

# Collecting Plant Genetic Diversity: Technical Guidelines

*Edited by L Guarino, V Ramanatha Rao, International Plant Genetic Resources Institute,  
and R Reid, Department of Primary Industry, Australia*

The case for conserving biodiversity is well established on economic as well as scientific grounds. Biodiversity is essential for sustainable development, adaptation to a changing environment and the continued functioning of the biosphere - indeed, to human survival itself. Plant breeders are dependent upon the availability of a large pool of diverse genetic material represented by local races and wild relatives, since in themselves modern crop varieties provide too restricted a genepool for further breeding. Without the ability to draw from a diverse genetic reservoir, further improvement may not be possible. It is therefore essential that guidance is available on collecting plant germplasm.

In recent years it has become evident that there is no single publication that provides the prospective collector of plant germplasm with generic as well as specific, and theoretical as well as practical, information. It was to fill this gap that the International Plant Genetic Resources Institute (IPGRI), together with FAO, IUCN and UNEP, cooperated to produce this book. The volume is a comprehensive reference work and is aimed at both new and experienced collectors as well as those with a general interest in plant genetics, breeding and biodiversity.

## Partial Contents:

- A brief history of plant germplasm collecting
- Legal issues in plant germplasm collecting
- Assessing the threat of genetic erosion *L Guarino*
- A basic sampling strategy: theory and practice *A H D Brown and D R Marshall*
- Information on previous plant germplasm collecting *M C Perry and E Bettencourt*
- Published information on the natural and human environment *G C Auricht et al.*
- Aids to taxonomic identification *N Maxted and R Crust*
- Secondary sources on cultures and indigenous knowledge systems *L Guarino*
- Bibliographic databases for plant germplasm collectors *J A Dearing and L Guarino*
- Geographic information systems and remote sensing for plant germplasm collectors *L Guarino*
- Plant health and germplasm collectors *E A Frison and G V H Jackson*
- Gathering and recording data in the field *H Moss and L Guarino*
- Collecting vegetatively propagated crops (especially roots and tubers) *Z Huaman et al.*
- Collecting woody perennials *FAO Forest Resources Division*
- Collecting in vitro for genetic resources conservation *L A Withers*
- Collecting pollen for genetic resources conservation *F A Hoekstra*
- Collecting Rhizobium, Frankia and mycorrhizal fungi *R A Date*
- Processing of germplasm, associated material and data *J A Toll*
- Reporting on germplasm collecting missions *J A Toll and H Moss*
- Collecting tropical forages *R Reid*
- Collecting Andean root and tuber crops (excluding potatoes) in Ecuador *R Castillo and M Hermann*
- Collecting the Musa genepool in Papua New Guinea *S Sharrock*
- Collecting the rice genepool *D A Vaughan and T T Chang*
- Collecting wild species of Arachis *J F M Valls et al.*
- KENGO's Genetic Resources Conservation Project
- Collecting by the Institute of Plant Genetics and Crop Plant Research at Gatersleben

**Readership:** Collectors and those with a general interest in plant genetics, breeding and biodiversity

May 1995 750 pages HB

ISBN 0 85198 964 0

Price: £65.00 (US\$120.00 Americas only)

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# New Diagnostics in Crop Sciences

Edited by J H Skerritt and R Appels, CSIRO Division of Plant Industry, Canberra, Australia

## Biotechnology in Agriculture Series, No.13

This book describes the theory and practical aspects of a number of "diagnostic" techniques that have evolved over recent years to assess variety, yield, quality and stress by pathogens or environment pre- and post harvesting of crops. Useful diagnostic methods can be based on molecular probes such as antibodies or gene probes, physical methods based on spectroscopy or by simplifying and refining long-established enzymological approaches.

A systems approach is taken, leading from diagnostic methods for the whole plant and its soil environment, to the chromosome, gene and molecular protein levels. Aspects of harvested crop quality and purity can also be rapidly assessed by physical or chemical diagnostic methods. Some of the diagnostic methods will remain for the foreseeable future as being suited only to a limited number of well-equipped laboratories, others can have immediate application, possibly in the form of test kits in the field. Some progress and constraints in making diagnostic methods widely available either commercially or through research collaborations are discussed. Authors from Europe, North America and Australasia share their expertise on an exciting variety of technologies which will take plant agriculture into the next century.

### Contents:

- An overview of the development and application of diagnostic methods in crop sciences  
*J H Skerritt and R Appels*
- Varietal identification of crop plants *R J Cooke*
- Monoclonal antibody technology *A Schots et al.*
- Antibody probes in cereal breeding for quality and disease resistance *N K Howes*
- The interface between RFLP techniques, DNA amplification and plant breeding  
*P M Gresshoff*
- Nucleic acid techniques in testing for seedborne diseases *J C Reeves*
- Fungal immunodiagnosics in plant agriculture *F M Dewey and C R Thornton*
- Antibody approaches to plant viral diagnostics *R J Sward and D R Eagling*
- Nucleic acid based approaches to plant virus and viroid diagnostics *P Waterhouse and P Chu*
- Monitoring safety of plant foods: Immunodiagnosics for mycotoxins and other bioactive compounds *M R A Morgan*
- Diagnostics for plant agrochemicals - a meeting of chemistry and immunoassay *S J Gee et al.*
- Measurement of polysaccharide-degrading enzymes in plants using chromogenic and colorimetric substrates *B V McCleary*
- Isozyme variation and analysis in agriculturally-important plants *T Konishi*
- The use of carbon isotope discrimination analysis in plant improvement *R A Richards and A G Condon*

**Readership:** Research workers, graduate students in crop science, plant breeding and biotechnology, and crop protection.

July 1995                      352 pages                      HB

ISBN 0 85198 934 9

Price: £49.95 (US\$90.00 Americas only)

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# *Brassica* Oilseeds: Production and Utilization

Edited by D Kimber, formerly of the National Institute of Agricultural Botany, Cambridge, UK  
and D I McGregor, Agriculture Canada Research Station, Saskatchewan, Canada

*Brassica* oilseeds are one of the few edible oil crops that can be cultivated in the temperate zones of the world, at higher elevations and, as winter crops. This comprehensive volume encompasses research and practice in the production and use of *Brassica* oilseeds. The first section considers each aspect of the field crop including the importance of plant breeding and biotechnology. The impact of the crop on the surrounding environment is also discussed

The second section covers utilization. This is especially important as rapeseed oil has gained high nutritional status in recent years, and this is considered in relation to the human diet. The use of the meal by-product for animal feeds is also discussed. The oil is also used for industrial purposes and derivatives are used in pharmaceuticals and cosmetics. The increased interest in the production and use of biodiesel from *Brassica* oilseeds, is reflected by the inclusion of a chapter on this topic.

The contributors are leading specialists from North America, Europe and Australia. The book provides a complete reference resource for students, researchers and practitioners within the disciplines of crop production, plant and food sciences.

## Contents:

### Preface

- The species and their origin, cultivation and world production, *D Kimber and D I McGregor*

### Part I: The Field Crop

- Physiology: crop development, growth and yield, *N J Mendham and P A Salisbury*
- Agronomy, *A Pouzet*
- Weeds and their control, *J Orson*
- Diseases, *S R Rimmer and L Buchwaldt*
- Insect pests, *B Ekbohm*
- Plant breeding, *G C Buzza*
- Biotechnology, *D J Murphy and R Mithen*
- Environmental impact of production, *R Marquard and K Waller*

### Part II: Processing and Utilization

- Seed chemistry, *B Uppström*
- Seed analysis, *J K Daun*
- Processing the seed and oil, *R A Carr*
- Oil properties of importance in human nutrition, *B E McDonald*
- Meal and by-product utilization in animal nutrition, *J M Bell*
- Industrial utilization of long-chain fatty acids and their derivatives, *N O V Sonntag*
- Utilization of oil as a biodiesel fuel, *W Körbitz*
- The mustard species: condiment and food ingredient use and potential as oilseed crops, *J S Hemingway*

**Readership:** Students, researchers and practitioners within the disciplines of crop production, plant and food sciences.

October 1995      416 pages      HB  
ISBN 0 85198 960 8    Price: £60.00 (US\$110.00 Americas only)

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# Seedborne Diseases and their Control

*R B Maude, Horticulture Research International, Wellesbourne, UK*

This book describes the principles derived from our knowledge of the biology of seedborne pathogens and how these are applied in the practical control of seedborne diseases. The pathogens covered are seedborne fungi, bacteria and viruses which attack temperate and some tropical field crops.

The main part of the book is concerned with the processes of infection of seeds, the location and the survival of inoculum, and the transmission and spread of seedborne pathogens. The author then describes how, with this knowledge, strategies and methods have been developed and employed at national and international levels to exclude and eradicate seed-transmitted diseases. Effective methods for the detection of seedborne inoculum are necessary throughout and a specific chapter is devoted to these technologies. The book is written for practising plant pathologists as well as for advanced students of plant pathology seeking a general review text of this subject area. It is also highly relevant to workers in this agrochemical industry with special interests in seed treatment and seed treatment methods.

## Contents:

- Seed pathology
- The infection of seeds
- Longevity of seedborne organisms
- Seed transmission of disease
- The epidemiology of the spread and survival of pathogens
- Disease control: exclusion and reduction of inoculum
- Disease control: eradication and reduction of inoculum by seed treatment
- Disease control by cultural measures and sanitation practices
- The detection of seedborne organisms

**Readership:** Practising plant pathologists and advanced students of plant pathology.

December 1995                      288 pages

ISBN 0 85198 922 5

Price: £40.00 (US\$72.50 Americas only)

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# Seed Science Research

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Abstracted in *Seed Abstracts* (CAB ABSTRACTS),  
*CABS* (Current Awareness in Biological Sciences),  
*Current Advances in Plant Science* and BIOSIS,  
*SciSearch*®, *Research Alert*®, and *Current Contents*®/Agriculture, Biology & Environmental Sciences

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Printed in the United Kingdom by Information Press, Eynsham, Oxford