African Green Revolution Needn’t Be a Mirage

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Africa missed out on the scientific breakthroughs that revolutionized agriculture in Asia. However, with locally developed and locally relevant technologies, a built-up human and institutional capacity, and supportive national policy and leadership, an African Green Revolution can be a reality.

Sub-Saharan Africa remains the only region in the world where hunger and poverty prevail. In the past 20 years, the number of Africans who live below the global poverty line (1 per day) has increased by more than 50%, and more than one-third of the population of the continent continues to suffer from hunger (1). This is of even more concern to African agricultural development as climate change impacts economies largely based on rain-fed agriculture (2). Crop adaptation to climate change requires rigorous research and a multifaceted technological approach that will be much harder to practice on a continent in which agricultural science is in its infancy and the culture of looking to science for solutions to local problems is not well established. However, I believe that Africa has the capacity to feed itself and become a net exporter of food.

In the 1960s, when the Asian Green Revolution was launched, independent Africa was born. Much of the human and institutional capacity essential for an agricultural revolution in Africa was weak or nonexistent. The discoveries of the miracle crop varieties that ignited the Asian Green Revolution were in wheat and rice, two globally important crops, but not in sorghum, millets, maize, or cassava, the critical crops for Africans. That notwithstanding, Africa was not then ready for a science-based development campaign.

Over the next two decades, investments were made from both internal sources and through foreign development assistance for building key institutions, including those of higher education, agricultural research, and technology-transfer institutions such as the agricultural extension services and seed-distributing agencies. Tens of thousands of young African men and women were sent to pursue graduate education in the agricultural sciences at European and North American institutions.

Today, there is a developing, although not yet robust, human capacity base and agricultural research infrastructure focused on seeking solutions for local problems in Africa (3), and links with regional programs and international research centers, foreign universities, and other scientific organizations are supporting this effort. Research collaborations between African scientists and foreign agencies have already yielded important results, for example, the biological control of major insect pests of cassava, the development of rice varieties suitable for Africa, and drought- and parasite-weed–resistant sorghums. Unfortunately, the growth attained in agricultural education and research (4) has not been matched by a concomitant advance in public and private technology transfer (5) institutions, and results of successful research have not yet been scaled up to the level of the continent.

In addition to the formidable “nature-based” constraints such as prevalence of drought, diverse agro-ecologies, poor soil fertility, and unique pests and diseases, African agricultural development also has to overcome persistent institutional and programmatic challenges. African higher educational institutions still lack the faculty strength and infrastructure to regularly produce high-quality graduates and postgraduates in numbers needed to promote change. Capacity-building and strengthening of local institutions are the areas in which foreign assistance is badly needed.

17. For agroXML, see www.agroxml.de (accessed 20 November 2009).
20. We thank D. Simpson for his help with the text and S. Palme for providing the data for Fig. 1.
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However, historically, the relationship between Africa and the international aid community has been problematic. Over-reliance on external funding for agricultural development programs has led to a lack of a firm national strategic framework and agendas for national development. Development aid has created unhealthy partnerships with aid recipient national programs made highly susceptible to frequent paradigm shifts generated by foreign agencies.

The earliest paradigm involved the successful basic institution-building programs (6) of the 1950s and 1960s. These programs built human capacity through overseas graduate and undergraduate education in North America and Europe and established new institutions in African countries. They laid the foundations for the needed human and institutional infrastructures, and their contributions have been the most lasting. In the 1970s, a paradigm for technology development and transfer was created, wherein the newly educated cadre was encouraged to start programs for developing and testing modern agricultural practices to take to rural African farms. When programs under this paradigm did not produce immediate impact, they were replaced with programs dubbed farming systems research (7) in the early 1980s. This paradigm argued for scientists to spend time on African farms learning about the realities on farms and in farm households. The 1990s saw the emergence of new paradigms, including programs in sustainable agriculture, participatory plant breeding research (8), and biotechnology, requiring that the agricultural research community pay attention to issues of environmental health, farmer knowledge, and the emergence of new and powerful scientific tools to address the more intractable agricultural problems of rural Africa. In the 2000s, the paradigm of the integrated value-chain approach advocated that research results be adopted to offer productivity gains and advised the needed connections to input and output markets. Although each of these paradigms added new wisdom and built up perspective, the frequent paradigm shifts resulted in changes in funding support that led to a series of failed starts and little progress.

Strengthening human capacity and institutional infrastructure in the essential areas of education, research, and technology transfer depend not only on consistency but also on levels of resource support and choices made. There is enormous variation among public sectors in various African countries and even more on commitments for encouraging the private sector to spur agricultural development (9). In East Africa, Kenya and Uganda have done well in their investments to strengthen their educational institutions and in encouraging private-sector investments. The emergence of a number of small but functional private seed businesses in these two countries is one of the more encouraging developments in African agriculture in the past several years. Ethiopia has made more substantive and sustained investments in its agricultural research and development enterprise than any other country in Africa. It has developed its agricultural research infrastructure and created a large army of agricultural extension agents. However, Ethiopia has not encouraged the development of its private sector initiatives. It is not the resource capacity of these countries that accounts for the unevenness in the research infrastructure development among them. For example, Nigeria, the wealthiest country in sub-Saharan Africa (other than South Africa) has done an admirable job of building its higher educational institutions but has failed to develop functional infrastructure in agricultural research, extension services, and private-sector input services. In contrast, the poorer countries of Mali in West Africa and Malawi in southern Africa have committed their meager internal resources to building functional institutions and made overt policy statements to encourage private-sector development. The executive leadership demonstrated by the president of Malawi in promulgating official subsidies to promote the extensive use of improved seeds and inorganic fertilizers to boost farm productivity by the peasant farmers of his country in the past few years has been particularly exemplary.

We are seeing a new sense of urgency and an increased commitment to making a lasting change in African agricultural development (10). We are also seeing an increase in the number and size of institutions engaged in African research and development efforts. One such major initiative that emerged recently in the continent is the Alliance for Green Revolution in Africa (AGRA), an organization created by the joint contributions of the Rockefeller and the Bill and Melinda Gates foundations. AGRA is not a research or development institution; it is a granting agency created to support national agricultural research and development efforts in selected African countries. It would sponsor further development and deployment of technologies generated by existing national agricultural services (NARS) and international agricultural research centers (IARCs). In addition to the IARCs, there are many more foreign institutions engaged in agricultural research in Africa, including several U.S. and European universities. For the eventual goals of AGRA and its national partners to be realized, the allied programs must work well together. What is needed is not a preponderance of independent units operating unengaged with local institutions but a coordinated and mission-oriented program with selective engagement in partnerships leading to proper division of labor and resource commitment.

Despite the challenges, I am optimistic. African leaders have put agriculture on their agendas and made a historic pledge to commit 10% of their national budgets to food security and agriculture-led growth through the Comprehensive Africa Agricultural Development Program (CAADP) (10). Many nations have set a target for science-based annual productivity growth of greater than 6% by 2015. Regional and subregional organizations have been put in place to facilitate technology generation and transfer. Foreign assistance to Africa is being examined and redefined and by various agencies (11); country-led partnerships are given emphasis. Donors at the Group of Eight Summit in 2009 committed more than $20 billion to support a renewed global effort and invest in comprehensive country-led plans (12). The case for science-based development in Africa may have finally been made.

An African Green Revolution can be a reality, but Africa will not be able to develop a science-based agriculture and economy without considerable external assistance, particularly in the areas of human and institutional capacity building. However, no amount of funding will bring about such a transformative change unless it is locally led by an inspired citizenry and driven by an unequivocal support and commitment from African leaders and policy makers (13).

References
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