

CIMMYT in sub-Saharan Africa

WEAVING THE FABRIC OF BETTER LIVELIHOODS

Agriculture engages nearly nine-tenths of the populace in sub-Saharan Africa.

Drought, depleted soils, unfavorable policies, disease, and armed conflict ravage productivity, health, and hope for a better life.

By mobilizing scientific knowledge, research networks, and development partnerships, CIMMYT works to restore the future to farm families in Africa.

 **CIMMYT**^{MR}
International Maize and Wheat Improvement Center





CIMMYT bases 18 international staff in the region—in Nairobi, Kenya; Harare, Zimbabwe; Addis Ababa, Ethiopia; and Lilongwe, Malawi. Their impact is multiplied through partnerships with national programs, extension bureaus, sub-regional networks, other CGIAR centers in the region, private companies, donor agencies, civil service organizations, community groups, and farmer associations. 40% of CIMMYT's budget—more than US\$ 15 million in 2002—is allocated to Africa.



Improved Varieties And Crop Management Practices To Combat Environmental Stresses

Southern Africa Drought and Low Soil Fertility Project (SADLF). With funding from the Swiss Agency for Development and Cooperation and the Rockefeller Foundation, SADLF develops, tests, and promotes improved maize varieties tailored to farmers' conditions—namely, drought and infertile soils—and works to establish effective seed supply systems for smallholder farmers. In operation since 1996, SADLF has already had an impact in the region by reforming the way maize varieties are developed and by releasing several high-quality, high-performing varieties. SADLF participants devised a novel, cost-effective, farmer-centered approach called “mother-baby trials,” in which sets of experiments are grown simultaneously by researchers, NGO and extension staff, and farmers under both researcher- and farmer-managed conditions. The approach has been so effective that it is being adopted by national programs throughout southern Africa and applied in CIMMYT research worldwide. The first maize varieties developed by the project produced an average 34% more grain than current improved cultivars, and new experimental varieties from the project outyielded the first generation by 15%.

African Maize Stress Project (AMS). In this project, CIMMYT and IITA work with a range of partners in western, central, and eastern Africa to develop locally adapted maize cultivars that have tolerance to drought, low soil nitrogen, and *Striga*, and that resist stem borers. The project also develops crop management practices for stress conditions, builds national program capacity to develop stress tolerant maize, helps farmers test and adopt new varieties, and promotes linkages with other development projects. Some accomplishments of AMS include: widespread testing of moisture and fertility conserving practices across East

Africa; installation of 19 fully equipped screening sites and more than 120 testing sites owned and operated by the national programs, and development of stress tolerant hybrids that yield 11 to 38% more than normal maize under optimum conditions, 8 to 41% more in nitrogen-poor soils, 10 to 80% more under drought, and 140% more in the presence of *Striga*.

Impacts for many of the following projects have been equally impressive, but a lack of space did not allow their inclusion. For more information, please contact the liaison officers listed on the back page.

Improving Food Security in sub-Saharan Africa. The Department for International Development (DFID, UK) funds key research to develop early maturing maize and varieties that resist post-harvest pests like the maize weevil. Early maturing maize varieties are integral to family food security during the “hungry season,” when stores from the previous year's harvest have run out. Weevil infestations cause serious losses to maize stored on-farm without chemical protection, resulting both in lost food and in reduced germination and seedling vigor when grain is sown.

The Soil Fertility Management and Policy Network for Maize-based Farming Systems in Southern Africa. With Rockefeller Foundation support, Soil Fert Net conducts targeted research and extension activities, fosters regional partnerships, and advocates appropriate policies to help farmers in Malawi, Mozambique, Zambia, and Zimbabwe to better manage their limited soil and water resources. Practices being tested and promoted include green manures, grain legume intercrops, rotations, and targeted use of organic and chemical fertilizers.

Improving Risk Management Strategies of Resource-Poor Farmers in Drought-Prone Maize-Based Farming Systems in Southern Africa.

This AusAID-funded, ACIAR-managed project combines crop modeling and participatory approaches to help farmers address problems of low soil fertility, climatic variability, and low and unstable agroecosystem productivity in areas where maize systems are fundamental to food security. Participants also promote productivity-enhancing, resource-conserving practices from Soil Fert Net and other sources.

Early-maturing Maize for Dambos. This project aims at developing, testing, and promoting improved varieties for dambos—low lying, naturally fertile river banks or beds of lakes or streams—in southern Africa. These varieties are sown early, grown on residual moisture, and harvested during the “hungry season,” when normal maize supplies are gone and food is scarce.

Streak Resistant Maize. Nearly unknown elsewhere, maize streak virus is among the most serious disease problems of the crop in sub-Saharan Africa. Since the 1980s, the OPEC Fund for International Development has supported CIMMYT and partners’ efforts to develop and disseminate resistant varieties. As a result of this work and the efforts of IITA and other breeding initiatives, practically all improved maize varieties for the region now carry streak resistance.

Regional Maize Nursery. With funding from the Rockefeller Foundation, CIMMYT circulates trials of improved maize to partners in eight countries in eastern and

southern Africa, with emphasis on stress tolerant varieties and hybrids. Known as REGNUR, the nursery is a hub of CIMMYT’s maize improvement activities in Africa.

Wheat Research in Africa. Wheat is grown in the eastern African highlands of Ethiopia and Kenya, and in Zimbabwe and South Africa. Water stress and diseases, mainly rusts and septoria, are the major production constraints. The eastern African highlands continue to be a hot spot for stem rust caused by *Puccinia graminis* f. sp. *tritici*, a disease under control in other parts of the world. CIMMYT and KARI, Kenya, are identifying varieties resistant to new, highly virulent races of the stem rust pathogen. CIMMYT also sends more than 400 wheat trials to the continent each year, most of these to northern Africa, for testing and to identify locally adapted varieties.

Insect Resistance Maize for Africa (IRMA). With funding from the Syngenta Foundation for Sustainable Agriculture, this project tests and deploys maize endowed with genetic resistance to stem borers. Resistance comes both from traditional sources and from *Bacillus thuringiensis* (Bt). A collaboration between CIMMYT and the Kenya Agricultural Research Institute (KARI), IRMA incorporates integrated pest management practices, resistance management strategies, the development of the regulatory and intellectual property protection frameworks, and public information campaigns.

Stewardship of IR Maize. With funding from the Rockefeller Foundation, CIMMYT works with the Weizmann Institute of Science (Israel), KARI, and BASF to develop and

evaluate strategies for controlling *Striga*, a parasitic weed that infests 40 million hectares and causes more than US\$1 billion in economic losses every year in sub-Saharan Africa. CIMMYT and its partners are developing methods to commercialize, market, and deliver Imazapyr-resistant maize varieties adapted to sub-Saharan Africa’s agro-ecologies. In addition, CIMMYT contributes to a project funded by DFID and headed by the International Centre of Insect Physiology and Ecology (ICIPE) to develop and disseminate an integrated pest and soil fertility management approach against *Striga*, stem borers, and declining soil fertility in the Lake Victoria Basin of Kenya.



Providing smallholder farmers in southern Africa with seed and information about stress tolerant robust maize varieties. CIMMYT and national programs are increasing production of breeder’s and foundation seed in southern Africa to meet the huge demand for affordable, quality seed of stress tolerant, open pollinated varieties (OPVs) as a result of the 2002 drought. Partners developed and distributed a brochure for extension and NGO staff on the characteristics of new maize OPVs. In collaboration with ICRISAT, CIAT, IITA, and national programs, staff are leading workshops on sustainable seed systems. CIMMYT also supports the efforts of the SADC Seed Security Network to establish regional policies on seed release, exchange, and certification.

Strengthening Maize Seed Supply Systems for Small-Scale Farmers in Western Kenya and Uganda.

In this project, CIMMYT and its partners—diverse community action groups and the national maize research programs of Kenya and Uganda—help farmers to produce and market quality seed of improved maize varieties they select. The project, which is funded by the Rockefeller Foundation, draws on the mother-baby trial approach pioneered in SADLF, and two SADLF open-pollinating maize varieties that have won farmers' praise in Kenya have been tested and released by KARI. In addition to teaching farmers how to produce quality maize seed, CIMMYT and its partners also provide information on how to link with markets and sources of foundation seed.



Nutrition

Quality Protein Maize for sub-Saharan Africa. Quality Protein Maize (QPM), first developed more than thirty years ago, has nearly double the protein content of normal maize but looks, tastes, and yields like normal varieties. Projects funded by the Nippon Foundation, CIDA-Canada, and the Rockefeller Foundation aim to bring QPM to small-scale farmers in sub-Saharan Africa. CIMMYT, IITA, Sasakawa Global-2000, and numerous public, private, and civil society partners are working to develop improved QPM varieties and to understand farmer adoption of QPM, facilitate farmer participation in research efforts, and improve availability of QPM at the village level. These projects are also building capacity among the national programs, NGOs, and private organizations in the region to develop and distribute QPM seed.

Micro-Nutrient Enrichment of Maize. The HarvestPlus Challenge Program aims to improve the nutritional value of maize (along with rice, wheat, sweet potato, cassava, and bean) by increasing levels of iron, zinc, and pro-vitamin A in grain. CIMMYT is leading the crop effort for maize. One approach involves developing QPM with enhanced levels of the above micronutrients. HarvestPlus is funded by the Gates Foundation, the World Bank, USAID, DANIDA, and the Asian Development Bank.



Socioeconomic Research

Socioeconomics Research in Eastern and Southern Africa. This collaborative research includes impact assessments; training; policy research and advocacy; refinement and promotion of participatory approaches; characterization of farmers and cropping systems; linking and coordinating efforts of national economists; and other important efforts that guide and add value to CIMMYT's work in Africa.

Strengthening Seed Marketing Incentives in Southern Africa to Increase the Impact of Maize Breeding Research. In support of the seed production initiatives mentioned above, this Rockefeller-funded project (1) assesses how the adoption of improved cultivars affects poor households and (2) identifies market constraints that prevent poor households from acquiring commercial maize seed. It is also helping to strengthen the local capacity for adoption and diffusion studies, documenting impacts of plant breeding research, evaluating the performance of seed markets, and designing germplasm distribution policies.



Network and Capacity Building

The Eastern and Central Africa Maize and Wheat Improvement Network (ECAMAW). This network, which operates under the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), links national research programs, NGOs, the private sector, and farmers to support research planning, implementation, budgeting, and training. The EU-funded network focuses on crop and natural resource research and management, chiefly through on-farm trials. Network scientists also help farmers test drought and low-N tolerant maize varieties. CIMMYT hosts one of the network's regional coordinators in our Addis Ababa office.

FOR MORE INFORMATION, CONTACT:

■ **Dr. Alpha O. Diallo**
Breeder/Liaison Officer
CIMMYT
ICRAF House
United Nations Avenue, Gigiri
P.O. Box 25171
Nairobi, Kenya
Email: a.o.diallo@cgiar.org
Phone: +254 (20) 522 878 / 524 600
Fax: +254 (20) 522 879 / 524 001

■ **Dr. Kevin Pixley**
Breeder/Liaison Officer
CIMMYT
P.O. Box MP 163
Mount Pleasant
Harare, Zimbabwe
Email: k.pixley@cgiar.org
Phone: +263 (4) 301 807 / 334 181
Fax: +263 (4) 301 327 / 334 168