

Maize and Grace: History, Corn, and Africa's New Landscapes, 1500–1999¹

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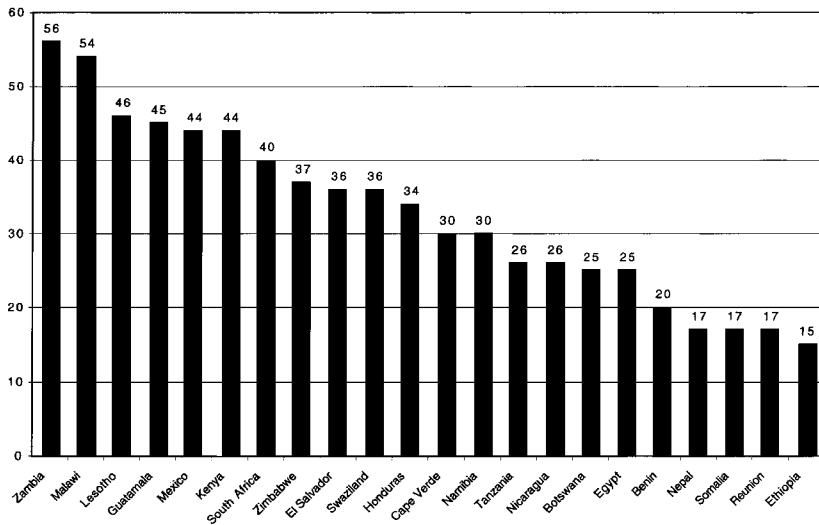
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Bemba, after leaving their country to work in urban areas in the south, say they find it difficult to adjust themselves to the maize flour “mealie meal” they are given there. One old man probably too fixed in his gastric habits to become adapted to town life said, “Yes, first I ate through one bag of [maize] flour and then a second. Then at last I said, ‘Well, there it is! There is no food to be found among the Europeans.’” Audrey Richards, *Land, Labour, and Diet in Northern Rhodesia* (1939)

The old man's complaint about maize as “European” food in Audrey Richards' now classic 1939 field study reflected his obvious disdain for the new food of the mines and cities of colonial Northern Rhodesia (Zambia). His perception of maize as “European” food was, however, anachronistic even in 1939, reflecting a landscape of memory rather than the creep of agrarian modernism and the maize-based diet of an urban wage-labor economy. In fact, by the 1930s diets and farm plots all over twentieth-century Africa were rapidly changing their seasonal tastes, textures and colors to reflect the inexorable spread of a food crop with origins in the New World, but with an increasingly African personality. These dramatic changes over the past three decades have now superseded the analysis and speculative data of Marvin Miracle's classic work *Maize in Tropical Africa*, and call for a reinterpretation of maize's historical trajectory in Africa.² The chronology and meaning of maize's expansion in Africa are the subjects of this article.

By the last decade of the twentieth century a tidal wave of maize had engulfed Africa, save its driest and wettest crannies, supplanting historical African food grains like sorghum, millet, and rice. Maize's recent spread has been alarmingly fast, with the historical and social implications of that change receiving scant consideration by social scientists. In southern Africa maize has become by far the most important staple food, accounting for over 50% of calories in local diets; in Malawi alone, maize occupies 90% of cultivated land and 54% of Malawians' total calories. Malawians of the late twentieth century state that “*chimango ndi moyo* (maize is our life).” Far from considering it as a European food like the Bemba man above, Malawians have forgotten maize's New World

TABLE 1:
Maize Calorie Consumption as % of Total Diet



origins and call their favorite variety “*chimango cha makola* (maize of the ancestors).”³ In the modern landscapes of Zambia that soon enveloped the world of the old Bemba man, the impact is even greater: Zambia has the world’s highest percentage of maize consumption in the national diet (58% of total calories). In South Africa itself, maize comprises 60% of all land planted in cereals and 40% of total calories consumed.

Like Zambia, many of Africa’s modern agrarian and urban landscapes have come to bear the imprint of this single crop. Maize has been the leading edge of an African agrarian transformation with ambiguous consequences: of the twenty-three countries in the world with the highest percentage of maize consumed in national diets, sixteen are in Africa (see Table 1).⁴ Moreover, the top three countries on this list are all in Africa (Zambia, Malawi, and Lesotho), and surpass even Guatemala and Mexico, maize’s homelands. In East Africa as a whole, maize accounts for 30% of all calories; Kenya and Tanzania are sixth and fifteenth on the world list of percentage consumption. Ethiopia, one of the world’s centers of genetic diversity in crop germplasm, now produces more of this New World food than any other crop.⁵

AFRICA’S GREEN REVOLUTION?

While the Americas produce more of their native crop in total volume, the overall impact of maize may be greatest in Africa, where its growth as a major food source has paralleled the continent’s economic and nutritional crises. Since its

original arrival with missionaries, merchants, and slave traders, the crop has expanded its domain in fits and starts. But in the last two decades, maize's rapid advance as a major food crop in Africa has caught the imaginations of agricultural economists and international policy planners, who see it as an agricultural sea change possibly equivalent to Asia's Green Revolution of the 1970s.⁶ Entrepreneurial academic economists like Carl Eicher and Derek Byerlee see the dominance of maize in Zimbabwe, Kenya, Malawi, and South Africa as a free market economic miracle. Nobel laureate Norman Borlaug, icon of Asia's wheat/rice-based green revolution, has also taken up the cause. He argues, through the organization Sasakawa Global 2000, that the technologies and new crop varieties already exist to launch Africa's equivalent of Asia's wheat/rice revolution of the mid-1970s, this time with maize adoption as its most visible expression.⁷

These bold claims suggest the need more fully to understand maize's historical role in Africa. The purpose here is to outline maize's historical engagement with the landscapes of Africa over half a millennium (1500–1999); i.e., from its introduction in around 1500 to its current apotheosis as Africa's dominant food crop. I thus will trace the history of maize's arrival into African fields, storage cribs, grinding stones and diets; its entrance into local rural scenes; and its ascension as a major *dramatis persona* in Africa's food supply of the late twentieth century.

MAIZE AS REPERTORY ACTOR

Maize expresses its own history in its genetic makeup, its varieties and land races, its agronomic imperatives, its qualities as food, and in its own peculiar symbiosis with its human hosts and the land they inhabit. If the documentary record of maize is often maddeningly elusive, the crop is nonetheless a versatile historical player that both shapes and takes the shape of the societies that cultivate it. By knowing the plant's genetic endowments and agronomic idiosyncrasies we can read nuances and even evidence of dramatic historical shifts into the disappointingly bare formal historical record.

While maize comes in five phenotypes—sweet, pop, floury, dent, and flint—all its forms derive from a single ancestor domesticated in central Mexico around seven thousand years ago. Though the exact date and circumstances of *Zea mays*' first cultivation is a mystery, by 1500 A.D. the Aztec and Mayan civilizations had long called the descendants of that plant "maize," literally "that which sustains life," and claimed that the crop was flesh and blood itself. In the modern economies of the U.S., East Asia, and Europe, however, it is the ultimate "legible" industrial raw material: agribusiness uses its starches and cellulose for fuel, fodder, paint, plastic, and penicillin.⁸

As a food plant maize has a split personality, appearing in some times and places as a vegetable crop in the garden, and at others as a grain in the field. On a farm it can be either, or both. As a household garden crop, people eat maize

at its green, milky stage, boiled as a snack, or roasted on the cob. As a field crop, farmers broadcast seeds onto prepared plots and harvest the dried ears; women grind its kernels for flour. In a strict nutritional and physiological sense, maize is a vegetable rather than a grain, offering vitamins A, C, and E (some of the ways in which a vegetable is defined nutritionally), but lacks the lower B vitamins that characterize a true grain such as sorghum or wheat. Corn is high in carbohydrates but low in useable protein, especially the vital amino acids lysine and tryptophan; its leucine content blocks absorption of niacin, a vitamin whose absence causes protein deficiency.⁹ When sown as a field crop, however, maize takes the mantle of a grain, often replacing true grains like wheat, rice, sorghum, or millet. In modern commodity markets maize appears as a grain; commercial farmers cultivate, harvest, process, and store it agronomically as such. In the late twentieth century as it has approached the status of a monocrop on African farms. Maize has overwhelmingly and permanently taken on a grain's dietary personality.

As a grain, maize yields more food per unit of land and labor than any other. Yet, to those in Africa and in the non-industrial world, seduced by maize's obvious virtues, corn has also revealed a darker side. It is highly sensitive to deprivation of water, sunlight, and nitrogen; it rots easily in tropical storage. Even a few days of drought at the time of tasseling can ruin a crop. Thus, maize monocultures are extremely vulnerable to environmental shocks, especially drought. It may also impoverish the bodies of those who depend too heavily on it for food, resulting in disease such as pellagra and kwashiorkor. The end result is that when they plant maize, commercial farmers and peasant families (especially women—African maize is largely a woman's crop) walk a slender tightrope of risk. Still, its cultivation continues to spread from rain forest plots to cocoa farms, and from remote villages to urban vacant lots. Moreover, Africa is distinctive among world regions in that 95% of its maize is consumed by humans, rather than used as livestock feed.¹⁰

Plant biology provides distinctive insights into maize's agronomic personality. Like house mice, English sparrows, and *Anopheles gambiae* mosquitoes, maize requires human presence to survive. Unlike self-pollinating grain equivalents such as wheat and rice, maize cross-pollinates and depends on humans to collect and sow its seeds. Within its twenty chromosomes each maize kernel contains part of the genetic record of its long and complex history of human husbandry.¹¹ By conscious seed selection, farmers and professional maize breeders can cajole the maize plant into changing its time to maturity, adjusting its height, increasing its yield, transforming its hard starch to soft, changing the color of its kernels, or increasing the percentage of those kernels that pop in a microwave oven. Each of these features can reside within the genetic makeup of a single land race (sub-variety) of maize, making each kernel a sum of generations of human selection in its original American homeland—a range of micro-ecologies that include the Caribbean, Brazilian coastal lowlands, and

the Andean highlands. Each of these regions contributed a different set of traits that made particular maize land races adaptable to specific ecologies of the Old World. Nestled in new African ecological crèches after 1500, maize allowed Old World farmers to tease out new expressions from its genetic palette.

In its modern form maize has spread as a grain, in hybrid and open-pollinating varieties that are products of the commercial breeding programs of governments, seed corporations, and international agencies.¹² Like a child's set of building blocks, maize is reducible to its genetic elements for experimental recombination. Its components can also be built into huge, uniform cultivations extending to thousands of hectares, a scale that appeals to centralized state planners and corporate farms, as well as to small farmers on half-hectare plots. For better or worse, modern genetic alchemy has transformed maize's personality from an obligingly adaptive vegetable crop into a hegemonic leviathan that dominates regional diets and international grain markets. In contrast to early genetic selections by native Americans, who adapted maize to the vagaries of locality, modern plant breeders choose reliability in character (especially yield) and then seek to manipulate the local ecology with nitrogen, irrigation, and herbicides in order to achieve uniformity. Modern human management has thus produced a plant that anticipates a predictable ambience, with only a limited ability to conform to the soils and climate of diverse local landscapes.

ON STAGE: MAIZE'S ARRIVAL IN AFRICA

After the opening of the Atlantic basin to trade, cultural exchange, and violent exploitation, the Old World was for maize a *tabula rasa*. Maize arrived in Africa after 1500 as part of the massive global ecological and demographic transformation that historian Alfred Crosby called the "Columbian Exchange."¹³ The great irony, of course, is that the same Atlantic economy that wrenched captive labor from Africa to the pre-industrial economies of scale in the New World also provided the former continent with new cultigens (cassava, beans, potatoes, and maize) that reinvented Africa's food supply. There is, however, little documentary evidence of what must have been a conscious process of Europeans and Africans introducing the maize plant to Africa. The importation of the maize seeds to various parts of Africa generally went unremarked, though it certainly was not unremarkable.

The first reference to maize's introduction to Africa may be that of an anonymous Portuguese pilot in 1540, who described its already well-established cultivation on the Cape Verde Islands:

At the beginning of August they begin to sow grain, which they call Subaru [zaburro], or in the West Indies mehiz [sic]. It is like chick pea, and grows all over these islands and along the West African coast, and is the chief food of the people.¹⁴

On the island of Sao Tomé another Portuguese pilot in the mid-sixteenth century reported that the island's slave traders fed their captives on "zaburro, which

we call maize in the western islands and which is like chickpeas.”¹⁵ By the middle of the seventeenth century, European references to maize in settings in West Africa became more commonplace. French scholar Dominique Juhé-Beaulaton has cited in great detail historical “recit[s] de voyage” that describe the appearance of maize on West Africa’s Gold Coast beginning in the early seventeenth century. She notes that by the late seventeenth century the cultivation of both millet and sorghum declined dramatically against maize. By the eighteenth century maize was the principal *céréale cultivée* in the region. Only in two areas, the Volta river delta and at coastal Axim, did rice remain the dominant cereal.¹⁶

In southern Africa, maize still had not arrived at the Cape by 1652; Jan Van Riebeeck did not report seeing it there in that year, despite his hope to identify new local food sources. As part of his plan to provision Dutch East India Company ships he asked for maize seed to be sent from home, to test its value at his planned supply station.¹⁷

The threads of cultural, aesthetic, and popular responses by African peoples who appropriated the New World crop into their diets and economic lives provide more enigmatic evidence of maize’s arrival in Africa. One measure of local perceptions of the new crop, and the timing of its local arrival, is the fascinating panoply of names that African languages attach to maize. One common Old World practice for naming the new arrival was the use of a name for an already-known grain, combined with popular ideas about its provenance. In highland Ethiopia, Semitic speakers called it *yabaher mashela* (lit. “the sorghum [from] the sea”); in Malawi, speakers of Chichewa called it *chimanga* (lit. “from the coast”), indicating a similar perception of its origin; on the East African coast the Kiswahili word is *muhindi* (lit. “the grain of India”). Among East African language groups (Chagga, Akamba, Samburu, Pokomo, Taita), who must also have received maize first from the coast, the common name for maize is *pemba*, the name of the island on which sixteenth-century Portuguese planters began to raise foodstuffs, including maize, to supply their coastal garrison.¹⁸

At the mouth of the Congo River in the mid-sixteenth century local Kikongo speakers called maize *maza mamputo* (“[grain of] the white man”); Mande-speakers in Senegambia offered *tuba-nyo* (“white man’s grain”), a similar gloss. From Egypt southward and along the trade route south to Lake Chad, local lexical terms for maize, especially in Hausa and dialects of Fula, derived from the root *masa* (Egypt), describing maize’s likely direction of introduction to the region. Among other groups, the Bambara use *maka* or *kaba*, words that suggest maize’s introduction by pilgrims returning from the *hajj*.¹⁹

It is worth noting that the only African localities to use *burro* or *aburro*, derivations of the Portuguese *milho zaborro*, were two early sites of Portuguese trade: the earliest Portuguese permanent trading station on the West Africa coast at El Mina (est. 1482) on the Gold Coast, and in Mozambique. In Akan *aburo* is maize, but Akan-speakers also describe overseas countries as *aburokyire*, lit.

“[countries] where maize comes from.” The Akan call the English (their colonizers) *abrofo*, a similar reference to the maize-foreigner association.²⁰

West African societies also appropriated maize imagery into elements of ritual, popular oral tradition, sumptuary law, and material culture in ways that are evocative of its influence. In Akan oral tradition, one *ntoro* (exogamous patrilineal division), Bosommuru, has maize as its totem. The *ntoro*'s day of veneration (on Tuesdays) includes a ban on consuming maize on that day. Ivor Wilks' reconstruction of other oral traditions of Asante aetiology reaches back to the late fifteenth or early sixteenth century as the origin of Asante cultural identity, the approximate time of maize's first arrival.²¹ As indicated below, by the eighteenth century maize became strongly associated with the Asante army and perhaps with state power in general. One Akan proverb notes: *Aduane panin ne aburoo* (lit., The chief/elder among foods is maize).²²

Elsewhere in West Africa, maize appears as an anthropomorphic figure. In a nineteenth-century Yoruba folk tale maize appears as a mysterious ghost-like stranger:

I do not know at all, but I wish I knew
What clothes the maize plant wore
When he first came
To this Origbo from Olufe town
But this I know surely
That he was disguised upon his journey here.²³

In Yoruba symbolism, maize [*àgbàdo*] also appears within Ifá divination's oral verse, or *ÉsÉ Ifá*. Here the text celebrates corn's almost human fecundity:

Maize went nakedly to the farm
She brought back two hundred clothes
Two hundred clothes
Maize went to the farm alone
Two hundred clothes
She brought back two hundred clothes
Maize went to the farm alone
She brought back two hundred children
Two hundred children²⁴

Maize also established itself within West African aesthetic traditions of material culture. In ceramic ware, artisans among the Yoruba and several other groups used maize cobs as a tool to inscribe “maize-cob roulette,” a distinctive rolled design, on pottery. At Ife, the ritual center of Yorubaland, potsherds with this design formed the paving materials for elite household walkways.²⁵

HIDDEN EXPRESSIONS

For most African societies and agrarian systems there is little direct testimony to maize's arrival in local diets and in farmers' fields. Yet the hidden genetic and phenotypic evidence within the maize ear itself offers intriguing glimpses

into the crop's historical geography. Though all maize types can cross-pollinate, each of the many cultivars has distinctive characteristics in its starch content, number of rows, color, insect resistance, maturity dates, etc. Farmers and consumers select from these traits every year, when choosing the taste, appearance, and growth characteristics of the next year's seed. Each of the five major types of maize (sweet, pop, floury, flint, dent) moved into Old World settings having already evolved within distinctive New World ecologies and farming techniques.

The political geography of Europeans' New World conquests and trans-Atlantic trade thus determined the patterns of maize's genetic emigration to Africa. Spanish ships, for example, began their New World contacts with the Caribbean, and first encountered distinctive Caribbean flint maizes, identifiable by their hard starch, early maturation, and variegated bright colored grains (especially red Spanish flint maize). Thus, varieties with striking red kernels first came to the Old World at Seville, then moved on to Venice, and then to Africa via Egypt and the Nile Valley, where many observers and local names remark on their striking red color.²⁶ Roland Portères argues that Caribbean flint maize then moved south and west to West Africa, following the pilgrimage routes. Certainly, the core names of *makka* and *masa* in Fula, Hausa, and other West African languages imply this route (see above). At an early date, the Portuguese may have also introduced *Cateto*, a yellow-to-orange flint maize from the uplands of Brazil, a variety also found later among Xhosa and Zulu maize farmers at the Cape and Natal, respectively. All of these locations were, of course, situated along lines of trade within the early Portuguese trade hegemony.²⁷

Flint maize adapted well to many of the same niches in which Africa's indigenous sorghums and millets had thrived. Maize never fully replaced sorghum and millets in the drier areas of Senegambia, but it complemented them. The new crop's quick maturity also offered a low-labor food source in the pre-harvest "hungry season," i.e., well before long-maturing sorghum was edible. In more humid areas of West Africa, especially the Upper Guinea Coast, where rice was the dominant cereal, maize remained a vegetable niche crop, which was consumed fresh and not stored or hand-milled.²⁸ Whereas rice dominated the irrigated bottomlands of that zone, maize could occupy uplands and serve as a pioneer crop for new forest clearings, a role it also played in its spread into China and Southeast Asia.²⁹

In other non-rice areas of West Africa, farmers apparently disdained the hard starch and lower yield of flints and chose a "floury" maize as their dominant staple, replacing or avoiding the flint types that complemented the agronomic cycle of rice.³⁰ Floury maize may have come later to Africa, since its origins in the Andes and dry areas of northern Mexico made it less accessible to European settlers and merchants. Once it arrived, however, the soft-starch floury maize made dramatic inroads into West African areas as part of massive forest clearance and state-building efforts in the era of the slave trade and the new Atlantic

economy. The floury maize that dominated much of West Africa until the late twentieth century served not as a vegetable, but as a grain paired with New World root crops such as cassava and yam. Floury maize provided the carbohydrates essential to support large concentrations of population (see the Asante case below).

Floury maize, like its flint cousin, offered new options to West African farmers, who needed an annual crop that could adjust to a forest-savanna mosaic, thrived in newly cleared forest soils, was transportable, divisible for taxation, and resistant to the pre-harvest bird damage that plagued sorghum, millet, and rice. In West Africa, as in northern China, maize proved to be an excellent “relay” crop, planted between rows of cowpeas that mature in succession, and in intercropping with other food crops, especially nitrogen-fixing legumes like beans and peas. Most importantly, maize proved a pioneer crop *par excellence* for establishing forest fallow cultivation systems in new frontier forest settlements (see below).³¹

Outside of West Africa, maize had a different history of movement and adoption. Maize appeared in most areas of Africa within a century of the birth of the Atlantic system, but often unobtrusively, as a novelty or niche crop. In Ethiopia in 1623, Caspar Bauhin reported seeing a “pod” maize, a type with each kernel encased in a husk formed by the enlarged glumes of the cob, though there is no documentary evidence of extensive cultivation of maize in the highlands until 1805. Farmers on the Ethiopian highlands obviously kept maize within their repertoire as a garden vegetable crop, but disdained its use as a field crop until well into the twentieth century.³²

Elsewhere in eastern Africa the geography of maize followed closely on the penetration of mercantile imperialism and then formal colonialism. Along the Swahili coast sixteenth-century Portuguese settlers began cultivating maize to provision their garrison at Mombasa, and it became one of the staples of the mid-nineteenth century Swahili caravan towns that helped coastal traders penetrate the Great Lakes region. Maize appeared as part of the farm repertoire in early European accounts of local farming systems which were generally dominated by starchy bananas (*matooke*), New World root crops (including cassava and sweet potatoes), and African cereals. In Uganda by 1860 maize appeared in the garden agriculture of most of the major state systems—Buganda, Bunyoro, Toro, Ankole, and Acholi—where maize as a low-labor annual crop complemented perennial banana cultivation and local horticultural traditions. By 1876 on the shores of Lake George, Henry Stanley found local cultivation of “an abundance of Indian corn, millet, sweet potatoes, bananas, and sugar cane.”³³ By 1880 Emin Pasha (a European entrepreneur turned potentate) reported that maize was widely cultivated in the Acholi region of Uganda, where he had undertaken to introduce a “horse-tooth” maize variety [probably an American dent] that “thrives well.”³⁴ Other Europeans dutifully recorded maize as a food or field crop in their travels, though it was African farmers who found

ways to build it into the rhythms of labor, diet, and daily life. In Western Kenya it was women, who had lost male labor to early urban migrations, who were the most active innovators. In 1917 a new white dent maize was novel enough that Luo women called the new crop *orobi* (or Nairobi, after the capital, founded in 1901), perhaps a sign that it marked a new era in their economic lives.³⁵

Maize in southern Africa followed a somewhat different chronology of contact, though like in other regions the crop percolated onto African farms through international trade and population movements. Portuguese trade seems to have provided the earliest introduction, as suggested by use of names such as *zaburro* (in Mozambique, from the Portuguese *milho zaburro*), *masa mamputo* (in Angola, lit. “grain of the white man”), and *mealie* (Afrikaans, from Portuguese *milho*), a term used by many linguistic cultures in South Africa and Zimbabwe.³⁶ Other cultures use names with more enigmatic referents, or have borrowed names from neighboring cultures where the crop had had a longer history. Swazi traditions, for example, associate maize’s arrival with the origins of their Dlamini royal clan, but the siSwati language borrows the Zulu term *m’langu* (lit. white man).³⁷ Among the northern Tswana, maize arrived with missionaries who established agricultural stations as part of mission churches. As in the memory of the Bemba man quoted at the outset, southern African diets up to the first third of the twentieth century still consisted of sorghum and millet, reflecting landscapes where maize was sometimes known but never dominant.

Maize made its early appearance in southern African farms and gardens not as a protagonist, but as part of a supporting cast that fit into seasonal cycles or specific soil niches between the older staple crops, or alongside other New World émigrés such as cassava, beans, or pumpkins. Brazilian coastal flints, perhaps the first maize imports to southern Africa, adapted well to the drier areas favored by South African livestock-raising peoples. If flint yields did not challenge drought-resistant sorghum, fresh maize was edible earlier in the hungry season and could stay longer in the field without bird damage.

In areas to the north of the Limpopo river, early flint maize moved in tandem with the penetration of the Indian Ocean economy from the east. By the middle of the nineteenth century, maize was already part of a hand-hoe based, woodland fallow cropping system in low population areas of southern Malawi, where bush fallow was the norm. Maize then spread into the Shire highlands along with new varieties of cotton that reflected the growing regional exchange economy.³⁸ In drier areas of that region, where finger millet and sorghum were still the dominant starchy staples, farmers planted the moisture-sensitive maize seed (mostly flint varieties) in moist alluvial patches (*dambo* land), which they then covered with sand to prevent waterlogging and evaporation. Malawian farmers, in fact, preferred these local flints to more “modern” dent varieties until late in the twentieth century. On the farm, Africa’s early flinty maizes probably also appealed to women, who preferred flint maize’s high flour-to-grain

extraction rate because the flint germ separates from the bran more easily in the mortar than that of higher-yielding dent types. The longer husk of flint maize also protected ears from weevils in the field and during storage.³⁹

It seems that black South African farmers embraced the floury and flint maizes on their farms long before white settlers did. Even at the end of the nineteenth century, white South African farmers still argued that maize was a “Kafir” crop, with little commercial value. In South Africa’s largest maize growing area in 1914, the Orange Free State, only 2.25% of the province’s area was planted to the crop, mostly by black sharecroppers.⁴⁰ Only with the arrival of the American white dent variety “Hickory King” and its local descendants (such as Salisbury White) did white farmers take to maize as a major cereal crop, and then only after black African farmers had begun to exploit its usefulness and profitability in feeding growing mining centers.

In Africa as a whole, maize took its place within smallholder farms finely tuned to the vagaries of Africa’s capricious climate and old soils, but adoption of the new crop also increased the capacity for population growth and concentration. Traditional grain yields in Africa were less than half those of Asia and Latin America, reflecting the obstacles of aridity and poor fertility that generally attain in Africa. John Iliffe, in his *Africans: History of a Continent*, describes the African physical environment as distinctively challenging to its human inhabitants. He argues that, in contrast to Asian floodplain agriculture or temperate cultivation in highland Latin America: “. . . African peasant farming was a skilled craft producing numerous crops adapted to small variations of soil and climate.”⁴¹ Unlike New World farms that depended heavily on maize as a primary starchy staple, most African farmers initially adopted maize as a vegetable niche crop, tucked within a complex cropping system that relied on intercropping, rotation, and swidden management of fertility. In these systems, shaped by Africa’s sharply defined wet/dry seasonality, averting risk demanded diversity of cropping strategies, rather than rewarding efficiencies of scale. It was the late (i.e., twentieth-century) shift of maize into a monocropped grain staple that changed its effects on diet and transformed African farming systems. The following three vignettes illustrate separate stories of maize’s role in the formation of Africa’s historical landscapes.

Theaters of Change, Scene I: Maize, the State, and the Upper Guinea Forest

If maize percolated slowly into farms and foodways in most of pre-twentieth-century Africa, in some times and places it also assumed a more dramatic, *deus ex machina* role in events that were otherwise political, economic, and ecological. One of these episodes was the human transformation of the Upper Guinea forest (along West Africa’s Gold Coast) into the home base of major state systems in the seventeenth and eighteenth centuries.

The primary food dilemma for those involved in human settlement and state-building in the Upper Guinea forest was not a lack of protein, but a paucity of

carbohydrates. Wild yams and other tubers were part of the forest's biodiversity, but were too scarce to provide the caloric base for an army, a bureaucracy, a population of town-dwellers, or nucleated villages of taxpayers. While lowland rice (*Oryza glaberrima*) was endemic to the northern Upper Guinea forest in Sierra Leone and Guinea, it seems not to have made an impact on the drier, semi-deciduous forests of central Ghana and the historical Gold Coast.⁴² Other African grains, such as sorghum and millet, which sustained most dense savanna settlements, were long-maturing, needing ample sunlight and a long dry season to ripen into viable food. Yams were a source of carbohydrates and well-adapted to shady plots and forest soils, but were also a long-maturing, labor-intensive root crop that was more a prestige food than a reliable staple.⁴³ Forest soils were fertile and moist on surface levels, where leaf debris decomposed, but sunlight—the forest's most precious commodity—rarely reached the floor of the closed canopy forest. The tallest trees won the competition for sunlight, allowing only shade-loving plants to occupy the vegetative understory.

It requires a fairly bold vision to solve the historical puzzle of how the foundations of forest state-craft and population density were successfully laid in this region, given the paucity of archaeological and historical evidence. Historian Ivor Wilks takes one such approach, using tantalizing shreds of historical evidence and the botanical facts of forest ecology and crop agronomy. He has linked a description of the Akan people's development of a distinctive forest fallow agriculture to the conjuncture of the emerging Atlantic economy. To this convincing but still speculative formula, we need to add maize as an essential ingredient.

The fundamental issues constraining human forest settlement were: (1) how to remove high canopy, primary forest vegetation in order to allow sunlight to penetrate to food crops at ground level; and (2) how to prevent vegetative regrowth from choking fields after clearance. The figures for pre-modern tropical forest clearance are staggering: clearing a single hectare of primary climax tropical forest required removing 1,250 tons of moist vegetation using cutlass, billhook, and fire. It was hot, dangerous, and arduous work to remove the "cumbersome growth of fibrous stems and vines, mixed with other plants of a watery nature."⁴⁴

The gist of Wilks' equation, however, was not so much the daunting weight of biomass to be hacked, cut, uprooted, dragged away, and burned, but the fact that after the first clearance of 1,250 tons, subsequent clearance of the same plots after a fifteen-year fallow was only 100 tons! Thus, the key task had been the initial breaking of the forest canopy's monopoly on sunlight, and the first-stage removal of both the canopy and the choking understory of trees, bushes, and vines. Once the forest's primary canopy was cleared, an agricultural economy could expand its frontier into the forest; during the later stages of this effort, some labor was released for crop cultivation, military service, construction, etc.

Nineteenth-century observers tell us that this ecological revolution had already taken place when they first visited the forest zone. By the time of Dupuis' 1820 visit to the Asante heartland, the forest fallow system was well entrenched and much of the land clear felled, leaving a landscape akin to "the country gardens of Europe."⁴⁵ How was this cleared and cultivated landscape achieved, given the labor costs of the initial clearance?

Wilks answers the labor question with intriguing oral and documentary evidence that points to the fifteenth and sixteenth centuries as the time of a crucial conjuncture, which drew new human populations into the central forest and provided the social and institutional mechanisms (matriclans or *abusua*) to integrate them. The first European contacts with the West African coast, which arrived in the fifteenth century in search of gold, found that there was already an active slave trade bringing captive labor from the Niger delta to the Ghanaian coast. As the Portuguese traders quickly learned, the easiest way to obtain gold from the mines of central Ghana was to transport slaves from elsewhere on the West African coast to the new (founded in 1482) Atlantic entrepôt at El Mina.⁴⁶ The incorporation of these new populations as slaves, fictive kin, and dependents thus provided both the labor and the mechanisms of social coercion that permitted state systems to evolve.

One element of this story points directly to the early 1500s as a take-off point for changes in the ecosystem: the arrival from Central and South American forest ecosystems of new food crops ideally suited to feeding expanding forest polities. New World food crops—cassava, cocoyam, cowpeas, and above all, maize—brought by Portuguese ships to provision their coastal fortresses and island plantations, spread quickly beyond the fortress gardens. The infusion of these plants spurred an agricultural carbohydrate revolution that allowed peoples of the Upper Guinea forest to feed a dense, growing population, and fostered an elite political class, royal courts, and a standing army. Maize and cassava together were the nutritional wedge of a human assault on the forest landscape, intended to convert the forest's biomass and energy into useable carbohydrate calories. The primary weapon was a local "forest fallow" repertoire, a historically-accumulated body of local knowledge combined with revolutionary new plant germplasms.

Observers had been describing elements of the forest fallow farming system since the early nineteenth century, but its fullest elaboration appears in the insightful field work of anthropologist Kojo Amanor. What Amanor, working in the 1990s, describes as a twentieth-century adaptation, historical documents and data from other forest zones suggest was in fact a historical process that evolved over time, and which, as a system (or, more accurately, a set of related but localized practices), was in place throughout central Ghana after the sixteenth century, when forest farmers and gatherers first added maize and cassava to specialized niches within their forest cultivation.⁴⁷

Ghana's Upper Guinea forest cultivation system derives its rhythms from

two seasons of rainfall and a season of dry winds (the *harmattan*) that blows dry air and dust from the Sahel toward the Gulf of Guinea. The heavy rains take place between March and early July; a second, lesser rainy season begins in September and lasts until October and allows the cultivation of a second crop. The farm cycle begins with the clearing of fields for the primary farm between December and January. Farmers use cutlasses to slash and remove the understory of shrubs and ground cover. They then cut major branches from large trees (a practice known as pollarding) to open the canopy cover and add leaf debris as a mulch to the soil's surface.

With the beginning of rains in March, farmers place leaf debris, smaller branches, and other now-dried vegetation into piles for controlled burning. Fire reduces forest biomass to ash, and destroys insects and small weeds. Burning also releases phosphorous and singes the leaves and branches that may fall to the ground, thus adding organic matter to soil, enhancing the layer of mulch and increasing sunlight's penetration to the forest floor. Clearing, burning and pollarding, in effect, convert the energy stored above ground in the form of vegetation into soil nutrients, to feed nitrogen-loving food crops such as maize.

During the March rains farmers also plant yams in mounds near small trees that serve as stakes for the plant's emerging tendrils. With the March rains fully established, these farmers then plant maize, using minimum tillage to keep mulch and soil moisture in place. Maize thus receives the moisture essential for its early growth and tasseling. Two weeks later, cassava sticks are planted between the germinated maize plants, and cocoyam corms preserved in the soil begin to sprout. As these crops grow, a dense vegetation emerges, with maize leaves leading the way toward the intense sunlight they require. The leaves of the young cassava and cocoyams closer to the forest floor cool the maize roots and protect the forest soils from rainfall impact and direct sun.

Maize's capacity to provide a second harvest in a single season was a strategic boost to local food supply. This food supply, in turn, released labor to push the frontiers of forest settlement forward and support development of the art of politics and statecraft.⁴⁸ The forest fallow crop repertoire as a whole was thus part of an agricultural transformation that drew new labor into the forest and broke the logjam of primary clearance. One of the engines that pushed the Upper Guinea "forest fallow" revolution was the arrival of three New World domestic plants that occupied strategic niches in forest cultivation. As a new cultigen, maize offered an advantage—it was an early-maturing food source that provided carbohydrates by the end of the rains, with less work than yams. Maize also gave a second harvest, while cassava—another low-labor (but long-maturing) crop, which was able to remain stored in the ground for extended periods—complemented maize's early yield and double crops. It is therefore not surprising that historical sources report the increasing dominance of maize in forest and coastal cultivation during the era of the slave trade.⁴⁹

Over the course of the late eighteenth and nineteenth centuries maize con-

tinued its influence on state expansion and economic growth. First, it provided a transportable forest-based food supply for Asante's army, which had expanded its reach into savanna zones to the north. Second, farmers in the savanna, probably using mass selection techniques, adapted their floury maize to the drier environments at the savanna's edge, where the new crop slowly replaced sorghums and millets. By the middle of the twentieth century, northern Ghana's farmers had bred local maizes into early, middle, and late maturity varieties, ideally adapted to their farming systems and physical environment.⁵⁰

Scene II, South Africa: New Dents for Old Flints

Another, quite different maize-led transformation took place in southern Africa in the late-nineteenth and early twentieth centuries as a part of the mining revolution and industrialization that spiraled out from the Kimberly (diamonds) and Witwatersrand (gold) urban demands for food supplies to sustain mine labor. The evolution of a distinctive agricultural landscape—the region of the Transvaal, the eastern Orange Free State, and colonial Basutoland (Lesotho after 1968) known as the “maize triangle,”—was a product of the historical conjuncture of maize, labor migration, and nascent industrial capitalism on the South African highveld. This setting of highlands, palatable grasses, friable soils, and well-defined rainfall frontiers became a stage on which maize played a seminal role in struggles over labor, landscape, and livelihood. Maize thus stood at the heart of an industrial transformation of the national food supply.

Events of the mid-nineteenth century transformed the Vaal and Caledon river valleys on the highveld (see map) into a space for new demographic expansion and agricultural innovation. In the wake of the Zulu expansion of the 1820s [*mfecane*] and its dispersal of peoples on the highveld, and the Cape Dutch migration from the west after 1838, new and old populations pushed forward competing ideas about landscape and land use. For the Basotho people caught in this demographic crucible, the highveld landscape was not new for a farming system based on the hand-hoe and on sorghum as the primary grain crop, but it was *terra incognita* for the new requirements of the crops and tools that arrived as a part of the baggage of southern Africa's emerging political economy.

By the mid-nineteenth century, maize was already entrenched as a minor part of the highveld mixed cropping system.⁵¹ In this era, sorghum was the preferred food and the dominant crop, though flint maize appears to have been one of several complementary crops sowed in fields that women prepared with hand hoes and weeded cooperatively. The friable, sodic soils required little clearing or plot preparation, and allowed the Basotho to escape to defensive positions in the foothills at any sign of an enemy. Eugene Casalis, a French Protestant missionary, described in his diary his first encounter with the Basotho at the western edge of their territory in June 1833:

... we reached the foot of a beautiful mountain [Thaba Nchu] five to six hundred metres in height and several kilometers in circumference. Directly under the mountain, we

could see large fields of near ripe maize and sorghum (large millet). The inhabitants had built their huts on the steepest summits, as a precaution against enemy attacks. Those who were busy in the plantations fled at our approach.⁵²

By the 1830s, the Basotho had moved back onto lower cultivable lands, reclaiming pediment soils and territory that included abundant winter lowland grazing on sweet *Themeda trianda* grasses. Maize already appears to have been well established within the local diet, particularly as a vegetable that refugees could harvest early, roast quickly or prepare at a milky stage well before a season's planting of sorghum was mature. In 1840, Thomas Arbousset, accompanied by the Basotho chief Moshoeshoe and his son, visited the chief of an isolated village tucked into the Maluti Mountains:

. . . the good man offered us some sweet reeds; then his wives arrived to roast some corn cobs; from time to time they also brought us a kind of moist bread or *bohobe*, made from half ripe Indian corn, from Turkish corn [sorghum?], and pumpkin. All this ground and boiled together without salt is not, it is true, very appetizing; but what does one not eat when one is hungry?⁵³

The half-ripe maize served to the guest and described in other accounts of the period was undoubtedly the green milky stage of the older flint-type maize, which people had carried with them as they fled off the highveld and into the mountains from the violence of the *mfecane*. As in the case of the moist bread, the milky flint maize complemented sorghum (the preferred staple) and squash as a vegetable, rather than being the grain staple it later would become. Basotho must have seen this flint maize as a food of social turmoil, transportable and edible in quick order, and contrasted to long-maturing sorghum that required the stability of settlement. Also, unlike sorghum, which required constant vigilance against bird depredations, maize could be left in the field in otherwise open, dangerous areas and harvested in stages as safety permitted.

The 1867 discovery of diamonds at Kimberly rewrote the agrarian script of the highveld economy. Two of the earliest consequences of the influx of workers and capital to the northeastern Cape were: (1) the creation of a market for food and (2) the birth of economic infrastructure in the region, including a cash economy, road networks, and new technologies of transport and production (wagons and moldboard plows).⁵⁴ The response of Basotho farmers to these market opportunities was astonishing: in 1873 alone Basutoland exported over 8,000 metric tons of grain, perhaps a third of it maize. Export figures by 1893 had more than doubled to include 11,600 tons of wheat and 6,000 tons of maize.⁵⁵ By 1900 the Basotho response to urbanization and the region's links to international markets were apparent in the regional economy: winter wheat, maize, Merino sheep, and Angora goats superseded Basutoland's agricultural staples of sorghum, milk, and cattle. More subtly, these changes redefined maize from a garden vegetable to a commoditized grain; new urban consumers ate their maize not as a milky stage snack, but as "mealie" flour.

In addition to market access, trade brought new seeds suited to large-scale

production. The arrival of the railroad at Kimberly in 1885 also opened the regional markets to cheap grain imports and new ideas from Australia and the United States. A critical introduction from these contacts was a new maize type: the American medium-late white dent maize known as “Hickory King,” a variety that was to become the progenitor of most of South African (and, later, East African) commercial maize types over the course of the twentieth century. Hickory King was an eight-row, large-grained dent variety that tolerated poor soils but outyielded the older flint maizes. Dent maize, in contrast to its hard-starched flint cousin, not only had higher yields than older varieties and sorghum, but also had a soft starch suited to the mechanized milling of mining towns and new highveld urban areas.⁵⁶ Dent maize now offered the possibility of maize production on an industrial scale for export, and as a cash crop for both highveld black sharecroppers and commercial farms after the 1910s. Dent maize also provided a direct link to an international revolution in dryland agriculture, centered in the American midwest, that had begun to leapfrog into Canada, Argentina, Brazil, Australia, and, after 1917, the Soviet Union. Production on this grand scale made South African maize a potentially exportable commodity, valued in new international markets not as a subsistence food but as an industrial raw material (starch).⁵⁷

The same regional economic boom that fueled the agriculture of South Africa’s maize triangle also increasingly drew Basotho male labor to the mines and away from full-time agriculture. In 1873 fifteen thousand Basotho men worked in South Africa’s diamond mines; in 1886 (the year of gold’s discovery on the Witwatersrand) the number had doubled. Male wage labor thus had rapidly supplanted agriculture as a source of cash for the region’s black populations. The 1913 Native Lands Act, a pillar of what in 1948 became apartheid policy, resulted in mass dispossession of black sharecroppers and bolstered white farms investing in commercial maize production. By the 1920s only one fifth of Basutoland’s adult males were still employed in agriculture.⁵⁸

The entrepreneurial economy of the Orange Free State/Basotholand region that had shown such resilience in the 1870s suffered two simultaneous shocks in the first third of the twentieth century. First, the loss of men to the mines left local agriculture in the hands of women, who were forced to manage household farm production without male labor.⁵⁹ Second, the feminization of agriculture shifted strategies away from high-labor, uncompetitive wheat—increasingly available more cheaply from overseas markets—to low-labor maize. Winter wheat’s demand for timely labor at harvest raised production costs and increased crop losses. By contrast, maize offered two attractive but contrasting properties. It was an early-yielding, low-labor crop (compared to sorghum and wheat) that offered food to the family; it was also attractive to labor-poor farms because it could remain in the field until harvest season labor costs declined.⁶⁰ As labor costs forced wheat farms toward mechanization, maize farms, by contrast, relied on off-peak labor.⁶¹ For those large-scale white farms with access

to capital, improved dent maize was also a high-yielding cash crop amenable to commercial inputs and industrial-scale production. Maize thus was highly compatible with both the national labor equation that required mineworkers *and* the political need for a cheap food supply.

It was no accident that by 1930 maize surpassed wheat as the region's major cash crop, and in turn replaced sorghum as the major food crop. The seasonal exodus of male labor from Basutoland also meant that the colony had become a net grain importer.⁶² For the Basotho on the highveld, maize fed both sides of the "divided family": males in the mining hostels ate commercial mealie "papa" (cornmush), and women and young children on impoverished farms in the black homelands consumed their household local crop in the same form. After 1948 cheap "mealies" continued to sustain the economic foundation of apartheid.⁶³

In the late nineteenth century and the first third of the twentieth century there were few differences in the agricultural economies of the political units within the maize triangle. The Orange Free State, southern Transvaal, and Basutoland each served the growing industrial economy with labor and food. Orange Free State farmers, whose land was more arid, developed livestock ranches, whereas Basotho areas that received at least five hundred millimeters of annual rainfall concentrated on grain production.

By the 1930s and 1940s, however, the paths of their rural economies crossed and took very different trajectories. Black farms had ceased to produce food crops for the market and relied on maize as subsistence. White farms, by contrast, had grown in scale and attained access to resources of credit, extension, and markets through price controls and government programs. Mining towns and marketing centers like Bloemfontein, Maseru, Harrismith, Bethlehem, and Potchefstroom organized both markets for maize and the distribution of new crop varieties and equipment. The introduction of new high-yield, open-pollinated dent varieties like Hickory King and industrial milling in the new towns and cities encouraged such monocropping and, eventually, the mechanization of maize farming.⁶⁴

At the end of the twentieth century political and economic forces had inscribed two graphically divergent landscapes, which shared maize as their dominant crop. White farmers took advantage of a postwar boom to invest heavily in large land units, cheap black labor, and the technology of dryland production of winter wheat and hybrid maize. Since the 1950s, government subsidies from South Africa's mine-based economy allowed white farms to invest in tractors, harvesters, anti-erosion measures, and post-harvest processing technologies already tested on dryland farms in the United States and Australia.⁶⁵

Basutoland and black farms in South Africa itself, by contrast, emerged from the post-WWII years mired in the rural economy of a labor reserve: farms deficient in labor and capital produced maize primarily for subsistence. The networks of erosion gullies that zig-zag across the countryside, collecting rusting

auto carcasses and swallowing farmer's maize fields, are only the most visible manifestation of a fall from grace. Archival records show that the incidence of pellagra (a skin disease caused by niacin deficiency) and kwashiorkor in Basutoland increased in direct proportion to the rising percentage of maize in the local diet and the decline of sorghum as a staple during the post-war years.⁶⁶ The Lesotho economy, which had been a major grain exporter in the late nineteenth century, was, by the mid-twentieth century, a net maize importer. Maize was an engine of Basutoland's historical growth, but now has become a measure of its decline.

Scene III: The Salubrious Highlands of Ethiopia

In contrast to the West African innovation of forest fallow agriculture and the transformation of southern African agriculture on the periphery of a capitalist industrial boom, Ethiopia's highlands have displayed a remarkable stability of technology in their ox plow-based farming system, and the building of its repertoire of food crops. Deep soils, dedicated farmers, and the single-tine scratch plow called the *maresha* allowed early innovation in cereal crops and the agronomic strategies deployed within the highland's kaleidoscope of micro-ecologies. In fact, Vavilov's classic study of crop origins cited Ethiopia as the cradle and point of secondary dispersal for a wide range of cereals and pulses that later spread throughout the Old World.

By 1500, the plow, the classic battery of cereals (barley, teff, wheat, sorghum, eleusine), and an annual cropping regime had already been evolving for a millennium or more among a wide variety of local polities, ethnicities, and ecological frontiers. Maize's arrival on the highlands in the late sixteenth or early seventeenth-century, probably through Portuguese contacts, caused little stir.⁶⁷ Like many cultivators elsewhere in Africa, Ethiopian farmers unceremoniously added the new crop to their complex mix. In Ethiopia's highlands, maize cultivation occupied an altitude niche between wheat and sorghum, serving as a *gwaro* (garden) vegetable crop that was consumed green before the major cereal harvest.

Maize first appeared as a grain crop in historical records of the early nineteenth century, though it likely had taken that form in some places a few generations earlier. In 1805 in Tigray, traveler Henry Salt noticed a well-established field of *e bahr mashella* [lit, the sea's sorghum], which he glossed as Indian corn. He described a valley "well cropped, especially with Indian corn, which is usually more forward in this climate than any other grain," identifying maize by its most salient behavior, early maturity.⁶⁸ Other nineteenth-century travelers also found maize planted sporadically across the highlands, but never as a dominant grain crop. Most of these descriptions make it clear that what they saw was a yellow flint maize with a low yield, a plant height "that does not exceed 1.25 meters and has ears of 10 rows of small grain."⁶⁹

By the middle third of the twentieth century a new export economy of cof-

fee cultivation in the southwest created a conflict between labor, land use, and the agricultural cycle of traditional annual cereal crops. Instead of collecting wild coffee from the forest, farmers integrated the cultivation of coffee seedlings into their farm production. Local maize, already a household vegetable crop on southern farms by the late-nineteenth century, proved an ideal complement to the demands that coffee made on farm labor. After World War II a widespread coffee-maize complex evolved that paired coffee as a cash crop and local flint maize as an early-maturing, low-labor (in sowing and harvest) food available before the coffee income of the fall. Those farmers who did not produce coffee could earn cash as coffee laborers while still sowing maize on their own plots.

The coffee-maize complex in southern Ethiopia, also tying into the perennial culture of *ensete ventricosum* (false banana), expanded and matured over much of the southwestern highlands in the period from 1950 to 1975 and into the early years of the Ethiopian revolution's socialist development policies (1974–1991). In highland zones of the southeast (Chercher, for example) maize had already replaced sorghum as the primary grain crop. Agricultural marketing policies formed by urban technocrats within the new socialist government, however, squeezed local coffee farm profits by controlling prices on coffee and most cereal crops (excluding maize, the cheapest and least marketable of Ethiopia's food crops). By 1980, falling coffee prices and runaway food prices had undermined the economy of the coffee-maize complex. Coffee farmers began to cut coffee bushes and broadcast maize into those plots to avoid state control over coffee marketing. Farmers in the eastern highlands did the same, rapidly replacing sorghum with maize to complement the cultivation of *chat*, a narcotic plant with lucrative markets in Somalia and Yemen.

Ironically, the shift to maize also had a perverse appeal for peasant farmers outside of the coffee-growing regions. Unlike traditional crops such as sorghum, teff, wheat, and pulses, maize offered expediency. Farmers whose workforce was under pressure from the state-mandated forced labor policy could broadcast maize seed after only one plowing, whereas other cereals required up to four plowings. Local maize types needed little weeding; the plant grew as a pioneer crop on newly deforested land; and its quick maturity and relatively high yield feed hard-pressed families. Such farmers, however, gambled that the rains would come on time.

Government policies to resettle drought-affected farmers, force labor for road construction, and control marketable food crops provided further incentives for farmers to take advantage of the short-term exigencies of maize as an uncontrolled food source. Ethiopia's socialist military government also found in improved dent maize a food crop that they could push to replace the high-labor traditional cereals that they felt symbolized the *ancien regime*. Maize was one of the symbols of their "Green Campaign" of the early 1980s.

The rapid national rise in maize production during the revolution (1974–1991) pointed to the farmers' perceptions of crisis, an oppressive national gov-

ernment, and the availability of improved maize varieties from Kenya and the West. In 1970 and 1971, maize made up 15.3% of the national cereal production (fourth among all cereals). In 1983 and 1984, at the height of a famine, and after ten years of socialist agrarian policy, maize comprised 28.3% (first place) among all cereals.⁷⁰ From 1986 to 1991, maize as a percentage of total national cereal production rose from 32% to 48%.⁷¹ By the 1990s, maize appeared to have solidified its position atop Ethiopia's national food supply.

EPILOGUE / CONCLUSION

Ghana

Ghana underwent a second maize-led revolution in the 1990s, built upon both forest and savanna production as new improved varieties and economies of scale arrived on the scene through international crop science. From 1975 to 1995, maize area planted in Ghana increased by 124%, with yield increases of 50%. Maize often replaced both sorghum and cocoa.⁷² Prepared as *kenkey*, *banku*, or *akple*, maize has taken its place alongside cassava and yam as part of the region's national cuisine and farm economy. This has meant, however, that Ghana's food supply has begun the process of moving from the diversity of a forest ecology to the homogeneity of a maize-based diet and the use of new varieties distributed by the government and private seed companies.

South Africa/Lesotho

South Africa's expanding maize triangle is now a full-fledged member of the international maize industrial complex. From its modest origins, based in the coexistence of flint maize with traditional cereal crops, maize has grown to be South Africa's most important cereal crop. In 1999 maize occupied 60% of all land planted in cereals and 67% of total cereal production.⁷³ Mealies, consumed primarily by black South Africans, provide 35% of the nation's carbohydrates, 15% of the fat, and 31% of the protein requirements in local diets. Since 1994, South Africa has received 441 new maize breeding lines from the International Center for Maize and Wheat Improvement, and has now developed its own private seed companies to market hybrid lines to large-scale farms. Unlike elsewhere in Africa, however, South Africa's developed meat markets consume 25% of its maize for livestock feed.

Ethiopia

Despite the fall of the military government in 1991, international aid and the new government's agricultural policies have renewed the push to expand cultivation of improved and hybrid maize to farmers as part of "minimum" packages of fertilizer and seed, in part stimulated by the highly visible Global 2000 project sponsored by ex-President Jimmy Carter and Nobel Laureate Norman Borlaug. Successes in yield improvement have been quick in coming but may

be unstable. During my 1998 visit to Global 2000 project areas in the southwest, I observed that row planting has become widespread, as has use of improved open-pollinated (dent) seed and nitrogen fertilizer. There is evidence, however, that farmers who have had success with hybrid seed are “recycling” it for seed corn for the next planting (with likely losses in yield), or are choosing to return to traditional methods to avoid, in their view, harming the soil.⁷⁴

Strangely, Ethiopia's major expansion of maize production raises some perplexing questions, as surplus Ethiopian maize has few places to go. Regional markets are either unstable or unprofitable; storage and transport costs cannot cope with increased levels of production; and domestic urban markets have not yet fully accepted maize as a grain staple. Moreover, unlike Zimbabwe or South Africa, Ethiopia has no industrial capacity to process maize, nor an internal seed industry capable of providing domestic hybrid seed. The expanding landscapes of maize increase the country's vulnerability to drought and its own weak economic infrastructure, making it further dependent on either the world's markets or the world's largesse.

Africa's agrarian landscapes include two divergent responses to agrarian modernism, both of which reflect the impact of maize in the late twentieth century: one is a commercial maize landscape of uniform fields with an almost industrial order of crop rows, roads to markets, and the trappings of economic rationality. The other, by stark contrast, is a landscape of subsistence in which farmers cultivate small plots, distant from viable markets and dominated by maize. These economic and human landscapes of subsistence present to the eye Africa's classic historical, irregular patchwork plots, but on closer examination now include high proportions of maize as a grain and a primary household food supply. Though they offer quick meals to fill the stomach, fields of maize are increasingly dependent on the vagaries of rainfall and local markets.

The old Bemba man who lamented the lack of real food among Europeans probably could not foresee the irony of his children's, grandchildren's, and great-grandchildren's diets. The varieties of food, labor, and crop diversity than he imagined or remembered were already in his lifetime changing into a landscape of uniformity, and a new industrial poverty. Africa may well be experiencing a maize revolution that will sustain its expanding cities and reward rural entrepreneurs. But in exchanging its gardens for industrial fields, it will also be trading diversity for monotony and resilience for vulnerability.

ENDNOTES

1. For comments on an earlier draft of this paper at the Yale University Colloquium on Agrarian Studies I am particularly grateful to Robert Harms, Enrique Meyer, Eric Worby, and Cassandra Moseley. Jean Hay and Sara Berry also read drafts, and offered helpful advice.

2. Marvin Miracle, *Maize in Tropical Africa* (Madison, 1966).

3. Elon Gilbert, “The Meaning of the Maize Revolution in Sub-Saharan Africa: Seeking Guidance from Past Impacts.” Overseas Development Administration Network Pa-

per No. 55, 19: 3; Melinda Smale, "'Maize is Life': Malawi's delayed green revolution." *World Development*, 23, 5 (1995):820.

4. Christopher R. Dowswell, R. L. Paliwal, and Ronald P. Cantrell, *Maize in the Third World* (Boulder: Westview Press, 1996), 8.

5. Most Ethiopians are shocked by this fact. I recently asked an Ethiopian friend from a rural background to guess Ethiopia's major crop. She guessed wrongly five times and never ventured maize as a possible answer. West African maize has a lesser but growing role in the region's total calories. In Ghana, nonetheless, maize production has tripled since 1950 and has become that country's dominant cereal. Robert Tripp and Kofi Marfo, "Maize Technology Development in Ghana during Economic Decline and Recovery." In Derek Byerlee and Carl Eicher, eds., *Africa's Emerging Maize Revolution* (Boulder: Lynne Rienner, 1997), 95.

6. Byerlee and Eicher, "Accelerating Maize Production: Synthesis." In Byerlee and Eicher, *Maize Revolution*, 249–50.

7. Norman Borlaug, "Linking Technology and Policy." In Steven Breth, ed. *Overcoming Rural Poverty in Africa*. (Geneva: Center for Applied Studies in International Negotiations 1997), 140–2. Borlaug has championed the position that off-the-shelf technology and crop varieties already exist to transform world food supply, but that they must be linked to massive national extension efforts.

8. For a full description of the concept of legibility see James Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998), 2–3.

9. I am grateful to Prof. Vincent Knapp for information on the chemistry of vegetables. For maize chemistry, see "Quality Protein Maize," *CIMMYT Today*, 1 (1975):1–12.

10. Worldwide, the figure for human consumption is 34% (the remainder being fed to livestock). Byerlee and Eicher, *Maize Revolution*, 16; Dowswell, et. al, *Maize in the Third World*, 27.

11. It has been pointed out to me that human husbandry has also erased part of maize's genetic memory.

12. Hybrids are the result of crossing—once, or more commonly, twice—two or more inbred (self-pollinated) genetic lines to produce *heterosis*, or hybrid vigor, in order to increase yield or other desired traits. To maintain the desired characteristic, farmers must use new hybrid seed for each planting. OPVs, or Open-Pollinated Varieties, are the result of selection and combination of several desired traits from self-pollinated plantings to produce a uniform improved crop. OPVs can be replanted by farmers using seed from their own fields.

13. See Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492*. (Westport, CT: Greenwood Press, 1972). A few scholars have claimed that maize appeared in the Old World before 1492, citing early Portuguese references to *milho zaburro* on the West African coast. See M. D. W. Jeffreys, "The History of Maize in Africa," *South African Journal of Science* (March 1954):197–200 and M. D. W. Jeffreys, "The origin of the Portuguese word zaburro as their name for maize." *Bulletin de L'Institut Français d'Afrique Noire, Serie B, Sciences Humaines*, 19, 1–2 (January-April 1957):111–36.

14. Jeffreys, "The History of Maize": 198. In this quotation the common mistranslation of the Portuguese *milho zaburro* as maize (as opposed to sorghum, an indigenous African grain) is not a factor. The reference to *mehiz* and to the grain's resemblance to chickpeas points to maize as the cereal described.

15. M. D. W. Jeffreys, "How Ancient is West African Maize," *Africa*, 33, 2 (1963):121. Jeffreys cites a translation by Lains e Silva. Also, see Frank Willett, "The Introduction of Maize to West Africa: An Assessment of Recent Evidence," *Africa*, 32, 1

(1962):11. Robert Harms tells me that the French slaving ship *Diligent* called in at Sao Tomé in December and January of 1731 and 1732, where it took on cassava flour and “une Demy gamelle De mil,” as food for the middle passage. The latter may be maize rather than millet, since maize is elsewhere described as a major provision for such vessels calling at Sao Tomé. It is not clear why the *Diligent* did not take on maize, though perhaps the harvest was delayed.

16. Dominique Juhé-Beaulaton, “La diffusion du maïs sur les côtes de l’or et des esclaves aux XVII et XVIII siècles,” *Review français d’histoire d’outre-mer*, 77 (1990): 188–90.

17. A. J. H. Goodwin, “The Origin of Maize,” *The South African Archaeological Bulletin*, 8 (1953):13.

18. A. C. A. Wright, “Maize Names as Indicators of Economic Contacts,” *The Uganda Journal*, 13, 1 (1949):64. Wright mentions a Portuguese manuscript of 1634 that refers to maize production on Pemba island. By contrast, historian Steven Feierman tells me that the Shambai word for maize is mpemba, derived from the word for sorghum.

19. For many other West African languages the evidence is not at all clear. See Christine Chiang, “Determining the Origins of Maize in West Africa Using Ethnolinguistic Evidence,” unpublished paper, UCLA, 1997, 4. These names suggest possible patterns of adoption, though any conclusions can only be speculative and await a more detailed, systematic linguistic survey. A similar case is seen in India, where the Hindi word *makka*, or *makka jouar*, implies an introduction from Arabia and the Eastern Mediterranean. In each of these cases it seems likely that maize returned with *hajji*, whose pilgrimages provided both intellectual and agronomic cross-fertilization.

20. My thanks to Dr. Edward Kissi for this information.

21. R. S. Rattray, *Ashanti* (Oxford: Oxford University Press, 1923), 47. Also see Ivor Wilks, *Forests of Gold: Essays on the Akan and the Kingdom of Asante* (Athens, OH: Ohio University Press, 1993), 66–72.

22. J. J. Christaller, ed. *A Collection of Three Thousand and Six Hundred Tshi Proverbs* (New York, 1990), 150. I am grateful to the work of James D. LaFleur and to the advice of Maxwell Amoh and Edward Kissi for this citation.

23. A. Babalola, “Folk Tales from Yoruba Land,” *West African Review* 23, 292 (1952):14–15. Frank Willett, in “The Introduction of Maize into West Africa: An Assessment of Recent Evidence,” *Africa*, 32, 1 (1962):9, ascribes this tradition to the early nineteenth century.

24. “Wande Abimbola, *Ifá: An Exposition of Ifá Literary Corpus* (New York: Athelia Henrietta Press, 1997), 221–2.

25. Robert Soper, “Roulette decoration on African pottery: technical considerations, dating, and distributions,” *African Archaeological Review*, 3 (1985):31, 44.

26. The primary maize cultivated for polenta in Veneto region of Italy until 1952 was a red flint called Marano. I am grateful to Dr. Armando DeGuio of the University of Padua for this information. Colloquial Venetian for maize is “sorgo rosso” or “red sorghum.”

27. Joseph Burt-Davy, *Maize: Its History, Cultivation, Handling, and Uses. With Special Reference to South Africa* (London: Longmans, Green, and Co., 1914), 316. There was a white-grain version of this flint found on black South African farms. For further description of Brazilian *Cateto* flint maize, see also Dowswell, et al., *Maize in the Third World*, 17, 106–7.

28. Juhé-Beaulaton, “La diffusion,” 187, states that the seventeenth-century inhabitants of Aquapim consumed maize exclusively fresh or roasted on the cob.

29. Dowswell, et. al. *Maize in the Third World*, 202–5.

30. Portères argues that floury maize types came from the coast and flint types via the Nile valley. Miracle suggests that flints may also have come from the coast but found

less favor among farmers, especially women, who preferred the soft starches more suitable to hand-milling. Current "local" maize varieties in Ghana are semi-dent floury types. Interview with S. Twumasi-Afriyie, Kumasi, July 1997. See Roland Portères, "L'Introduction du Mais en Afrique," *Journal de l'Agriculture Tropicale et de Botanique Appliquée*, 2, 5–6 (May–June 1955):224–6; and Marvin P. Miracle, "Interpretation of Evidence on the Introduction of Maize into West Africa." *Africa*, 33, 2 (1963):133. Burt-Davy mentions a Brazilian flour corn that resembles a Zulu bread maize known as *u'hlanza-gazaan*. See Burt-Davy, *Maize*, 322–3.

31. Dowsnell, et al., *Maize in the Third World*, 48–49.

32. See James C. McCann, *People of the Plow: An Agricultural History of Ethiopia* (Madison: University of Wisconsin Press, 1995), 56. For an earlier date for pod maize see Burt-Davy, *Maize*, 13.

33. Henry Stanley, *Through the dark continent* (New York: Harper and Brothers, 1878), Vol. I, 439.

34. G. Schweinfurth, ed., *Emin Pasha in Central Africa* (London: G. Phillip and Son, 1888), 418.

35. John Gerhart cites the pioneering work of Margaret Jean Hay. See John Gerhart, *The Diffusion of Hybrid Maize in Western Kenya* (Mexico City: CIMMYT, 1975), 35. Hay has pointed out that Luo farmers readily accepted maize but initially rejected cotton cultivation pushed by the expanding colonial state.

36. Burt-Davy, *Maize*, 13–14; 18–24.

37. Burt-Davy, *Maize*, 13. I am grateful to Sandra Sanneh of the Department of African Languages at Yale University for help on South African languages.

38. Megan Vaughan, *The story of an African famine: Gender and famine in twentieth-century Malawi* (Cambridge: Cambridge University Press, 1987), 52–53. Vaughan suggests that maize had been present in the area since "before the eighteenth century." For a wider view of agricultural change in central Africa, see also Megan Vaughan and Henrietta Moore, *Cutting Down Trees: Gender, Nutrition, and Agricultural Change in Northern Rhodesia* (Portsmouth, NH: Heinemann, 1994).

39. Smale, "Maize is life": 819–31. Burt-Davy reports a similar flint "Kaffir" maize collected in southern Somalia around 1900 from an area settled by freed slaves originally from the Malawi area. Burt-Davy, *Maize*, 314.

40. Burt-Davy, *Maize*, 322–3. Also see William Beinart and Peter Coates, *Environment and History: the taming of nature in the USA and South Africa* (London: Routledge, 1995), 58.

41. John Iliffe, *Africans: the history of a continent* (Cambridge: Cambridge University Press, 1995), 268. For references to maize and population growth see 110, 114, 138, 164, 173, 215, 217.

42. For evidence of the geography of historical cereal on the West African coast, see Juhé-Beaulaton, "La diffusion," 185–6; 190–1.

43. For his views on the ecology of yams I am grateful to Dr. Edward Ayensu, former ecologist at the Smithsonian Institution and now an environmental consultant in Accra, Ghana.

44. Wilks, *Forests of Gold*, 58, cites J. Dupuis, *Journal of a Residence in Ashantee* (London, 1924), 65–66.

45. Wilks, *Forests of Gold*, 58.

46. Wilks, *Forests of Gold*, 70.

47. Kojo Amanor, *The New Frontier: Farmer's Response to Land Degradation, A West African Study* (London and Geneva: Zed Books Ltd., 1994), 173–8. For the arguments that this is a historical process and not merely recent adaptation, see James Fair-

head and Melissa Leach, *Misreading the Landscape: society and ecology in a forest-savanna mosaic* (Cambridge: Cambridge University Press, 1996), 289; James Fairhead and Melissa Leach, *Reframing Deforestation. Global analysis and local realities: studies in West Africa* (London: Routledge, 1998), 60–93; and Wilks, *Forests of Gold*, 56–63.

48. Amanor, *The New Frontier*, 175.

49. Juhé-Beaulaton, “La diffusion,” 185–6; 190–1.

50. In adapting maize to their local environment, West African farmers also deselected some disease resistance, especially to a certain maize rust (*Puccinia polysora*) that devastated local maize types in the period from 1949 to 1952. See W. R. Stanton and R. H. Cammack. “Resistance to the maize rust *Puccinia polysora*,” *Nature*, 172 (1953):505–6.

51. Maize must have arrived in the South African highveld along with Indian Ocean trade contacts in the late eighteenth century. Women, its primary cultivators, must have passed on the Brazilian flint and floury types along with the household segmentation that pushed populations north and west in that period.

52. E. Casalis *Mes Souvenirs* (Paris, 1882), quoted in R. C. Germond, *Chronicles of Basutoland* (Moriya, Lesotho: Morija Sesuto Book Depot, 1967), 23.

53. Thomas Arbousett, *Missionary Excursion into the Blue Mountains*. Edited and translated by David Ambrose and Albert Brutsch (Moriya, Lesotho: Morija Sesuto Book Depot, 1991), 75. Here, Turkish corn probably refers to sorghum (Indian corn is maize and sweet reed may mean sorghum cane eaten as a snack).

54. For description of settlement and conflict, see Colin Murray, *Black Mountain: Land, Class, and Power in the Eastern Orange Free State, 1880s to 1980s* (Washington, DC: Smithsonian Institution Press, 1992). See also Germond, *Chronicles*, 152 for a description of early Boer settlement.

55. A. F. Robertson, *The dynamics of productive relationships: African share contracts in comparative perspective* (Cambridge: Cambridge University Press, 1987), 137; Colin Murray, *Families Divided: The Impact of Labour in Lesotho History* (Johannesburg: Raven Press, 1981), 1ff.

56. Burt-Davy, *Maize*, 286–9. Crossbreeding later changed Hickory King to a more productive ten- and twelve-row variety. Burt-Davy states that Hickory King arrived on the highveld from Natal before 1898, but offers no specific date.

57. Beinart and Coates, *Environment and History*, 58–69. For descriptions of this dryland agronomy, see Sarah Phillips, “Lessons from the Dust Bowl: Dryland Agriculture and Soil Erosion in the United States and South Africa, 1900–1950,” *Environmental History* (April 1999).

58. Timothy Keegan, *Rural Transformations in Industrializing South Africa: The Southern Highveld to 1914* (Johannesburg: Raven Press, 1986), 166–95. For a graphic narrative account of the impact on one family, see Charles Van Onselen, *The Seed is Mine: The Life of Kas Maine, A South African Share Cropper, 1894–1985* (New York: Hill and Wang, 1996), 29–48. In the 1920s and 1930s South Africa exported almost a third of its maize crop. See Henry Bernstein, “The Boys from Bothaville, or the Rise and Fall of King Maize.” Paper presented to the Colloquium on Agrarian Studies, Yale University, February 1999. Robertson, *The dynamics of productive relationships*, 134.

59. While men often had mine contracts allowing them to return home during the agricultural season, in practice male labor was usually missing on the key workdays for plow agriculture. John Gay, Debby Gill, and David Hall, eds. *Lesotho's Long Journey: Hard Choices at the Crossroads* (Maseru: Sechaba Consultants, 1995), 108, presents survey data on the loss of male labor.

60. Keegan, *Rural Transformations*, 75. Maize farmer Petrus Poee: "A sorghum producer has to trim his field, put up scarecrows and be there in person every morning and every evening to drive the birds away."

61. Keegan, *Rural Transformations*, 124–30. Keegan points out that mechanization in wheat production long predated that in maize.

62. Murray, *Families Divided*, 18.

63. For discussion of maize pricing, see Bernstein, "The Boys from Bothaville," 7. Most aggregate data on maize from South Africa reflects white commercial farms only; black smallholders are not included in national surveys.

64. South African Department of Agricultural Report, 1937 cited in Keegan, *Rural Transformations*, 119–20.

65. Beinart and Coates, *Environment and History*, 51–71.

66. Lesotho National Archives, cited in Tumelo Tsikoane, "A History of Public Health in Lesotho, Southern Africa, 1900–1980." Ph.D. diss., Boston University, 1996.

67. There is no record of maize's first arrival, but the Portuguese Jesuit F. Paes often receives credit. The Jesuits established a farm at Fremona in Tigray to experiment and sustain their small community. See McCann, *People of the Plow*, 52.

68. Henry Salt, quoted in George Annesley Valentia, *Voyages and Travels to India, Ceylon, and the Red Sea, Abyssinia, and Egypt in the Years 1802, 1803, 1804, 1805, and 1806*. 3 vols. (London: William Miller: 1809), vols. 3 and 5.

69. Antonio Cecchi, *Da Zeila alle frontiere del Caffa*. 2 vols. (Rome: Ermanno Loescher, 1886), vol. 2, 278. My translation. Cecchi described what he had seen in Gera in the southwestern forest. Benti Tolessa, Ethiopia's senior maize breeder, recalls his father telling him about this variety, which is similar to the Italian early flint called "quarantino," but unknown in Ethiopia today.

70. Ian Watt, "Regional Patterns of Cereal Production and Consumption," in Zein Ahmed Zein and Helmut Kloos, eds. *The Ecology of Health and Disease in Ethiopia* (Addis Ababa: Ministry of Health, 1988), 121.

71. See Kassahun Seyoum, Hailu Tafesse and Steven Franzel, *The Profitability of Coffee and Maize among Smallholders: A Case Study of Limu Awraja, Ilubabor Region*. Research Report No. 10 (Addis Ababa, 1990), 10–22; McCann, *People of the Plow*, 184–6.

72. Interview with S. Twumasi-Afryie, Crop Research Institute, Kumasi, June 1997.

73. http://www.cimmyt.mx/worldwide/CIMMYT_Regions/CIMMYT_Africa/index.htm CIMMYT also reports that it (rather than South Africa commercial maize breeders) has taken the lead in developing new cultivars with drought and insect resistance as well as low nitrogen tolerance.

74. For row planting as a first "improvement" adopted by farmers, see Gerhart, *The Diffusion of Hybrid Maize*, 29–30. For early evidence of hybrid seed recycling, I thank CIMMYT agricultural economist Wilfred Mwangi, personal communication, May 1998; for fears that fertilizer will sap soil nutrients, my interview with farmer Gali Abba Gojjam, Bonga district, May 1998.