

Farmers, Gene Banks and Crop Breeding:
Economic Analyses of Diversity in
Wheat, Maize, and Rice

NATURAL RESOURCE MANAGEMENT AND POLICY

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EDITORIAL STATEMENT

There is a growing awareness to the role that natural resources such as water, land, forests and environmental amenities play in our lives. There are many competing uses for natural resources, and society is challenged to manage them for improving social well being. Furthermore, there may be dire consequences to natural resources mismanagement. Renewable resources such as water, land and the environment are linked, and decisions made with regard to one may affect the others. Policy and management of natural resources now require interdisciplinary approach including natural and social sciences to correctly address our society preferences.

This series provides a collection of works containing most recent findings on economics, management and policy of renewable biological resources such as water, land, crop protection, sustainable agriculture, technology, and environmental health. It incorporates modern thinking and techniques of economics and management. Books in this series will incorporate knowledge and models of natural phenomena with economics and managerial decision frameworks to assess alternative options for managing natural resources and environment.

Concerns about genetic diversity of agricultural crops grow as traditional varieties are replaced by modern varieties, and as biotechnology threatens genetic diversity to further deteriorate. This book is the first comprehensive effort to bring together the state of the art of the economic analysis of genetic diversity. The book develops new applications in economics using methods such as sequential search models, probability models for gene distributions, and household models. It offers first empirical results of costs and benefits of genetic diversity.

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PREFACE

This book has its origins in the research community's concern for crop genetic resources and genetic diversity. At the International Maize and Wheat Improvement Center (CIMMYT), this concern is reflected in a special research project on the collection, conservation, evaluation, and equitable sharing of genetic resources for our mandate crops, primarily maize and wheat. As part of that project, we have undertaken to develop methods for identifying the fundamental economic issues related to genetic diversity in crop species, with special reference to developing countries. In consultation with researchers from many disciplines and organizations, we have sought to assemble the current knowledge on these issues for two reasons: to learn from each other's work and to communicate with greater precision about the economics of genetic diversity. This book is one product of that effort. It presents the results of initial economic investigations of diversity in the world's three major food crops: wheat, maize, and rice.

In several ways, this volume furthers our understanding of the economic context in which crop breeders make use of genetic resources and their diversity. First, the authors provide an annotated catalog of the tools used to measure and value genetic diversity, describing their limitations as well as the insights they can offer. This is a useful point of departure for the analyses presented throughout the book and a practical guide for those who are unfamiliar with diversity issues.

Second, the book explores fundamental questions related to the value and efficiency of conserving seed *ex situ*, in gene banks. What are the economics of storing seed in gene banks? How do we assess the economic efficiency of searching for different types of genetic resources to use in breeding programs? Does it make economic sense to store many accessions in a gene bank, even if most accessions are rarely used? The answers to these questions should be extremely useful in managing the *ex situ* conservation of genetic resources.

Questions about genetic diversity are not restricted to gene banks, of course. Increasingly, conservation focuses on the prospects for maintaining diversity *in situ*—in other words, in farmers' fields. A third major contribution of this book is that it examines the many ways that diversity issues are manifested at the farm level in the developing world. Three chapters analyze farmers' objectives and incentives for

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Much of the research described in this book was first presented at a conference hosted by Stanford University on behalf of CIMMYT, “Building a Basis for the Economic Analysis of Genetic Resources and Diversity in Crop Plants,” 17–19 August, 1997, Palo Alto, California. We are indebted to Walter Falcon, Director of the Institute for International Studies at Stanford University, and Chairman of CIMMYT’s Board of Trustees, for making that conference possible. We also thank Prabhu Pingali, Director of the CIMMYT Economics Program, whose guidance and encouragement have enabled this research to reach a wider audience through the publication of this book.

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