Seed Technology
An International Journal Serving Seed Scientists and Technologists

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PROCEEDINGS FOR

IUFRO
Tree Seed Symposium

held at
Athens, Georgia

August 10–14, 2003

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and the Society of Commercial Seed Technologists

Additional Symposium Abstracts

(Continued on Inside Back Cover)

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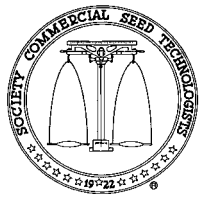

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Seed Technology

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, PMB #411, 1763 East University Blvd., Suite A, Las Cruces, NM 88001, USA. Refer to last pages of this volume for **Instructions to Authors** for manuscript and Seed Tech Note submissions.

EDITORIAL

I AM PLEASED THAT this special issue of Seed Technology *is devoted to the publication of the Proceedings of the International Tree Seed Symposium held in Athens, Georgia, USA, from August 10–14, 2003. This symposium is the annual meeting of the Seed Physiology and Technology section of the International Union of Forestry Research Organization (IUFRO). The issue includes 13 full manuscripts and 30 abstracts of papers and posters to be presented at the symposium over a wide range of basic and applied research topics related directly to forest tree seed physiology. I'm certain all readers will have a much greater appreciation for this group of scientists and technologists after reading this issue.*

It is with some regret that I advise the readers that this is my last issue as Editor of Seed Technology. *After six years, I feel that we have made good progress with the journal, but I am never satisfied with the number of full manuscripts and Seed Tech notes submitted and published annually. I'm pleased that we have maintained continuity by publishing one or two volumes of the journal per year for a total of ten volumes from 1997 through 2003. During this period we have reviewed nearly 120 manuscripts for full papers and 34 manuscripts for Seed Tech Notes including the Tree Seed Symposium published in this issue. The publication of papers from four symposia that were presented at annual AOSA/SCST meetings has also made a major contribution to the journal.*

As I leave the position of editor, I must offer a special thank you to all Associate Editors and the many peer reviewers who have made an important contribution to all volumes published. I must also express my personal thanks to the typesetter, Mr. Charles Chandler, who has worked diligently to improve and publish each issue in a timely manner. Likewise, my proofreader, Ms. Amélie Charron, has provided expert assistance to make the final corrections needed for each issue. Finally, I express my appreciation for the financial support provided by both the Association of Official Seed Analysts and the Society of Commercial Seed Technologists. I strongly suggest that both associations provide similar support for the new editor and continue to publish this journal for scientific and technical papers in all areas of Seed Science and Technology for many years.

Dennis M. TeKrony
Editor

Seed Technology
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 for all plant species. The journal relates to individuals interested in seed production, sampling, testing, conditioning, distribution and storage of horticultural, agronomic and forest seed crops. 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 may be submitted as a hard (paper) copy or electronically. See instructions for submission at end of instructions. 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. (Do not include list of key words). 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 (under abstract). 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 detailed guide for both paper and electronic manuscript preparation and can be accessed on line at

http://www.asa-cssa-sssa.org/style98/

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, respectively. 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. High resolution .TIF files (at least 300 dots-per-inch) may also be submitted, but they should not be substituted for high quality original prints. 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 smooth white paper. For computer generated line art, submit original printouts, not poor quality copies. 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 line art figures are black and white open and closed squares, circles and triangles. Do not use colors, shades of gray, or fine screens or patterns to fill bars on graphs or wedges on pie charts. Use solid black or white, well-spaced parallel lines, widely spaced dots, or other black and white line art methods instead. Again, any patterns and lines should be able to withstand reduction by half or more. 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, abbreviated journal title, volume number and inclusive pages. Cite personal communication and unpublished work only in the text, not in the reference list. Examples of acceptable references are:

Koning, G., TeKrony, D. M., Pfeiffer, T. W., and Ghabrial, S. A. 2001. Infection of soybean with soybean mosaic virus increases susceptibility to Phomopsis spp. seed infection. Crop Science. 41:1850–1856.

Bernard, R. L., and Weiss, M. G. 1973. Qualitative genetics. Pages 117–154 in: Soybeans: Improvement, production, and uses. B. E. Caldwell, R. W. Howell, J. W. Judd, and H. W. Johnson eds. 1st ed., Agron. Monogr. 16. ASA, CSSA, and SSSA, Madison, WI.

Fehr, W. R., and Caviness, C. E. 1977. Stages of soybean development. Spec. Rep.80. Iowa Agric. Home Econ. Exp. Stn., Iowa State Univ., Ames.

McGee, D. C. 1992. Soybean diseases. American Phytopathology Society, St. Paul, MN.

Association of Official Seed Analysts. 2000. Rules for testing seeds. Association of Official Seed Analysts. Las Cruces, NM, USA.

Proofs, publication charges and reprints. One set of page proofs in Adobe Acrobat format will be returned to the corresponding author by e-mail attachment. Corrections should be restricted to printer's errors and returned to the Editor promptly. *Seed Technology* does not require page charges, however reprints can be ordered from the publisher when returning corrected proofs.

Submission electronically or hard paper copy. Initial submission may be on paper, on disk, or by e-mail attachment. The manuscript should be typed, double spaced with ample margins (at least 4.0 cm on each side) on one side of line-numbered, paper (approximately 21 x 28 cm). If submitted on paper, when the necessary revisions are made and the paper is accepted, authors must submit a final version on computer disk or by e-mail attachment, accompanied by two identical copies on paper. Both high density 3½-inch PC disks or CD-ROM are acceptable. Mail four hard copies of the manuscript to:

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

Tel: 859-257-3878
Fax: 859-257-2185

Electronic submission. Manuscripts submitted electronically must follow the same style as a paper submission to include the text of the manuscript, all tables and figures in an acceptable format. MS Word or Wordperfect for Windows are the preferred formats for submitting files on 3½-inch high density PC disk or CD-ROM. If files are submitted as e-mail attachments, both Macintosh and Windows versions of Word or Wordperfect may be used. Files can also be accepted in MS-Works, RTF, ASCII, and other formats if the preferred options are not available. Contact the Editor if you have questions. Manuscripts submitted by e-mail attachment should be sent to:

dtekrony@uky.edu

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. These notes should not exceed four pages of printed text and a maximum of two figures or photographs.

SYMPOSIA PUBLICATIONS

Manuscripts resulting from symposia having appropriate subject matter will be considered for publication as a single volume of *Seed Technology.* Manuscripts considered may originate from symposia sponsored by the

Association of Official Seed Analysts or the Society of Commercial Seed Technologists or from appropriate seed symposia sponsored by other organizations. Symposia organizers desiring to publish a set of manuscripts in *Seed Technology* must solicit the Editor with the following information: (i) title, date and location of the symposium, (ii) the organization affiliated with the symposium, (iii) names, addresses, e-mail and telephone numbers of symposium organizers and (iv) Titles and abstracts for each paper to be considered for publication. Symposia papers are subject to the usual format described above for *Seed Technology* and will be reviewed by the editorial board prior to acceptance for publication.

Additional Symposium Abstracts (continued from Inside Front Cover)