

# CIMMYT IN SOUTHERN AFRICA

## Celebrating 30<sup>years</sup> of partnership in agricultural research

“Maize is life” to many of southern Africa’s most vulnerable. While the production of cereal crops has tripled in the last 50 years in the developing world, with only a 30 percent increase in cultivated land area, the impact of improved varieties has largely bypassed southern Africa (excluding South Africa). Maize production in this region is the lowest in the world, yet its food security is highly dependent on maize. Breaking the cycle of low yields and food insecurity in southern Africa requires a range of interventions – from plant breeding and seed systems to improved agronomy, analysis of the markets and a favorable policy environment. CIMMYT-Southern African Regional Office (SARO) and its partners in southern Africa are working to sustainably increase the productivity of maize-based farming systems to ensure food and nutritional security, increase household incomes and reduce poverty.



## CIMMYT-SARO and Sustainable Intensification

Improved maize varieties will benefit farmers most if grown under the best agronomic practices. Using smallholder farmers' limited resources more efficiently is a key to achieving their potential. Sustainable intensification is focused on increasing food production from existing farmland while minimizing pressure on the environment. During the past 10 years, sustainable intensification strategies based on the principles of conservation agriculture (CA) have been successfully promoted in Malawi, Mozambique, Zambia and Zimbabwe. Making use of the combined benefits of minimum soil disturbance, crop residue retention and crop

rotation, CA increases yields when compared to conventional agricultural practices after two to five cropping seasons. Trials in farmers' fields in Malawi increased yields by 20 to 60 percent. In Zambia and Zimbabwe, yields were increased by almost 60 percent using animal traction CA technologies. Furthermore, the development and up-scaling of mechanized CA technologies and the use of chemicals for weed control have offered opportunities to reduce drudgery associated with cropping in southern Africa's smallholder systems.



Growing more with less - Some of CIMMYT's agricultural Technologies focus on sustainable intensification of maize-legume cropping systems for food security in southern Africa

## CIMMYT - Southern Africa Regional Office

The International Maize and Wheat Improvement Center (CIMMYT), with its headquarters in Mexico, established a maize research center in Zimbabwe in 1985. Based at the University of Zimbabwe farm on the outskirts of the capital, Harare, CIMMYT works with public and private sector partners in all the Southern African Development Community (SADC) countries.

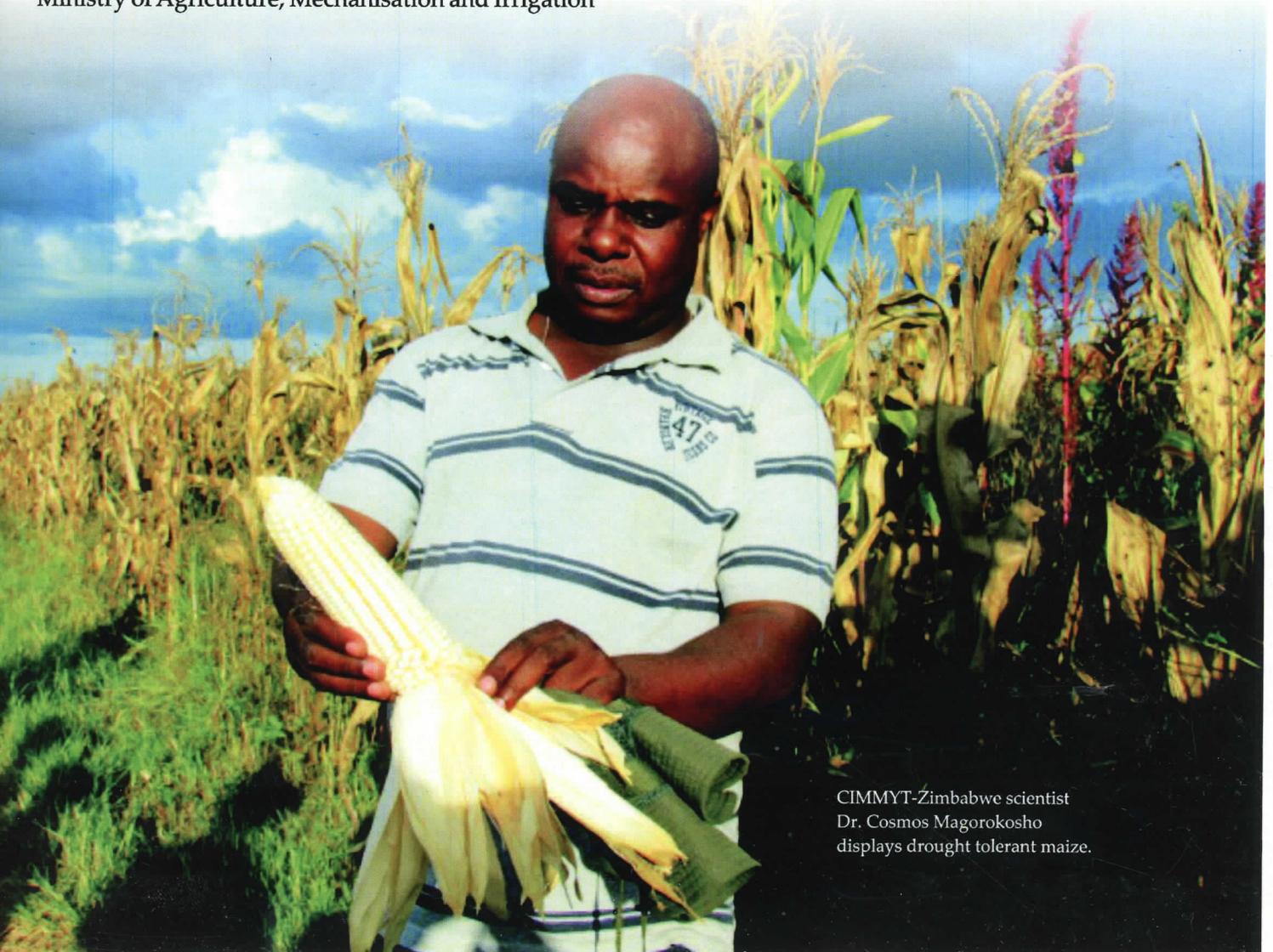
In Zimbabwe, CIMMYT conducts experiments on-station but has outreach activities at the Agricultural and Development Authority's Muzarabani Estate in Mashonaland Central Province, the Lowveld Research Station in Masvingo Province, Gwebi Variety Testing Centre, Henderson Research Station, Devonia Farm, ART Farm, Domboshava Training Centre, Rattray Arnold Research Station, Kadoka Research Center and many on-farm trial locations throughout the SADC region in collaboration with respective national research systems.

The first Memorandum of Understanding between the Government of Zimbabwe represented by the **Ministry of Agriculture, Mechanisation and Irrigation**

Development, and CIMMYT, was signed in March 1985. The strong support from the Government and partners provided CIMMYT with the opportunity to build a sustainable presence and establish strong partnership and collaborative research in maize and wheat systems and capacity building in the SADC region over the last three decades.

CIMMYT-SARO implements national, regional and global projects with an annual budget of over \$6 million. Its investments has increased three-folds since 2005. Major projects include:

- Drought Tolerant Maize for Africa (DTMA)
- Water Efficient Maize for Africa (WEMA)
- Improved Maize for African Soils (IMAS)
- New Seed Initiative for Maize for Africa (NSIMA)
- Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA)
- Conservation Agriculture for smallholder farmers



CIMMYT-Zimbabwe scientist  
Dr. Cosmos Magorokosho  
displays drought tolerant maize.

## CIMMYT-SARO and Food Security

The combination of lack of access to information and, inputs, poor soils, unfavorable weather conditions, pests, diseases and inadequate agricultural extension services are major factors limiting smallholder farmers in southern Africa from increasing their maize productivity. Using a combination of conventional and molecular breeding techniques, CIMMYT and partners have produced new varieties which yield 20 to 30 percent more than currently available local varieties under drought stress and low nitrogen conditions. On farm trials in Zimbabwe show new varieties yield 173 kg ha<sup>-1</sup> more than conventional hybrids in very drought prone maize growing regions. New maize varieties now account for 26% of maize hybrids grown in Zimbabwe.

Access to improved varieties at affordable prices is essential to boost agricultural productivity and increase food security. However, the dissemination of improved varieties is often a major bottleneck. To facilitate farmers' access to these improved seeds, CIMMYT provides support to seed companies in seed

business development including capacity building for technical and entrepreneurial skills, varietal release and registration, seed multiplication and commercialization. Working with various partners, CIMMYT is providing needed input for greater policy reform in southern Africa in order to facilitate easy seed movement across borders and to make the variety release and registration processes more efficient.

A total of 28 varieties with greater tolerance to the stresses experienced in most smallholder farmer fields have been released in southern Africa in the past two years. These new varieties are expected to benefit almost 12 million people, helping to enhance food security, increase livelihoods and reduce poverty in southern Africa.



Mr Casper Kamutando, of CIMMYT-Zimbabwe, examining a maize crop for northern leaf blight disease. CIMMYT is working with the Ministry of Agriculture to develop drought and low nitrogen tolerant maize varieties.

## CIMMYT-SARO and its Global Impact on Maize Breeding

The Green Revolution has been credited with saving over a billion people from starvation. This revolution was led by CIMMYT scientist Dr Norman Borlaug who developed new high yielding varieties that were more responsive to fertilisers. Dr Borlaug created the new varieties by crossing Mexican wheat varieties with Japanese dwarf varieties. For this work Dr Borlaug was awarded the Nobel Peace Prize in 1970. Genetic diversity and germplasm exchange was key to the green revolution and remains critical to breeding progress.

CIMMYT-SARO is part of the world's largest public drought and low nitrogen stress network. Every year 500,000 envelopes of maize seeds are sent to over 70 institutions worldwide. The demand for CIMMYT-SARO maize germplasm extends from Zambia to Afghanistan.



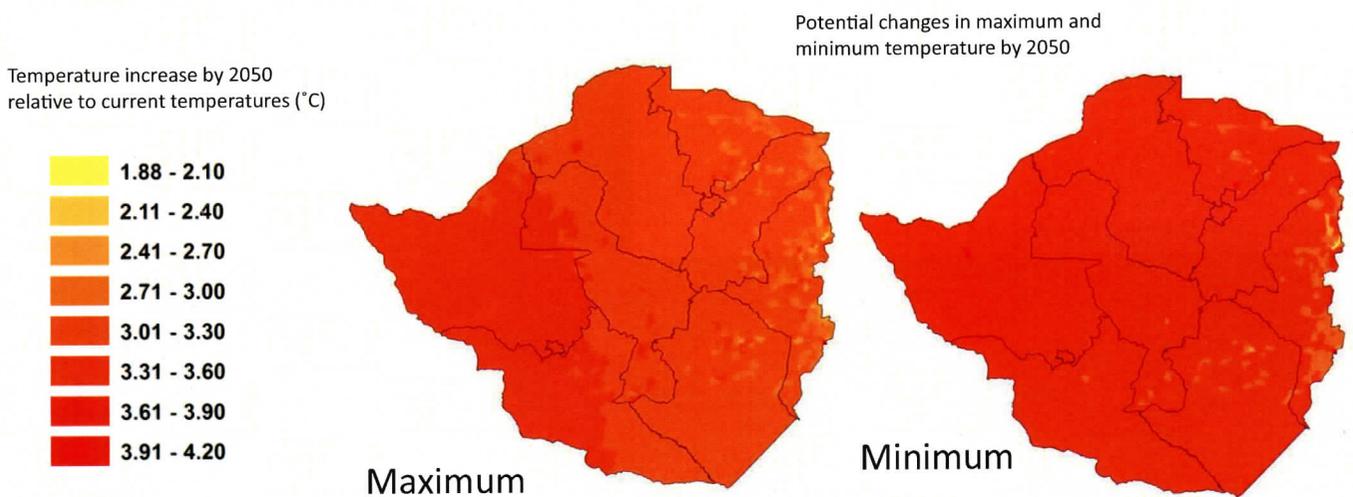
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# CIMMYT-SARO and Climate Change

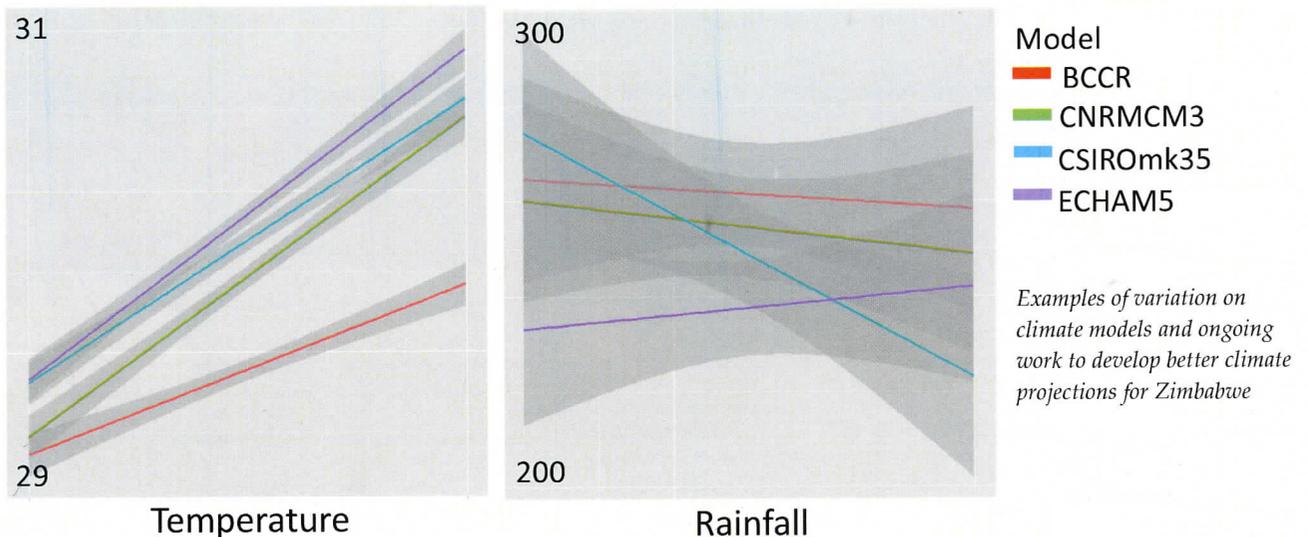
Climate change is expected to negatively impact agriculture production in Zimbabwe. Maize production in Zimbabwe is projected to decrease by 8% by 2050 without improved varieties and management options. Building adaptive capacity for maize systems to ensure they are more resilient to progressive climate variability through the provision of agricultural technologies, agronomic practices and community to national policies is essential to offset projected yield losses. CIMMYT is working to provide a portfolio of adaptation options for maize farmers in southern Africa. Increased climate variability will negatively affect agricultural production in southern Africa. CIMMYT has developed climate projections for

maize regions in southern Africa to determine agricultural responses to climate variation and set priorities for adaptation. Climate projections show temperatures will increase by 2.1°C during the growing season and delays in the onset of the rainy season. Combined drought and heat stress tolerance will become an increasing constraint on maize and seed production and growing improved varieties under “climate smart” agriculture cropping systems will increase the potential benefits of improved varieties under climate-stressed environments.

*Downscaled climate projections for 2050 showing changes in maximum and minimum temperature*



Variation in future climate data for maximum temperature and rainfall using four global climate models.





Transforming agriculture through technology:  
Farmers in Mitundu District, Malawi, demonstrate the use of Li seeder equipment in conservation agriculture

## CIMMYT-SARO and Gender

Women comprise more than half of the agricultural labor force in southern Africa, yet they generally produce less than male farmers do. Limited access to land, inputs such as improved seed, fertilizer and other resources cause these gender differences in productivity. If women had the same access to resources as men, they could increase their yields by 20 to 30 percent. To bridge the gender gap and promote women's access to technologies CIMMYT:

- Conducts participatory varietal selection and technology evaluation with farmers in gender-segregated groups to ensure the needs of female farmers are addressed.
- Develops and promotes labor-saving technologies such as direct seeding and herbicide use under CA.
- Trains female farmers on new technology options including herbicide use, crop diversification and on-farm processing for improving diet and incomes



Up to 80 percent of the food eaten in Africa is produced by smallholder farmers, most of them women.

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