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AFRICAN RICE IN THE COLUMBIAN EXCHANGE*

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ABSTRACT: Most studies of the Columbian Exchange have not appreciated the significance of Africans in establishing plant domesticates in the Americas. African plants traversed the Atlantic as provisions aboard slave ships and slaves proved instrumental in their establishment in the New World as preferred food staples. This paper identifies the diverse crops domesticated in Africa, the intercontinental plant exchanges between Africa and Asia that occurred in the millennia before the Columbian Exchange and the role of African indigenous knowledge in establishing rice in the Americas.

KEY WORDS: Western Africa, agriculture, slave trade.

THE decades following 1492 launched an unparalleled exchange of crops in what has become known as the Columbian exchange. In underscoring the significance of maritime expansion for global seed exchanges, scholarship on the Columbian exchange has drawn attention to the critical role of Europeans in revolutionizing transoceanic food systems with the introduction of Amerindian and Asian seeds to Africa. Relatively little attention, however, has been directed to the African plant domesticates that also figured in the Columbian exchange. This neglect is surprising for several reasons. Africans domesticated several life-sustaining cereals; crops grown in Africa routinely provisioned the slave ships that delivered at least eleven million forced migrants to the New World; and the establishment of many African staples in the Americas resulted from the deliberate cultivation by slaves of preferred food crops. In illuminating the botanical history of plants domesticated in Africa, this article seeks to correct a longstanding distortion in the literature on the Columbian exchange.

Emphasis in this article is placed on the contribution of African indigenous rice cultivation to the shaping of New World food systems. Divided into three parts, the discussion begins with a list of the diverse plants domesticated by Africans in three principal centers of agricultural origins. As African and Asian crop exchanges were underway millennia before the arrival of European navigators in the fifteenth century, these ancient plant dispersals reveal the bias against African accomplishments in plant domestication that emerged in the modern era. The second section identifies key African plants introduced to the Americas through the Atlantic slave trade. Against a background of scholarship that emphasizes the role of Amerindian plant introductions on the reorganization of African food systems, the discussion shows how subsequent research on rice in the Columbian exchange undervalues the contribution of African indigenous crops and Africans to Atlantic agricultural history. The final section lists key African domesticates planted by slaves and maroons who fled bondage.

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AFRICAN PLANT DOMESTICATION

A region of immense ecological diversity, Africa has been studied more for its agricultural crises than for the indigenous plants that sustained human populations for thousands of years. As in the other two major world areas of plant domestication, the Americas and Asia, the peoples of Africa responded to growing climatic aridity between 7,000 and 2,000 years ago with an agricultural revolution. During this period, Africans domesticated nine crucial cereals, a half dozen root crops, five oil-producing plants, a dozen forage crops, vegetables, fruits and nuts, and the bottle gourd.[1]

Agricultural domestication unfolded in three areas of sub-Saharan Africa: first, the East African savanna that extends from Sudan to the highlands of Ethiopia and Uganda; second, the West African savanna from the Atlantic coast inland to Lake Chad, including the floodplains of the inland delta of the Niger River in Mali; and, third, the tropical rainforest region of West and Central Africa from Nigeria and Cameroon southeastward to the Congo Basin.[2] In the East African center, coffee, sorghum, tef, finger millet, the castor bean and ensete (a banana-like plant that is processed into a starchy food staple) were domesticated. The West African center resulted in the domestication of both rain-fed and wetland crops. Rain-fed crops included pearl millet, fonio, the bottle gourd, shea butter tree, the baobab and watermelon, while African rice (*Oryza glaberrima*), a red species, was initially domesticated along the wetlands of the buckle of the Niger River before spreading southward as a rain-fed crop to areas of abundant precipitation. Tropical west-central African plant domesticates included white and yellow Guinea yams, the oil palm, tamarind, sesame, okra, cowpea (black-eyed peas) and pigeon peas. Table 1 presents a list of plants domesticated in each of these centers of African plant origins.

Even though their role in temperate agricultural systems may not appear significant, African cereals figure prominently in agricultural systems of the tropics and semi-arid regions. Only Asian rice (*Oryza sativa*), wheat, maize, and potatoes rank ahead of two African domesticates, sorghum and pearl millet, in feeding the human race.[3] Both cereals had diffused to India and China prior to the crop dispersals that accompanied the expansion of Islam from the eighth century.[4] Other African plants that migrated to India from an ancient period include sesame, okra, watermelon and pigeon peas, which could be split like lentils and made into dahl.[5] Plants from Asia reaching East Africa in antiquity included taro, the Asian yam (*Dioscorea alata*), coconut palms and bananas, while the introduction of sugar cane to Africa is attributed to Muslim expansion.[6]

[1] Jack R. Harlan, *Crops and Man* (Madison, 1975), 71–2; Richard MacNeish, *The Origins of Agriculture and Settled Life* (Norman, 1992), 298–318. [2] *Ibid.*

[3] National Research Council (NRC), *Lost Crops of Africa* (Washington, 1996), 127.

[4] Roland Portères, 'Vielles agricultures de l'Afrique intertropicale', *L'Agronomie tropicale*, 5 (1950), 489–507; Jack R. Harlan, 'The tropical African cereals', in David Harriss and Gordon Hillman (eds.), *Foraging and Farming* (London, 1989), 337–43; J. G. Vaughan and C. A. Geissler, *The New Oxford Book of Food Plants* (Oxford, 1999), 10.

[5] Vaughan and Geissler, *Food Plants*, 26, 38, 128, 174; Sam Bass Warner, *To Dwell Is to Garden* (Boston, 1987), 109, 119.

[6] Vaughan and Geissler, *Food Plants*, 22, 114, 190, 192; Andrew M. Watson, *Agricultural Innovation in the Early Islamic World* (Cambridge, 1983), 77–84.

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Table 1. *African plant domesticates.*

East Africa	
Avena abyssinica	Ethiopian oats
Catha edulis	Chat
Coffea arabica	Coffee (arabica)
Eleusine coracana	Finger millet
Ensete ventricosa	Ensete
Eragrostis tef	Tef
Guizotia abyssinica	Noog
Panicum maximum	Guinea grass
Pennisetum clandestinum	Kikuyu grass
Ricinus communis	Castor bean
Sorghum bicolor	Sorghum
West Africa Savanna	
Adansonia digitata	Baobab
Brachiaria deflexa	Guinea millet
Butyrospermum parkii	Karité or shea-butter tree
Ceratotheca sesamoides	Leaves and seeds
Citrullus lanatus	Watermelon
Corchorus olitorius	Potherd
Digitaria exilis	Fonio
Digitaria iburua	Black fonio
Hibiscus cannabinus	Kenaf
Hibiscus sabdariffa	Roselle
Lagenaria siceraria	Bottle gourd
Oryza glaberrima	African rice
Parkia biglobosa	Locust bean
Pennisetum glaucum	Pearl millet
Polygala butyracea	Black beniseed
Sesamum alatum	Sesame: leaves
Sesamum radiatum	Sesame: leaves
Solanum aethiopicum	African tomato
Solanum incanum	Bitter tomato
Solanum macrocarpon	Nightshade/'Garden eggs'
Tropical West-Central Africa	
Aframomum melegueta	Melegueta pepper
Blighia sapida	Akee apple
Cajanus cajan	Pigeon peas
Coffea canephora	Coffee (robusta)
Cola acuminata	Kola nut
Cola nitida	Kola nut
Cucumeropsis edulis	African seed
Digitaria decumbens	Pangola grass
Dioscorea bulbifera	Air potato yam
Dioscorea cayenensis	Yellow Guinea yam
Dioscorea dumetortum	Bitter yam
Dioscorea praehensilis	Bush yam
Dioscorea rotundata	White Guinea yam
Elaeis guineensis	Oil palm
Gossypium herbaceum	Cotton
Hibiscus esculentus	Okra, gumbo
Kerstingiella geocarpa	Kersting's groundnut

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Lablab niger	Hyacinth bean
Piper guineense	Piper seed
Pennisetum purpureum	Elephant grass
Plectranthus esculentus	Kaffir potato
Solenostemon rotundifolius	Piasa
Sphenostylis stenocarpa	Yam pea
Sesamum indicum	Sesame seed
Tamarindus indica	Tamarind
Telfairia occidentalis	Gourd
Vigna unguiculata	Cowpea/Black-eyed pea
Voandzeia subterranea	Bambara groundnut

Data drawn from Jack Harlan, *Crops and Man* (Madison, 1975), 71–2; Richard MacNeish, *The Origins of Agriculture and Settled Life* (Norman, 1992), 298–318; J. G. Vaughan and C. A. Geissler, *The New Oxford Book of Food Plants* (Oxford, 1999), 10, 26, 38, 128, 174.

Ethiopian occupation of Yemen in the sixth century A.D. contributed to the diffusion of a significant crop seldom associated with plant domestication in Africa, coffee. The Yemeni are credited with substituting roasting for the methods initially used in preparing coffee in Ethiopia: chewing, brewing and fermenting the beans. The consumption of coffee spread over the following centuries with the diffusion of Islam to North Africa, Turkey and Persia. Seedlings smuggled from the Arabian peninsula in the seventeenth century enabled the Dutch to develop coffee plantations in Ceylon and Java. The growing popularity of the beverage in Europe led the French to establish coffee plantations in the Caribbean and Cayenne during the eighteenth century.[7]

Thus, over the millennium preceding the overseas expansion of Europeans, Africa and Asia were involved in substantive crop exchanges. This pre-Columbian exchange relied upon maritime routes for inter-continental plant transfers. It centered on the Indian Ocean, and non-European peoples mediated the initial process of crop diffusion between Africa and the Orient. The diffusion of Asian *sativa* rice to Africa occurred relatively late in the pre-Columbian exchange as Egyptian hieroglyphics make no mention of rice among the cereals planted along the Nile floodplains.[8] The onset of rice cultivation in eastern Africa dates to population movements between the eighth and twelfth centuries that brought Islam to coastal Kenya as well as the migration of peoples from Malaysia and Indonesia to the unpopulated island of Madagascar, two hundred miles east of the African coast.[9] While Muslim traders and the Malagasy people introduced Asian *sativa* rice to the region, no evidence indicates the dispersal of the cereal overland to West Africa prior to the arrival of European mariners. In fact, Muslim scholars reaching the western Sudan from North Africa in the eleventh century found an already well

[7] Mark Pendergrast, *Uncommon Grounds* (New York, 1999), 5–15.

[8] A. Chevalier, 'Les céréales des régions subsahariennes et des oasis', *Revue de botanique appliquée et d'agriculture tropicale*, (1932), 742–59, esp. 755.

[9] A. Carpenter, 'The history of rice in Africa', in I. Buddenhagen and J. Persley (eds.), *Rice in Africa* (London, 1978), 3–10.

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developed system of rice cultivation in the inland delta of the Niger River and a robust regional trade in surpluses.[10] The domestication of *glaberrima* rice in West Africa was thus established centuries before Asian *sativa* arrived in East Africa.[11]

AFRICAN PLANT DIFFUSION DURING THE ATLANTIC SLAVE TRADE

Africa experienced a second major era of intercontinental crop exchanges following the expansion of Iberians over maritime routes initially focused on the Atlantic basin. European voyages led to the establishment of plantation slavery in the Americas, the enslavement of African captives and the global transfer of crops known as the Columbian Exchange. The scholarship on the Columbian exchange draws attention to the plant transfers that refashioned African agricultural systems but ignores the role of African domesticates. Africa is cast as a recipient rather than donor to transoceanic seed transfers in a literature that continues to emphasize the revolution in African agricultural production that followed the introduction of Amerindian and Asian crops such as maize, manioc and rice. Yet African food crops had provisioned the slave ships that traversed the Middle Passage of Atlantic slavery for some 350 years, and the establishment of these crops in the Americas profoundly shaped regional cuisines.

Within decades of the arrival of Columbus in the Americas, the New World domesticate, maize, was being planted in West Africa.[12] Other Amerindian staples soon followed, such as manioc, sweet potatoes, capsicum peppers, tomatoes, peanuts, cashew nuts, pineapple, pumpkins, squash and tobacco.[13] The early establishment of maize as a food staple in West and Central Africa illuminates the radical transformation of African agricultural systems wrought by the Columbian exchange. The deepening of the transatlantic slave trade in the course of the seventeenth century resulted in increased cereal demand, and high-yielding, easily-stored maize predominated among the food crops grown and consumed by those in bondage throughout the Atlantic basin. By the early eighteenth century, maize figured among the key food staples planted along the Senegal River and captives awaiting sale along the African coast were often required to grow the easily processed cereal to provision slave ships.[14]

In focusing on Amerindian crops adopted into African agricultural systems, literature on the Columbian exchange has placed scant emphasis on the significance of African domesticates in the Atlantic slave trade. Yet a

[10] M. Tymowski, 'Les domaines des princes de Songhay (Soudan occidental): comparaison avec la grande propriété fonçière au début de l'époque féodal', *Annales*, 15 (1971), 1637–43; Tadeusz Lewicki, *West African Food in the Middle Ages* (Cambridge, 1974), 22.

[11] Archaeological evidence now establishes the presence of *O. glaberrima* in the inland delta of the Niger River by A.D. 300. R. J. McIntosh and S. K. McIntosh, 'The inland Niger delta before the empire of Mali: evidence from Jenne-Jeno', *Journal of African History*, 22 (1981), 1–22.

[12] Marvin Miracle, *Maize in Tropical Africa* (Madison, 1966).

[13] W. O. Jones, *Manioc in Africa* (Stanford, 1959); Stanley B. Alpern, 'The European introduction of crops into West Africa in precolonial times', *History in Africa*, 19 (1992), 24–31; Gwendolyn Midlo Hall, *Africans in Colonial Louisiana* (Baton Rouge, 1992), 35.

[14] Hall, *Africans in Colonial Louisiana*, 35–9; Miracle, *Maize*, 91.

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review of historical accounts reveals their importance for provisioning slave ships. Observing the cereals that routinely supplied slave ships bound for Cartagena, Colombia in the early seventeenth century. Alonso de Sandoval drew attention to African millet as well as the grains and flour of Amerindian maize.[15] African yams also figured as a crucial foodstuff in the transatlantic slave trade as sailors aboard the slave ship *Wanstead* in 1719 claimed: 'Yams & Water the Usuall dyett for Slaves'.[16] Commentaries by captains and surgeons on slave ships reveal that surplus food produced in Africa disproportionately fed the human cargoes forced across the Middle Passage, including such African domesticates as sorghum, millet, rice, yams, tamarind, melegueta pepper and palm oil.[17] Table 2 presents the principal foods used to supply slave ships.

Table 2. *Crops grown in Africa purchased by slave ships.*

AFRICAN ORIGIN	
Aframomum melegueta	Melegueta pepper
Dioscorea spp.	Yams
Elaeis guineensis	Oil palm
Oryza glaberrima	African rice
Pennisetum glaucum	Pearl millet
Sesame spp.	Sesame
Sorghum bicolor	Sorghum
Tamarindus indica	Tamarind
NEW WORLD ORIGIN	
Arachis hypogaea	Peanut
Manihot esculenta	Manioc
Nicotiana tabacum	Tobacco
Zea mays	Maize
ASIAN ORIGIN	
Cocos nucifera	Coconuts
Musa spp.	Bananas and plantains
Oryza sativa	Asian rice

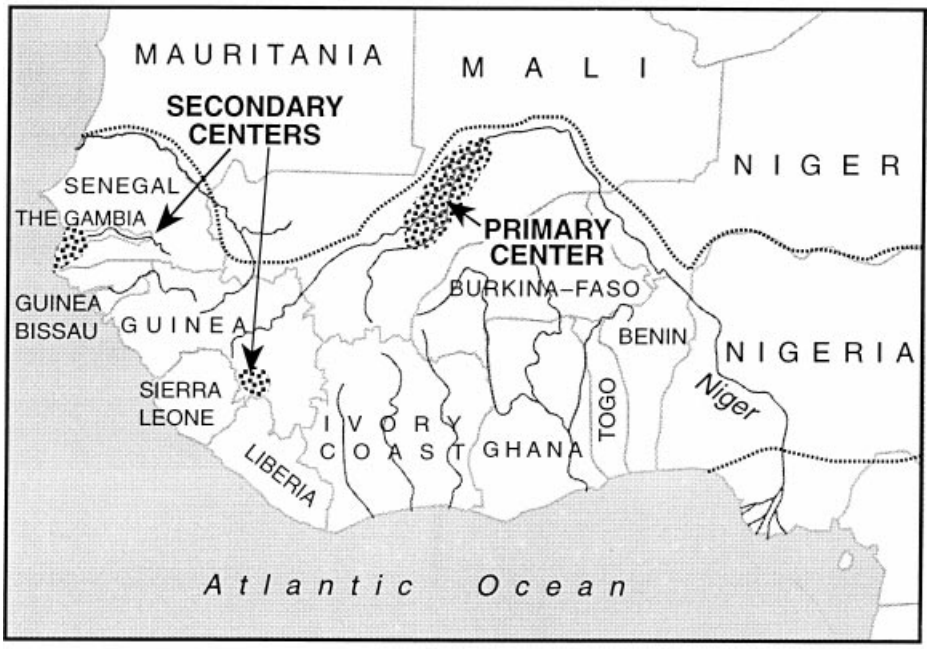
Data from Elizabeth Donnan, *Documents Illustrative of the History of the Slave Trade to America* (4 vols.) (Washington, D.C., 1930–1935), I: 393–4, 440; II: 192, 247–69, 279–88, 303–4; III: 61, 158, 293, 373–78; IV: 530; Gwendolyn Midlo Hall, *Africans in Colonial Louisiana* (Baton Rouge, 1992), 35.

[15] John Thornton, *Africa and Africans in the Making of the Atlantic World, 1400–1680* (New York, 1992), 155.

[16] Cited in Peter Linebaugh and Marcus Redicker, *The Many-Headed Hydra* (Boston, 2000), 169. On the importance of the yam trade to slave ships in Guinea-Bissau, see also Walter Hawthorne, 'Nourishing a stateless society during the Atlantic slave trade: The rise of Balanta paddy-rice production in Guinea-Bissau', *Journal of African History*, 42 (2000), 1–24, esp. 7–8.

[17] Elizabeth Donnan, *Documents Illustrative of the History of the Slave Trade to America* (4 vols.) (Washington, 1930–5), I, 393–4, 440; II, 192, 247–69, 279–88, 303–4; III, 61, 158, 293, 373–8; IV, 530; Robert L. Hall, 'Savoring Africa in the New World', in Hernan Viola and Carolyn Margolis (eds.), *Seeds of Change* (Washington, 1991), 161–9. For a Dutch ship feeding its slave cargo with tamarind in 1659, see Alpern, 'European introduction', 23.

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Map 1. Centers of origin, African rice, *Oryza glabberima*. The extent of the indigenous West African rice zone is marked by the broken line.

John Barbot's calculation in 1678–9 illustrates the magnitude of African food staples traded and the concomitant demand for agricultural surpluses: 'a ship that takes in five hundred slaves, must provide above a hundred thousand yams', or some two hundred yams per person.[18] The belief that slaves fed customary food would improve their survival rate across the Middle Passage also contributed to demand for African dietary staples on slave ships.[19]

Among the cereals in great demand was rice, the staple of millions enslaved from the densely populated West African rice region, extending along the Upper Guinea coast from Senegal to Ivory Coast, and inland over a thousand miles to Lake Chad (Map 1). The demand for rice during the Atlantic slave trade followed earlier Portuguese practices of purchasing the cereal for provisions. Journeying along the Upper Guinea coast in 1479–80, Eustache de la Fosse recorded one of the first rice purchases by Portuguese vessels. During travels in 1505–8, Duarte Pacheco Pereira noted that rice and meat could be found in great abundance in the region of Guinea-Bissau.[20] Valentim Fernandes (*c.* 1506–10), a German who worked in Lisbon with early mariner accounts, mentioned an active food trade with Gambian Mandinka: 'They eat rice, milk, and millet… and they have so much that

[18] Hall, *Africans in Colonial Louisiana*, 163.
[19] James Walvin, *Black Ivory: A History of British Slavery* (Washington, 1994), 50.
[20] Paul Pélissier, *Les paysans du Sénégal* (St Yrieix, 1966), 711–2; Duarte Pacheco Pereira, *Esmeraldo de situ orbis*, trans. G. H. T. Kimble (London, 1937), 91–9.

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they take it to sell and exchange, also [palm] wine, oil and meat and other foodstuffs. Because this Mandinka land is very rich in food…'[21]

By the sixteenth century, Portuguese had established rice in the Cape Verde Islands, just five hundred miles off the coast from Senegal, where it was cultivated by slaves originating from that region.[22] African domesticates, including yams, sorghum, millet and cotton, were also grown.[23] Rice appears on cargo lists of ships departing Cape Verde by 1513–15, and within decades of Cabral's landing in Brazil, vessels bound for Portugal's new colony carried seed rice and African yams across the Atlantic.[24]

AFRICAN DOMESTICATION OF RICE

While it is possible that this rice originated in the Iberian peninsula or Asia, it is quite unlikely for several reasons. In the early sixteenth century, Portuguese voyages to Asia had barely commenced and ships relied upon African surpluses for provisions. The center of rice cultivation in the Iberian peninsula was Spain, where Muslims developed it as a crop in Valencia during the tenth century.[25] Scholarship that attributes the presence of rice in West Africa to Portuguese introduction has not argued that the cereal was diffused from the Iberian peninsula, however, but that Portuguese mariners brought rice seeds from India.[26] Even though Arabs introduced Asian rice to East Africa in earlier centuries, its cultivation remained a localized coastal activity. *Sativa* only diffused into the interior in the nineteenth century.[27] The convergence of Portuguese commercial reliance upon West African rice and its early introduction to the Cape Verde islands in tandem with slaves skilled in its cultivation suggests that the rice being planted, transported and shipped as seed to Brazil in the early period of maritime expansion was African *glaberrima*.

Slavers followed suit. South Carolina received one of its initial deliveries of rice during the 1690s, when 'a *Portuguese* vessel arrived, with slaves from the east, with a considerable quantity of rice, being the ship's provision'.[28]

[21] Valentim Fernandes, *Description de la Côte occidentale d'Afrique*, trans. and notes by T. Monod, A. Teixeira da Mota and R. Mauny (Bissau, 1951), 40, 49.

[22] Orlando Ribeiro, *Aspectos e problemas da expansão portuguésa* (Lisbon, 1962), 147.

[23] Ribeiro, *Aspectos e problemas*, 143–5; T. B. Duncan, *Atlantic Islands: Madeira, the Azores, and the Cape Verdes in Seventeenth-Century Commerce and Navigation* (Chicago, 1972), 168; J. W. Blake, *West Africa: Quest for God and Gold, 1545–1578* (London, 1977), 91–2; George Brooks, *Landlords and Strangers: Ecology, Society and Trade in Western Africa, 1000–1630* (Boulder, 1993), 139–47.

[24] Blake, *West Africa*, 91–2, 103; Brooks, *Landlords and Strangers*, 149; Ribeiro, *Aspectos e problemas*, 146–7; Stuart B. Schwartz, *Sugar Plantations in the Formation of Brazilian Society: Bahia, 1550–1835* (New York, 1998), 84. Seed rice has not been milled so that its hulls, bran and endosperm remain intact for germination.

[25] See Watson, *Agricultural Innovation in the Early Islamic World*, 17; Raymond E. Crist, 'Rice culture in Spain', *Scientific Monthly*, 84/1 (1957), 66–74; Thomas F. Glick, *Irrigation and Society in Medieval Valencia* (Cambridge, 1970).

[26] Riberio, *Aspectos e problemas*, 49.

[27] Carpenter, 'History of rice', 6–7; Roland Portères, 'Primary cradles of agriculture in the African continent', in J. D. Fage and R. A. Oliver (eds.), *Papers in African Prehistory* (Cambridge, 1970), 43–58, esp. 49.

[28] P. Collinson, 'Of the introduction of rice and tar in our colonies', *Gentleman's Magazine* (June 1766), 278–80.

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Along the African coast in 1750, John Newton bought nearly eight tons of rice for feeding 200 slaves, while John Matthews estimated that 700 to 1,000 tons of rice would feed 3,000 to 3,500 slaves purchased along the Sierra Leone coast.[29] Even if Asian rice later figured as a crop in the Columbian exchange, such early use of the cereal to provision slave ships at a time when routes were only beginning to develop to India suggests that the rice purchased was *glaberrima*. Yet scholarship has uncritically attributed the presence of rice and its subsequent establishment in the Americas to Europeans who carried seed from Asia to Africa prior to developing the cereal as a crop on the western rim of the Atlantic basin. The conventional view of African crops in intercontinental plant exchanges echoes through the words of historian Orlando Ribeiro: 'Brazil supplied maize, beans, cassava [manioc], cashew, papaya and pineapples; India, rice, coconuts… Africa… provided nothing important'.[30]

The first challenge to the notion that rice cultivation in West Africa derived from Portuguese intercession came when French botanists working in the colonial service at the beginning of the twentieth century discovered widespread cultivation of the cereal throughout the western Sudan. A review of botanical collections from coastal West Africa during the previous century revealed the similarity of these specimens to the rice the French had collected in the region. The African rice eventually proved a distinctly different species from Asian *sativa*, and subsequent research in 1945 established the locus of its domestication in the inland delta of the Niger River in Mali. Two secondary centers of varietal development were located, in the Guinea highlands and in coastal marine estuaries.[31] Each center of domestication had resulted in a distinctive form of cultivation: floodplain tidal irrigation along Sahelian floodplains, rain-fed cultivation in the Guinean highlands and an irrigated system in mangrove estuaries south along the Atlantic coast from the Gambia River to Guinea Conakry.

However, even as African domestication of *glaberrima* gained wider scientific acceptance in the 1960s, many still attributed the sophisticated coastal irrigation system to Portuguese tutelage. August Chevalier, who had spearheaded French research on *glaberrima*, acknowledged the African origins of the floodplain system that developed in the interior of West Africa, but he assigned the origins of the complex irrigated rice system along the mangrove coast to Portuguese:

> [in] the coastal regions (the Southern Rivers) of West Africa, from Casamance to the frontier of Sierra Leone… the Portuguese established there for many centuries in the region, perfected [rice] culture by making a truly irrigated culture.[32]

[29] Boubacar Barry, *Senegambia and the Atlantic Slave Trade* (Cambridge, 1998), 117–8.

[30] Ribeiro, *Aspectos e problemas*, 49.

[31] Roland Portères, 'African cereals: *Eleusine*, *fonio*, *black fonio*, *teff*, *brachiaria*, *paspalum*, *pennesetum and African rice*', in Jack D. Harlan, Jan M. J. De Wet and Ann B. L. Stemler (eds.), *Origins of African Plant Domestication* (The Hague, 1976), 409–53, esp. 441.

[32] August Chevalier, 'L'importance de la riziculture dans le domaine colonial français et l'orientation à donner aux récherches rizicoles', *Laboratoire d'agronomie coloniale* (1936), 27–45, esp. 27–8.

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The orthodox view continued to hold that Africans only developed a rudimentary form of rice cultivation on Sahelian floodplains, with natural tidal flow and minimal landscape alternation that did not involve the transplanting of seedlings.[33] Floodplain, in contrast to irrigated, rice thus emerged as the defining feature that Europeans used to distinguish African from Asian systems. One French agricultural expert succinctly summarized the prevailing view in 1939: 'Rice cultivation by irrigation and rice cultivation by submersion – this is the difference between Asian and African civilizations'.[34]

Remarkably, the racist bias of European scholarship only began to be questioned in 1966 when the French geographer Paul Pélissier reviewed early Portuguese accounts of rice along the Upper Guinea coast. André Alvares de Almada (*c.* 1594), a Luso-African trader based in Cape Verde, who knew more about commerce and navigation than farming, observed: 'the residents were growing their crops on the riverain deposits, and by a system of dikes had harnessed the tides to their own advantage'.[35] Thus, about a century before the permanent colonization of South Carolina, where a similar system would result in a plantation economy based on rice, de Almada described its precursor in Senegambia.

Pélissier found it impossible to imagine how the Portuguese could have introduced such a system without leaving any documentary evidence. He queried how mariners and merchants could master such sophisticated agricultural methods and where they would have developed the specialized implements used in African irrigated rice, such as the long-handled, flat-bladed shovel (*kayendo*) for overturning heavy clay soils.[36] Nor was there linguistic evidence that Portuguese had brought irrigated rice farming to West Africans. Everywhere else in the continent, where rice cultivation was unknown before the arrival of European traders, local languages borrow the names of rice from those who introduced it; thus the Arabic and European names *erruz*, *eruz*, *arroz*, *riz*, *rijst* and *rice* are employed. However, in the areas where rice cultivation was known earlier, no such borrowing occurred. Peoples throughout the Upper Guinea Coast of Africa use names for rice derived from African languages. For example, in Senegal and Gambia, reached by the Portuguese in the mid-fifteenth century, the terms *mano* (Mandinka) and *malo* (Wolof) or some derivative of *maro/maaro* are employed for native African rice, and these same names were later extended to *sativa* rice when seeds from Asia were introduced.[37]

While the Columbian exchange may have resulted in the introduction of Asian *sativa* to the African irrigated rice system during the Atlantic slave trade, this was only possible because coastal farmers had already developed

[33] A. Chevalier and O. Roehrich, 'Sur l'origine botanique des riz cultivés', *Comptes rendus de l'Academie de Sciences*, 159 (1914), 560–2; Portères, 'Primary cradles', 49.

[34] Pierre Viguier, *La riziculture indigène au Soudan Français* (Paris, 1939), 1.

[35] Quoted from Walter Rodney, *A History of the Upper Guinea Coast 1545 to 1800* (New York, 1970), 20–1.

[36] Pélissier, *Les paysans du Sénégal*, 713–4.

[37] The suffixes -lo, -ro and -o in the languages of the Niger-Congo group mean food and nourishment, while the prefix, ma- is applied to foods or liquids with the meaning of 'full'. Mandinka is part of the Mande languistic group; Wolof is part of the West Atlantic language family. Portères, 'Primary cradles', 47–8. *Maaro* is the term for rice in the inland Niger delta.

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a sophisticated production system to accept it. The Diola of Casamance, who figured among the preeminent coastal irrigated rice growers, continued to rely upon *glaberrima* varieties well into the twentieth century.[38] Documentation supporting the introduction of Asian rice elsewhere in West Africa dates only to the nineteenth century, when American missionary settlements of freed slaves and recaptives from slave ships introduced a new type of rice to Sierra Leone and Liberia.[39] This was probably *sativa* rice, Carolina gold, cultivated by slaves on the antebellum plantations of South Carolina and Georgia, for it was known throughout the West African interior as *mérékè* after its country of origin.[40] Colonial rule and the implementation of rice development projects led to broader diffusion of *sativa* over the twentieth century, when Europeans promoted new cash crops in West Africa, including the higher-yielding Asian rice that was more resistant to breakage with mechanical milling than *glaberrima*.[41]

AFRICAN RICE IN THE AMERICAS

Besides falling to credit Africans with the domestication of rice and development of irrigation, the role of African rice in Atlantic history has also been generally neglected. Within twenty years of its settlement in 1670, planters in South Carolina turned to rice for an export economy. The suitability of the Carolina lowlands for rice led to requests for seed from ship captains trafficking between Asia, Madagascar, West Africa and the colony, resulting in multiple seed introductions from all over the world in the closing decade of the seventeenth century. A red rice, probably *glaberrima*, figured among the first established in South Carolina.[42] African slaves accompanied the first European settlers of the colony, and they were already planting rice for subsistence in 1690.[43] With the shift to wetland cultivation in the early eighteenth century, the burgeoning rice economy in South Carolina selected the higher-yielding *sativa* as an export crop.

Historical evidence suggests that *glaberrima* continued to be grown for domestic use by slaves in their garden plots throughout the eighteenth century. During the antebellum period, Carolina slaves planted rice varieties for subsistence distinctly different from the Carolina white and Carolina gold types grown on plantations for export. John Drayton in 1802 recorded several varieties planted by slaves:

> Besides the white and gold rice, already mentioned, there are some others in the State, of little note or consequence; principally cultivated by negros. They are called *Guinea rice*, *bearded rice*, *a short grained rice*, somewhat like barley, and a species of *highland rice* [italics in original].[44]

[38] Olga Linares, 'From tidal swamp to inland valley: on the social organization of wet rice cultivation among the Diola of Senegal', *Africa*, 51 (1981), 558–9.

[39] Paul Richards, 'Culture and community values in the selection and maintenance of African rice', in Stephen Brush and Doreen Stabinsky (eds.), *Valuing Local Knowledge : Indigenous People and Intellectual Property Rights* (Washington, 1996), 211–2.

[40] Viguier, *La riziculture indigène*, 42, 53.

[41] NRC, *Lost Crops*, 21, 25.

[42] A. S. Salley, 'Introduction of rice into South Carolina', *Bulletin of the Historical Commission of South Carolina*, 6 (1919), 10–13.

[43] John Stewart, cited in Peter Wood, *Black Majority* (New York, 1974), 57–8.

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The choice of the toponym Guinea for this rice suggests it was *glaberrima*.

A deliberate effort to revive upland rice cultivation in the American South by Thomas Jefferson may have been the source of the rice Drayton reported in slave gardens. Hoping to reverse the high mortality suffered by slaves growing irrigated rice in insalubrious malarial swamps in South Carolina and Georgia, Jefferson contacted slave merchants operating along the Upper Guinea Coast to send a shipment of rice seed that could be grown on uplands with rainfall because the '[system] they now possess, which requiring the whole country to be laid under water during a season of the year, sweeps off numbers of the inhabitants annually with pestilential fevers'.[45]

In 1790, he received a shipment of rice from Guinea, long a center of diversification of rainfed *glaberrima* varieties grown in highlands. He sent some of the seed to the Charleston Agricultural Society and to an acquaintance in Georgia. The rice grew abundantly in the two to three years Jefferson planted it, but difficulties were encountered with milling it because he lacked the 'conveniences for husking it'.[46] Several factors suggest that Jefferson's seed was African rice: the lack of evidence for the widespread cultivation of *sativa* in Guinea at the time of his request, the area's prominence as a center of diversity of upland rice varieties, and the difficulty he experienced with its milling. The notorious problem of grain breakage when husking *glaberrima* with mechanical mills put an end to his efforts to substitute the seed for commercial production although cultivation of the African rice continued on a small scale in slave gardens.[47]

References to rice cultivation in Suriname provide additional evidence that *glaberrima* rice was present in South Carolina during the eighteenth century. In 1750, the Dutch governor of Suriname contrasted the advantages of the rice planted there with a red type he knew in South Carolina; 'the rice in Essequibo has not the red husk [bran] which gives so much trouble in Carolina to get off, confirming African rice's greater susceptibility to breakage in milling compared with *sativa*.[48]

While we must be cautious in identifying red rice as evidence for *glaberrima*,[49] the historical record from other areas of the Americas indicates the deliberate cultivation of red rice in the eastern Amazon of Brazil. It is

[44] John Drayton, *A View of South Carolina* (Columbia, 1972, [1802]), 125.

[45] Quoted in Karen Hess, *The Carolina Rice Kitchen: The African Connection* (Columbia, 1992), 19.

[46] E. M. Betts, *Thomas Jefferson's Garden Book, 1766–1824* (Philadelphia, 1944), 381. Quote from 1 Dec. 1808. At the time of Jefferson's experiments with *glaberrima*, plantation rice was milled by machines.

[47] Only the African mortar-and-pestle method reduces grain breakage in processing *glaberrima*; this remains a problem in commercializing African rice to this day. NRC, *Lost Crops*, 29. The mortar and pestle remained in use to mill small quantities of rice by slaves and their descendants well into the twentieth century. Judith Carney, 'Rice milling, gender and slave labour in colonial South Carolina', *Past and Present* 153 (1996), 108–34.

[48] In this quote, husking refers to removing the bran as well as the hulls since the product desired in European markets was white rice, which *glaberrima* can also become with much effort in hand-milling. Mentioned in Hiko-Ichi Oka, 'Report of trip for investigations of rice in Latin American countries' (Mishima, 1961), 21.

[49] There are some varieties of Asian rice that are also red, but these are not widely grown and occur over a limited area in that part of the world.

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mentioned from the second half of the eighteenth century in the context of Portugal's attempt to establish plantations based on rice. The objective was to reduce the country's dependence on imported rice from South Carolina. This led to the creation from the 1760s of irrigated rice plantations in the Amazonian states of Amapá, Pará and Maranhão, modeled on the Carolina system and its high-yielding *sativa* seed. More than 25,000 slaves were imported to the region through the monopoly trading company of Gran Pará and Maranhão, many of them farmers from Guinea-Bissau who were already skilled in irrigated rice farming.[50] While these plantations ultimately failed to withstand competition from Carolina rice when production rebounded after the Revolutionary War, they developed in a regional economy in which rice had long been planted for subsistence.

While Brazilian plantations relied on Asian varieties, an older form of cultivation based on red rice was already in place in Maranhão. Its co-existence with the plantation sector led the Portuguese colonial administration to decree in 1772 a year's jail sentence for whites who planted red rice and two years imprisonment for slaves and Indians who continued to do so.[51] While the reasons for this harsh measure are not explicit, the decree suggests a conflict between two distinctive rice systems, one based on a pre-existing subsistence economy and the other on an introduced commercial type for export. If the red rice was *glaberrima*, then issues of quality control would have provided a rationale for the decision. If mixed with *sativa* in milling (which by then was mechanically performed with waterwheels), the easily breakable *glaberrima* would result in a higher percentage of broken rice as well as admixture of grains bearing a red color. Both factors would result in a lower value in the export market.

African rice established during the Atlantic slave trade also figured in collections made by French botanists in Central and South America. From the 1940s to 1950s, they recovered varieties of *glaberrima* in Cayenne and from a former sugar plantation area of El Salvador.[52] The *glaberrima* in Cayenne was collected from descendants of maroons who escaped from coastal sugar plantations over nearly two hundred years from the 1660s onwards. These upland varieties were found to be related to varieties cultivated in Guinea, Liberia and the Ivory Coast, where they are known as 'gbaga, baga, or bagaye' after the Baga with whom they remain associated.[53]

Many groups of irrigated rice farmers along the Upper Guinea coast were not organized into states.[54] The violence of the Atlantic slave trade made

[50] Raymundo Jozé de Souza Gayozo, *Compéndio histórico-político dos principios da lavoura do Maranhão* (Paris, 1818), 192; César Augusto Marques, *Dicionário histórico e geográfico da província do Maranhão* (Rio de Janeiro: 1970 [1870], 435–6.

[51] César Augusto Marques, *Dicionário histórico*, 435–6.

[52] A. Vaillant, 'Milieu cultural et classification des varietés de riz des Guyanes français et hollandaise', *Revue internationale de botanique appliquée et d'agriculture tropicale*, 33 (1948), 520–9; R. Portères, 'Présence ancienne d'une varieté cultivée d' *Oryza glaberrima* en Guyane française', *Journal d'agriculture tropicale et de botanique appliquée*, 11 (1955), 680; R. Portères 'Riz subspontanés et riz sauvages en El Salvador (Amérique Centrale)'. *Journal d'agriculture tropicale et de botanique appliquée*, 7 (1960), 441.

[53] Portères, 'Présence ancienne', 680.

[54] Linares, 'From tidal swamp', 557; Hawthorne, 'Nourishing a stateless society', 1.

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them increasingly vulnerable to predation by centralized societies involved in slaving. While many irrigated rice growers were swept into slavery, others like the Diola managed to survive the era's violence through their location in inaccessible wetlands.[55] Vulnerability to slave raiding forced still other stateless societies such as the Balanta of Guinea-Bissau, to migrate to isolated swamps, where they reorganized their traditional cropping system from yams to irrigated rice.[56] By the mid-eighteenth century, the expansion of Mande-speaking Susu to the Atlantic coast set off another wave of violence against irrigated rice farmers in the region between the rivers Pongo and Scarcies. The escalation of slave raiding came largely at the expense of the Baga, who increasingly filled the holds of slave ships.[57] Thus, during the same era (*c.* 1793) in which slave captain Samuel Gamble drew a diagram of Baga irrigated fields and noted 'the Bagos are very expert in Cultivating rice and in quite a Different manner to any of the Nations on the Windward Coast', they were being scattered across the Middle Passage.[58] Yet Baga fame as expert rice farmers survived in the name given to their cultivar. The discovery of *glaberrima* varieties in Cayenne related to ones cultivated by Baga who survived slavery in the Guinean highlands bears silent testimony to their role as agents responsible for the diffusion of rice cultivation throughout north-east South America.

The significance of *sativa* rice as an export crop in South Carolina contributed to views that Europeans introduced rice cultivation to the Americas. So did the unquestioned belief that the Portuguese introduced irrigated rice to West Africa. But even if Asian seeds figured in the Columbian exchange to West Africa at an early date, their establishment was made possible because sophisticated rice systems receptive to the seeds already existed. By privileging European seed introductions over the foundation of the knowledge system that slaves and maroons drew upon to adapt preferred food plants to diverse environments, scholarship has ignored a significant narrative of the Columbian exchange. The establishment of rice cultivation in the New World represents an African legacy, as millions enslaved from the West African area of rice domestication were already expert in the cereal's cultivation, having mastered its complexities more than a thousand years before the first Europeans arrived on that continent.

The African species found growing in the slave gardens of South Carolina, in proximity to a sugar plantation economy in El Salvador and in a maroon settlement in Cayenne testify to the crop's emergence in areas of black settlement in the New World. Historian Peter Wood has argued that Africans established rice in the Carolina rice economy because the cereal's cultivation was previously known to many of those enslaved in the formative years of the Carolina colony. Such was not the case with their English and French Huguenot masters. Daniel Littlefield and others have underscored

[55] Rodney, *Upper Guinea Coast*, 21, 112.
[56] Hawthrone, 'Nourishing a stateless society', 14.
[57] Rodney, *Upper Guinea Coast*, 112.
[58] Quoted in Daniel C. Littlefield, *Rice and Slaves* (Baton Rouge, 1981), 93–5.

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the significance of their expertise by revealing the preference of Carolina planters for slaves from West Africa's rice region.[59]

AFRICAN METHODS OF RICE CULTIVATION

A review of the cultivation methods and environments planted to rice in the early colonial period lends additional support to the role of Africans in establishing rice in South Carolina. Even if English planters could have learned to grow the cereal with rainfall in the manner of other crops they cultivated, irrigated rice also demanded a sophisticated understanding of landscape gradient and water flow in order to flood and drain fields. Irrigated rice production developed indigenously in just two areas of the world, Asia and West Africa. Historical accounts from colonial South Carolina do not show that planters learned irrigated rice cultivation from study of Asian systems. Instead, the nostalgic accounts of their descendants centuries later claim that the remarkable ingenuity of planters led to the independent discovery of a system of rice cultivation so eminently suited to the Carolina lowlands. Such accounts, as Wood cogently observes, fail to explore the more reasonable hypothesis that planters learned the methods from their slaves.

There are several reasons for arguing that Carolina slaves established the cultivation of rice, both African and Asian, in the Americas. The earliest records from South Carolina reveal the exploitation of identical environments to those Europeans observed earlier in West Africa. These included growing the cereal as a rain-fed crop on uplands, in inland swamps, and along river floodplains. Identical techniques for controlled flooding and drainage were also used on Carolina rice fields, with hollowed-out logs employed for sluices, a method still used in traditional West African irrigation. Along Carolina's tidal rivers rice cultivation followed the African practice of direct sowing rather than the preferred Asian method of transplanting.[60] Crucial technologies for field preparation, such as the long-handled hoe of African rice systems, travelled across the Atlantic basin to South Carolina as did African processing devices such as the mortar and pestle for milling rice and the oval coiled basket for winnowing.[61] Even methods of cooking rice that favor dishes based on grain separation, and their occasional preparation with black-eyed or pigeon peas, followed the preferred styles of rice preparation in West Africa.[62]

The establishment of rice cultivation during the early colonial period throughout the Americas thus involved considerably more than just trans-oceanic seed transfers. A West African indigenous knowledge system

[59] Wood, *Black Majority*. For an elaboration of the argument, see Littlefield, *Rice and Slaves*; David Richardson, 'The British slave trade to colonial South Carolina', *Slavery and Abolition*, 12 (1991), 125–72; Charles Joyner, *Down by the Riverside* (Chicago, 1984).

[60] Judith A. Carney, 'Landscapes of technology transfer: Rice cultivation and African continuities', *Technology and Culture*, 37 (1996), 5–35.

[61] Carney, 'Landscapes of technology transfer'; Peter Wood, '"It was a Negro taught them": A new look at African labor in early South Carolina', *Journal of Asian and African Studies*, 9 (1974), 172; Dale Rosengarten, 'Social Origins of the African-American Lowcountry Basket' (Ph.D. dissertation, Harvard University, 1997).

[62] Hess, *Carolina Rice Kitchen*, 31, 94–96.

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traversed the Middle Passage as well, carried by slaves already practiced in rice cultivation.

OTHER AFRICAN CROPS IN THE AMERICAS DURING THE ATLANTIC SLAVE TRADE

An examination of other African crops established in the Americas illuminates the prominent role of slaves in pioneering their cultivation. More than ten crops of African origin were planted for subsistence by slaves and maroons while another, the peanut, owes its introduction to North America to slaves already familiar with its cultivation in West Africa:

Akee (*Blighia sapida*). Slaves were planting this African domesticate in the West Indies in the eighteenth century. To this day, the fruits of the akee tree are combined with salted fish in a popular cuisine consumed in Jamaica.[63]

Bottle gourd (*Lagenaria siceraria*). While bottle gourd probably diffused to the Americas by water prior to the onset of the Atlantic slave trade, African slaves used them as floats for fishing nets, musical instruments, drinking and milking vessels, containers, ladles, and birdhouses over a broad area of the Americas as they had in West Africa. John Spark mentioned use of the bottle gourd to collect palm wine on Hawkins' second slave-raiding voyage to West Africa (1564–5). The gourd also conveys an image of the universe in African myths, just as it provided a celestial orientation to run-away slaves to 'follow the drinking gourd', or Big Dipper, to freedom. Alexander von Humboldt reported in 1853 that West Indian fishermen filled perforated gourds with fireflies to provide light during the night. The healing powers of gourds also figure early in American history in the story of Esteban, a black survivor of the Spanish Naváez expedition in Florida. Esteban gained repute as a healer by employing a gourd rattle for curing those he treated, and his healing powers enabled the survivors to travel for years through Indian territory to reach Spanish settlements in northern Mexico.[64]

Castor Bean (*Ricinus communis*). Widely found throughout Africa and the Americas, the castor bean was noted as a common medicinal among blacks in Jamaica in the early eighteenth century. It is also associated with the diaspora of West Africans to Brazil, where it is known by its Yoruba name, *ewe lara*.[65]

Cowpeas/Black-eyed peas (*Vigna unguiculata*). This African crop was grown in Spanish Florida by the seventeenth century and cultivated by slaves in Jamaica in the early 1700s. It is mixed with rice in a popular dish known as Hoppin' John in South Carolina and Georgia.[66]

[63] Vaughan and Geissler, *Book of Food Plants*, 108; Bryan Edwards, *The History, Civil and Commercial, of the British Colonies of the West Indies* (2 vols.) (London, 1763), I: 203; Fr. Richard de Tussac, *Flore des Antilles* (4 vols.) (Paris, 1808–1827), II: 66.

[64] The reference on Cuba dates to Humboldt's March 1801 visit. Quoted in Peter Wood, 'The Calabash estate: gourds in African American life and thought', paper presented at conference on African Impact on the Material Culture of the Americas at Winston-Salem State University in North Carolina, 30 May 1996; see also Alpern, 'European introduction of crops', 28; Jonathan D. Sauer, *Historical Geography of Crop Plants* (Boca Raton, 1993), 51.

[65] William Ed Grimé, *Ethno-Botany of the Black Americans* (Algonac, 1979), 168; Robert Voeks, *Sacred Leaves of Candomblé* (Austin, 1977), 28.

[66] William S. Pollitzer, *The Gullah People and their African Heritage* (Athens, 1999), 97; Robert. W. Schery, *Plants for Man* (New York, 1952), 404; Hess, *Carolina Rice Kitchen*, 92–113.

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Groundnut (*Voandzeia subterranea*). In the 1770s, Moravian missionaries among the Saramaka maroons reported the cultivation of the African (or Bambara) groundnut (*Voandzeia subterranea*) in Suriname, a practice that continued into the 1970s.[67]

Kola (*Cola cuminata*). Frederic Welwitsch reported from Angola in the mid-1800s that kola nuts represented a lucrative item of export to South America, being 'much sought out by the slaves there imported from Africa'. They were used as a condiment in the West Indies and Brazil.[68] Slaves had initiated planting the tree in the West Indies by the early 1700s, and kola nut remains esteemed for its medicinal value in contemporary Belize among the Garifuna, descendants of black Caribs.[69]

Oil Palm (*Elaeis guineensis*). Fruits of the oil palm were loaded as provisions on slave ships. Cultivation of the oil palm by slaves is recorded for the eighteenth century in Jamaica and Martinique. Known as *dendé* in Brazil, where it is a key ingredient of Afro-Brazilian cuisine, the oil palm's appearance is also attributed to an early date.[70]

Okra (*Hibiscus esculentus*). This tropical west-central African domesticate was established by slaves in the Americas. Brought to Brazil before 1658, okra reached Suriname before 1686, and was planted by slaves in Barbados in 1750 and in the American South during the same century.[71] Prized as a food by slaves, okra was also used to induce abortions.[72]

Peanuts (*Arachis hypogaea*). A South American domesticate, the peanut had diffused in pre-Columbian times from its center of origin in temperate valleys of the Andes to the Arawak cultures of the Caribbean. But historical accounts do not indicate the expansion of its cultivation to Central and North America prior to the period of European contact. By the 1560s, peanuts were planted in Senegambia. The peanut's cultivation over a broad area of West Africa by the end of the century resulted in the emergence of a distinctive African variety, *Arachis hypogaea africana*. Peanuts grown in West Africa and brought aboard slave ships as provisions led to their introduction to eastern North America during the early eighteenth century.[73] In some black communities of South Carolina and Georgia, peanuts are still known by their African names, *penda* and *goobers*.

Pigeon peas (*Cajanus cajan*). Also known as the Congo or Angola pea because its introduction was attributed to slaves from central Africa, the pigeon pea forms a

[67] Richard Price, 'Subsistence on the plantation periphery: Crops, cooking and labour among eighteenth-century Suriname maroons', *Slavery and Abolition*, 12 (1991), 107–27.

[68] Welwitsch cited in Voeks, *Sacred Leaves*, 26; Edward Lewis Sturtevant, in U. P. Hedrick (ed.), *Sturtevant's Edible Plants of the World* (New York, 1972), 184.

[69] Edwards, *History, civil and commercial*, I: 194; Carney fieldwork, 1993.

[70] W. Wright, 'An account of the medical plants growing in Jamaica', *London Medical Journal*, 3/3 (1787), 217–95, esp. 293; Voeks, *Sacred Leaves*, 26; Sauer, *Historical Geography*, 190.

[71] Hedrick, *Sturtevant's Edible Plants*, 303. Okra was also mentioned as being cultivated in maroon gardens by Moravian missionaries in Suriname during the 1770s. See Price, 'Subsistence on the Plantation Periphery', 110.

[72] Grimé, *Ethno-Botany*, 29, 63–64; Price, 'Subsistence'.

[73] Charles Bryant, *Flora diaetetica: or, History of Esculent Plants. Both Domestic and Foreign* (London, 1783), 345; Tussac, *Flore des Antilles* II: 66; Wood, *Black Majority*, 119–22; Joyce Chaplin, *An Anxious Pursuit : Agricultural Innovation and Modernity in the Lower South, 1730–1815* (Chapel Hill, 1993), 156; Pollitzer, *Gullah People*, 97; Sauer, *Historical Geography*, 81–82.

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staple legume in black cuisine from the West Indies throughout tropical America. It is frequently prepared in association with dishes based on rice and was cultivated by maroons in Suriname in the eighteenth century.[74]

Rice (*Oryza glaberrima*). Discussed in detail in the text, rice was cultivated over a broad area from South Carolina through the Caribbean and into Brazil. Bahian planter Gabriel Soares de Sousa noted in 1587 the cultivation of both rain-fed and swamp rice, the use of the mortar and pestle for milling, and the triumph of African dietary preferences among the slave population.[75] Efforts by slaves to maintain a dietary favorite in the sugar-cane economy of Jamaica, however, were frustrated by hand milling, which burdened their exhausted bodies. An account from 1753 noted:

> This grain is sowed by some of the Negros in their gardens, and small plantations in Jamaica, and thrives very well in those that are wet, but because of the difficulty there is in separating the grain from the husk, 'tis very much neglected, seeing the use of it may be supplied by other grains, more easily cultivated and made use of with less labour.[76]

Sesame (*Sesamum indicum*). Established in South Carolina by the 1730s, sesame (or benne as it is called in Africa and by the Gullah) was used by slaves as cooking oil and for seasoning. It was also established in Brazil early in the Atlantic slave trade.[77]

Sorghum (*Sorghum bicolor*). Also known in early references as 'Guinea Corn', eighteenth-century botanist Mark Catesby noted in the Carolinas that 'little of the grain is propagated, and that chiefly by the Negroes, who make bread of it, and boil it'.[78]

Watermelon (*Citrullus lanatus*). Native to the West African savanna, watermelon was planted in Spanish Florida in 1576 and cultivated in Brazil by 1648.[79]

Yam (*Dioscorea* spp.). Regularly used for ship provisions, African yams were established at an early period in tropical America. They were reported as being planted for food by slaves in the Antilles, Brazil and South Carolina and by maroons in Suriname.[80]

While these crops arrived in the Americas on slave ships, they became established in areas of plantation slavery because slaves and maroons deliberately planted them for subsistence. Through their labors and efforts to maintain preferred food staples in the New World, Africans and their descendants shaped the distinctive cuisines of the African diaspora enjoyed by blacks and whites alike. In this manner, plants domesticated in the African centers of agricultural origins served in the Americas to forge black

[74] Tussac, Flore des Antilles, IV: 95; Price, 'Subsistence on the plantation periphery', 110.
[75] Soares mentioned in Ribeiro, *Aspectos e problemas*, 152–6.
[76] Hans Sloane quoted in Grimé, *Ethno-Botany*, 154.
[77] Pollitzer, *Gullah People*, 6; Grimé, *Ethno-Botany*, 25–6.
[78] Mark Catesby, *The Natural History of Carolina, Florida, and the Bahama Islands* (2 vols.) (London, 1771 [1743]), I: xviii; Bryant, *Flora diaetetica*, 336.
[79] Lewis Gray, *History of Agriculture in Southern United States to 1860* (2 vols.) (Gloucester, 1958), I: 53, 194; Hedrick, *Sturtevant*, 170.
[80] Tussac, *Flore des Antilles*, IV: 82; Catesby, *Natural History*, xix; Ribeiro, *Aspectos e problemas*, 152–6; Price, 'Subsistence on the plantation periphery', 110.

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cultural identity through bondage, as French historian Jean Suret-Canale claims for Brazil:

> The blacks had an agricultural civilisation already well adapted… and it was in just this sense that in Brazil in 1827 Brigadeiro da Cunha Matos, a convinced slaver, affirmed the civilising character of Africa in relation to America. It was even said in the Brazilian Chamber of Deputies by Bernardo Pereira de Vasconcelos in 1843: 'It is Africa that has civilized Brazil'. In effect, a whole material civilisation, including nutritional practices, was implanted in tropical America, not only in the African populations but in many areas among those of European origin. It was an imported African material civilisation.[81]

This civilization, as Suret-Canale correctly observed, rested on the foods and agricultural practices that Africans introduced to the Americas.

In this sense, then, the subsistence plots of slaves served as a parallel form of crop experimentation to the seeds exchanged by European and North American scientific societies and botanical gardens. With the notable exception of rice, whites of the Americas paid little heed to the garden crops planted by blacks unless they showed commercial promise. One historian of the American South underscores the crucial role of provision gardens in establishing and maintaining African foods in the Americas:

> Whatever, its name, supplying slaves provision gardens proved common practice in many plantation areas. While criticized as a system enabling planters to abrogate some of their food responsibilities to slaves, the right to grow preferred food crops that might also be marketed proved generally popular with slaves… Considering their long-standing connection with Africa established by the slave trade, it is surprising that whites in the lower South did not experiment more with African crops… They experimented with truly tropical crops from unfamiliar areas only if such plants had already proved successful in the Europeanized West Indies… Rather than importing African crops, planters more often discovered them in the gardens of their slaves. For these crops, blacks were the true experimenters and relied on a transatlantic network much different from that emanating from the Royal Society. Through the Atlantic slave trade, blacks had gradually transferred African plants (like sesame, guinea corn [sorghum], okra) and American crops transplanted in Africa (peanuts and capsicum peppers) to lands where they were enslaved. Whites discovered uses for slaves' products only when they learned of external markets for them.[82]

Through subsistence preferences and provision gardens, slaves adopted key African staples to the diverse environments of the New World. In this sense they followed the established practices of their forebears who had adapted plants diffused to the continent in at least two major epochs of intercontinental crop exchanges to diverse African environments. The process continued among those enslaved in the Americas. Through crop experimentation, seed exchanges, and indigenous systems of knowledge, they ensured the survival of African foods among blacks forced into bondage. The parallel universe of crop exchanges initiated by African slaves relied upon the right to garden plots and probable contacts with African sailors and

[81] Jean Suret-Canale, *Essays on African History* (Trenton, 1988), 67.
[82] Chaplin, *An Anxious Pursuit*, 156.

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cooks aboard slave ships for obtaining the seeds that would forge the diaspora cuisines of the Americas.[83]

CONCLUSION

The revolution in global agricultural production remains a central finding of scholarship on the Columbian exchange. But these transoceanic crop transfers were taking place within the political-economic context of European overseas expansion and Atlantic slavery. More than the revolutionary role of Amerindian crops on food systems was at stake with the Columbian exchange in Africa. African agricultural production underwent a radical reorganization as demand grew for food that would feed the armies involved in the Atlantic slave trade, their victims aboard slave ships, and the groups who fled the violence by retreat to remote locations. Many African societies produced food staples for sale to slave ships, often by captives awaiting deportation to American plantations or in client agricultural villages specialized for surplus cereal production.[84] Other societies not involved in the slave trade sold cereals to those who were, in order to obtain critical trade goods. The Balanta's avoidance of slavery by retreat to isolated swamps forced the adoption of wetland rice but provided them the opportunity to market a crop much in demand by slavers. Sales of rice gave them access to iron, with which they strengthened the implements used to prepare the heavy clay soils for rice cultivation.[85] The reorganization of African agricultural production during the Atlantic slave trade thus involved indigenous as well as introduced crops. As provisions on slave ships African domesticates arrived in the Americas, and they became established on the western rim of the Atlantic basin through the efforts of slaves.[86]

Slaves made a far greater contribution to the agricultural history of the Americas than is indicated in conventional accounts that portray them as mere unskilled plantation laborers growing the export crops demanded by their masters. Through the indigenous knowledge systems of farming they brought to the New World, their efforts to grow preferred African foods for subsistence and the struggles they waged over the right to provision gardens, they carried out a vital part of the Columbian exchange by establishing their food staples in the Americas. In relegating African food crops and knowledge systems to insignificance in global agricultural history, scholarship on the Columbian exchange has failed to engage the profound legacy of African crops and Africans in the making of the Atlantic world.

[83] On the role of Africans working aboard slave ships, see W. Jeffrey Bolster, *Black Jacks; African American Seamen in the Age of Sail* (Cambridge, 1997); Linebaugh and Redicker, *The Many-Headed Hydra*.

[84] On cereal production by African captives, see Francis Moore, *Travels into the Inland Parts of Africa* (London, 1738), 43; G. Mollien, *Travels in Africa* (London, 1820), 110; Walter Rodney, 'African slavery and other forms of social oppression on the Upper Guinea Coast in the context of the Atlantic slave trade', in J. E. Inikori (ed.), *Forced Migration* (London, 1982), 6–70; C. Robertson and M. Klein, 'Women's importance in African slave systems', in C. Robertson and M. Klein (eds.), *Women and Slavery in Africa* (Madison, 1983), 3–28; Barry, *Senegambia*, 107–18.

[85] Hawthorne, 'Nourishing a stateless society', 14.

[86] One pioneering exception, but in need of revision, is Grimé's, *Ethno-Botany*.

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