



## AGRICULTURAL PRODUCTIVITY PROGRAM FOR SOUTHERN AFRICA (APPSA)

# Situation Analysis on Domestication of SADC and COMESA Harmonised Seed Regulatory Systems among APPSA countries



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## Abbreviations

|           |  |
|-----------|--|
| AGRA      | Alliance for Green Revolution in Africa  |
| APPSA     | Agricultural Productivity Programme for Southern Africa                              |
| CCARDESA  | Centre for Coordination of Agricultural Research and Development for Southern Africa |
| COMESA    | Common Market for Eastern and Southern Africa  |
| HSRS      | Harmonised Seed Regulatory System  |
| RCol      | Regional Centre of Leadership  |
| SADC      | Southern African Development Community   |
| SADC HSRS | SADC Harmonised Regulatory System  |
| OECD      | Organisation for Economic Cooperation and Development                                |
| ISTA      | International Seed Testing Association   |
| DAR       | Department of Agricultural Research  |
| USAID     | United States Agency for International Development                                   |
| R&D       | Research and Development   |
| DAR       | Department of Agricultural Research  |
| SCCI      | Seed Control and Certification Institute   |
| IIAM      | Mozambique's Institute of Agricultural Research                                      |
| IIA       | The Institute of Agricultural Research   |
| UNACA     | Confederation of Farmer Associations and Agricultural Cooperatives of Angola         |

## Executive Summary

Agricultural Productivity Programme for Southern Africa (APPSA) under CCARDESA coordination is an investment programme mandated to improve agricultural technology generation and dissemination within and among participating countries (Angola, Lesotho, Malawi, Mozambique and Zambia); building capacity within national Research and Development (R&D) systems, and enhancing regional collaboration in agricultural research and development. Investments from or through APPSA are expected to support the national seed authorities in the APPSA countries in building their capacity and aligning national legislation and regulatory systems to the SADC and/or COMESA harmonized seed regulatory systems (HSRS). Harmonisation will provide a platform for disseminating technologies that were generated by Phase 1 countries (Malawi, Mozambique and Zambia) and other collaborating institutions operating outside the region to APPSA Phase 2 countries (Angola and Lesotho). Where harmonization is not fully realised, further dialogue involving key stakeholders from the countries and the region on operationalization of the SADC and COMESA HSRS, will be promoted.

In order to understand the status of harmonisation of SADC/COMESA HSRS within APPSA countries, CCARDESA conducted a study on Situation Analysis on Domestication of SADC and COMESA Harmonised Seed Regulatory Systems among APPSA countries. The results of the study grouped the APPSA countries into four (4) categories:

- **Fully harmonized and implemented:** - This category fits Zambia, whose seed legislations are aligned to both SADC/COMESA HSRS. The country however, still expects support from the APPSA programme to do specialised training and acquire specialised equipment to keep with modern trends in technological advancement. Also, the NPPO, feels that they may need support for COMESA standards awareness. Zambia, however, acknowledges the contribution made by the APPSA programme in supporting the harmonisation process.
- **Partially harmonised but not ready to implement:** - This category is for Angola and Mozambique, which are members of SADC. The major challenges curtailing the implementation is lack to limited capacity both in human and material resources including infrastructure. APPSA programme has not yet assisted these countries. Angola would still need to be facilitated to accede to the SADC MoU on harmonised seed regulatory system, finalise and enact the implementing regulations the Plant health law No. 5/21 of February 3rd, to be able to facilitate trade. Mozambique require support to finalise the development of the main seed legislation.
- **Partially harmonised and partially ready to implement:** - This category fits Malawi, which is part to SADC and COMESA. Malawi has fare human and material resources, although it requires replenishing, as its Seed Services Unit transforms into an Authority. It needs to amend its seed and plant protection regulations to be able to operationise both seed act and plant protection act, which are harmonised to the SADC/COMESA HSRS.
- **Absence of Acts and Regulations, and not ready to implement:** - This category fits Lesotho, as apart from having harmonised National Seed Policy and National Plant Protection Policy, it has no legislative instruments (Acts and Regulations) in place. Though drafts legislative instruments are in place, the Seed Bill and the Plant Protection Bill are still under development. APPSA programme has assisted in putting various drafts of various pieces of legislations together and the programme is still expected to help the processes that will realise enactment of the same. There is dire need to put human, material and correct infrastructure in place to be able to implement the harmonised regulatory system when in place.

While Malawi provided a full list of requirements needed under the NPPO to implement the HSRS (Annex 4), other countries would require to undertake capacity needs assessments. There is also dire need for

APPSA countries to be assisted to sign and accede to relevant regional instruments like the SADC MoU for Angola, Charter establishing SADC Seed Centre and even the SADC PBR Protocol to allow for effective implementation of the SADC HSRS.

This study was timely for CCARDESA and the APPSA Programme, as understanding the situation with regards to harmonisation of APPSA countries to SADC/COMESA HSRS, revealed gaps that will be explored in order to strengthen national organizations' capacities to attain the appropriate level of national regulatory systems to implement harmonised COMESA/SADC HSRS. Consequently, addressing the identified gaps will effectively facilitate safe seed trade and improve countries access to markets.

## 1. INTRODUCTION

The lack of quality seed in the SADC region has contributed significantly to food insecurity and poverty; currently, only a handful of countries in the region are food secure. Seed trade is also limited due to cumbersome and lengthy processes for testing and release procedures and variations in national standards in seed certification, quality control, quarantine, and phytosanitary measures.

To ensure better food security and livelihoods in the region, the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) has a mandate of coordinating agricultural research and development. It is a subsidiary organisation of the Southern African Development Community (SADC), established in 2011 and initiated its full operations in 2013. Among the Research and Development (R&D) programmes being coordinated by CCARDESA is the World Bank funded Agricultural Productivity Programme for Southern Africa (APPSA) implemented in five countries: three countries (Malawi, Mozambique and Zambia) in 2013 (First Phase) and expanded to Angola and Lesotho in 2019 (Second Phase). The main thrust of the programme is to improve agricultural technology generation and dissemination within and among participating countries; building capacity within national Research and Development (R&D) systems, and enhancing regional collaboration in agricultural research and development. The implementation of APPSA is based on partnerships and collaboration among SADC countries. Each country under APPSA establishes a Regional Centre of Leadership (RCoL) in its respective commodity area that distinguishes it as a leader in the region and beyond. So far, Zambia has established an RCoL in food legumes and legume-based farming systems, Malawi in maize and maize-based farming systems and Mozambique in rice and rice-based farming systems. In the current phase, Angola and Lesotho are establishing RCoLs in Cassava and Cassava-based farming systems and Horticulture and Horticulture-based farming systems, respectively.

Investments from or through APPSA are expected to support the national seed authorities in the APPSA countries in building their capacity and aligning national legislation and regulatory systems to the SADC and/or COMESA harmonised seed regulatory systems (HSRS). All the five countries involved are either part to SADC or COMESA Harmonised Seed Regulatory Systems while some countries maybe part to both. Harmonisation is envisaged to facilitate integration of smaller and isolated national seed markets into one larger SADC/COMESA market for seed. This, in turn, will promote the entry of new improved varieties in the region and ease the movement of quality seed from our country to other regional countries at a less cost. The development of the legal framework will open business opportunities for farmers in APPSA countries and increase investments in the seed sector, increased seed production, promote access to more elite crop varieties of specific commodities to which each country is a leader.

Most important, harmonisation to the SADC/COMESA Harmonised Seed Regulatory Systems will provide a platform for disseminating technologies that were generated by Phase 1 countries and those generated by other collaborating institutions operating outside the region to APPSA Phase 2 countries. Where harmonisation is not fully realised, further dialogue involving key stakeholders from the countries and the region on operationalisation of the SADC and COMESA HSRS, increasing the capacity to manage risks to prevent the transmission of pests and diseases

through seed or vegetatively propagated material, clarification of intellectual property rights, implementation of biosafety regulations and other related topics, will be promoted.

In this context, stakeholders would benefit from a situation analysis report on the domestication of the SADC and COMESA HSRS among the current APPSA countries for which CCARDESA engaged the services of a consultancy.

## **1.1 Objectives**

The overall objective of the consultancy is to conduct an assessment of the current status of domestication of the SADC and COMESA HSRS among the current APPSA countries (Angola, Lesotho, Malawi, Mozambique, and Zambia) in order to enhance their capacity to effectively integrate seed policy harmonisation issues into national planning and implementation.

Specifically, the objectives of the assignment are to:

- i. Review and document the current status of the national seed policy framework in each of the APPSA countries.
- ii. Determine the extent to which the countries' capacities, national legislation and regulatory systems are aligned to the SADC and COMESA HSRS. What are the gaps, and what actionable recommendations are proposed for countries to fully domesticate the SADC and COMESA HSRS?
- iii. Identify bottlenecks associated with domestication of seed regulatory systems in the APPSA Countries and suggest solutions
- iv. Document the role played by APPSA and other agencies in supporting the domestication efforts in the five countries.
- v. Act as a resource person for subsequent regional dialogues to be organised by CCARDESA where key stakeholders are expected to participate.

## **1.2 Deliverables**

The expected deliverables include the following:

- Inception report, spelling out the proposed technical approach, the assessment tool, time scale, resources and validation plan for the delivery of the final version of Domestication of Harmonized Seed System.
- A draft situation analysis report, which shall include: the current status of national seed policy framework in each of the APPSA countries; assessment of the extent of alignment of national capacities, legislation and regulatory systems to the SADC and COMESA HSRS; role played by APPSA and other agencies in supporting domestication efforts in the five APPSA countries; and current gaps and recommendations on how national seed regulatory systems in the current APPSA countries can be capacitated, strengthened and/or improved to fully domesticate the SADC and COMESA HSRS

- A final situation analysis report. The final report should incorporate comments received from CCARDESA, APPSA countries and other key stakeholders

## 2. METHODOLOGY

### 2.1 Data gathering and Working Tools

The study methodology incorporates information collected from various sources to highlight the benefits, challenges and status of implementation of COMESA/SADC HSRS in the five APPSA countries. The type of information used comprised both primary and secondary information, including use of internet and questionnaires to gather data on the status of COMESA/SADC HSRS implementation in Angola, Lesotho, Malawi, Mozambique and Zambia. The approach used is desk-study meant to provide the situational analysis report for the harmonisation status of APPSA countries to the COMESA/SADC HSRS through critically reviewing secondary information with a particular focus on the need to:

- Provide the current status of national seed policy framework in each of the APPSA countries;
- Assess the extent of alignment of national capacities, legislation and regulatory systems to the SADC and COMESA HSRS;
- Identify the gaps that exists between national seed legislations of APPSA countries and the COMESA/SADC HSRS;
- Outline any regulatory changes that might need to be considered for the full implementation of the COMESA/SADC HSRS; and
- Highlight capacity building requirements to operationalize the COMESA/SADC HSRS.
- Reveal the role played by APPSA and other agencies in supporting domestication efforts in the five APPSA countries;

Questionnaires were administered to NSA, NPPOs and APPSA national coordinators and/or administrators. List of respondents to questionnaires administered is shown in annex 1. Document review of literature from secondary sources and administration of questionnaires among selected seed stakeholders was conducted in order to conceptualize the subject better, integrate any relevant knowledge on the subject matter already available and identify gaps from current knowledge. The Work plan and budget followed was as indicated in annexures 2 and 3.

### 2.2 Risks, limitations and Mitigation

Below is a list of any potential risks/limitations and possible ways to mitigate against them.

| Risk/Challenge                                   | Mitigation Plan  |
|--|--|
| National Covid Lockdown                          | In the past the sector has been treated as an essential service so this should not disrupt data collection<br>Virtual tools such as ZOOM options to conduct interviews |
| Ban on travelling of senior government officials | Communicate with CCARDESA Regional Coordinator and Administrator for options.<br>Virtual tools such as ZOOM can be deployed to conduct meetings                        |

Delays in responding to questionnaires

Follow-ups were done with assistance of the regional programme coordinator and where impossible, web based searches were done.

### 3. RESULTS AND FINDINGS OF THE STUDY

#### 3.1 Assessment of Harmonisation efforts at Programming and Planning Level

##### 3.1.1 Regional CCARDESA Level

In its coordination role of APPSA, CCARDESA is expected to support policy dialogue and harmonisation activities with other key stakeholders as appropriate. During past APPSA Implementation Support Missions, there were recommendations that options for increasing the regional release of varieties, in particular, those tested under APPSA should be explored. APPSA Phase 2 countries are also encouraged to disseminate technologies that were generated by Phase 1 countries and those generated by other collaborating institutions operating outside the region. If APPSA countries and those they are collaborating with have not fully domesticated the SADC and COMESA HSRS, it will be difficult to achieve the above as well as other related milestones. It was therefore critical to assess whether the programming and planning at CCARDESA regional level took cognisance of the need to harmonise with COMESA and SADC HSRS.

An assessment of the APPSA Regional Implementation Methodology, in particular CCARDESA Internal Implementation Arrangement and Facilitation approach shows seven CCARDESA functions (CCRADESA, APPSA, 2019) under APPSA (Table 1).

**Table 1. Outline of CCARDESA's functions under APPSA**

|  |
|--|
| <b>1. Convening</b>  |
| Convene regional meetings involving APPSA participating countries to identify regional strategic research priorities and develop regional strategic research agendas.  |
| Convene regional meetings involving APPSA participating countries and broader groups of APPSA stakeholders and partners for purposes of scientific exchange, policy dialogue, operational coordination, etc. |
| <b>2. Networking</b>   |
| Support the development of information-sharing platforms to facilitate spillovers and enable sharing of benefits generated by technologies developed by RCoLs.   |
| Facilitate exchanges between APPSA, APPSA participating countries, and RCoLs and the international R&D community.  |
| <b>3. Technical backstopping</b>   |
| Establish a roster of peer-reviewers and manage the peer review of R&D proposals that have been approved for funding.  |
| Assist in RCoLs in developing standardized research guidelines and scientific protocols  |
| <b>4. Monitoring and Evaluation</b>  |
| Using M&E information generated by the R&D projects and compiled and forwarded by the RCoLs, produce annual technical reports showing overall APPSA implementation progress.                                 |
| Provide capacity building for M&E staff working in RCoLs, participate in impact assessment activities, and facilitate and participate in APPSA evaluation and reviews.                                       |
| <b>5. Policy harmonisation and Advocacy</b>  |

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|--|
| Encourage the rationalisation and harmonisation of policies, procedures, and regulations related to technology generation and dissemination in APPSA participating countries by supporting technical studies and promoting dialogue. |
|--|

|                             |
|-----------------------------|
| <b>6. Capacity building</b> |
|-----------------------------|

|  |
|--|
| Facilitate and participate in capacity building organised by RCoLs (i.e., long and short-term training, workshops, study tours, etc.). |
|--|

|  |
|--|
| Administration and management of APPSA |
|--|

|  |
|--|
| Report on and be accountable for activities and resources managed by CCARDESA. |
|--|

NB: Adopted from CCARDESA, APPSA, 2019.

Out of the seven functions (Table 1), number 5 clearly express that CCARDESA regional initiatives are supportive to harmonisation of SADC/COMESA HSRS by the APPSA programme implementing countries. The major bottleneck, could be if the said harmonisation of policies or legislative frameworks, has not been flagged in priorities submitted to CCARDESA region by respective countries. Thus, there is adequate regional support evidenced by the highlighting harmonisation of policies as a function to be tracked at regional level.

In an effort to strengthen seed regulatory and related services Malawi and Zambia have carried revision of the seed policy and seed act, respectively, taking cognizance of SADC regulations (CCARDESA, APPSA, 2015). A regional meeting held for Malawi, Mozambique and Zambia, confirmed that the funding from APPSA was used to advance their national seed systems towards a regional harmonised system, and also, witnessed by increased flow of good quality seeds across country the borders (APPSA Round Up, 2020).

Another stride at regional level was a workshop in Johannesburg, South Africa from 22 to 23 March 2017 convened by CCARDESA to discuss the seed harmonisation process in SADC and COMESA regions focusing on progress made by Agricultural Productivity Programme for Southern Africa (APPSA) participating countries regarding preparedness to participate in listing seed varieties on the regional catalogue.

The workshop looked at how best to enhance the capacity of APPSA countries to effectively integrate seed policy harmonization issues into national planning and implementation in order to facilitate seed availability and affordability (<https://www.ccardesa.org/events/ccardesa-convenes-workshop-seed-harmonization-sadc>). The workshop agreed actions in order to ensure that harmonized seed policy issues are effectively implemented include:

- Awareness creation to minimise legal impediments to be initiated by national stakeholders with support from regional communities through workshops, policy briefs targeting National Seed Authorities, policy makers, Seed Trade Association, Customs officials, Seed Producers & Seed Inspectors;
- Alignment of national legal frameworks to the SADC/COMESA Seed Harmonisation Policy to be spearheaded by national seed authorities.
- Lobbying and advocacy for alignment by the National Seed Trade Association
- Ensuring effective participation by the private sector in the alignment process;

- Preparation of policy briefs on Seed Harmonisation System and sharing with policy makers and politicians to fast track the revision of national seed laws to enhance seed trade;
- Ensuring commitment by countries to joint listing of crop varieties on regional seed catalogue(s) and ensuring effective participation of emerging seed companies through collaboration with and facilitation by NARs and CGIAR centres;
- Facilitation of simultaneous release of varieties in two countries to assume regional status and testing of the Seed Harmonisation System across borders;
- Development and implementation of awareness campaign action plans with assistance from the SADC Seed Centre, COMESA (for COMESA countries) and CCARDESA.

### **3.1.2 National Level APPSA Programming**

#### **3.1.2.1 APPSA Programming in Angola**

The theme to support regional harmonisation of COMESA/SADC Harmonised Seed Regulatory Systems is positively affirmed through responses as part of national planning, although the harmonisation of national legislative instruments with SADC harmonised regulatory system is regarded partially done. The national seed standards in Angola are not fully harmonized with the SADC seed standards, and the challenge has been due to the fact that support on harmonisation programmes by development partners at SADC regional level has not been extended to all SADC countries, and as such Angola has not been fully involved. In addition, Angola has limited capacity to support human and material resources needed to implement the requirements of the SADC HSRS if domesticated by APPSA countries. The areas to be strengthened would include:

- Infrastructure/building – Rehabilitation of existing and construction of new ones;
- Lab equipment required – Laboratory needs assessment required to ascertain missing equipment;
- Human resources training – should be ongoing
- Institutional arrangement – To be considered internally to assist in signing of SADC HSRS MoU;
- Funding support – Currently a weak financial situation, dependent on public resources

With respect to domestication of SADC HSRS, the APPSA programme is expected to assist Angola through provision of funding for stakeholders’ trainings and workshops; advocacy for domestication to policy makers through awareness campaigns, and the piloting of SADC HSRS implementation to enhance seed trade across APPSA countries involving and collaborating with relevant agribusiness entities in Angola. Strengthening the links of the different agribusiness authorities in Angola is critical to the implementation of the SADC HSRS.

Based on the Angola Final Version in English Cleared for Disclosure (Begbie-Clench and Bassimba, 2018), APPSA Project Design Component 2 on Strengthening the Institutional and Enabling Environment for Technology Adoption, although not direct, maybe subsumed to include harmonisation of national seed policies to regional seed regulatory systems. However, this can

only be a reality when activities to align national seed regulatory instruments to regional harmonised seed regulatory system were subsequently drawn for implementation.

The Component provide finances for: (i) upgrading of research infrastructure including rehabilitation and construction of physical infrastructure; laboratory, and office equipment; and information technology and knowledge management systems; (ii) upgrading of infrastructure for sanitary and phytosanitary (SPS) management and regulatory systems; (iii) improving institutional administration and performance management systems within RCoLs; (iv) developing human capital, with special focus on promoting women scientists, by providing scientific or technical training at the post graduate level; by upgrading skills through short courses or targeted training, and scientific exchanges; (v) strengthening seed production capacity, seed regulatory functions, and related services, and (vi) improving national research regulatory system to facilitate NARS functionality and implementation of research and dissemination activities (<https://documents1.worldbank.org/curated/en/525121535521163302/pdf/IPPF-for-Angola-Final-Version-English-Cleared-for-Disclosure.pdf>).

Activity (ii) upgrading of infrastructure for sanitary and phytosanitary (SPS) management and regulatory systems and activity (v) strengthening seed production capacity, seed regulatory functions, and related services, if implemented well should be able to build capacity and strengthen seed regulatory functions in light of the need to harmonise with and implement regional harmonised regulatory systems.

For Angola, it is important therefore to leverage upon component 2, in order to allow for alignment of national seed policy framework to the regional harmonised regulatory systems and be in a position to participate in technology exchanges with other APPSA countries.

### **3.1.2.2 APPSA Programming in Lesotho**

The theme to support regional harmonisation of SADC Harmonised Seed Regulatory System was part of national planning and resulted in the development of draft seed legislative instruments which are aligned to the regional harmonized regulatory systems. DAR through APPSA project engaged consultant to harmonize the seed policy with SADC Protocols and four (4) documents were developed; 1. Guidelines for variety release registration, 2. Instructions for drafting plant variety protection bill, 3. Seed certification scheme and 4. Seed regulations, and have been validated.

Delays in harmonisation has been due to lack of parliamentary approvals. Frequent changes in Government administration in Lesotho (i.e., Ministers and PS) delayed the presentation of the legislative work to parliament. Lesotho to some extent has capacity to support human and material resources to implement the requirements of the SADC HSRS. DAR is currently working hard to empower its human resources through training under APPSA Project, finalising the legal frameworks and also making institutional arrangements geared towards fulfilling this obligation.

APPSA programme is expected to provide funding to support Agricultural Research and Development and advocacy for domestication of regional HSRS to policy makers in order to urge

policy makers to prioritize agricultural research and development in their budget allocation. If funds permit the areas of service to be met would include the following:

- Infrastructure/building renovations – there are laboratories that needs upgrading and new ones
- Lab equipment refurbishment – need most of the equipment for various analyses e.g., growth room, tissue culture equipment
- Human resources training – need training on DUS of vegetable crops and
- Institutional arrangement – Not sustainable at the moment, working towards semi-autonomy of DAR

With respect to domestication of SADC HSRS, APPSA programme could assist by providing funding for the following activities:

- to speed up finalisation of seed act development aligned to the SADC HSRS
- Advocacy for domestication of regional HSRS to policy makers – sensitise policy makers through provision of evidence and benefits of shared technologies
- Initiate a Pilot to enhance seed trade across APPSA countries – Through exchange of germplasm, APPSA will ensure registration of tested and adopted seeds from R&D sub-projects
- Select seeds of economic importance and demonstrate the effect of HSRS

Other issues to highlighted and taken for consideration would include engaging stakeholders towards the end of the value chain so as to enhance adoption of the system; and that Governments should be made accountable through regional protocols to engage in HSRS. This will help to gain sustainability even during the ever-changing governments, as is the case in Lesotho.

### **3.1.2.3 APPSA Programming in Malawi**

The response from Malawi APPSA Coordinator acknowledged the theme to support regional harmonisation of COMESA/SADC Harmonised Seed Regulatory Systems as part of national planning, although the harmonisation of national legislative instruments with SADC/COMESA harmonised regulatory systems was partially done. The incompleteness was a result of Ministry of Justice that delayed the vetting and drafting of the seed bill. Therefore, the time available allowed the Seed Bill to be enacted by the Parliament but still remains finalization of the Seed Regulations. The Annual Report produced in 2016 by CCARDESA (CCARDESA, APPSA 2016), laments slow progress in the alignment of national seed regulatory policies with the regional seed policy harmonization and confirms the engagement of consultancy services for drafting of the seed policy and the seed bill in Malawi through APPSA programme.

In terms of capacity to support human and material resources to implement the requirements of the SADC/COMESA systems, Malawi has reasonable capacity, which needs to be strengthened. The areas of service that require strengthening include:

- Infrastructure/building – The New Seed Bill establishes a semi-autonomous Seed Regulatory Authority, hence needs new offices and laboratory space to accommodate the new establishment.
- Lab equipment required – will need additional state of the art equipment for seed testing
- Institutional arrangement – to suit the new establishment
- Funding support – Substantial funding required

AGRA has been implored to assist in providing platform for advocacy for domestication of regional HSRS to policy makers. The APPSA national project if renewed for another phase in Malawi, is envisaged to assist the following activities:

- Provide funding for office and laboratory infrastructure and equipment
- Initiate a Pilot to enhance seed trade across APPSA countries to some extent by motivating and engaging the private sector

#### **3.1.2.4 APPSA Programming in Mozambique**

The theme to support regional harmonisation of SADC Harmonised Seed Regulatory Systems was part of Mozambique's national planning and resulted in the seed regulations being aligned with the regional harmonized regulatory systems. Mozambique's legislation is now aligned to the SADC HSRS. Regulations that align to HSRS are yet to be approved. APPSA resources have been used to help support strengthening of the basic seed unit and IIAM plans to scale up support for basic seed production. The protocols necessary for seed harmonization are in place, and these are variety release system, seed certification and quality assurance, and quarantine and phytosanitary measures for seed. The plant breeder rights have been developed and pending are the guidelines to make the act operational. The Decree 12 of 2013 meant to harmonize seed systems with SADC standards was already approved.

Mozambique to some extent has capacity to support human and material resources to implement the HSRS. The area that needs to be addressed is the institutional arrangement. IAM has been making efforts to release improved seed varieties. However, between releasing a variety and ensuring that the variety is maintained including issues of ownership is a big challenge for IIAM. On the other hand, the legislation provides for agreements to be made with seed companies, but the internal mechanisms for operationalizing the decrees/legislation/licensing of the companies are not yet in place.

At the Ministry of Agriculture and Government level, there was an effort to approve the instruments/legislation for harmonizing the seed system, however the operationalization of the instruments will continue to be a challenge. There are still not enough inspectors to administer seed quality control and certification. Indeed, Mozambique stressed the need to initiate a Pilot to enhance seed trade across APPSA countries through the APPSA programme as this will create a learning opportunity and lessons for best practices.

### **3.1.2.5 APPSA Programming in Zambia**

The theme to support regional harmonisation of COMESA/SADC Harmonised Seed Regulatory Systems was part of the Zambian national planning and resulted in the seed regulations being aligned with the regional harmonized regulatory systems. Zambia allocated resources to the Seed Control and Certification Institution (SCCI) to strengthen its systems and structures for variety release, seed inspection, testing, quality assurance and certification (CCARDESA, APPSA, 2016). Currently, the aligned regulations are currently in use, operationalising the regional harmonised regulatory systems.

Prior to domestication of regional harmonised seed regulatory systems, a number of national stakeholder awareness campaigns have been carried out targeting almost all stakeholders in the seed sector including seed companies, agro dealers, farmers organizations. The campaigns provided support for the principal seed law (amendment) to go through Parliamentary approvals.

Now that full domestication of regional harmonised regulatory systems is realised in Zambia, the assistance of APPSA programme is still expected to offer support to the implementation of the HSRS. APPSA could provide funding towards the holding of sensitization meetings targeting all relevant national stakeholders from the private and public sectors. In addition, advocacy meetings for domestication to policy makers could be facilitated to bring and raise awareness of policy makers including as appropriate Parliamentary committee responsible for agriculture. The meetings in their various forms will provide platforms where policy makers and parliamentary committees would support the inclusion of implementation of HSRS in national planning and budgeting for sustainability.

## **3.2 Assessment of Harmonisation efforts at Implementation level**

### **3.2.1 Regional level implementation assessment**

Regional harmonisation is expected to facilitate access to new and improved varieties, ease the movement of seed, improve distribution, simplify administrative procedures, encourage investments and reduce costs. The SADC and COMESA HSRS stipulate that once a variety has been released in two member states, the variety can be included in the regional variety catalogue. The entry of a variety in the SADC/COMESA Variety Catalogue implies that the variety can be traded freely anywhere in the SADC/COMESA Region.

The COMESA and SADC Regions recognise the fundamental importance of a sustained provision of improved seed for its agriculture to perform. The Harmonised Seed Regulatory System (HSRS) provides a robust system to achieve this desire and it aims to implement three components, namely (a) Variety Release and Registration; (b) Seed Certification and Quality Assurance; and (c) Quarantine and Phytosanitary Measures for Seed.

COMESA has to date 64 entries or varieties on the COMESA variety catalogue representing 7 crop types ((maize, common bean, soybean, sorghum, pearl millet, groundnut, Irish Potato), mostly from privately owned seed companies (<https://varietycatalogue.comesa.int/varietycatalogue>). Among the countries that have aligned

their national seed laws and regulations with the COMESA Seed Trade Harmonization Regulations are: Burundi, Comoros, Djibouti, DR Congo, Egypt, Eritrea, Eswatini, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Uganda, Zambia and Zimbabwe (COMESA, 2019).

The SADC HSRS has to-date registered over 100 crop varieties that represent 7 crop types, also from privately owned seed companies. Although there is a significant progress made in the registration of crop varieties for regional production and trade, the domestication is slow and affects smooth implementation of the System. Member States are still in the process of reviewing their national laws, while others are yet to sign the Charter establishing the SADC Seed Centre to facilitate smooth coordination of HSRS implementation. Only three member states have signed the charter (Botswana, Eswatini and Mozambique) (Table 2). Similarly, the Plant Variety Protection Protocol is not yet operational since it is signed by only Nine Member States (Angola, Botswana, DRC, Eswatini, Lesotho, Mozambique, Namibia, South Africa, Tanzania and Zambia). The SADC Seed Centre is currently running with the help of the SPGRC as an interim measure.

At regional level, without the signing/ratification of the Charter establishing the SADC Seed Centre and Plant Variety Protection protocol, the SADC HSRS Monitoring unit remains compromised and as such delay the progress of HSRS implementation. There is urgent need to facilitate and operationalise the Centre through attainment of two-thirds majority of Member States signing the Charter.

**Table 2. Status of signing and operationalise of various components of SADC HSRS**

| <b>Component of SADC HSRS</b>  | <b>Number of Member States Signed</b> | <b>Threshold Need</b> | <b>Remarks</b>               | <b>APPSA Countries</b> |
|--------------------------------|---------------------------------------|-----------------------|------------------------------|------------------------|
| SADC HSRS MoU                  | 12                                    | Two-thirds majority   | >2/3 and being operationised | 4 signed except Angola |
| Charter for SADC Seed Centre   | 3                                     | Two-thirds majority   | <2/3 and not operatinised    | 4 signed except Malawi |
| Plant Breeders Rights Protocol | 10                                    | Two-thirds majority   | <2/3 and not operatinised    | Only Mozambique signed |

### **3.2.2 National level implementation assessment by country**

#### **3.2.2.1. Variety Release System, Seed Certification and Quality Assurance in Angola**

##### **The Current Status of Seed Policy Framework in Angola**

Angola belongs to the SADC but not COMESA and is therefore expected to align to the SADC HSRS. In terms of the national seed policy framework, Angola has the seed legislations (the Seed Law and the Seed Regulations) that regulate variety release and registration, and seed certification and quality assurance. However, it has no national seed policy in place.

The state and implementation of various legal instruments is shown below (Table 3). Generally, all the available legal instruments do not function well.

**Table 3. State and implementation of Legal instruments in Angola**

| Legal instrument       | a. Not in place                     | b. Under development     | c. In place but not functioning well | d. In place and functioning well | Not applicable to country's seed sector |
|------------------------|-------------------------------------|--------------------------|--------------------------------------|----------------------------------|---|
| National seed policy   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input type="checkbox"/>         | <input type="checkbox"/>                |
| National seed strategy | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Law of seeds           | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Seed regulations       | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Ministerial decrees    | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | <input type="checkbox"/>         | <input type="checkbox"/>                |

The specific legal instruments available include the Decree of the Council of Ministers No. 92/04 on the prohibition of imports of genetically modified seeds enacted in 2004, the Seed Law No. 7/05 enacted in 2005, and Presidential Decree No. 93/16 of 9 May, also the Seed Law Regulation enacted in 2016.

The implementing body of the seed regulatory system in Angola is the SENSE - National Seed Service established in 1995 by Decree No. 15/95 of 9 June of the Council of Ministers, which created the National Seed Service, under the auspices of the Ministry of Agriculture.

The National Seed Service is mandated to ensure the implementation of the policy measures outlined in the field of seeds and the application of the revised standards in the regulations in order to contribute to increase crop production, agricultural productivity and prevent the entry of seeds which are harmful to agriculture in the country. The mandate of the National Seed Service, is achieved through meeting following functions/activities:

- a) define the specific regulations, by species or groups of species, as well as the standards and technical manuals necessary for the proper application of the Seed Law and this Regulation;
- b) Promote the use of quality seeds, as well as maintain the functional quality control service;
- c) carry out the control of seeds marketed in the country and imported in such a way as to ensure the required quality, compliance with plant standards and existing legislation in the field of seeds;

- d) Control the quality of seeds of domestic and imported production;
- e) Manage the publication of the National Variety Catalog and update it annually;
- f) register seed producers, traders and importers;
- g) propose fees for the provision of variety registration and seed quality control services;
- h) act as seed certification inspector, control and supervise the production and processing of certified seeds;
- i) issue official labels which, in accordance with seed law, this Regulation and specific regulations accompany the seeds marketed;
- j) update seed statistics and publish relevant information annually;
- k) propose, to the Ministerial Department responsible for the Agriculture sector, an accreditation system for seed inspectors and analysts, and to conclude contracts with natural and/or legal persons, the collaboration that is appropriate for the performance of their purposes;
- l) impose penalties and levy fines under the Seed Act and this Regulation.

### **Assess the extent of alignment to the SADC Harmonized Seed Legislation and Regulatory Systems in Angola**

The legislation provides for alignment to SADC HSRS. With respect to registration and release of varieties, Article 43 of the Regulation of the Seed Law provides for the marketing of seeds entered into the SADC Catalogue. Similarly, Seed certification and quality assurance for varieties in the regional catalogue is also provided for. For a variety that is already included in the SADC Variety Catalogue, the process of adding this variety to the National Variety Catalogue, would entail regular checking by the NSA or Variety Release Secretariat of new varieties once a regional listing is made and updating the national listing at the request of a seed company or agent, supported by a national demonstration trial to enable adoption.

The observed gaps in Angola include the country not signing the SADC HSRS MoU, and weak human and financial capacity. Angola has 18 provinces, but SENSE is only represented in 10. Despite its statutory financial and asset autonomy, its human resources are not qualified due to the freezing of staff entering the civil service and financial capacity affected by budgetary limitation.

The study recommends that Angola needed to sign the SADC HSRS MoU and for this to be achieved, high-level advocacy meetings would be necessary to motivate decision makers. To address the issues of human capacity, there is a need to train existing staff on seed certification and quality assurance, laboratory equipment audit to match the scope of the seed testing laboratory. Mobilisation of financial support from government and development partners remains key.

### **Key stakeholders involved in the domestication and harmonization of regulatory seed systems in Angola**

Key stakeholders involved in the domestication of the regional harmonised seed regulatory system are listed (Table 4) and the roles specified.

**Table 4. List of key stakeholders for Angolan Seed Industry**

| <b>Category</b>  | <b>Stakeholder</b>  | <b>Role</b>   |
|--|---|---|
| Public researchers                                       | The Institute of Agricultural Research (IIA) (Instituto de Investigação Agronómica)                   | Conduct agronomic research  |
|  | CIMMYT, IITA  | Evaluation for adaptability   |
| Regulators   | SENSE - National Seed Service   | Seed quality control and certification                                  |
|  | National Directorate for Agriculture and Livestock - Department of Agriculture and Agrarian Economics | Plant imports and export regulation                                     |
| Evaluators of local varieties                            | Luanda's University – NPGRC (Genebank)  | Conservation and sustainable utilization of plant genetic resources     |
| Private researchers and evaluators of new varieties      | Chinese company WIN-ALL HI-TECH SEED CO., LTD   | Breeding and technical support  |
|  | SEEDCO, Capestone Seeds   | Evaluation for adaptability and technical support                       |
| Inputs (seed and fertilizers) managers and extensionists | Instituto de Desenvolvimento Agrícola.  | Management of government subsidy program and technical support services |
| Seed producers and marketers                             | Various seed companies: Novagrolider, Jardins da Yoba, Kambondo, Valagro, Vrelo                       | Bulking of seed, processing and marketing                               |
| Seed dealers   | Acquasolo, Fertiseme, Lda Agrowaco, S.A Food Factory, Agro-Quibala                                    | Importing and selling of imported seed                                  |
| Associations   | Confederation of Farmer Associations and Agricultural Cooperatives of Angola (UNACA)                  | Users of seed   |

NB. Adopted from Angola Seed Industry Report (Unpublished), compiled for the consultancy on the Feasibility study for the Regional Access to Seeds Index for East & Southern Africa (Angola, Botswana, Burundi, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Rwanda, South Sudan, Somalia (tbc), South Africa, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe).

### **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

The survey clearly shows that in Angola, the APPSA programme has not yet facilitated alignment of the national policy frameworks to the SADC HSRS. Whilst the assistance to domesticate national instruments to the SADC HSRS is welcome, it is critical that the APPSA programme assist the signing of the SADC HSRS MoU or at least acceding to it. Without acceding to the SADC HSRS, the implementation of the regional HSRS is compromised. APPSA programme is therefore requested to provide financial support to allow for stakeholder consultations, which presumably will gather support and rationale for the need to accede to the SADC HSRS MoU.

Stakeholder support will provide the inertia needed for the advocacy and the eventual signing or accession.

Other agencies include the National Seed service whose functions is Drafting of the Seed Law and Regulations while FAO financed and participated in the drafting of the Seed Law and Regulation through a TCP (Technical Cooperation).

### **3.2.2.2 Quarantine and Phytosanitary Measures for Seed in Angola**

#### **The Current Status of the National Plant Protection Policy Framework**

With regards to the legislative instrument regulating trade in plants and plant products, including seeds, Angola has a Plant health law No. 5/21 of February 3rd, which is aligned to HSRS.

The current gaps are lack of regulations for operationalizing the law and weak human and financial capacity. Areas of concern include the need for Laboratory equipment, Human resources requiring training on specialised areas like pest risk assessment, funding support and investment in infrastructure. The study also identified limited consultations to finalise regulations as one of the bottle necks hindering full domestication of the SADC HSRS.

The study recommends finalizing regulations to operationalise the law are under development, conducting institutional capacity needs analysis, stakeholder consultations, high level advocacy workshops and mobilising financial resources to address gaps identified through capacity needs analysis – e.g., training of personnel, equipping of labs and infrastructure development.

#### **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

APPSA programme has not yet assisted in harmonisation initiatives. The NPPO of Angola view the potential contribution of APPSA programme in providing a platform for Advocacy for domestication of SADC HSRS to policy makers and assisting in Stakeholder awareness campaigns.

Other Agencies include the Ministries of Health, Commerce and Environment that facilitated the development and enactment of Plant health law No. 5/21 of 3 February 2021.

### **3.2.2.3 Variety Release System, Seed Certification and Quality Assurance in Lesotho**

#### **The Current Status of the National Seed Policy Framework**

Lesotho belongs to the SADC but not COMESA block, and its seed policy frameworks are expected to align to the SADC HSRS. Lesotho has no legislative instruments regulating variety release and registration, and seed certification and quality assurance. However, it has a national seed policy in place.

The state and implementation of various legal instruments is prescribed (Table 5). The available national seed policy does not function well in the absence of other supporting instruments (Act and Regulations).

**Table 5. State and implementation of Legal instruments in Lesotho**

| Legal instrument       | a. Not in place                     | b. Under development                | c. In place, not functioning well   | d. In place and functioning well | Not applicable to country's seed sector |
|------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|---|
| National seed policy   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>         | <input type="checkbox"/>                |
| National seed strategy | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Seed law               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Seed regulations       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Ministerial decrees    | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |

The specific policy framework available is the National Seed Policy enacted in 2016, and is expected to be revised to include some clauses relating to GMOs.

The main institution and implementing body that govern the country's seed sector is the Department of Agricultural Research in particular its Seed Development Unit that was established in 2007. The Seed Development Unit carries out seed field inspections and seed certification on maize and beans. There is also a Seed Multiplication Unit under Department of Crops Services which carries out seed field inspections on seed potato. All these fall under the Ministry of Agriculture and Food Security.

The National Seed Policy establishes the need for a semi-autonomous institution, the National Seed Services which is mandated to regulate the seed industry and ensure the implementation of the policy measures outlined in the field of seeds. The National Seed Services when in place, will ensure the development and operationalisation of the national regulatory framework and proper seed standards in order to contribute to the increase in crop production, agricultural productivity and prevent the trade of poor quality seeds to and from the country.

### **The extent of alignment to the SADC HSRS in Lesotho**

#### **Legislation and regulatory systems**

Lesotho has not harmonised its legal instruments to SADC HSRS as there is no legislation enacted to that effect. However, recently, a consultancy work under the APPSA programme assisted in developing the Guidelines for variety release and registration, Seed certification scheme and seed

regulations taking into account the domestication of the SADC HSRS. In addition, instructions for development of Plant Variety Protection Bill were also developed. However, the current gap is that the Seed Act is still under development thus delaying approval of supporting instruments available in drafts (schemes and regulations).

The actionable recommendations required for Lesotho to fully domesticate the SADC HSRS include:

- Finalising Seed Act that will assist in governing the operations of the seed sector
- Establishment of the National Seed Services, and other Seed bodies responsible for executing / administering seed procedures/protocols.
- Approval of supporting schemes and regulations
- Signing of the Charter for establishing the SADC Seed Centre by the Minister,
- Approval of other supporting laws e.g., Plant Variety Protection Bill.

Assessment of Lesotho’s national capacity showed that Lesotho has no capacity to implement the SADC HSRS. The absence of various seed bodies, limited staff, lack of resources (transport) and inadequate infrastructure (Lack of laboratory equipment) are major constraints.

Several areas of concern listed (Table 6) indicate the existing gaps.

**Table 6. Areas of Concern in Lesotho as guided by options provided**

| <b>Options</b>   | <b>Variety registration and release</b>   | <b>Seed Certification and Quality Assurance</b>   |
|--|---|---|
| Infrastructure/building required (Specify)   | Office space for Committee operations to be established   | Offices for National Seed Services to be established  |
| Lab equipment required (specify)   |   | The whole seed lab set up required.   |
| Human resources to be trained (specify training area)<br>Variety Release for seed bodies<br>Seed inspections for inspectors<br>Seed sampling and quality assurance for samplers and analysts | Variety release bodies to be trained on procedures/ protocols to be followed in releasing a variety | Seed inspections course for inspectors<br>Seed sampling and quality assurance for samplers and analysts<br>Laboratory Technologists on laboratory procedures in seed testing and seed health. |
| Institutional arrangement required (specify)   | No established National Seed Services<br>No established Crop Variety Release Committee              | No established National Seed Services.  |
| Funding support  | Establishment of the National Seed Services   | Procurement of Vehicles for conducting Seed field inspections and seed sampling.  |

Actionable recommendations required for Lesotho to fully domesticate the SADC HSRS include:

- Establish and operationalise National Seed Services and seed bodies
- Employ or second human resources for adequacy
- Train human resources in specific aspects including Variety Release procedures, seed certification and quality assurance procedures and protocols

### **Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

Below are key bottlenecks that are stalling the process of domestication of the seed regulatory systems in Lesotho:

- Stakeholder awareness campaigns – Lack of funds for conducting awareness campaigns limiting factor
- Cabinet approval – needed for other supporting policies and legislative instruments
- Parliamentary approvals – needed for all seed legal frameworks to be enacted into force
- Presidential signature to be appended – needed for the signing of the Charter establishing the SADC Seed Centre
- Absence of the seed regulating body.

The following are the suggested solutions for facilitating domestication of seed regulatory systems in Lesotho:

- Financial resource mobilisation for establishment of National Seed Services (infrastructure) and capacitating Human and material resources,
- Mobilizing Policy makers through stakeholder consultations for Signing of the Charter, finalising seed act and making recommendations on establishment of the National Seed Services
- Initiate approval processes for other supporting policies and Acts/laws

The stakeholders that are critical in the seed value chain of Lesotho are listed below (Table 7).

**Table 7. Key stakeholders in Lesotho seed sector**

| Category                               | Stakeholder  | Role  |
|--|--|---|
| Regulators                             | Department of Agriculture Research                       | Seed quality control, plant import permits and phytosanitary issuance                   |
|  | Ministry of Tourism, Environment and Culture             | Biosafety issues  |
| Researchers                            | Department of Agriculture Research                       | Seed development, seed quality control, plant import permits and phytosanitary issuance |
|  | National University of Lesotho                           | Research  |
| Seed multipliers and monitors (public) | Department of Crops                                      | Seed multiplication   |
|  | Department of Field Production                           | Monitoring seed production  |
| Marketers                              | Department of Marketing                                  | Access to markets   |
| Policy guidance                        | Department of Policy Planning and Analysis               | Policy development and direction  |
| Seed producers (private)               | Seed Companies (Lehakoe, MM Greenland, Bahlabani, Bunny) | Research, Seed Production and Marketing   |
|  | Seed Growers   | Bulking of seed   |
| Legal drafters                         | Ministry of Law and Justice                              | Legal drafting  |
| Traders                                | Ministry of Trade  | Trade facilitation  |
| Foresters                              | Ministry of Forestry and Soil Conservation               | Forest seed research  |

**The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

Lesotho acknowledges the crucial role played by the APPSA programme – the engagement of a consultant for development of 1) Guidelines for variety release and registration 2) instructions for development of Plant variety protection Bill 3) Seed certification scheme and 4) seed regulations. In addition, the consulting services assessed and proffered options for the establishment of a functional National Seed Services and training needs for human personnel within various seed bodies.

However, in order to fully realise the fruits of domestication to the SADC HSRS, Lesotho believes APPSA programme needs to go an extra mile in assisting. The APPSA programme is expected to assist in:

- Providing funding for the establishment of National Seed Services (infrastructure) and capacitating Human resource,
- Advocating for SADC HSRS domestication to Policy makers through mobilizing Policy makers to support the Signing of the Charter, finalising seed act and making recommendations on establishment of the National Seed Services
- Supporting approval processes for other supporting policies and legislative instruments (Acts/laws/regulations)

There are no any other agencies facilitating domestication and harmonisation of SADC HSRS in Lesotho, apart from APPSA programme under CCARDESA.

### **3.2.2.4 Quarantine and Phytosanitary Measures for Seed in Lesotho**

#### **The Current Status of the National Plant Protection Policy Framework**

With respect to legislative instrument regulating trade of plants and plant products, including seeds, Lesotho is governed by the Agricultural Marketing Act, 1967 (Act No. 26 of 1967). The law is not specific to quarantine and phytosanitary measures only as it broadly addresses a whole range of marketing issues and therefore is deemed ambiguous.

#### **Assess the extent of alignment to the SADC HSRS**

##### **Legislation and Regulatory Systems**

The country has not harmonised its national legislative instrument for Phytosanitary measures with SADC HSRS. However, currently the country is busy drafting a new bill that is expected to be aligned to the SADC HSRS. The procedure for domestication begins with the relevant department, indicating the piece of amendment that needs to be amended. Then, the ministry responsible with its legal advice will highlight the procedures to be followed, including stakeholder involvement, then parliamentary council till it reaches full Parliament for approval.

Apart from under developed Bill, the other gaps observed in Lesotho are increasing workload, and weak human and material capacity. Areas of concern include there following:

- Lab equipment required – Significant progress to secure some equipment has been done but more is required in particular equipment for seed health.
- Human resources to be trained – Seed Health Testing methods to examine plant pathogens in seeds.

The study proposes the following actionable recommendations for Lesotho to fully domesticate the SADC HSRS:

- Institutional needs assessment
- Lab equipment for seed health testing acquired
- Human resources trained on Seed Health Testing methods.

## **Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

The bottlenecks identified for Lesotho include:

- Funding limiting – More funding support is needed for stakeholder awareness campaigns, then advocacy for Parliamentary approvals and Presidential signature accent.
- Silo approach to development of legislations – there's a need to ensure synchrony in the movement of the two documents (Seed Bill and Plant Protection Bill) as operationally they complement each other. There should not be a case where another bill is completed leaving the other behind.

### **Suggested Solutions**

- Funding mobilisation to support activities for finalisation development of Plant Protection Bill
- Concurrent development and advocacy of the two bills (Seed Bill and Plant Protection Bill) for approval by policy makers (Parliament and President)

### **Key stakeholders for Lesotho**

- Department of Marketing – regulation quota of imported commodities.
- Department of Livestock – regulating the movement of animal and animal products coming in and outside the country.
- Department of Agricultural Research – regulating the movement of plants and plant products as well as regulated materials.

## **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation in Lesotho**

While APPSA programme has been hailed in Lesotho for funding the drafting of the seed regulatory documents (Seed bill, Schemes, Regulations etc), its support towards development of Plant Protection Bill is still at initiation stage. Funding support to be provided through APPSA is expected to see the development of Plant Protection Bill through to completion. Expectations are that APPSA programme will also provide funding for lab equipment and training of human resources as guided by the needs assessment. Other Plant health (SPS) projects assisted in acquiring some lab equipment.

### **3.2.2.5 Variety Release System, Seed Certification and Quality Assurance in Malawi The Current Status of the National Seed Policy Framework**

Malawi belongs to both COMESA and SADC economic communities and therefore expected to harmonise its legislative framework to both COMESA and SADC HSRS. In terms of legislative instruments regulating Variety release, seed certification and quality assurance, Malawi has recently enacted the Seed Act of 2022. However, there is need to amend existing Regulations,

2018 in harmony with regional HSRS in order to implement the requirements stipulated in the Seed Act.

The state and implementation of various legal instruments is prescribed (Table 8). The available Seed Act does not function well in the absence of amended Regulations, which are supporting instruments needed to operationalise the Act.

**Table 8. State and implementation of Legal instruments in Malawi**

| Legal instrument       | a. Not in place          | b. Under development                | c. In place, not functioning well   | d. In place and functioning well | Not applicable to country's seed sector |
|------------------------|--------------------------|-------------------------------------|-------------------------------------|----------------------------------|---|
| National seed policy   | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>         | <input type="checkbox"/>                |
| National seed strategy | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Seed law               | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Seed regulations       | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>         | <input type="checkbox"/>                |
| Ministerial decrees    | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>         | <input type="checkbox"/>                |

The specific policy frameworks available included the National Seed Policy enacted in 2018, Seed Act of 2022 and Seed Regulations of 2018. Currently, Seed Services Unit (SSU) established in 1976 is operating under the old seed act of which has gaps addressed in the new seed act, 2022. Seed Act of 2022, provides for the establishment and operation of the Malawi Seed Regulatory Authority; regulate the release and registration of crop varieties; and regulate the production, processing, certification and sale of certified seed in Malawi and the importation and exportation of seed.

The country therefore needs to establish the regulatory authority as per the new seed act. Transformation of the current SSU to a regulatory authority if delayed would affect effective implementation of seed certification activities which would consequently affect the implementation of both COMESA and SADC HSRS. Currently, the country uses Seed Regulations enacted in 2018 in its quest to govern the seed industry. However, these regulations do not match the Seed Act enacted in 2022. New seed regulations are therefore required to operationalize the Seed Act of 2022, once gazetted. There is therefore need to fast track review of seed regulations and amend the existing regulations to meet the aspirations of the latest Seed Act, which is in harmony with regional HSRS.

### **Assess the extent of Malawi's alignment to the SADC and COMESA HSRS**

#### **Legislation and Regulatory Systems**

Malawi has harmonised its new Seed Act of 2022 with COMESA and SADC HSRS. For a Variety already listed in COMESA or SADC regional catalogue to be marketed in Malawi, the NSA or

Variety Release Secretariat intends to regularly check the regional catalogues once any regional listing is done and update its national listing upon request from Seed company or Agent, through approval by National Variety Release Committee. The absence of seed regulations is delaying the process of domestication. The Seed Regulations have not been revised to align with the new Seed Act as such, it is recommended that the review of seed regulations to operationalise the new Seed Act, which is harmonised to COMESA and SADC HSRS, should be fast tracked.

In terms of the capacity, the authority needs more human resources as it takes up new roles such as the variety release system. The current offices and equipment are outdated as they were built in 1976 when the country had only 1 seed company. There are currently over 20 seed companies in Malawi now, which calls for an upgrade or new facilities. Therefore, resources will be required for capacity building. Apart from limited office infrastructure and equipment/facilities other gaps are also expressed by areas of concerns as highlighted in the table below (Table 9).

**Table 9. Areas of Concern in Malawi as guided by options provided**

| <b>Options</b>  | <b>Variety registration and release</b>   | <b>Seed Certification and Quality Assurance</b>   |
|---|---|---|
| Infrastructure/building required (Specify)  | Laboratory and offices  | Laboratory and offices  |
| Lab equipment required (specify)  | Cameras   | Seed testing equipment  |
| Human resources to be trained (specify training area) <ul style="list-style-type: none"> <li>— Variety Release for seed bodies</li> <li>— Seed inspections for inspectors</li> <li>— Seed sampling and quality assurance for samplers and analysts</li> </ul> | <ul style="list-style-type: none"> <li>— DUS and VCU data collection and analysis</li> <li>— Evaluation of applications for variety release and registration</li> </ul>           | <ul style="list-style-type: none"> <li>— OECD seed inspections</li> <li>— ISTA Seed sampling and testing</li> <li>— Quality assurance in seed sampling and testing</li> </ul> |
| Institutional arrangement required (specify)  | <ul style="list-style-type: none"> <li>— Transformation of SSU into the Malawi Seed Regulatory Authority</li> <li>— establishment of the plant breeders' rights office</li> </ul> | <ul style="list-style-type: none"> <li>— Transformation of SSU into the Malawi Seed Regulatory Authority</li> <li>— OECD accreditation</li> </ul>                             |
| Funding support   | Required for establishment of the Malawi Seed Regulatory Authority  | Required for establishment of the Malawi Seed Regulatory Authority  |
| Others  |   |   |

Table 5 captures the actionable recommendations required for Malawi to fully domesticate the SADC HSRS, in addition to the need to provide resources to upgrade facilities and capacity building.

## **Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

In the absence of domestication of SADC/COMESA harmonised seed regulatory systems, the NSA/Seed Unit can facilitate movement of seed based on OECD Seed Schemes and ISTA accreditation but on small scale. Harmonization opens up a larger market.

The major bottleneck is the absence of seed regulations to implement the new Seed Act enacted 2022, in order to implement the domestication of COMESA and SADC HSRs. This is due to financial limitations to conduct the required activities necessary to amend the seed regulations.

Suggested activities for Malawi to develop regulations to operationalize the Seed Act, 2022 are as follows.

- Inception meeting
- Review 2022 Seed Act, 2018 Seed Regulations and drafts to identify provision for inclusion in the new seed regulations
- Drafting of new Seed Regulations
- Drafting procedures and forms for schedules
- Drafting new seed regulations
- Review meeting
- Submission and approval – Gazette seed regulations

In order for domestication to be fully realised in Malawi the key players to be consulted are tabulated below (Table 10), as adopted with changes from Mabaya, Kachule, Waithaka, Mugoya, Kanyenji, and Tihanyi (2021).

**Table 10. Key players in Malawi’s seed sector**

| Category               | Stakeholder(s)   | Role                               |
|------------------------|--|------------------------------------|
| Researchers/Breeders   | Department of Agricultural Research Services (DARS), private seed companies, Consultative Group on International Agricultural Research (CGIAR) centers                                 | Research and breeding              |
| Variety release bodies | DARS, Seed Services Unit (SSU), Agriculture Technology Clearing Committee (ATCC)   | Variety release and regulation     |
| Seed producers         | Seed companies, individual seed growers  | Seed production and processing     |
| Technical support      | Seed companies, Seed Trade Association of Malawi (STAM), Department of Agricultural Extension Services (DAES), Lilongwe University of Agriculture and Natural Resources (LUANAR), DARS | Education, training, and extension |

|              |   |  |
|--------------|---|--|
| Associations | The Seed Trade Association of Malawi (STAM) | is an umbrella association for coordinating the seed companies in the country. |
| Seed sellers | Seed companies, agro-dealers                | Distribution and sales   |
| Users        | Farmers                                     | Using certified seed for planting  |

### **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

APPSA assisted in the development of the National Seed Policy. More is expected from the APPSA programme, since the process of domestication of COMESA and SADC HSRS is not yet completed.

Areas for support would include providing financial resources for infrastructure and human resource development, and sensitization of Policy makers advocating for domestication as well as facilitating transformation of SSU into a Regulatory Authority to efficiently implement seed certification and quality assurance systems.

Other Agencies are USAID Seed Trade and USAID who built capacity (human and equipment) while AGRA funded the development of seed Act, and also strengthened national capacity (human resource and equipment).

### **3.2.2.6 Quarantine and Phytosanitary Measures for Seed in Malawi**

#### **The Current Status of the National Plant Protection Policy Framework**

Malawi has legislative instrument regulating trade of plants and plant products, including seeds. The legislative instrument is the Plant Protection Act, enacted in 2018. However, the Plant Protection regulations need review in order to match the requirements of the Act.

#### **The extent of alignment to the SADC and COMESA HSRS in Malawi**

##### **Legislation and Regulatory Systems**

The Plant Protection Act of 2018 is aligned to regional trade blocks (COMESA and SADC) and to effectively implement the legislation, the review of Plant Protection regulations is required.

Although Malawi has adequate human resources, there is urgent need to strengthen their capacity skills and knowledge. Physical and hands on training on diagnostics for pests and diseases, and pest risk analysis analysis are some of the key areas. The need to furnish laboratory with required tools and equipment as specified in Annex 3 will be key for Malawi.

### **Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

To fully realise domestication, there is need to develop the Plant Protection Regulations which are aligned to the SADC and COMESA HSRS. This process entails consultation of stakeholders in 3 regions of Malawi that are involved in export and import of agricultural trade of plants and plant products, conduct a Senior management meeting on draft regulations and a national validation workshop on draft regulations for stakeholders. The last stage will be submission of regulations for approval by Minister of Agriculture and gazetting.

The need for financial support to review the plant protection regulations which would guide the implementation of Plant Protection Act and train human resources as well as equipping labs are highlighted as key bottlenecks. Mobilising of financial resources through government, development partners and private sector is the proposed solution.

### **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation in Malawi**

APPSA programme assisted in providing financial support for finalizing review of old Plant Protection Act and in construction of laboratory complex. However, no laboratory equipment was procured because of insufficient funds.

The Programme is expected to provide more funding to allow for the review of the Plant Protection regulations which would guide the implementation of Plant Protection Act in line with the SADC and COMESA HSRS. Furthermore, the same funding would provide platform for advocacy for domestication to Policy makers.

Other agencies which supported the development of Plant Protection Act, 2018 included the EU and Malawi Govt itself.

### **3.2.2.7 Variety Release System, Seed Certification and Quality Assurance in Mozambique**

#### **The Current Status of the National Seed Policy Framework**

Mozambique belongs to the SADC Regional Economic Community and as such its seed policy frameworks are expected to be aligned with the SADC HSRS. Its legislation governing the variety release system, seed certification and quality assurance is the Decree 12/2013 Seed Regulations.

The specific legislative instruments listed below (Table 11) indicate the current state of development and functioning. The Seed regulations (Ministerial decrees 12/2013) is supported by Ministerial Diplomas, which include Ministerial Diploma 58/2017 on the Standards for the Licensing of Private Inspectors and Laboratories enacted in 2017; Ministerial Diploma 51/2018 on cassava Certification Standards enacted in 2018 and the Ministerial Diploma 50/2018 on the Standards for Certification of Sweet Potato Seed enacted in 2019.

**Table 11. State and implementation of Legal instruments in Mozambique**

| Legal instrument       | a. Not in place                     | b. Under development                | c. In place, not functioning well | d. In place and functioning well    | Not applicable to country's seed sector |
|------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|---|
| National seed policy   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/>            | <input type="checkbox"/>                |
| National seed strategy | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>          | <input type="checkbox"/>            | <input type="checkbox"/>                |
| Law of seeds           | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/>            | <input type="checkbox"/>                |
| Seed regulations       |                                     |                                     |                                   |                                     |   |
| Ministerial decrees    | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>          | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |
| Ministerial Diplomas   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>          | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |

The main implementing body of the legislative instruments governing the seed industry is the National Seed Authority (Department of Seeds and Regional Laboratories), supported by the National Committee of Seeds and the Subcommittee on Registration and Release of varieties. The implementing body was established 1987 and all various bodies are defined within the legal instrument Decree 12/2013.

The responsibilities of the Department of Seeds and Regional Laboratories is to engage in seed quality control and certification mainly. While the National Committee on Seeds is responsible for proposing the legislation of the sector and its implementation, and the Subcommittee on Registration and Release of varieties control the release and registration of varieties, the Department of Seeds and Regional Laboratories is works with the two bodies.

**The extent of alignment to the SADC HSRS in Mozambique  
Legislation and Regulatory Systems**

In terms of harmonisation to the SADC HSRS, Decree 12/2013 of 10 April 2013 is aligned with respect to Variety Release System, and Seed Certification and Quality Assurance. For a variety from SADC regional catalogue to be included in the national listing, the NSA or Secretariat for Registration and Release of Varieties checks the Regional Catalogue once a regional listing is made and update the national catalogue, to allow for the marketing of variety in Mozambique.

The existing gap is the absence of main seed law (Seed Act) hence the study recommends that the development of the seed law needs to be finalized. The areas of concern raised in Table 12 constitute some of the gaps affecting the national capacity to fully domesticate and harmonize the SADC HSRS. In summary, the following factors affect Mozambique to effectively harmonise and implement the SADC HSRS:

- Lack of capacity for conducting DUS tests,
- Absence of an established Quality management system to allow accreditation in SADC and ISTA.
- Poor financial capacity for quality control and supervision of the commercial network;
- Strained human resources and need for technical training
- Lack of equipment and work materials

**Table 12. Areas of Concern in Malawi as guided by options provided**

| Options   | Registration and release of varieties   | Seed certification and quality assurance  |
|---|---|---|
| Infrastructure/construction required (Specify)  | Establishment of the irrigation system for conducting tests                   | Establishment of the quality assurance system, preparation of quality manuals and acquisition of appropriate laboratory equipment and consumables |
| Laboratory equipment required (specify)   | Appropriate room or area for the conservation of Reference samples            | Greenhouses for germination of horticultural and agricultural crops, filter paper, moisture meter, thermometers, analytical scales                |
| Human resources to be trained (specify training area)<br>— Release of varieties for seed bodies<br>— Seed inspections for inspectors<br>— Seed sampling and quality assurance for samplers and analysts | Variety evaluations and conducting of DUS tests, statistical analysis of data | Inspection of fields according to OECD and seed sampling according to ISTA rules<br>Seed sampling and quality assurance for samplers and analysts |
| Institutional disposition required (specify)  | Institutional capacity building   | Institutional capacity building   |
| Support for funding   | Needed to support above concerns and the development of main seed law         | Needed to support above concerns and the development of main seed law   |

**The actionable recommendations required for Mozambique to fully domesticate the SADC HSRS include:**

- Capacity building for conducting DUS tests, and
- the establishment of the System for Quality management to allow accreditation in SADC and ISTA
- Other solutions are as articulated in Table 7.

**Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

In addition to the gaps explained above, Mozambique faces the following bottle necks in its strive to fully harmonize and domesticate the seed policies:

- Absence of main legislation (Seed law/Act)

- Lack of capacity to establish the quality assurance system with an equipped laboratory, and trained technicians

Mobilisation of financial support in order to (i) finalise drafting the main seed law (ii) capacitate seed personnel to conduct DUS tests, and (iii) assist in the establishment of the System for Quality management to allow accreditation in SADC and ISTA are the suggested solutions for the country. In order to achieve full harmonization, Mozambique needs to take on board the relevant and critical stakeholders, some of which have been summarized in Table 13 below.

**Table 13. Key players in Mozambique’s seed sector**

| Category        | Stakeholders (s)  | Roles   |
|-----------------|---|---|
| Policy maker(s) | Direcção Nacional de Planificação e Políticas                   | Policy formulation and guidance   |
|                 | Direcção Nacional de Sanidade Agropecuária e Biosegurança       | Policy guidance   |
| Regulators      | Departamento de Sementes (NSA)                                  | Seed regulatory entity, Agency for Variety registration and certification |
|                 | Regional seed Laboratories located in Lionde, Chimoio e Nampula | Seed Testing and certification  |
|                 | Zambezia Seed Laboratory  | Seed testing and certification  |
| Associations    | Aassociação para Promoção do Sector de Sementes (APROSE)        | Platform for dialogue and communication in the seed value chain           |
|                 | Mozambique Seed Trade Association (MOSTA)                       | Seed trade Association  |
| Researchers     | Instituto de Investigação Agrária de Moçambique (IIAM)          | Research Institute Breeding and production of EG seed                     |
|                 | União Nacional de Camponeses (UNAC)                             | Farms association   |
| Seed Companies  | Oruwera   | Seed Production and trade   |
|                 | Companhia de Zembe  | Seed Production and trade   |
|                 | Phoenix seed  | Seed production and trade   |
|                 | Zara Yapera   | Seed production and trade   |
|                 | Klein Karoo   | Seed production and trade   |
|                 | Limpopo Sementes  | Seed production and Trade   |
|                 | ACOF  | Seed Production and trade   |
|                 | Ac Matama   | Seed production and trade   |
|                 | TECAP   | Vegetable Seed import, distribution and trade                             |
|                 | AQUI  | Seed distribution and trade   |
| Soluções Rurais | Vegetable Seed imports, distribution and trade                  |   |

## **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

Up until now the APPSA programme has not assisted the country to harmonise and/or assist implementation of the SADC HSRS. Areas proposed for support include advocacy for domestication to policy makers and training of seed personnel to be able to effectively implement the HSRS. AGRA was reported as one of the other agencies supporting the seed policy project.

### **3.2.2.8 Quarantine and Phytosanitary Measures for Seed in Mozambique**

#### **The Current Status of the National Plant Protection Policy Framework**

Mozambique has a legislative instrument regulating trade in plants and plant products, including seeds. The legislative instrument is known as the Regulation of Phytosanitary Inspection and Plant Quarantine (Decree 5/2009 of 1 June).

#### **Assess the extent of alignment to the SADC HSRS**

##### **Legislation and Regulatory Systems**

The legislative instrument i.e., the Regulation of Phytosanitary Inspection and Plant Quarantine (Decree 5/2009 of 1 June) is aligned through the attachment of an Addendum to operationalise the SADC HSRS. USD Seed Trade Project finalized legislation and its approval process. What remains is dissemination through meetings with the stakeholders in the seed chain to allow for implementation.

It was observed that Mozambique NPPO has limited human and material resources as such, required the rehabilitation of its infrastructure, improvement of its limited laboratory equipment and improvements human expertise, in particular in plant pest diagnosis, inspection and certification.

#### **Other bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

Under the roles stipulated in the Regulation on Plant Inspection and Plant Quarantine (Decree 5/2009 of 1 June) the NPPO has drawn up an Addendum to the Regulation to operationalise the SADC HSRS which was approved by the National Director of DINAS as national phytosanitary authority in the country and entered into in force on the date of approval.

Funding is the limiting factor to be able to improve human, material and infrastructure capacity of the NPPO. Mobilising financial resources from government, development partners and private sector. Financial resources are needed to ensure the effective implementation of the Harmonised Seed Regulatory System.

## The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation

The contribution of APPSA programme in Mozambique is not known. However, the programme is expected to assist harmonisation through financial support.

Other Agencies include USD Seed Trade Project which assisted with finalising the Regulation of Phytosanitary Inspection and Plant Quarantine (Decree 5/2009 of 1 June), making sure it is aligned to the SADC HSRS, till enacted in 2018.

### 3.2.2.9 Variety Release System, Seed Certification and Quality Assurance in Zambia

#### The Current Status of the National Seed Policy Framework

Zambia belongs to both COMESA and SADC economic groupings and has legislative instruments regulating variety release and seed certification and quality assurance in place.

The current legislative framework and status of implementation is indicated in Table (Table 14). In general, Zambia has Plant Variety and Seed Act CAP 236 of 1984, which was revised in 2022 to include other plant species, and the enabling seed regulations. Although, the country indicated the presence of National Seed Policy and National Seed Strategy, the two are not standalone policies but their aspirations are reflected in the 2nd National Agricultural Policy, 2018 and the Strategic Plan 2022-2026, respectively. Recent changes to the legislative framework took into account the revision of it seeds law to encompass harmonisation under SADC and COMESA and also to be in line with other international organisations like OECD.

**Table 14. State and implementation of Legal instruments in Zambia**

| Legal instrument       | a. Not in place          | b. Under development     | c. In place but not functioning well | d. In place and functioning well    | Not applicable to country's seed sector |
|------------------------|--------------------------|--------------------------|--------------------------------------|-------------------------------------|---|
| National seed policy   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |
| National seed strategy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |
| ed law                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |
| Seed regulations       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input checked="" type="checkbox"/> | <input type="checkbox"/>                |
| Ministerial decrees    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>             | <input type="checkbox"/>            | <input type="checkbox"/>                |

The body the govern the seed industry in Zambia is the Seed Control and Certification Institute (SCCI), established in 1969 and defined by Plant Variety and Seeds Acts, CAP 236 legal instrument.

The responsibilities of SCCI include the following:

- conduct variety assessment tests
- register seed and plant varieties
- conduct seed inspections and sampling
- conduct seed testing
- conduct control growing
- issue licences in accordance with this Act
- compile and maintain statistics with regards to seeds and plant varieties
- conduct seed training
- guide in seed policy issues
- do all such functions connected with or incidental to the foregoing

### **The extent of alignment to the SADC and COMESA HSRS**

#### **Legislation and Regulatory Systems**

Zambia as a country has harmonised its national legislative instruments with SADC/COMESA harmonised regulatory systems. A variety can only be marketed in Zambia if listed on the national variety listing. For a variety on any of the regional catalogues to be commercialised in Zambia, the NSA or Variety Release Secretariat checks regional catalogue once a regional listing is done and update national listing upon request from Seed company or Agent, through approval by National Variety Release Committee. There were no gaps identified as legislations are fully harmonised.

In addition, Zambia has adequate human capacity but they need specialised training and also the institute needs financial resources to enable it to buy modern equipment and other infrastructure to carry out its mandate adequately. The actionable recommendations required for Zambia to sustain full domestication are conducting an institutional needs analysis and mobilising funding for capacity building of human resources and equipment/infrastructure.

Currently, Zambia has no bottlenecks associated with domestication of seed regulatory systems. Apart from being aligned to COMESA and SADC HSRS, the country is accredited to ISTA and a member of OECD. Lately, Zambia has started the processing of joining UPOV.

The various stakeholders that are critical in the implementation of the HSRS and their roles are provided in table below (Table 15).

**Table 15. Key stakeholders in Zambian seed sector**

| <b>Category</b>   | <b>Stakeholder(s)</b>   | <b>Role</b>   |
|---|---|---|
| Regulators  | Seed Control and Certification Institute (SCCI)   | Quality assurance/standards (inspect and certify any seed produced to ensure acceptable seed quality)<br>Research-Generation of seed technology-Breeder/foundation seed<br>Registration of other actors |
|   | Plant Quarantine and Phytosanitary Services   | Seed trade facilitation<br>Regulation-inspection, certification   |
| Policy guidance   | Policy and Planning Department within Ministry of Agriculture   | Policy Formulation & direction  |
| Extension   | Extension Service Department within Ministry of Agriculture   | Extension services  |
| Research and Development  | National Agricultural Research Institutes (NARI's) Zambia<br>Agriculture Research Institute (ZARI), Cotton Development Trust, Golden Valley Agricultural Research Trust, University of Zambia<br>Private seed companies | Research and breeding<br>Transfer of technological innovations<br>Maintenance of breeder seed and production of basic seed of recommended crop  |
| Producers of EGS and certified seed                             | National Agricultural Research Institutes (NARI's) Zambia<br>Agriculture Research Institute (ZARI), Cotton Development Trust, Golden Valley Agricultural Research Trust, University of Zambia                           | Production of EGS and certified seed<br>Technical support   |
| Producers and marketers of EGS and certified seed including QDS | Seed Companies - National, Regional and Multinational e.g., Zamseed, SeedCo, Corteva, Synergy Seeds, Klein Karoo, Monsanto, Good Nature Seed  | Production of EGS and certified seed including QDS<br>Seed processing<br>marketing and distribution,<br>Quality maintenance<br>Technical support  |
| Farmer groups and small companies involved in QDS               | Seed Multiplication Farmer Associations/ groups<br>National seed companies such as Kamano Seed Company, AfriSeed  | Seed multiplication of mostly QDS<br>Seed processing<br>Marketing and distribution<br>Seed distribution to farmers<br>Funding of seed related projects and programmes<br>Technical support              |
| Civil society and associations                                  | Zambia Seed Traders Association (ZASTA), Zambia   | Seed Policy lobbying and advocacy   |

|   |   |   |
|---|---|---|
|   | National Farmers Union (ZNFU)   | Coordination of training of seed growers and seed multiplication<br>Quality assurance<br>Training capacity-building in business management, marketing<br>Funding of seed related projects and programmes<br>Technical support |
| Agrodealers   | Seed dealers/stockists  | Market/Distribute seed to farmers<br>Quality assurance  |
| Seed users  | Farmers seed users  | Buy and use seed for production   |
| Development partners<br>Technical support<br>Support to the private sector participation in seed production and trade | Development Partners such as DFID, Irish Aid, Netherlands, USAID, SIDA, GTZ, World Bank, ADB  | Funding of seed related projects and programs<br>Technical support<br>Support to the private sector participation in seed production and trade  |
| Implement various seed related projects and programs  | Non-Governmental Organisations (NGOs) such as: Africare, AGRA, AgriProFocus, Catholic Relief Services, Farm Africa, Care International, Plan International, SNV, One Acre Fund, Oxfam, World Vision | Implement various seed related projects and programs  |

### **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

The APPSA programme provided financial support to facilitate harmonisation to COMESA and SADC HSRS. Financial support apart from assisting domesticating by aligning legal instrument, it also provided platform for awareness creation across the country.

USAID Seed Trade Project provided funding to the Seed Control and Certification Institute (SCCI), to fund the rebuilding of the cold-storage seed store facility destroyed by fire in 2015. The grant helped SCCI expand its reference cold storage facility for seed samples. The cold storage facility is a critical infrastructure of the seed certification process, meeting internationally agreed standards such as the International Seed Testing Association (ISTA) and the SADC/COMESA HSRS guidelines. Also, the same project funded the capacity building of inspectorate, piloting movement of certified seed from Zambia to DRC under the SADC HSRS, as well as development of e-certification system.

### 3.2.2.10 Quarantine and Phytosanitary Measures for Seed in Zambia

#### **The Current Status of the National Plant Protection Policy Framework**

Zambia has a legislative instrument regulating trade of plants and plant products, including seeds. The legislative frameworks are the Plant Pests and Diseases Act, CAP 233 of 1994 of the Laws of Zambia and the Statutory Instrument number 69 of 2020.

#### **The extent of alignment to the SADC and COMESA HSRS**

##### **Legislation and Regulatory Systems**

Zambia has harmonised its national legislative instrument for Phytosanitary measures with SADC/COMESA. The alignment was done through the enactment of the Plant Pests and Diseases (Phytosanitary Certification) (General) Regulations, Statutory Instrument No. 69 of 2020.

The country has reasonable human and material capacity to implement the requirements of the SADC/COMESA systems although not adequate to effectively take care of phytosanitary risks associated with seed trade.

Areas that require attention include the following:

- Lab equipment required (specify) – in particular Molecular techniques’ diagnostics equipment such as the PCR
- Human resources to be trained (specify training area) – Inspection, sampling and diagnostics

#### **The actionable recommendations required for Zambia to sustain its domestication status include:**

- Conducting institutional needs analysis
- Procurement of laboratory equipment
- Training of human personnel in critically identified skills gap.

#### **Bottlenecks associated with domestication of seed regulatory systems, suggested solutions and key stakeholders**

Zambia has fully domesticated the SADC/COMESA harmonised seed regulatory systems. However, in the absence of domestication, Zambian NPPO could still be in a position to facilitate movement of seed through operationalisation of the existing legislations; the Plant Pests and Diseases Act, CAP 233; (Phytosanitary Certification) (General) Regulations, Statutory Instrument No. 69 of 2020. In order to improve its operations Zambia required funding of to procure molecular diagnostics laboratory equipment and continue training of Plant Health Inspectors in sampling, inspection and laboratory diagnostics.

## **The role played by APPSA and other agencies in supporting the domestication as well as integrating in national planning and implementation**

The APPSA Programme has been of assistance in Zambia with respect to domestication of SADC/COMESA harmonised Regulatory Systems by provided funding to carry out activities in line with domestication. The APPSA programme provided financial support for drafting of the Statutory Instrument involving the NPPO and the Ministry of Justice.

Further financial support is expected from the APPSA programme in order to put requirements of the COMESA HSRS in place and provide platform for advocacy for domestication to Policy makers for them to support the process.

USAID Seed Trade Project provided financial support for awareness creation among Plant Health Inspectors and stakeholders of the (Phytosanitary Certification) (General) Regulations, S.I No. 69 of 2020.

## 4. SUMMARY AND RECOMMENDATION

### 4.1 Comparison of key areas Across APPSA Countries

As a summary and for quick view of the status of harmonisation, below is a schematic presentation of the key features of this assessment.

#### 4.1.1 Country Status on Regional Obligations

| Key Component                                 | Angola     | Lesotho    | Malawi        | Mozambique | Zambia        |
|---|------------|------------|---------------|------------|---------------|
| <i>Country Status of Regional Obligations</i> |            |            |               |            |               |
| Economic Block or Grouping                    | SADC       | SADC       | COMESA & SADC | SADC       | COMESA & SADC |
| SADC MoU on HSRS                              | Not signed | Signed     | Signed        | Signed     | Signed        |
| Charter establishing SADC Seed Centre         | Not signed | Not signed | Not signed    | Signed     | Not signed    |
| SADC PBR Protocol                             | Signed     | Signed     | Not signed    | Signed     | Signed        |
|   |            |            |               |            |               |

#### 4.1.2 Availability and Functionality of policies: Variety Release, Seed Certification and Quality Assurance, Quarantine and Phytosanitary Measures for Seed

| Key Component                          | Angola                         | Lesotho                        | Malawi                         | Mozambique                     | Zambia                         |
|--|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| National seed policy                   | Not in place                   | In place, not functioning well | In place, not functioning well | Under development              | In place, and functioning well |
| National seed strategy                 | In place, not functioning well | Not in place                   | -                              | Not in place                   | In place, and functioning well |
| Laws: Seed and Plant Protection        | In place, not functioning well | Under development              | In place, not functioning well | Under development              | In place, and functioning well |
| Regulations: Seed and Plant Protection | In place, not functioning well | Not in place                   | In place, not functioning well | -                              | In place, and functioning well |
| Ministerial decrees                    | In place, not functioning well | Not in place                   | -                              | In place, and functioning well | -                              |
| Ministerial diplomas                   | -                              | -                              | -                              | In place, and functioning well | -                              |

### 4.1.3 Domestication of COMESA/SADC HSRS into national seed laws

| Key Component                       | Angola   | Lesotho   | Malawi   | Mozambique                        | Zambia   |
|-------------------------------------|--|---|--|-----------------------------------|--|
| Alignment of Legislative frameworks | Aligned (Seed law, Seed regulations, Plant Protection Act)             | National Policies fully aligned                                   | Seed Act and Plant Protection Act, aligned   | Ministerial decrees fully aligned | Fully aligned  |
| Gaps in legislations                | SADC MoU on HSRS not signed, Plant Protection Regulations not in place | Plant Protection Act & Seed Act under development, no regulations | Implementing Regulations for the Seed Act and Plant Protection Act to be developed | Seed law under development        | Need to put Phytosanitary requirements of the COMESA HSRS in place |
| National Capacities                 | Weak for basic   | Weak for basic  | Average for basic  | Weak for basic                    | Adequate for basic   |
| Gaps in capacities                  | Basic Human skills gap   | Basic Human skills gap  | Human skills gap – modern & specialized  | Basic human skills gap            | Human skills gap – modern & specialised                            |
|                                     | Basic infrastructure/equipment   | Basic infrastructure/equipment                                    | Basic & Specialized infrastructure/equipment                                       | Basic infrastructure/equipment    | Specialized infrastructure/equipment                               |
| Major Bottleneck                    | Funding  | Funding   | Funding  | Funding                           | Funding  |

### 4.1.4 Implementation of COMESA/SADC HSRS by APPSA countries

| Key Component   | Angola   | Malawi | Zambia | Mozambique | Lesotho                                 |
|---|--|--------|--------|------------|---|
| How to register variety already in regional catalogue | • Request from seed company required                           |        |        | -          | • Not possible without legal instrument |
|   | • NSA or Variety Release Secretariat checks regional catalogue |        |        |            |   |
|   | • Approval by National Variety Release Committee required      |        |        |            |   |
|   | • National listing   |        |        |            |   |
|   | • National demonstration trial to enable adoption              | -      | -      | -          |   |
| Can variety on regional catalogue be marketed in      | No   | No     | No     | No         | No                                      |

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| country without national listing?                     |  |  |  |  |  |
| How can APPSA support implementation of regional HSRS | Through engaging in a pilot by facilitating trade of varieties across APPSA countries and draw best practices and lessons learnt |  |  |  |  |

## 4.2 Recommendations

### 4.2.1 Country Status on Regional Obligations

- Conduct stakeholders' awareness campaigns to support signing of regional agreements
- Conduct regional pilot studies as a way to enhance and push countries to sign and learn best practices

### 4.2.2 Availability and Functionality of policies: Variety Release, Seed Certification and Quality Assurance, Quarantine and Phytosanitary Measures for Seed

Where applicable:

- To advocate for functional seed and plant protection policies and legislations
- To facilitate development of new legislation where there is nothing at all
- To facilitate completion of those legislation under development
- To facilitate the development of subsidiary legislations

### 4.2.3 Domestication of national seed laws to COMESA/SADC HSRS

- To facilitate alignment of legislations especially those still under development and in draft forms
- To facilitate the development of subsidiary legislations which are aligned to the regional HSRS
- To facilitate the development of infrastructure and equipping of laboratories to be able to implement the HSRS
- To conduct training needs analysis to ascertain the different requirements of APPSA countries
- To facilitate for skills capacitation of human resources
- Mobilise funding for capacity building of human resources and equipment/infrastructure

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## 6. LIST OF ANNEXES

### Annex 1. List of Respondents

| Name                      | Country    | Organization  | Designation  | Contact  |
|---------------------------|------------|---|--|--|
| Dr Dickson Ng'uni         | Zambia     | Zambian Agricultural Research Institute                           | Deputy Director – Research Services (APPSA national Coordinator) | +260 972400946, +260 9610 82834<br>dickson.nguni@gmail.com         |
| Bruce Chulu               | Zambia     | Seed Control and Certification Institute (NSA)                    | Chief Seeds Officer  | <a href="mailto:chibru71@hotmail.com">chibru71@hotmail.com</a>     |
| Doreen M. Chomba          | Zambia     | Department of Plant Quarantine and Phytosanitary Service (NPPO)   | Chief Plant Health Inspector- International Trade                | +260 979672806<br>pqps.infor@agriculture.gov.zm                    |
| Dr Grace Kaudzu           | Malawi     | Seed Services Unit (NSA)  | Team Leader  | +265 993 706 339<br>gkaudzu@gmail.com                              |
| David Kamangira           | Malawi     | Department of Agricultural Research Services (NPPO)               | Snr Deputy Director  | +265 999122199<br>davidkamangira1@gmail.com                        |
| Elisa Mazuma              | Malawi     | Department of Agricultural Research Services (NPPO)               | Deputy Director  | <a href="mailto:ericmazuma@yahoo.co.uk">ericmazuma@yahoo.co.uk</a> |
| Dr Wilkson Makumba        | Malawi     | Agricultural Research Services                                    | Director and Soil Scientist                                      | +265993480025/+265884586724<br>wilk.makumba@gmail.com              |
| Ms. Marankoe Selikane     | Lesotho    | Department of Agricultural Research – Seed Development Unit (NSA) | Senior Research Officer  | 00266 59972007<br>rankoe1@yahoo.co.uk                              |
| Solomon Motlatsi Molatela | Lesotho    | Plant Protection and Quarantine (NPPO)                            | Senior Research Officer  | 00266 58965880<br>mmolatela@yahoo.co.uk                            |
| Monica Lephole            | Lesotho    | Department of Agricultural Research                               | RCoL Coordinator   | 40molephole@gmail.com  |
| Mabusetsa Makau           | Lesotho    | APPSA   | Project Manager - APPSA  | azaelmakau@yahoo.com<br>+266 58795478                              |
| JOAQUIM CÉSAR             | Angola     | APPSA   | Project Coordinator  | jcaesar@gmail.com<br>+244 923 334 182                              |
| Augusto Caetano Da Silva  | Angola     | MINAGRIP (NSA)  | Director General   | +244 923 323909<br>adasilva520@yahoo.com                           |
| Laurinda Paim             | Angola     | MINAGRIP (NPPO)   | Technician   | +244949222853<br>paim.laurinda57@gmail.com                         |
| Mrs Elsa Adelia Timana    | Mozambique | Seed Department (NSA)   | Head of Seed Department  | 258 8247 40810<br>elsa.timana@gmail.com                            |
| Tomas Siteo               | Mozambique | Centre for Socioeconomic studies                                  | APPSA M&E Head   | +258845386900<br>sitoetoms@yahoo.com                               |
| Armando Marcos W. Come    | Mozambique | Division of plant inspection and plant quarantine (NPPO)          | Head (APPSA Coordinator)   | +258 844968334<br>a.come54@gmail.com                               |



## Annex 2. General Consultant Work Plan For 25 Days (spread over 3 months)

| OBJECTIVE   | ACTIVITY   | TARGET   | BY WHO?  | TIME      | DAYS* | INDICATORS  |
|---|--|--|--|-----------|-------|---|
| <ul style="list-style-type: none"> <li>Draft an Inception Report of the Situational Analysis Report detailing the methodology, workplan, budget, and validation for delivery of final report</li> </ul>   | Writing an inception report  | Draft Inception Report                         | Consultant   | Week 1    | 4     | Inception Report detailing the methodology, workplan and budget           |
|   | Virtual meeting to discuss elements of Inception Report  | Administration of questionnaires               | Consultant and Regional Coordinator                                  | Weeks 2&3 | 1     | Implementation mapping  |
| <ul style="list-style-type: none"> <li>Review and document the current status of the national seed policy framework in each of the APPSA countries.</li> </ul>  | Design and administer questionnaires for NSAs/NPOs and request for copies of national legislations | All 5 APPSA countries                          | Consultant, CCARDESA Coordinator                                     | Weeks 3&4 | 3     | Questionnaire designed and administered                                   |
| <ul style="list-style-type: none"> <li>Assess the extent of alignment of national capacities, legislation and regulatory systems to the SADC and COMESA HSRS, highlighting the gaps, and what actionable recommendations required for countries to fully domesticate the SADC and COMESA HSRS.</li> </ul> | Analysing the submitted national legislations and regulatory systems on the extent of alignment    | All 5 APPSA countries                          | Consultant   | Week 5    | 3     | Reviewed legislations with identified gaps on harmonisation issues        |
|   | Analyse responses from Questionnaires send to NSAs and NPOs  | Questionnaire responses from 5 APPSA countries | Consultant and Regional Coordinator                                  | Weeks 5&6 | 3     | Challenges and national capacity gaps on harmonisation issues identified  |
| <ul style="list-style-type: none"> <li>Identify bottlenecks and key stakeholders associated with domestication of seed regulatory systems in the APPSA Countries and suggest solutions</li> </ul>   | Review of responses from questionnaires and APPSA literature from activities undertaken            | All 5 APPSA countries and APPSA documents      | Consultant (+ Regional Coordinator – assisting with APPSA documents) | Week 7    | 2     | Bottlenecks and key stakeholders identified and solutions/roles proffered |

|   |  |   |                                   |         |   |  |
|---|--|---|-----------------------------------|---------|---|--|
| <ul style="list-style-type: none"> <li>Document the role played by APPSA and other agencies in supporting the domestication efforts in the five countries, as well as integrating in national planning and implementation.</li> </ul> | Design a questionnaire and administer it                               | Questionnaire responses   | Consultant                        | Week 8  | 2 | APPSA and Other agencies roles in supporting domestication roles |
|   | Analyse literature on the role played by APPSA and other agencies      | APPSA documents and literature sourced from previous regional programmes  | Consultant + Regional Coordinator | Week 9  | 2 | APPSA and Other agencies roles in supporting domestication roles |
| <ul style="list-style-type: none"> <li>Drafting the Situation Analysis Report</li> </ul>  | Compiling all the above activities into a draft report                 | Information documented and gathered from questionnaires   | Consultant                        | Week 10 | 3 | Draft Situation Analysis Report                                  |
| <ul style="list-style-type: none"> <li>Validation meeting for the Draft Situation Analysis Report</li> </ul>  | Virtual (Physical) presentation of the Draft Situation Analysis Report | CCARDESA Coordinator and principals, Country Coordinators   | Consultant                        | Week 11 | 1 | Validation minutes with comments                                 |
| <b>FINAL PRODUCT TO BE SUBMITTED TO CCARDESA BY END OF 3 MONTHS</b>   |  | <b>Final report of acceptable standard and quality</b> on the whole assignment with clear recommendations on how to improve our national seed regulation system. <b>(Week 12 – 1 day)</b> |                                   |         |   |  |

**\*Please Note that counting of Days is depended on signing of letter of agreement but Weeks are depended on approvals.**

### Annex 3. Laboratory Equipment required by Malawi DARS-NPPO to boost plant pests and disease diagnostic capacity

| No.                              | Qty                            | Equipment                  | Function  | Specifications                              |  |
|----------------------------------|--------------------------------|----------------------------|---|---|--|
| 1                                | 1                              | Fume hood                  | Working space - safety measure when working dangerous chemicals | Exterior Dimensions                         | 175 cm appr.   |
|                                  |                                |                            |   | Exterior Dimensions                         | 132 cm appr.   |
|                                  |                                |                            |   | Exterior Dimensions                         | 62 cm appr.  |
|                                  |                                |                            |   | Blower (hp)                                 | 0.75 hp  |
|                                  |                                |                            |   | Blower (Type)                               | Spark Proof  |
|                                  |                                |                            |   | Power                                       | 240V / 50 Hz   |
| 2                                | 1                              | Centrifuge                 | Getting plant extract   | Height:                                     | 38 cm appr.  |
|                                  |                                |                            |   | Width:                                      | 61 cm appr.  |
|                                  |                                |                            |   | Depth:                                      | 66 cm appr.  |
|                                  |                                |                            |   | Weight:                                     | 86 kg  |
|                                  |                                |                            |   | Drive Type:                                 | Brushless induction  |
|                                  |                                |                            |   | <i>g</i> Force:                             | 64 400 x <i>g</i>  |
|                                  |                                |                            |   | Max Speed:                                  | 30 000 rpm   |
|                                  |                                |                            |   | Noise Level 1 Meter in Front of Centrifuge: | 65 db(A)   |
|                                  |                                |                            |   | Set Speed:                                  | 10 independent profiles  |
|                                  |                                |                            |   | Set Temperature:                            | -20° to +40°C  |
|                                  |                                |                            |   | Set Time:                                   | 10 h, hold   |
|                                  |                                |                            |   | Speed Control:                              | ± 50 rpm of set speed  |
|                                  |                                |                            |   | Temperature Control:                        | 2° to +40°C  |
| Ventilation Clearances Required: | 7.6 cm (3.0 in) Sides and Rear |                            |   |   |  |
| 3                                | 1                              | Desktop computer           | Visualisation of DNA banding patterns and taking pictures       | Monitor                                     | Frameless 24"  |
|                                  |                                |                            |   | Central processing unit                     | 16 GB RAM, 500 GB SSD, corei 7 processor                             |
|                                  |                                |                            |   | Printer                                     | HP Laser Jet Printer with Scanner, Copier                            |
| 4                                | 1                              | Microplate absorber reader | Specific identification of pathogens                            | Precision                                   | 1.0% or 0.005 OD, from 0.000 to 2.000 OD 1.5% from 2.000 to 3.000 OD |
|                                  |                                |                            |   | Accuracy                                    | ± 1.0% or 0.010 from 0.000 to 3.000 OD at 490 nm                     |
|                                  |                                |                            |   | Resolution                                  | 0.001 OD   |
|                                  |                                |                            |   | Measurement                                 | 6 seconds  |
|                                  |                                |                            |   | Wavelength                                  | 400 - 750 nm   |
|                                  |                                |                            |   | Optical systems                             | Filters  |
|                                  |                                |                            |   | Plate format                                | 8 / 12 Well Strip Plates   |
|                                  |                                |                            |   | Power                                       | 240 V / 50 Hz  |
|                                  |                                |                            |   | Identification Clips                        | Inclusive  |
| Pipette Tips                     | Inclusive                      |                            |   |   |  |

|   |   |                     |   |   |                                    |
|---|---|---------------------|---|---|------------------------------------|
|   |   |                     |   | Guide to pipetting                              | Inclusive                          |
|   |   |                     |   | 3 Adhesive-backed single pipettes hangers       | Inclusive                          |
| 5 | 1 | Refrigerator        | Storage of samples                            | Type  | Chest                              |
|   |   |                     |   | Temperature Range                               | Between -18 to -20 degrees Celsius |
|   |   |                     |   | Capacity  | 576 - 600 Litres                   |
|   |   |                     |   | Class   | HF 576 N                           |
|   |   |                     |   | Voltage   | 230 V / 50 Hz                      |
| 6 | 1 | Magnetic stirrer    | Mixing samples                                | Stirrer   | 500-1200 rpm                       |
|   |   |                     |   | heating plate                                   | ceramic                            |
|   |   |                     |   | stirring quantities                             | 5 -10 l (H <sub>2</sub> O)         |
|   |   |                     |   | Hot Top indicator                               | Present                            |
|   |   |                     |   | Temperature display                             | LED                                |
|   |   |                     |   | Tachometer                                      | Standard                           |
|   |   |                     |   | Dimensions Load cell (L x W x H)                | 700 x 120 x 62 mm                  |
|   |   |                     |   | Plates  | Single- Multi Plate Preferable     |
|   |   |                     |   | Connector                                       | Present                            |
| 7 | 1 | Laminar Flow Hood   | Working space                                 | Horizontal laminar flow hood                    |                                    |
|   |   |                     |   | 230 V / 50 Hz                                   |                                    |
|   |   |                     |   | Fan and Light                                   |                                    |
|   |   |                     |   | With class cover                                |                                    |
|   |   |                     |   | With a button for Automatic opening and closing |                                    |
| 8 | 1 | Incubator           | Incubating of processed samples               | Type  | Horizontal                         |
|   |   |                     |   | Capacity  | 200 L                              |
|   |   |                     |   | No of Shelves                                   | 4                                  |
|   |   |                     |   | No of Shelves positions                         | 7                                  |
|   |   |                     |   | Temperature                                     | +8 to 70°C                         |
|   |   |                     |   | Fluctuation                                     | ±0.25°C @ 37°C                     |
|   |   |                     |   | Internal Dimension with fan (HxWxD) cm          | 75 x 50 x 55 appr.                 |
|   |   |                     |   | Exterior Dimension (HxWxD) cm                   | 85 x 85 x 65 appr.                 |
|   |   |                     |   | Weight  |                                    |
|   |   |                     |   | 230 V / 50 Hz                                   |                                    |
| 9 | 1 | Compound microscope | Visualisation of colonies and fruiting bodies | Zoom Lens:                                      | professional lens                  |
|   |   |                     |   | Camera  | : TEO C7 1 / 2" Color CCD          |
|   |   |                     |   | Magnification of field lens                     | : 0.7~4.5X WD:92mm                 |
|   |   |                     |   | TV Total magnification:                         | 20~128X                            |
|   |   |                     |   | Object view:                                    | 7~1.1mm                            |
|   |   |                     |   | Data Resolution:                                | 0.001mm                            |
|   |   |                     |   | Z-axis travel (mm):                             | 150mm                              |
|   |   |                     |   | The indication error of X,Y-axis                | ≤(3+L/200)um                       |

|   |                       |   |   |                               |  |
|---|-----------------------|---|---|-------------------------------|--|
|   |                       |   |   | X,Y,Z Measurement Range (m m) | 150*100  |
|   |                       |   |   | The glass table's size (mm)   | 210*160  |
|   |                       |   |   | The metal table's size (mm)   | 354*228  |
|   |                       |   |   | Power                         | 230V / 50Hz  |
| 10  | 1                     | Digital microscope                                    | Visualisation of colonies and fruiting bodies | Stand                         | 12V 30 stab  |
|   |                       |   |   | Focusing drive                | 2 step   |
|   |                       |   |   | Nosepiece                     | 6 fold   |
|   |                       |   |   | Condenser lens                | CL/LS  |
|   |                       |   |   | Daylight filter               | 32mm   |
|   |                       |   |   | XY stage control Standard     | Present  |
|   |                       |   |   | Filter                        | f 2 32mm   |
|   |                       |   |   | Grey light filter             | N16 32mm   |
|   |                       |   |   | Pachrom                       | Green filter 32mm                                  |
|   |                       |   |   | Phototube                     | HC LiT/45/5/7 trinoculare                          |
|   |                       |   |   | Condenser achr                | A 0.9 (p) CC                                       |
|   |                       |   |   | Obj. HI PLAN                  | (4x/0.10,10x/0.25,40x/0.65,63x/0.75, 100x/1.25OIL) |
|   |                       |   |   | Eyepiece                      | HC PLAN 10x/22 Br.M                                |
|   |                       |   |   | C Mount                       | HC 0.55x   |
| Control Unit and monitor                        | Configured Instrument |   |   |                               |  |
| 11  | 1                     | HPLC - MS/MS with Post Column Derivatization (1 Unit) |   | Quaternary pump               | 1 to 4 solvents                                    |
|   |                       |   |   |                               | Flow rate range: 0.2 to 10mL/min. in 0.001 mL/min  |
|   |                       |   |   |                               | Max pressure:600 Bar                               |
|   |                       |   |   |                               | Delay Volume 600 - 900 µL                          |
|   |                       |   |   | Solvent Rack & Degasser       | Max flow rate:>= 10mL/min per channel              |
|   |                       |   |   |                               | 4 channels   |
|   |                       |   |   | Autosampler                   | Sample carryover: <0.1%                            |
|   |                       |   |   |                               | Injection range:0.1 to 100 µL in 0.1 µL            |
|   |                       |   |   |                               | Precision: < 0.25% RSD                             |
|   |                       |   |   |                               | Sample capacity: 100 X 2-ml vials in 1 tray        |
|   |                       |   |   | Column Compartment            | Temperature Range:10°C below ambient to 80°C       |
|   |                       |   |   |                               | Temperature stability: ± 0.15 °C                   |
|   |                       |   |   |                               | Column Capacity: at least three 30 cm columns      |
|   |                       |   |   |                               | Independent heat exchangers                        |
|   |                       |   |   |                               | Automatic column identification                    |
|   |                       |   |   | DAD Detector                  | Light source Deuterium                             |
|   |                       |   |   |                               | 8 signals  |
| Max sampling rate 80Hz (both spectra & signals) |                       |   |   |                               |  |

|  |  |  |                                     |   |
|--|--|--|-------------------------------------|---|
|  |  |  |                                     | Short term noise < $\pm 3 \times 10^{-6}$ AU at 230/4 nm, slit 4nm TC 2 sec, ASTM with 10 mm Max-light cartridge cell   |
|  |  |  |                                     | Drift < $0.5 \times 10^{-3}$ AU/hr at 230 nm  |
|  |  |  |                                     | Linearity > 2.0 AU (5%) at 265 nm   |
|  |  |  |                                     | Wavelength range 190-640 nm   |
|  |  |  |                                     | Electronic temperature control (ETC)  |
|  |  |  | Fluorescence Detector               | Light source: Xenon flash lamp  |
|  |  |  |                                     | Pulse frequency: at least 2 frequencies   |
|  |  |  |                                     | Excitation monochromator range: 200-1200 nm, bandwidth 20 nm  |
|  |  |  |                                     | Emission monochromator range: 280-1200 nm, bandwidth 20 nm  |
|  |  |  |                                     | Flow cells: 8 $\mu$ L volume, 20 bar max pressure   |
|  |  |  |                                     | Data collection rate: 74Hz or more  |
|  |  |  | Data system, Computer & printer     | Computer minimum specs: 16 GB RAM, 500 GB SSD HDD, DVD+/- RW supermulti (Lightscribe) - Windows 10 Pro 64bit, with monitor and printer  |
|  |  |  |                                     | Software must be compliant with Windows 7/8 64bit. Software must provide complete control of hardware as well as giving 3D scanning capabilities for FLD & DAD detectors  |
|  |  |  | Triple Quadrupole Mass Spectrometer | Mode EI upgradable to PCI and NCI   |
|  |  |  |                                     | Mass Range (m/z) 10 to 1050   |
|  |  |  |                                     | Non-coated EI source  |
|  |  |  |                                     | Collision gas - Nitrogen with helium quench   |
|  |  |  | Post Column Derivatization          | Post column derivatisation system for analysis of low level mycotoxins in grain/food samples  |
|  |  |  |                                     | System must be designed for Mycotoxins including Aflatoxin, Fumonisin, single pump, knitted 1.4mL, 240V   |
|  |  |  |                                     | Dead-head plumbing Kit for HPLC   |
|  |  |  |                                     | Multi-residue mycotoxin kit with at least Mycotoxin Reversed-Phase column 4.6 x 250 mm; Guard cartridge holder, with 3 cartridges, OPA diluent, 4 x 950 mL; o-Phthalaldehyde, 5g; Sodium Phosphate Eluant, pH 3.3; Thiorlour, 10g (2 per Kit) |
|  |  |  | Installation and Training           | Yes   |

|    |                    |                                  |  |   |  |
|----|--------------------|----------------------------------|--|---|--|
|    |                    |                                  |  | UPS   | Suitable for supplied HPLC   |
| 12 | 1                  | Humidifier<br>(1 UNIT)           |  | Volume Capacity                                       | 40 L   |
|    |                    |                                  |  | Display   | High Contrast Display (HCD)  |
|    |                    |                                  |  | ° Tdew  | 20...75 C or Humidity -40...+140 °C)                                     |
|    |                    |                                  |  | Pressure  | 0...20 bar   |
|    |                    |                                  |  | Relative Humidity                                     | 10...100 %   |
|    |                    |                                  |  | Temperature   | optional 20...300 °C   |
|    |                    |                                  |  | Flow (l/min)  | 0...100 , 0...250, 0...500 ,0...1000                                     |
|    |                    |                                  |  | Power (VAC)   | 240 VAC, 50/60 Hz  |
|    |                    |                                  |  | Visual alarm indicator                                | Present  |
| 13 | 1                  | Autoclave<br>(1 UNIT)            |  | Average cycle time                                    | 30 min   |
|    |                    |                                  |  | Chamber size<br>(Volume/nominal)                      | 80/75 L  |
|    |                    |                                  |  | Max psi   | 36.98 psi  |
|    |                    |                                  |  | Chamber construction                                  | Stainless Steel  |
|    |                    |                                  |  | Display   | 4 digit LED  |
|    |                    |                                  |  | Pressure  | 121 C at 1.5 bar   |
|    |                    |                                  |  | Power   | 240 VAC, 50/60 Hz  |
| 14 | 1                  | Analytic<br>Balances (1<br>UNIT) |  | Calibration   | FACT internal  |
|    | 1                  |                                  |  | Capacity (g)  | Max. 210-320   |
|    | Display            |                                  |  | High Contrast Display (HCD)<br>minimum. four decimals |  |
|    | Readability (mg)   |                                  |  | 0.0001, 0.001 and 0.01                                |  |
|    | Linearity (g)      |                                  |  | ±0.3  |  |
|    | Repeatability (mg) |                                  |  | ±0.1  |  |
|    | Weighing units     |                                  |  | g, kg, mg   |  |
|    | Stabilization time |                                  |  | 3 sec   |  |
|    | Stability filters  |                                  |  | three filters to match weighing<br>environment        |  |
|    | Power (VAC)        |                                  |  | 240 VAC, 50/60 Hz                                     |  |
| 15 | 1                  | Orbital<br>Shaker<br>(1 UNIT)    |  | Shaking plane   | Orbital  |
|    |                    |                                  |  | Revolutions/ min                                      | 25 to 500 rpm  |
|    |                    |                                  |  | Display   | High Contrast Display (HCD)  |
|    |                    |                                  |  | Time  | 1 to 120 minutes   |
|    |                    |                                  |  | Platform size (mm)                                    | Above 420x500  |
| 16 | 1                  | Water<br>distiller<br>(1 UNIT)   |  | Distillation rate                                     | 15 -20 litres per hour   |
|    |                    |                                  |  | Casing  | Stainless Steel or Glass   |
|    |                    |                                  |  | Auto stop heating                                     | Present  |
|    |                    |                                  |  | Size(wood)  | minimum 4m <sup>2</sup>  |
|    |                    |                                  |  | Type Of Elements                                      | Preferably copper  |
|    |                    |                                  |  | Voltage   | 240 V / 380V / 50 Hz   |
| 17 | 1                  | RealTime PC                      |  | Thermal cycling system                                | Peltier-based, 96-well block<br>+/-1.1°C/sec<br>1.6°C/sec<br>4°C – 100°C |
|    |                    |                                  |  | Sample Ramp Rate                                      |  |
|    |                    |                                  |  | Peak Block Ramp Rate                                  |  |
|    |                    |                                  |  | Temperature Range                                     |  |

|  |  |  |  |                                 |  |  |
|--|--|--|--|---------------------------------|--|--|
|  |  |  |  | Temperature Accuracy            | ±0.25°C of setpoint/display temperature measured minutes after clock start |  |
|  |  |  |  | Temperature Uniformity          | ±0.50°C, 30 seconds after clock start                                      |  |
|  |  |  |  | Optical system                  | Single excitation, four emission filters, and CCD camera                   |  |
|  |  |  |  | Calibrated Dyes at Installation | SYBR® Green I, FAMTM, VIC®, JOETM, NEDTM, TAM, ROXTM                       |  |
|  |  |  |  | Passive Reference Dyes R        | OXTM or any calibrated dye.  |  |
|  |  |  |  | Data Collection                 | Data collected in all 4 filters for all wells regardless of setup.         |  |
|  |  |  |  | Quantitative PCR run time       | < 1 hour 50 minutes  |  |
|  |  |  |  | Supported Volumes               | 20 – 100 µL  |  |
|  |  |  |  | Supported Consumables •         | Standard optical 96-well plates  |  |
|  |  |  |  |                                 | • 8-strip 0.2mL tubes  |  |
|  |  |  |  |                                 | • 0.2mL tubes  |  |
|  |  |  |  |                                 | • Optical adhesive covers  |  |
|  |  |  |  | Main Power Voltage              | 240 V  |  |