr	Agriculture Specialist
55	Tanzania	Regulator	Tanzania Official Seed Certification	Swella	George	Dr	Director, Seed Certification
56	Tanzania	Seed Company	IFFA Seed Company	Mohamoud	Mohamed	Mr	Managing Director
57	Tanzania	Seed Company	AgriSeed Technologies	Mbwaga	Ambone sigwe	Dr	Managing Director
58	Tanzania	Seed Company	Kibo Seed Limited	Mwaura	Francis	Mr	General Manager
59	Tanzania	Seed Company	AgriSeedCo Limited	Ngowi	Andrew	Mr	Operations Manager
60	Uganda	Border Official	Trade Information Office	Amule	Middy	Ms	Trade Information Desk Officer
61	Uganda	Border Official	Uganda National Bureau of Standards	Kisitu	John	Mr	Legal Metrologist
62	Uganda	Border Official	Uganda Revenue Authority - Customs Katuna	Mayamba	Dennis	Mr	Customs Officer
63	Uganda	Border Official	Trade Information Office	Ndeda	Washing tone	Mr	Trade Information Desk Officer
64	Uganda	Border Official	Uganda Revenue Authority - Katuna	Mbabazi	Martin	Mr	
65	Uganda	CG Centre	International Centre for Tropical Agriculture	Mukankusi	Clare	Dr	Plant Breeder - Beans
66	Uganda	Ministry	Ministry of Agriculture Animal Industry & Fisheries - Katuna	Kimanga	Michael	Dr	Inspector
67	Uganda	Ministry	Ministry of Agriculture Animal Industry & Fisheries - Katuna	Rukuba	Doreen	Ms	Inspector
68	Uganda	National Research Organization	National Crop Resources Research Institute (under NARO)	Asea	Godfrey	Dr	Director-NaCCRI
69	Uganda	National Research Organization	National Crop Resources Research Institute (under NARO)	Kalule	David	Dr	Breeder - Groundnut
70	Uganda	National Research Organization	National Agricultural Research Organization	Prossy	Namugga	Dr	Plant breeder – potato
71	Uganda	Other	Heartland Global - AgVerify	Joynson-Hicks	Emma	Ms	Managing Director
72	Uganda	Regional Body	Association for Strengthening Agricultural Research in Eastern &	Kyotalimye	Miriam	Ms	Program Assistant

			Central Africa				
73	Uganda	Development Partner/NGO	ISSD Africa	Oyee	Patrick	Mr	Deputy Chief of Party
74	Uganda	Regulator	National Seed Certification Service (Under MALF)	Wanyama	David	Mr	Senior Inspector
75	Uganda	Seed Company	NASECO Seeds Limited	Rodeyns	Nicolai	Mr	Managing Director
76	Uganda	Seed Company	FICA Seeds	Tumushabe	Narcis	Mr	Managing Director
77	Uganda	Seed Trade Association	Uganda Seed Trade Association	Masereka	Nelson	Mr	Executive Secretary
78	Uganda	University	Makerere University Kampala	Tukamuhabwe	Phinehas	Prof	Genetics, Plant Breeding & Seed Systems Specialist
79	Uganda	Seed Company	Equator Seeds Limited	Okello	Tony	Mr	Managing Director
80	Zambia	Border Official	Border Control - Nakonde	Maesious	Hankanga	Mr	Plant Health Inspector
81	Zambia	Border Official	Border Control - Nakonde	Frank	Byali	Mr	Plant Health Inspector
82	Zambia	Development Partner	United States Agency for International Development	Ngoma	Harry	Mr	Food Security Specialist
83	Zambia	Development Partner	Feed the Future, Southern Africa Seed Trade Project	Makanda	Itai	Dr	Chief of Party
84	Zambia	National Research Organization	Zambia Agricultural Research Institute	Msiska	Ken	Dr	Head, Plant Quarantine and Phytosanitary Service
85	Zambia	National Research Organization	Zambia Agricultural Research Institute	Mwale	Edgar	Dr	Deputy Director
86	Zambia	Other	Transtra Limited	Muzamai	Thomas	Mr	Clearing agent
87	Zambia	Other	c/o SCCI	Sommeling	Eric	Mr	Integrated Management System Developer
88	Zambia	Regional Body	Alliance for Commodity Trade in Eastern & Southern Africa	Mukuka	John	Dr	Development Expert
89	Zambia	Regulator	Seed Control and Certification Institute	Miti	Francisco	Dr	Chief Seeds Officer
90	Zambia	Regulator	Seed Control and Certification Institute	Phiri	Nathan	Mr	Client Seeds Officer
91	Zambia	Seed Company	AfriSeed/Steward's Globe	Angomwile	Stephanie	Ms	Chief Executive Officer

92	Zambia	Seed Company	SeedCo Limited - Zambia	Muhandu	Ignatius	Mr	Export Officer
93	Zambia	Seed Company	AfriSeed/Stewart's Globe	Chikumbi	Duplessis	Mr	Administration Officer
94	Zambia	Seed Company	Kamano Seeds Limited	Daka	Dominic	Mr	Quality Assurance Manager
95	Zambia	Seed Company	SeedCo Limited - Zambia	Hanzala	Kirth	Mr	Operations Manager
96	Zambia	Seed Company	Kamano Seeds Limited	Horemans	Sylvia	Ms	Managing Director
97	Zambia	Seed Company	MRI Seed Zambia Limited	Mudenda	Given	Mr	Regulatory Manager – Zambia & Tanzania
98	Zambia	Seed Company	Kamano Seeds Limited	Mulonga	Nokutula	Ms	Sales Manager
99	Zambia	Seed Company	MRI	Chipepo	Emmanuel	Mr	Export Logistics Officer
100	Zambia	Seed Company	Zambia Seed Company Limited	Musonda	Zack	Mr	Marketing Manager
101	Zambia	Seed Trade Association	Zambia Seed Trade Association	Mwale	Watson	Dr	Chairman
102	Zambia	Regulator	Seed Control and Certification Institute	Chanda	Richard	Mr	Principal Seeds Officer
103	Zimbabwe	Border Official	Border Control - Chirundu	Lumangwa	Emmanuel	Mr	Seed Inspector Quarantine
104	Zimbabwe	Border Official	Border Control - Chirundu	Mashura	Emmanuel	Mr	Plant Inspector
105	Zimbabwe	Border Official	Border Control - Chirundu	Samho	Pointer	Mr	Plant Health Inspector

ANNEX. LIST OF ONE STOP BORDER POSTS WITH THEIR DEVELOPMENT STATUS

		Border post visited	Development Status
1	Kenya	Busia	Newly opened, One Stop Border Post
2	Kenya	Namanga	Functional One Stop Border Post
3	Rwanda	Gatuna	One Stop Border Post building construction ongoing
4	Tanzania	Nakonde	Functional One Stop Border Post
5	Tanzania	Namanga	Functional One Stop Border Post
6	Uganda	Busia	Newly opened, One Stop Border Post
7	Uganda	Katuna	One Stop Border Post building construction halted due to lack of funding
8	Zambia	Chirundu	Functional One Stop Border Post
9	Zambia	Nakonde	Functional One Stop Border Post
10	Zimbabwe	Chirundu	Functional One Stop Border Post

ANNEX 3. IMPORT AND EXPORT DATA

Table 6:
Import and Export Volumes of Focus Crops in Focus Countries, 2015 - 2017 (MT)

	IMPORTS			EXPORTS		
	2015	2016	2017	2015	2016	2017
KENYA						
Maize	4,947	4,977	4,530	3,130	2,761	5,249
Sorghum	0	1	9	0	151	121
Soybean	0	0	2	0	0	0
RWANDA						
Maize	1,720	1,165	2,084	0	0	0
Sorghum	0	0	0	0	0	0
Soybean	500	210	200	0	0	0
TANZANIA						
Maize	15,361	13,903	18,560	*	*	*
Sorghum	5	<1	0	*	*	*
Soybean	2	0	0	*	*	*
UGANDA						
Maize	**	**	**	**	**	**
Sorghum	**	**	**	**	**	**
Soybean	**	**	**	**	**	**
ZAMBIA						
Maize	8,682	335	569	18,843	14,040	23,744
Sorghum	0	49	9	0	0	0
Soybean	0	880	1,001	0	1	0
Note that Kenya and Zambia export data is based on seed issued with ISTA certificates						

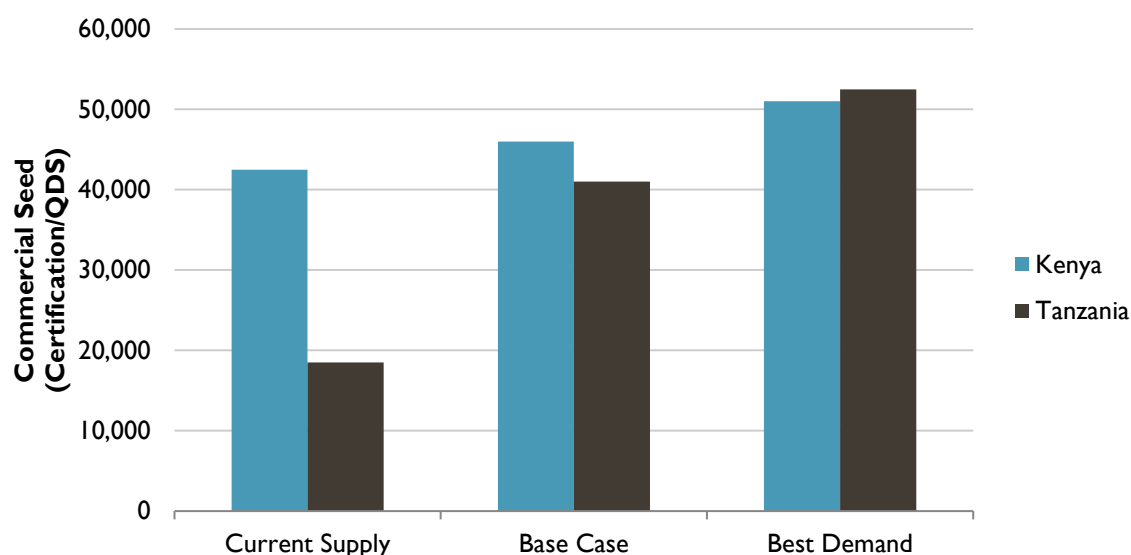
* Tanzania declined to provide any export data. However, export amounts are estimated to be zero to low, as Tanzania in the past has forbidden exports in order to meet local demand.

** Uganda has not yet provided import or export data despite repeated requests. It is likely that export amounts are low relative to total supply, and primarily driven by humanitarian tenders, e.g. from FAO. Import volumes relative to overall supply are not known.

ANNEX 4: REGIONAL DEMAND AND SUPPLY COMPARISONS

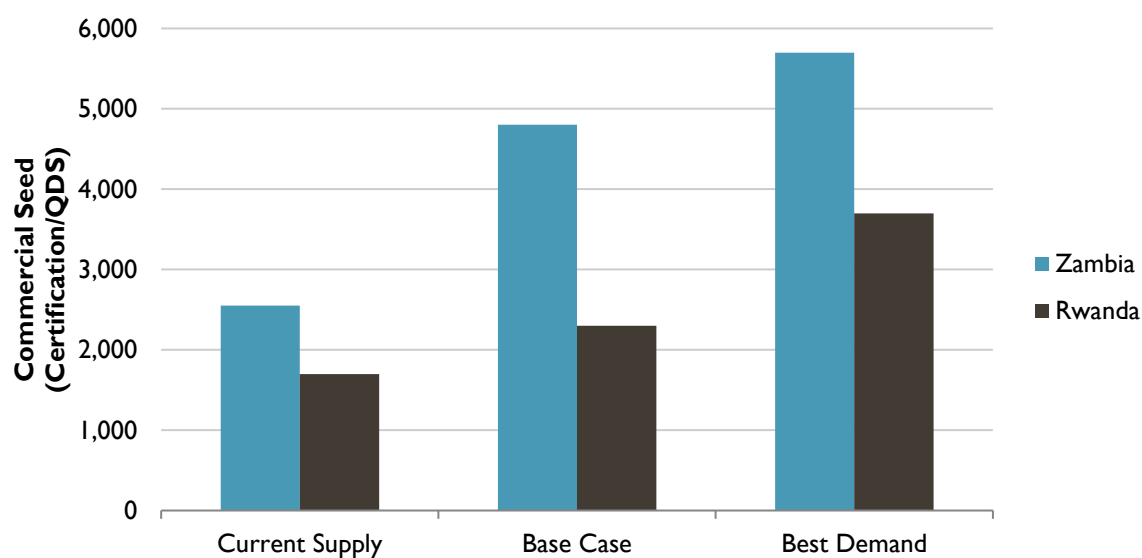
Graph 7:

Kenya vs. Tanzania - Hybrid Maize Seed Demand and Supply (Potential Commercial Estimates - MT)



Graph 8:

Rwanda vs. Zambia – Bush Beans Seed Demand and Supply (Potential Commercial Estimates - MT)



ANNEX 5. SEED TRADE-RELATED PROGRAMS IN EAST AFRICA

PROGRAM	DEVELOPMENT PARTNER	DESCRIPTION
AGRA-SSTP	USAID	Supported development of prototype COMESA Regional Seed Catalogue
ASARECA	USAID	Supported harmonization of seed trade in East Africa, exchange visits between countries, determining regulatory gaps and differences, establishing eastern Africa seed committee. ASARECA is currently staffed by one seed specialist.
COMSHIP	USAID, DFID/UKAID, EU	Supported harmonization of seed regulations, production and distribution of gazetted COMESA Seed Trade Harmonization Regulations, convening and coordination of committees, national launch in COMESA countries, national variety release committee establishment, institutional and human capacity building, awareness creation and sensitization of COMESA seed systems, seed industry information system development, ACTESA Seed Expert, M&E Officer and Project Assistant.
	FAO	Supported ECOWAS and SADC Seed harmonization
FoodTrade ESA project	DFID/UKAID	Domestication of COMESA Seed Trade Harmonization Regulations in ESA including support for regional seed committee, regional seed catalogue, information system. The program has since ended. Staff were not available for interviews.
	IFC	Supported domestication of seed laws in Kenya, harmonization of EAC seed standards for maize, sorghum, sunflower, groundnuts and soybean, and study to assess the level of domestication of these standards
Opening seed markets in EAC	World Bank	Supported developing EAC Seed Standards through regional working group meeting
Seeds2B	Syngenta Foundation and USAID	Support to improve the seed sector in Zimbabwe, Malawi, Senegal and Mali with the African Agricultural Technology Foundation (AATF) through the Seeds2B project. Recently launched a USAID-funded through a GDA titled: "Building Equitable Partnerships of Technology Transfer of In-demand Publicly-bred Technologies in Sub Saharan Africa."
SADC Seed Security Center	USAID	SADC Seed Harmonization process

ANNEX 6: RECENT AND ONGOING SEED SUBSIDY PROGRAMS IN THE FOCUS COUNTRIES

Country	Name of Seed Subsidy	Description
Kenya	Kenya Cereal Enhancement Program (KCEP)	- Phase I ran from April 2014 to December 2017 and focused on western Kenya - Phase II expanded to cover drier regions of eastern Kenya - Applies the e-voucher system - Has been faced with considerable delays in providing inputs through the program
Rwanda	Government seed subsidy	- Government runs a subsidy voucher system granting farmers access to certified seed and fertilizers in order to improve agricultural productivity - Includes seed of maize, soybean and wheat - Distribution is through government outlets
Tanzania	National Agricultural Input Voucher Scheme (NAIVS, 2008/09-2012/13 and again in 2015/16)	- Each eligible household (HH) received inputs (seed and fertilizer) enough for 0.4 ha - Subsidy approx. 50% of the input market price - HH received fertilizer, plus one seed voucher - Reintroduced NAIVS in 2015/2016 – the model did not work and there is no current subsidy - Payments to private sector input suppliers were delayed for up to two years, causing considerable damage to seed company cash flows
Uganda	Government seed subsidy	- Government heavily involved in seed supply; major buyer of seed from private companies - Subsidy managed through Operation Wealth Creation under the office of the President and the National Agricultural Advisory Services (NAADS) under MAAIF - Seed in subsidy program often has quality issues
Zambia	Farm Input Subsidy Program (FISP)	- In 2009, former fertilizer subsidy program changed to include 20 kg of maize seed - In 2015, government of Zambia allocated 55% of its agriculture budget to the Farm Input Subsidy Program (FISP) - Electronic voucher system introduced in 2015/2016, which gave farmers choice of seed variety and supplier - However, delays in payments to private sector input suppliers have been a big issue, together with reluctance by banks to advance credit for the electronic voucher system

Source: Author's Compilation, and J. Ariga, IFDC, 2016 for Tanzania

ANNEX 8: REGIONAL SEED POLICY HARMONIZATION EFFORTS

Efforts to improve the enabling environment for seed trade in sub-Saharan Africa have been underway for many years. In particular, RECs have worked to harmonize seed regulations and policies among their member countries to facilitate and boost seed trade. The earliest REC to begin this work was SADC, which started talks on regional seed harmonization in the mid-1980s (Kuhlmann, 2015) and later, Seed Security Network Project (SSSN I) in 2006. This work resulted in the approval of a Memorandum of Understanding by member states, and the adoption a harmonized seed regulatory system. Other RECs, including the EAC, ECOWAS, and COMESA followed suit, and are currently in the process of creating and adopting harmonized seed rules. COMESA is the most recent to have begun the work of harmonization, and has been able to use the experience of other RECs to guide its efforts (Keyser, 2013).

The intent to harmonize seed policies within COMESA was declared in 2008, and draft seed trade regulations were approved in 2013 (Kuhlmann, 2015). The COMESA Seed Trade Harmonized Regulations was consequently published in 2014.

Prominent examples of initiatives undertaken by RECs to harmonize seed regulations include:

1. Ministers of agriculture in member countries have signed EAC regional policy directives from the policy sectorial council on agriculture policy. Unfortunately, this process stalled after the drafting stage, which has slowed down the process of getting harmonized seed regulations. EAC has also developed a framework that guides stakeholder approach to issues of concern, and this process is being supported by USAID.
2. SADC is implementing the harmonized seed regulations, and has launched the regional variety release and registration system. SADC is developing an online application system for the regional seed catalogue. SADC intends to pilot their seed label in 2018. SADC has also focused on building awareness about harmonized seed regulations, and has made presentations in Malawi, Zambia, and Zimbabwe, with the aim of developing a shared understanding and commitment among stakeholders. In addition, SADC established the SADC Seed Committee in 2016.
3. COMESA has made efforts to advance the awareness, domestication, and adoption of the harmonized seed regulations. Six-member states have harmonized their domestic regulations, with Zambia receiving legal assent in late March 2018, during the course of the field work for this study. Advanced discussions are ongoing with the Democratic Republic of Congo, Malawi, and Ethiopia to harmonize their regulations this year. Ethiopia has already aligned her certification processes, but is yet to align the phytosanitary systems. Table 7 below summarizes the status of COMESA member states with regard to the harmonized seed regulations.

Table 6:

Status of COMESA Member States Alignment with Harmonized Seed Regulations

COUNTRY	STATUS OF COMESA HARMONIZED SEED REGULATIONS
Kenya	Gazetted
Rwanda	Gazetted
Tanzania	Gazetted
Uganda	Gazetted
Zambia	Draft aligned national seed regulations awaiting gazettelement

Source: ACTESA, 2017

In order to increase awareness of the harmonized seed regulations system, COMESA has produced and shared over 3,000 brochures and 13,500 copies of the harmonized regulations in 14 local languages in the COMESA region.

COMESA has developed a regional labeling approach to be taken up by private sector players, and identified a printing company from South Africa to print COMESA labels. This will be piloted in 2018.

The COMESA Seed Harmonization Plan (COMSHIP) has developed an M&E framework, with the first M&E technical working group meeting held in July 2016. COMESA plans to develop a COMESA Seed Information System (COMSIS) in collaboration with the African Seed Access Index (TASAI) and Integrated Seed Sector Development Africa project (ISSD Africa).

Once a REC adopts harmonized seed regulations, those rules must then be ‘domesticated’ through a process of adoption – including execution, tracking and reporting – at the national level in each country (Zhou, 2017). This process is made more complicated by the overlap, or lack of overlap, in membership between some RECs (see Figure 2) and their differing legal structures. Regulations may have commonalities between RECs but also may differ; creating confusion if a country belongs to more than one REC. The regulatory differences is often quite minimal, such as the color or overall visual appearance of tags used for different classes of seed, but may also be more significant, such as information required to be provided with respect to certification standards.

There have been discussions in recent years to harmonize seed regulations between RECs, such as the planned Tripartite Free Trade Area involving COMESA, SADC and EAC (COMESA and ACTESA, 2014; Kuhlmann, 2015), but these discussions have not moved forward.

Progress to harmonize seed regulations has been greater in some countries than others. As one would expect, countries with more developed seed sectors and systems have made greater strides than those with less developed seed sectors and systems. Many development partners have supported the harmonization efforts. Primary among these partners has been USAID, who has placed particular emphasis on regional harmonization of seed regulations and improving customs procedures and processes, including support of capacity building for relevant border officials. For example, USAID-Kenya and Eastern Africa and USAID Southern Africa have both supported seed sector development with funding provided to national governments and regional bodies such as COMESA.

ANNEX 9: SEED CLASS TERMINOLOGY

Seed is categorized into various classes according to where it falls on the early generation seed (EGS) spectrum and what type of quality assured seed it is. In theory, all categories of seed could be traded, but only the EGS and certified seed categories are formally traded. Others are often informally or semi-formally traded. Some categories, for example breeder seed, are shipped across borders for research, while other categories such as certified seed are shipped across borders to supply planting material for farmers in other countries. Key categories of the formal seed sector are outlined below.

Seed Class Terminology

Breeder Seed: Breeder seed is produced by or under the direction of the plant breeder who created the variety, or the breeder's successor. During breeder seed production the breeder (or an official representative of the breeder) selects individual plants to harvest based on the phenotype (physical appearance) of the plants. Breeder seed is produced under the highest level of genetic control to ensure the seed is genetically pure and accurately represents the variety characteristics identified by the breeder during variety selection.

Pre-basic Seed: Pre-basic seed is a level of seed multiplication between breeder and basic seed that is used to produce sufficient quantities of seed for basic seed production. It is generally the responsibility of the breeder to produce pre-basic seed, and production ideally occurs under very rigorous levels of genetic control.

Basic Seed: Basic seed is the descendent of breeder or pre-basic seed and is produced under conditions that ensure maintaining genetic purity and identity. When basic seed is produced by an individual or organization other than the plant breeder, there must be a detailed and accurate description of the variety that the basic seed producer can use as a guide for eliminating impurities ("off types") during production.

Early Generation Seed: This phrase has grown in use in recent years as international development interventions have focused more heavily on the seed sector. It is used to refer to breeder, pre-basic and basic seed classes, in total.

Certified Seed: Certified seed is seed that has been officially approved by a certification agency as having met specified germination and purity standards, and being the progeny of known and approved parent seed. All certified seed undergoes multiple field inspections and specified levels of sampling and testing during growing, processing and packaging.

Standard Seed: Seed of a known variety that meets minimum post-control and laboratory standards. Exact specifications for standard seed can vary by country, but are less restrictive than for certified seed.

Quality Declared Seed: In 1993, FAO produced and published specific crop guidelines as Plant Production and Protection Paper No. 117, Quality Declared Seed – Technical Guidelines on Standards and Procedures. The QDS system is a seed-producer implemented system for production of seed that meets at least a minimum standard of quality. The intent behind the QDS system is to provide farmers with the assurance of seed quality while reducing the burden on government agencies responsible for seed certification. QDS standards are generally lower than certified seed standards, but it is possible for QDS seed to be of equal quality to certified seed. QDS seed is sampled at lower levels than certified seed, often at 10%. The definition of QDS seed may vary by country.

Source: Agri Experience. 2016. *Reaching More Farmers with High Quality Seed for Drought Tolerant Crops*. Vuna Research Report. Pretoria: Vuna. Online: <http://www.vuna-africa.com>