

**Maize Breeding Research in
Eastern and Southern Africa:
Current Status and Impacts of Past
Investments Made by the Public and
Private Sectors, 1966-97**

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Abstract: This report documents the impacts of international maize breeding research in eastern and southern Africa. It draws on information from a comprehensive 1998/99 survey of public and private maize breeding and seed production organizations active in the region. In many countries of eastern and southern Africa, policy reforms introduced in the 1980s and 1990s encouraged private sector participation in the maize seed industry. The private sector now supplies most of the maize seed in the region, spends more on research, and generates a larger number of maize releases than the public sector. Hybrids dominate varietal releases and seed sales, a trend that may negatively affect subsistence-oriented farmers who lack resources to buy fresh seed every season. Although farmers' adoption of improved maize varies throughout the region, it has increased steadily. Survey data show that CIMMYT's maize breeding program has had significant impacts in eastern and southern Africa, especially in recent years. Of the maize varieties released in the region since 1990, 31% (55% if South Africa is excluded) were developed using CIMMYT breeding materials. In 1996, more than 1.6 million hectares in eastern and southern Africa were planted to varieties developed using CIMMYT germplasm. The varietal release data and adoption data indicate growing demand for CIMMYT breeding materials from both public and private breeding programs, as well as growing acceptance by farmers of varieties developed using those materials.

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Executive Summary

In 1997, the International Maize and Wheat Improvement Center (CIMMYT) launched a major study designed to document the impacts of international maize breeding research in developing countries. The study was intended to update and extend the findings of CIMMYT's first global research impacts study, which had been published three years earlier in a report entitled *Impacts of International Maize Breeding Research in the Developing World, 1966-90* (López-Pereira and Morris 1994). Given the enormity of the data collection task, the follow-up study was divided into three regional studies—one each for Latin America, Asia, and sub-Saharan Africa. The sub-Saharan Africa study focused specifically on eastern and southern Africa; a separate impacts study for western and central Africa was conducted by the International Institute for Tropical Agriculture (IITA), which holds the mandate for maize germplasm improvement work in that region. This report presents the results of the eastern and southern Africa study.

The results presented in this report are based on information collected during 1998 and 1999 through a comprehensive survey of public and private maize breeding organizations and seed production agencies in 12 countries of eastern and southern Africa. The survey collected information on many aspects of maize research, seed production, and seed distribution (e.g., maize breeding activities, products of breeding programs, maize seed production and sales operations, seed industry regulations and policies). The countries covered by the survey accounted for more than 95% of all maize produced in the region in 1998/99. The organizations contacted as part of the survey currently control about 97% of the total maize seed market in the 12 countries.

Major findings of the study are summarized below.

Policy reforms have led to increased private-sector participation in many national maize seed industries

In many countries of eastern and southern Africa, policy reforms introduced during the 1980s and 1990s have succeeded in liberalizing national maize seed industries by opening up maize seed markets to increased private sector participation. This represents a major change from earlier years, when maize seed industries in most countries throughout the two regions were dominated by public agencies. Major policy reforms have included the lifting of outright bans on private seed companies, removal of restrictions on importation of commercial maize seed, and elimination of direct seed price controls. In a number of countries, however, implicit restrictions in the form of strict seed certification requirements and lengthy varietal registration procedures continue to limit the participation of private firms, both local companies and multi-nationals. Moreover, governments in some countries still are trying to influence maize seed prices indirectly by subsidizing maize seed production, especially where public agencies continue to operate and control large shares in the seed market.

Rapid growth in private-sector investment in maize breeding research has been accompanied by changes in varietal release patterns

Throughout eastern and southern Africa, private-sector investment in maize breeding research has been growing rapidly. In eastern Africa, public-sector

scientists still significantly outnumber private-sector scientists; in southern Africa, the numbers are roughly equal. Numbers of scientists provide an imperfect measure of total research investment, however, since private seed companies tend to support each scientist with considerably more operating funds. Adjusting for the difference in operating funds, total research investment by the private sector probably exceeds total research investment by the public sector, at least in southern Africa and possibly in eastern Africa as well.

Private-sector maize breeders have on average released a larger number of varieties than public-sector maize breeders. This difference in varietal release rates can be attributed to differences in the quantity and quality of investment, as well as to the commercial orientation of private seed companies compared to public breeding programs, which focus more on non-commercial breeding objectives. The composition of varietal releases reflects steady growth in the role of the private sector; by 1996, all maize varieties released in eastern and southern Africa originated from private seed companies. The recent decline in public-sector varietal releases also reflects reductions in public funding for agricultural research that have occurred in many countries in the region.

Increased private-sector participation in the maize seed industry has been accompanied by greater concentration of the industry

During the 1990s, the private sector effectively took over the seed supply function throughout most of eastern and southern Africa. In 1996, the most recent year for which complete data are available, private seed companies controlled more than 97% of all commercial maize seed sales in the region. Efforts to privatize maize seed markets were thus largely successful. It is important to note, however,

that in a number of major maize producing countries (e.g., Kenya, Zambia, Zimbabwe), the leading private seed company is simply a transformed version of a previously public or parastatal seed agency that had long monopolized the local seed market. In several instances, these privatized parastatals continue to control more than 80% of the national seed market.

With privatization, the maize seed industry is becoming more concentrated as a relatively small number of large multinationals acquire, merge with, or buy large shares in local seed companies. While consolidation could lead to scale economies, reduced competition is a concern to farmers, who worry that they may eventually face restricted choices and have to pay higher prices. The fact that seed prices in many countries have not risen significantly may reflect continued attempts by governments to keep maize seed prices affordable by subsidizing public seed production agencies.

Hybrids now dominate varietal releases and seed sales

With the emergence of a flourishing private seed industry, the share of hybrids in varietal releases and seed sales has risen steadily. Coupled with the fact that public breeding programs are also concentrating increasingly on hybrids, this has led to a situation in which varietal releases and seed sales are now completely dominated by hybrids. This could have negative impacts on small-scale subsistence-oriented farmers, many of whom may lack the resources needed to buy fresh seed every season. To date, little empirical evidence has emerged to indicate that small-scale farmers have been adversely affected by the shift to hybrids, but the matter will require careful attention, because supplying seed to smallholders may not be of interest to profit-motivated private firms.

Adoption of improved maize varieties increased during the 1990s

Commercial maize seed sales data support estimates made by researchers and seed industry insiders that adoption of improved varieties increased steadily during the 1990s in eastern and southern Africa. However, adoption patterns have differed between countries and regions. Total sales of improved maize seed have fluctuated around 20,000 tons per year in eastern Africa, whereas in southern Africa total seed sales grew steadily in the early 1990s, peaking in 1992 at just under 100,000 tons before declining. Within individual countries, the percentage area planted to improved maize seed varies from less than 10% to nearly 100% in several major maize producing countries. The variability between countries in adoption rates can be attributed to differences in economic, institutional, and policy factors that affect the availability and affordability of improved seed.

Use by researchers of CIMMYT germplasm continues to increase, as does adoption by farmers of CIMMYT-derived varieties

CIMMYT's maize breeding program has had significant impacts in eastern and southern Africa, especially in recent years. Of all maize varieties

released by public and private breeding programs since 1966, about 24% (35% if South Africa is excluded) were developed using CIMMYT source materials. Use of CIMMYT germplasm showed a strong positive growth over time; of the varieties released since 1990, over 31% (55% if South Africa is excluded) were developed using CIMMYT source materials. In 1996, more than 1.6 million ha in eastern and southern Africa were planted to varieties that had been developed using CIMMYT germplasm, representing over 20% of the area planted to modern varieties. Excluding South Africa, where farmers grow mainly temperate materials not targeted by CIMMYT's breeding program, nearly 37% of the area planted to modern varieties in eastern and southern Africa was planted to varieties containing CIMMYT germplasm. Taken together, the varietal release data and the adoption data indicate growing demand for CIMMYT source materials on the part of public and private breeding programs, as well as growing acceptance by farmers of varieties developed using those materials. The observed growth in demand for and use of CIMMYT germplasm in eastern and southern Africa over recent years validates the decision by the CIMMYT Maize Program to establish regional maize breeding programs in eastern and southern Africa and to allocate increased resources to local adaptive breeding.

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