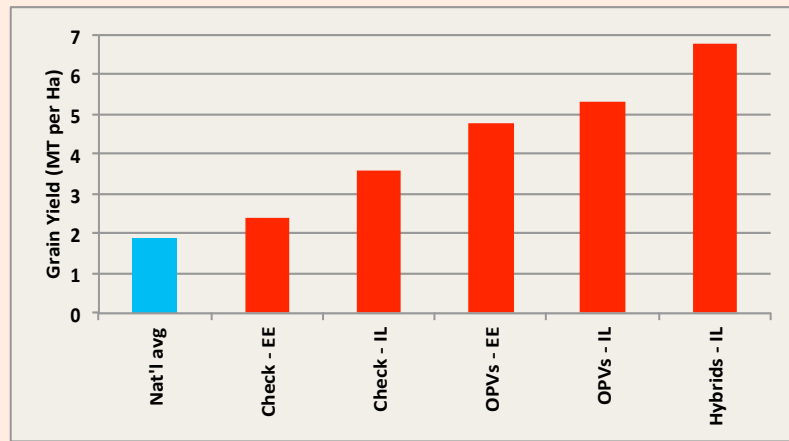


A Quarterly Bulletin of the Drought Tolerant Maize for Africa Project

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.



Grain yields of new varieties compared with checks and national average (EE and IL at the end of each data point represent extra-early/early and intermediate/late maturity, respectively)

New Drought Tolerant Maize Varieties for Ghana

Background

Maize is Ghana's largest and most widely cultivated crop accounting for 50-60% of total cereal production; it is the second largest commodity crop after cocoa, and followed by cassava, yam, oil palm, groundnut, plantain, sorghum, cocoyam, cowpea, and other pulses. The crop is a major source of food, feed and cash for many households. It accounts for more than 45% of the agricultural cash income among smallholder farmers in the country. National data indicate that maize area, production and consumption have been increasing in recent years. The current area planted to maize in Ghana stands at approximately 1 million ha, with the yield and production averages of about 1.74 metric tons (MT) per ha and 1.65 million MT (2009-11 avg.), respectively, as shown in Figure 1.

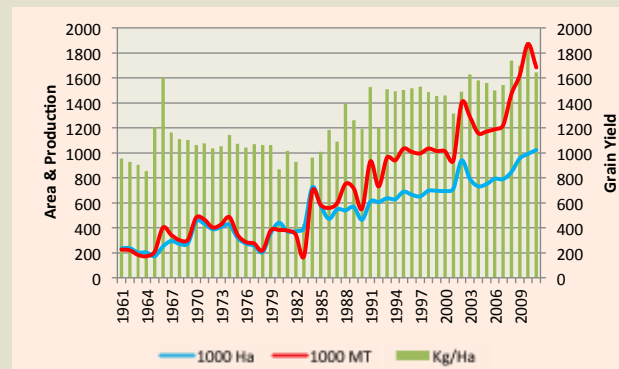


Figure 1: Maize trends in Ghana (source: FAOSTAT, Feb 2013)

The per capita consumption of maize in Ghana is estimated at 44 kg/person/year (2005 estimates); this is a 5.4 kg/person/year increase over the 1980 level. The national demand is forecast to grow at about 1.83% per annum. Ghana is net-importer of maize, even though it has great potential to be self-sufficient and net-exporter. The country imported an average of nearly 33,000 MT of maize at the cost of about US\$ 8.32 million per year between 2001 and 2010; the bulk of this was yellow maize.

There is a huge gap between the current yield and what is achievable on-farm, more than 6 MT per ha. Drought (low moisture stress), infestation by the parasitic weed known as witch weed (*Striga hermonthica*) and various foliar diseases are among the major causes of low yield of maize in Ghana.

Ghana is one of 13 countries in Sub-Saharan Africa that participate in the DTMA (Drought Tolerant Maize for Africa) project, funded by the Bill & Melinda Gates Foundation. The project is implemented jointly by the International Institute of Tropical Agriculture (IITA) and the International Center for Maize and Wheat Improvement (CIMMYT), in partnership with the Crop Research Institute (CRI), Savanna Agricultural Research Institute (SARI), seed companies, community-based seed producers, and other organizations in Ghana. Its aim is to develop maize varieties that are resistant/tolerant to key constraints limiting production, including drought, witch weed, and major foliar diseases such as maize streak virus (MSV), southern corn leaf rust and southern corn leaf blight. Progress made in variety development and release carried out between 2007 and 2012 by CRI and SARI of Ghana, in collaboration with IITA and CIMMYT, is reported here.

Varieties Released

A total of 21 maize varieties were registered in Ghana between 1983 and 1998 in close collaboration between CRI and SARI of CSIR (Council for Scientific and Industrial Research) with IITA and CIMMYT. Those varieties were screened against the key foliar diseases, including MSV, leaf rust, downy mildew, ear rot, *Striga* and the maize stalk borer (*Eldana saccharina*). Obatanpa has remained the dominant open-pollinated variety (OPV) since its release in 1992. It accounts for 95% of all maize seed planted in Ghana. This variety is susceptible to *Striga* even though it is tolerant to rust and MSV. Improved maize varieties were not released in Ghana between 1999 and 2006.

Working in close collaboration with IITA and CIMMYT, CSIR-CRI (Kumasi) and CSIR-SARI (Tamale) released a total of 12 new varieties between 2007 and 2012 that are tolerant to drought and other key stresses (Table 1). Five of these are hybrids and the rest are OPVs. All of the hybrids have intermediate and late maturity. Five of the OPVs are in the extra-early and early maturity category whereas two are in the intermediate and late maturity group (Table 1).

Average yields for the hybrids (all of them intermediate/late maturing) ranged from 5.5 to 7.9 MT per ha (overall average: 6.8 MT per ha); in a similar fashion, the average yield for the intermediate/late maturing OPVs was 5.4 MT per ha; and the extra-early/early maturing OPVs yielded between 4.6 and 5.0 MT per ha (average: 4.8 MT per ha), as presented in Table 1. In general, the hybrids outperformed the intermediate/late maturing varieties and extra-early/early varieties by about 1.4 MT per ha and 2.0 MT per ha, respectively. There was a difference of about 0.5 MT per ha between the intermediate/late and extra-early/early OPVs, in favor of the former.

Comparing with the national average, there was a more than 3.6-fold, 2.9-fold, and 2.5-fold yield increase of the hybrids, intermediate/late OPVs, and extra-early/early OPVs (Table 1). It should be noted that ten of all the new varieties are white (including all hybrids). The new varieties are expected to serve the various agro-ecological zones of Ghana (Figure 2).

In addition to their yield advantages and tolerance/resistance to different stresses, some of the new varieties have additional attributes that make them more attractive than the existing varieties. For example, five of the new varieties, viz. Etubi, Enii-Pibi, Abontem, Omankwa, and Aburohemaa are QPM (quality protein maize).

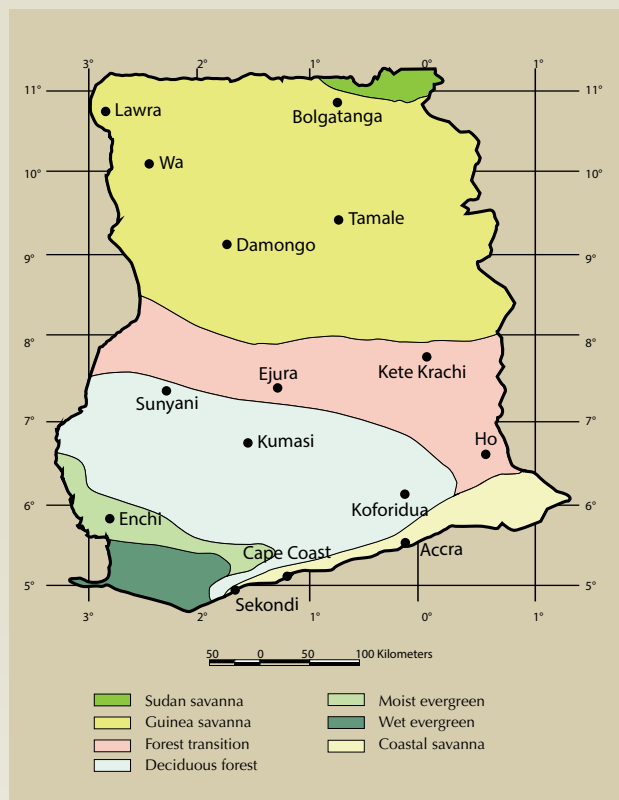


Figure 2: Agro-ecological zones of Ghana

Table 1: Drought tolerant maize varieties released in Ghana, their on-farm yields and other characteristics

Release name	Year of release	Grain yield (MT/Ha)	Days to maturity	Suitable AEZs ^φ	Special trait(s)/remarks
<i>Hybrids (intermediate/ late)</i>					
Etubi ^ψ	2007	6.5	110	All AEZs	Drought tolerant and QPM
Enii-Pibi (Enibi) ^ψ	2010	5.5	110	F, FT	Drought tolerant and QPM
Tintim ^ψ	2012	7.9	115	GSV, SSV	Very good for domestic purposes
Opeaburoo ^ψ	2012	7.5	115	GSV, SSV	Very good for domestic purposes
Aseda ^ψ	2012	6.7	115	GSV, SSV	Very good for domestic purposes
Average		6.8			
<i>OPVs (intermediate/late)</i>					
Ewul-Boyu ^ψ	2012	5.4	110	GSV, SSV	Drought tolerant
Sanzal-Sima ^ψ	2012	5.4	110	GSV, SSV	Drought tolerant
Average		5.4			
<i>OPVs (extra-early/early)</i>					
Abontem ^λ	2010	4.7	80	GSV,SSV	Drought tolerant, <i>Striga</i> resistant and QPM; extra-early maturity
Omankwa ^ψ	2010	5.0	90	GSV	Drought tolerant, <i>Striga</i> resistant and QPM
Aburohema ^ψ	2010	5.0	90	F, SSV	Drought tolerant, <i>Striga</i> resistant and QPM
Bihilifa ^λ	2012	4.6	90	GSV, SSV	<i>Striga</i> tolerant; early maturity
Wang Dataa ^ψ	2012	4.7	90	GSV, SSV	<i>Striga</i> tolerant; early maturity
Average		4.8			
Standard/local checks and national average					
Intermediate/late	-	3.6	-	-	-
Early/extra-early	-	2.4	-	-	-
National average	-	1.9	-	-	-

^φGSV, SSV, F and FT refer to Guinea Savanna, Sudan Savanna, Forest, and Forest Transition zones, respectively; ^ψ and ^λ indicate white and yellow maize varieties, respectively.

The next challenge for maize researchers and their partners in Ghana is how to produce enough foundation seed to scale up use of the new varieties. Etubi and Enii-Pibi have been in full production since 2011 and the rest of the varieties released in 2010 were under increasing production by 2012. The new varieties are now being used in the preparation of staple dishes such as *tuo zaafi* – a thick porridge made from maize and eaten with various sauces, in place of local maize varieties as well as other traditional staple crops such as millet and sorghum.

Another lesson to be learned here is that even local materials do substantially better, given better crop management, that is, good seedbed preparation, timely planting, optimum fertilizer application, and proper weed management. ■

Kwadwo Obeng-Antwi (CRI-Kumasi, Ghana)
Manfred Ewool (CRI-Kumasi, Ghana)
Alidu Haruna (SARI-Tamale)
Tsedeke Abate (CIMMYT-Nairobi, Kenya)
Abebe Menkir (IITA-Ibadan, Nigeria)
Baffour Badu-Apraku (IITA-Ibadan, Nigeria)
Tahirou Abdoulaye (IITA-Ibadan, Nigeria)

News and Events

DTMA Recognizes Best Performing Teams in Eastern Africa



Participants drawn from seed companies, national agricultural research institutes, and CIMMYT at the regional Maize Working Group (MWG) meeting Arusha, Tanzania

On 25-26 February 2013, 22 participants drawn from seed companies, national agricultural research institutes, and CIMMYT met in Arusha, Tanzania, for the regional Maize Working Group (MWG) meeting, a forum that brings together participants from country MWGs in Ethiopia, Kenya, Tanzania, and Uganda. The DTMA project used this opportunity to recognize national partners that perform well in breeding, maize technology development, and dissemination, as the project has done in previous years. The National Agricultural Research Organization (NARO) was awarded the best maize breeding team of 2012 prize, but its members were not the only ones receiving a plaque and certificates of recognition. "As this culture has served as a motivating tool for the partners involved in the project, it was decided to begin awarding not just the best team but also runners up," explained the project's administrator Kamau Kimani. "It is an honor to see recognition of the significant effort we have made in breeding and disseminating maize together with the private sector," said Godfrey Asea, a NARO maize breeder. "It is also a challenge to keep the momentum to achieve targets in DTMA and translate this to food security for farmers," added Asea.

Speaking during the meeting, DTMA project leader Tsedeke Abate emphasized the fact that drought tolerant varieties perform well even under optimal

conditions and are therefore not only meant for marginal drought-prone areas. "Varieties have to be supported by good management practices, land preparation, timely planting, input use, and cultivation," said Abate as he explained other factors that contribute to the performance of improved varieties. The work, challenges, and successes of MWG partners in the four above-listed countries were discussed during the meeting. The participants received feedback on sub-grant proposals they had made for support in maize research activities in the region. The national programs and seed companies have benefited through "access to improved maize varieties, more collaboration on multi-locational variety testing, and exposure through interaction with other scientists," said Sammy Ajanga, the chair of the Kenya MWG. "Our varieties have a better chance of being released to the farmers," said Ajanga as he cited the advantages of the multi-locational field trials facilitated through collaborative research across the region.

Participants also observed a minute of silence in memory of the late CIMMYT maize breeder Stafford Twumasi-Afriyie, a former key member of the MWG and the leader of Nutritious Maize for Ethiopia (NuME). "Twumasi was a very passionate maize breeder," said principal scientist Stephen Mugo, highlighting the work he did in quality protein maize breeding.

Best Maize Breeding Team 2012

National Agricultural Research Organization (NARO), Uganda

Runner up Maize Breeding Team 2012

Ethiopian Institute for Agricultural Research (EIAR), Melkasa

Best Maize Technology Development and Dissemination Team 2012

The National Crops Resources Research Institute (NaCRRI), Uganda; FICA Seeds, Uganda; Nalweyo Seed Company (NASECO), Uganda; and Pearl Seeds, Uganda

Runner up Maize Technology Development & Dissemination Team 2012

Selian Agricultural Research Institute (SARI), Tanzania; Suba Agro-Trading & Engineering Company (SATEC), Tanzania; Meru Agro, Tanzania; Agricultural Seed Agency, Tanzania; Aminata Quality Seeds and Consultancy Limited, Tanzania; and Tanseed International, Tanzania

During the meeting, Peter Matowo, a maize breeder from Tanzania, was elected chair of the Eastern Africa Regional MWG. ■

*Florence Sipalla
(CIMMYT-Nairobi, Kenya)*

Major Visits and Meetings by DTMA Scientists

Places visited	Scientists/staff involved	Date	Major tasks
Nepal (Kathmandu)	All (CIMMYT scientists only)	28-31 Jan	Participated in the annual GMP meeting
Tanzania (Arusha)	T Abate, K Kimani, D Makumbi, M Regasa, F Sipalla	25-26 Feb	Participated/conducted Regional Maize Working Group meeting
Angola (Huambo, Quibala, Wako Hongu)	T Abate, C Magorokosho	01-06 Mar	Monitored/evaluated on-going research activities; discussed with government officials and private seed companies
Ethiopia (Addis Ababa)	T Abate	07-15 Mar	Followed up on the CIMMYT DG's assignment on a new initiative for Ethiopia
Mozambique (Chimoio)	T Abate, O Erenstein, V Kandiwa, D Makumbi, BM Prasanna, P Setimela, D Wegary	18-22 Mar	Participated in SIMLESA Annual General Meeting