End of project report

1 January 2016 - 30 June 2017

EMERGENCY SEED SUPPORT
for drought affected maize and wheat growing areas of Ethiopia

Photo: CIMMYT/EQuilligan.
This report describes activities and outcomes of a unique and successful project funded by the U.S. Agency for International Development (USAID) and Office of Foreign Disaster Assistance (OFDA) of the U.S. Ethiopia mission to address Ethiopian farmers’ critical shortage of maize and wheat seed for sowing in 2016, after the country’s worst drought in 50 years. Coordinated and implemented by the International Maize and Wheat Improvement Center (CIMMYT) in partnership with Ethiopia’s Agricultural Transformation Agency (ATA), public and private seed producers, and regional and local entities, during 2016-17 the project sourced and delivered 3,439 tons of high quality seed that was sown on more than 100,300 hectares. With funding from the Bill & Melinda Gates Foundation, ATA supported the transport of seed to drought-affected districts and jointly organized training and workshops. These efforts directly benefited the food security and livelihoods of more than 271,000 rural households and 1.6 million individuals in Ethiopia’s Amhara, Oromia, Tigray, and SNNP regions and strengthened seed systems to address future climate, disease, and pest crises.
Maize and wheat agriculture, Ethiopia: Overview

Agriculture provides 42 percent of Ethiopia’s GDP, 77 percent of employment, and 84 percent of exports. Most of the agricultural sector consists of smallholder farmers who make their living from less than two hectares of land and pursue subsistence modes of production, predominantly growing cereals that are the major staple foods (Table 1). Wheat and maize are the most important crops for food security; they are also at the center of Ethiopia’s increasingly vibrant agricultural output markets (Minten et al. 2014) and have been the focus in recent years of significant public investment to raise national production.

Table 1. Key crops grown by smallholder farmers, Ethiopia, 2016-17.*

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area (million ha)</th>
<th>Annual production (million tons)</th>
<th>Average yield (tons/ha)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain crops</td>
<td>12.6</td>
<td>29.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Cereals</td>
<td>10.2</td>
<td>25.4</td>
<td>N/A</td>
</tr>
<tr>
<td>Teff</td>
<td>3.0</td>
<td>5.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Maize</td>
<td>2.1</td>
<td>7.8</td>
<td>3.7</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.7</td>
<td>4.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Barley</td>
<td>0.96</td>
<td>2.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Sorghum</td>
<td>1.9</td>
<td>4.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Finger millet</td>
<td>0.46</td>
<td>1.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Pulses</td>
<td>1.6</td>
<td>2.8</td>
<td>N/A</td>
</tr>
<tr>
<td>Oil crops</td>
<td>0.8</td>
<td>0.8</td>
<td>N/A</td>
</tr>
</tbody>
</table>


One of the most widely cultivated crops in Ethiopia, maize is grown chiefly in high rainfall, mid-altitude areas but a small proportion also comes from dry and highland areas (Figure 1). With a total annual production of 7.8 million metric tons and average yield per ha of 3.7 tons, maize in Ethiopia stands first in terms of production and productivity.

Figure 1. Maize growing agro-ecologies, Ethiopia.

Figure 2. Wheat farming areas, Ethiopia.
Similarly, farmers grow wheat from lowland to high rainfall areas and in large quantities (Figure 2). Ethiopia is the major producer of wheat in sub-Saharan Africa today. Moreover, wheat is the most profitable crop, placed third by the amount of consumption. Despite this, Ethiopia typically imports more than 1 million tons of wheat each year to meet demand, so the focus is on enhancing domestic production to reduce imports, as well as improving food security and rural livelihoods.

Maize and wheat in Ethiopia depend heavily on rainfall which, together with Ethiopia’s location and landscape, make the crops highly prone to adverse climate variability. Various studies predict an approximately 30 percent reduction on average in farm incomes due to predicted climate change impacts. This will come from climate change effects that include greater extremes in average temperatures and rainfall (floods, droughts), with more erratic rainfall, increased soil erosion, the emergence of new pest and disease strains and further dispersion of familiar ones, increases in atmospheric carbon dioxide, and changes in growing season (Yohanis, 2016).

For wheat in Ethiopia, research shows that moisture stress is already depressing yields and will eventually lead to a reduction in area sown, even where rainfall may increase. For maize, climate change studies forecast a 25 percent gain in average yields in the Eastern Highlands near the Great Rift Valley and in the North-Central Highlands by 2030. In contrast, a considerable portion of maize cropland in southwestern and eastern zones of Central Ethiopia will become unsuitable for the crop and, overall, climate change will limit maize production and input responsiveness in seasons of poor weather.

“We went three years without rain,” says farmer Usman Kadir, of Wanjo Bebele village, Halaba Special Woreda, whose 1.5 hectare homestead supports a household of 11 persons. “The droughts brought hunger, and we lost cattle from lack of forage. We ate thanks to emergency food programs.” His crop from 2016 relief seed was washed out by floods that affected 38 local villages, but in 2017 he planted 0.5 hectares of maize and harvested 3 tons, getting his farm back on its feet. “If new improved varieties come, we want to work with you and expand our farming operation.”
End of project report

El Niño drought and its effects

Associated with several seasons of erratic or failed rains in Ethiopia, the 2015-16 droughts caused by the El Niño climate phenomenon were among the most severe in the country’s history. Crop yield losses ranged from 50 to 90 percent in the eastern part of the country, water sources dried up, many livestock in pastoralist areas died, malnutrition reached alarming levels, and rural inhabitants descended upon urban areas in search of water. By January 2016, an estimated 10.2 million people in Ethiopia required immediate food assistance (Figure 3). To make matters worse, excessive rains in mid-2016 led to flooding, particularly in Rift Valley areas, washing away developing crops.

Emergency seed support for drought-affected farmers

To fast-track the sourcing and delivery of maize, wheat, and sorghum seed to needy Ethiopian farmers, in 2016 CIMMYT and Ethiopia’s Agricultural Transformation Agency (ATA) jointly implemented the project “Maize and Wheat Emergency Seed Support for Drought Affected Areas of Ethiopia.” Eventually reaching farmers in 74 districts, the CIMMYT component was financed by USAID/OFDA and leveraged partnerships, seed sources, and diverse support from two other CIMMYT-led, USAID-funded initiatives for maize and wheat in Ethiopia. With funding from the Bill & Melinda Gates Foundation (BMGF), ATA supported the transport of seed to drought-affected districts and jointly organized training and workshops.
**Partners and contributors.** Seed was sourced through diverse CIMMYT partnerships, including producers in the USAID-funded “Drought Tolerant Maize for Seed Scaling Project (DTMASS)” and “Wheat Seed Scaling Initiative.” Stakeholders included ATA, the Ministry of Agriculture and Natural Resources (MoANR), the Bureau of Agriculture and Natural Resources (BoANR), public and private seed companies/enterprises, farmer cooperative unions, federal and regional research institutes, FAO, and non-government organizations working in target areas. The CIMMYT-Ethiopia office coordinated activities and ensured follow through.

**Key activities.** CIMMYT purchased 2,769 tons of maize, sorghum and wheat seed in 2016 and coordinated its distribution to 214,840 households, 21 percent of which were female headed, in the Amhara, Oromia, Tigray, and SNNP regions. As part of a no-cost extension in 2017, CIMMYT sourced and distributed 670 additional tons of maize and wheat seed to 56,371 households (20 percent headed by women) whose 2016 crops had been affected by drought, disease, or flooding in 22 districts of Oromia and SNNP.

The CIMMYT-Ethiopia office organized awareness creation, training, and consultation meetings, as well as procuring certified or quality-declared seed of selected varieties from reliable sources. With BMGF funding, ATA worked closely with CIMMYT and BoANR in Amhara, Oromia, SNNPR, and Tigray to identify good plots for seed production and to inspect and distribute seeds to target areas. Farmer cooperative unions, primary cooperatives, federal and regional seed enterprises, and private companies collected, processed, and supplied the seed. Research centers provided crucial information and support in training and training materials.

**Type of varieties distributed.** CIMMYT in consultation with its stakeholders identified appropriate maize and wheat varieties suitable for drought-affected areas. The wheat varieties chosen were disease resistant and early maturing. Most of the maize varieties were drought tolerant, of early-to-intermediate maturity, and included both open pollinated and hybrid varieties, depending on farmer preferences and local suitability. Some 10 percent of the varieties were of quality protein maize, which carries enhanced levels of key amino acids for protein synthesis in humans and mono-gastric farm animals and which in conventional maize grain are deficient. Emergency seed deliveries were coordinated in consultation with ATA, MoANR, and seed growers to ensure they did not compete with commercial markets or government distribution channels.

**Table 2. Performance of Emergency Seed Relief project.**

<table>
<thead>
<tr>
<th></th>
<th>Initial target</th>
<th>Performance, 2016</th>
<th>Performance, 2017</th>
<th>Overall performance</th>
<th>Percent of initial target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area covered (ha)</td>
<td>75,350</td>
<td>74,704</td>
<td>25,622</td>
<td>100,326</td>
<td>133</td>
</tr>
<tr>
<td>Quantity of seed (t)</td>
<td>2,735</td>
<td>2,769</td>
<td>670</td>
<td>3,439</td>
<td>126</td>
</tr>
<tr>
<td>Households benefited</td>
<td>226,050</td>
<td>214,840</td>
<td>56,371</td>
<td>271,211</td>
<td>120</td>
</tr>
<tr>
<td>Number of people</td>
<td>1,356,300</td>
<td>1,289,040</td>
<td>338,226</td>
<td>1,627,266</td>
<td>120</td>
</tr>
</tbody>
</table>
Monitoring and evaluation. Monitoring and evaluation were implemented jointly with ATA and BoANR through direct field observations, review workshops, surveys and telephone calls with focal persons, visits to seed production plots, and communications from beneficiaries.

Summary of outcomes. The project was very successful, delivering in a timely manner 3,439 tons of high quality seed that was sown on more than 100,300 hectares, directly benefiting the food security and finances of more than 271,000 rural households and 1.6 million individuals, as well as the nutritional status of maize farm families who received seed of quality protein maize, in the Amhara, Oromia, Tigray, and SNNP regions (Figure 4).

The work also enhanced the capacity of district and zonal development agents and experts through training in crop protection, agronomy, drought mitigation practices, and seed systems. Finally, through the project, five women seed producer associations and a large union of farmer seed producer cooperatives received wheat seed threshers and a maize sheller, which will greatly expedite their operations and contribute to the expanded and more reliable access of farmers to affordable, quality seed in the future.

Figure 4. Districts whose farmers received emergency seed and other support.

Conclusions and lessons

At a closing workshop of 30 participants, including project coordinators, funders, partners, and stakeholders, nearly all expressed their appreciation to the project’s funders and implementers, citing the outstanding coordination between CIMMYT and ATA and the close follow up and monitoring from seed distribution through harvesting and threshing. The participants considered this project as a model for good practices from well-coordinated planning to fruitful results.

Overall, the project has helped strengthen seed systems and linkages, increasing their resilience and ability to respond quickly and effectively to support farmers who face more extreme and unpredictable climates and rapidly evolving diseases and pests.

The project’s success also underlined the value of CIMMYT, whose longstanding presence and broad partnerships in Ethiopia, along with funders’ trust, uniquely positioned the Center to coordinate the project.
Ethiopia and CIMMYT

The association of Ethiopia and CIMMYT dates back to the late 1960s, when Ethiopian scientists began participating in long-term training courses and visiting scientist programs at CIMMYT-Mexico. To date, more than 200 Ethiopian researchers have benefited, and many of these alumni hold leadership roles in Ethiopian institutions. In the 1970s, CIMMYT began sending regular shipments of breeding lines of elite maize and wheat for testing and possible release or inclusion in national crossing programs. In 1987, CIMMYT first posted staff to Ethiopia and signed an agreement for cooperative research on wheat. In the late 1980s, the Center launched collaborative research to develop and improve drought tolerant and highland maize in eastern Africa, posting a senior breeder to Ethiopia and establishing highland maize screening activities at Ambo. In 2012, the international conference, “Wheat for Food Security in Africa,” organized in Addis Ababa by EIAR, CIMMYT, ICARDA, IFPRI, the African Union (AU) and the CGIAR Research Program on Wheat, led to official endorsement of wheat as a strategic crop for Africa by the African Union in 2013. The CIMMYT office in Ethiopia currently houses more than a dozen internationally recruited CIMMYT scientists who pursue joint research with national partners on drought tolerant and quality protein maize, the sustainable intensification of maize–legume cropping systems, developing and deploying high-yielding and disease resistant wheat varieties and cropping systems, wheat biofortification research, and crop disease monitoring and early-warning systems.

Since 1970, Ethiopian farmers have had access to more than 100 high-yielding bread wheat and durum wheat (for pasta and semolina) varieties, developed and spread through collaboration among the Ethiopian Institute of Agricultural Research (EIAR), Ethiopia’s regional agricultural research institutes (RARIs), and CIMMYT, whose work has contributed to 80 percent of Ethiopia’s wheat varieties. Use of these high-yielding, disease resistant varieties, along with supportive government policies and better cropping practices, have caused Ethiopia’s average annual wheat production to more than double since the early 2000s. For maize, based on CIMMYT breeding lines, EIAR has released 17 maize varieties and hybrids that comprise a significant portion of the recommended varieties for the country’s major maize production zones.

Stories about the Emergency Seed Relief Project

Emergency seed project brings relief to drought-affected farmers in Ethiopia

Seeding the future: Emergency support for drought-affected farmers in Ethiopia

Rushing to relieve Ethiopia’s shortage of maize and wheat seed

For more information

Bekele Abeyo
Wheat breeder/pathologist for sub-Saharan Africa/country liaison officer.
c/o ILRI/CIMMYT, P.O. Box 5689,
Addis Ababa, Ethiopia
Phone: +251 11 6462324/26/27
Email: b.abeyo@cgiar.org