



Courtney Fullilove. *The Profit of the Earth: The Global Seeds of American Agriculture.* Chicago: University of Chicago Press, 2017. 288 pp. \$40.00, cloth, ISBN 978-0-226-45486-3.

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The World in a Grain of Wheat

Humans are inclined to attribute magical powers to seeds, and never less so than in the modern age. For over a century scientific crop-breeding techniques, from controlled crosses to genetic modification, have conjured into being a succession of improved varieties of important crops like maize, wheat, and rice, routinely hailed as “miracle seeds.” We attribute to these seeds the power to change the world: to eliminate hunger, poverty, and malnutrition; to thrive through flood, drought, and pests; and to bring prosperity, entrepreneurial energy, and democracy to the rural poor. The miracle wheats and rices of the first Green Revolution may have failed to deliver on all their promises, but our belief in the power of seeds to transform the world for the better continues unabated: we turn again to the plant scientists, confident that new technologies will allow them to develop still better seeds, bringing us a “second Green Revolution” or “doubly Green Revolution” to parry the demographic and environmental threats of the Anthropocene.[1]

In pursuit of abundant harvests humans have collected, selected, and exchanged seeds of crop plants for millennia. But a seed, as Courtney Fullilove reminds us, is not just a package of germplasm that goes into the soil and—all being well—

grows, fruits, and yields a material harvest. A seed is a “deep-time technology” (p. 1) compressing into a tiny material nugget myths about the past, ideologies of the present, and hopes for the future: it both *encapsulates*[2] and *masks* (p. 135) the accumulation of human and natural events that produced it, and the regimes of value and relations of production, the political economy, that it in turn serves to reproduce.

The politics of modern seed-breeding and their social, environmental, and symbolic impact have recently attracted a number of outstanding studies,[3] as have the historical contributions of subalterns hitherto erased from the genealogies of crop-breeding.[4] *The Profit of the Earth* is a virtuoso addition to this critical rewriting of histories of capitalism, science, and modern global food-systems. Fullilove takes on the daddy of all the seeds around which modern farming landscapes and ideologies have taken shape. She unfolds a bold and intricately articulated historical deconstruction of the Midwestern landscape of “amber waves of grain” and of the seeds of Red Turkey wheat from which the amber waves sprouted, transforming the prairies of Kansas into the world’s breadbasket in the 1870s and 1880s, and ultimately launching the Green Revolution.

The Profit of the Earth is organized in three sections which home in on the politics of American wheat seeds and ideologies of modern seed-breeding science from cross-cutting perspectives. These sections are interleaved with notes from the field expeditions Fullilove made with seed scientists across several continents. The three chapters in part 1, "Collection: The Political Culture of Seeds," investigate the mission of the nineteenth-century US Patent Office to collect and distribute seeds and specimens of potential utility from around the world, as part of the office's broader remit to encourage innovation, improvement, and economic growth. Sometimes the agricultural innovations succeeded; sometimes (as in the case of tea, discussed in chapter 3) they failed. While patents promoted a system of individual intellectual property rights, it was more morally and practically complicated to lay claim to the ownership of natural objects like seeds. For the thousands of seeds that it distributed, the Patent Office "adopted a model of public research and free circulation of specimens that persisted in the autonomous USDA," established in 1861 (p. 44).

Part 2, "Migration: Wheat Culture and Immigrant Agricultural Knowledge," consists of two chapters exploring the creation of a capitalist farming landscape in late nineteenth-century Kansas. The arrival of the railways, en route to the Pacific, transformed a backwater into a land of opportunity. Promoters lured Mennonite colonists, internationally renowned as wheat farmers, from Ukraine and the Crimea to the "New Russia" of Kansas. Fullilove traces the contexts in which Mennonites came to be seen as model farmers and ideal migrants back two centuries, first from Prussia to the Russian steppes, developed from around 1800 as a grain-exporting region, and then to America, anxious to feed its growing industrial towns, expand its own exports, and civilize its untamed wastes by bringing them under the plough. She traces the networks of expertise that went into producing and then maintaining and improving the fabled "Turkey Red" wheats that the Mennon-

ites introduced to the United States, and probes the material and social resources that allowed them, unlike many less well-connected settlers, to succeed. The Mennonites grew highly profitable hard red winter wheats that suited both soil and climate and whose high gluten content guaranteed their success on national and international markets. The quality of the seed was maintained through continuous imports from Russia. The Mennonites mono-cropped wheat commercially on large, increasingly mechanized and capitalized farms, in a dynamic of scale that became the mantra of efficiency for advanced agriculture both in Western nations and in the socialist East.

The three chapters in part 3, "Preservation: Indigenous Plants and the Preservation of Biocultural Diversity," approach the "amber waves of grain" from a different angle entirely. Where parts 1 and 2 investigate the assembling of elements into the agrarian system of the Kansas wheat field, drawing together threads from across the world, this section looks at what had to be eliminated or destroyed in order for the new landscape to thrive. Native Americans, buffalo, prairie grasses, immigrant subsistence farmers, all disappeared as the Wheat Belt took shape and shifted into high gear. As her emblematic actor here Fullilove selects John Uri Lloyd, pharmacist-herbalist, visionary, and champion of the elk's weed, or purple coneflower. A common prairie flower, prominent in the medicinal repertory of the Plains Indians, the coneflower was quickly incorporated into the pharmacopeia of white American herbalists. But manufacturers of herbal remedies like Lloyd found supplies increasingly hard to come by as the grasslands were turned under the plough. Medical historians typically see the decline of herbalist medicine in Europe and its white colonies as the loss of an epistemological battle. Fullilove argues that "the marginalization of botanic medicine in the United States was as much a result of changes in land use and political economy as of medical knowledge" (p. 154). Yet, as her discussion of Lloyd's science-fiction critique of bureaucratic knowledge systems

suggests, the epistemologies of knowledge-making more generally were shifting towards a modernist rationality of simplification in the interests of efficiency.

The book concludes with an epilogue, “In the Gene Bank,” that returns to the discussion of “how novel concepts of temporality, continuity, and change applied to seeds have structured modern technological choices, social relations, and modes of production” (p. 11). The DNA coding of contemporary wheat varieties is just as much a “poetic reduction” (p. 214), a mythologizing and laying claim, as are more obviously subjective stories about founding deities or immigrant grandmothers carrying seeds tucked into their bundles. But as the sites for the classification and modification of plants have shifted from the hillside, the field, or the herbarium to the laboratory, we have increasingly naturalized property regimes that attribute ownership to the corporations whose scientists inscribe DNA sequences instead of to the people who gathered, grew, and selected the plants over the centuries. The uneasy equilibrium between seeds as a common good or as private, exploitable property has shifted inexorably towards the capitalist regime of private property rights. Today these claims are ardently challenged by many indigenous groups and NGOs, and one goal of Fullilove’s study is to illuminate the contending claims and their politics. The overarching point, however, is to remind us that a seed conceals labor and knowledge and masks the politics of its own production and use.

As historians we need to understand how assemblages come into being and dissociate, and equally we need to scrutinize what is erased in the process. Accidents and contingencies are part of both history and historiography. Accordingly, *The Profit of the Earth* is a history written at the boundaries of time, space, discipline, and the meeting points of recognition. The sections, chapters, and interludes of field notes loop back and forth across space and time, focusing on neglected corners and

turning surprises into questions. “History defies beginnings and ends” (p. 1) and peripheries are where centers take shape. In lieu of a linear chronology or a regular pattern of moving between places, Fullilove transports us back and forth between archaeological remains and modern gene banks; between the archives of the US Patent Office in Washington DC, seed collections at the Nikolai Vavilov Research Institute for Plant Industry in St Petersburg, and the correspondence of Lloyds Brothers Pharmacists in a Cincinnati collection; between wheat field margins in Kansas and wheat field margins in the Caucasus. She collects crosses between “wild” and domesticated wheats while accompanying plant genetic resource specialists in Morocco, Syria, Armenia, Kazakhstan, and New Zealand, and listens while they attempt, usually through interpreters, to extract information about varietal names, characteristics, and pedigrees from local farmers, often caught by the sleeve in passing, impatient to resume their own lives.

As people on the move, people on the edges of settled, civilized life, pastoralists and nomads are categorically excluded by most authorities as playing a role in developing crops or farming techniques. This was as true of ancient empires as it is of modern nations: governments value people and things that stay still, that can be counted and mapped and taxed. Fullilove combs the documents to retrieve the likely contributions of Nogai and Tatar pastoralist cultivators in Russia, and Yazidi or Kurdish nomads on the frontiers of Turkey, Iran, and Syria, to the selection and development of the strains of Crimean-Turkish wheat that enabled the Mennonites to make a success of farming first in the Crimea and then in Kansas. Fullilove also asks what the needs and preferences of these mobile groups living within wheat’s “center of origin” might be in shaping the gene pool of “land races” so essential to modern breeders and gene banks. She further refines the remapping of the skill and knowledge flows that make up the genealogies of modern universal crop breeds like miracle wheats

by highlighting the global circuits of modern wheat-breeding. To give just one example: the disease-resistant, prolific wheats bred by Norman Borlaug, awarded the Nobel Peace Prize in 1970 as the “father of the Green Revolution,” were bred from a combination of Mexican disease-resistant varieties and North American crosses with Norin 10, a semi-dwarf wheat pioneered in Japan pre-WWII that was itself a cross between Japanese wheats and American red wheats.

The Profit of the Earth is a history written, creatively and consistently, from the margins. The central object of analysis where the sightlines converge, the core around which the whole book is organized, is literally placed at the center of the work, in part 2. This is where Fullilove introduces us to the newly prosperous wheat belt of Kansas whose “amber waves of grain” inspired Katherine Lee Bates in 1893 to pen a grandiose vision of *America the Beautiful*, and whose fruitful seeds of Turkey Red wheat fed America’s growth as a world power and helped entrench an ideal of agrarian excellence that transformed the world economy. Fullilove shows us the modern world written in a grain of wheat, and studied from the margins. Her ambitious strategy does pay off, but because of the complexity of its structure and arguments, the book is certainly not an easy read. I had constant recourse to the index to find my way back and forth. Some cross-referencing, a bibliography, and a list of maps and figures would have helped. Although this is definitely not a book for undergraduates, it is engrossing, challenging, and extremely rewarding. This is a book for all historians of agriculture, of capitalism, and of science to read closely, relish, argue with, and return to.

Notes

[1]. International Rice Research Institute (IRRI), “The Second Green Revolution Has Begun: Rice, Food Security, and Climate Change,” IRRI website, July 31, 2015, <http://irri.org/the-second-green-revolution-has-begun>; Gordon Conway, *The Doubly Green Revolution: Food for All in the Twen-*

ty-First Century (Ithaca, NY: Cornell University Press, 1999).

[2]. David Biggs, “Promiscuous Transmission and Encapsulated Knowledge: A Material-Semiotic Approach to Modern Rice in the Mekong Delta,” in *Rice: Global Networks and New Histories*, ed. Francesca Bray et al. (Cambridge and New York: Cambridge University Press, 2015), 118–37.

[3]. Including Jonathan Harwood, *Europe’s Green Revolution and Others Since: The Rise and Fall of Peasant-Friendly Plant Breeding* (London: Routledge, 2012); Tiago Saraiva, *Fascist Pigs: Technoscientific Organisms and the History of Fascism* (Cambridge, MA: MIT Press, 2016).

[4]. Judith Carney and Richard Nicholas Rosomoff, *In the Shadow of Slavery: Africa’s Botanical Legacy in the Atlantic World* (Berkeley: University of California Press, 2011); Bruce L. Mouser et al., “Red and White Rice in the Vicinity of Sierra Leone: Linked Histories of Slavery, Emancipation, and Seed Selection,” in *Rice, Global Networks and New Histories*, , 138–62; Biggs, “Promiscuous Transmission.”

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