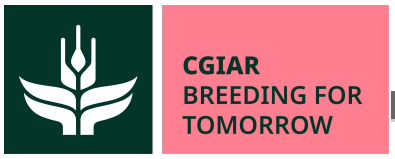

IFPRI Discussion Paper 02377

November 2025

Mapping the Design and Implementation of Seed Sector Regulation

The Case of Rwanda

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ABSTRACT

Rwanda's seed sector is changing, with clear signs of a move towards greater responsiveness to market actors and forces and new investments in the production and distribution of improved varieties and quality seed to farmers. This study examines how the country's legal and regulatory systems support—or constrain—the development and delivery of improved varieties and quality seed in light of these changes. Using a Regulatory Systems Mapping (RSM) approach, the study assesses four core areas of Rwanda's seed sector: variety registration and release, early generation seed (EGS) production and distribution, seed quality assurance, and seed trade. The analysis integrates stakeholder perspectives from across the public and private sectors, highlighting critical implementation bottlenecks, institutional coordination gaps, and areas where laws diverge from practice. Findings show that while Rwanda has made significant strides in advancing a market-oriented vision for its seed sector and aligning with regional frameworks such as the Common Market for Eastern and Southern Africa (COMESA), systemic issues persist, including limited clarity on appeals processes, underdeveloped quality control infrastructure, and insufficient support for private sector breeding and farmer-based enterprises. The study offers targeted, time-bound recommendations for improving regulatory effectiveness, promoting inclusive participation (especially by women and farmer groups), and operationalizing flexibilities that suit Rwanda's seed sector. By focusing on both regulatory design and implementation realities, this work aims to support ongoing policy reform and investment efforts in Rwanda's seed sector.

Keywords: Seed law, regulatory implementation, early generation seed, seed sector development, seed systems reform, regulatory systems mapping, Rwanda

ACKNOWLEDGMENTS

This study was conducted by the New Markets Lab (NML) in collaboration with the International Food Policy Research Institute (IFPRI) under the CGIAR Seed Equal Research Initiative and the CGIAR Breeding for Tomorrow Science Program which is supported by contributors to the CGIAR Trust Fund (https://www.cgiar.org/funders/). Additional support was provided by the Rwanda Strategy Support Program (Rwanda SSP), a joint initiative of the Ministry of Agriculture and Animal Resources (MINAGRI) and IFPRI that receives funding from the European Union, the United States Agency for International Development (USAID), and the Government of Netherlands.

The authors would like to acknowledge the invaluable input provided by stakeholders from the public and private sectors in Rwanda, including Beatrice Uwumukiza, Telesphore Ndabamenye, Jean Paul Hategekimana, Patrick Karangwa, Antoinette Mbabazi, Ildephonse Niragire, Joseph Moughan, Nizeyimana Fidele, Daniel Gies, John Mpore, Bucyana Richard, Norah Kamashazi, Kate Ojungo, Francois Nsengiyumva, John Muvara, Fraterne Kamali, Jean Paul Gafigi, Jean Bosco Safari, Anita Ingabire, Viateur Nsengumuremyi, Placide Akingeneye, Innocent Namuhoranye, Athanase Harelimana, Joy Rubirika Abesiga, George Ngarambe, Dinah Borus, Samuel Mugambi, Innocent Mugenzi, and James Warner.

Any opinions expressed here belong to the authors alone and do not necessarily reflect those of the funders listed above or the organizations with which the authors are affiliated. Any and all errors are the sole responsibility of the authors.

ACRONYMS

AGRA	Alliance for a Green Revolution in Africa
APTC	Agro Processing Trust Corporation Ltd.
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
COMESA	Common Market for Eastern and Southern Africa
COVID	Coronavirus Disease
DUS	Distinctness, Uniformity, and Stability
EAC	East African Community
ECAPAPA	Eastern and Central Africa Program for Agricultural Policy Analysis
EGS	Early generation seed
IFPRI	International Food Policy Research Institute
IPPC	International Plant Protection Convention
ISTA	International Seed Testing Association
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA
KEPHIS	Kenya Plant Health Inspectorate Service
MINAGRI	Ministry of Agriculture and Animal Resources
NAP	National Agriculture Policy
NISR	National Institute of Statistics Rwanda
NML	New Markets Lab
NPT	National performance trials
NVRC	National Variety Release Committee
NVRC	Committee Responsible for Evaluation, Certification, and Registration of Plant Varieties and their Withdrawal from the List
OECD	Organisation for Economic Co-operation and Development
OIC	Orange ISTA Certificate
PVoC	Pre-export verification of conformity
PVP	Plant variety protection
QDS	Quality Declared Seed
R&D	Research and development
RAB	Rwanda Agriculture and Animal Resources Development Board
RICA	Rwanda Inspectorate, Competition and Consumer Protection Authority
RSB	Rwanda Standards Board
RSMs	Regulatory Systems Maps
SNS	Smart Nkunganire System
SPS	Sanitary and phytosanitary standards
TASAI	The African Seed Access Index
UPOV	International Union for the Protection of New Varieties of Plants
VCU	Value for Cultivation and Use

1. LEGAL AND REGULATORY FRAMEWORKS FOR SEED SECTOR DEVELOPMENT

A well-functioning seed sector depends on a legal and regulatory system that is transparent, coherent, and adaptable. At its core, such a system encompasses national policies, legislation, implementing regulations, and technical guidelines that collectively shape how seed is developed, certified, marketed, and accessed. These instruments govern a range of processes from plant breeding and varietal release to quality assurance and cross-border trade, and they define the roles and responsibilities of breeders, producers, traders, and public institutions. In many low- and middle-income countries, legal frameworks for seed are in place, but their structure and implementation vary widely in terms of clarity, inclusiveness, and institutional coherence.

Strong legal design, rooted in principles of good governance and informed by regional and international standards, can help reduce regulatory complexity, enhance market access, and support the delivery of quality seed through both formal and informal channels. Clear and inclusive rules also foster trust and participation among stakeholders, reduce transaction costs, and create conditions favorable to private investment and innovation (Kuhlmann, 2015). In turn, this can lead to broader adoption of improved varieties, more efficient distribution systems, and measurable gains in food security, livelihoods, and national economic growth. Importantly, effective seed regulation also plays a foundational role in regional integration by aligning national systems with shared trade and quality standards, enabling greater mobility of seed products and contributing to the development of regional markets across Africa.

Rwanda's seed regulatory framework has undergone major changes during the past five years. While there are no specific policy instruments relating directly to seed sector development in the country's overarching Vision 2050 and the First National Strategy for Transformation (NST1) (2017-2024), the country's National Agriculture Policy (NAP) (2017) includes several policy statements relating to the seed industry. The Fourth Strategic Plan for Agriculture Transformation (PSTA4) (2018-24) and, most recently, the Fifth Strategic Plan (PSTA5) (2024-2029) and the Second National Strategy for Transformation (NST2)

(2024-2029) are more articulate on targets for farmer adoption of improved varieties, national seed industry development, and local seed production.

Historically, the government has been the main actor in Rwanda's formal seed sector, playing a central role in crop improvement, varietal release, seed production, seed distribution, and extension service provision. The NAP and fourth and fifth PSTAs encourage a shift in the role of government toward establishing an enabling environment for a more private sector-led industry. Evidence of this shift is most notable in Seed Law No. 005 (2016), which covers key areas in seed sector development, including plant variety evaluation, registration and release, plant variety protection and plant breeders' rights, seed production and certification, and seed import, export, and marketing. The Seed Law is supported by several ministerial orders that provide detailed guidelines on the implementation of various aspects (Table 1). In addition to regulatory reforms, the Government of Rwanda has taken various initiatives to improve the enabling regulatory environment for the seed sector. These efforts include permitting private seed companies to sell seed directly to farmers, rather than requiring them to sell through government entities; the creation of the seed certification agency, the Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA); funding public research to develop of improved varieties of key staple food crops; and the creation of a subsidy program that increases farmers' access to improved varieties, especially for maize. Some of these efforts, like the Crop Intensification Program, date back to 2009, while others are newer, such as the Ministerial Orders described in Table 1.

In recent years, the Government of Rwanda has initiated regulatory reforms aimed at aligning its national seed sector with broader regional and international frameworks. Regionally, Rwanda is working toward compliance with the Common Market for Eastern and Southern Africa (COMESA) Seed Trade Harmonisation Regulations adopted in 2014, as well as proposed harmonized seed regulations under the East African Community (EAC). These frameworks are designed to promote consistency in seed quality standards, streamline variety release procedures, and facilitate cross-border trade in certified seed. At the international level, Rwanda's legal commitments extend to various multilateral agreements. As a member of the World Trade Organization (WTO), Rwanda is bound by the Agreement on the Application of

Sanitary and Phytosanitary Measures (SPS Agreement), which establishes common principles for protecting human, animal, and plant life through trade measures. Rwanda is also subject to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement), which requires that member states establish minimum legal standards to protect intellectual property rights, including protection of plant varieties through patents, a *sui generis* regime, or a combination of both. Rwanda is currently exploring pathways to fulfill these obligations. In terms of plant variety protection specifically, Rwanda has initiated the process of accession to the International Union for the Protection of New Varieties of Plants (UPOV). Although not yet a formal member, Rwanda has begun aligning its national legal framework with UPOV's standards for granting and enforcing plant breeders' rights. These efforts signal a broader commitment to building a legal environment that supports innovation, expands access to improved seed varieties, and integrates Rwanda more fully into regional and global seed markets. However, in doing so, it will remain important that Rwanda also balances legal protections for its many smallholder farmers.

Table 1. Policy and regulatory instruments governing Rwanda's seed sector

Instrument	Year	Primary contribution
A. Public policies and strategies		
First National Strategy for Transformation (NST1) (2017-2024)	2017	Promotes research and development of new varieties and sets broad targets for improved variety use by farmers
National Agriculture Policy	2017	Provides a guiding framework upon which the legal and regulatory framework for the agricultural sector is based
Fourth Strategic Plan for Agriculture Transformation 2018-24	2018	Elaborates priority actions and plans for the government in relation to the agricultural sector; sets targets for improved variety use by farmers
Second National Strategy for Transformation (NST2) (2017-2024)	2024	Promotes seed self-sufficiency through local production; sets broad targets for improved variety use by farmers
Fifth Strategic Plan for Agriculture Transformation 2024-2029	2024	Elaborates priority actions and plans for the government in relation to the agricultural sector, including seed industry development and national seed production and self-sufficiency; sets targets for improved variety use by farmers
B. Laws		
Law Governing Seeds and Plant Varieties in Rwanda	2016	Consolidates national rules on plant variety evaluation and registration, seed quality assurance, and plant variety protection and plant breeders' rights.
Law on Plant Health Protection	2016	Provides for strategies meant to control and contain the establishment of pests or diseases and matters related to living organisms.
Law Establishing Rwanda Inspectorate, Competition and Consumer Protection Authority and Determining its Mission, Organisation and Functioning	2017	Establishes RICA and defines its quality assurance role in the seed industry.
Law Establishing Rwanda Agriculture and Animal Resources Development Board and Determining its Mission, Organisation and Functioning	2017	Establishes RAB and defines its research development and extension roles in the seed industry.

Instrument	Year	Primary contribution
C. Ministerial Orders		
Ministerial Order Determining the Modalities for the Assignment and Transfer of Plant Breeder's Rights	2017	Establishes regulations on the assignment and transfer of plant breeders' rights.
Ministerial Order Determining the Modalities for Testing the Distinctness, Uniformity and Stability of Plant Variety	2017	Establishes regulations for testing the distinctness, uniformity, and stability of plant variety.
Ministerial Order Presenting the Format and Content of the Register in Which all Information Related to the Plant Breeder's Rights is Recorded and the Conditions for Having Access to Such Information	2017	Establishes rules on recording plant breeders' rights and access to such information.
Ministerial Order Establishing the Criteria for Recognizing a Seed Testing Laboratory	2017	Establishes criteria to be met by a seed testing laboratory prior to being recognized.
Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates	2017	Establishes rules on seed quality assurance.
Ministerial Order with Requirements for a Person to be Granted a License for Importing and Exporting Seeds	2017	Establishes criteria to be met prior to authorization to import and export seed.
Ministerial Order Establishing the Information that a Quality Seed Label and Container Have to Bear and the Criteria for Putting Seed Varieties in Categories and the Colors of Labels for Each Category	2017	Establishes rules on seed labeling.
Ministerial Order with Requirements for a Person to be Authorized to Become a Quality Seed Producer, Conditioner or Dealer	2017	Establishes criteria to be met prior to registration as a seed dealer.
Ministerial Order Establishing the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format.	2017	Establishes rules on evaluation of varieties prior to registration.
Ministerial Order Establishing the Organization and Functioning of the Committee Responsible for Evaluation, Certification, and Registration of Plant Varieties and their Withdrawal from the List	2017	Establishes modalities for the operation of the national variety release committee

Instrument	Year	Primary contribution
Ministerial Order determining modalities for importation of a pest, a plant or a plant product for scientific and research purposes and modalities for inspection of the plant or plant product and the format of the phytosanitary certificate	2017	Providing procedural guidelines on the implementation of the provisions related to plant health protection under the main law.
Ministerial Order determining modalities and time limits for confining any means of conveyance and action to be taken with regard to unlawfully imported plants, plant products and regulated articles	2017	
Ministerial Order determining a list of plants or plant products that do not require a license or a phytosanitary certificate for importation	2017	
D. Regional instruments		
COMESA Seed Trade Harmonisation Regulations	2014	Establishes regional seed rules on variety registration and release, seed certification, and trade.

Source: Authors

Rwanda's seed regulatory system is shaped not only by national laws and policies but also by technical guidance and standards set by key international organizations. These global frameworks offer reference points for quality assurance, biosafety, and genetic resource use. For example, Rwanda draws on the seed schemes developed by the Organisation for Economic Co-operation and Development (OECD), and it follows seed testing and certification guidelines issued by the International Seed Testing Association (ISTA). The country also references phytosanitary protocols under the International Plant Protection Convention (IPPC), a standard-setting body recognized under the WTO SPS Agreement. In addition, Rwanda aligns with the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which governs access to and fair use of genetic materials globally. Aligning domestic laws with these frameworks helps Rwanda enhance the credibility and marketability of locally produced seed, while also fostering innovation and facilitating cross-border seed movement (Kuhlmann, 2015). This alignment is particularly important as Rwanda seeks greater participation in regional seed markets and looks to scale the adoption of improved varieties.

To assess how Rwanda's legal and regulatory framework functions in practice, this study applies a Regulatory Systems Mapping (RSM) methodology. The RSM tool visually illustrates regulatory processes—from the design of rules to their day-to-day enforcement—and helps identify where systems break down or diverge from legal intent. Unlike static legal reviews, RSMs offer a dynamic picture of how institutions interact, where delays occur, and how actors experience regulation differently (Kuhlmann 2025; Kuhlmann et al., 2023, 2022, 2017, 2025). The RSMs focus on smaller innovations and interventions, which can be referred to as "micro-interventions" (Kuhlmann, 2025, 2023), which can make Rwanda's system unique and fit-for-purpose, even as it aligns with broader international legal principles and requirements (Kuhlmann, 2021; Kuhlmann and Dey, 2021).

The analysis is grounded in both desk-based legal research and stakeholder consultation, conducted between mid-2023 and early 2024. Interviews with seed companies, public officials, researchers, and farmer organizations helped validate the maps and provided practical insights into how rules are applied or bypassed in real-world settings. The resulting RSMs translate complex legal instruments into simplified

visual narratives that enable clearer understanding, monitoring, and decision-making (Kuhlmann 2025; Kuhlmann et al., 2023, 2022, 2025; Kuhlmann, 2021; Kuhlmann and Dey, 2021).

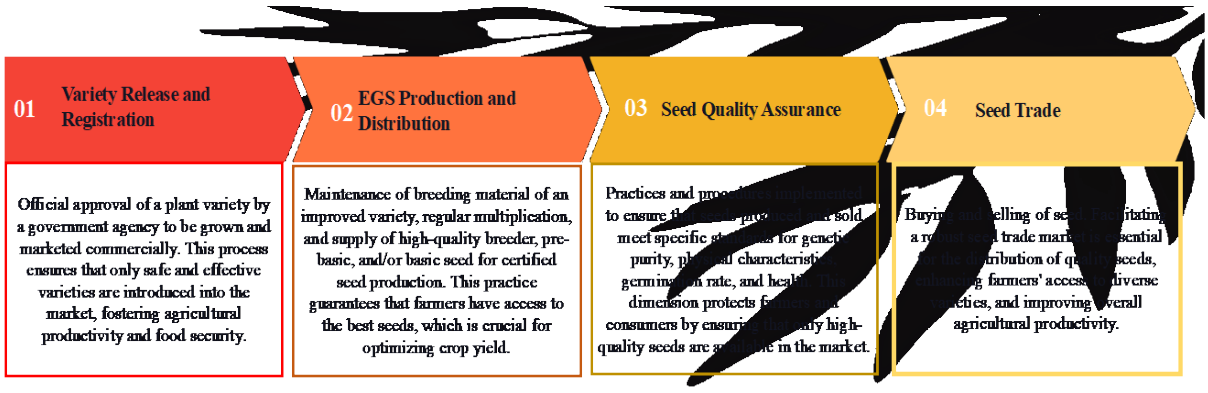
The remainder of this paper is organized to guide the reader through the analytical approach, findings, and policy implications of the study. Section 2 outlines the methodological framework used in the research, with a particular focus on how RSM was applied to evaluate the structure and function of Rwanda's seed laws and regulations. It also sets the legal and institutional context, including relevant policies, legislative instruments, and stakeholder roles. Section 3 presents the main results of the mapping process, organized around four critical domains of the seed regulatory system: (i) the procedures for variety registration and release, (ii) the production and distribution of early generation seed, (iii) the mechanisms for ensuring seed quality, and (iv) the rules governing seed trade and import/export processes. Within each domain, the analysis identifies good practices, implementation challenges, and inconsistencies between law and practice. Section 4 develops a set of targeted policy and regulatory recommendations aimed at improving system functionality and inclusiveness. These recommendations are grounded in legal analysis and stakeholder insights and are intended to support both near-term reforms and longer-term regulatory evolution. This section also concludes by summarizing the key insights from the study and reflecting on their implications for future policy development and regulatory strengthening in Rwanda's seed sector.

2. CONCEPTS AND METHODS IN LEGAL AND REGULATORY ASSESSMENTS

This study applies a systems-based methodology to assess the structure and implementation of Rwanda's seed laws and regulations. The approach builds on previous work using RSMs as a diagnostic tool for evaluating legal and institutional environments in the seed sector. Prior applications of this methodology in countries such as Uganda have demonstrated its utility in identifying gaps between legal design and practical implementation (see Kuhlmann et al., 2023; 2025; Kuhlmann, 2025; 2021). While informed by this earlier work, the present study adapts the RSM approach specifically to Rwanda's regulatory and institutional context.

For this analysis, regulatory systems maps were created to trace the processes, actors, and rules involved across four core areas of a seed sector: (i) variety registration and release, (ii) the production and distribution of early generation seed (EGS), (iii) systems for seed quality assurance, and (iv) seed trade, including import and export procedures (Figure 1.1). Each is discussed in detail below. These maps serve not only as visual tools for unpacking legal complexity but also as analytical frameworks for identifying points of regulatory friction, gaps in coordination, and opportunities for reform.

Figure 1.1 Four key regulatory dimensions of the Rwandan seed value chain



Source: New Markets Lab

The underlying data for the maps were gathered through a combination of desk-based legal review and direct engagement with stakeholders from across Rwanda's seed sector. Participants included representatives from public institutions, private seed enterprises, non-governmental organizations, and

farmer groups. Their insights were used to validate the accuracy of the maps, enrich the analysis with practical perspectives, and highlight implementation realities that may not be evident in the legal texts alone.

Throughout this analysis, due consideration is given not only to the formal seed system but also to the farmer-based systems and integration between the two systems (Louwaars et al., 2013; Louwaars and Boef, 2012). Farmer-based systems are important to consider at each step. For example, can farmers or farming communities register varieties in recognition of their stewardship of genetic resources over time (Otieno et al., 2023; De Jonge et al., 2021)? Are there quality assurance standards that can be met by farmer-based enterprises, cooperatives, or women farmers' organizations (Kuhlmann et al., 2023; Mastenbroek et al., 2021; Kuhlmann and Dey, 2021)? Can farmer-based enterprises, cooperatives, and rural producer organizations engage in seed production and trade?

Application of a Systems-Based Approach to Regulatory Mapping

To assess Rwanda's seed regulatory framework in a comprehensive and actionable way, this study applies a systems-based methodology grounded in five key components (Figure 2.1). These elements span legal analysis, stakeholder engagement, comparative benchmarking, and forward-looking design. While the approach draws on prior applications of RSMs (Kuhlmann, et al., 2023, 2019, 2016; Kuhlmann 2025, 2021), it has been adapted here to reflect the unique institutional and legal context of Rwanda's seed sector and to ensure meaningful participation by local actors at every stage of the process.

a. ***Holistic Legal and Regulatory Review.*** The first step involved a broad review of legal texts governing the seed sector, including primary laws, regulations, ministerial orders, and administrative procedures. This review extended beyond seed-specific rules to include relevant frameworks at the national, regional, and international levels—such as laws on plant health, trade, intellectual property, and environmental protection. Rather than viewing legal instruments in isolation, this step analyzed the interplay of rules, responsibilities, and institutions across the value

chain. The maps generated from this review highlight both the formal structure of regulation and areas where procedural clarity or coordination may be lacking.

b. ***Stakeholder Engagement and Field-Level Validation.*** Consultations with stakeholders were central to capturing the real-world implementation of legal rules. Between August and December 2023, the research team conducted structured interviews with 28 stakeholders from across Rwanda's seed sector. Participants included private seed companies, agro-dealer associations, international research centers, development partners, public breeders, and regulatory authorities such as the Ministry of Agriculture and RICA. Interviews were tailored to explore how legal and regulatory processes operate in practice, where gaps exist between written law and institutional behavior, and how legal reforms might better reflect on-the-ground realities. These perspectives were used to validate the RSMs and to identify shared priorities for reform.[1]

c. ***Regional and International Benchmarking.*** The study incorporated relevant regional and global standards to place Rwanda's seed framework in a broader legal context. For example, regulatory elements from the COMESA Seed Trade Harmonisation Regulations, the EAC's draft seed rules (AGRA 2023), and international bodies such as the OECD, the ISTA, and UPOV were referenced. This allowed for cross-comparison of domestic law with established international practices, revealing both points of convergence and areas requiring alignment (Kuhlmann, 2025, 2021).

d. ***Focus on Inclusion and Innovation.*** One important goal of the mapping process was to assess the extent to which Rwanda's legal framework supports inclusive participation. This includes identifying how different groups, such as smallholder farmers, women, youth, and community-based seed enterprises, are represented within the system and how flexible or adaptable the law is to their needs (Kuhlmann et al., 2023; Kuhlmann, 2025, 2021). The maps also surface legal innovations and design features that promote equity, reduce barriers to entry, or support

[1] Subsequent updating was conducted in 2025 following circulation of the Second National Strategy for Transformation (NST2) (2017-2024) and Fifth Strategic Plan for Agriculture Transformation 2024-2029.

collaboration between formal and informal actors in the seed sector (Kuhlmann et al., 2023, Kuhlmann 2025, 2021; Kuhlmann and Dey, 2021).

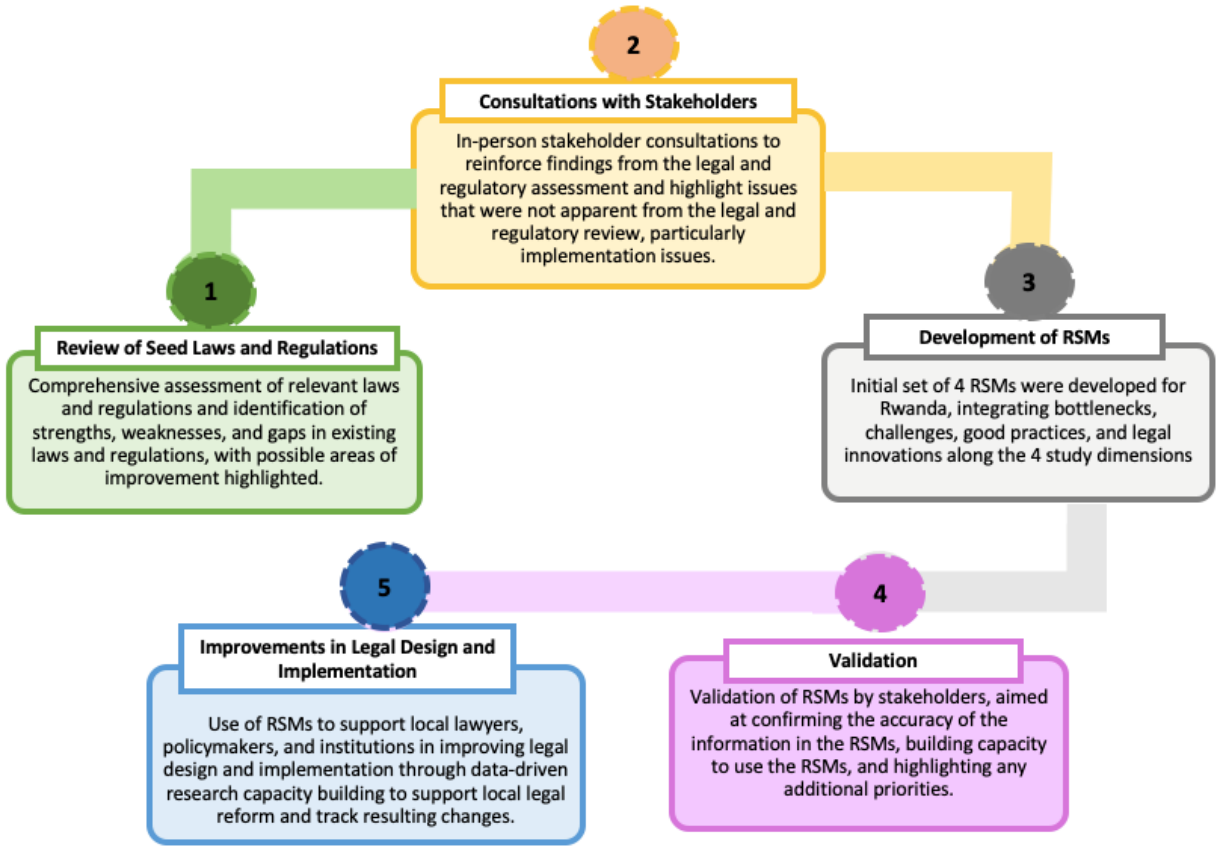
e. ***Use of RSMs to Support Legal Design Improvement Pathways.*** The final step focused on translating the findings into practical pathways for regulatory improvement. The RSMs were designed not only as diagnostic tools but also as guides to help local institutions and policymakers enhance legal clarity, streamline procedures, and build capacity for enforcement. In December 2023, draft findings and recommendations were shared with key public and private stakeholders for review and validation. Their input was used to refine both the maps and the reform proposals.

Together, these five components form the basis for developing Rwanda's RSMs across the four primary regulatory dimensions studied. Figure 2.1 outlines the overall process, while the maps themselves are presented in Figures 3 through 6.

Formulating Recommendations

The final stage of this study involves translating the insights gained from the regulatory mapping process into a set of actionable recommendations. These proposals are designed to support more coherent, inclusive, and efficient regulation across Rwanda's seed sector. The recommendations respond directly to challenges identified during the analysis and are categorized by timeframe—short-term actions that are already under discussion or can be implemented quickly; medium-term steps requiring additional development or coordination; and long-term reforms that may demand broader legal or institutional change. Two guiding principles shape the recommendations: the need to enhance inclusivity and flexibility within the regulatory framework, and the importance of providing clear decision points for public and private actors involved in seed sector governance. Recommendations are organized into the four thematic areas noted below.

Figure 2.1: Approach for developing RSMs



Source: New Markets Lab

Clarifying and Operationalizing Existing Legal Instruments. Some of the procedures outlined in Rwanda's seed laws and Ministerial Orders remain ambiguous or lack the detail needed for practical implementation. In these cases, the recommendations focus on developing or refining supporting regulations, technical directives, and operational guidelines. Special attention is paid to ensuring alignment with Rwanda's regional commitments, particularly the COMESA Seed Trade Harmonisation Regulations.

Addressing Gaps Between Law and Practice. In many instances, stakeholders reported discrepancies between what is written in law and how regulatory processes are applied in reality. Recommendations in this category aim to improve transparency, consistency, and accessibility of the regulatory system, particularly for small and mid-sized actors who often face disproportionate compliance burdens. These suggestions also underscore the importance of regulatory outreach and simplified procedures.

Promoting Good Regulatory Practices. This set of recommendations supports the adoption of legal and administrative practices that strengthen regulatory performance. These may include improved coordination among institutions, clearer timelines for regulatory approvals, or the use of digital tools to streamline inspections and data collection. Where relevant, these practices are informed by regional models and international benchmarks that promote efficiency, accountability, and legal certainty.

Incorporating Flexibility and Local Adaptation. Recognizing that seed systems are not static, the recommendations also emphasize the importance of flexibility in regulatory design. This involves creating space for context-specific solutions, such as tailored licensing pathways, pilot programs for informal seed actors, or transitional measures to bring legacy systems into compliance. Flexibility also enables adaptation over time as the sector evolves and new actors, technologies, or market demands emerge.

Collectively, these recommendations are intended to inform ongoing policy dialogue, legislative refinement, and programmatic support for Rwanda's seed sector. They are rooted in stakeholder perspectives and tailored to the country's institutional realities, while also drawing on broader trends in regional and international seed sector development.

Importantly, the methodology itself offers value beyond Rwanda. The systems-based approach, and in particular the use of regulatory systems maps, provides a replicable framework that can be adapted to other national contexts. Its feasibility lies in the balance it strikes between rigor and practicality; because it relies primarily on desk-based legal review and focused stakeholder consultations, it is less resource-intensive than large-scale field studies. Replication in other countries is, therefore, achievable within a relatively modest budget and a timeframe of several months or longer, provided that legal texts are accessible and a representative group of stakeholders can be engaged. This makes the approach especially suitable for cross-country comparisons and for advancing regional harmonization processes. All graphics used in this report have been reviewed, and permissions have been verified where necessary. Graphics adapted from prior work are fully attributed to their original sources to ensure compliance with citation and use standards.

3. FINDINGS

Despite the presence of a well-developed legal framework governing Rwanda's seed sector, the system faces persistent challenges in execution. Practical constraints, regulatory ambiguities, and uneven enforcement have contributed to gaps between the intent of the law and its implementation on the ground. Although the National Agriculture Policy includes some reference to the seed sector, primarily emphasizing the development of improved varieties and encouraging greater private sector participation, its coverage is relatively limited. Notably, the policy was adopted after the enactment of the Seed Law and its implementing Ministerial Orders, creating a degree of misalignment in sequencing between legal and policy instruments. It does not provide a guiding framework for the seed legal and regulatory environment as it should. The Law Governing Seeds and Plant Varieties in Rwanda of 2016 was the first legal instrument created to regulate the seed industry in a period of transition from government dominance to private sector engagement. There are a few gaps in the law and its subsequent regulatory instruments. For instance, the appeals process for administrative decisions made under the seed law and ministerial orders is not well defined, making the process unclear for those who might want additional clarity on judgements. In addition, the Ministerial Order on Determining Procedures for Seed Inspection and Granting of Seed Quality Certificates provides for payment of prescribed fees to get seed certified, but no fee schedule is available.

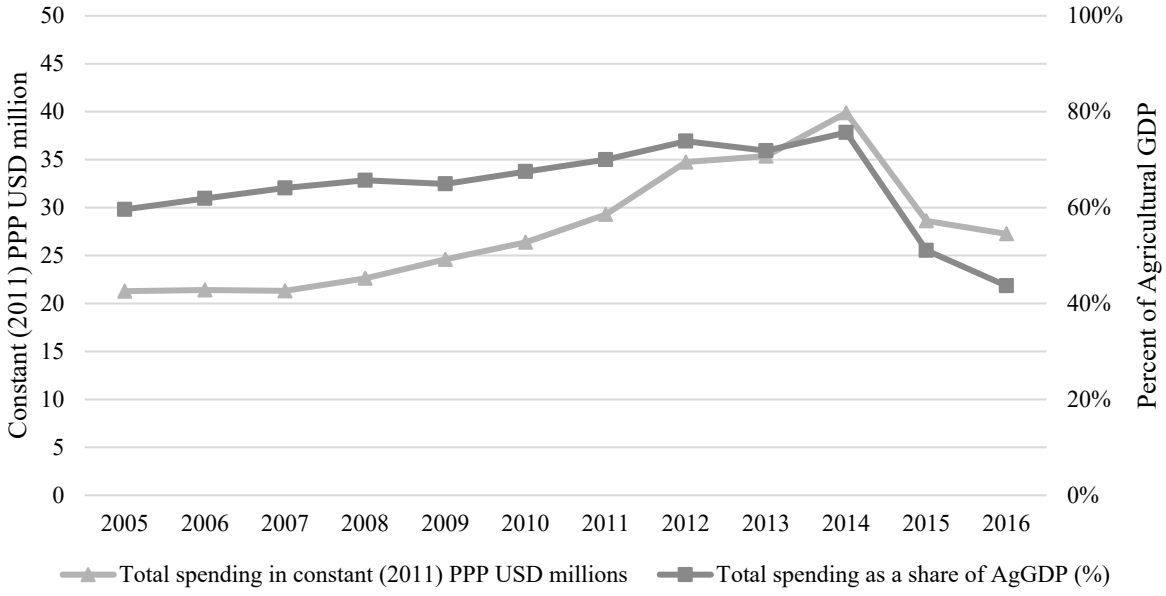
To support a more robust seed trade environment in Rwanda, additional regulatory instruments and operational guidelines are needed. These may include clearer procedures for accessing and distributing EGS, frameworks for increased private sector participation in plant breeding and research, and formal mechanisms for reporting and addressing cases of counterfeit or substandard seed in the market. The absence of clear standards for several key crops further limits the effectiveness of current seed governance, as elaborated in subsequent sections.

Beyond regulatory gaps, the study also reveals persistent challenges related to implementation across all four areas assessed. Despite commendable steps taken by the government to strengthen institutional capacity, particularly within seed oversight bodies, operational limitations remain. RICA

continues to face resource and staffing constraints, especially in the recruitment of qualified field inspectors and laboratory personnel. Similarly, the Rwanda Agriculture and Animal Resources Development Board (RAB), while active in research and extension, struggles to meet the growing demand for variety evaluation and performance testing. Meanwhile, the private sector, though increasingly engaged, has not yet achieved scale in breeding programs or seed quality certification, and faces delays in accessing subsidy reimbursements that affect its operational cash flow.

These weaknesses collectively limit the performance of Rwanda's seed sector. Consequences include low farmer uptake of certified seed, fragmented coordination across the value chain, particularly in EGS, and continued circulation of counterfeit seed. Furthermore, Rwanda's national seed testing laboratory remains under-equipped and lacks accreditation from the ISTA, which restricts international recognition of seed quality standards. The broader context of declining public investment in R&D compounds these concerns, although more recent data are needed to assess trends beyond 2016 (Figure 3.1). In 2016, Rwanda's public agricultural R&D spending totaled about US$27.3 million (2011 PPP dollars), equivalent to 0.44 percent of its agricultural GDP (ASTI, 2023). This measure of "research intensity" is an important way to put R&D investments into perspective relative to the size of the agricultural sector. While Rwanda's share is slightly below the African Union/United Nations target of 1%, it is broadly consistent with the Sub-Saharan Africa average, which stood at 0.46 percent of agricultural GDP in 2014, down from 0.68 percent in 2000. In other words, Rwanda's investment effort is in line with regional peers but still falls short of the global benchmark needed to drive agricultural transformation at scale.

Figure 3.1: Agricultural R&D spending in Rwanda in constant (2011) USD at purchasing power parity exchange rates and as a share of agricultural GDP



Source: ASTI (2023).

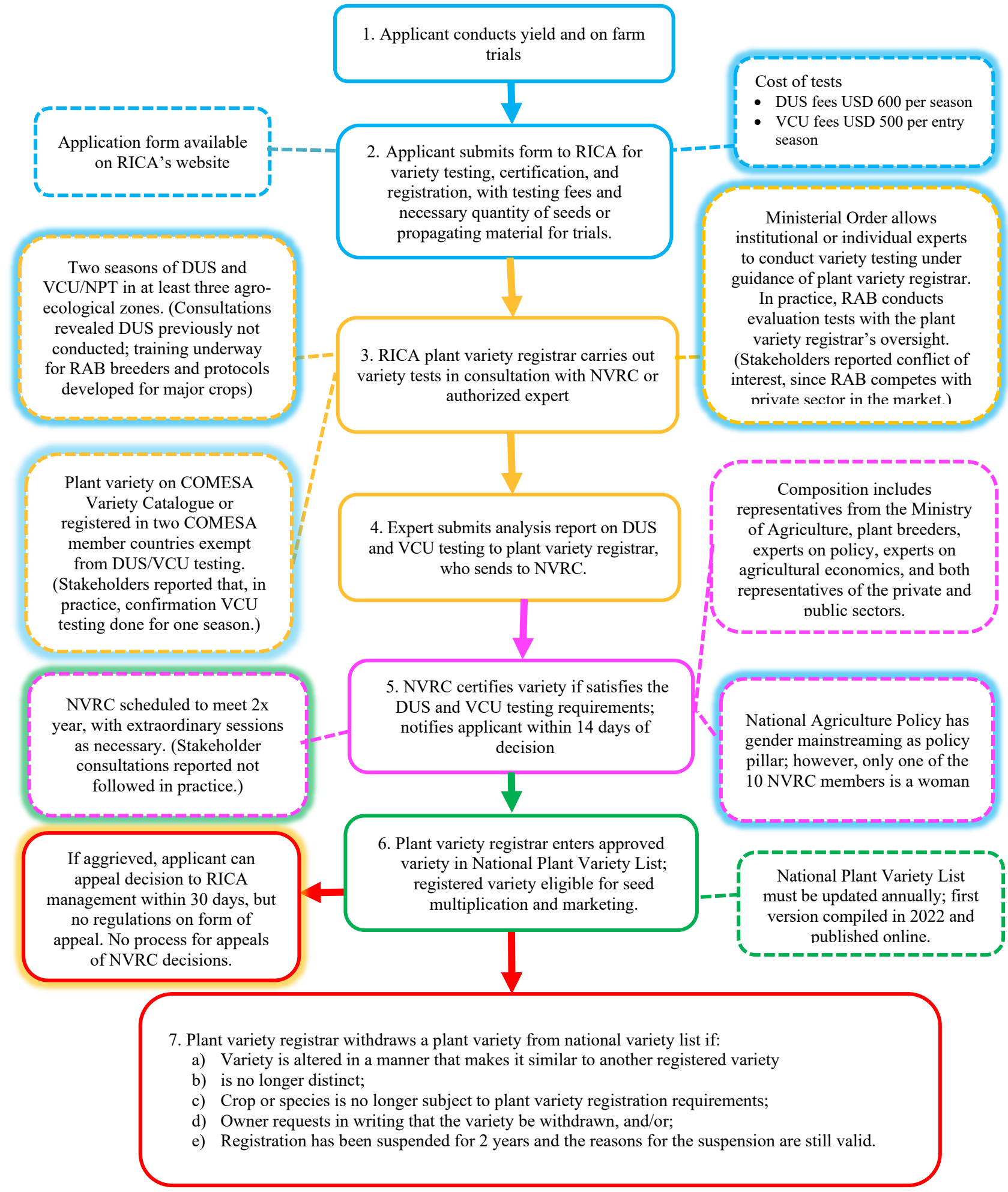
These challenges affect the availability and accessibility of quality seed: while 45 percent of agricultural households reported using improved varieties in 2020, use rates were concentrated in maize (61 percent), rice (45 percent), wheat (30 percent), and vegetables (24 percent), and much more limited for beans, soybean, Irish potato, and other crops (less than 4 per cent) (NISR, 2021). Although commercial seed markets are active for certain priority crops, the majority of Rwandan farmers continue to rely on traditional practices such as seed saving, local seed exchanges, and informal methods of varietal selection. The analysis that follows examines the legal and regulatory strengths and weaknesses of Rwanda's seed sector, highlighting both areas of concern and examples of legal or institutional innovation. The assessment is organized around four central dimensions of the seed regulatory framework: (i) the registration and release of new plant varieties, (ii) the production and distribution of early generation seed (EGS), (iii) systems for ensuring seed quality, and (iv) the regulation of seed trade, including import and export procedures. For each of these areas, the study applies RSMs to document the legal processes and institutional responsibilities involved. These visual tools also serve to highlight key findings by capturing both the formal provisions of the law and how they are experienced in practice. Color shading is used within

the RSMs to indicate where reforms may be needed, where implementation diverges from legal text, where good practices are already in place, and where Rwanda has introduced regulatory flexibilities to adapt its seed systems to local needs.

Dimension One: Variety Registration and Release

In Rwanda, as in many other African countries, the commercialization of new crop varieties requires that each variety go through a formalized process of testing, evaluation, and registration before being added to the official national variety list. This process is relatively new in the Rwandan context. The country's first national variety catalogue was only published in February 2022, marking a key milestone in formalizing variety release procedures. However, the system is still evolving, and certain procedural aspects remain under development. Oversight of the variety release process falls under the mandate of the RICA, which was also established in 2022. The newness of both the institutional and procedural framework has presented transitional challenges that require refinement and streamlining. The variety release system in Rwanda involves four main stages: (a) submission of an application for variety registration and certification, (b) performance testing of the variety under defined protocols, (c) technical review by the relevant regulatory committee, and (d) issuance of a regulatory decision followed by any required post-decision actions. These steps are illustrated in Figure 3.2 and provide the foundation for understanding current implementation bottlenecks and areas for improvement.

Figure 3.2: Regulatory Systems Map of the variety registration and release process in Rwanda



Key

Application
Evaluation and testing
NVRC evaluation and certification
Approval for release
Appeals and rejection

Process-related steps

Stakeholder experience differs from law

Good practices in the law and regulations and their implementation

Areas require further detailed regulations, directives, or guidelines

Fit-for-purpose regulatory flexibilities

Source: Authors

Legal sources

- National Agriculture Policy, 2017.
- Law No.5/2016 of 05/04/2016 Governing Seeds and Plant Varieties in Rwanda.
- Law No 31/2017 of 25/07/2017 Establishing RICA and Determining its Mission, Organisation and Functioning.
- Ministerial Order No.3/11.30 of 2017 Determining the Modalities for Testing the Distinctness, Uniformity and Stability of Plant Variety.
- Ministerial Order No.5/11.30 of 2017 Establishing the Criteria for Recognizing a Seed Testing Laboratory.
- Ministerial Order No.10/11.30 of 2017 Establishing the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format.
- Ministerial Order No.11/11.30 of 2017 Establishing the Organization and Functioning of the Committee Responsible for Evaluation, Certification, and Registration of Plant Varieties and their Withdrawal from the List.
- COMESA Seed Trade Harmonization Regulations, 2014.

The overall process for variety release and registration still contains notable shortcomings, including unclear procedures and inconsistent implementation. The sections that follow examine these challenges in greater detail, organized by each stage of the release and registration pathway.

Variety testing is the first regulatory step in the variety release and registration process. Under the Seed Law, RICA, or an institution authorized by RICA, subjects a variety to DUS and VCU testing over two growing seasons in at least three locations before the variety can be released for commercialization in the country.[2] Consultations revealed that, in practice, evaluation tests are conducted by RAB as depicted in the blue shaded box off of step 3 in Figure 3.2, which some companies noted as a potential conflict of interest considering that RAB also competes with seed companies in the market and has the most commercialized varieties. Stakeholders expressed concern regarding verifying the evaluation results that RAB submits to the Plant Variety Evaluation, Certification and Registration Committee (NVRC) and believe an independent institution would be better placed to test the varieties.

RICA has noted that after an application is submitted, it submits the variety to RAB for testing, where it oversees the process. Local seed companies noted a different process in practice, however, highlighting the absence of a formal process of application for evaluation of varieties by RAB since it is not the regulatory institution mandated to perform that role. This application process could be made clearer in the seed rules to avoid ambiguity. Instead, in practice, an interested seed company contacts a breeder responsible for a specific crop and coordinates with the breeder to assist in testing the company's variety. The company then applies to RICA with the testing results from RAB.

While the law also stipulates that the fee for DUS testing is US $600 per season for two seasons, and US $500 for VCU testing per season,[3] these official fees are not charged in practice, since tests are not done by RICA. Seed companies noted that RAB does not charge any official fees for variety evaluation. However, the interested company pays fees associated with the breeder evaluating the variety, including

[2] Ministerial Order Determining the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format §4.
[3] Ministerial Order Determining the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format §2 and Form no. 2 in Annex II.

transportation, allowances, accommodation, meals, stationary, irrigation, fertilizer, pesticide, and the like. One company noted that, since there is no official fee schedule followed by RAB, it instead improvises on the charges it sets, which turn out to be quite exorbitant, with costs reportedly reaching as high as $10,000 for either DUS or VCU for one variety (see blue shaded box off of steps 2 and 3 in Figure 3.2).

Historically, Rwanda did not conduct DUS tests, largely due to resource constraints and limited technical capacity (Mabaya et al., 2021) (see left blue shaded box off of step 3 in Figure 3.2). When the first national variety list was compiled by the NVRC in 2022, the old varieties that were already in the market had only been subjected to VCU tests, were exempted from DUS, and were registered with only VCU data. Stakeholder consultations revealed that all new varieties will now be mandated to be subject to both DUS and VCU tests prior to registration since 2023. Since 2022, RAB has been training breeders with the support of development partners like the Alliance for a Green Revolution in Africa (AGRA) and partnerships with other countries' regulators, like the Kenya Plant Health Inspectorate Service (KEPHIS), to build their capacity to conduct DUS tests. Consultations revealed that although Rwanda does not currently have DUS protocols in place, starting in 2022, breeders at RAB have been conducting DUS tests that are aligned with international variety evaluation standards under the International Union for the Protection of New Varieties of Plants (UPOV). Rwanda has also initiated discussions with UPOV to become a member, and regulators were open to developing DUS protocols starting with priority crops, given appropriate international technical support.

Developing and disseminating clear protocols for DUS and VCU testing should be prioritized to ensure that prospective breeders have the guidance needed to navigate the variety release process effectively (see left blue shaded box off of step 3 in Figure 3.2). It is a major regulatory gap that affects private sector involvement in research and breeding. RAB has some guides on conducting VCU tests, but private seed companies need definitive guidelines to fully participate.

Initiatives by the private sector, led by One Acre Fund (OAF) in partnership with the Rwanda Institute for Conservation Agriculture and with funding from the Howard G. Buffett Foundation, seek to address these issues as well as other related issues. OAF and the Rwanda Institute for Conservation

Agriculture together launched the Seed Center in October 2023 to assist RAB, RICA, and private seed companies with varietal testing, seed quality assurance, and capacity development for the seed sector and industry. This is a noteworthy advancement that should be further developed and harmonized with RICA and Ministerial Orders.

Notably, the Ministerial Order on variety evaluation expressly "adopts the COMESA procedures for certification of new and existing varieties as provided for by the Treaty for the Establishment of the Common Market of Eastern and Southern Africa,"[4] which could expedite the registration of varieties that have been registered outside of Rwanda by a competent authority in the COMESA region. Consultations revealed issues of implementation of this provision (highlighted in the second blue shaded box on the left of step 3 of Figure 3.2). While the COMESA Seed Trade Harmonization Regulations of 2014 require that a variety that is listed in the COMESA Variety Catalogue or registered in two COMESA countries be exempt from further NPT (VCU) and DUS testing, in practice, Rwanda subjects such varieties to one confirmation VCU test for one season. While this is contrary to the COMESA Seed Trade Harmonization Regulations, regulators have stressed that it is necessary to assess that the variety can perform well in Rwanda's unique agro-ecologies.

Aligning domestic law with all international seed-related agreements would be a challenge for Rwanda going forward. As a regulatory gap, the legal framework only recognizes regional rules under COMESA, yet Rwanda is also a member of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and is subject to the Agreement under ASARECA and the Eastern and Central Africa Program for Agricultural Policy Analysis (ECAPAPA, 2003) which also recommends a fast-tracked process for varietal registration in East Africa, including Kenya and Tanzania. Similar rules are under development within the East African Community (EAC), of which Rwanda is also a Partner State, under the Seed and Plant Varieties Bill. These implementation and regulatory gaps present a challenge for regional alignment and harmonization.

[4] Ministerial Order Determining the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format §5.

Evaluation is the next step in the variety release and registration process in Rwanda's system. While the process is relatively new, there have been some successes. After a variety is tested, the breeder submits the results to RICA, which then submits them to the NVRC in order for the variety to be considered for release and registration.[5] In practice, the NVRC is comprised of 10 members from both the private and public sectors. The directorate general of agricultural modernization in the Ministry of Agriculture and Animal Resources (MINAGRI) is the chair of the NVRC and the secretary chosen by the director general of RICA. The NVRC also consists of one breeder, one pathologist, one agronomist (all from RAB), two farmer representatives, one seed company representative, a legal expert from MINAGRI, and one seed business expert.[6] Notably, at the time of this assessment and its validation in 2024, out of the 10 NVRC members, only one is a woman, which does not fully reflect the pillar on gender mainstreaming under the National Agriculture Policy (see blue shaded box off of step 5 in Figure 3.2). Commendably, since the NVRC started meeting, it has been sitting for more than the two legally mandated times per year.[7] The NVRC met four times in 2021, three times in 2022, and two times in 2023 (see green shaded box off of step 5 in Figure 3.2).

The final phase of the variety release and registration process, ***Regulatory determination,*** also presents opportunities for refinement. Once the NVRC reviews and evaluates the technical data submitted by the breeder, it decides to either approve or reject the proposed variety (see Step 6 in Figure 3.2). If the variety is approved, it must then be formally entered into the National Variety List by the Plant Registrar. Only after the Minister officially publishes this listing in the Official Gazette[8] does the variety become eligible for multiplication, distribution, and commercial sale (see Step 7 in Figure 3.2). Clear directives regarding possible appeals processes are needed. While the Seed Law provides for the possibility of appeals

[5] Ministerial Order Determining the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format §9.
[6] Ministerial Order Determining the Organization and Functioning of the Committee Responsible for Evaluation, Certification and Registration of Plant Varieties and their Withdrawal from the List §9.
[7] Ministerial Order Determining the Organization and Functioning of the Committee Responsible for Evaluation, Certification and Registration of Plant Varieties and their Withdrawal from the List §5 .
[8] Law Governing Seeds and Plant Varieties in Rwanda §5 and Ministerial Order Determining the Procedures for Evaluation, Certification and Registration of Plant Varieties and Procedures for the Withdrawal of Certified Plant Varieties from the List and its Format, §10.

against the Registrar if a registration application is rejected[9] (see yellow shaded red box after step 7 in Figure 3.2), stakeholder consultations revealed that there is no clarity on the relevant procedures and form of appeal.

Dimension Two: Legal Framework for EGS Production and Distribution

Varietal research, development, and transfer constitute the earliest steps in the seed value chain and are the most fundamental aspects of a well-functioning seed regulatory system. The activities in this dimension have a significant influence on the quality and quantity of seed that is made available to the market. In particular, stakeholder consultations highlighted that access to quality EGS is a pressing and urgent issue in Rwanda. The RSM in Figure 3.3 depicts the current system for EGS production and distribution, illustrating varietal research, development, and transfer in Rwanda and highlighting some of the key regulatory steps, issues, and decision points and their relationship to the main legal and regulatory instruments of relevance.

Four key regulatory and implementation issues were identified in the area of EGS production. First, there is a need to establish clearer operational guidance for private entities involved in agricultural research and development (see yellow-shaded box in Figure 3.3, Step 2). Second, both RAB and private seed companies face persistent limitations in financial and technical capacity, which hinders their ability to fully participate in breeding activities (blue-shaded box in Figure 3.3, Step 2). Third, the availability and quality of EGS remain inadequate (blue-shaded box in Figure 3.3, Step 3), due to constraints such as insufficient funding, limited equipment, and restricted access to foundational genetic material. Finally, the process for obtaining EGS from RAB lacks clarity and consistency, with no formal guidelines currently in place to support access by seed sector stakeholders (blue-shaded box in Figure 3.3, Step 3). Each of these challenges is explored in more detail below.

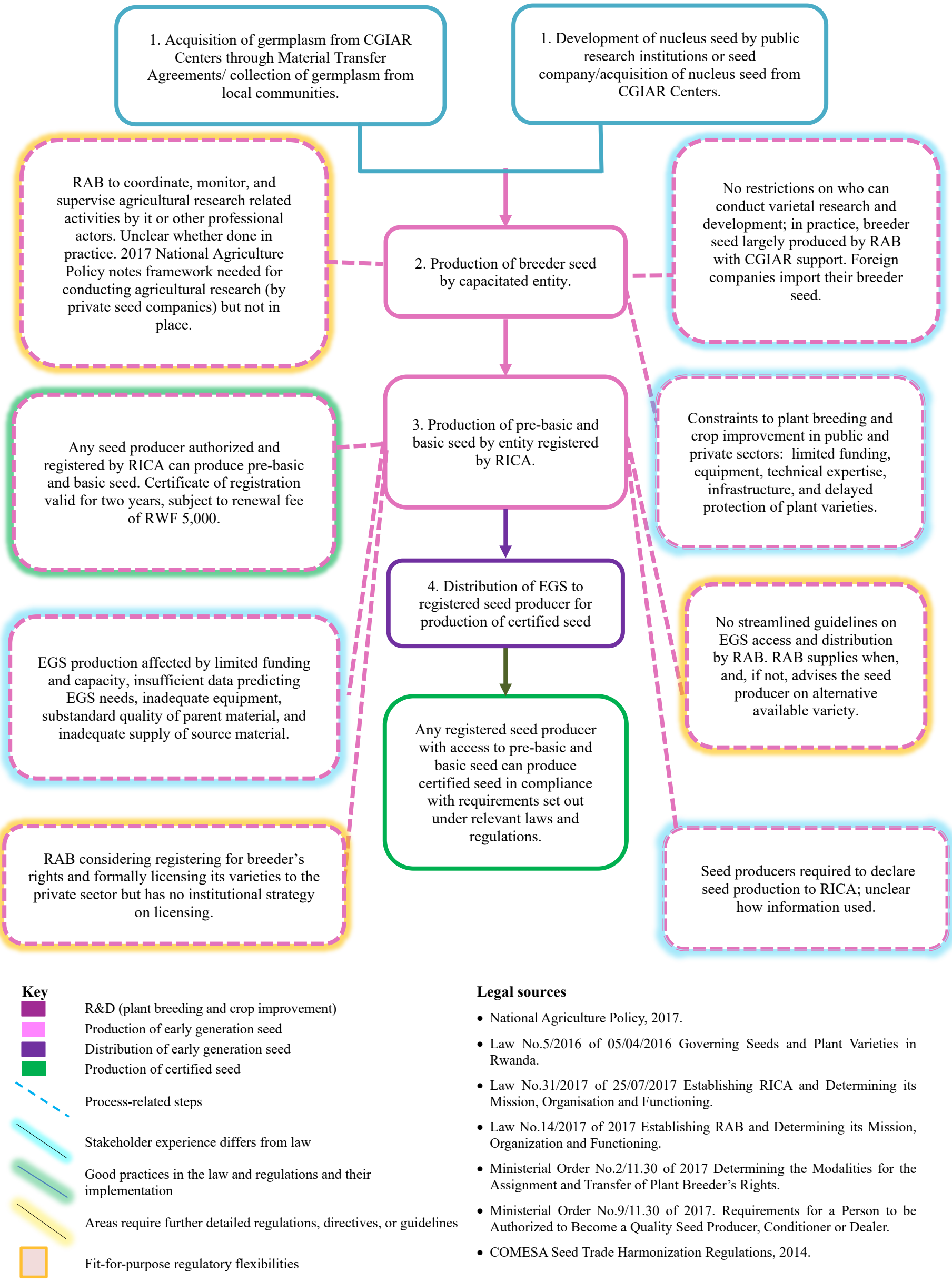
Crop improvement and plant breeding. In Rwanda, crop improvement research and variety development by public institutions and private companies takes place through several pathways. These

[9] Law Governing Seeds and Plant Varieties in Rwanda §50.

include: (i) breeding using germplasm maintained in national programs, gene banks, or proprietary collections; (ii) incorporating germplasm sourced from international agricultural research centers (such as CGIAR institutions) into locally adapted breeding lines; and (iii) acquiring nucleus seed from other public breeders or CGIAR centers for testing in national trials (Figure 3.3, Steps 1 and 2). Transfers of genetic material from CGIAR institutions typically take place under a material transfer agreement, consistent with the terms outlined in the Standard Material Transfer Agreement (SMTA). The SMTA is a mechanism under the ITPGRFA, which governs access and benefit sharing among countries that are party to the treaty (Figure 3.3, Step 1).

In Rwanda, although these channels for germplasm access technically exist, the absence of standardized procedures has made actual access inconsistent. There are currently no publicly available protocols for obtaining genetic material from the national gene bank located in Rubona, the community seed bank in Rubaya, or from institutional breeding programs. Instead, germplasm is typically shared on an informal basis, relying on existing relationships between breeders within RAB and external actors. This reliance on personal discretion rather than formal rules may limit broader access to foundational materials and constrain opportunities for innovation and variety development.

Figure 3.3: Regulatory Systems Map of early generation seed production and distribution in Rwanda



Legal sources

- National Agriculture Policy, 2017.
- Law No.5/2016 of 05/04/2016 Governing Seeds and Plant Varieties in Rwanda.
- Law No.31/2017 of 25/07/2017 Establishing RICA and Determining its Mission, Organisation and Functioning.
- Law No.14/2017 of 2017 Establishing RAB and Determining its Mission, Organization and Functioning.
- Ministerial Order No.2/11.30 of 2017 Determining the Modalities for the Assignment and Transfer of Plant Breeder's Rights.
- Ministerial Order No.9/11.30 of 2017. Requirements for a Person to be Authorized to Become a Quality Seed Producer, Conditioner or Dealer.
- COMESA Seed Trade Harmonization Regulations, 2014.

Source: Authors

Rwanda's legal framework governing research and development (R&D), as outlined in Law No. 14/2017 of 14 April 2017, places no legal limitations on who may engage in varietal development and plant breeding (see blue dotted box linked to Step 2 in Figure 3.3). This openness aligns with international good practices. In practice, however, agricultural R&D in Rwanda is predominantly carried out by RAB, the primary public research institution in the sector. Despite the inclusive legal provisions, both public and private sector actors face substantial obstacles in conducting plant breeding activities. These challenges include inconsistent financial support, shortages of essential materials and equipment, gaps in technical expertise, and limited research infrastructure (see second blue-shaded box on the left side of Step 2 in Figure 3.3). In fact, findings confirmed that only two domestic private seed companies have actively engaged in the breeding of maize, and even those have been unable to produce any EGS for their registered varieties due to challenges mentioned above. Foreign companies import their breeder seed for local production.

The 2017 National Agriculture Policy requires that the legal framework for conducting agricultural research be elaborated under another legal instrument, but this is yet to be done and impacts private sector engagement in R&D. RAB has the mandate to coordinate, monitor, and supervise activities related to agricultural research by it or other professional actors under Law No.14/2017 of 14/04/2017. In practice, however, RAB lacks legislative guidance for private sector engagement in R&D, and it lacks the capacity to effectively coordinate and monitor this engagement, as shown in the yellow-shaded box off Step 2 in Figure 3.3.

Moreover, while the Seed Law and Ministerial Orders on Determining the Modalities for Testing the Distinctness, Uniformity and Stability of a Plant Variety and Determining the Modalities for the Assignment and Transfer of Plant Breeder's Rights provide the basis for plant variety protection, consultations revealed that this has not yet been implemented. The office responsible for registering plant varieties is still at an early stage, with applications under ongoing review following the establishment of the regulatory framework just six years ago. One major consequence of the current system is the lack of effective legal protection for newly developed varieties. This gap has discouraged private sector investment in plant breeding and research, as innovators have limited assurance that their varieties will be safeguarded

against unauthorized use or reproduction by third parties (second blue-shaded box in Figure 3.3, Step 2). Regulatory implementation and enforcement are critical for private sector participation.

Early generation seed production and distribution. With respect to EGS production and distribution, both public institutions and seed companies are permitted to produce basic seed as long as they are registered by RICA as a seed producer and meet the requirements for EGS multiplication prescribed in the Seed Law and Ministerial Order with Requirements for a Person to be Authorized to Become a Quality Seed Producer, Conditioner or Dealer (the green-shaded box off of Figure 3.3, Step 3). Stakeholders commended the process of application and renewal of a license to multiply seed, noting that it can be quite seamless as long as the seed multiplier meets the requirements and follows the rules. This is consistent with good practices in other countries.

Findings indicate that what actually occurs is that EGS is largely produced by RAB and a few foreign seed companies, with little or no production by local seed companies. Local seed companies and farmer- or community-based organizations mostly depend on RAB to source pre-basic and basic seed. For a registered seed producer to obtain EGS from RAB, it must first apply to RAB to be registered as a RAB outgrower, showing proof that the EGS seed producer meets RAB's requirements, including registration by RICA, sufficient land for seed production, seed processing facilities, and an agronomist, among other requirements. Once registered, the EGS seed producer applies for pre-basic seed from RAB. RAB needs to provide clear formal guidelines for demand and supply of EGS, as shown in the blue-shaded box to the right off of step 3 in Figure 3.3. Seed producers consulted revealed that they apply for pre-basic seed up to one month before the intended supply date. Once an application for pre-basic seed has been made, RAB generates a proforma invoice and issues it to the seed producer, who then makes a payment to RAB's account. After RAB's confirmation of payment, the seed producer can collect the pre-basic seed from RAB.

Seed producers have indicated that there have been instances where the variety requested or the seed quantity required for the variety requested is not available at RAB, as illustrated in the right blue-shaded box off of Step 3 in Figure 3.3. When this happens, RAB recommends a different variety that is available in store. Some seed producers mentioned that when they apply to RAB and make payment for

EGS, but RAB does not have the crop variety requested, the seed can be sourced from a private seed company at no extra cost to the seed producer. This is a commendable practice that ensures farmer access to improved seed, but the sustainability of the practice is questionable due to the additional costs incurred by RAB.

Under the Seed Law, seed producers are required to declare their seed production to the RICA, and in practice, all seed producers do so. This information could be used by RAB to estimate the seed supply in different classes and across seasons and years, but, at present, much of this information is not aggregated for management purposes (see the final blue-shaded box off of Step 3 in Figure 3.3). RAB produces EGS based on previous production data, although consultations revealed that there can be misalignments between demand and the type of EGS crop varieties produced, especially when market dynamics change. Stakeholders recommended that RAB conduct regular market assessments, liaising with economists and agronomists who work directly with farmers, to assess market interests ahead of EGS production.

As shown in the blue-shaded box to the left off of step 3 in Figure 3.3, some seed producers also mentioned the deficient quality of EGS produced by RAB and challenges associated with the purity of the seed. During EGS production, producers are supposed to pluck out nonconforming plants, but this is always performed by RAB.

Licensing. The next issue is the management of genetic resources, namely the licensing of new varieties to EGS producers by RAB. While RAB does not currently charge any royalty payments for private sector access to public varieties, it is in the process of considering licensing its varieties and is in ongoing discussions with seed companies and cooperatives to better understand their interests. The licensing of RAB varieties would dramatically change the country's EGS production landscape, but careful consideration is needed for proper implementation and appropriate investment in private sector capacity. Plant variety protection and implementation of PBR are seen as central to licensing and promoting innovation and investment in the seed industry. While the regulatory framework for plant variety protection exists in Rwanda, no variety has been subject to protection. To date, 14 applications have been submitted, seven by seed companies and the other seven by RAB (see the yellow-shaded box off of Step 3 in Figure 3.3). It

would also be relevant for RAB to consider putting in place an institutional intellectual property policy prior to commencing with licensing. The IP Policy would guide RAB's licensing activities, including establishing an institutional framework for IP management, reporting by breeders, benefit sharing of royalties with research teams, and position on IP co-ownership in case of partnerships with other institutions, among other things.

Dimension Three: Seed Quality Assurance

For many years, the government of Rwanda supported the importation of certified improved seed by foreign seed companies through its subsidy program, especially varieties of hybrid varieties of maize, wheat, and soybean. This was because local seed companies lacked the capacity to produce quality seed varieties sought by farmers. At the end of 2021, however, the government announced that it would no longer support the importation of improved seed, shifting focus instead to building capacity and creating an enabling environment for local seed production. This has been an ongoing process, which could explain gaps that exist in the quality assurance schemes in Rwanda.

Rwanda's seed quality assurance system includes elements from both the formal and informal sectors. The Seed Law and its Ministerial Orders establish two main pathways: mandatory certification and the Quality Declared Seed (QDS) system, both overseen by the government. The recognition of QDS reflects a practical regulatory flexibility (see beige-colored box in Figure 3.3), supporting farmer access to quality seed outside the formal certification process and linking informal and formal seed systems.

Another positive development is the legal provision allowing private seed inspectors, which can ease regulatory burdens and expand oversight capacity. However, implementation gaps remain, particularly related to limited resources and inconsistencies in enforcement, as shown in Figure 3.4.

Figure 3.4: Regulatory Systems Map on seed quality assurance process in Rwanda

Source: Authors

First, capacity gaps exist for both the private sector and RICA to implement quality assurance rules, associated with limited training, resources, and human capacity (see left blue shaded box off step 2 in Figure 3.4). For instance, there are insufficient field inspectors (Mabaya et. al., 2021; KIT, 2020) and only two formal seed processing plants, which cause delays in distribution and affect the quality of seed (see blue shaded box off of step 5 in Figure 3.4). Second, consultations highlighted an important regulatory gap in the lack of rules on mandatory seed certification and minimum standards of quality declared seed. The Rwanda Standards Board (RSB) has developed non-binding seed standards for a few crops, but these standards are yet to be included in a binding instrument that can be implemented by RICA and the seed industry, as illustrated in the yellow-shaded righthand box off of step 2 of Figure 3.4. The absence of a fee schedule for field inspections should be remedied in a timely manner (see the dotted yellow shaded box off of step one of Figure 3.4). Third, the national seed laboratory does not have ISTA accreditation (Mabaya et al., 2021; New Markets Lab, 2019), which is called for under international seed testing standards and regional practices (see righthand blue shaded box off of step 2 in Figure 3.4). The national laboratory is also still under RAB, which raises concerns of potential conflicts of interest, even though a few precautionary measures have been taken by RICA (see blue shaded box off of step 6 in Figure 3.4). Fourth, the Seed Law does not specify the procedure and form of lodging an appeal (see blue shaded red box off of step 2 in Figure 3.4). Finally, there is inadequate and inconsistent production and supply of certified seed due to the absence of seed demand projections, even though data on seed production exists (see blue shaded box off of step 4 in Figure 3.4).

Considering that a large share of farmers in Rwanda still rely on informal seed sources, it is essential that the legal framework for seed quality assurance facilitates better integration between the formal and informal systems. The QDS approach plays an important role in this regard. Its requirements are generally less stringent than those for full seed certification, making it more accessible for small-scale seed producers and local seed enterprises. By lowering regulatory barriers under certain conditions, QDS encourages broader participation in the seed sector and helps ensure that farmers can access reliable seed, including varieties that may not be commercially profitable but are vital for household food security and national

nutrition goals. This flexibility, illustrated in the green-outlined, beige-colored box in the upper right of Figure 3.4, reflects a practical and inclusive regulatory innovation.

Field inspection, processing, analysis, and laboratory testing. These activities form the foundation of Rwanda's seed quality assurance system. This section highlights both positive regulatory practices and ongoing challenges that influence the consistency and reliability of seed quality. For a seed lot to be certified, it must comply with established field and laboratory standards.[10] Field inspections play a critical role in this process by verifying genetic purity and preventing contamination throughout the production cycle.

In Rwanda, however, there are no rules, regulations, or guidelines on either compulsory seed certification or quality declared seed. This is a major regulatory gap as illustrated in the yellow-shaded dotted box off of step 2 of Figure 3.4, which greatly affects implementation of the quality assurance seed schemes. For instance, during consultations, the industry did not know which crops QDS applied to in comparison to mandatory seed certification. While the RSB has developed seven seed standards for common bean, rice, wheat, peas, sweet potatoes, vegetable seeds, and cassava seeds (this one includes QDS standards), RICA confirmed during consultations that these are being used to guide the certification process at the moment but are not legally binding. Moreover, one who seeks to access these standards must pay a fee to RSB, which may create a knowledge gap for those who might not be able to afford to pay. RICA agreed that seed rules and applicable Ministerial Orders will have to be revised to integrate binding rules on implementing compulsory seed certification rules and QDS and that RSB will need to develop standards for other crops.

Two weeks after planting, the seed multiplier applies to RICA for seed inspection (see step one of Figure 3.4). The form for this process is in the Seed Law, available on RICA's website, and can be sent to RICA via email or submitted physically. While the Ministerial Order requires the applicant to pay inspection fees,[11] there is no applicable fee schedule, which is a major regulatory gap illustrated in the

[10] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates §5(4).
[11] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates §2.

dotted yellow shaded box off of step one of Figure 3.4.

In most cases in practice, RICA conducts at least three field inspections. Depending on the crop, the first field inspection is during flowering, the second during de-tasseling, and the last during pre-harvesting. Sometimes, inspectors also come before planting or during harvesting, as is the case for Irish potatoes. Consultations revealed that while inspections were delayed in the past, this has been significantly improved in 2023 due to the authorization of private seed inspectors, which is a commendable regulatory improvement (as depicted in the green shaded box off of step 2 of Figure 3.4). With the support of AGRA, RICA rigorously trained 80 private seed inspectors, of these, 24 were accredited and authorized to conduct inspections, with five of the 24 inspectors being women. These private inspectors supplement the ten public inspectors (six men and four women) under RICA. The inclusion of women in the inspection process is a commendable practice that aligns with the key principle on gender inclusion under the National Agriculture Policy, as shown in the green shaded box off of step 2 of Figure 3.4, although the gender balance and overall number of inspectors remain low.

For now, the private inspectors are under a two-year contract, and they are paid by RICA with the support of OAF. Since this is not financially sustainable, RICA intends to contract a private company to hire private inspectors and be responsible for contracting and dispatching them. In either case, RICA will retain oversight over the seed certification process and the private seed inspectors by extension. Due to the limited capacity of private seed companies, stakeholders noted that it is not yet possible to accredit or authorize private inspectors from these companies. There was also concern that the private inspectors attached to seed companies might not be impartial.

Notably, Rwanda's approach to accrediting private inspectors is quite uniquely fit-for-purpose, as illustrated in the beige-filled box off of step 2 of Figure 3.4, and it is different from other countries in sub-Saharan Africa like Kenya and Zambia, where the accredited private inspectors are attached to seed companies. The regulator noted that the identification of the appropriate approach on authorization of private inspectors is a process subject to continuous improvement and that it is testing out the current

approach to see how to integrate the private seed sector, but it is generally open to trying out other, more effective approaches.

Consultations revealed that field inspection results are issued immediately after inspection, which is good practice as shown in the green-shaded dotted box off of step 2 of Figure 3.4. The inspection report is issued and signed by the inspector with the field owner or his agent's countersignature.[12] The inspector can fully accept, partially reject, or fully reject a field inspection. If either the full or partial field inspection is rejected, the inspector must provide supportive reasoning for the decision in the report. The applicant can either appeal the decision or keep the rejected fields for food consumption. Stakeholders said that they were unsure of the specific appeals process. While the law provides for appeals for re-inspection to be made to RICA within 48 hours after receiving the field results,[13] the Ministerial Order is unclear on the procedure and form.

RICA mentioned that in practice, appeals should be a formal letter sent, either by email or traditional mail, to the Director General of RICA. The field should remain untouched until a reassessment is conducted and the appeal process is completed. However, this procedure is not consistently followed in practice, revealing a clear regulatory gap (highlighted in the yellow-shaded box linked to Step 2 in Figure 3.4). Notably, despite these gaps, none of the seed companies or cooperatives interviewed reported submission of an appeal, possibly indicating a lack of trust or clarity in the appeals mechanism. This gap undermines essential principles of administrative fairness and due process, which are critical when regulatory authorities make binding decisions (Kuhlmann et al., 2022).

After inspection, the registered seed producer harvests, transports, and stores the seed (see step 4 of Figure 3.4). There is no regulatory guidance on this particular process, which is a gap noted in the yellow shaded box on step 4 of Figure 3.4. The quality of seed can be greatly affected during this process (Kuhlmann et al., 2022), especially for perishable seed like that of potatoes, and thus, regulatory guidance

[12] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates § 2(6) and form no. 3 in annex III.
[13] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates § 2(6) and form no. 3 in annex III. See also Law Governing Plant Varieties in Rwanda §14.

may be needed. Consultations revealed that RICA sometimes dispatches (private and public) inspectors to monitor these processes, but this is not consistently done.

The seed is then processed and conditioned by a registered seed conditioner, put into lots, and packaged and labeled in accordance with the rules, with the exception of QDS, which does not have to be labeled (see step 5 of Figure 3.4).[14] As illustrated in the blue-shaded dotted box off of step 5 of Figure 3.4, consultations revealed capacity gaps in seed processing, with only two formal seed processing plants and most seed producers using rudimentary seed processing mechanisms. These insufficient processing technologies affect the quality of seed produced, and some consulted farmers noted cases in which they planted certified seed that did not germinate.

After processing, the seed producer applies to RICA for sampling and testing of the seed by submitting a prescribed form,[15] also available on the RICA website, which can be submitted by email or letter. A RICA inspector collects samples for laboratory testing (see step 6 of Figure 3.4).[16] Seed companies initially complained that the laboratory was hosted by RAB, noting a likely conflict of interest considering that RAB competes with other seed companies on the market and also had its seed samples tested there (illustrated by blue shaded dotted box off of step six of Figure 3.4). To address this challenge, RICA inspectors provided random codes to collected seed samples so that, when tested, RAB cannot differentiate between their own samples and those of seed companies. RICA also noted during consultations that it is in the process of moving the national laboratory under its purview, which will involve revising its institutional structure to add the laboratory staff.

Samples are tested for germination, moisture content, and purity (see dotted second box off of step 6 of Figure 3.4). Testing costs RWF 2,000 (approximately $1.50) per lot, and testing can take between two weeks and a month. Seed companies and cooperatives noted that the testing period is reasonable, although there can be significant delays during particular busy periods, considering that there is only one laboratory.

[14] Ministerial Order Determining the Criteria for Recognizing a Seed Testing Laboratory §2.
[15] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates §3 and table in annex IV.
[16] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates §3 and table in annex IV. See also Law Governing Plant Varieties in Rwanda §14.

To address this challenge, the Seed Law authorizes RICA to accredit private seed laboratories to conduct seed testing,[17] as long as they meet the prescribed requirements.[18] In this case, actual practice differs from this provision, as depicted under the blue-shaded dotted box off of step 6 of Figure 3.4, and no private seed laboratories have yet been accredited because of insufficient technical capacity in the private sector. However, a private laboratory is being created at the Seed Center by OAF in partnership with RICA, and funding from the Howard Buffett Foundation. Once complete and accredited, this will complement the national seed laboratory and reduce its seed testing burden.

Another challenge is related to the lack of ISTA-accreditation by the national seed laboratory. Although Rwanda is an ISTA member (shown in blue shaded dotted box off of step six of Figure 3.4). This affects the legitimacy of locally produced seed in the regional market. Rwanda is now at advanced stages of acquiring ISTA accreditation, including acquiring proper laboratory equipment and increasing human resource capacity. RICA also noted that both field and laboratory testing are aligned with international standards under ISTA, the EAC, and COMESA. Only a few seed standards are available, and access to some requires payment.

A gap also exists in the regulatory framework concerning the right to appeal laboratory testing results, as shown in the yellow-shaded box connected to Step 6 in Figure 3.4. RICA noted that in practice, if aggrieved with the testing results, a seed producer can request re-testing by formal letter to RICA Management. None of the consulted stakeholders had made use of this process, however, reportedly due to limited awareness.

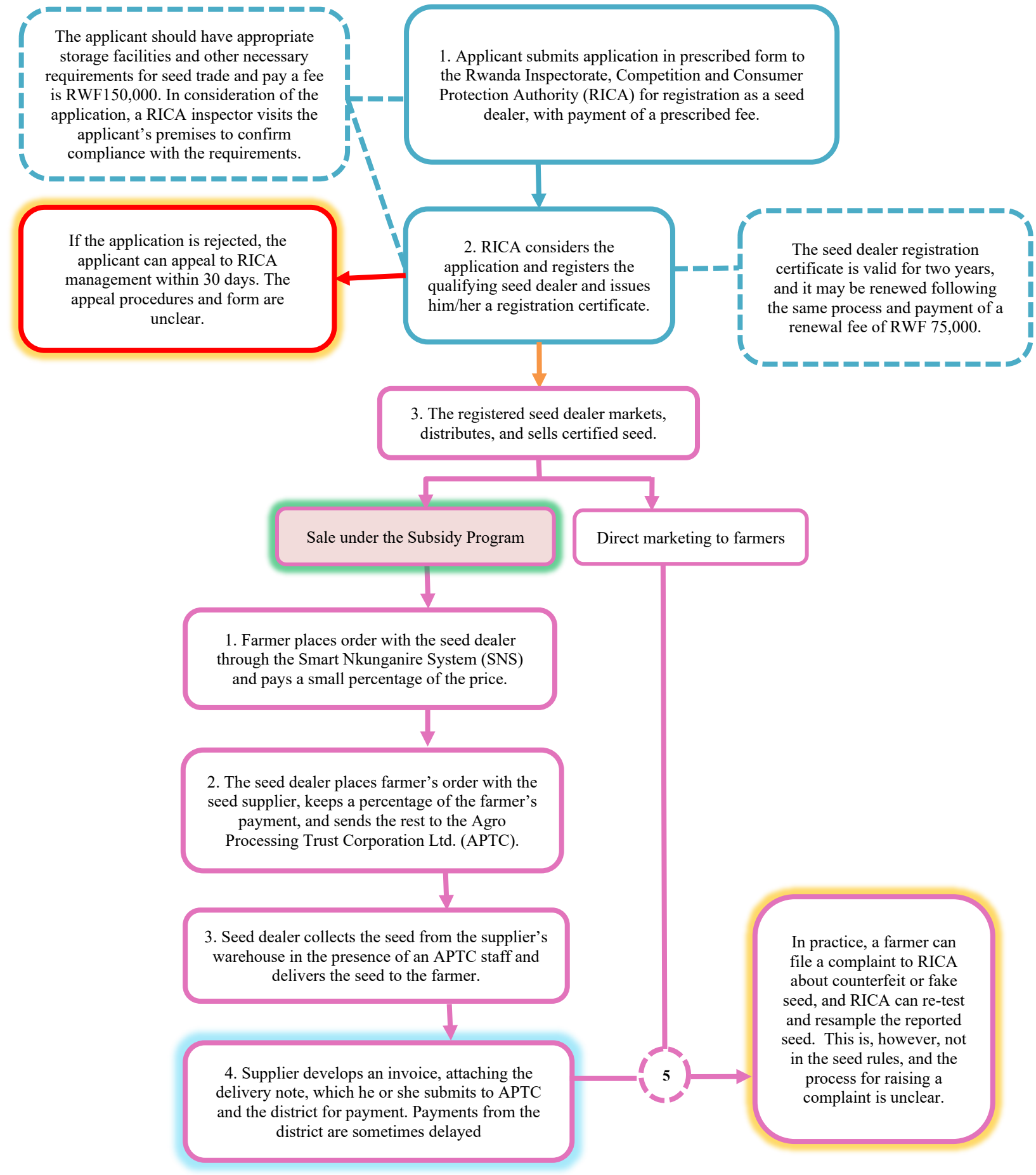
Seed Marketing and Distribution is an avenue for getting certified seed out to farmers. Various activities at this stage can impact the quality of seed. This is why regulatory quality assurance is equally important at this stage. Rwanda has taken a relatively unique approach to seed marketing and distribution. For example, seed can be sold directly to farmers at full price and/or through the government's subsidy

[17] Law Governing Plant Varieties in Rwanda § 19.
[18] Law Governing Plant Varieties in Rwanda § 51.
[18] Law Governing Plant Varieties in Rwanda § 51.

program (illustrated under the two schemes under seed marketing and distribution in Figure 3.5 below). It is important to note that the subsidy program only applies to priority crops, which currently are maize, wheat, and soybean; of these, over 80 percent of the seed subsidies are allocated to maize because hybrid maize seed is very costly for farmers (Spielman et al., 2022).

The subsidy program is a fit-for-purpose regulatory approach designed to support resource-poor farmers that is uniquely tailored to Rwanda's economic and social situations, as depicted in the beige shaded box under seed marketing and distribution in Figure 3.5. Since the introduction of the seed subsidy program, farmers' use of improved seed has greatly increased (Spielman et al., 2022), improving agricultural productivity and food security in the country. Subsidies are coordinated under the Seed and Fertilizers Division of the Directorate of Agriculture Development in MINAGRI through the local district agricultural offices. The subsidy program is extensive, covering most maize seed sold in the market.

Figure 3.5: Regulatory Systems Map on seed marketing and distribution in Rwanda



Key

- Application and issuance of seed dealer certificate
- Seed marketing and distribution avenues
- Appeal
- Approvals
- Process-related steps
- Stakeholder experience differs from law
- Good practices in the law and regulations and their implementation
- Areas require further detailed regulations, directives, or guidelines
- Fit-for-purpose regulatory flexibilities

Legal sources

- Law No 005/2016 of 05/04/2016 Governing Seeds and Plant Varieties in Rwanda.
- Law No 31/2017 of 25/07/2017 Establishing RICA and Determining its Mission, Organisation and Functioning.
- Ministerial Order No.7/11.30 of 2017 Requirements for a Person to be Granted a License for Importing and Exporting Seeds.

Source: Authors

Under the subsidy program, MINAGRI sets the price for the different crop varieties a season in advance, in consultation with RAB, seed companies, and cooperatives, and announces what percentage of the price would be subsidized. The government of Rwanda implements the subsidy program through the Agro Processing Trust Corporation Ltd (APTC), a private company, and the districts, using a digital platform called the Smart Nkunganire System (SNS). The companies and cooperatives have no direct contact with the farmers. Instead, seed is sold to farmers through licensed agrodealers registered on the SNS system. Consultations revealed that the program is structured this way to reduce the incidence of fake and counterfeit seed and to improve seed traceability. RICA tracks the amount of a producer's seed that it has certified, and the company is required to declare this on the SNS, along with the type of variety and location of warehouses. The company cannot sell more seed than it has declared and certified.

Agrodealers and farmers also register on the SNS, detailing their contact information and the crop varieties in which they are interested. The farmer applies for desired crop varieties and seed quantity from the agrodealer and pays the agrodealer a small percentage of the seed price (see step 1 under the subsidy program in Figure 3.5). Of this amount, the agrodealer keeps 0.75 percent of the price and sends the rest of the amount to APTC. The agrodealer places an order with the seed supplier, collects the seed from the supplier's warehouse in the presence of APTC staff, and delivers the seed to the farmer (see steps 2 and 3 of the subsidy program in Figure 3.5). After supplying seed to the agrodealer, the supplier makes a delivery note, which is countersigned by the APTC staff and the agrodealer. The seed company or supplier develops an invoice, attaching the delivery note, which he submits to APTC and the district for payment (see step 4 of the subsidy program in Figure 3.5). APTC transmits the amount received from the agrodealer to the supplier, deducting 0.25 percent as a service fee.

APTC usually pays promptly, taking between two weeks to a month. The payment from the districts usually takes a lot longer, which seed companies noted to be a problem, as depicted under the blue-shaded box in step 4 and under the subsidy program in Figure 3.5. While payment is supposed to be made within 45 days, consultations revealed that it can sometimes take up to a year. Districts sometimes divert the money received from the government and meant for the subsidy program to other issues that are considered priorities or emergencies. The delays in payment by the government force

many seed companies and cooperatives involved in seed production to take out bank loans, which incur very high interest rates that the repayment amount does not cover. This was noted as a major challenge to seed trade.

Some seed companies also noted that price setting, and the subsidy program in general, curtail competition and growth of the seed sector, as most farmers are usually unwilling to pay the full price when there is an option to only pay a subsidized portion. MINAGRI indicates that the subsidy is meant to encourage farmers' use of improved varieties and that it will slowly phase it out as farmers become more aware of the benefits of improved seed. In fact, the subsidy rate has been reduced over the past years, albeit not significantly.

Quality control in Rwanda's seed marketing and distribution system continues to face serious challenges, with stakeholders reporting a growing problem of counterfeit seed entering the market. Under the Seed Law and relevant Ministerial Orders, RICA has the authority to track counterfeit seed by re-testing the carry-over stocks that were not sold in the previous season, that is, about six months after the seed certification test.[19] There are also stringent penalties under the law, including fines of up to USD 5,000 for any person who is caught contravening the provisions of the law and blacklisting of any seed producers or agrodealers who are caught dealing in counterfeit seed.[20] Oversight under the subsidy program is more stringent as RICA requires that the seed producer declare their seed production, which is tracked with the declared amount of certified seed for sale on the SNS. This way, it is not easy for a seed company to sell more seed than what was produced, declared, and certified. However, even with these initiatives, implementation challenges and regulatory gaps continue to exist, affecting the quality of seed marketed.

There have been numerous cases of the sale of fake and counterfeit seed on the market, especially for crop varieties not under the subsidy program. While traceability of seed is possible under the subsidy program, there remain a few inefficiencies that could result in the sale of fake seed under this program. RICA noted that it intends to conduct an assessment and investigate the source of the fake seed. While there are stringent penalties under the law for contravention of the law, including fines of

[19] Ministerial Order Determining the Procedures for Seed Inspection and Granting of Seed Quality Certificates §6.
[20] Law Governing Plant Varieties in Rwanda §51.

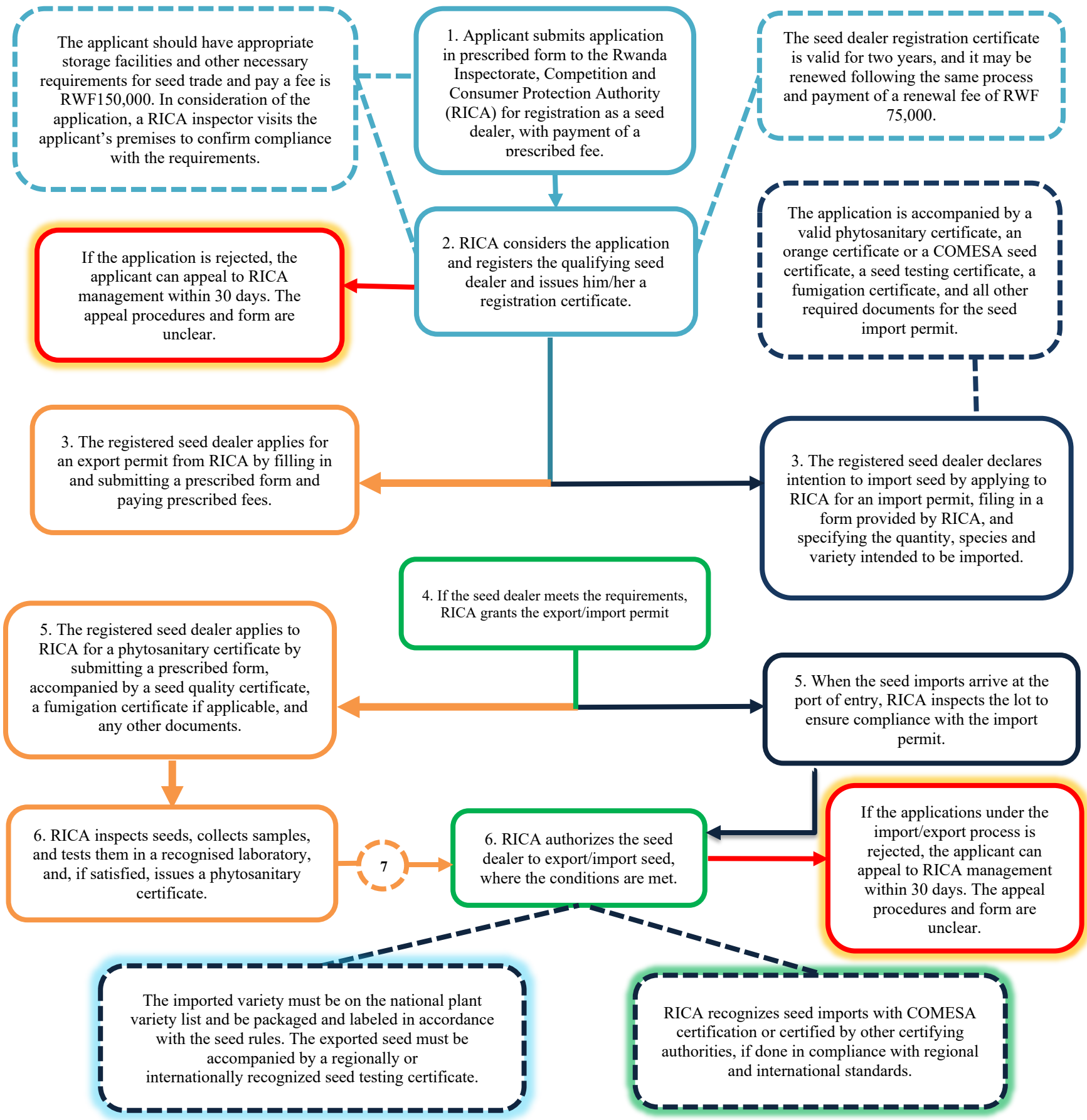
up to $5,000, there have not been any prosecutions. Consultations also revealed that seed rules are unclear regarding the process of lodging complaints with RICA (see steps 4 and 5 under seed marketing and distribution in Figure 3.5) or the process that RICA follows in partnership with other relevant authorities in order to address the complaints. One seed company noted, for instance, that it had reported to RICA a case of a fraudulent company that was found to fake its labels with intent to package fake seed, but, by the time of consultation, months had passed without redress. RICA responded, asserting its willingness to investigate any reported cases in partnership with the police and the Rwanda Investigation Bureau (RIB). It also identified a regulatory gap related to the filing of complaints and noted that, in practice, lodging complaints could be done by phoning RICA or sending an email.

Dimension Four: Seed Trade

A transparent and predictable regulatory framework for seed trade is essential to support strong domestic markets and facilitate regional and international exchange. Conversely, unclear or burdensome trade rules can hinder investment and slow the delivery of improved seed to farmers. In Rwanda, most stakeholders indicated that the regulatory processes governing seed trade are generally well defined. However, some gaps and inconsistencies in implementation continue to present challenges, particularly in cross-border contexts.

The importation and exportation of seed are regulated under various instruments, including Rwanda's Seed Law and Ministerial Order, which include the requirements for obtaining a license for importing and exporting seeds; the Law on Plant Health Protection and its Ministerial Orders, which determine modalities for obtaining a phytosanitary certificate and other sanitary and phytosanitary measures; and the 2014 COMESA Seed Trade Harmonization Regulations, which include rules on regional trade. Seed trade encompasses both the import and export of seed and typically involves several regulatory steps, including: (a) registration as a seed merchant or dealer, (b) securing the necessary import or export permits, and (c) navigating authorization procedures and potential appeals. Rwanda has made meaningful progress in this area, including simplifying trade-related procedures, accelerating the issuance of documentation, and applying rules to domestic seed transactions. Despite these advances, several challenges persist, as outlined in the sections that follow.

Figure 3.6: Regulatory Systems Map on seed trade in Rwanda



Key

- Application and issuance of seed dealer certificate
- Seed trade avenues
- Appeal
- Approvals
- Process-related steps
- Stakeholder experience differs from law
- Good practices in the law and regulations and their implementation
- Areas require further detailed regulations, directives, or guidelines
- Fit-for-purpose regulatory flexibilities

Legal sources

- National Agriculture Policy, 2017
- Law No 005/2016 of 05/04/2016 Governing Seeds and Plant Varieties in Rwanda.
- Law No.16/2016 on Plant Health Protection in Rwanda
- Law No 31/2017 of 25/07/2017 Establishing RICA and Determining its Mission, Organisation and Functioning.
- Ministerial Order No.7/11.30 of 2017 Requirements for a Person to be Granted a License for Importing and Exporting Seeds.
- COMESA Seed Trade Harmonization Regulations, 2014.

Source: Authors

Registration as a Seed Dealer is the first step of engaging in seed trade (see steps 1 and 2 of Figure 3.6).[21] The application process rests with RICA, and applicants must prove that they meet necessary seed trade requirements and pay a fee of RWF 150,000. As part of the seed dealer registration process, an inspector from the RICA visits the applicant's facilities to verify compliance with regulatory standards. Once approved, the registration certificate is valid for two years and may be renewed following a follow-up inspection and payment of a RWF 75,000 fee (see dotted box to the right of Step 2 in Figure 3.6). According to seed companies, the process to obtain certification as a dealer is generally straightforward and, when all requirements are met, can be completed in as little as one week. Stakeholders also reported that the renewal process is clear and efficiently managed.

Obtaining import and export documentation. The cross-border movement of seed is governed by specific rules designed to manage phytosanitary risks. Because seed is classified as a high-risk agricultural input, import and export procedures typically involve multiple steps, including permit applications, certification, pre-shipment inspections or clearance, use of designated entry points, and in some cases, post-entry quarantine. While these procedures are essential for plant health protection, challenges remain in ensuring clarity, consistency, and efficiency in their implementation.

To import seed into Rwanda, a registered seed dealer applies to RICA for an import permit (see step 3 under seed import in Figure 3.6).[22] The application must be accompanied by a phytosanitary certificate and an orange ISTA certificate (OIC) or a COMESA seed certificate, a seed testing certificate issued by a competent authority, a fumigation certificate or proof that the seeds have been treated before dispatch, as well as any other relevant documents (see dotted box off of step 3 under seed import in Figure 3.6).[23] For exports, the exporter must apply to RICA for an export permit and phytosanitary certificate, accompanying the application with a valid seed certificate that proves that the seed complies with the relevant regional seed standards, a copy of the fumigation or seeds treatment certificate, and any other

[21] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §2(1).
[22] Ministerial Order on Determining the Requirements for a Person to be Granted a License for Importing and Exporting Seeds §3.
[23] Ministerial Order on Determining the Requirements for a Person to be Granted a License for Importing and Exporting Seeds §3.

required document (see step 3 under seed export in Figure 3.6).[24] After inspection, sampling, and laboratory testing, RICA may issue an export permit[25] and a phytosanitary certificate in accordance with the Law on Plant Health Protection and its Ministerial Orders (see step 6 under seed export in Figure 3.6). The exported seed must be accompanied by an export permit from RICA and a phytosanitary certificate, conform to the regional seed standards, and be properly packaged and labelled.[26]

Consultations revealed that the procedures for acquiring documents for import and export are quite clear and that it can take only two weeks to obtain documentation if the importer/exporter meets all the requirements. There have been initiatives by the Rwandan government to improve cross-border seed trade, including the introduction of One-Stop Border Posts and occasional training of seed producers, agrodealers, and farmers on various aspects of seed quality (Mabaya, E, et. al., 2021; New Markets Lab, 2019). As a good regulatory practice depicted in the green shaded dotted box off of steps 6 and 7 under the importation and exportation of seed in Figure 3.5, Rwanda recognizes COMESA seed labels and seed certified by regulatory agencies in other countries in accordance with international standards.

Despite relatively streamlined processes, there are implementation challenges and regulatory gaps in the importation and exportation of seeds. The seed rules require that varieties that are imported or exported appear on the national variety list,[27] which creates implementation challenges since variety release and registration practices are not fully aligned with the regional seed rules under COMESA. In practice, varieties on the COMESA Variety Catalogue are still subject to one season of confirmation VCU testing prior to their inclusion on the national variety list, contrary to the COMESA seed rules. This difference in law and practice could delay farmers' access to improved varieties in the COMESA Variety Catalogue and is depicted in the blue shaded dotted box off of step 6 and 7 under the importation and exportation of seed

[24] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §4.
[25] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §4.
[26] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §5.
[27] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §2(2).

in Figure 3.6. Stakeholders have recommended the harmonization of the national variety list with the regional one.

Moreover, with Rwanda lacking an ISTA-accredited laboratory, it is not yet fully competent to issue an OIC, which is required for the exportation of seed.[28] Seed companies incur extra costs taking seed to other countries for testing to obtain the OIC. Companies also noted that they incur extra costs to comply with packaging requirements due to Rwanda's ban on imports or the use of single-use plastic items;[29] however, this requirement should be considered in the broader context of environmental sustainability. Companies usually need to repackage seed before they import seed into Rwanda, and this cost is typically transferred to the consumer.

As highlighted in the sections above, the appeal procedure and form relating to administrative decisions made under the importation and exportation procedures remain unclear. This area requires further detailed clarification and guidance, as illustrated in yellow-shaded boxes off of steps 2, 6, and 7 under the import and export of seed in Figure 3.6.

[28] Ministerial Order on Determining the Requirements for s Person to be Granted a License for Importing and Exporting Seeds §5(2)a.
[29] Law No. 17/2019 Relating to the Prohibition of Manufacturing, Importation, Use and Sale of Plastic Carry Bags and Single-Use Plastic Items.

4. RECOMMENDATIONS AND CONCLUSIONS

Findings from this analysis indicate various challenges in the design and implementation of Rwanda's seed rules, even with Rwanda's comprehensive legal and regulatory framework for the seed sector. Regulatory gaps include the absence of the following: rules on mandatory seed certification and minimum standards of quality declared seed, a fee schedule for field inspections, clear appellate procedures and forms, channels for lodging complaints and obtaining redress, streamlined guidelines for private sector agricultural R&D, streamlined guidelines on access to EGS from RAB, and an institutional policy or strategy on licensing in RAB. Implementation challenges include limited financial and human resource capacity in both the public and private sectors to adequately engage in crop breeding and seed delivery, specifically as they relate to the supply of high-quality EGS by RAB and others, evaluation by RICA, assessment of seed to better manage under/over production, and timely payments by the government under the subsidy program. On the regional and global front, Rwanda needs to better align with the regional seed rules under the COMESA Seed Trade Harmonization Regulations of 2014 and is still moving towards ISTA accreditation for the national seed laboratory.

Rwanda is currently updating its seed regulatory framework to address existing shortcomings, providing a chance to design targeted interventions. These actions can be organized and prioritized into short-, medium-, and long-term efforts. The recommendations presented here, and summarized in Tables 4.1–4.4, begin with short-term measures that are already in progress, followed by initiatives requiring further development, and finally, longer-term strategies that should be launched over time. Throughout these recommendations, and as noted in the RSMs, there are clear opportunities to simplify seed policies and regulations, strengthen legal and regulatory expertise, and establish a more inclusive and transparent governance system. Detailed suggestions for closing gaps across different regulatory areas are outlined below, organized according to their anticipated timelines.

Variety Registration and Release Process

The variety registration and release process remains one of the more challenging of the key regulatory dimensions. Issues include potential conflicts of interest with RAB conducting public testing, a lack of transparent cost schedule for variety testing, absence of clear DUS and VCU protocols, review of gender representation on the NVRC, better alignment with regional seed rules, and an absence of clear appeals procedures and forms.

Key proposed interventions include building RICA's capacity to effectively oversee the variety registration and release process and improved support to private sector initiatives, including the OAF Seed Center. More urgently, MINAGRI and RICA will have to develop formal protocols for conducting DUS and VCU tests. This could be done starting with priority crops, with additional crops added over time.

Rwanda is a member of the EAC, which is in the process of developing regional seed rules, so the Seeds Law and Ministerial Orders will have to be revised to better harmonize seed rules in regional bodies of which Rwanda is a member. The practice of variety evaluation should also be aligned with regional rules, including harmonizing the regional variety catalogue with the national variety list. Revisions to the rules should also include clear appeal procedures and forms to ensure transparency in the implementation of rules on variety release and registration.

EGS Production and Distribution

While the legal framework has no restriction on who engages in agricultural R&D and, specifically, crop improvement and plant breeding activities, it gives RAB the mandate to monitor and provide guidance for private sector involvement. However, relevant RAB guidelines are not yet in place, which affects the quality of parent material used in EGS production. There are other implementation challenges that affect EGS quality, including limited resources and capacity for production, absence of proper projection of EGS demand, and absence of formal guidelines on EGS demand and supply. Different development partners have continued to support RAB in its R&D activities under various projects, but these efforts need to be harmonized and made sustainable. RAB is in the process of exploring licensing as a way of improving

access to EGS and creating an income stream, but it does not have a guiding policy or strategy for the management of its intellectual assets and property.

In order to improve adequate production of EGS and streamline the process of EGS demand and supply, RAB will have to develop and prioritize proper EGS demand projections leveraging data that is collected by various institutions, including RICA on production declarations by seed producers, MINAGRI on sales from the SNS, NISR on actual use of improved varieties, and IFPRI's data assessments, among others. Digital systems and technologies could be used, like Uganda's seed tracking and tracing system (Kuhlmann et al., 2023), to project and plan EGS production, set annual production targets, and identify intervention points to support market growth.

Guidelines on EGS distribution will also have to be developed by RAB to streamline the process of placing orders for basic seed by interested seed producers and EGS distribution. To guide and streamline its licensing activities, RAB will have to develop an institutional policy on its management of intellectual property and build its capacity to implement licenses. With improved private sector capacity and increased interest in R&D, RAB will have to develop guidelines for the private sector.

Seed Quality Assurance

In order for farmers to trust the quality of seeds, robust seed quality assurance systems must be in place. While various steps have been taken to improve seed quality management in Rwanda, some challenges persist. Establishing a capable regulatory body dedicated to quality assurance with adequate resources to carry out its functions would provide comprehensive oversight to guarantee that both certified seed and QDS meet high standards. As a short-term intervention to alleviate some of the capacity stresses on RICA, RICA could proceed with its plan to implement a more sustainable private seed inspection program. Capacity building for RICA inspectors should also be done on an ongoing basis. Another short-term intervention would be to change RICA's structure to bring the laboratory under its purview. This would address issues of conflict of interest regarding housing the laboratory under RAB. RICA could also leverage its partnerships and secure support to have the national laboratory accredited by ISTA.

The absence of binding rules on compulsory seed certification and QDS needs attention, with clear consequences for seed quality assurance. The Seed Law and Ministerial Orders may need to be revised to include binding provisions with criteria and standards on QDS and compulsory seed certification. RICA is currently funding the private seed inspection, but cost recovery for this activity should be considered due to sustainability issues. For example, the seed rules should also be revised to include a fee schedule for conducting inspections, from which fees the private seed inspectors would be paid. The seed rules should also be revised to include clear processes and forms of appeal. Continued capacity building could be supported for the private sector through their collective associations.

Seed Trade

Effective seed trade requires a streamlined regulatory framework at the national level. MINAGRI has taken significant steps to improve seed trade in Rwanda, but additional work needs to be done. The Seed Law and Ministerial Orders could be revised to align the national variety list with the COMESA Variety Catalogue and allow the importation of regionally registered varieties without requiring further varietal evaluation. Revisions to seed rules could also address procedural gaps relating to streamlined and clear appeal, complaint, and redress procedures.

Conclusion

Rwanda's legal and regulatory framework for seed is relatively new but covers a broad range of areas comprehensively. Notably, several seed laws and regulations are well aligned with regional and international standards and incorporate flexible provisions tailored to local needs. Regulators have also experimented with various implementation strategies, some of which have produced positive outcomes. Despite these strengths, certain gaps remain. For example, the absence of a national seed policy limits guidance for the sector's regulatory development, and some seed laws and ministerial orders require updating to better reflect industry growth and align with the NAP. Further, enforcing laws and regulations continues to pose significant challenges. Both the public and private sectors face capacity and resource limitations that hinder effective regulatory oversight and reduce private sector participation and investment

in the seed industry. These regulatory and enforcement weaknesses ultimately restrict farmers' access to improved seed varieties and affect both the quantity and quality of seed production, with significant consequences for Rwanda's food and nutrition security.

We end with a brief reflection on the replicability and adaptability of the RSMs used in this study. As noted earlier, RSMs have been used to explore seed sector policy and regulation in a number of countries. They have also been used to examine policy and regulatory changes over time, and to compare policy and regulation between and among countries. As such, RSMs can be replicated and adapted to a wide range of questions and context. That said, the application of RSMs does require a unique combination of skills and experience to be conducted effectively. These include expertise in legal research and analysis, in the analysis of policy design and implementation, and first-hand knowledge of how seed systems function—including knowledge about the relevant crops, industry structure, farming systems, seed markets, and agricultural policies—in the focus country. Importantly, this approach speaks to the value of both an inter-disciplinary approach that integrates knowledge from different disciplines to inform the analysis, and a transdisciplinary approach that integrates non-academic expertise with policy, regulatory, and industry experience into the analysis.

Table 4.1: Summary of issues, relevant legal provisions, and recommendations for EGS production and distribution

Existing issues	Recommendations
Short-term recommendations	
RAB has limited financial and human resource capacity to adequately engage in breeding and varietal development.	Enhance financial and human resource capacity.
Limited private sector engagement in variety acquisition, development, research, and EGS production.	Prioritize the development of an institutional IP Policy or strategy for RAB and support building private sector capacity on breeding and EGS production.
Medium-term recommendations	
Absence of streamlined guidelines on conducting agricultural research.	Develop RAB guidelines on agricultural research in accordance with the National Agriculture Policy.
Absence of streamlined guidelines on access to EGS from RAB.	Develop RAB guidelines on EGS distribution to streamline the process of accessing EGS.
Poorer quality and limited availability of EGS.	Further implement EGS quality assurance measures through RICA.
Absence of a seed production projections to plan EGS production, set annual production targets, and identify intervention points to support market growth.	Prioritize leveraging partnerships with institutions with access to data on seed production, sale, and use. Leverage digital systems and technologies to streamline the process of EGS demand and projection.

Table 4.2: Summary of issues, relevant legal provisions, and recommendations for variety release and registration

Existing issues	Recommendations
Medium-term recommendations	
Address conflict of interest in relation to RAB conducting VCU and DUS testing.	Build RICA's capacity to conduct variety evaluations; leverage independent variety testing facilities by the private sector, such as the Seed Center.
Improve formal protocols on DUS and VCU testing.	MINAGRI and RICA could prioritize developing formal protocols on conducting DUS and VCU tests aligned with regional and international standards.
Gender reviews of standing advisory committees, including NVRC.	Restructure the NVRC if necessary
Long-term recommendations	
The Seed Law and Ministerial Orders need improved transparency in the procedure and form of lodging appeals.	Revise the Seeds Law and Ministerial Orders to better define the appeals processes and form.
The Ministerial Order on variety testing only expressly recognizes regional variety testing rules under COMESA, yet Rwanda is also a member of the EAC, which is at advanced stages of developing regional seed rules, and ASARECA, which also recommends a fast-tracked process for varietal registration.	Revise the Seed Law and Ministerial Orders to recognize Rwanda's obligations under other bodies of which it is a member.
The variety release and registration process is misaligned with the COMESA Seed Trade Harmonisation Regulations in practice, as it requires a confirmatory VCU test prior to release of varieties on the COMESA Variety Catalogue or registered in other COMESA Member States, contrary to COMESA regional seed rules.	Conduct ongoing capacity building for both stakeholders in the public and private sectors on regional seed rules and their impact on Rwanda's seed trade.

Table 4.3: Summary of issues, relevant legal provisions, and recommendations for seed quality assurance

Existing issues	Recommendations
Medium-term recommendations	
Improve capacity of RICA in terms of staffing and financial resources. Inadequate supply of certified seed due to absence of demand projections.	Leverage digital technologies to enable RICA to monitor and oversee field inspections in real time, which would speed up the certification process, and record production data, which could be used to project demand. Support RICA to recruit new inspectors and improve the capacity of existing ones, including providing them with the necessary equipment to perform their roles.
Both public and private sector stakeholders reported laboratory capacity gaps in terms of finance, human resource, and facilities. The national seed laboratory does not have ISTA accreditation, which is called for under international seed testing standards and regional practices.	Support RICA to build the resource, technical, and financial capacity of the national seed laboratory and prioritize the process for obtaining ISTA accreditation.
The national laboratory is currently under RAB, which is a potential conflict of interest, because RAB is a competitor with private seed companies.	Prioritize changing RICA's structure to bring the laboratory under its purview.
Long-Term recommendations	
The Seed Law and Ministerial Orders does not address the procedure and form of the appeal process. The Seed Law and Ministerial Orders do not include procedures and forms of possible complaints against counterfeit and fake seed.	Revise the Seed Law and Ministerial Orders to include clear provisions on appeal procedures and forms, and procedures on lodging and addressing complaints against counterfeit and fake seed.
The accredited private seed inspectors are currently being funded by RICA, and transition to a fee-paying mechanism needs to be developed.	Revise the Ministerial Order on seed certification to include a fees schedule, which can be charged to pay private seed inspectors.

Table 4.4: Summary of Issues, Relevant Legal Provisions, and Recommendations for Seed Trade.

Existing issues	Recommendations
Medium-term recommendations	
Lack of ISTA accreditation for the national laboratory puts seed exports to wider regional and international markets at a disadvantage where the importing country requires an Orange ISTA Certificate (OIC).	Enhance resources and technical and financial capacity of the national seed laboratory and prioritize ISTA accreditation.
Varieties must be on the national variety list to be eligible for importation, yet the national variety list is not aligned with the regional COMESA Variety Catalogue, nor is the variety release process aligned with COMESA seed rules.	Build NVRC capacity to recognize varieties on the COMESA Variety Catalogue, and support MINAGRI to align the national variety list with the COMESA Variety Catalogue.
Long-term recommendations	
The Seed Law and Ministerial Orders do not account for a possible appeals process.	Revise the Seed Law and Ministerial Orders to include clear provisions on appeal procedures and forms.
There is an increasing incidence of counterfeit seed, without clear legal or regulatory procedures for receiving complaints and redress.	Support MINAGRI to strengthen enforcement against sale of counterfeit seed. Revisions to the Seed Act are also needed to include clear procedures and forms for reporting cases of trade in counterfeit seed.

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