ISSN: 0960-2585

SEED SCIENCE RESEARCH journals.cambridge.org/ssr



Seed Science in the 21st Century Editor: Henk W.M. Hilhorst











Seed Science Research is the official Journal of the International Society for Seed Science

The contents of this journal are available to subscribers online at journals.cambridge.org/SSR

Aims and Scope

Seed Science Research is an international journal that publishes original papers, as well as reviews and opinion papers, dealing primarily with the fundamentals of seed research with emphasis on the physiology, biochemistry, molecular biology and ecology of seed development, dormancy and germination. The importance of seeds to propagation, food, biofuel and biodiversity is of increasing interest and therefore submissions on seed genetics, seed biotechnology, seed treatment and seedling establishment are especially encouraged if they are novel and 'seed driven'.

Editor

Henk W.M. Hilhorst

Lab of Plant Physiology, Wageningen University, Arboretumlaan 4, 6703 BD Wageningen, The Netherlands

Review Editor

J. Derek Bewley

Department of Molecular & Cellular Biology, University of Guelph, Guelph, Ontario N1G 2W1, Canada

Associate Editors

Julia Buitink, INRA, France Bill Finch-Savage, Warwick University, UK Hiro Nonogaki, Oregon State University, USA C.A. Thanos, University of Athens, Greece Ken Thompson, University of Sheffield, UK

Editorial Board

P. Allen, Brigham Young University, Provo, USA
C.C. Baskin, University of Kentucky, Lexington, USA
R. Benech-Arnold, University of Buenos Aires, Argentina
P. Berjak, University of KwaZulu-Natal, South Africa
M. Black, King's College London, UK
K.J. Bradford, University of California, Davis, USA
M.A. Cohn, Louisiana State University, USA
F. Corbineau, Université Pierre et Marie Curie, Paris, France
J.M. Farrant, University of Cape Town, South Africa
D. Job, CNRS, Bayer CropScience, Lyon, France
O. Leprince, Institut National d'Horticulture, Angers, France

- G. Leubner-Metzger, *Albert-Ludwigs-University*, *Freiburg*, *Germany*
- E. Nambara, University of Toronto, Canada
- H. Nonogaki, Oregon State University, Corvallis, USA
- B. Peco, Universidad Autonoma de Madrid, Spain
- S. Penfield, University of York, UK
- H. Pritchard, Royal Botanic Gardens, West Sussex, UK
- K. Steadman, University of Queensland, Brisbane, Australia
- P. Toorop, Royal Botanic Gardens, West Sussex, UK
- C.W. Walters, National Seed Science Laboratory, Fort Collins, USA

© Cambridge University Press 2012 Published by Cambridge University Press Cambridge CB2 8RU: New York, NY 10013-2473

Seed Science Research

Volume 22 Supplement 1 February 2012

Seed Science in the 21st Century

Editor: Henk W.M. Hilhorst





Seed Science Research

Preface

Tenth International Conference on Seed Science: Seed science in the 21st century	. S1
Review Papers	
Benech-Arnold, R., Semmartin, M. & Oesterheld, M. Seed science in the 21st century: its role in emerging economies	. S3
Louwaars, N. Seed science in the 21st century: rights that scientists have to deal with	. S9
Harada, J.J. & Pelletier, J. Genome-wide analyses of gene activity during seed development	S15
Kendall, S. & Penfield, S. Maternal and zygotic temperature signalling in the control of seed dormancy and germination	S23
Ren, JP., Li, Y., Wong, JH., Meng, L., Cho, MJ., Buchanan, B.B., Yin, J. & Lemaux, P.G. Modifying thioredoxin expression in cereals leads to improved pre-harvest sprouting resistance and changes in other grain properties.	S30
Rech, E.L. Seeds, recombinant DNA and biodiversity	S36
Ligterink, W., Joosen, R.V.L. & Hilhorst, H.W.M. Unravelling the complex trait of seed quality: using natural variation through a combination of physiology, genetics and -omics technologies	S45
Ooi, M.K.J. Seed bank persistence and climate change	S53
Corbineau, F. Markers of seed quality: from present to future	S61
Matthews, S., Noli, E., Demir, I., Khajeh-Hosseini, M. & Wagner, MH. Evaluation of seed quality: from physiology to international standardization	S69
de Santana, D.G., Wielewicki, A.P. & Salomão, A.N. Validation of quality tests for forest seed species	S74
Wagner, MH., Ducournau, S., Luciani, A. & Léchappé, J. From knowledge-based research towards accurate and rapid testing of seed quality in winter rape	S80
Taylor, A.G. & Salanenka, Y.A. Seed treatments: phytotoxicity amelioration and tracer uptake	S86

Seed Science Research is covered in the Science Citation Index[®], Current Contents[®]/Agriculture, Biology & Environmental Sciences, SciSearch [®], Research Alert [®], BIOSIS[®] Database, CAB ABSTRACTS, and Elsevier BIOBASE/Current Awareness in Biological Sciences

Subscribing organizations are encouraged to copy and distrubute this table of contents for non-commercial purposes.

Seed Science Research

journals.cambridge.org/ssr ISSN: 0960-2585

Publishing, Production, Marketing, and Subscription Sales Office:

Cambridge University Press The Edinburgh Building Shaftesbury Road Cambridge CB2 8RU UK journals@cambridge.org

For Customers in North America:

Cambridge University Press Journals Fullfillment Dept 100 Brook Hill Drive West Nyack New York 10994-2133 USA journals_subscriptions@cup.org

Seed Science Research is an international journal published quarterly by Cambridge University Press in March, June, September and December.

Special sales and supplements:

This journal accepts relevant advertising and inserts. We also provide bulk reprints of suitable papers to meet teaching or promotional requirements. The journal also publishes abstracts and proceedings on behalf of academic and corporate sponsors. Please contact special_sales@cambridge.org

Subscription information:

The subscription rates for Volume 22, 2012 (4 issues) are: Organisational, Online & Print: £543/\$1035 Organisational, Online only: £420/\$800 Individual, Online only: £120/\$232 Individual, Online only: £120/\$232 Individual, Print only: £300/\$570 ISSS members can benefit from discounted subscriptions.

The Journal can be accessed online at http:// journals.cambridge.org/ssr

Any **supplements** to this journal published in the course of the annual volume are normally supplied to subscribers at no extra charge.

Back volumes are available. Please contact Cambridge University Press.

Claims for non-receipt of journal issues will be considered on their merit and only if the claim is received within six months of publication. Replacement copies supplied after this date will be chargeable.

US POSTMASTERS: please send address corrections to CUP Cambridge.

Notes for Authors: may be found at http:// journals.cambridge.org/ssr. Please note there are no page charges or handling fees to publish in SSR.

Offprints: The author (or main author) of an accepted paper will receive a free PDF file via email.

Copyright: CUP, 2012. All rights reserved: permission for reproduction of any part of the journal (text, figures, tables or other matter) in any from (on paper, microfiche or electronically) should be sought directly from the Publisher, or a licence permitting restricted copying obtained from the Copyright Licensing Agency, Tottenham Court Road, London W1P 9HE, UK, or in the USA by the Central Clearance Center, 27 Congress Street, Salem MA 01970.

Disclaimer: The information contained herein, including any expression of opinion and any projection or forecast, has been obtained from or is based upon sources believed by us to be reliable, but is not guaranteed as to accuracy or completeness. The information is supplied without obligation and on the understanding that any person who acts upon it or otherwise changes his/her position in reliance thereon does so entirely at his/her own risk.

Cambridge University Press does not accept responsibility for any trade advertisement included in this publication.