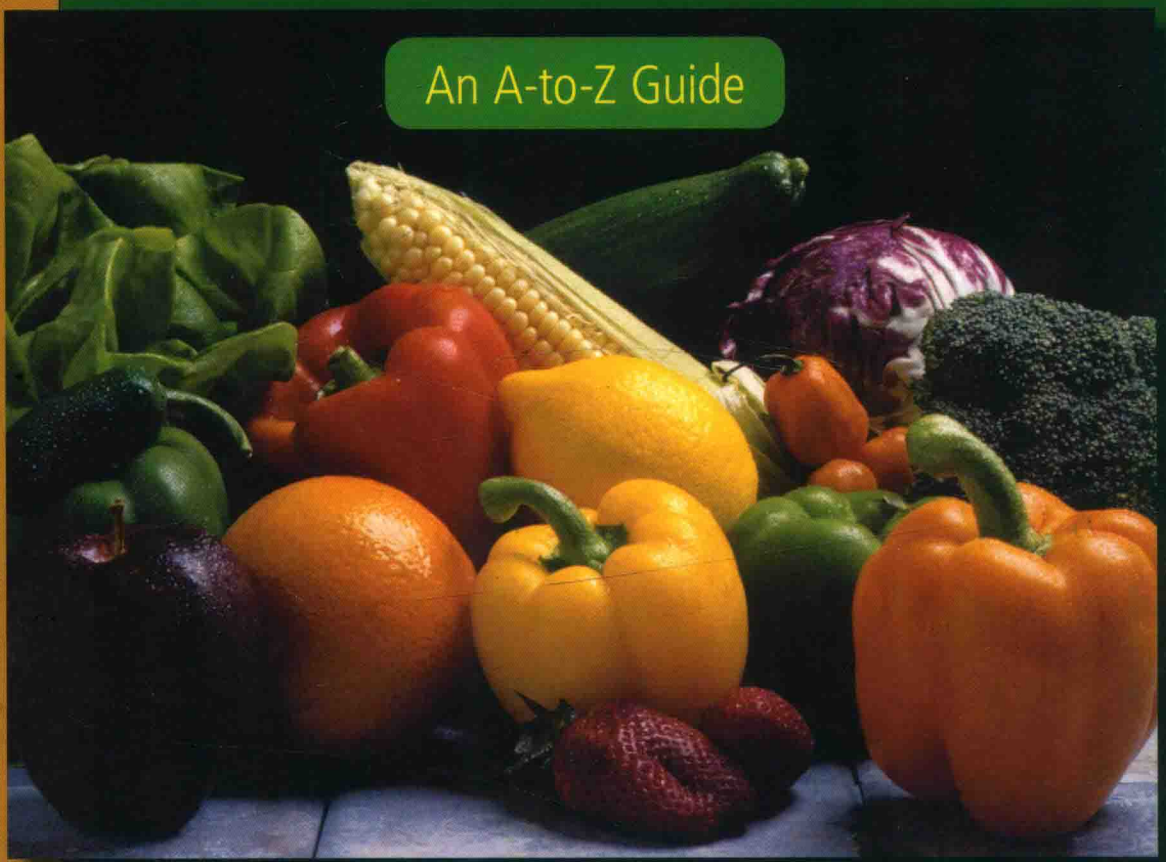
The SAGE Reference Series on
Green Society
Toward a Sustainable Future

Green Food

An A-to-Z Guide



Dustin Mulvaney, General Editor
Paul Robbins, Series Editor

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Green Food

About the Editors

Green Series Editor: Paul Robbins

Paul Robbins is a professor and the director of the University of Arizona School of Geography and Development. He earned his Ph.D. in Geography in 1996 from Clark University. He is General Editor of the *Encyclopedia of Environment and Society* (2007) and author of several books, including *Environment and Society: A Critical Introduction* (2010), *Lawn People: How Grasses, Weeds, and Chemicals Make Us Who We Are* (2007), and *Political Ecology: A Critical Introduction* (2004).

Robbins's research centers on the relationships between individuals (homeowners, hunters, professional foresters), environmental actors (lawns, elk, mesquite trees), and the institutions that connect them. He and his students seek to explain human environmental practices and knowledge, the influence nonhumans have on human behavior and organization, and the implications these interactions hold for ecosystem health, local community, and social justice. Past projects have examined chemical use in the suburban United States, elk management in Montana, forest product collection in New England, and wolf conservation in India.

Green Food General Editor: Dustin Mulvaney

Dustin Mulvaney is a Science, Technology, and Society postdoctoral scholar at the University of California, Berkeley, in the Department of Environmental Science, Policy, and Management. His current research focuses on the construction metrics that characterize the life cycle impacts of emerging renewable energy technologies. He is interested in how life cycle assessments focus on material and energy flows and exclude people from the analysis, and how these metrics are used to influence investment, policy, and social resistance. Building off his work with the Silicon Valley Toxics Coalition's "just and sustainable solar industry" campaign, he is looking at how risks from the use of nanotechnology are addressed within the solar photovoltaic industry. Mulvaney also draws on his dissertation research on agricultural biotechnology governance to inform how policies to mitigate risks of genetically engineered biofuels are shaped by investors, policy-makers, scientists, and social movements.

Mulvaney holds a Ph.D. in Environmental Studies from the University of California, Santa Cruz, and a Master of Science in Environmental Policy, and a Bachelor's Degree in Chemical Engineering, both from the New Jersey Institute of Technology. Mulvaney's previous work experience includes time with a Fortune 500 chemical company working on sulfur dioxide emissions reduction, and for a bioremediation startup that developed technology to clean groundwater pollutants like benzene and MTBE.

Introduction

Our food and agricultural systems have undergone a tremendous change in the 20th century. Less common now are the pastoral ways in which we have come to imagine agriculture, such as the images found on a milk carton. Agriculture and the food system have become thoroughly industrialized and increasingly globalized. A plentiful supply of cheap fossil fuels has helped to power mechanization, produce the fertilizers and pesticides, and lengthen distance from farm to plate. The result is a carbon-intensive food system that keeps food prices cheap, while large retailers and processors continue to extract value from farmers at increasing margins. The result of this transformation is an agrifood system with an enormous productive capacity, but one that causes considerable environmental burdens and that has exacerbated problems with poverty and food distribution.

The extent to which our agricultural system has become dependent on fossil fuel–based fertilizers; highly mechanized planting, harvesting, and processing; and high-tech seed has changed significantly the systems on which past agricultural practices depended. Our existing food and agricultural production systems have a long list of environmental and social impacts that suggest the need for a more sustainable agrifood system. Not only are there these externalities cause by agricultural production, but the resource intensity of the industrial food system overall could be undermining its future prosperity. For example, most agricultural soils, once rotated out of production, and once enriched with nearby farm animals, are now treated with chemicals intending to kill all of the living matter in the soil. The soil, far from its previous state as a collection of carbon and living organisms, and as a reservoir of essential nutrients, is now a sterile environment for controlled growth and pest control. Water from conventional farms now contains high levels of nitrogen pollution, salts, and other fertilizer and pesticide runoff, preventing the water's reuse, and creating anoxic zones where rivers drain into the sea, such as the infamous Mississippi River "dead zone."

The changes to our food system have not just affected how food is produced, but they have also considerably changed how the agrifood system is organized. Industrial concentration has marked the 20th century in agriculture as food and agriculture companies have vertically and horizontally integrated to dominate entire sectors; grain transportation, meat packing, agro-chemical manufacturing, and seed production are just some examples of agricultural sectors that are dominated by only a handful of large, multinational firms. This in and of itself has implications as the decisions made in several small boardrooms of multinational corporations to pursue one technology or another can have a considerable and lasting effect on the landscape and on human health.

These changes have shaped consumer expectations of the food system. Consumers demand that their food purchases defy the logic of seasons. They want tomatoes and strawberries in the cold of winter. They want consistent-tasting fast foods. This is happening while consumers have become more distant from the food they eat, and less aware of what it takes to get a food from the field to the factory to the plate.

The move toward green food is part of a reaction to the degradation and violence of industrial agriculture. The development has many roots in animal rights movements, appropriate technology movements, and back-to-the-land movements, among many others, each with its own motivations for action. The slow food movement, for example, emerges out of the hope to combat the spread of fast-food, reintroducing the cultural rituals of eating that require more time spent at the table in conversation, as opposed to the fast-paced meals eaten in the car. Evidence for the popularity of this new green food movement can be seen in the growth of organic agriculture and the constantly evoked statistic of its 20 percent annual growth in sales and revenues. The popularity and growth of farmers markets also shows evidence of this burgeoning agrifood movement. Food consumption is central to any individual's daily routine. So in many ways the environmental and social impacts of food production are closely tied to our individual choices as consumers. Hence, there is political space for those who want to see more food labeled and food's content disclosed where it currently is not.

Often lacking from the mainstream discussion of green foods, but critical to the question of environmental justice, is the treatment of agricultural workers. The improper treatment of agricultural workers has a long storied past—one could point to John Steinbeck's *The Grapes of Wrath* for an earlier account—but it continues today. Many agricultural and food system workers are minorities or immigrants, many of whom lack legal rights. The story of agricultural labor in the United States and Mexico has an interesting twist. Some of the cheap labor that has always come through the United States was recently driven to migrate from Mexico's corn-growing regions after the North American Free Trade Agreement helped the United States dump corn into the Mexican market at very low prices, undercutting local producers. Those farmers without a market for corn had little to sell but their labor, and their seasonal migrations result in remittances back to their communities. The story shows how food production in many industrialized countries is strongly influenced by everything from government policies on trade to consumer fads. We hope this volume speaks to the numerous issues and challenges we face in order to change our approach to eating.

These entries help lay out the contours of the field of agrifood studies. They on scholars working in the fields of political ecology, rural sociology, geography, and environmental studies to paint a picture of agriculture and food's past, present, and future. They look to provide the reader with a basic understanding of the institutions, practices, and concepts to help identify what is and is not a green food. Because food is so intimately connected to our daily lives, it could be that the food system offers the most promise to make changes in a sustainable direction.

What constitutes an actual sustainable and green food system is still an open question. There are many unresolved questions about what it should look like, what policies would help get it there, and what kinds of tradeoffs we face in deciding which path to choose. This volume should provide people interested in food and agricultural systems with the basic analytical and conceptual ideas that help explain why our food system looks the way it does, and what can be done to change it.

Dustin Mulvaney
General Editor

Reader's Guide

Food Challenges

Animal Welfare
Beyond Organic
Cheap Food Policy
Crop Genetic Diversity
DDT
Debt Crisis
Disappearing Middle
Export Dependency
Famine
Farm Crisis
Fast Food
Food Processing Industry
Food Safety
Food Security
Genetically Modified Organisms
Grain-Fed Beef
High-Fructose Corn Syrup
Integrated Pest Management
Irradiation
Mad Cow Disease
Malthusianism
Mechanization
Millennium Development Goals
Modernization
Nitrogen Fixation
Organochlorines
Origin Labeling
Peasant
Pesticide
Productionism
Proletarianization
Recombinant Bovine Growth Hormone
Roundup Ready Crops
Salmonella
Sewage Sludge
Soil Erosion
Sustainable Agriculture
Swidden Agriculture
Weed Management

Food Economics and Trade

Adoption-Diffusion
Appropriationism
Bracero Program
Cash Crop
Commodity Chain
Comparative Advantage
Concentration
Fisheries
Foodshed
Horizontal Integration
Just-in-Time
Labor
Land Reform
Land Tenure
Monsanto
Retail Sector
Supermarket Chains
Supply Chain
Trade Liberalization
Vertical Integration

Food Farm and Industry

Agrarianism
Agrarian Question
Agribusiness
Agricultural Commodity Programs
Agricultural Extension

Food Laws, Agreements, and Organizations

Foods and Lifestyle

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Green Food Chronology

12,000–6,000 B.C.E.: During the Neolithic Revolution, early humans learn to domesticate plants and animals, developing agriculture and the beginnings of settlements in the Fertile Crescent. Previously gathered plants, including grains and legumes, are sowed and harvested, and wild sheep, goats, pigs, and cattle are herded instead of hunted. The earliest forms of storage create food surpluses, which ensure the growth of fledgling cities.

4000 B.C.E.: The Egyptians discover how to make bread using yeast. The Chinese discover how to use lactic acid bacteria to make yoghurt, molds to produce cheese, and fermentation to make vinegar, soy sauce, and wine.

4000–3000 B.C.E.: In a seemingly simultaneous innovation, civilizations in Europe and the Middle East use oxen to pull sledges and plow fields.

3200 B.C.E.: The wheel is used in Ancient Mesopotamia.

2500 B.C.E.: Ancient Sumerians make use of the natural occurring element sulfur as the first known use of an insecticide, applying it to their crops.

1202: King John of England proclaims the first English food law, the Assize of Bread, which prohibited adulteration of bread with such ingredients as ground peas or beans.

1673: Spanish scientist Francesco Redi compares two competing theories to explain why maggots appear on rotting meat. He observes that meat covered to exclude flies does not develop maggots, whereas uncovered meat did.

1700: The British Agricultural Revolution begins at the start of the century and describes a period of the next hundred years in which significant increases in agricultural production support an unprecedented population surge.

1724: Anton van Leeuwenhoek uses his microscopes to make discoveries in microbiology. He is the first scientist to describe protozoa and bacteria and to recognize that microorganisms might play a role in fermentation.

1801: American pioneer John Chapman, better known as Johnny Appleseed, wanders the American West, planting orchards of apples. He becomes a legend in his own time for his generous ways and passion for nature.

1820–1975: Over this period, worldwide agriculture productions double four times.

1870: Forty-seven percent of gainfully employed Americans are engaged in agriculture.

1888: Vedalia beetles are imported from Australia to control fluted scale on citrus, marking the first successful biological control program of a crop pest.

1898: The Association of Agricultural Chemists establishes a Committee on Food Standards headed by Dr. Harvey Wiley, who is later the main proponent of the Pure Food and Drugs Act.

1902: Congress appropriates $5,000 for the Bureau of Chemistry to study chemical preservatives and coloring and their effects on digestion and health. Dr. Wiley's studies draw widespread attention to the problem of food adulteration. Public support for passage of a federal food and drug law grows.

1906: U.S. President Theodore Roosevelt signs the Pure Food and Drugs Act, effectively creating the Food and Drug Administration (FDA). The Center for Food Safety and Applied Nutrition (CFSAN) is the specific branch that oversees food. Now a part of the Department of Health and Human Services, the FDA regulates the safety of foods, dietary supplements, drugs, vaccines, cosmetics, and other products. The CFSAN is responsible for about $240 billion worth of domestic food in the United States. The passage of the Pure Food and Drug Act coincides with the Meat Inspection Act.

1910: Wild blueberries are domesticated.

1911: In *U.S. v. Johnson*, the Supreme Court rules that the 1906 Pure Food and Drugs Act does not prohibit false therapeutic claims but only false and misleading statements about ingredients.

1924: Austrian scientist Dr. Rudolf Steiner gives a series of eight lectures outlining the principles of biodynamic farming. His lectures are then published in the book *Spiritual Foundations for the Renewal of Agriculture*. Biodynamic farms use organic principles and, today, are a registered trademark of a U.S.-based corporation.

1933: The FDA recommends a complete revision of the obsolete 1906 Pure Food and Drugs Act.

1939: German scientist Paul Müller discovers that the chemical compound dichlorodiphenyltrichloroethane (DDT) is a very effective insecticide. In the decade to follow, manufacturers begin to produce large amounts of synthetic pesticides, and their use becomes an industry standard. Many years later, DDT would be at the heart of national outrage over irresponsible pesticide usage.

1940: Lord Northbourne writes *Look to the Land*, outlining the fundamental tenets of organic farming.

1943–1964: During these years, Mexico transforms its wheat industry and goes from importing half of its wheat to exporting half a million tons a year. The progress in Mexico sparks worldwide interest in new agricultural developments. U.S. Agency for International Development Director William Gaud coins the term "Green Revolution" in a speech, saying, "These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution."

1950: The Delaney Committee starts congressional investigation of the safety of chemicals in foods and cosmetics, laying the groundwork for future legislation.

1954: The U.S. Congress passes the Miller Pesticide Amendment, spelling out procedures for setting safety limits for pesticide residues on raw agricultural commodities.

1954: The first large-scale radiological examination of food is carried out by the FDA when it receives reports that tuna suspected of being radioactive is being imported from Japan following atomic blasts in the Pacific. The FDA begins monitoring around the clock to meet the emergency.

1958: The Food Additives Amendment is enacted by the U.S. Congress, requiring manufacturers of new food additives to establish safety. A provision prohibits the approval of any food additive shown to induce cancer in humans or animals.

1959: Three weeks before Thanksgiving, U.S. cranberry crops are recalled for FDA tests to check for aminotriazole, a weed killer found to cause cancer in laboratory animals. Cleared berries are allowed a label stating that they had been tested and had passed FDA inspection—the only such endorsement ever allowed by the FDA on a food product.

1960: The Color Additive Amendment is enacted by the U.S. Congress, requiring manufacturers to establish the safety of color additives in foods, drugs, and cosmetics.

1962: Rachel Carson's *Silent Spring* is a national phenomenon, first in serial form in the *New Yorker* and then as a hardcover best seller. This exhaustively researched and carefully reasoned attack on the indiscriminate use of pesticides sparks a revolution in public opinion. Specifically, the book deals with the controversial chemical DDT, which is widely used to controls insects and other pests. Carson claims that DDT is digested by birds and causes them to lay thinner eggs, resulting in detrimental effects on the greater ecosystem. She also accuses chemical companies of promoting disinformation and lobbying public officials to ignore the dangers of modern farming practices. Historians of popular culture will later mark *Silent Spring*'s publication as a turning point in the consciousness of American consumers. In the decades to follow, extensive legislation is passed as a result of civil unrest over food production, especially on large, agro-intensive farms.

1962: The Consumer Bill of Rights is proclaimed by U.S. President John F. Kennedy in a message to Congress. Included are the right to safety, the right to be informed, the right to choose, and the right to be heard.