

# Lost Crops of Africa

**volume I**

**Grains**

**Board on Science and Technology for International Development  
National Research Council**

**NATIONAL ACADEMY PRESS**

**Washington, D.C. 1996**

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The report was reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This report was prepared by an ad hoc advisory panel of the Board on Science and Technology for International Development, Office of International Affairs, National Research Council. Staff support was funded by the Bureau for Africa, Bureau for Research and Development, Office of Nutrition, and Office of Research, Agency for International Development, under Grant No. DPE-5545-A-00-8068-00.

Library of Congress Catalog Card Number: 93-86876

ISBN 0-309-04990-3

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### **A NOTE FROM THE SPONSORS**

For two decades, the U.S. Agency for International Development (AID) has supported various reports from BOSTID's Innovation Program. This current one, on the under exploited cereals of Africa, is particularly timely. Africa's nutrition situation is deteriorating, and this is a serious concern. Much of the population is more vulnerable to malnutrition and starvation than ever before. Clearly, the problem needs tangible and sustained support from the international community, but it also needs a host of fresh ideas.

This book offers many such ideas and is part of a commitment AID made at the International Conference on Nutrition (ICN) in December 1992. There, member countries, nongovernmental organizations, and the international community pledged to eliminate or substantially reduce starvation, widespread undernutrition, and micronutrient malnutrition within this decade.

By highlighting the broad potential for Africa's own native biodiversity to reduce the vulnerability of seriously at-risk people to food shortages, the book could become a major contributor to the ICN objectives. The so-called "lost crops" obviously can help provide food security in their native areas, which include many parts of Africa threatened with hunger. At the same time, however, maintaining the diversity of these ancient crops will protect options for the rest of the world to use.

For these and other reasons, we are pleased to have been this project's major sponsors. We hope the wealth of information in the following pages will stimulate much interest and many subsequent activities. If that occurs, the now largely overlooked resources described herein should contribute substantially toward achieving the goal of eliminating hunger and malnutrition by decade's end.

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By 1993, more than 1,000 people had participated in BOSTID's overall study of the lost crops of Africa. Most had participated by nominating species of grains, fruits, nuts, vegetables, legumes, oilseeds, spices, sweeteners, and beverage plants worthy of inclusion. In a sense, all these people were contributors to this, the first product from the study. However, the following list includes only those who provided technical details that became incorporated into various chapters of this particular book. To all the contributors, both listed and unlisted, we are truly grateful.

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## Preface

The purpose of this report is to draw worldwide attention to traditional African cereals and especially to their potential for expanding and diversifying African and world food supplies. Africa is seen by many observers as a basket case—a vast region incorporating more than 40 nations that appears unlikely to be able to feed its burgeoning population in the coming years. To many observers, there seem to be no ready solutions. Some have given up hope that anything can be done.

What has been almost entirely overlooked, however, is that throughout that vast continent can be found more than 2,000 native grains, roots, fruits, and other food plants. These have been feeding people for thousands of years but most are being given no attention whatever today. We have called them the "lost crops of Africa."

Among the 2,000 lost foods are more than 100 native grasses whose seeds are (or have been) eaten. These can be found from Mauritania to Madagascar. Only a handful are currently receiving concerted research and development, and even those few are grossly underappreciated. Our goal is to demonstrate the potential inherent in these overlooked traditional cereals. Our hope is thereby to stimulate actions to increase the support for, and use of, the best of them so as to increase food supplies, improve nutrition, and raise economic conditions.

It should be understood that most of the plants described are not truly lost; indeed, a few are well known worldwide. It is to the mainstream of international science and to people outside the rural regions that they are "lost." It should also be understood that it is not just for Africa that the grains hold promise. Several of Africa's now neglected cereals could become major contributors to the welfare of nations around the world. This potential is often emphasized in the following chapters in hopes of stimulating the world community into serious and self-interested support for these species that now languish.

This study began in 1989 when the staff officers mailed questionnaires to about 1,000 scientists and organizations worldwide. The questionnaire requested nominations of little-known African food plants for possible inclusion. It contained a list of 77 native African grains, roots and tubers, vegetables, fruits, legumes, oilseeds, nuts, spices, sweeteners, and beverage plants. We anticipated that perhaps 30 of these species would prove to have outstanding merit and that the report would focus on those. What actually occurred, however, was very different.

Within a few weeks of mailing the questionnaire, replies started flooding back in numbers far greater than anticipated; many recipients photocopied their questionnaire and sent the copies (as many as 50 in several cases) on to their colleagues; requests came pouring in from people we had never heard of. The staff could barely keep up with the hundreds of requests, replies, suggestions, scientific papers, and unsolicited writings that began to appear in the mail. Within 4 months, over 100 additional species had been nominated as "write-in candidates." Within a year, at least 100 more were recommended. By then it was clear that the power of this project was far greater than anyone had foreseen. It was decided, therefore, to divide it into sections dealing individually with the different types of foods.

This report on the lost grains of Africa is the first in this series. From the flood of suggestions and information on the native African cereals was fashioned a first draft. Each of its chapters was mailed back to the original nominators as well as to other experts identified by the staff. As a result, hundreds of suggestions for corrections and additions were received, and each was evaluated and integrated into what, after editing and review, became the current text.

The report is intended as a tool for economic development rather than a textbook or survey of African botany or agriculture. It has been written for dissemination particularly to administrators, entrepreneurs, and researchers in Africa as well as other parts of the world. Its purpose is to provide a brief introduction to the plants selected and to stimulate actions that explore and exploit them. The ultimate aim is to get the most promising native African grains into greater production so as to raise nutritional levels, diversify agriculture, and create economic opportunities.

Because the book is written for audiences both lay and professional, each chapter is organized in increasing levels of detail. The lead paragraphs and prospects sections are intended primarily for nonspecialists. Subsequent sections contain background information from which specialists can better assess a plant's potential for their regions or research programs. These sections also include a brief overview of "next steps" that could help the plant to reach its full promise. Finally,

appendixes at the back of the book provide the following information:

- The addresses of researchers who know the individual plants well;
- Information on potential sources of germplasm; and
- Lists of carefully selected papers that provide more detail than can be presented here.

Because most of these plants are so little studied, the literature on them is often old, difficult to find, or available only locally. This is unfortunate, and we hope that this book will stimulate monographs, newsletters, articles, and papers on all of the species. One of the most effective actions that plant scientists and plant lovers can take is to collect, collate, and communicate the Africa-wide observations and experiences with these crops in such publications. They might also create seed supplies and distribute seeds of appropriate varieties. All this could stimulate pan-African cooperation and international endeavors to ensure that these crops are lost no more.

This book has been produced under the auspices of the Board on Science and Technology for International Development (BOSTID), National Research Council. It is a product of a special BOSTID program that is mandated to assess innovative scientific and technological advances, particularly emphasizing those appropriate for developing countries. Since its inception in 1970, this small program has produced 40 reports identifying unconventional scientific subjects of promise for developing countries. These have covered subjects as diverse as the water buffalo, butterfly farming, fast-growing trees, and techniques to provide more water for arid lands (see BOSTID Innovation Program, page 373).

Among these reports, the following provide information that directly complements the present report:

- *More Water for Arid Lands* (1974)
- *Triticale: A Promising Addition to the World's Cereal Grains* (1989)
- *Quality-Protein Maize* (1988)
- *Amaranth: Modern Prospects for an Ancient Crop* (1983)
- *Applications of Biotechnology to Traditional Fermented Foods* (1992)
- *Ferrocement: Applications in Developing Countries* (1973)
- *Neem: A Tree for Solving Global Problems* (1992)
- *Vetiver: A Thin Green Line Against Erosion* (1993).

Program and staff costs for this study were provided by the U.S. Agency for International Development. Specifically, these were

provided by the Office of Nutrition and the Office of the Science Advisor (both of the Bureau for Science and Technology), as well as the Bureau for Africa. The panel would like to acknowledge the special contribution of Norge W. Jerome, Director of the Office of Nutrition, 1988-1991, without whose initiative the project would not have been launched. Other AID personnel who made this work possible include Calvin Martin, Tim Resch, Dwight Walker, John Daly, Frances Davidson, and Ray Meyer.

General support for printing, publishing, and distributing the report has been provided by the Kellogg Endowment Fund of the National Academy of Sciences and the Institute of Medicine as well as from the Wallace Genetic Foundation. We especially want to thank Jean W. Douglas, a foundation director, for her trust and perseverance during this project's long gestation and difficult birth.

The contributions from all these sources are gratefully acknowledged.

How to cite this report:

National Research Council. 1996. *Lost Crops of Africa. Volume I: Grains*. National Academy Press, Washington, D.C.

## NOTE ON TERMS

Throughout this book the word "Africa" always refers to Africa south of the Sahara. (The plants of North Africa are, biogenetically, part of the Mediterranean-Near East complex of plants, and so are mostly not native to the rest of Africa.) We have preferred to use English common names where possible, except in a few cases where they imply the plant pertains only to one country (for example, Egyptian lupin). Finally, because this book will be read and used in many regions beyond Africa, we have used the internationally accepted name "cassava" rather than its more common African name, "manioc," and "peanut" for "groundnut."

Nutritional values are in most cases presented on a dry weight basis to eliminate moisture differences between samples.

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