



Policy options for enhancing quality groundnut seed production and delivery systems in Tanzania

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Overview of the groundnut seed sector in Tanzania

A stable and well-functioning groundnut seed sector is a major step for farmers to achieve the potential of groundnut productivity and production (Bezkorowajnyj *et al.*, 2007). Availing quality groundnut seed is a key component of the groundnut value chain for farmers in particular (NAP, 2013). Quality seed helps cope with the recent increase in drought due to climate change, market shift, and other biotic and abiotic stresses that groundnut production is facing (Zurich, 2014). To make sure that quality and superior variety seeds are produced, the Tanzanian seed sector operations are guided by policy and regulatory frameworks under the Seeds Acts No 29 of 1973 and the No 18 of 2003. The two Seed Acts detail the roles and responsibilities of each seed actor in making sure that quality seed is produced and made available to

farmers across the country. The Tanzanian seed sector has been able to release a total of 17 groundnut varieties since the 1960s, which complement one another through their agronomic, genetic and market attributes (Table 1). The released groundnut varieties can be divided into two categories, namely old varieties and recent varieties. The groundnut varieties released before 2009 have been categorized as old varieties (older than 10 years), while those released in 2009 to date are considered new or recent varieties.

Recent varieties are much superior in agronomic, genetic and market attributes than old ones. New varieties are expected to have higher adoption rates than old ones because they are less susceptible to abiotic and biotic stress, more productive and possess more attractive market attributes (Photo 1). However, the recent varieties



Photo 1. The Jipe Moyo farmer group believes improved groundnut varieties send more children to school, Kinaga, Kahama district.

Table 1. Improved varieties released - their attributes and yield potential URT (2016; 2017; 2018).

Variety	Year of release	Top 3-5 agronomic, genetic, market attributes	Expected yield (kg/ha)		
			Max. on station	Min. on station	Under farmer management
Mtwaranut 2016	2018	Medium maturity (110-115 days), tolerant to groundnut rosette disease, tan in color, large in size, drought tolerant.	1300	1100	1040
Tanzanut 2016	2018	Medium maturity (110-115 days), tolerant to groundnut rosette disease, large in size, tan in color, drought tolerant	1500	1200	1095
Naliendele 2016	2018	Medium maturity (115 days), tolerant to diseases and drought, bold size, red color, high oil content (40.10%)	1500	1200	1050
Narinut 2015	2015	Medium maturity (110-115 days), large, brown, groundnut rosette disease resistant, best for confectionery market, oil content (46.20%)	2000	1300	1000
Kuchele 2015	2015	Medium maturity (110-120 days), large in size, brown in color, groundnut rosette disease resistant, best for confectionery market	2000	1200	1000
Nachi 2015	2015	Medium maturity (110-115 days), tolerant to groundnut rosette disease, large size, tan color, oil content (43.70%)	2000	1500	1300
Mangaka 2009	2009	Early maturity (90-100days), tan color, tolerant to diseases and drought, oil content (41.10%)	1500	1000	1000
Naliendele 2009	2009	Early maturity (90-100 days), tan color, tolerant to diseases and drought	1100	1000	900
Mnanje 2009	2009	Medium maturity (110-120days), tolerant to diseases and drought, large size, red color, high oil content (51.5 %)	1500	1300	1100
Nachingwea 2009	2009	Medium maturity (90-100 days), resistant to rosette disease, large size, tan color, oil content (44.50%)	1250	1050	950
Masasi 2009	2009	Medium maturity (90-100days), tolerant to groundnut rosette disease, large size, red color, oil content (46.70 %).	1600	1100	1000
Pendo 1998	1998	Short duration (90-100 days), tolerant to disease and drought, medium size, tan color, good shelling percentage, medium kernel size, soft pod, oil content (44.50%).	1500	1400	1100
Sawia 1998	1998	Light tan and small kernels. Light green plant, early maturing (90-100day) with an oil content of 58%. Sprouting at maturity if harvesting is delayed. Tolerant to early and late leaf spots, rosette and leaf rust	1500	1200	950
Johari 1985	1985	Virginia bunch type, medium-sized tan kernels, dark green plant, medium maturing (110-120 days), semi-spreading	1200	1000	850
Nyota1983	1983	Light pink and small kernels. Light green plant, early maturing (90 – 100days) with an oil content of 58%. Sprouting at maturity if harvesting is delayed. Tolerant to early and late leaf spots, rosette and leaf rust	1500	1000	800
Red mwitunde 1976	1976	Virginia bunch type, small in size, red in color, two to three kernels has medium-term maturity (110-120)	1000	800	600
Dodoma bold 1960s	1960s	Spanish bunch type, tan in color, small in size, has two to three kernels, has early maturity (90-100)	1000	800	600

have low adoption rates among groundnut farmers in the country compared to the old ones (Table 2). Among old varieties, Pendo 1998 is highly popular, because after its release it benefitted from intensive promotion activities in the early 2000s. As Pendo 1998 is highly susceptible to rosette disease, Mangaka 2009 was released in 2009 with less susceptibility to rosette disease. The adoption of the recently released varieties varied with the gender of the farmer. Female farmers adopted less than males due to lack of resource ownership. Recent findings also indicate that non-group membership, seed unavailability, and high seed cost hinder the adoption of recent varieties of groundnut in Tanzania.

Variety	Year of release	Adoption rate (%) by respondents in intervention districts (n=300)
Nachi	2015	0.42
Naliendele	2009	0.83
Mnanje	2009	5.42
Mangaka	2009	5.42
Pendo	1998	17.08
Johari	1985	5.82
Total		35

Variety business case, 2019; Figure in parenthesis is sample size

Moreover, the majority (62%) of the farmers recycle grain as seed, applying an average of 62.5 kg/ha seed rate which is 17.5 kg/ha to 37.5 kg/ha less than the recommended practice.

Main actors involved in groundnut seed production and marketing in Tanzania

To ensure that quality groundnut seed is produced in sufficient quantity and well-marketed to farmers and off-takers, the involvement of multi-actors and institutions is necessary. The multiple actors and institutions can be categorized into public, private and civil society organizations. These players work in a value chain, which starts with groundnut variety breeding to seed production and marketing. The three major categories are composed of nine main actors in the seed chain, namely Tanzania Agricultural Research Institute - Naliendele (TARI-Naliendele), Tanzania Official Seed Certification Institute (TOSCI), Agricultural Seed Agency (ASA), Non-Governmental Organizations (NGOs), the

Local Government Authorities (LGAs), individual seed enterprises, agro-dealers, farmer groups or cooperatives, and individual farmers (Figure 1). At every stage of the

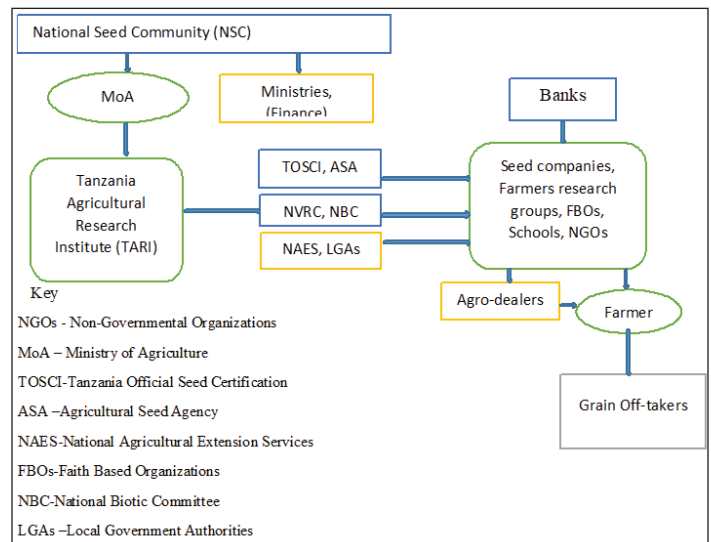


Figure 1: Main actors involved in groundnut seed production and marketing in Tanzania.

seed production, TOSCI is involved to ensure quality requirements are met by all actors before marketing to farmers and other buyers.

Different seed classes and delivery systems of groundnut

The above-mentioned actors work to produce and market four seed classes, namely Pre-basic or Breeder seed, Basic or Foundation seed, Certified seed, and Quality Declared Seed (QDS). The four seed classes are delivered through various seed supply mechanisms. TARI-Naliendele is the sole producer of pre-basic seeds as a national center mandated for groundnut breeding in Tanzania. The total seed production has been increasing over the years and reached a maximum of 4611.5 tons in 2018, all seed classes inclusive. The QDS producers have high seed contribution in all the years, e.g., 84% in 2015, 90.1% in 2016, 89.5% in 2017, and 87.7% in 2018. Conversely, certified seed producers (private seed companies) are the least contributors of groundnut seed to farmers with only 0.04% in 2017 and 0.05% in 2018 (Table 3).

The low contribution of seed companies is because there are few of them compared to other seed categories. In addition, investors are challenged by limited capital to start and expand seed production. This observation may delay a timely spread of seeds across the country since QDS cannot be transacted beyond the local districts (ASARECA, 2014).

Table 3. Seed production (tons) and a percentage contribution per seed category from the year 2015 to 2018.

Seed Classes	Producer categories	2015		2016		2017		2018	
		Tons	%	Tons	%	Tons	%	Tons	%
Breeder	Research Institute	23	5.6	21.2	0.6	40.1	0.9	30	0.6
Basic	Public seed company and Farmer Research Groups	43.6	10.6	329	9.3	413.1	9.5	533.7	11.6
Certified	Private seed company	-	-	-	-	1.8	0.04	2.5	0.05
QDS	Farmer Research Groups, NGOs, Individual seed enterprises, Faith-Based Organizations (FBOs), Farmer association, Primary and Secondary schools	345.8	84	3170	90.1	3897.7	89.5	4045.3	87.7
Total		412.4	100	3520.2	100	4352.7	100	4611.5	100

Source: Variety business case, 2019

Moreover, there has been a yearly increase in the number of seed producers from 134 in 2015 to 858 in 2018 (Table 4). Farmer organization and groups lead the seed producer categories in the country with a total of 530 groups (Photo 2). However, they are limited because their seed marketing requirement does not go beyond their local districts of production, as opposed to seed companies (ASARECA, 2014).

Table 4. Number and type of seed producers engaged in seed production and marketing.

Seed producer	2015	2016	2017	2018
Seed company	1	2	4	5
Farmer organization/groups	100	240	420	530
Public seed enterprise	0	1	1	1
Individual entrepreneurs	33	94	201	316
NGOs	0	1	5	7
Total	134	338	631	859

Characterizing the main groundnut seed systems actors

Every main actor in the groundnut seed system has roles as expected by the Seed Act No 29, 1973 and Seed Act No 18, 2003 (Table 5). Findings show that TARI-Naliendele, individual enterprises, district agricultural extension agents and TOSCI seem to perform their respective functions. However, challenges associated with a limited number of TOSCI centers (there are only five countrywide) hinder easy access to TOSCI services by seed sector stakeholders. NGOs and farmer organizations are to some extent involved in extension work often within projects, but largely in a facilitation role for QDS production. ASA has been experiencing an improvement in seed production and marketing over the years. As a public agency, it is now taking a lead to ensure that enough basic seed is produced and disseminated to private seed companies.



Photo: Charles Mkandawile

Photo 2. A farmer amazed to see yield of improved variety at TARI, Naliendele.

Table 5. Seed actors and their roles in the groundnut seed system.

Actors	Expected roles	Actual roles
TOSCI	Conducting seed inspections Effect sampling and testing Authorizes seed sampling and seed testing laboratories Training seed producers, seed inspectors and seed analysts Liaising with other International Organizations such as the International Seed Testing Association (ISTA) Carrying out variety performance tests Carrying out pre- and post- control tests.	It conducts seed inspections It effects sampling and testing It authorizes seed sampling and seed testing laboratories Trains seed producers, seed inspectors and seed analysts Liaises with other International Organizations such as the International Seed Testing Association (ISTA) Carries out a variety performance tests Carries out pre- and post- control tests with limited staff and centers.
ASA	Producing, processing and marketing basic and certified seeds Promoting private sector participation in seed production Promoting the use of improved seeds Collaborating with research institute on matters related to the availability of new varieties.	Yearly improvement in production and marketing of groundnut basic and certified seeds Promotes private sector participation in seed production Promotes the use of improved groundnut seeds Collaborates with research institute on matters related to the availability of new varieties.
TARI-Naliendele	Variety development and maintenance Producing and marketing basic and certified seed Promoting private sector participation in seed production Promoting the use of improved seeds.	17 varieties developed and their maintenance Produces and markets basic seed It promotes companies for seed production It promotes the use of improved seeds.
NGOs	Promoting the use of improved seeds.	They promote improved seeds.
Individual enterprises	Producing and marketing Quality Declared Seeds Producing and marketing basic and certified seed.	Producing and marketing Quality Declared Seeds Producing and marketing basic and certified seed.
Local Government Authorities (LGAs)	Conducting seed inspections on behalf of TOSCI Performs extension services to seed producers and farmers.	Conduct seed inspections on behalf of TOSCI Performs extension services to seed producers and farmers.
Farmers	Buying either QDS, certified seed to produce grain.	Purchases QDS, certified seeds to produce grain.

Source: Variety business case survey, 2019

Matching groundnut seed and grain market: Existing gaps

Numerous market gaps have been recorded along the commodity value chain, from the seed to the grain market. About 28% of the grain off-takers interviewed reported of the challenge in finding grain quality, quantity and attributes that the end-users want. The missing desirable variety traits in the grain

market include bold and tan, bold and red with high oil content. The challenges to have desired grain traits imply an existing gap between the seed sector and the grain market. This existing gap has further resulted in large deficit in quantity demanded by traders in various districts in the country. About 12% of traders in Nanyumbu missed the grain with tan traits (Table 6).

Table 6. Grain amount (tons) and percentage of traders in various districts (n= 123).

District	Nanyumbu	Singida	Bahi	Dodoma	Kongwa	Gairo	Morogoro	Ilala	Total
% of traders	12	20	6	18	20	6	12	6	100
Amount(tons)	90	15	15	15	15	15	15	10	190

Variety business case, 2019; Figure in parenthesis is the sample size for traders

Overall, in the Tanzania seed system, old varieties are still more dominant than new varieties. The majority of the farmers recycle grain as seed and do not apply the recommended seed rates per hectare. Also, TOSCI capacity is limited due to low number of centers and staff. Likewise, seed companies are few and are the least contributors to seed supply to farmers. Finally, the off-takers are short of grain supply in terms of varieties traits, quantity and quality.

Policy recommendations for effective groundnut seed delivery systems in Tanzania

The potential of groundnut productivity and production cannot be met unless the following issues within the seed sector are addressed through:

- Engaging multi-media promotion of the recently released varieties along with their complementary agronomic practices simultaneously to incentivize farmers. In this endeavor, the private sector alongside NGOs and government entities will have a major role to play.
- Mobilizing farmers into groups and incentivizing them through benefits from shared experiences, economies of scale in seed purchases facilitating purchase of more seed at low cost.
- Establishing a comprehensive seed subsidy mechanism that will attract more seed companies to invest in groundnut seed production and ensure wide and timely distribution of seed. Groundnut being a bulky seed and self-pollinated crop, such mechanism may bring some change. The subsidy can take the form of small grants to interested seed companies.
- Brokering public-private partnerships in the seed inspection area mainly between TOSCI and inspecting companies. This will enhance the current capacity of TOSCI as the private companies can be guided and trained to assist TOSCI in inspecting seed production activities.
- Developing network for groundnut grain off-takers at national, regional and district levels to disclose new seed technologies released by TARI, and provide wide information on the attributes of newly released varieties in terms of their key market traits and further enhance their market linkages.

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