TOSCI 5-YEAR Action Plan for Cassava Seed Certification in Tanzania

An output of the BEST Cassava Project

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5-YEAR Action Plan for Cassava Seed Certification – TOSCI

Introduction to TOSCI

The Tanzania Official Seed Certification Institute (TOSCI) is a Government of Tanzania (GoT) institute under the Ministry of Agriculture (MoA), established by the Seed Act No. 18, 2003. TOSCI is responsible for the certification and promotion of quality agricultural seeds produced or imported into the country for sale. It is also entrusted with safeguarding the farming community from procuring poor quality or fake seeds from vendors of farm inputs. TOSCI's headquarters is located at the main campus of Sokoine University of Agriculture (SUA) in Morogoro. It also has four other branches: Arusha, which serves the Northern Zone, Njombe serving the Southern Highlands Zone, Mwanza which serves the Lake and Western Zones, and Mtwara serving the Southern Zone. TOSCI was formed through the transformation of the Tanzania Official Seed Certification Agency (TOSCA), which was established by the 1973 Seed Act. The transformation of TOSCI from TOSCA was a result of government reform initiatives to increase the efficiency of public institutions. The Seeds Act of 1973 was reviewed and replaced by the Seeds Act No. 18 of 2003 in order to incorporate the private sector. The Act also made provision for joining the International Seed Testing Association (ISTA) for seed testing procedures and the Organization for Economic Cooperation and Development (OECD) Seed Schemes as a requirement for facilitating international seed trade.

TOSCI Objectives

- TOSCI to become an accredited center of excellence in seed certification and control.
- To provide educational activities to increase public awareness and encourage the use of quality seed and vegetative plant materials.
- To work for cultivar/variety assessments through variety performance testing; control plots and testing for distinctness, uniformity and stability.
- To maintain a cooperative working relationship with crop researchers, seed industry, other seed regulatory agencies in the region, agricultural extension services, international associations such as ISTA, OECD, UPOV and other groups and individuals that can help fulfil these purposes.

Vision and Mission

Vision

- To ensure that the farming community gets the best access to quality seed for improved productivity and profitability.

Mission

- To be the best regulator for quality and efficient seed certification services to the seed industry in partnership with accredited institutions at cost recovery basis.

Introduction to TOSCI and cassava seed certification

In order to achieve improvements in the quality and efficiency of cassava seed systems in Tanzania, it is critically important that TOSCI has adequate capacity and resources. TOSCI is funded both directly, through the GoT, as well as through donor grants, and it also receives income from carrying out services for which it charges a fee. These services include the certification of seed at all levels of the production system, as well as support to cassava breeders through overseeing distinctness, uniformity and stability (DUS) testing, as well as national performance trials (NPTs). As part of the certification

service, TOSCI also generates income through selling labels which indicate that seed has been officially certified. Since TOSCI is part of the GoT, its own sustainability is guaranteed, since it plays a key role in the government's support to agriculture. However, its coverage is currently very much limited, both in terms of the numbers of crops that it inspects, as well as the scope of the inspections undertaken for the crops that are currently inspected. Cassava is a crop that has not previously been inspected by TOSCI, although the Institute has for many years recognized the importance of inspecting vegetatively propagated crops, such as cassava, sweet potato, round potato and bananas. Realizing this need, TOSCI worked closely with IITA and other stakeholders, through the 5CP project, to develop and implement guidelines for the certification of cassava 'seed' (in this context, seed is equivalent to planting material). In January 2017 these guidelines were officially appended to the Seed Act. The guidelines covered pre-basic, basic and certified seed, but did not include quality declared seed (QDS). TOSCI plans to append guidelines for QDS as soon as these have been approved following a comprehensive review process to be undertaken with all the major stakeholder groups. Once this has been finalized, TOSCI will have a mechanism for certification and quality assurance for all levels of the cassava seed system.

5-year Action Plan Background

TOSCI is currently working with the team of the BEST Cassava Project, which runs from 2017-2021 and aims to build a sustainable seed system for cassava in Tanzania. One of the main themes of this project is to strengthen the management of quality in the cassava seed system, and a key deliverable of this work is to put in place a 5-year Action Plan that will ensure that cassava seed certification in being routinely and sustainably undertaken by 2022. This document sets out the elements of the 5-Year Plan. It should be noted, however, that whilst this is a project document that has been put together by TOSCI, IITA and other project partners, it does not constitute an official policy document of TOSCI. It is anticipated, however, that the document will provide a valuable guide both for TOSCI and for other cassava seed system stakeholders on how quality management targets will be met over the duration of the BEST Cassava Project.

Goal: Strengthened Government-enabled Quality Assurance in cassava seed systems of Tanzania to be achieved through the following areas of activity:

1. Strengthening capacity of TOSCI and public-sector staff
2. Delivery of a decentralized system for cassava seed certification
3. Establishing virus testing capacity at TOSCI
4. Developing and TOSCI running a system for real-time management of field-based certification and data management
5. Effective and timely completion of DUS and NPT evaluations

Structure of the 5-year Plan

The main element of the 5-year plan is the series of targets which have been identified for each of the five major themes. Targets are indicated for each of the years in each of the main activity areas, and these are provided in tables – one for each of the major themes. Each of the tables is accompanied by a short commentary which discusses the main activities undertaken under that theme.

Theme 1 - Strengthening capacity of TOSCI and public-sector staff

TOSCI has a limited number of its own Seed Inspectors (48 at present). In order to effectively oversee the inspection of cassava as well as other crops, the Institute plans to increase this number over the next 5 years to a target of 100. Currently, very few of the inspectors are trained to do inspections for cassava. TOSCI plans to increase both the number and overall proportion of its inspectors who are qualified to do cassava seed certification inspections. TOSCI will also be increasing its level of decentralization over this period (with more staff being based in the regional centres), which will allow for more effective inspection of cassava seed production fields from pre-basic to certified levels. For QDS inspections, it is envisaged that these will be done by Authorized Seed Inspectors (ASIs). The process of gazetting these inspectors, who are employed by Local Government as extension officers, was already initiated under the 5CP and MMB projects. In order to be authorized as a seed inspector, an extension officer needs to successfully complete training in certification of all of the major crops that TOSCI inspects. This will lead to the officer being 'gazetted'. The pattern of progression for seed inspectors based on this scheme is: i) The inspector is trained in cassava seed certification, ii) The inspector passes a Proficiency Test in seed inspection allowing the inspector to be gazetted, and iii) The inspector inspects cassava fields. This plan envisages an increasing level of progression along this pathway over the course of the 5-year period considered here. By the end of the period, there should be 100 TOSCI Seed Inspectors and 205 ASIs, a significant proportion of these will have been trained to do cassava field certifications, and for those trained in this way, 90% of TOSCI Seed Inspectors and 80% of ASIs will have successfully completed cassava seed certification inspections.

	Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
	1. Strengthening capacity of TOSCI and public-sector staff						
	TOSCI Seed Inspectors						
(a)	Number (%) of TOSCI Seed Inspectors	48	64	80	98	100	100
(b)	Number (%) of TOSCI Seed Inspectors trained in cassava seed certification	5 (10.4%)	10 (15.6%)	15 (18.7%)	20 (20.4%)	20 (20%)	20 (20%)
(c)	Number (%) of cassava-trained inspectors passed Proficiency Test	5 (100%)	10 (100%)	15 (100%)	20 (100%)	20 (100%)	20 (100%)
(d)	Number (%) of cassava-trained inspectors inspected cassava fields	3 (60%)	8 (80%)	12 (80%)	18 (90%)	18 (90%)	18 (90%)
	Authorized Seed Inspectors (ASIs)						
(a)	Number of ASIs	145	165	185	205	205	205
(b)	Number of ASIs (%) trained in cassava seed certification	60 (41%)	95 (57.6%)	95 (51.4%)	95 (46.3%)	95 (46.3%)	95 (46.3%)
(c)	Number of cassava-trained ASIs (%) passed Proficiency Test	54 (90%)	86 (90%)	86 (90%)	86 (90%)	86 (90%)	86 (90%)
(d)	Number of cassava-trained ASIs (%) inspected cassava fields	0 (0%)	43 (50%)	43 (50%)	60 (70%)	60 (70%)	69 (80%)

Theme 2. Delivery of a decentralized system for cassava seed certification

In order to have a sustainable seed system, it is essential to have a routine programme of inspections being carried out by inspectors, and a robust system for collecting the fees that are levied for the inspections. The first step is having the protocols in place for doing the certification at all levels. Under the 5CP project, cassava seed certification guidelines for pre-basic (PB), basic (B) and certified (C) levels were published in 2017 as amendments to the Seed Act. During the BEST Cassava Project, TOSCI aims to complete the publication of guidelines for QDS, which will also be appended to the Seed Act. As inspections are undertaken, the system will also rely on the majority of inspected fields passing. Experience under the 5CP and MMB projects has shown that this is achievable. However, continued success will depend on sustained efforts by all project stakeholders to train seed multipliers in methods required for producing high quality healthy seed. Significant new efforts may be required for basic seed producers, of which there are currently only a small number. TOSCI has an established system for collecting fees at PB, B and C levels, but will work to assure higher levels of payment compliance. For payment at QDS level, the system will depend on effective collaboration between ASIs from extension and farmer CSE cooperatives.

	Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
	2. Delivery of a decentralized system for cassava seed certification						
(a)	QDS guidelines for cassava approved	No	Yes	Yes	Yes	Yes	Yes
(b)	Guidelines for cassava seed certification for tissue culture and screen house levels approved	No	No	Yes	Yes	Yes	Yes
(c)	Levels of cassava seed (pre-basic to QDS, tissue culture, screen-house) being inspected	PB, B, C, QDS	PB, B, C, QDS	PB, B, C, QDS	PB, B, C, QDS	PB, B, C, QDS	PB, B, C, QDS
(d)	Number of pre-basic fields inspected per year	12	12	12	12	12	12
(e)	Number of basic fields inspected per year	3	6	9	12	15	18
(f)	Number of certified fields inspected per year	18	24	30	36	42	48
(g)	Number of QDS fields inspected per year	102	100	120	140	160	180
(h)	% of pre-basic fields passing inspection	91.7	90	90	90	95	95
(i)	% of basic fields passing inspection	100	90	90	90	95	95
(j)	% of certified fields passing inspection	88.9	90	90	90	95	95
(k)	% of QDS fields passing inspection	95.1	85	85	85	90	90
(l)	System for fees payment of pre-basic, basic and certified fields	Yes	Yes	Yes	Yes	Yes	Yes
(m)	% of pre-basic, basic and certified field inspections paid	60	70	70	80	80	90
(n)	System for fees payment for QDS fields	No	Yes	Yes	Yes	Yes	Yes
(o)	% of QDS field inspections paid	Na	60	70	80	80	90

Theme 3. Establishing virus testing capacity at TOSCI

Virus testing for cassava brown streak viruses (CBSVs) is an essential part of producing healthy cassava planting material in Tanzania. CBSVs currently occur in virtually all cassava-producing regions of the country, and certainly in all of the major producing regions. In spite of rigorous cassava brown streak disease (CBSD) monitoring procedures, it is inevitable that initially virus-free cassava plants planted in pre-basic field sites will become infected by CBSVs to some degree. Virus testing is therefore essential at the pre-basic level. Since it is anticipated that a much greater area will eventually be taken up with basic seed production, testing using currently available methods will not be feasible for this level. TOSCI therefore aims to have a robust, reliable and rapid system for virus testing pre-basic field sites. As with other themes, significant progress was made towards this target during the 5CP project, and further progress has been realized during the early stages of the BEST Cassava Project. Therefore, virus testing protocols are available, although not yet adapted to TOSCI lab conditions. TOSCI has lab space for molecular biology including virus testing, and through the BEST Project all major pieces of equipment required for real-time PCR-based virus testing have already been procured and delivered to TOSCI. Similarly, five technicians (all that will be needed) have already been trained at IITA in virus testing protocols. The important additional requirements will be for the virus testing procedures to be fully established in TOSCI's lab, a reporting system to be set up, and the speed of testing improved steadily through the course of the 5-year period. The rapid provision of reports for virus testing will be critically important for the effective running of the PB part of the cassava seed system. A payment system has already been set up, but the level of compliance with fee payments should increase through the period of the plan.

	Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
	3. Establishing virus testing capacity at TOSCI						
(a)	Availability of TOSCI-adapted virus testing protocol	No	Yes	Yes	Yes	Yes	Yes
(b)	Fully functional lab for virus testing at TOSCI	No	Yes	Yes	Yes	Yes	Yes
(c)	Number of TOSCI technicians trained in virus testing	5	5	5	5	5	5
(d)	Number of TOSCI technicians using virus testing	0	5	5	5	5	5
(e)	Reporting protocol for virus testing at TOSCI	No	Yes	Yes	Yes	Yes	Yes
(f)	Number of completed virus testing reports at TOSCI/year	0	24	24	24	24	24
(g)	'Response time' established for virus testing at TOSCI	No	Yes	Yes	Yes	Yes	Yes
(h)	% virus testing reports delivered within the 'response time'	NA	10%	30%	50%	70%	90%
(i)	Cost per sample of virus testing at TOSCI	$400	$400	$400	$400	$400	$400
(j)	System for the payment of virus testing	TOSCI Account					
(k)	% of virus testing reports paid for	60	70	70	80	80	90

Theme 4. Developing and TOSCI running a system for real-time management of field-based certification and data management

SeedTracker is an online system that provides capabilities for monitoring seed systems through the uploading of data to the website from remote field locations. It has a series of forms which can be accessed online and used to fill in data of various types. Most importantly for TOSCI, it has a facility to manage seed certification activities. Early discussions on the use of SeedTracker in Tanzania were held between IITA (developer of SeedTracker), TOSCI and the GoT's E-Government Agency. Through this, it was agreed that SeedTracker could be of use to TOSCI in Tanzania, although it would have to be housed within the TOSCI website, and TOSCI and the GoT should have sole access to the data entered into the system. Final discussions will be held in 2018 on how practically to set up the system. Once this plan has been completed, computer hardware (server for hosting the system and tablets for seed inspectors) will be purchased, the web app finalized, a data management system designed and Standard Operating Procedures (SOPs) put in place. For effective maintenance and sustained running of the system, three TOSCI IT operators will be trained. As the system is rolled out from the end of 2018, TOSCI Seed Inspectors will be trained on how to use the system and associated tablet devices for the certification of cassava seed. In view of the cross-crop relevance of this system, through the 5-year period of the Action Plan, all 100 target Seed Inspectors will be trained (i.e. not just the 20 Seed Inspectors that will be focusing on cassava). The approach will be a key element of the modernisation of seed certification in Tanzania, so training initiatives run by the mainstreaming team will incorporate information on electronic seed certification so that it is widely understood by all cassava seed system stakeholders.

	Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
	4. Developing and TOSCI running a system for real-time management of field-based certification and data management						
(a)	Agreed model for the use of SeedTracker seed certification component within the TOSCI website	No	Yes	Yes	Yes	Yes	Yes
(b)	Computer hardware in place for running cassava seed certification	No	Yes	Yes	Yes	Yes	Yes
(c)	Web app for cassava seed certification by TOSCI	No	Yes	Yes	Yes	Yes	Yes
(d)	Electronic data management system for seed certification	No	Yes	Yes	Yes	Yes	Yes
(e)	Standard operating procedures (SOPs) in use	No	No	Yes	Yes	Yes	Yes
(f)	Number of TOSCI IT operator/assistants trained to run and administer the E seed certification system	0	3	3	3	3	3
(g)	Number of TOSCI seed inspectors trained in app use	0	64	80	98	100	100
(h)	% trained inspectors using app	0	50	80	100	100	100
(i)	% of certification reports that are E-certification reports	0	50	80	100	100	100
(j)	E-seed certification training incorporated into awareness-raising agenda of cassava seed system mainstreaming	No	No	Yes	Yes	Yes	Yes

Theme 5. Effective and timely completion of DUS and NPT evaluations

TOSCI is responsible for the final stages of the internal variety release process in Tanzania. TOSCI is also responsible for providing guidance on the release in Tanzania of varieties that have been released previously in neighbouring countries. Regulations in this respect differ for countries in the SADC region (the southern African grouping which includes Tanzania) and those in East Africa. In theory, varieties released in other SADC countries can be released without DUS and NPT testing in Tanzania. By contrast, varieties released in neighbouring East African countries require the provision of previous trials data from the country of origin in addition to experimental evaluation under NPT at multi-locational sites in Tanzania. Over the course of the 5-year plan, DUS and NPT procedures will be streamlined through building strong links with researchers involved with cassava breeding work in Tanzania. The desired outcome will be a system that facilitates the regular and timely release of new improved cassava varieties. TOSCI partners with cassava breeders in DUS and NPT evaluations, and numbers of varieties therefore depend on the numbers submitted by breeders, so values provided in the table are current best estimates.

	Activity	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
	1. Effective and timely completion of DUS and NPT evaluations						
(a)	Number of ARI stations participating in the DUS and NPT Testing	4	4	4	4	4	4
(b)	Number of candidate varieties where DUS results will be obtained from countries in agreement with Tanzania on seed regulations	0	1	0	0	0	0
(c)	Number of candidate varieties that will be DUS tested	3	11	0	0	0	0
(d)	Cost per candidate variety of DUS testing	$560	$560	$560	$560	$560	$560
(e)	*Cost per DUS test certificate*	$2	$2	$2	$2	$2	$2
(f)	*Number of candidate varieties requiring two recent previous seasons of advanced yield trial data and farmers' assessment data*	0	1	0	0	0	0
(g)	Number of candidate varieties released in eastern African countries for which advanced yield data will be adopted from these countries. These varieties only need one-year verification under NPT	0	1	0	0	0	0
(h)	Number of varieties that will be registered according to the SADC agreement i.e. not requiring DUS and NPT tests	0	2	0	0	0	0
(i)	Number of candidate varieties that have expressed excellent performance (e.g. CBSD resistant) therefore requesting consideration for release under emergency criteria in the CBSD susceptible areas	0	0	4	0	0	0
(j)	Estimated number of candidate varieties to be released and registered after fulfilment of the requirements for DUS and NPT tests	0	0	7	7	0	0
(k)	Cost per candidate variety of NPT testing	$650	$650	$650	$650	$650	$650

Conclusions

This document sets out the series of targets that TOSCI aims to meet in order to reach a position in which it can sustainably manage quality within the cassava seed system in Tanzania. This has been organized under five main themes: capacity building in the inspection system, delivery of a decentralized seed certification system, virus testing, electronic management of quality in the seed system, and supporting new variety release through DUS and NPT trials. Significant progress has already been achieved within most of these themes, and there is therefore a strong likelihood that this pace of change will be sustained and that the targets proposed will be successfully achieved. The targets themselves will also provide a valuable monitoring and evaluation tool in measuring progress towards the delivery of the 5-year Plan. Key targets within the Plan include: the doubling of the number of TOSCI Seed Inspectors from the current 48 to 100, the writing into law of new guidelines for QDS quality management, the establishment of virus-testing capabilities in TOSCI's labs, the replacement of the paper form-based certification reporting approach with a real-time electronic system, and partnership with Tanzania's cassava breeders to facilitate the release of 15 new varieties. For all of this to achieved and sustained into 2022 and beyond, great attention will need to be given to the efficient collection of fees for certification, labels and virus testing. Additionally, it is assumed that the GoT will continue to provide a level of budgetary support to TOSCI that will increase in line with inflation. TOSCI expects to continue for the foreseeable future as a GoT parastatal in which government funding provides a partial subsidy for the costs of certification and DUS/NPT operations.

TOSCI has a vital role to play in the development of the cassava sub-sector in Tanzania. Proposed activities under the 5-year Action Plan outlined here, in part supported by the BEST Cassava Project, provide an excellent opportunity for TOSCI to fully realize this role on a long-term sustainable basis.