

Seed Technology

An International Journal Serving Seed Scientists and Technologists

Volume 20

1998

Number 2

Special Publication

A Symposium

Vegetable and Flower Seed Quality

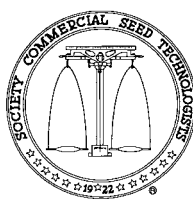
ISSN: 1096-0724

Published Jointly by the Association of Official Seed Analysts
and the Society of Commercial Seed Technologists

Seed Technology

*An International Journal
Serving Seed Scientists and Technologists*

Volume 20, Number 2 • 1998



Published jointly by:

ASSOCIATION OF OFFICIAL SEED ANALYSTS
SOCIETY OF COMMERCIAL SEED TECHNOLOGISTS

Editor:

Dennis M. TeKrony
Department of Agronomy
University of Kentucky
Lexington, Kentucky 40546-0091
USA

Associate Editors:

Joe Burris, Iowa State University, USA
Wayne Guerke, Georgia Department of Agriculture, USA
Tim Gutormson, Midwest Seed Services, SD, USA
Miller McDonald, Jr., Ohio State University, USA
José França Neto, Embrapa Soja, Londrina, BR

ISSN: 1096-0724

Printed in the USA by Allen Press, Lawrence, KS

Seed Technology

EDITORIAL REVIEW BOARD –

Dennis Berkey, Stoneville Pedigreed Seed, MS, USA
Terry Booth, USDA-ARS, WY, USA
Edgar Caberra, Pioneer HiBred Int., IA, USA
Tom Chastain, Oregon State University, USA
Lawrence Copeland, Michigan State University, USA
J. Curt Delouche, Mississippi State University, USA
Mirian T. Souza da Eira, CENARGEN, Brasilia, BR
Julio Marcos Filho, University of Sao Paulo, Piracicaba, BR
Joane Frank, DeKalb Genetics, IL, USA
Ademir Hening, Embrapa soja, Londrina, BR
Norman Hopper, Texas Tech. University, USA
James Hunter, Pioneer Hi-Bred Int., IA, USA
Francisco C. Krzyzanowski, Embrapa soja, Londrina, BR
Denis McGee, Iowa State University, USA
Richard Payne, USDA-ARS, MD, USA
Silmar Peske, UFPEL-FAEM, Pelotas, BR
Jan Spears, North Carolina State University, USA
Chip Sundstrum, CA Crop Improvement Assoc., USA
Alan Taylor, Cornell University, NY, USA
Roberval Vieira, FCAV/UNESP, Jaboticabal, BR
Nancy Vivrette, Ransom Seed Lab, CA, USA
Shirley West, University of Florida, USA
Loren Wiesner, USDA-ARS, CO, USA
Dale Wilson, Pioneer Hi-Bred Int., IA, USA

AIMS AND SCOPE – *Seed Technology* is an international journal containing scientific and technological papers in all areas of seed science and technology. The emphasis is on applied and basic research in seed physiology, pathology and biology that may relate to seed development, maturation, germination, dormancy and deterioration. Studies on seed production, sampling, testing, conditioning, distribution and storage are also included. Short communications from seed analysts and technologists are encouraged and will be published as Seed Tech Notes. These notes include new techniques, standardization of laboratory tests and documentation of anatomical and pathological observations of seed and seedling development. The journal also includes timely review articles in all areas of seed technology that may relate directly to the seed industry.

TYPES OF PAPERS – Original research papers, review articles and Seed Tech Notes are reviewed for publication. Manuscripts should be typed, double spaced and three copies sent to the Editor. After acceptance, a disk copy of the original hard copy is also required. Potential authors should note that there are no page charges, however reprints can be ordered at a minimal fee. The journal is co-sponsored by the two predominant organizations in North America with a direct interest in seed technology: the Association of Official Seed Analysts and the Society of Commercial Seed Technologists.

SUBSCRIPTIONS & SUBMISSIONS – *Seed Technology* is published one to three times annually, at the price of \$50.00 (North America) and \$60.00 (outside North America including postage). Subscriptions should be sent direct or through a bookseller to: Association of Official Seed Analysts, 201 North 8th Street, Suite 400, P.O. Box 81152, Lincoln, NE 68501-1152, USA. Refer to last pages of this volume for **Instructions to Authors** for manuscript and Seed Tech Note submissions.

EDITORIAL

I'M HONORED THAT SEED TECHNOLOGY can devote this special publication, Volume 20, No. 2, to the Proceedings of a Vegetable and Flower Seed Quality Symposium. This symposium was sponsored by the Society of Commercial Seed Technologists and held at the annual combined meeting of this society and the Association of Official Seed Analysts in Boise, Idaho in June, 1998.

This special publication of Seed Technology considers the factors responsible for seed quality problems for major vegetable and flower seed crops. It relates directly to problems in the field, in bedding plant production and the laboratory for these crops including the increasingly popular wildflowers. The importance of seed dormancy, pathogens, enhancements and approaches to seed quality testing are an important component of this publication.

The symposium was organized by Dr. Miller McDonald, Ohio State University, who provided an introduction to the proceedings. He carefully selected the ten authors who are recognized as experts from the vegetable and flower seed industry, seed testing laboratories and academia. Professionals in the seed industry, seed analysts, seed technologists and seed biology students wishing further insight into vegetable and flower seed quality will find this publication a valuable and essential reference.

It is my pleasure to welcome two new Associate Editors to Seed Technology: Dr. José França Neto, a research seed scientist at Embrapa Soja at Londrina, Brazil and Mr. Tim Gutormson, RST, manager of Midwest Seed Services at Brookings, SD. I must also thank Dr. Nancy Vivrette, RST, Ransom Seed Laboratory at Carpinteria, CA, who has graciously offered her time and assistance for the past three years and has completed her term as Associate Editor. We will miss Nancy on the Editorial Board, but look forward to the input from José and Tim.

Dennis TeKrony

Invited Review Articles for Future Editions of *Seed Technology*

The following authors have agreed to write review articles for the topics listed to appear in future volumes of *Seed Technology*. Any and all ideas on additional review articles are always welcomed by the editor.

Proposed Title for Review	Author(s)
International Seed Training Programs—	
Return on Investment	J. Curt Delouche
Seed Storage, Critical to the National Germ Plasm System.	Eric Roos
Flower Seed Industry—	
Problems and Opportunities	Nancy Vivrette
Seed Enhancement Implications on the Seed Testing Laboratory	Alan Taylor and Ellen Chirco
Open Field Burning—	
Grass Seed Quality in the Northwest	Tom Chastain
Effect of Seed Drying on Corn Seed Quality	Joe Burris
Seed Herbarium, Beltsville—	
A National Resource to Seed Analysts	Bob Gunn and John Wiersema
Seed Vigor—An Important Component to Seed Quality in Brazil.	Roberval Vieira UNESP, Jaboticabal, Brazil

Instructions to Authors

Seed Technology is an international journal which publishes original papers, review articles and notes in all areas of seed science and technology. This includes information from applied and basic seed research in physiology, pathology and biology, which relates to individuals interested in seed production, sampling, testing, conditioning, distribution and storage. Papers are accepted on the understanding that they have not been published or submitted to any other scientific journal.

Manuscripts must be written in English and should be typed, double spaced with ample margins (at least 4.0 cm on each side) on one side of line-numbered, bond paper (approximately 21 x 28 cm). Four copies of all manuscripts should be sent to the Editor, Dr. Dennis M. TeKrony, Department of Agronomy, University of Kentucky, Lexington, KY, USA, 40546-0091. Three types of submissions will be considered for publication:

- a. Full-length papers. This includes information from applied and basic seed research in physiology, pathology and biology which relates to individuals interested in seed production, sampling, testing, conditioning, distribution and storage. Papers are accepted with the understanding that they have not been published or submitted to any other scientific journal.
- b. *Seed Technology Notes* are appropriate for the reporting of seed laboratory or seed production research which might not justify a full paper, but provide important information of potential practical importance. This may include new techniques or developments, standardization of old techniques or anatomical, pathological or other documentation of seed or seedling development. The requirements for such notes are described below.
- c. Review articles are welcomed by special arrangement with the Editorial Board. The content of reviews should have a strong technical and/or scientific base and may include papers presented at symposia sponsored by the Association of Official Seed Analysts or Society of Commercial Seed Technologists at annual meetings.

INSTRUCTIONS FOR FULL LENGTH PAPERS

Manuscripts should be arranged in the following order: Title (no separate title page), Author(s), Abstract, Text, Acknowledgments, References, Tables, Captions for Figures (separate page) and Figures. The title should be concise (10 to 12 words) but informative, containing key words which describe the subject matter for use in abstracting systems. The name of the author(s) should be placed below the title with an asterisk (*) after the name of the corresponding author. The abstract indicating the scope of the paper should be complete in itself without reference to text or figures and not more than 250 words typed immediately below the title and authors. The text of the manuscript should normally have the subject matter grouped under the following major headings: Introduction, Materials and Methods, Results, Discussion, Acknowledgments (optional) and References. Main

headings are centered on each page and capitalized in bold type. Secondary headings begin at the left margin (do not indent) with the first letter capitalized and the entire heading in bold print.

Author-paper documentation. Author-paper documentation is a single paragraph at the bottom of the first page. The first sentence lists the authors (without professional titles) and their complete addresses. If the author has moved, provide the current address. The second sentence lists institutional sponsors with identification of the article or research project including granting agency acknowledgment, if appropriate. Always end the author-paper documentation with two statements: “*Corresponding author. Received _____.”

Style Manual. *The Style Manual for Biological Journals* prepared by the Committee on Form and Style of the Council of Biology Editors and published by the American Institute of Biological Sciences (AIBS) should be followed for writing papers submitted to *Seed Technology. The Publications Handbook and Style Manual* of the American Society of Agronomy can also be used as a guide in manuscript preparation.

Abbreviations. Use standard abbreviations (e.g, Fig., RH, °C) listed in the AIBS Style Manual without definition. Other abbreviations should be defined at first usage and may be used thereafter without further definition. Names of states, provinces and countries should be abbreviated following city names, using appropriate abbreviations of the postal service in that country.

Units. Metric units must be used for all measurements and the SI system (System International de Unites) used as far as possible.

Numbers. Use arabic numerals for all numbers with two or more digits and for all measurements such as time, weight, or degrees except when the number is the first word in a sentence. Spell out numbers when they are the first word in a sentence or when they are less than 10 and not measurements, except when in a series in which one figure has two or more digits. The percentage sign should be used in conjunction with a number (5 %), but percentage should be written in full when used as a noun (percentage germination). Dates should be given as 2 December, 1938, for example.

Nomenclature. Species should be described by their scientific (‘Latin’) names. At first mention in the main text the full binomial and authority must be given, but subsequently the genus should be abbreviated to its initial letter and the authority omitted. Authorities are not quoted after Latin names in the title or abstract. Crop varieties should be identified by single quotation marks at the first listing only, ‘Ranger’ alfalfa (*Medicago sativa* L.)

Tables. Tables should be numbered consecutively with Arabic numbers and should be reduced to the simplest form. Each table should be typed on a separate page from the main text. Table headings should be brief but complete and self-contained. Use the following symbols for footnotes, in this order: †, ‡, §, ¶, #. Asterisks are used only to indicate statistical significance, with * and ** representing significance at the 0.05 and 0.01 probability levels. Do not duplicate table information in figures.

Figures. Photographs or halftone reproductions should be provided as original artwork or glossy prints with good dark and white contrast. Photographs should only be submitted if they are essential for understanding the manuscript.

Prepare drawings for graphs and charts with India ink, dry-transfer lettering system or laser printer output on white bond paper. All figures should be of sufficient size and quality to allow for reduction by half or more for printing. Lettering should be kept at a minimum in graphs. All lettering, symbols, and lines must be large enough, clear enough, and thick enough to still be easily read and prominent after reduction.

Preferred symbols for figures are open and closed squares, circles and triangles. Do not use varying shades of gray to identify bars on graphs or wedges on pie charts. Use parallel lines, widely spaced dots, or other black and white line art methods instead. Label the back of each figure with the name of author and figure number. Figure captions should be brief, self contained and listed consecutively on a separate sheet at the end of the manuscript.

References. Either the author-year or numbered notation may be used in the text. Citations by authors in the text should appear as Smith (1996) or (Smith, 1996). Use *et al.* each time when there are three or more authors for a reference in the text, but give all authors in the reference list itself. In the reference list, arrange all published references alphabetically by author: e. g., last name and then initials of the first and each subsequent author. Citations should include names of all authors, year, complete title, complete journal title, volume number and inclusive pages. Cite personal communication and unpublished work only in the text, not in the reference list.

Proofs, publication charges and reprints. One set of page proofs will be returned to the corresponding author for correcting which should be restricted to printer's errors and returned to the Editor promptly. The *International Journal of Seed Technology* does not require page charges, however reprints can be ordered from the publisher when returning corrected proofs.

Submission on computer disk. Initial submission should always be on paper. When the necessary revisions are made and the paper is accepted, authors **must** submit the final version on computer disk, accompanied by two identical copies on paper. Electronic submission reduces the interval between acceptance and publication and reduces typesetting errors. Both Macintosh and PC disks in double or high density 5¼- or 3½-inch sizes are acceptable. Electronic files saved in relatively recent Macintosh, DOS, or Windows versions of WordPerfect, MS-Word, MS-Works, or Wordstar are preferred, but RTF and ASCII files can also be accepted. Contact the Editor if you have questions.

INSTRUCTIONS FOR 'SEED TECH NOTES'

The format for *Seed Tech Notes* is as for full length papers except that the text headings will be: Abstract, Experimental Techniques, Results and Discussion, and References. The Experimental Techniques section will include a brief narrative of those elements normally included in the Introduction and Materials and Methods sections of full length papers. *Seed Tech Notes* are usually much shorter and may

present only preliminary research data compared to full length papers.

Submission of Manuscripts. Four copies of the original manuscript and artwork (with originals not photocopies of photographic plates) should be submitted to the Editor:

Dr. Dennis M. TeKrony
Department of Agronomy
University of Kentucky
Lexington, KY 40546-0091
USA
Tel: 606-257-3878
Fax: 606-257-2185
e-mail: dtekrony@ca.uky.edu

Special Publication –

A Symposium: VEGETABLE AND FLOWER SEED QUALITY

Editorial – Dennis TeKrony 119

Improving Our Understanding of Vegetable and Flower Seed Quality / Miller B. McDonald 121

Seed Quality Problems Commonly Encountered During Vegetable and Flower Seed Production / James T. Watkins 125

Flower Seed Testing and Reporting Needs of the Professional Grower / Paul T. Karlovich 131

Seed Quality Problems Commonly Encountered in the Laboratory for Vegetable and Flower Seeds / Deborah J. Lionakis Meyer. 136

A Walk on the Wild Side: Quality Assurance Problems Unique to the Wildflower Seed Trade / Jane T. Hall. 162

Unique Seed Quality Problems of *sh2* Sweet Corn / Dale Wilson and Krishna Mohan. 176

Seed-borne Pathogens of Vegetable and Flower Seeds: Their Devastation, Identification and Control / J. W. Sheppard. 187

The Use of Biologicals to Enhance Vegetable Seed Quality / Mark A. Bennett 198

The Evolution and Effects of Priming Vegetable Seeds / Gregory E. Welbaum, Zhengxing Shen, Melkizedek O. Oluoch, and Lewis W. Jett 209

Seed Dormancy in Commercial Vegetable and Flower Species / Robert L. Geneve 236

Instructions to Authors. 251