

## 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.



*A farmer's well-managed maize field (intercropped with sweet potato) in a village near Chitipa, Huambo. Note the landrace maize (farmers in Angola obtain an average yield of less than 700 kg/ha). Photo: Tsedeke Abate*

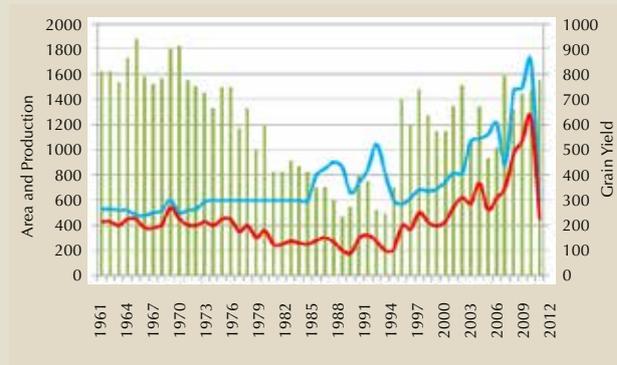
## Angola Fast-Tracks New Drought-Tolerant Maize Varieties

### Background

Angola is a country of immense mineral wealth and enjoys huge agricultural potential because of its vast land and water resources. It produces a number of staples; a 2013 DTMA household survey shows that maize occupies about 63 percent of all the crops grown in Angola. Other major staples include cassava, common bean, groundnut, millet, sweet potato, banana and potato.

Maize yields are low in spite of its high significance in the diet of the majority of Angolans. The Ministry of Agriculture (MoA) data for 2008-10 indicate that the average national yield is barely 650 kilograms per hectare (kg/ha). The total production for the same period was about 1.2 million metric tons (mt).

The bulk of maize in Angola is grown by smallholder farmers whose average maize area is estimated at 1.5 ha per household, the largest in the southern Africa sub-region. These households have not had the opportunity to use improved seed and chemical fertilizer, even though they try their best with available resources. Maize production in Angola plummeted (Figure 1) during the liberation and civil wars of the 1970s and 1980s. Current yields are still lower and more volatile than they were in the late 1960s and early 1970s.



*Figure 1: Performance of maize in Angola (source: constructed by the authors from FAOSTAT, accessed 25 March 2014)*

An adoption monitoring survey conducted in six provinces (Bie, Huambo, Kwanza Norte, Kwanza Sul, Lunda Sul and Malanje), under DTMA in June 2013, found that 32.3 percent (range: 0.0-60.1 percent) applied chemical fertilizers in their maize crop and 14.2 percent (0-22 percent) used irrigation. One-third of the households surveyed (range: 6.0-56.7 percent) said they had access to extension service. About 36 percent of the respondents said they produced enough grain for consumption year-round.

## Major Growing Areas

Angola is divided into three major agro-ecological zones (AEZs) – the tropical humid zone in the northeast, the sub-humid central highlands and the semi-arid and arid areas in the west coast, south and southeast. The country has 18 provinces (Figure 2) represented in one or more of the three AEZs.



Figure 2: Distribution of maize (encircled numbers represent 1000 ha) in various provinces of Angola (2008-10 avg.); source: constructed from Ministry of Agriculture, Republic of Angola, data (map not to scale)

Maize is grown across all provinces, with the largest concentrations in Huíla (25 percent) and Huambo (20 percent), followed by Namibe (10 percent), Lunda Norte (10 percent) and Bié (10 percent) – according to MoA data for 2008-10. In other words, these five provinces account for more than 75% of Angola's total maize production.

Nationwide, about 1 percent of the total area and 93 percent of all maize production is during the main rainy season (November-April) but there are regional differences. Only Luanda has the largest proportion of land (41 percent) and production (83 percent) during the off-season. Other provinces with about one-fourth to one-third of their production during this period are Lunda Sul, Bengo and Moxico. These are areas with access to irrigation and are mainly operated by large-scale farmers.

According to the MoA data, the national area harvested grew at the rate of 14.4 percent per annum between 2006 and 2010 (about 1.72 million ha in 2010 compared with 1.21 million ha in 2006), in comparison with a 2.1 percent growth for yield. However, there were substantial variations among provinces. Eleven of the 18 provinces had appreciable increases, two showed little or no change and five showed declines ranging between 8 percent and 42 percent. Those with significant growth included Bengo, Kunene, Lunda Norte, Lunda Sul, Namibe and Zaire, among others, whereas examples of decline were Benguela, Bié, Kwanza Sul, Luanda and Moxico. Little change was observed in Kwanza Norte and Malanje.

## Dominant Varieties Grown

According to the monitoring adoption survey mentioned above, farmers in the six provinces mentioned a total of 27 maize varieties they grew in 2013. About 40.4 percent of the households responded that they grew Branco Redondo, followed by Amarelo (14.9 percent). Other common varieties were Catete, Kalagi, Kapomo, Likusuka, Nanhala, Ndende, Vermelho, ZM521 and SAM3; ZM623 was also mentioned but only by 0.2 percent of the households surveyed.

The varieties Branco Redondo, Dente de Cavalo and SAM3 were released by the Instituto de Investigação Agronómica (IIA) in the 1970s. ZM521 was introduced with CIMMYT collaboration in 2003 and ZM623 was released in 2007 under DTMA. The remaining 21 were landraces, and one (Sintetico) was of unknown source. There were no known maize hybrids released in Angola prior to the advent of DTMA.

IIA, in collaboration with the DTMA project, released a total of eight drought-tolerant varieties (Table 1) between 2007 and 2013. These included five open pollinated varieties (OPVs) and three hybrids. One more hybrid is due for release in 2014. The OPV ZM523 appears to be the most successful so far; the recent releases are being promoted. The yellow versions of the OPVs (ZM423Y, ZM523Y and ZM623Y) are mainly produced as poultry feed.

## The Maize Seed System

Angola has a young agricultural research and development system. The IIA researchers, with support from CIMMYT scientists through DTMA, are responsible for breeder and foundation seed production. Currently there are three private companies and two farmers' cooperatives engaged in certified seed production. The country produced 511 mt of drought-tolerant maize seed in 2012 and 413 mt in 2013, the latter amount being much lower than the projected volume of 850 mt.

Table 1: Drought-tolerant maize varieties released under DTMA in Angola (2007 to May 2013)

Release name	Release year	Hybrid/OPV	Maturity range	Suitable agro-ecologies	Grain Yield*	Additional traits/remarks
ZM623	2007	OPV	Late	Drier mid-altitudes	Medium -high	MSV resistant
ZM623Y	2007	OPV	Late	Drier mid-altitudes	Medium -high	MSV resistant
ZM423	2009	OPV	Early	Drier mid-altitudes	Medium	MSV resistant
ZM423Y	2009	OPV	Early	Drier mid-altitudes	Medium	MSV resistant
ZM523	2010	OPV	Medium	Drier mid-altitudes	Medium	MSV resistant
ZM523Y	2010	OPV	Medium	Drier mid-altitudes	Medium	MSV resistant
ZM725	2010	OPV	Late	Drier mid-altitudes	Medium –high	MSV resistant
CZH03030	2012	Hybrid	Medium	Drier mid-altitudes	Medium –high	MSV resistant
CZH0819	2012	Hybrid	Medium	Drier mid-altitudes	Medium –high	MSV resistant
CZH0837	2013	Hybrid	Medium	Drier mid-altitudes	Medium-high	MSV resistant
ZM309	2013	OPV	Very early	Drier mid-altitudes	Low-medium	Flinty; MSV resistant

\* Refer to Box 1

However, all this is changing now. Currently, a total of 580 ha are planted to drought-tolerant maize seed production in Angola (Table 2). It is estimated that nearly 2,660 mt of certified seed would be obtained from these efforts (including a stock of about 10 mt of CZH03030 seed that Kambondo produced during the 2013 off-season). This amount is more than twice the projections made by the DTMA strategy for 2014; it is even more than the projection for 2016. The expected amount of seed is enough to cover more than 106,000 ha, benefiting 266,000 households (or nearly 1.8 million people). Another seed company, SEDIAC, is working in partnership with IIA and DTMA to produce foundation and certified seed of CZH03030, CZH0837 and the hybrids in the pipeline.

This turn-around was possible because of the Government of Angola (GoA) incentive to farmers on improved seed and fertilizer use; the seed producers have already a guaranteed market for their seed. GoA introduced a new yellow hybrid maize

variety, Sahara, from South Africa in 2013 to meet the growing demand for poultry production but the initiative was unsuccessful because the previously untested new variety succumbed to heavy disease pressure – Maize Streak Virus, Gray Leaf Spot and Turcicum Leaf Spot – and lacked adaptation to the mid-altitude of Angola.

Box 1: Codes used to define maize variety yields (mt/ha)

Yield code	Maturity group			
	Very Early	Early	Medium	Late
Very high	>6	>7	>8	>9
High	5 to 6	6 to 7	7 to 8	8 to 9
Medium	4 to 5	5 to 6	6 to 7	7 to 8
Low	3 to 4	4 to 5	5 to 6	6 to 7
Very low	<3	<4	<5	<6

Table 2: Estimates of certified seed production of improved maize varieties in Angola for the 2014 crop season

Company/Coop	Variety	Area (ha)	Yield (MT)	Enough to cover (ha)	Estimated beneficiaries (numbers)	
					Households	People
Matogrosso	ZM523	320	1,440	57,600	144,000	956,160
Kambondo	ZM523	240	1,080	43,200	108,000	717,120
Kambondo	CZH03030	18	126	5,040	12,600	83,664
Kambondo	CZH03030	In stock	10	400	1,000	6,640
CFTPT (farmers' coop)	ZM725 & ZM309	2	3	120	300	1,992
Total	-	580	2,659	106,360	265,900	1,765,576

## Trade

At present, Angola is a net-importer of maize (Figure 3). Data from the Food and Agriculture Organization of the United Nations (FAO) show that the country imported an average of approximately 65,000 mt of grain at an estimated cost of US \$11.2 million per year between 2002 and 2011. This is ironic for a country that exported 114,000 mt of grain each year between 1965 and 1974. The IFPRI/IMPACT model suggests that Angola would remain a net-importer through 2011, but the 2012 drought caused a more than 64 percent decline in the area harvested and under production

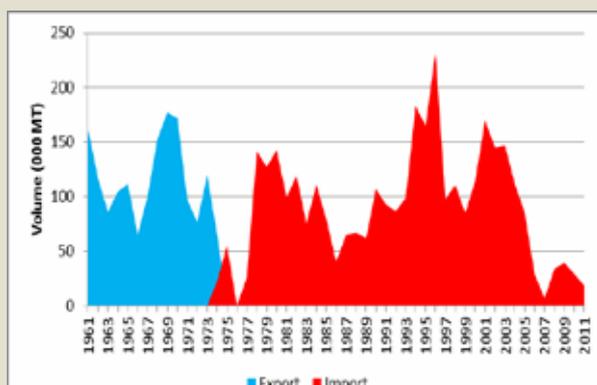


Figure 3: Maize export and import volumes between 1961 and 2011 in Angola (source: constructed by authors from FAOSTAT, accessed 13 May 2014)

compared to 2011, and the country's quest to produce enough maize grain to meet the national demand may have to wait for another couple years.

We conclude that Angola has every opportunity to enhance the productivity and production of maize under smallholder conditions. It has vast areas of arable land that have yet to be developed and huge water resources for irrigation. A good number of improved maize varieties are now available and more are in the pipeline; these need to be popularized and promoted vigorously. Government subsidies for seed of improved maize varieties are creating interest in seed companies. Efforts need to be made to intensify fertilizer use more widely across the country and increase the rate of application. Small-scale mechanization would help transform maize production in this country where possibilities for animal traction are extremely low. The skills and experiences of existing researchers need to be upgraded through both long- and short-term training and mentorship; more researchers also need to be recruited to speed up maize research and development. ■

Tsedeke Abate (CIMMYT-Kenya), Cosmos Magorokosho (CIMMYT-Zimbabwe), Peter Setimela (CIMMYT-Zimbabwe), Dibanzilua Nginamau (IIA-Huambo, Angola), Kennedy Lweya (CIMMYT-Zimbabwe), Rodney Lunduka (CIMMYT-Zimbabwe), with editorial assistance from Scott Mall (CIMMYT-Mexico)

## News and Events

### Major visits and meetings by DTMA staff

Places visited	Scientist(s) involved	Date	Major tasks
Ethiopia (Rift Valley)	T Abate, D Wegary	4-8 April	Visit foundation seed production at Ethio Veg Fru; SIMLESA annual meeting
Malawi (Lilongwe, Chitala)	T Abate, C Magorokosho, K Lweya, R Lunduka	9-10 April	Coordination visit
Mozambique (Chimoio)	Same as above	11-12 April	Same as above
Zimbabwe (Harare)	T Abate	14-15 April	Coordination visit; annual field day
Zambia (Lusaka area: ZARI, Steward Globe)	T Abate, C Magorokosho, J Cairns, Z Mainassara, K Lweya, R Lunduka	16 April	Coordination visit
Nigeria (Ibadan)	T Abate, C Magorokosho, D Makumbi, P Setimela	23-26 April	Annual Regional meeting
Ethiopia (Addis Ababa)	T Abate	15-17 May	IFPRI 2020 Resilience conference
South Africa (Durban)	T Abate, Y Beyene, J Cairns, J Gethi, Z Mainassara, M Regassa, K Semagn	2-3 June (Abate), 2-6 June (the rest)	IMAS annual meeting
Ethiopia (Addis Ababa)	T Abate	5-6 June	ATA (Agricultural Transformation Agency) strategy meeting

## Upcoming Events

The 2014 DTMA Annual Review and Planning meeting is scheduled for 6-10 October in Addis Ababa, Ethiopia. The meeting is being jointly organized by the Ethiopian Institute of Agricultural Research and CIMMYT/IITA. Participants outside the DTMA team and invited guests are welcome to attend, as long as they pay their own transportation and accommodation costs. Further details can be obtained from Mr. Kamau Kimani at [k.kimani@cgiar.org](mailto:k.kimani@cgiar.org).

Contacts: To contribute to or participate in DTMA:

Tsedeke Abate, email: [t.d.abate@cgiar.org](mailto:t.d.abate@cgiar.org); Tel: +254 20 722 4640; Mobile: +254 719 802 743.

For media relations: Florence Sipalla, email: [f.sipalla@cgiar.org](mailto:f.sipalla@cgiar.org); Tel: +254 722 4619.

International Maize and Wheat Improvement Center (CIMMYT); [www.cimmyt.org](http://www.cimmyt.org)

Mailing address, CIMMYT-Kenya: ICRAF House, UN Avenue, Gigiri, PO Box 1041-00621, Nairobi, Kenya.

Web page: <http://dtma.cimmyt.org>