Building on Successes in African Agriculture

Recent Growth in African Cassava

Felix Nweke, Steven Haggblade, and Ballard Zulu

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Cassava serves as a staple food for 200 million Africans, second only to maize in its calorie contribution. In response to a series of devastating attacks by cassava diseases and pests over the past several decades, the International Institute of Tropical Agriculture (IITA) and several national agricultural research services have launched successful cassava research programs. Together, they have fended off a series of mosaic virus mutations as well as a devastating invasion of the cassava mealybug from South America, using biological control with an imported predator wasp. Since both diseases and pests spread across individual farmer fields as well as national boundaries, their prevention and cure constitute classic public goods. Close collaboration by international and national researchers has achieved impressive results in responding to these repeated threats.

Breeding programs sustained during the ensuing noncrisis periods have yielded a rich harvest of new varieties, the Tropical Manioc Selection (TMS) varieties. Bred for disease resistance, high yield, early bulking, and root shapes that will accommodate mechanical processing, the TMS varieties have routinely generated substantial yield gains. Diffusion of these varieties has spurred the private sector to develop simple mechanical processing technologies that greatly reduce processing labor. As a result of these new production and processing technologies, production has grown rapidly in many parts of Africa. In the process, Nigeria has replaced Brazil as the world's leading cassava producer.

Because cassava is vegetatively propagated, it requires no purchased inputs and thus remains accessible to even the poorest small farmer. Since it can be planted throughout the rainy season and harvested over a period of up to 18 months, it offers important flexibility in the timing of labor inputs and harvesting. This flexibility makes cassava particularly attractive to labor-deficit and HIV/AIDS households.

Sustained production gains bring with them falling consumer prices, as recent data over the past two decades from Nigeria attest. Benefiting small farmers as well as poor urban consumers, Africa's cassava transformation has arguably proven to be its most powerful poverty fighter to date.

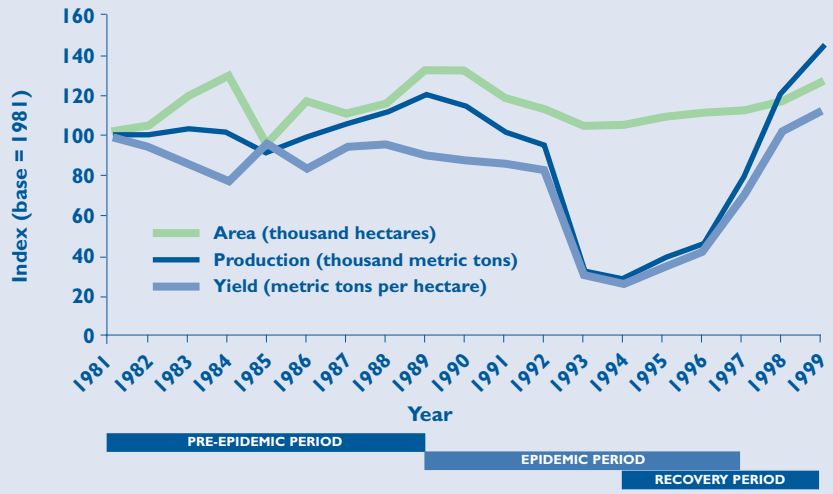
IMPACT

• ***Production.*** In a series of crisis situations, release of new cassava varieties has reversed production declines of 20 percent to 80 percent. Most recently in Uganda during the early 1990s, a virulent new mutation of the mosaic virus disease destroyed 80 percent of Uganda's cassava crop within six years. Rapid import of resistant varieties from IITA enabled the Ugandans to restore production to trend levels within five years (see figure). In noncrisis situations, the new TMS varieties achieve on-farm yield gains of 40 percent, even without fertilizer. Together with mechanized processing technology, the new cassava technology produces returns to land 20 times greater than those achieved with local varieties and manual processing.

• ***Equity.*** In countries such as Malawi and Zambia, where cassava remains primarily a food security crop for human food consumption, smallholders and poor people depend more on cassava than do large farmers. In places like Nigeria, where cassava has become primarily a commercial crop, small farmers continue to grow cassava, although large farmers produce the bulk of the commercial crop. In these settings, poor urban consumers become the principal beneficiaries of the cassava booms and the resulting declines in the relative price of cassava.

• ***Sustainability.*** Cassava proves financially profitable for smallholders in a wide variety of settings. It requires no purchased inputs. Its flexible planting and harvesting calendar enables households to fit in labor requirements around other obligations, making cassava one of the easiest crops for labor-constrained HIV/AIDS households to grow. Initial evidence from Zambia suggests that HIV/AIDS prevalence makes a small but statistically significant contribution to area expansion of cassava among affected households. Long-term trials suggest that cassava can maintain steady yields over 30 years on the same plot without fertilizer.

Trends in production, area, and yield of cassava in Uganda, 1981–99



SOURCE: University of Greenwich, "An Application Nominating the National Agricultural Research Organization of Uganda (NARO) for the King Baudouin International Development Prize." January 19, 2000.

DRIVERS OF CHANGE

• ***Improved varieties.*** A stream of new TMS varieties has powered cassava production growth over the past 25 years. With yields 40–100 percent higher than local varieties, earlier bulking, disease resistance, and roots shaped to facilitate mechanical processing, the TMS varieties have dramatically improved the profitability of cassava production in Africa. Initial research at the IITA in Nigeria has provided new genetic material to national research programs across Africa and stimulated production surges across a broad swath of the continent

• ***Biological control of mealybug.*** In the early 1970s the accidental introduction of the cassava mealybug from South America resulted in crop losses of up to 80 percent, as the mealybug literally ate its way across Africa. After identifying a predator wasp, also from South America, international research centers, African research services, and donors launched a mass rearing and distribution program that led to the biological control of the mealybug threat by 1988. These efforts saved cassava production worth more than US$2.2 billion at a program cost of US$15 million, resulting in an eye-popping benefit-cost ratio of 149.

• ***Development of mechanical processing technologies.*** As TMS varieties increase on-farm yields, they likewise increase labor requirements for harvesting and processing. In response to growing labor shortages in Nigeria, local artisans have developed a wide array of simple mechanical processing technologies that reduce labor requirements and facilitate the commercial production of cassava and prepared cassava-based convenience foods, such as gari, a fermented, precooked cassava flour used widely to prepare porridge.

• ***Policy reforms.*** Macroeconomic and sectoral policy reforms triggered substantial increases in cassava production. In Nigeria an overvalued exchange rate, coupled with food subsidies for imported rice, stymied the expansion of TMS cassava varieties during the early years of their release in the late 1970s. A decade later, after petroleum revenues dried up and government was forced to devalue the naira and suspend its subsidies on imported foods, adoption of TMS cassava varieties surged. Similarly, policy reform proved instrumental to cassava expansion in Malawi and Zambia. In these two countries, heavy maize subsidies through the 1980s artificially inflated profitability and area planted to maize. When governments withdrew these unsustainable subsidies in the early 1990s, cassava production surged in both countries as farmers substituted cassava for maize. In both cases, the emergence of a level playing field has favored rapid expansion of cassava production and area.

• ***Drought.*** In Southern Africa recurrent droughts during the 1990s favored policymakers' and farmers' interest in cassava, just as the new TMS varieties were coming onstream. The epidemic outbreak of HIV/AIDS in the region may have contributed as well, as a diminished rural labor supply induces a move to flexible, labor-saving, low-input crops like cassava.

KEY LESSONS FOR BUILDING FUTURE SUCCESSES

• ***Long-term sustained research.*** The cassava mosaic virus continues to mutate, and new pests will undoubtedly emerge as they have in the past. Africa's cassava research establishment cannot rest on its laurels. Sustained scientific capacity will remain instrumental for ensuring effective crisis response as well as ongoing productivity gains.

• ***Multiplication and distribution of improved cuttings.*** Multiplication and distribution of improved cuttings requires coordinated public support in the early years of any new variety release. Because cassava farmers clone new crops with cuttings from their prior season's crop, private seed companies have no financial incentive to distribute cassava cuttings.

• ***Mechanical processing and production.*** Cassava marketing and processing will need to improve dramatically if the highly perishable fresh cassava crop is to continue to grow rapidly. Hence drying and processing become central to any strategy for expanded marketing of cassava. Southern, Central, and East Africans can learn from the cassava mechanization and processing technology that has been developed over many decades in West Africa.

• ***Regional cooperation.*** Africa's experiences with cassava illustrate the considerable benefits accruing to regional research collaboration. Over the past three decades, the sharing of genetic material—primarily from IITA to national programs, but also between countries—has proven critical in responding to crises and sustaining ongoing yield gains. For contiguous small countries sharing common agroecological zones, the benefits of collaboration have been evident in the numerous successful cassava varietal exchanges over the past decades. The repeated rapid spread of disease and pests across national boundaries has instilled a recognition of the value and even the necessity of continued regional collaboration. ■

For further reading see F. I. Nweke, D. S. C. Spencer, and J. K. Lynam, *The Cassava Transformation: Africa's Best-Kept Secret* (East Lansing, MI: Michigan State University Press, 2002); S. Haggblade and B. Zulu, "The Cassava Surge in Zambia and Malawi," Background Paper No. 9 for the conference "Successes in African Agriculture: Building for the Future," Pretoria, South Africa, December 1–3, 2003; F. Nweke, "New Challenges in the Cassava Transformation in Nigeria and Ghana," Environment and Production Technology Division Discussion Paper No. 118 (Washington, DC: International Food Policy Research Institute, 2003).

Felix Nweke (nwekefel@yahoo.com) is a visiting professor of agricultural economics at Michigan State University. Steven Haggblade (s.haggblade@cgiar.org) is a senior research fellow in IFPRI's Development Strategy and Governance Division (DSGD). Ballard Zulu (zulub@msu.edu) is a researcher with the Michigan State University's Food Security Research Project in Zambia.

International Food Policy Research Institute
2033 K Street, N.W. • Washington, D.C. 20006-1002 • U.S.A.
Phone: +1-202-862-5600 • Fax: +1-202-467-4439 • Email: ifpri@cgiar.org
www.ifpri.org