
Introduction: Africa's Food Crisis

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At the beginning of the independence movement in 1960, African agriculture was moving. Africa was self-sufficient in food and a leading agricultural exporter. In contrast, Asia was the epicenter of the world food crisis. But by the mid-1960s, Asia had launched the green revolution, which presently adds 50 million tons of grain to the world's food supply each year. Today, although Asia still struggles to increase household food security, it is Africans, not Asians, who bear the brunt of the world food problem.

The food crisis began shifting to Africa in the early 1970s as the continent's food balance sheet changed from positive to negative. Food production grew at half (1.5% per year) the rate of population growth (3.0% per year) from 1970 to 1985. Since then, the situation has continued to deteriorate. For the period 1988 to 1993, 33 African countries experienced a reduction in per capita food production (FAO 1994b). On the consumption side, sub-Saharan Africa is the only region of the world where the average caloric intake has declined over time. In 1990, it was estimated that 37% of Africa's population was undernourished. Even if economic growth resumes, sub-Saharan Africa will have 300 million undernourished people by the year 2000, nearly half of the world's total (Alexandratos 1995).

The problem of stagnating food production is reflected in growing dependence on food imports, rising poverty, and degradation of the natural resource base, all of which have become increasingly critical problems in Africa over the past two decades. Although many solutions have been proposed, they have often been at a level that is too general for this diverse continent, which comprises 47 countries, a wide range of ecologies, seven colonial histories, and an array of food staples.

Increased food production has a vital role to play in enhancing food security, peace, and democracy in Africa in the twenty-first century. Africa's population will grow by an additional 100 million over the coming six to seven years, and its 1995 population of 600 million is expected

to double to 1.2 billion by 2020. Africa's food production gap demands fresh thinking and urgent attention by scientists and policymakers.

Two preconditions are essential for alleviating the downward spiral of poverty and malnutrition in Africa. First, in nearly all African countries, the key to economic growth is growth in agriculture. The bulk of the population depends on agriculture, and increases in agricultural household income generate further rounds of spending that stimulate economic growth by increasing demand for rural nonfarm products, as well as urban industrial products. Second, the key to renewed growth in the agricultural sector is rapid technical change in food production. Greater productivity, brought about by technical change in staple food crops, generates broad-based growth through increased rural incomes and reduced prices of food.

The success of Asia's green revolution encouraged many scientists, governments, and donor agencies to try to replicate Asia's model for technical change in Africa, but virtually all of these attempts have failed. There is abundant evidence that Asia's green revolution model cannot be automatically replicated in Africa (Eicher 1989). Instead, there is a need to turn inward, to study Africa's own experience in developing food production models compatible with its cultures, histories, environments, and population densities. This book contributes to the debate over the future course of African agriculture by focusing on a large body of recent research on one staple food crop, maize. Africa's emerging revolution in maize production represents one of the few rays of hope for stepping up food production over the coming 10 to 20 years.

Technology alone, however, will not provide the momentum for a maize revolution. Institutional change, rural infrastructure, and policy are critical to success, and this book focuses on these complex issues. During much of the 1980s, development assistance agencies promoted reforms to remove the large policy distortions that characterized most countries in Africa and that almost invariably discriminated against the agricultural sector. Policy reforms also encouraged privatization of product and input markets, in which governments had been dominant, and the elimination of input subsidies, especially on fertilizer. Much progress has been made, but policy reforms are still incomplete (Donovan 1995). We will return to some of the issues in the policy debate later in this chapter, but first we discuss our reasons for focusing on maize rather than on any other staple food crop.

Why Maize?

We have chosen to focus on maize in this book for several reasons. First, although maize is a relatively new crop in Africa, its production has expanded so rapidly since independence that it is the most important food

crop for urban and rural consumers.¹ Maize is the dominant food staple throughout most of eastern and southern Africa, where its importance equals that of rice and wheat in much of Asia. Consumption of rice and wheat is increasing more rapidly in Africa, but these increases are supplied largely through imports, whereas maize is a home-grown food.

A second reason for focusing exclusively on maize is that the past two decades have yielded some compelling success stories for this crop, as the use of new seed and associated technologies has increased smallholder maize production. The diffusion of new technologies in Africa has been more widespread for maize than for other food crops, and Africa's maize experience can provide lessons for increasing food production more generally.

Third, as we look to the future, maize—with its high yield potential and ease of processing and marketing for urban consumers—has considerable potential to help reverse the downward spiral of food production in Africa (Blackie 1994b). More knowledge is available about production systems, processing, and marketing for maize than for any other food crop in Africa. Finally, maize is a politically important crop in many countries because it is the most important food staple. The chapters in this book bring together a large body of new evidence on the evolving maize economies of Africa, including country studies that summarize results of recent surveys of thousands of farmers.

Food Policy Debates

The six country studies bring fresh evidence to bear on policy debates surrounding future food production strategies, beginning with evidence related to several technical questions. To what extent should food production strategies emphasize high-potential areas and/or areas with good infrastructure, where the potential for quick payoffs is highest? Given the extremely critical nature of the food crisis in Africa, the country case studies make a strong case for seeking an increase in production in high-potential areas with adequate rainfall, where maize is often the leading food crop. Despite the continuing, gradual spread of maize into more marginal areas in Africa, most maize is still produced in medium- to high-potential areas, although the crop is subject to infrequent but sometimes severe drought. Maize also tends to be grown in more densely populated areas and areas with better infrastructure. Thus maize is concentrated in areas that, because of their ecological and geographic characteristics, have the potential to be major breadbaskets of Africa.

A related question that permeates much of the debate about strategies for technical change in Africa is whether the major agents for increasing food production should be external inputs (fertilizers, hybrid seed, and

pesticides) or new, low-input production systems that emphasize farmer-saved seed (i.e., open-pollinated varieties) and internally generated sources of crop nutrients (Low 1993). Fertilizer use in Africa is still very low and, even more important, the rate of growth in fertilizer consumption in the 1980s was slow compared to Asia and Latin America, where fertilizer use has grown rapidly, even in rainfed areas. One school of thought vigorously maintains that the poor infrastructure in much of Africa, combined with the poverty of African farmers, precludes the use of such external, usually imported, inputs. Adherents of this view contend that other means, based on internally generated sources of nutrients, must be found to restore and maintain Africa's impoverished soils. Given that increased doses of chemical fertilizer have been an important source of growth in crop yields in both industrialized and developing countries since World War II, this question is obviously central to future strategies for African food production. If the model of change in agricultural productivity that has served much of the world in recent decades is not applicable in Africa, the implications for investment in research and extension in Africa to develop and diffuse new types of technologies are enormous.

The worldwide emphasis on protecting the environment has stimulated interest in natural resources, especially soil and water conservation. There is no doubt that critical problems of soil and water conservation exist in Africa. An important issue to resolve is the extent to which the historical emphasis on increasing agricultural productivity should be shifted to give more emphasis to conservation of land resources for succeeding generations.

Sustainable agricultural systems require more than a one-time boost to agricultural productivity. Institutional structures must be in place to provide a continual stream of new innovations and to adapt to an ever-changing environment. These structures include research and extension systems and seed and fertilizer distribution systems. The record of building research and extension systems in Africa has been disappointing. From a very small base at independence, these systems have grown rapidly in numbers of scientific staff, but real budgets have eroded steadily. Declining funds, combined with poor incentive systems and defective management, have provoked a crisis in African research and extension systems (Eicher 1989). Many African governments are grappling with the question of how to revitalize these systems. New management and incentive systems, in which the private sector, farmers, and nongovernmental organizations (NGOs) participate, are part of these ongoing institutional experiments. Some of these, such as the Training and Visit (T&V) extension system, have been widely applied in Africa. Given the weak state of African national research systems and the small size of many African countries, regional research bodies and networks and international centers assume greater importance in Africa relative to other regions. These institutions, however, have also been undergoing rapid evolution.

Finally, from the colonial period into the postindependence period, the heavy hand of government has pervaded almost all aspects of food crop production in Africa, including input supply, processing, and marketing. The period since 1980 has seen an effort not only to align local prices with international prices through reforms in exchange rates, price policy, and trade but also to minimize or eliminate government interventions in agricultural markets, allowing the private sector to take over. Under pressure from international lenders and donors, governments are withdrawing marketing board monopolies on food procurement and distribution, privatizing fertilizer distribution, removing fertilizer subsidies, and selling state seed monopolies. Although considerable progress has been made—especially in freeing trade and exchange rates—the process is still incomplete, and the debate continues over how to sequence and implement reforms. It is now recognized that it is not enough for governments to abruptly withdraw, for example, from fertilizer distribution and assume that the private sector will effectively take over (Tripp 1993). Likewise, the dismemberment of effective maize marketing boards in some countries has led to difficulty in stabilizing maize prices and administering a floor price to producers. Thus a critical but still unresolved debate concerns the appropriate role of government intervention in input and output markets in the climate of fiscal austerity and privatization of the 1990s (Smith 1995).

All of these issues are discussed to varying degrees in the chapters of this book. Through a focus on one crop from the farm level to the consumer, we hope to add significantly to the debate and identify appropriate policy interventions to increase food production.

Objectives and Outline

This book has four main objectives. First, we seek to synthesize historical and contemporary experience related to Africa's emerging maize-based revolution; second, to foster cross-country comparisons and exchange of information on technical, policy, and institutional issues in maize production, marketing, and processing; third, to provide guidelines to African policymakers and international agencies for developing environmentally sound strategies for increasing the production of maize; and fourth, to identify research gaps and priorities for technology generation, farmer support systems, and policy reforms to meet future food supply needs.

The book is divided into four parts. A general overview of maize production and consumption in Africa (Chapter 2) concludes part one. Part two presents case studies that synthesize information on the evolution of the maize economies of six countries (Chapters 3–8). The six countries were selected on the basis of the importance of maize in local diets and success in introducing improved maize production technologies. The chapters

draw on in-depth studies of maize production, processing, and marketing completed within the past five years. All of the studies are based on extensive fieldwork, including surveys of thousands of farmers. The results of these studies provide a unique opportunity to draw implications for future food production strategies, policy reforms, and donor assistance.

The third part of the book examines technologies, institutions, and policies to increase food production in Africa in the twenty-first century. Chapter 9 reviews past achievements and future challenges related to the generation and diffusion of technology through research and extension systems. The next chapter discusses the need to take account of consumer preferences when setting priorities for maize research. Chapter 11 focuses on a critical issue in much of Africa's maize belt: the search for cost-effective and sustainable approaches to increasing soil fertility.

Government monopolies are rapidly being replaced by new forms of public and private partnerships and new indigenous and multinational seed companies in eastern and southern Africa. These encouraging institutional innovations are discussed in Chapter 12 on the maize seed industry. Chapter 13 examines the contentious issues surrounding the development of efficient fertilizer distribution systems. Chapter 14 pulls together the burgeoning literature on maize marketing, processing, and pricing to shed light on the complex issues of public grain marketing monopolies. In eastern and southern Africa, most of these monopolies were established during the world depression in the 1930s to regulate the pricing and distribution of maize. In the wake of the policy reforms that have occurred over the past decade, the appropriate roles of government and the private sector in marketing maize and other food crops are evolving and subject to vigorous debate.

In part four, we draw together the main findings from the country studies and technical chapters to identify the crucial decisions that must be taken to increase maize production in Africa in the next 20 years. Although these findings are based on the analysis of data for only one crop, we believe many of the conclusions and generalizations are relevant to the broader issues of increasing food production in Africa.

Note

1. In 1992, the per capita calorie consumption of food staples in sub-Saharan Africa was as follows: maize, 302; cassava, 299; sorghum, 162; rice, 162; millet, 123; wheat, 120; sweet potatoes, 107; and plantain, 57 (FAO, various years).

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Evolution of the African Maize Economy

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Maize was a relatively minor food crop in Africa in 1900, but today it is the continent's most important food crop. This chapter first briefly traces the evolution of maize in Africa during the twentieth century and updates the historical description provided in Marvin Miracle's *Maize in Tropical Africa* (1966). The bulk of the chapter is devoted to an analysis of broad trends in maize production, yields, and consumption over the past thirty years, based on secondary statistics. Given the poor quality of statistics in Africa, the conclusions must be treated with caution. Some countries undoubtedly have fairly reliable statistics on food production and consumption, but in many other countries civil war and financial constraints have produced gaps and inconsistencies in the data.

Historical Background

Maize arrived in Africa in the course of the sixteenth century, most likely through Portuguese traders who stopped along both the western and eastern coasts. From the coast, maize slowly moved inland through various routes, particularly through the incursions of slave traders, who valued maize as a storable and easily processed grain (Miracle 1966). Most farmers had little to do with the new crop, however, and for centuries maize was an important food staple in only a few pockets of Africa.

Maize's transition to a major crop occurred in Kenya during World War I, when the colonial government encouraged farmers to plant maize for the war effort. At the same time, a serious disease epidemic in the traditional food crop, millet, led to famine, and stocks of millet seed were consumed rather than saved for planting. By providing farmers with seed of a late-maturing white maize variety, the colonial government sped the transition from a millet- to a maize-based food economy. After the war, the development of export markets encouraged maize production, and by the