Policy Brief

November 2010

Reducing maize insecurity in Kenya: the WEMA project

About WEMA

The Water Efficient Maize for Africa (WEMA) project is a public-private partnership coordinated by AATF to develop drought-tolerant African maize using conventional breeding, marker-assisted breeding, and biotechnology and make it available royalty-free to small holder farmers in Sub-Saharan Africa.

About KARI

Kenya Agricultural Research Institute is the national institute responsible for agricultural research, knowledge and technology generation, dissemination and impact assessment for improved productivity, commercialization and competiveness (www.kari.org).

About AATF

The African Agricultural Technology Foundation (AATF) is a not-for-profit organisation that facilitates and promotes public-private partnerships for the access and delivery of appropriate proprietary agricultural technologies for use by resource-poor smallholder farmers in Sub-Saharan Africa (www.aatf-africa.org).

Introduction

Kenya is one of the five countries participating in the Water Efficient Maize for Africa (WEMA) project. Other countries are Tanzania, Uganda, Mozambique and South Africa. WEMA is a public-private partnership project formed in 2008 and coordinated by the African Agricultural Technology Foundation (AATF). The partnership is funded by the Bill and Melinda Gates and Howard G. Buffett Foundations. It aims at developing and deploying royalty-free drought-tolerant maize varieties using a combination of conventional breeding, marker-assisted breeding and biotechnology techniques and applications. This policy brief highlights the food insecurity challenges that Kenya has been experiencing in recent years and presents the potential benefits of WEMA in mitigating maize production constraints occasioned by drought.

Background

Agriculture is the mainstay of Kenya's economy. It accounts for approximately 27 percent of Kenya's Gross Domestic Product (GDP) and is the main source of livelihoods for about 80 percent of the population in rural areas (MoA, 2009). Over the years, the Kenya Government has strived to achieve national, household and individual food security. This is evidenced by several development strategies and policies that have been prepared and launched to steer the development of the agricultural sector in the country. They include the 'Strategy for Revitalizing Agriculture (SRA) (2004-2014)'. Kenya's current development goals and ambitions are articulated in the Vision 2030. The blueprint has identified agriculture as one of the six economic sectors expected to drive the economy to a projected 10 percent economic growth annually over the next two decades through promotion of an innovative, commercially oriented and modern agriculture (GoK, 2007). Ensuring food security and nutrition has been a key element in Kenya's agricultural policies and strategies.

Since independence, the government has concentrated on policies aimed at enhancing maize production to boost the country's food security. For many years food security was equated to self-sufficiency in maize production.

Maize and food security in Kenya

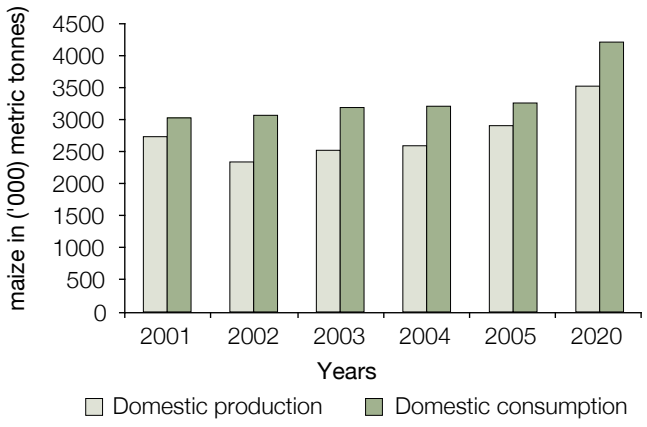
Maize is the most important and widely consumed cereal in Kenya. It is the staple food crop for 96 percent of Kenya's population with 125 kg per capita consumption and provides 40 percent of the calorie requirements (Byerlee and Eicher, 1997). About 70–80 percent of maize is produced by smallholder farmers. Self-sufficiency in maize production was achieved during the 1970s when production was high and the

surplus was exported. Current trends show that the country is struggling to achieve self sufficiency in major staples including maize. Growth in maize production has been marginal averaging about 2 percent. This is lower than the population growth rate which stands at about 3 percent. If the country is to be self-sufficient, domestic production has to grow at a rate of 4 percent.

Low self-sufficiency is attributed to a wide array of causes including lack of productivity enhancing technologies, high incidence of pests and diseases, erratic climatic conditions and difficulties in accessing credit (Nyoro et al., 2007). As a result, on-farm yields are low averaging 1.5–2.6 tonnes per hectare compared to on-station yields of about 5–8 tonnes per hectare. In the last one decade, the country has experienced years of heightened food insecurity and dependence on imports and emergency humanitarian assistance. In 2009, Kenya imported 16.8 million bags of maize (GoK, 2010).

Maize demand in the country has been on the increase outstripping supply. For instance, in 2008 maize production stood at 2.4 million metric tonnes (26 million bags) against a national requirement of 3.1 million tonnes (34 million bags). With the country's population projected to be 43.1 million by the year 2020, the demand for maize is likely to be 5 million metric tonnes. Based on the prevailing growth rate, it is projected that Kenya will have a maize deficit of 1.2 million metric tonnes by 2020 (Nyoro et al., 2007). Increased reliance on imports implies that the foreign exchange reserves and resources earmarked for development is diverted to procurement of food. The graph below compares production and consumption trends over the years.

Maize production and demand trends in Kenya



Source: Republic of Kenya, Economic Survey, 2006

Drought and unpredictable weather conditions have led to a succession of failed seasons in key production areas. Successive crop failure has been compounded by rising food prices and a state of chronic food insecurity in the country. The precarious situation has adversely affected both rural and urban households. Increase in the price of maize from time to time has often impacted adversely on the poor who divert meagre household incomes to maize. In 2009, maize prices were 100 to 130 percent higher than normal levels (USAID, 2009).

Impacts of drought on food security in Kenya

Persistent incidences of drought in Kenya have continued to threaten the food security situation and subjected millions of Kenyans to starvation. In January 2009, the President of Kenya declared a state of food emergency and appealed for humanitarian assistance from the international community to save approximately 10 million Kenyans from the risk of starvation. The effect of drought on the production of maize is of considerable concern in Kenya where over 80 percent of land area is arid or semi-arid. Most of these areas receive low and uncertain rainfall distribution patterns averaging 500-800mm per annum.

A chronology of drought in the last one decade indicates that Kenya is now a drought-prone country. The high frequency of drought implies that the vulnerable populations have a very short recovery phase. According to the Intergovernmental Panel on Climate Change, Kenya will suffer more intense and frequent droughts in the 21st Century.

Chronology of droughts 1997–2009

January 1997: the Kenyan Government declared a state of national disaster after a severe drought threatened the livelihoods of 2 million people.

December 2000: 4 million people were in need of food aid after Kenya was hit by its worst drought in 37 years.

March-June 2004: the long rains failed and the subsequent crop failure left more than 2.3 million people in need of assistance.

December 2005: President Kibaki declared a 'national catastrophe' in reference to the famine that affected 2.5 million people in northern Kenya.

January 2009: President Kibaki declared drought and famine in the country a national disaster and announced that 10 million people are food insecure and in need of emergency support.

Source: Kandji, 2006.

The country's dependence on rainfall is one of the root causes of the country's vulnerability to drought. Agriculture, which is the mainstay of the economy, is almost entirely rain-fed. Unless the drought

phenomenon is adequately addressed, it may hinder Kenya's efforts to achieve the Millennium Development Goals (MDGs). The most important one related to agriculture is the first MDG on eradication of poverty and hunger.

Modern biotechnology provides a major opportunity to address perpetual maize shortages that are now being compounded by new threats triggered by climate change. Harnessing biotechnology to develop maize seed varieties with traits of drought tolerance is therefore a key mitigation and adaptation strategy.

The WEMA promise

The Water Efficient Maize for Africa (WEMA) partnership was formed in response to a growing call by African farmers, leaders, and scientists to address the effects of drought in a way that is cost effective to African smallholder farmers.

AATF works with the internationally funded non-profit International Maize and Wheat Improvement Center (CIMMYT), the private agricultural company Monsanto, and the National Agricultural Research Systems (NARS) in eastern and southern Africa in this effort. Each partner brings its unique expertise to the project. AATF contributes its leadership, experience in public-private partnership management, technology stewardship and project management expertise. CIMMYT provides high-yielding maize varieties that are adapted to African conditions and expertise in conventional breeding and testing for drought tolerance. Monsanto provides proprietary germplasm, advanced breeding tools and expertise, and drought-tolerance transgenes developed in collaboration with BASF. The national agricultural research systems, farmers' groups, and seed companies participating in the project contribute their expertise in field testing, seed multiplication and distribution.

The varieties developed through the project will be distributed to African seed companies through AATF royalty free and made available to smallholder farmers as part of their seed business. The partnership involves local, public and private institutions, which in the process of implementing the project are expanding their capacity and experience in crop breeding, biotechnology, and biosafety. The benefits and safety of the maize varieties that will be developed will be assessed by national biosafety authorities according to regulatory requirements in the partner countries.

The first conventional hybrids developed through marker-assisted breeding could be available after six or seven years of research and development. For the drought-tolerant varieties developed through transgenic means, it is projected that farmers could have access to the seeds between 2015 and 2017. This will take slightly longer because of the technology development process and the biosafety regulatory requirements that have to be addressed prior to commercial release.

The constraints impacting on maize production are numerous and diverse. The WEMA project will partly contribute towards addressing the constraints by providing water efficient maize seeds, addressing the serious drought challenge. Stable and reliable yields will revitalize and build the confidence of farmers in maize production. Stability in yields will give farmers the confidence to invest in other productivity enhancing technologies such as sustainable soil management practices. About 70 per cent of Kenya's maize is believed to be produced mainly by farmers in the North Rift Valley region, traditionally Kenya's 'grain basket'. WEMA is a technological opportunity to expand maize production in the areas susceptible to drought such as the arid and semi-arid lands (ASALs). About 10 million Kenyans live in the ASALs which cover 80 percent of Kenya's land area. Farmers in these highly vulnerable to drought areas possess low levels of resilience and adaptation.

There have been several interventions in the areas of weather forecasting, drought monitoring and early warning systems. The WEMA project will therefore play an important role in building the resilience of farmers to cope with drought. Increased production of maize in drought-prone areas will translate to increased yields and improved food security both at the household and national levels. It is projected that maize varieties to be developed could increase yields by 25 percent compared to current varieties. This increase would translate into about two million additional tonnes of food during drought years.

Conclusion

The volatile climatic conditions, and in particular drought, pose a major threat to the agricultural sector, maize security and livelihoods of smallholder farmers in Kenya. Drought has become a frequent phenomenon making it difficult for the affected vulnerable smallholder maize farmers to cope and recover. At the national level, the country has failed to achieve self sufficiency in maize production. This has placed Kenya in the category of countries that depend on imported maize and humanitarian emergency relief operations. In this respect, WEMA was launched as a demand driven technological innovation designed to strengthen the resilience and adaptive capacity of maize farmers to cope with drought.

The partners will develop new African drought-tolerant maize varieties, incorporating the best technology available internationally. The long-term goal is to make drought tolerant maize available royalty-free to smallholder farmers in Sub-Saharan Africa most of whom are women – so they can enhance their food security and increase household incomes.

Risk of crop failure from drought is one of the primary reasons why smallholder farmers in Africa do not adopt improved farming practices. A more reliable harvest would give farmers the confidence to adopt new technologies. With the expansion of maize production in the areas susceptible to drought, it is expected that farmers will get higher, stable, and reliable yields. Commercialisation of maize varieties being developed under WEMA is projected to increase yields in the drought prone areas within the range of 25 percent compared to the current varieties.

Strong and consistent policy support is critical to the success of WEMA project in Kenya. Policy makers within the relevant government institutions and agencies should create an enabling environment and make science-based decisions that will facilitate the conduct of confined field trials and other biosafety regulatory steps that will eventually lead to commercialisation of WEMA seed varieties. The WEMA project is only part of what is needed to help smallholder farmers boost their yields and incomes. Farmers also require good soil health, training and extension services, effective pest and disease management practices, sound infrastructure and access to markets to sell their surplus.

References

Byerlee Derek and Carl K Eicher (eds.). 1997. *Africa's Emerging Maize Revolution*. Boulder, CO: Lynne Rienner Publishers.

Government of Kenya. 2010. *Kenya Economic Survey Highlights. Ministry of State for Planning National Development and Vision 2030*. Nairobi: Kenya Government Printers.

Government of Kenya. 2007. *Kenya Vision 2030. Ministry of State for Planning National Development and Vision 2030.* Nairobi: Kenya Government Printers.

Kandji ST. 2006. *Drought in Kenya: Climatic, Economic and Socio-Political Factors. New Stand Points November-December 2006*

Ministry of Agriculture. 2009. *Strategic Plan 2008-2012.* Nairobi: Kenya Ministry of Agriculture.

Ministry of Agriculture. 2005. *Kenya Strategy for Revitalizing Agriculture (2004-2014),* Nairobi, Kenya.

Nyoro J, Ayieko M and Muyanga M. 2007. *The Compatibility of Trade Policy with Domestic Policy Interventions Affecting the Grains Sector in Kenya.* Tegemeo Institute, Egerton University.

Kenya Food Security Update 2009 (September). Kenya Food Security Network

USAID 2009. Food Insecurity. Situation Report Bureau of Democracy, Conflict and Humanitarian Assistance (DCHA) Office of U.S Foreign Disaster Assistance (OFDA).

This policy brief is produced by the African Agricultural Technology Foundation (AATF) and the Kenya Agricultural Research Institute (KARI) with contribution from Daniel Otunge, Nancy Muchiri, Grace Wachoro, James Gethi and Grace Agili

P.O. Box 57811-00200,
Nairobi, Kenya
Tel: +254-20-4183301-20
Fax: +254-20-4183344
Email: resource.centre@kari.org
Website: www.kari.org

P.O. Box 30709–00100,
Nairobi, Kenya
Tel: 254-(0)20-422 3700
Fax: 254-(0)20-422 3701
Email: aatf@aatf-africa.org
Website: www.aatf-africa.org