

About the Bulletin

DT Maize is a quarterly publication of the DTMA (Drought Tolerant Maize for Africa) project, funded by the Bill & Melinda Gates Foundation. Its aim is to inform partners and the general public at large about developments related to drought tolerant maize in Sub-Saharan Africa. It publishes short, general articles, relevant news, and events related to DTMA. Articles and news on all aspects of maize in Africa from sister projects and other partners are also welcome. Any feedback from our readers would be appreciated.



In memory of the late Dr Richard Ndonzi: seed multiplication by Suba-Agro of the drought tolerant maize hybrid TZH536, Lyamungu, Moshi, Tanzania (Photo: Tsedeke Abate, 21 July 2014)

Maize in Tanzania: Breakthroughs Yet to Come

Background

Tanzania has the second largest area planted to maize in Africa, after Nigeria. According to the Food and Agriculture Organization of the United Nations (FAO) data, approximately 4.12 million ha of land was planted to maize in Tanzania in 2012. Other staples include cassava, paddy, common bean, sorghum, sweet potato, banana, groundnut, sunflower and several others. A Drought Tolerant Maize for Africa (DTMA) adoption monitoring survey of 900 maize-growing households (HH) in nine districts in northern Tanzania conducted in 2012 found that farmers allocate nearly 70 percent of their land to this crop. An estimated 3.2 million HH (more than 24 million people) grow maize in Tanzania; each HH has an average area of about 1.3 ha. Approximately 30 percent of maize-growing HH are headed by women and women contribute about 70 percent of the total labor to maize production.

Maize provides 60 percent of dietary calories and more than 35 percent of utilizable protein to the Tanzanian population. It is also a major source of income for the majority of smallholders. Maize is produced for both human consumption and the market (about 40 percent is sold, mostly locally). Annual per capita consumption is 73 kg per person per year. Consumers prefer white flint maize; the amount of yellow maize grown in Tanzania is therefore negligible.

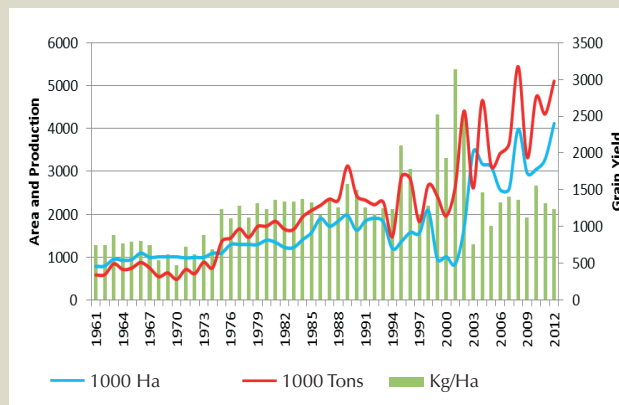


Figure 1: Performance of maize in Tanzania (source: constructed by the authors from FAOSTAT, August 2014)

Maize productivity in Tanzania is very low in spite of its importance to the country's food security and economic well-being. The average yield for 2010-12 was 1370 kg/ha, much less than the Sub-Saharan Africa (SSA) average of about 1800 kg/ha. Production showed upward trends starting the first quarter of the last decade but this has been achieved through expansion in the area planted rather than in increases in yield gains (Figure 1). FAO data for 2003-12 show that the yield gain for maize in Tanzania was 33 kg/ha/yr, compared to 146 kg/ha/yr for Malawi, 124 kg/ha/yr for Uganda, 110 kg/ha/yr for Zambia and -20 kg/ha/yr for Kenya.

Major Bottlenecks

Maize-based agriculture in Tanzania faces both technical and institutional constraints. Drought, diseases (including the maize streak virus, leaf blight, leaf rust, grey leaf spot and ear rot), and insect pests (the spotted stalk borer and the larger grain borer) are among the major technical problems but maize varieties tolerant or resistant to these are already available.

The root cause of Tanzania's unflattering performance of maize is more institutional than technical:

- There is a compelling need to strengthen country-wide coordination for devising and implementing a comprehensive strategy for maize research and development.
- There is inadequate critical mass (a total of 13.3 FTE¹, compared to 39.0 for Ethiopia, for example) and mostly aging population of maize researchers.
- Tanzania has limited extension capacity to create enough awareness about improved maize technologies and production practices (e.g. extension agent to farm household ratio for this country is 1:2500, compared to 1:476 for Ethiopia, 1:1000 for Kenya and 1:1603 for Malawi).
- The average fertilizer (nutrient) consumption for maize in this country is 8.7 kg/ha/yr (compared to an average of 12.3 kg/ha/yr for SSA and 48.9 kg/ha/yr for Zambia)².
- Even though the country has a better record of increasing its investment in agricultural research for development (0.43 percent of its agricultural GDP is invested in AR4D, compared to about 0.29 percent average for all DTMA countries), this still falls short of the recommended 1.0-1.5 percent.
- The advent of the new virus disease, maize lethal necrosis (MLN), in 2011 has created an additional burden on maize production in Tanzania.

Major Growing Areas

Tanzania is divided into seven development zones – Central (Dodoma and Singida regions), Eastern (Tanga, Pwani, Dar es Salaam, Morogoro), Lake (Kagera, Mara, Mwanza, Shinyanga), Northern (Arusha, Kilimanjaro, Manyara, Lushoto district of Tanga), Southern (Lindi, Mtwara, Tunduru district of Ruvuma), Southern Highlands (Iringa, Mbeya, Rukwa and Ruvuma), and Western (Kigoma and Tabora). Maize is accorded highest priority among major crops in five of the zones, and second priority in Northern Zone (after common bean) and Southern Zone (after sesame); administratively, there are 21 regions (see table 1).

1 FTE = full-time-equivalent.

2 The African Union recommendation is 50 kg/ha/yr.

Maize production in Tanzania is widely distributed across agricultural development zones and regions (Table 1). The Southern Highlands Zone and Lake Zone occupy approximately 26 percent and 25 percent, respectively, of the total maize area in the country. These are followed by Eastern (13 percent), Northern (12 percent), Western (10 percent), Southern (8 percent), and Central (6 percent) zones. Maize in Tanzania is adapted to agro-ecologies ranging from near sea level to 2400 meters (m) above sea level, depending on the variety. However, the main agro-ecologies fall within 500-1500 m.

The importance and performance of maize in Tanzania also varies from region to region (Table 1). The total area for the country showed a slight decline of about 0.6 percent whereas the yield and production grew at an annual rate of about 5.5 percent and 5.0 percent, respectively, during the period from 2003 to 2010. Shinyanga accounts for 13.3 percent of total area and 11.3 percent of production; this is followed by Mara, Dodoma, Rukwa, Kagera, Tanga, Lindi, Tabora, Mbeya and Ruvuma. These 10 regions make up about 69 percent of total area and 74 percent of maize production in the country.

Several regions, including Mara, Lindi, Dar es Salaam and Mtwara showed double digit annual rates of growth (ROGs) in area during the period from 2002/03 to 2009/10; high ROGs for yield during this period were recorded for Shinyanga, Dodoma, Lindi, Mtwara, and Kigoma (Table 1). Yields crossed the 2 tons/ha level only in Mbeya and Kigoma; these were followed by Rukwa, Kagera and Mara.

Dominant Varieties Grown

Until recent times Tanzania has relied on maize variety introductions from abroad (mainly from Kenya). The first introduction was the short duration variety Katumani from Kenya in the late 1950s, followed by H622, H511 and H632 in 1968. ARI-Ukiriguru and ARI-Ilonga were the first national research centers that developed and registered the varieties UCA and Tuxpeno, respectively, in 1976³. Accelerated variety releases, in partnership with CIMMYT, started in 2001. In total, 69 varieties were registered between the late 1950s and 2006. In addition to the national research institutes (ARI-Ilonga, ARI-Selian, ARI-Ukiriguru and ARI-Uyole) and the local company Tansed International, regional and international seed companies such as Pannar, Kenya Seed Company, Seed Co, Cargill Zimbabwe, Monsanto and Pioneer have played an important role in registering new maize varieties in Tanzania in the past.

The DTMA team in Tanzania facilitated the development, release and promotion of 17 drought-tolerant maize

3 The variety list in 2008 shows that UCA and ICW were released in 1976, but these were actually released in the late 1960s and were used by one of the authors here (ZM) to develop Kilima and Staha that are still widely grown to date.

varieties between 2007 and 2013. Fourteen of these were hybrids and two open-pollinated varieties (OPVs). Today, there are five national private companies releasing maize varieties in the country – Aminata, IFFA, MAMS, Meru, Suba-Agro and Western Seed Company.

ARI-Selian was responsible for the registration and promotion of these varieties during this period. Fifteen of the new releases are being commercialized by private seed companies – Aminata, IFFA, Krishna, MAMS, Suba-Agro and Tanseed.

Table 1: Performance of maize in different regions of Tanzania

Region	Performance (2007/08-2009/10)			ROG (2002/03-2009/10)		
	000 Ha	Kg/Ha	000 Tons	Area	Yield	Production
Shinyanga	443	1126	508	2.5	12.2	14.8
Mara	295	1913	503	27.8	1.1	26.3
Dodoma	293	1514	407	4.9	16.9	20.3
Tabora	210	1230	251	-1.3	8.8	6.4
Lindi	209	1279	253	20.1	13.8	34.0
Rukwa	200	1954	367	3.7	7.9	10.7
Tanga	198	1152	283	-5.4	7.5	3.9
Dar es Salaam	191	713	158	114.4	2.4	117.34
Mtwara	180	1192	194	14.8	15.5	30.7
Mbeya	180	2213	240	-8.2	8.8	-7.7
Iringa	151	1353	204 ^φ	-7.1	0.3	NA
Kagera	149	1938	288 ^φ	7.4	72.2	NA
Ruvuma	133	1829	234	-0.9	3.8	1.8
Singida	100	1091	110	-2.9	7.4	2.88
Manyara	99	1854	173	-13.5	10.8	-5.0
Arusha	97	1440	152	3.22	3.8	11.6
Kigoma	95	2049	188	-3.47	10.9	6.4
Kilimanjaro	62	1119	64	-7.3	-1.0	-8.7
Mwanza	61	1050	63	-20.8	3.38	-17.9
Morogoro	43	1525	50	-28.4	7.22	-21.9
Coast	2	1853	2	-48.8	10.87	-42.9
Total/avg.	3331	1347	4499	-0.6	5.5	5.0

^φ = Estimated by the authors.

Source: Calculated by the authors from Ministry of Agriculture, Food Security and Cooperatives.

Table 2: Drought-tolerant maize varieties released under DTMA in Tanzania⁴

No.	Release name	Year of release	Hybrid/OPV	Maturity Range	Suitable agro-ecologies/altitudes	Grain yield*
1	WH403	2007	Hybrid	Medium	<1400 m	Medium
2	WH502	2007	Hybrid	Late	<1600 m	Medium
3	WH505	2007	Hybrid	Late	<1500 m	Low
4	ZM623	2007	OPV	Medium-late	900-1500 m	Medium
5	Vumilia K1	2009	OPV	Late	900-1500 m	High
6	HB405	2012	Hybrid	Extra early-early	<800 m	Medium
7	HB513	2012	Hybrid	Medium	800-1500 m	Medium
8	HB623	2012	Hybrid	Late	1000-1500 m	High
9	TZM523	2012	OPV	Medium	900-1500 m	Medium
10	TZH536	2012	Hybrid	Medium	900-1500 m	High
11	TZH538	2012	Hybrid	Medium	900-1500 m	High
12	TZH417	2012	Hybrid	Early-medium	900-1500 m	High
13	Nata H104	2013	Hybrid	Early-medium	<1600 m	Medium
14	Nata H105	2013	Hybrid	Early-medium	<1600 m	Medium
15	Nata K6Q	2013	OPV	Early	<1600	Medium
16	Meru HB515	2013	Hybrid	Medium	800-1500	High
17	MAMS H913	2013	Hybrid	Medium	800-1500	Medium

⁴ See DT Maize Vol. 3 No. 2 (Box 1) June 2014 issue for a description of yield categories.

Maize Seed System

Tanzania is one of six DTMA project countries that have regulations governing plant breeders' rights but it is not a member of ISTA or OECD. It takes an average of 2.2 years (range: 1-3 years) to release a variety and about 2 years from release to the seed being available on a commercial scale in Tanzania, which is considered to be below average time for eastern and southern Africa. Private companies can produce, distribute and market seed.

At present, there are 37 seed companies in Tanzania. These include 26 small- and medium-size national, 10 regional and two multinational companies. The DTMA team in Tanzania has partnerships with 20 of those companies including Aminata, IFFA, Krishna, MAMS, Meru-Agro, Tansed and Tropical Seeds. The DTMA partner national companies produced a total of 2,376 tons of seed in the 2011/12 season, consisting of nine OPVs and four hybrids. Suba-Agro produced the largest share of seed during this period, followed by Tansed, Meru, Aminata and MAMS.

Trade

In spite of its great potential to produce a surplus, Tanzania has remained a net importer of maize over the last five decades (Figure 2). Import volumes were high during shortfalls of production following bad years, mainly as a result of drought. Historically, import volumes were rather high during the early to mid-70s, early to mid-80s and for most of the 1990s (Figure 2).

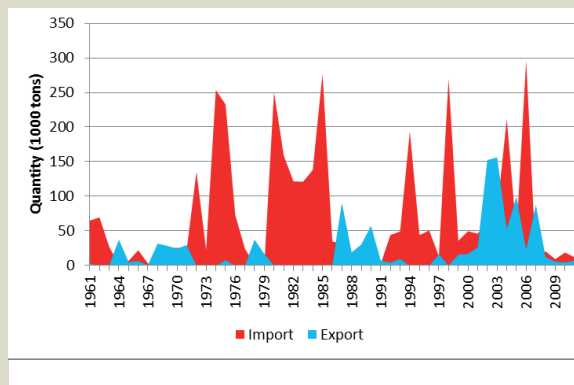


Figure 2: Maize trade in Tanzania (source: constructed by the authors from FAOSTAT, August 2014)

Export volumes improved starting in the early to mid-2000s but the country still remained a net importer. For example, the average import volume for the 2002-2011 period was 76,000 tons at the cost of US\$ 18.8 million per year, compared to the export volume of more than 60,000 tons, which was valued at US\$ 8.8 million per year. ■

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News and Events

Major visits and meetings by DTMA staff

Places visited	Scientist(s) involved	Date	Major tasks
Ethiopia (Addis Ababa)	T Abate, P Setimela, D Wegary	2-4 July	SIMLESA second phase launching meeting
Uganda (Kampala)	T Abate	8-10 July	PASS/AGRA "10K Club" meeting
Uganda (Kibale, Masindi, Bulindi)	T Abate, D Makumbi, M Regasa	19-23 July	Maize Working Group (MWG) Travelling Workshop
Tanzania (Babati, Karatu)	T Abate, D Makumbi, M Regasa	24-26 July	MWG Travelling Workshop
Kenya (Kakamega)	D Makumbi, M Regasa	30 July	MWG Travelling Workshop
Swaziland (Mbabane)	T Abate, J Cairns, M Gedil, J Gethi, C Magorokosho, Z Mainassara, A Menkir, A Tarekegne	12-15 August	NSIMA Collaborators' Annual Meeting

Upcoming Events

The 2014 DTMA Annual Review and Planning Meeting has been postponed from its original date of 6-10 October 2014 to February/March 2015, in Addis Ababa, Ethiopia, as a result of travel restrictions following the Ebola outbreaks in West Africa