

Revamping sorghum seed production and supply systems in Tanzania: policy options forward

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Overview of the sorghum seed sector in Tanzania

Seed being an important input in agricultural production, it represents a valuable asset to farmers and the entire society because it serves as the means to attain food, nutrition and income security for both rural and urban populations (Kiambu and Mugo, 2016). To achieve a sustainable agriculture in the drylands, an effective sorghum seed system that involves quality seed production, processing, marketing, and timely delivery is important.

Over the years, sorghum seed system has matured in Tanzania, but it still experiences various challenges that need to be effectively addressed to increase its delivery. The sorghum seed system faces several challenges including low availability of early generation seed, inconsistent seed production by private seed companies, inconsistent seed demand by farmers, inadequate facilities, inadequate technical capacity on seed production and distribution, limited systematic feedbacks between researchers and farmers, weak distribution channel and low adoption rate (Kimbi et al., 2021; ASARECA/KIT, 2014). Other constraints are limited capacity to forecast demand, infrastructure challenges by private seed companies and community-based organizations (CBOs). Also, the public seed enterprise, and the Agricultural Seed Agency (ASA) lack infrastructures for basic seed multiplication, though currently they are taking the lead to ensure enough production. The Tanzania Official Seed Certification Institute (TOSCI) lacks enough operational centres.

Some of the advances in the sorghum seed systems in Tanzania include release of improved varieties (e.g., NACO Mtama 1, NACOSH 1, NACOSH 2, PAC 537, PAC 501), private seed companies having breeding rights, access to pre-basic seeds of protected public bred varieties through licencing, and capacity building through access to public infrastructures of Agricultural Seed Agency (ASA) e.g., irrigation facilities and human resources for production of basic seeds (AGRA, 2016)],

farmers being engaged in Quality Declared Seeds (QDS) production across the country but also serving as out-growers under the supervision of Tanzania Agricultural Research Institute (TARI). To leverage on these advances, adapted solution are needed to solve limited exposure to knowledge, information, low seed availability, narrow distribution channels and low-income levels contribute to farmers dependence on informal seed system (Mabaya and Mburu, 2016). Recent reports (ASARECA/KIT, 2014) indicated that about 42% of farmers source seeds from formal channels these include the Government (25%), Private seed companies (13%), QDS producers (3%) and agro-dealers (1%). Close to 60% still use grain or recycled seed. The figures have not changed much up to now (Kimbi et al., 2021).

Authorized seed classes in Tanzania

In Tanzania there are four recognized seed classes: pre-basic, basic, certified and QDS. Pre-basic seeds are considered to have a highest purity and are produced, controlled and provided directly by breeders from either public institutions or private seed companies for further multiplication. Basic and certified seeds are produced and multiplied by the public seed agency, research institutions and some seed companies. Private seed companies produce certified seeds while QDS are produced by farmers and marketed within the ward.

Overall roles and responsibilities of main sorghum seed system actors

The sorghum seed systems involve public sector, private sector, development organisations and farmer organisations. These overall responsibilities of the various actors are delineated in Table 1.

TOSCI inspects both public and private seed producers and provides certification; It also manages QDS groups through seed inspectors at district councils. Recently, TOSCI accreditation by ISTA has made seed export and import possible as the institute provides both import

Table 1: Main actors and respective roles in the sorghum value chain

Main actors	Roles and responsibilities
TARIs, ASA, seed companies, universities	Research and breeding
TOSCI, MOA	Variety release and regulation
ASA, seed companies	Seed production and multiplication
Seed companies, universities, TASTA, ASA, TOSCI, NGOs, MOA	Education, training and extension
Seed companies, agro-dealers	Distribution and sales
Banks and credit facilities	Financial service provision and education

and export permits. TARI-Hombolo registers varieties, licences varieties to private sector, produces, maintains and promotes released improved sorghum varieties. ASA Collaborates with TARI and other international organizations, like ICRISAT, on improvement of improved sorghum varieties. ASA also produces and markets sorghum seed. Private seed companies produce certified seeds of improved varieties, e.g., *Macia*, *Tegemeo*, NACO Mtama 1, NACOSH 1 and NACOSH 2. The private seed companies involved include Namburi Agricultural Company, Agri-seed, Suba-Agro, Mbozi Highland Economic Group Company Limited (MHEG), Zasse Agricultural Seed and Food Co Ltd, Rieta AgroSciences Tanzania limited, PAVIG Agro Company Limited (PACL) and Dodoma Agricultural Seed Production Association (DASPA) which is a farmer seed producer organization. NGOs Promote the use of improved seeds, link farmers to the formal seed system through projects and establish network with TARI through projects (Ilonga, Hombolo, Naliendele and Ukirigulu). QDS producers and CBOs purchase and grow certified seeds to produce QDS within respective districts; they also sell QDS seeds to farmers within a price range of 1000-1500 Tshs/kg (1 USD is around TZS 2300). Individual farmers grow seed to obtain grain for selling. About 39% of the sampled farmers in main sorghum production areas in Tanzania plant improved seeds of sorghum (Kimbi et al. 2021).

Characterizing the expected versus actual roles of the main actors in sorghum seed system

The analysis of Table 2 show discrepancies between the actual and the expected commitments of various actors.

Though institutions are managing to perform their roles, different constraints especially financial constraints drive them into less efficiency in performing given roles.

Policy recommendations for effective sorghum seed delivery systems in Tanzania

Changes in the sorghum seed system are essential for sustainable agriculture and food security. Therefore, some of the interventions suggested to close the existing gaps are as follows:

- Enhanced seed certification services through community seed inspector and private sector
- Strong linkages and win-win agreements between private, public and development institutions to enhance availability of basic seed for private seed companies
- Availability and accessibility of improved seeds to smallholder farmers could further improve with more integration between the formal and informal seed delivery channels.
- Decentralized production for proximity availability to farmers at community level

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Table 2: Expected versus actual roles of different actors in sorghum seed system

Actor	Expected roles	Actual roles
TOSCI	Ensures compliance to quality standards through certification; Provides both import and export permits; Full coverage of the country in inspection service	Ensures compliance to quality standards through certification by performing different national trials; Provides both import and export permits; limited coverage of the country with seed inspectors
TARI	Production and maintenance of breeder seeds; Protecting and registering varieties; Licencing varieties to private sectors; Promoting the released sorghum varieties	About five recent varieties have been released and maintained; Protecting and registering varieties; Licencing varieties to private sectors; Promoting released sorghum varieties
ASA	Producing and promoting basic and certified seeds; Collaborating with research institutes on issues relating to new varieties availability	Yearly production and marketing of sorghum seeds; Collaborates with TARIs and other organizations on improved sorghum varieties dissemination; limited availability of basic seed.
Private seed companies	Producing and marketing certified seeds; Producing breeder varieties; producing early generation seed of their varieties	Certified seeds of improved varieties produced by private seed companies, e.g., Agri-seed, Suba-Agro and DASPA seed companies (Macia); 3 self-released varieties are produced by Namburi Agricultural Company, i.e., NACO Mtama 1, NACOSH 1, NACOSH 2
NGOs	Promoting use of improved seeds; Linking farmers to the formal seed system	Promoting use of improved seeds through research projects through ICRISAT (AVISA, HOPE, SMU Value Chain projects); Network establishment with TARI through projects (Ilonga, Hombolo, Naliendele, Ukirigulu); Linked some farmers to the formal seed system through projects
QDS producers and CBOs	Producing QDS and promoting use of improved sorghum varieties	Purchase and grow certified seeds to produce QDS within respective districts; Sold QDS to farmers within a price range of 1000-1500 Tshs/kg
Individual farmers	Grow improved seeds to obtain grain with improved quality and quantity	Sampled farmers (39.2%) planted improved seeds for sorghum grain production

N'Dossi et al. (2022)

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