
Farmer’s Bounty: Locating Diversity in the Contemporary World is intended to evaluate and give a scholarly assessment of the state of crop diversity in the world and the potential for its future preservation. It will be an essential text for those interested in crop diversity, genetic erosion, sustainability, farmer knowledge, and the thorny problems regarding ownership of genetic resources. Stephen Brush’s descriptions of recent academic research and policy initiatives on crop diversity bring the book up to date. Most readers will find the book easy to understand, although occasionally some technical terms used by anthropologists and other specialists may cause confusion for the uninformed reader. The book is a rich source of the literature, past and present, on the complex issues of crop diversity.

Brush is a professor in the College of Agricultural and Environmental Science, Department of Human and Community Science, University of California, Davis. Trained as an anthropologist, he has several decades of field experience and research in the cradles of domestication of potatoes in Peru, maize in Mexico, and wheat in Turkey. Most of his work centers on a subject dear to my heart: the humble potato. In 1949 Redcliffe Salaman, in his book The History and Social Influence of the Potato, wrote, “Indeed, there have not been wanting those who have regarded these activities (potato improvement) with a shake of the head and an indulgent smile, indicating that nothing short of mental instability could excuse a lifelong attachment to the study of so banal a subject.” I am certain that readers will disagree with the head shakers after reading Brush’s book, in which he uses his extensive knowledge of potato growing in the Peruvian Andes to answer questions such as “Why are crop species so diverse?”

The author brings together the knowledge and the literature of the numerous disciplines concerned with the multiple aspects of crop diversity. Included is the work of anthropologists, agricultural scientists, ecologists, geneticists, ethnobotanists, and sociologists. As a plant pathologist, I had hoped for more content on diseases and pests, but considering the immense scope of the book, this omission is understandable. Brush concentrates on farmers’ knowledge and provides an in-depth treatment of how it may contribute to an agenda for future research. He concludes that the vast amount of research on crop diversity since the pioneering work of Nikolai Ivanovich Vavilov has been “balkanized” into “different disciplines, technical language, and popular understandings.” The author’s own rigorous research with diversity in potatoes in the Peruvian Andes adds solid authenticity to the book.

The book is divided into sections and chapters that discuss in detail the various aspects of diversity. Four chapters cover the dimensions of crop diversity and the many questions surrounding it. They are followed by a history of human knowledge about crop diversity, going as far back as Theophrastus. Brush notes that although scientists have studied biological diversity in agriculture for 150 years, two puzzles remain unsolved. First, why is there so much variation, and second, why is variation within crop species distributed unevenly? He further notes that although originally a scientific curiosity, the issue of crop diversity has recently emerged as an important policy area with implications for agricultural development, environmental protection, resource conservation, and the rights of cultural minorities and poor farmers. Also described is the interaction of human ecologists with the study of diversity.

The book charts the fascinating history of the early searches for diversity, not only by plant collectors and naturalists but also later by more “scientific” groups. Brush describes the organized explorations for new plants, from the voyage of Captain Bligh in the Bounty to the expeditions of later explorers such as Humboldt, Darwin, and Vavilov. He also considers the contributions of the ethnobotanists and economic botanists who have developed methods for describing knowledge about crop diversity and the selection and maintenance of types of crops and crop populations. Studies by human ecologists have examined crop diversity in the context of environmental and social change.

The book describes and lists the various ways crop diversity, especially in potatoes, has been defined and measured, a subject of particular interest to me because I spent 11 years working on potatoes in the Andes of Colombia. Brush describes in detail folk practices, which emphasize the useful parts of the plant. He notes that this complex folk knowledge has guided the selection and maintenance of diversity for millennia. The names farmers give to potato varieties in the Andes can often provide humor. For example, one extremely knobby variety, which was difficult to peel, was named lumchipamundana, which translates as “the potato that makes brides weep.” Genetic measures discussed consist of both qualitative and quantitative traits and genetic markers. Ecological measures address population structure and distribution and analyze the relation between crop diversity and changes in agricultural environments.
The next portion of the book describes the scientific issues the author has concentrated on in his research. He first introduces the three crops and farming regions he has worked with during the last three decades: potatoes in the Peruvian Andes, maize in Mexico, and wheat in Turkey. He includes examples of how anthropological research can contribute to an overall understanding of the ecology and evolution of a crop in its center of origin. The nature of farmer selection is described using wheat diversity in Turkey as an example.

Brush describes the main issues around genetic erosion and offers a theoretical framework to improve the reader’s understanding of the concept. The literature on the subject is considerable, and he evaluates and analyses it. As he notes, the hypotheses that provide the logical underpinning of the genetic erosion concept are disputed in ecological and cross-sectional analysis, and this indicates the need for improving the theory and methods relied on today for understanding crop, environment, and human interactions.

Other chapters of the book ponder the question of how to conserve diversity in crops. The pros and cons of in situ versus ex situ methods are discussed in depth. Mankind’s rather dismal attempts at conservation to date are described in detail. Some efforts, such as gene banks, are of great importance and value, but will probably no longer continue as the only means by which crop genetic resources are preserved. Brush considers in situ or on-farm conservation to be a viable alternative. Enthusiasm for the concept has waxed and waned. Brush describes the past neglect of in situ conservation, its scientific basis, and strategies for its use. The addition of lessons learned from FSR (farming systems research), such as farmer participation, strengthen the concept of in situ conservation.

“Rights over Genetic Resources and the Demise of the Biological Commons” is the longest chapter in the book and raises many problematic issues that are yet to be resolved. The questions of ownership of genetic resources, plant breeders’ rights, farmers’ rights, biopiracy, and open access to crop resources are explored but hardly settled. As I wrote this review, I received a copy of an article in Spanish from the newspaper El Peruano, published in Lima on 24 February 2005. The article stated that the Peruvian government has established 30 May as the first annual “National Potato Day” in recognition of the potato’s genetic riches and the government’s obligation to preserve its biological diversity.

The final chapter ponders the future of crop diversity in a world with 11 billion people (the population projection for 2050), and ends on an optimistic note by deciding that the case histories of conservation efforts in developed societies are beneficial for the future of diversity. The vast amount of material covered and the scholarly thoroughness with which it is written ensure that Farmer’s Bounty: Locating Diversity in the Contemporary World will become a major text for all those interested in crop diversity, sustainability, traditional knowledge, and the difficult problems that surround ownership of genetic resources.

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BUILDING A NOAH’S ARK FOR PLANTS


In 1984, Frank Thibodeau and Donald Falk, fresh from graduate school at Tufts University, founded a new conservation organization, the Center for Plant Conservation, whose goal was to federate US botanical gardens and other horticultural institutions to hold a Noah’s Ark–like collection of endangered plants as a last resort against extinction in the wild. Recognizing the considerable but untapped expertise and facilities that these institutions represented, they sought to complement land-based conservation efforts and to ensure the survival of the increasingly threatened national flora. Ten gardens (including my own, the North Carolina Botanical Garden) took part in those early discussions. Some 20 years later, the network has expanded to 33 gardens. Today, the center is housed at one of its participating institutions—the Missouri Botanical Garden—and is led by Kathryn Kennedy, one of the 29 contributing authors of the volume reviewed here.

“Ex situ conservation” describes those activities that take place off site or away from wild populations (that I have to define the phrase points out my only quibble with the book—the title!). Such activities face several hurdles if they are to truly contribute to conservation. Most important, they make their highest contribution not by merely holding germ plasm in storage, but by using that germ plasm to support restoration in the wild. Further, the germ plasm collections must capture the original genetic variation, must be stored in a way that maintains viability for years or decades (or longer), must be appropriate to the sites where reintroduction will take place, and must be held in a way that avoids both genetic drift and selection pressures (either in storage or for plants grown in the experimental beds).

I hope that this gives some idea of the complexities of this program and the subjects covered by Ex Situ Plant Conservation: Supporting Species Survival in the Wild. It’s been noted that Noah’s selection criterion (a male and a female of each species) is not genetically sufficient, and that his time frame (40 days) is short compared with a continuing century of habitat loss and fragmentation, as well as likely environmental change. Ex situ conservation and restoration are also important for the very reason that we are running out of intact wild populations to protect.

Over the past 20 years, the National Collection of Endangered Species has increased from 50 to 610 species, with some