

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

The production of new potato varieties: technological advances

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

*The production of new potato
varieties:
technological advances*

Edited by

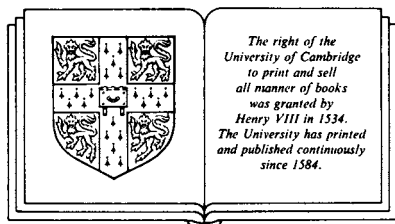
G. J. JELLIS

Principal Scientific Officer

Plant Breeding Institute, Cambridge

D. E. RICHARDSON

National Institute of Agricultural Botany



CAMBRIDGE UNIVERSITY PRESS

Cambridge

New York New Rochelle

Melbourne Sydney

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521324588

© Cambridge University Press 1987

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 1987

This digitally printed version 2008

A catalogue record for this publication is available from the British Library

ISBN 978-0-521-32458-8 hardback

ISBN 978-0-521-06378-4 paperback

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

CONTENTS

List of contributors	x
Preface	xvi
Editors' note and acknowledgements	xvii
Introduction	xviii
J.G.Th. HERMSEN and K.M. SWIEZYNSKI	
The development of potato varieties in Europe	1
G.J. JELLIS and D.E. RICHARDSON	
Genetic Resources	9
Genetic resources: their preservation and utilization	10
N.E. FOLDØ	
Gene pooling of modern potato varieties	28
D.R. GLENDINNING	
Breeding Strategies	31
Potato breeding strategy in the German Democratic Republic	32
M. SCHOLTZ	
Potato breeding strategy in the Federal Republic of Germany	38
M. MUNZERT	
Potato breeding strategy in the Netherlands	45
J.P. VAN LOON	
Potato breeding strategy in Poland	55
K.M. SWIEZYNSKI	
Potato breeding strategy in the United Kingdom	60
G.R. MACKAY	
Private potato breeding in the United Kingdom	68
J.M. DUNNETT	
Selection and Screening Methods	71
The efficiency of early generation selection	72
J. BROWN	
Problems associated with early generation selection of potato clones in West Siberia	75
B. DOROZHKIN and B. CADYCHEGOV	

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

<i>Contents</i>	vi
Influence of weight of seed tubers on selection of first year clones: preliminary results K.M. LOUWES and A.E.F. NEALE	78
A joint cyst nematode/late blight test for early generation screening of potato clones C.N.D. LACEY, G.J. JELLIS, N.C. STARLING and S.B. CURRELL	81
Screening for resistance to diseases in a potato breeding programme G.J. JELLIS, R.E. BOULTON, N.C. STARLING and A.M. SQUIRE	84
Breeding for resistance to potato viruses with special reference to cDNA probes R.E. BOULTON, G.J. JELLIS and A.M. SQUIRE	86
Screening for resistance to diseases and pests G.R. MACKAY	88
Breeding for resistance to and tolerance of potato cyst nematode M.F.B. DALE	91
Breeding multi-resistant potato germplasm M.W. MARTIN	94
Resistance to storage diseases in breeding stocks A. PAWLAK, J.J. PAVEK and D.L. CORSINI	96
<u>Phytophthora</u> research at the Foundation for Agricultural Plant Breeding (SVP), The Netherlands A.G.B. BEEKMAN	99
Effect of time interval between inoculation and assessment on relative content of potato virus Y ^N in leaves of potato plants XU PEI WEN	102
Selection and evaluation of potatoes for improved tolerance of environmental stresses D. LEVY	105
Variety Assessment	109
Potato variety assessment in the Federal Republic of Germany W. BÄTZ	110
Potato variety assessment in France P. PERENNEC	114
Variety assessment in The Netherlands K. VAN DER WOUDE	119
Potato variety assessment in Poland J. BORYS	131
Potato variety assessment in the UK D.E. RICHARDSON	135
Use of common origin seed for potato trials S.P. KERR	140

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

<i>Contents</i>	vii
Micropropagation - an aid in the production of new varieties P. WOOSTER and T.J. DIXON	142
Testing potato varieties for response to drought and irrigation S.J. FLACK	146
Testing varieties for resistance to and tolerance of <i>Globodera pallida</i> G.M. GURR and S.P. KERR	148
Testing for glycoalkaloids J. WHITE	151
Methods for calculating 1-9 values to express the resistance of potato varieties to diseases P.T. GANS and P. WOOSTER	153
Establishing standards in variety assessment M. TALBOT	157
Consumer quality requirements in the United Kingdom R.M. STOREY and D.P. HAMPSON	163
The effects of fertilizer treatments on a range of old and new early-maturing potato varieties A.J. THOMSON	165
Variety trials in Egypt, with special reference to dormancy M.K. IMAM	168
Semi-conventional Breeding Methods	171
Efficient utilization of wild and primitive species in potato breeding J.G.Th. HERMSEN	172
Advances and limitations in the utilization of <i>Neotuberosum</i> in potato breeding R.L. PLAISTED	186
Breeding at the $2x$ level and sexual polyploidization S.A. HERMUNDSTAD and S.J. PELOQUIN	197
Haploids extracted from four European potato varieties L. FRUSCIANTE and S.J. PELOQUIN	211
Heterosis for tuber yields and total solids content in $4x \times 2x$ FDR-CO crosses M.F. MASSON and S.J. PELOQUIN	213
Variability of F_1 progeny derived from inter-ploidy ($4x \times 2x$) crossing J. JAKUBIĚC	218
Unreduced gametes in the breeding of potatoes at the diploid level E. ZIMNOCH-GUZOWSKA and I. WASILEWICZ	222

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

<i>Contents</i>	viii
Desynapsis and FDR 2n-egg formation in potato: its significance to the experimental induction of diplosporic apomixis in potato E. JONGEDIJK	225
Utilizing wild potato species via <u>Solanum phureja</u> crosses R.N. ESTRADA	229
The use of diploid <u>Solanum phureja</u> germplasm C.P. CARROLL	231
Advances in population breeding and its potential impact on the efficiency of breeding potatoes for developing countries H.A. MENDOZA	235
True Potato Seed	247
Breeding strategies for true potato seed M.T. JACKSON	248
Evaluation of yield and other agronomic characteristics of true potato seed families and advanced clones from different breeding schemes L. CONCILIO and S.J. PELOQUIN	262
Evaluation of true potato seed families obtained from different breeding schemes in the south of Italy L. FRUSCIANTE, S.J. PELOQUIN and A. LEONE	264
Potato production from true potato seed in Italy L. MARTINETTI	266
Field seeding of true potato seed in a breeding programme M.W. MARTIN	269
Unconventional Breeding Methods	271
Recent progress in molecular biology and its possible impact on potato breeding: an overview R.B. FLAVELL	272
Combined application of classical and unconventional techniques in breeding for disease resistant potatoes G. WENZEL, S.C. DEBNATH, R. SCHUCHMANN and B. FOROUGH-WEHR	277
Auther colture of dihaploid <u>Solanum tuberosum</u> H.703 N ³ P. BATTY and J.M. DUNWELL	289
Genetic manipulation in potato using <u>Agrobacterium</u> G. OOMS	293

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

<i>Contents</i>	ix
Prospects of using tumour-inducing plasmid-mediated gene transfer for the improvement of potato varieties A. BLAU, P. ECKES, J. LOGEMANN, S. ROSAHL, R. SANCHEZ-SERRANO, R. SCHMIDT, J. SCHELL and L. WILLMITZER	309
Use of protoplast fusion and somaclonal variation in potato breeding M.G.K. JONES	315
The potential value of somaclonal variants in potato improvement A.J. THOMSON	327
Use of <i>in vitro</i> culture of <i>Solanum tuberosum</i> in potato breeding B. COLIN, F. LAMMIN and Y. DATTEE	331
Commentary	335
A practical breeder's view of the current state of potato breeding and evaluation A.J. THOMSON	336
Index	347

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

CONTRIBUTORS

N.P. BATTY

John Innes Institute, Norwich NR4 7UH, UK.

W. BATZ

Bundessortenamt, Hannover, D-3163 Sehnde 8, Federal Republic of Germany.

A.G.B. BEEKMAN

Foundation for Agricultural Plant Breeding (SPV),
P.O. Box 117, 6700 AC Wageningen, The Netherlands.

A. BLAU

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

J. BORYS

The Research Centre for Cultivar Testing, 63-022
Slupia Wielka, Poland.

R.E. BOULTON

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

J. BROWN

Scottish Crop Research Institute, Pentlandsfield,
Midlothian, EH25 9RF, UK.

B. COLIN

Laboratoire d'Amélioration des Plantes, ADAR, 91405
Orsay, France.

L. CONCILIO

Conorzio Provinciale per la Valorizzazione delle
Produzioni Agricole, Mario Neri, Imola, Italy.

D.L. CORSINI

University of Idaho, Research and Extension Center,
Aberdeen, ID 83210, USA.

S.B. CURRELL

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

Contributors

xi

M.F.B. DALE

Scottish Crop Research Institute, Pentlandsfield,
Midlothian, EH25 9RF, UK.

Y. DATTEE

Laboratoire d'Amélioration des Plantes, 91405 Orsay,
France.

S.C. DEBNATH

Biologische Bundesanstalt für Land und
Forstwirtschaft, Institut für Resistenzgenetik
D-8059 Grünbach, Federal Republic of Germany.

T.J. DIXON

National Institute of Agricultural Botany, Cambridge,
CB3 0LE, UK.

B. DOROZHKIN

Siberian Research Institute of Agriculture, Omsk,
USSR.

J.M. DUNNETT

Caithness Potato Breeders Ltd, Canisbay (by Wick),
Caithness, UK.

J.M. DUNWELL

John Innes Institute, Norwich NR4 7UH, UK.

P. EEKES

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

R.N. ESTRADA

Instituto Colombiano Agropecuario (ICA), Apartado
Aéreo 151123 ElDorado, Bogotá, Colombia.

S.J. FLACK

National Institute of Agricultural Botany, Cambridge,
CB3 0LE, UK.

R.B. FLAVELL

PLant Breeding Institute, Cambridge, CB2 2LQ, UK.

N.E. FOLDØ

Danish Potato Breeding Foundation, 7184 Vandel,
Denmark.

B. FOROUGH-WEHR

Biologische Bundesanstalt für Land und
Forstwirtschaft, Institut für Resistenzgenetik
D-8059 Grünbach, Federal Republic of Germany.

L. FRUSCIANTE

Cattedra di Genetica Agraria, Università di Napoli,
Portici, Italy.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

Contributors

xii

P.T. GANS

National Institute of Agricultural Botany, Cambridge,
CB3 0LE, UK.

D.R. GLENDINNING

Scottish Crop Research Institute, Pentlandsfield,
Midlothian, EH25 9RF, UK.

G.M. GURR

National Institute of Agricultural Botany, Cambridge,
CB3 0LE, UK.

C.P. HAMPSON

Potato Marketing Board, Broadfield House, 4 Between
Towns Road, Cowley, Oxford, OX4 3NA, UK.

S.A. HERMUNSTAD

University of Wisconsin, Madison, WI 53706, USA.

J.G.TH. HERMSEN

Agricultural University, Wageningen, The Netherlands.

M.K. IMAM

Faculty of Agriculture, Assiut University, Assiut,
Egypt.

M.T. JACKSON

University of Birmingham, B15 2TT, UK.

J. JAKUBIEC

University of Agriculture, 02-766, Warsaw, Poland.

G.J. JELLIS

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

M.G.K. JONES

Rothamsted Experimental Station, Harpenden, Herts,
AL5 2JG, UK.

E. JONGEDIJK

Agricultural University, 6700 AY Wageningen, The
Netherlands.

S.P. KERR

National Institute of Agricultural Botany, Cambridge,
CB3 0LE, UK.

C.N.D. LACEY

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

F. LAMMIN

Laboratoire d'Amélioration des Plantes A.D.A.R.,
91405 Orsay, France.

A. LEONE

Centro Studio Miglioramento Genetico Ortaggi-C.N.R.,
Portici, Italy.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

Contributors

xiii

D. LEVY

The Volcani Center, ARO, Bet Dagan 50 250, Israel.

J. LOGEMANN

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

J.P. VAN LOON

Hettemer Zonen B.V., Randweg 25, Emmeloord, The
Netherlands.

K.M. LOUWES

Foundation for Agricultural Plant Breeding, SVP,
Wageningen, The Netherlands.

G.R. MACKAY

Scottish Crop Research Institute, Pentlandsfield,
Midlothian, EH25 9RF, UK.

M.W. MARTIN

Agricultural Research Service, US Department of
Agriculture, Irrigated Agriculture Research &
Extension Center, Prosser, WA 99350, USA.

L. MARTINETTI

Institute of Agronomy, University of Milan, Italy.

M.F. MASSON

Germicopa Research & Creation, 29119 Chateauneuf
du Faou, France.

H.A. MENDOZA

The International Potato Center, P.O. Box 5969, Lima,
Peru.

M. MUNZERT

Bayerische Landesanstalt für Bodenkultur und
Pflanzenbau, Freising, Federal Republic of Germany.

A.E.F. NEELE

Foundation for Agricultural Plant Breeding, SVP,
Wageningen, The Netherlands.

G. OOMS

Rothamsted Experimental Station, Harpenden, Herts,
AL5 2JQ, UK.

J.J. PAVEK

University of Idaho, Research and Extension Center,
Aberdeen, ID 83210, USA.

A. PAWLAK

Potato Breeding Station Zamarte, 89-655 Ogorzelyny,
Poland.

S.J. PELOQUIN

University of Wisconsin, Madison, WI 53706, USA.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

Contributors

xiv

P. PERENNEC

INRA - Station d'Amélioration de la Pomme de terre
et des Plantes à Bulbes, BP 5 - 29207 Landerneau,
France.

R.L. PLAISTED

Cornell University, Ithaca, New York, NY 14853, USA.

D.E. RICHARDSON

National Institute of Agricultural Botany, Cambridge,
CB3 OLE, UK.

S. ROSAHL

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

R. SANCHEZ-SERRANO

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

J. SCHELL

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

R. SCHMIDT

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

M. SCHOLTZ

Institut für Kartoffelzüchtung, 2591 Bohlendorf,
German Democratic Republic.

R. SCHUCHMANN

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

A.M. SQUIRE

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

N.C. STARLING

PLant Breeding Institute, Cambridge, CB2 2LQ, UK.

R.M. STOREY

Potato Marketing Board, Broadfield House, 4
Between Towns Road, Cowley, Oxford, OX4 3NA, UK.

K.M. SWIEZYNSKI

Institute for Potato Research, Młochow, 05-832,
Rozalin, Poland.

M. TALBOT

Agriculture & Food Research Council Unit of
Statistics, University of Edinburgh, EH9 3JZ, UK.

A.J. THOMSON

Plant Breeding Institute, Cambridge, CB2 2LQ, UK.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

Contributors

xv

I. WASILEWICZ

Institute for Potato Research, 05-832 Rozalin,
Młochow, Poland.

G. WENZEL

Biologische Bundesanstalt für Land un Forstwirtschaft
Institut für Resistengenetik D-8059 Grünbach,
Federal Republic of Germany.

J. WHITE

National Institute of Agricultural Botany, Cambridge,
CB3 OLE, UK.

L. WILLMITZER

Max-Planck-Institut für Züchtungsforschung, 5000
Köln 30, Federal Republic of Germany.

P. WOOSTER

National Institute of Agricultural Botany, Cambridge,
CB3 OLE, UK.

K. VAN DER WOUDE

Government Institute for Research on Varieties of
Cultivated Plants, (RIVRO), PO Box 32, 6700 AA
Wageningen, The Netherlands.

XU PEI WEN

Institute of Vegetable Research, Shandong Academy of
Agricultural Sciences, Jinan, China.

E. ZIMNOCH-GUZOWSKA

Institute for Potato Research, 05-832 Rozalin,
Młochow, Poland.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

PREFACE

It has become a tradition that the section Potatoes of the European Association for Research on Plant Breeding, EUCARPIA, and the section Breeding and Varietal Assessment of the European Association for Potato Research, EAPR, hold their section meetings simultaneously, thereby benefiting mutually from the experience of experts from both Associations.

The present proceedings 'The Production of New Potato Varieties Technological Advances', constitute however the very first publication *in extenso* of papers presented at joint meetings of the sections.

The book contains, among other items, papers presented at the meeting held at Cambridge, England, between December 16th - 20th, 1985, under the main theme 'The development and Identification of Superior Potato Genotypes - Limitations and Prospects for the Future'. It is a coherent publication, offering non-participants as well as participants in the section meetings a presentation of such important aspects as the current strategies employed in the breeding of new potato varieties, the achievements to date, and future prospects for varietal improvements.

The European Association for Research on Plant Breeding and the European Association for Potato Research welcome this initiative on the part of the sections, and hope that readers of the book will give it the appreciation it deserves.

J. Bijanowski
President of the European
Association for Research
on Plant Breeding, EUCARPIA

N.E. Foldø
President of the European
Association for Potato
Research, EAPR

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

EDITORS' NOTE AND ACKNOWLEDGEMENTS

As indicated in the Preface, this book is based on the EAPR/EUCARPIA Breeding & Variety Assessment Meeting in 1985. A restriction on the size of the book has meant that the most space has been allocated to papers from invited speakers at the Meeting. This does not mean that the shorter contributions are of lesser importance.

In the arrangement of papers we have attempted to follow a logical sequence, but there is often an overlap of interest between the different sections of the book. Cross referencing partly helps to overcome this problem. Four papers are included which are additional to those presented at the Meeting. These aim to cover some additional aspects and to give a general background to the past, present and future state of breeding and variety assessment in potatoes (Foldø, Jackson, Jellis & Richardson, Thomson).

We thank all contributors for their excellent cooperation in compiling this book, particularly those who have been willing to communicate in a language not their own.

We would also like to thank our colleagues at the Plant Breeding Institute and the National Institute of Agricultural Botany for help in organizing the Meeting on which this book is based. In particular we are greatly indebted to both Mrs Susan Jellis for preparing the Index and to Mrs Sheila Tassell and Miss Ann McDonnell for help with the secretarial work.

G.J. Jellis
Plant Breeding Institute,
Cambridge.

D.E. Richardson,
National Institute of
Agricultural Botany,
Cambridge.

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

INTRODUCTION

J.G.Th. Hermsen, Chairman of EUCARPIA: Section "Potatoes"

K.M. Swiezynski, Chairman of EAPR: Section "Breeding and Variety Assessment"

The potato is one of the world's most important food crops, being surpassed in total production only by wheat, corn and rice. Therefore, advances in potato breeding may greatly contribute to the world's food supply.

Potato breeders are expected to produce improved cultivars that give high yields of high quality tubers. Furthermore, resistance is required to diseases and pests during growth and storage, to stress conditions and to mechanical damage. Finally, specific properties of the tubers are required for various processing industries.

A rich source of genetic variation is available in existing cultivars, in primitive forms and in wild relatives of potato. The main problem faced by potato breeders is how to exploit most efficiently this large genetic variation.

In the last 75 years there has been a considerable expansion of world potato breeding and associated research. Before World War I breeders used to grow no more than several thousand seedlings, and a few years of basic selection were sufficient to put a new cultivar on the market. Research associated with potato breeding was very limited. Nowadays breeders in many countries grow several hundreds of thousands of seedlings. The breeding cycle is usually 10-12 years and breeding often involves sophisticated selection procedures. Governments in many countries have organized an elaborate varietal assessment system to make sure that only cultivars of satisfactory quality are being released. In addition, many sophisticated research centres make available to breeders new genetic variation, new breeding methods and improved selection techniques.

With such advances one might expect considerable progress in breeding and a quick replacement of old cultivars by better ones. Although significant results have been achieved in potato breeding, e.g. improvement of tuber quality and disease and pest resistance, very old cultivars are still predominant in some countries with advanced agriculture. Striking

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)

examples are Russet Burbank introduced in 1876 in the USA and Bintje introduced in 1910 in the Netherlands; King Edward introduced in 1902 in Great Britain has only recently declined in popularity. The question may be raised as to why so much recent effort has yielded relatively limited results. The conference at Cambridge, on which this volume is based, aimed at elucidating the answer to this question.

In invited papers, breeding strategy and varietal assessment in various countries was presented, and several specialists summarized their experience with various new breeding procedures which they have introduced or developed. These papers were supplemented by numerous others related to all aspects of potato breeding. The opinions of the conference participants on various matters were sought in a general discussion.

The following considerations may be helpful in evaluating the present situation.

1. Potato breeding is at a transition stage. The expansion of activities during the past few decades has not produced satisfactory results, probably because insufficient attention has been paid to some basic problems in potato breeding. The potato is a highly heterozygous autotetraploid crop plant. High heterozygosity is needed for high vigour and tuber yield, but leads to segregation for too many important characters in breeding progenies (Simmonds 1969), thus decreasing the probability of detecting superior genotypes. In addition, many characters of the potato are highly sensitive to environmental influence, especially in early generations. At this stage, satisfactory selection techniques are still lacking (Brown, this volume).

In order to increase the frequency of desired genotypes in breeding progenies, superior parents with high breeding values are needed. However, the production of such parents is a long term and tedious job. Breeding at the diploid level simplifies the genetic segregation patterns and may thus render breeding more efficient if it can be associated with effective techniques for intact transfer of selected diploid genotypes to tetraploid progeny. Such techniques exist but more research is needed on their manipulation in a breeding programme. The concept of introducing homozygous or multiplex loci for certain simply inherited traits, and thereby reducing the number of characters to be selected for in the early generations, deserves careful consideration. An increase in research into these problems is needed. International cooperation should be promoted.

2. The selection in segregating breeding progenies and the selection of advanced clones in varietal assessment should be regarded as one process

Cambridge University Press

978-0-521-06378-4 - The Production of New Potato Varieties: Technological Advances

Edited by G. J. Jellis and D. E. Richardson

Frontmatter

[More information](#)*Hermesen & Swiezynski: Introduction*

xx

with one objective - to eliminate defective genotypes and to introduce those that are superior to those now in production. Consistent selection criteria should be utilized throughout the whole selection process and the limited possibilities for successful selection at each stage should be duly considered. It is necessary to bear in mind that until now the final evaluation of a potato cultivar may only be obtained after testing it in practice.

3. New developments in tissue culture techniques and in genetic engineering of the potato are presented in some interesting and critical papers. Breeders must be prepared to try out any new development which is likely to make their work more efficient. However, new procedures often are not very useful to breeders because they do not help to solve the most important difficulties which are inherent in potato breeding.

REFERENCE

Simmonds, N.W. (1969) Prospects of potato improvement. Ann. Rep. Scott. Pl. Breed. Stat., 1968-1969, pp.18-37.