



# The Seed Technologist Newsletter

*A newsletter for*

**The Association of Official Seed Analysts  
and The Society of Commercial Seed Technologist**

**Volume 81, Number 2  
May 2007**



# 2006-2007 AOSA EXECUTIVE BOARD AND EXECUTIVE ASSISTANT INFORMATION

## **Brent Turnipseed, Acting President**

SDSU Seed Lab  
Plant Science Dept.  
P.O. Box 2207A, Ag Hall 227  
Brookings, SD 57007  
PH: 605-688-4589  
Email: [brent\\_turnipseed@sdstate.edu](mailto:brent_turnipseed@sdstate.edu)  
FAX: 605-688-4013

## **Mark Hafdahl, Acting Vice-President**

North Dakota State Seed Dept.  
Box 5257  
1313 18<sup>th</sup> St. N.  
Fargo, ND 58105  
PH: 701-231-5420  
Email: [mhafdahl@state-seed.ndsu.nodak.edu](mailto:mhafdahl@state-seed.ndsu.nodak.edu)  
FAX: 701-231-5401

## **Dan Curry, Secretary-Treasurer**

128A Seed Science Center  
Iowa State University  
Ames, IA 50011  
PH: 515-294-0117  
Email: [curry@iastate.edu](mailto:curry@iastate.edu)  
FAX: 515-294-2014

## **Board Members**

### **Laura Donaldson**

Indiana State Seed Laboratory  
Purdue University  
175 S. University St.  
West Lafayette, IN 47907-2063  
PH: 765-494-9832  
Email: [DonaldsonL@purdue.edu](mailto:DonaldsonL@purdue.edu)  
FAX: 765-496-3967

### **Jim Effenberger**

California Dept. of Food and Ag  
Plant Pest Diagnostics Center  
3294 Meadowview Rd.  
Sacramento, CA 95832-1448  
PH: 916-262-1136  
Email: [jeffenbe@cdfa.ca.gov](mailto:jeffenbe@cdfa.ca.gov)  
FAX: 916-262-1140

### **Janine Maruschak**

CFIA Saskatoon Lab  
Seed Science and Technology Section  
301-421 Downey Rd.  
Saskatoon, Saskatchewan  
Canada S7N 4L8  
PH: 306-975-5832  
Email: [jmaruschak@inspection.gc.ca](mailto:jmaruschak@inspection.gc.ca)  
FAX: 306-975-6450

### **Victor Shaul**

Washington State Department of Agriculture  
21 N. 1 st Ave. #203  
Yakima, WA 98902  
PH: 509-225-2630  
Email: [vshaul@agr.wa.gov](mailto:vshaul@agr.wa.gov)  
FAX: 509-454-4395

### **Gil Waibel**

Wyoming Seed Analysis Laboratory  
749 Road 9  
Powell, WY 82435  
PH: 307-754-4750  
Email: [gwaibel@uwyo.edu](mailto:gwaibel@uwyo.edu)  
FAX: 307-754-4932

### **Jan Osburn, AOSA Executive Assistant**

AOSA, Inc.  
Mail Boxes Etc. #285  
601 S. Washington  
Stillwater, OK 74074-4539  
PH: 405-780-7372  
Email: [aosaoffice@sbcglobal.net](mailto:aosaoffice@sbcglobal.net)  
FAX: 405-780-7372



## 2006-2007 SCST EXECUTIVE BOARD

### **President**

Diane Mesa, RST, CGT  
Syngenta Seeds, Inc.  
1525 Airport Rd.  
Ames, IA 50010  
515-239-3503  
[diane.mesa@syngenta.com](mailto:diane.mesa@syngenta.com)

### **Vice President**

Gil Waibel, RST  
Wyoming Seed Analysis Lab  
749 Road 9  
Powell, WY 82435  
307-754-4750  
Fax 307-754-4932  
[gwaibel@uwyo.edu](mailto:gwaibel@uwyo.edu)

### **Director-at-Large**

Doug Miller, RGT  
Illinois Crop Improvement  
3105 Research Road  
PO Box 9013  
Champagne, IL 61826  
217-359-4053  
Fax: 217-359-4075  
[dmiller@ilcrop.com](mailto:dmiller@ilcrop.com)

### **Director-at Large**

Stewart Oliver, RST  
GROWMARK, Inc.  
1301 W. Washington St.  
Suite B.  
Bloomington, IL 61701  
309-823-9457  
Fax: 309-823-9408  
[soliver@growmark.com](mailto:soliver@growmark.com)

### **Director-at Large**

Jane Penrose, RST  
Agri Seed Testing  
1930 Davcor Ct. SE  
Salem, OR 97302  
503-585-1440  
FAX: 503-588-0733  
[jpagriseed@comcast.net](mailto:jpagriseed@comcast.net)

### **Director-at Large**

Brent Reschly, RST  
Integrity Seed Testing  
307-287-2629  
[rfotowerks@yahoo.com](mailto:rfotowerks@yahoo.com)

### **Director-at Large**

Quentin Schultz, RST  
BioDiagnostics, Inc.  
507 Highland Dr.  
River Falls, WI  
715-426-0246  
Fax 715-426-0251  
[Quentin.Schultz@biodiagnostics.net](mailto:Quentin.Schultz@biodiagnostics.net)

### **Executive Director**

Anita Hall  
101 East State Street  
PMB #214  
Ithaca, NY 14850  
607-256-3313  
Fax 607-256-3313  
[scst@twcny.rr.com](mailto:scst@twcny.rr.com)



## SEED TECHNOLOGIST NEWSLETTER EDITORIAL STAFF

---

### **AOSA EDITOR**

Cindy Finneseth  
Seed Testing Coordinator  
Division of Regulatory Services  
College of Agriculture  
University of Kentucky  
103 Regulatory Services Building  
Lexington, KY 40546-0275  
859-257-2785  
Fax 859-323-9931  
[Cindy.Finneseth@uky.edu](mailto:Cindy.Finneseth@uky.edu)

### **SCST EDITOR**

Wendy Zillgitt, RGT  
BioDiagnostics, Inc.  
507 Highland Dr.  
River Falls, WI 54022  
715-426-0246  
Fax 715-426-0251  
[Wendy.Zillgitt@biodiagnostics.net](mailto:Wendy.Zillgitt@biodiagnostics.net)

### **NORTHWEST I**

Cindy Arnett  
Washington State Dept. of Ag.  
21 N. 1<sup>st</sup> Ave., Suite 203  
Yakima, WA 98902  
509-225-2630  
Fax 509-454-4395  
[CArnett@agr.wa.gov](mailto:CArnett@agr.wa.gov)

### **MIDWEST IIA**

Jim Lair  
USDA/ NASS – Grain Yields Lab  
c/o IL. Department of Agriculture  
801 Sangamon Ave., P.O. Box 19281  
Springfield, IL 62794  
217-492-4295 Ext. 254  
Fax 217-492-4291  
[j\\_lair@nass.usda.gov](mailto:j_lair@nass.usda.gov)  
[jnl@gcctn.com](mailto:jnl@gcctn.com)

### **MIDWEST IIB**

Ronny Parmely  
SDSU Seed Lab  
P.O. Box 2207-A  
Brookings, SD 57007  
605-688-6636  
Fax 605-688-4013  
[Ronny\\_Parmely@sdstate.edu](mailto:Ronny_Parmely@sdstate.edu)

### **NORTHEAST III**

Norma Rossel  
Johnny's Selected Seeds  
955 Benton Avenue  
Winslow, ME 04901  
207-861-3939 ext. 301  
Fax 207-861-8381  
[nrossel@johnnyseeds.com](mailto:nrossel@johnnyseeds.com)

### **SOUTHWEST IV**

Sue Alvarez  
Seminis  
2700 Camino del Sol  
Oxnard, CA 93030  
Phone: (805)918-2469  
FAX: (805)918-2424  
[sue.alvarez@seminis.com](mailto:sue.alvarez@seminis.com)

### **SOUTHERN V**

Aaron Palmer  
Arkansas State Plant Board  
#1 Natural Resources Dr.  
Little Rock, AR 72205  
501-225-1598  
Fax 501-225-7213  
Aaron. [Palmer@aspb.ar.gov](mailto:Palmer@aspb.ar.gov)

### **CANADA**

Doug Ashton  
CSAAC  
108 Vaughan St.  
Almonte, Ontario  
CANADA K0A 1A0  
613-256-7411  
Fax 613-256-0485  
[csaac@rogers.com](mailto:csaac@rogers.com)

### **BOOKSHELF**

Harold Armstrong  
Montana State Seed Lab  
Montana State University  
P.O. Box 173145  
Bozeman, MT 59717-3145  
406-994-5068  
Fax 406-994-3786  
[harmstrong@montana.edu](mailto:harmstrong@montana.edu)

**Subscription: \$35.00 per year, U.S. Funds. Includes; three newsletter publications and the conference proceedings. For subscriptions, contact Anita Hall, SCST Executive Director, or Jan Osburn, AOSA Business Office, 505-522-1437**

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## NOTES FROM THE EDITORS

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The Newsletter Committee will be meeting at 9:00 am – 10:00 am on Thursday, June 7<sup>th</sup> during the annual meeting. Everyone is welcome to attend. We will discuss reporting assignments for the annual meeting and other Committee business.

Please remember that articles can be submitted at anytime. Don't wait for the deadline! Anyone can submit an article, but we consider the appropriateness and timing, and will not break copyright laws. We reserve the right to edit, but will not change content.

Some suggestions for articles:

Seed testing or method ideas, Analyst news, Lab spotlight, General interest, Technical information, Position announcements/Employment opportunities, Workshop announcements, Seed school announcements and Meeting summaries or announcements

**Deadline for the September 2007 Newsletter Issue: August 17, 2007**

Submit articles by email to Cindy Finneseth, Wendy Zillgitt, or your regional editor. Find the names and contact information on page 4.

**Please type all articles in Arial 12 pt.  
One-inch margins on all sides  
Please no indents  
Please do not define headings**

Cindy Finneseth, AOSA Editor  
Wendy Zillgitt, SCST Editor

### Websites

AOSA ([www.aosaseed.com](http://www.aosaseed.com))  
SCST ([www.seedtechnology.net](http://www.seedtechnology.net))

## EXECUTIVE BOARD REPORTS

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### AOSA President's Report

It is hard to believe that in a few short weeks we will all be in Cody, WY for another annual meeting. The meeting hosts have done a great job this year and the meeting will be an excellent chance to work and enjoy the surrounding area. I look forward to seeing everyone there.

We will be discussing a number of important initiatives at the annual meeting this year. Included in this newsletter is a report from the AOSA/SCST Consolidation Task Force, please review this carefully and come prepared with your questions and comments. The AOSA membership will also be discussing a proposal to adopt continuing education requirements for accredited analysts. This is an important step for our association to take and the draft proposal offers a number of ways to achieve the points. There are twenty one rule proposals this year, some with far reaching repercussions. I know all of us take our responsibility seriously and will give these proposals the careful consideration they require.

A notice was sent to all members regarding the status of the master calibration samples. Instructions for how to borrow and use the samples will be posted on the AOSA website ([www.aosaseed.com](http://www.aosaseed.com)) and sent to all members of AOSA and SCST when they are finalized. It is extremely important that we maintain the integrity of the samples and that the samples are returned in a timely manner to ensure that all labs that need to use them get the chance. Therefore we are going to be instituting some fairly stiff guidelines for late return of samples and the replacement of samples if needed. If the samples are used within the allotted time and returned in the same condition they were received there will be no repercussions to the borrower (besides the shipping cost) for using the Master Calibration Samples.

I will be representing AOSA at the ISTA Congress in Brazil during May. This will be a good opportunity to communicate with ISTA members and leaders. The USA is the number one importer and exporter of seed and it is very important to our industry that AOSA maintain a strong international presence. I am looking forward to participating in this meeting.

Clearly there will be plenty of issues for us to discuss in Cody, see ya'll in June!

Dr. Brent Turnipseed  
Acting President, AOSA

---

### SCST President's Report Diane Mesa

Our annual AOSA/SCST meeting in Cody, Wyoming is fast approaching and the committees planning and preparing for the meeting are finishing their work that will result in a successful and

informative session. The venue will provide many opportunities for recreation and sightseeing for members who can spare the time before or after the meeting.

This year's meeting will have more joint sessions with AOSA. The business meeting, the long range planning, and many of our committees are going to involve members of both SCST and AOSA participating. We need to consider our diversity of thought and experience as one of our strengths moving forward.

The Seed Technology Research Foundation (STRF) has almost reached the goal of \$100,000 so it can begin soliciting research proposals for seed testing research. At the annual meeting in June, the silent auction and quilt raffle will be two fun ways for participants to help raise money.

There has been significant effort focused on the Seed Technology Journal. Quentin Schultz chaired the committee to revamp the publication. Allen Knapp will continue as editor with two technical editors assisting him. There are task forces concentrating on marketing, innovative publication formats, and funding methods. We strongly encourage presenters involved in the workshops and symposia at the annual meeting to provide articles for the Journal.

The new Seed Law Guide is almost ready for publication. We expect a big demand for this publication from seed companies, seed analysts, and others in the industry. Getting the information collected, edited, and formatted has been a major undertaking.

As my term as SCST President draws to a close, I want to thank the membership, the committee chairs, the SCST executive board, and executive director Anita Hall for your efforts on behalf of the society. Many of you work for the society simply because you believe in what we stand for. Others find friendship and camaraderie sharing experiences with colleagues in seed testing. Let's continue to maintain our proud heritage and high standards as we work to promote our industry.

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### **SCST Executive Director Update**

Submitted by Anita Hall

The annual meeting in Cody, WY is now less than six weeks away! Hopefully everyone has completed their travel plans and is gearing up for a productive and enjoyable meeting. A number of our committees have put extra effort into organizing special speakers and presentations. Please check the meeting schedule for committee agendas, we will be posting these as they are received up until the meeting begins.

Here are a few 'special' events at this meeting that you should be aware of:

- June 6<sup>th</sup> 6:00pm-7:30pm- Orientation and Reception for new and current members.
- Herbicide Bioassay Working Group- Clearfield® tolerant species presentation by Kyle Keller, BASF
- Lab Standards and Documentation Committee Meeting- Six Sigma/LEAN Presentation, Steve Schmidt, Pioneer Six Sigma Master Black Belt
- Joint long range planning session for AOSA and SCST members to discuss shared initiatives followed by break out meetings for each association.



- A joint business session Rules Voting and Committee Report business session. This will allow members of both organizations to vote on the rule amendments and hear committee reports during a concurrent session.

Important items included in the May Newsletter:

- The preliminary long range planning schedule. Please review this information and send any additional topics to me.
- AOSA/SCST Consolidation Task Force Report, it is extremely important that all members review this information prior to the meeting.
- Rule proposal #20 has been revised. There are twenty-one proposed amendments to the AOSA Rules for Testing Seeds; these can be downloaded from the SCST website at: [http://www.seedtechnology.net/rules\\_committee.htm](http://www.seedtechnology.net/rules_committee.htm). There is also an on-line discussion forum where you can post and read comments.

### SCST Membership Update

4-2007

RST	136
Associates	56
Research	15
RGT	18
CGT	13
CVT	3
RST/CGT	10
RST/RGT	1
<b>Total Membership</b>	<b>252</b>

#### **New Registered Genetic Technologists- Congratulations!**

Pam Hogue, Indiana Crop Improvement, West Lafayette, IN

Erin Murphy-Untz, BioDiagnostics, Inc., River Falls, WY

#### **New Registered Seed Technologists- Congratulations!**

Kazi Alam, Seed Quality Quest Canada, Lindsay, ON

Randy Crawl, Nebraska Crop Improvement, Lincoln, NE

Dave Svik, Seed Control Official, Nebraska Crop Improvement, Lincoln, NE

#### **New Associate Members- Welcome!**

Ginger Adams, Delta and Pine Land, Aiken, TX

Shannon Bruder, Syngenta Seeds, Inc., Owatonna, MN

Kate Cardon, Agri Seed Testing, Salem, OR

Randy Collins, Dow Agro Sciences, Indianapolis, IN

Tammy Hobbs, Illinois Crop Improvement Association, Champaign, IL

Drew Johnson, Seminis Vegetable Seeds, Oxnard, CA

Alberta Ochoa, Delta and Pine Land, Aiken, TX

Stella Sepeda, Delta and Pine Land, Aiken, TX

Eliseo Taytayon, Germain's Technology Group, Gilroy, CA

**RMI to RST- Welcome back!**

Neal Foster, South Dakota Crop Improvement, Brookings, SD

**RMI/CMI to RST/CGT- Welcome back!**

Tim Matthei, NST Seed Labs, Bridgewater, SD



**Joint AOSA/SCST Board Conference Call Minutes**

February 23, 2007

Began 10:00 p.m. CST

**Board Members Present:**

AOSA - Brent Turnipseed, Mark Hafdahl, Dan Curry, Gil Waibel, Laura Donaldson, Jim Effenberger, Janine Maruschak and Executive Assistant, Jan Osburn

SCST - Gil Waibel, Stewart Oliver, Quentin Schultz, Jane Penrose, and Executive Director, Anita Hall

1. **Exam Consolidation Committee:** Co-chairs have been appointed by both organizations. This committee is planning a conference call in March to finalize a detailed outline of the exam for presentation at the annual meeting.
2. **Seedimages.com Proposal:** The proposal from Colorado State University offered to share revenue from subscriptions to seedimages.com if the fee is included on the AOSA or SCST membership dues invoice. Members of both boards felt it would set an undesirable precedence to include additional fees or subscriptions on dues invoices. The boards agreed to support seedimages.com by including website links and providing information to their respective memberships about this resource but not to collect funds or financially benefit from subscriptions to the website.

**Action:** A decision was made that Brent, Diane and/or Gill will prepare a response to Colorado State University concerning their proposal. The letter will state support for seedimages.com but declining to include the subscription fee on dues invoices. The letter will include an offer to advertise seedimages.com on the websites, in the newsletter, and include the suggestion that the subscription fee be lowered by the amount that would have been given to SCST and AOSA.

3. **Seed Law Guide Management and Fee:** A draft fee proposal was reviewed. The final production costs are not yet set as the total page count has not been finalized. The board agreed that the cost of a printed copy will have to be relatively high to cover production and administrative costs.

Costs		Proposed Fees	
CD, jewel case, label	\$5.00	CD-single user	\$150
Administrative fee	\$30.00	CD-multiple users	\$250
Shipping fee	\$5.00	Bulk orders: 5+	\$100
TOTAL	\$40.00		



A database of purchases will be maintained and order forms that include what updates have been made will be sent annually.

Quentin Schultz moved to accept the proposed fee for electronic copies and to table establishing the final price of printed copies until the costs can be determined, Dan Curry seconded, motion carried.

It was suggested that the Seed Law Guide be included in the Seed Issues Forum at the annual meeting and be available for viewing during the meeting.

4. **Journal Tax Status:** The letter determining tax liability for publications from the SCST accounting firm was sent to both boards prior to the call. The letter determined that the journal would not be tax deductible as it fits the original application (form 1024) for not-for profit status as submitted to the IRS. Anita will send Jan all the information sent to the SCST accountant.

The difference in the CPA's interpretations for each organization is directly related to how each organization filed their tax-exempt status when formed.

The boards discussed the possibility of moving the journal under the SCST for tax purposes. Since AOSA and SCST are more than half way into the current fiscal year additional information will need to be gathered before this is done to ensure there will be no tax liabilities for either organization. Jan, Dan, Anita will discuss this with both organizations' accountants and research how to proceed.

**Action:** Anita will send tax information to Jan. Anita and Jan will contact the respective accountants and research transfer of funds.

5. **AOSA/SCST Seed Standardization and Research Fund:**

- A. Co-Chairs: The AOSA and SCST chairs both stepped down in June 2006. Mike Thompson has been asked to serve as SCST chair. Brent Turnipseed will appoint an AOSA co-chair.

- B. Account balance: The research account currently contains just over \$14,000.  
AOSA/SCST Seed Standardization and Research Fund:

- C. Possibility of combining this fund with STRF: The Seed Testing Research Foundation would achieve the goal of raising \$100,000 this year with the \$14,000 from the ASSRF fund, and be able to begin to funding research. The articles of incorporation for STRF state that "the corporation will provide seed testing research and development in conjunction with the AOSA/SCST Research fund." The STRF incorporating board has stated in literature and public relations material that a independent proposal review committee will develop guidelines for submitting and funding research proposals. Once STRF begins to fund research do AOSA and SCST need to maintain a separate research fund or can these efforts be combined? The concern was raised that AOSA and SCST members will want to continue to have a voice in the types of proposals that are funded

from their contributions. The proposal review committee must have a transparent and impartial process for making funding decisions.

If the STRF Board of Directors accepts and adopts the AOSA/SCST proposal as stated below, then we can approach our membership about shifting the current \$14,000 into the STRF endowment.

*Quentin Schultz moved that AOSA and SCST send a request that the current STRF board officially appoint the AOSA/SCST Seed Testing Standardization Research Fund (STSRF) committee as the proposal review committee for STRF, based on the current STSRF guidelines, Mark Hafdahl seconded, motion carried.*

**Action:** Brent Turnipseed and Gil Waibel will draft a letter to the STRF board and request a response by May 1<sup>st</sup>, 2007.

- 6. Joint Website Posting/Newsletter Pricing:** At this time advertising on both websites is free. The group discussed developing a standardized form for employment advertisements with a set fee of \$100 for both websites and the newsletter to be divided equally.

*Brent made a motion that a flat fee of \$100 per month be charged for website posting/newsletter for a one month time frame. Mark seconded the motion. Motion passed.*

**Action:** Laura Donaldson and Anita Hall will develop a form for employment advertising.

Quentin made a motion to adjourn. Stewart seconded the motion. Call ended 11:11 am CST.

## COMMITTEE REPORTS

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### Rules Committee Update

Cindy Finneseth, Chair

Please review the changes in or additions to the AOSA Rules that were published in the previous newsletter. Note that Rule Proposal #20 Noxious-weed seed tolerances has had important changes made to it since originally published. You are welcome to circulate proposals among interested parties within both public and private sectors. The names and addresses of the proposal authors are included so that they may be contacted directly if additional information concerning a particular proposal is needed. You may also submit written comments (preferably via email) to the Rules Committee Chair prior to the annual meeting.

All proposals are posted online and can be accessed via the Rules Committee webpage ([http://www.aosaseed.com/rules\\_committee.htm](http://www.aosaseed.com/rules_committee.htm)). Also from this page a link will take you to a discussion forum where comments and questions can be posted about each individual proposal.

The author will have opportunity to respond, if necessary. Prior to making comments or posting questions, you must register. The process is simple and explained on that page. If you prefer not to be identified, please send your comments to the proposal author or me and we will make sure a response or clarification is posted to the forum.

Remember that discussion of the proposals will occur during the Open Rules Committee Meeting, which is scheduled for Saturday, June 9, beginning at 9:00 am. Amendments to the proposals will be completed during that session; therefore, no amendments will be allowed from the floor during the AOSA or SCST business meetings. Please bring your own hard copy of the 2007 proposals with you to the annual meeting, as additional copies of the proposals **will not** be made available at the meeting.

Feel free to contact me if you have any questions, comments or suggestions. Phone: (859) 257-2785 or e-mail:Cindy.Finneseth@uky.edu.

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### **Preliminary Draft: SCST Constitution and By-Laws**

At the Annual Business Meeting in 2005, a motion was passed to appoint a special committee to review and update the SCST Constitution and By-Laws. The Executive Board later approved a complete rewrite of the document. The following is the preliminary draft which has been reviewed by the Executive Board. The draft has since been published in the September 2006 newsletter and has been reviewed by the SCST membership. You can also access the draft from the annual meeting schedule or this link:

[http://www.seedtechnology.net/2007/CB\\_Final\\_Draft\\_4-2007.pdf](http://www.seedtechnology.net/2007/CB_Final_Draft_4-2007.pdf)

There will be a one hour open committee meeting held at the 2007 annual meeting to focus on specific questions, concerns and suggestions regarding the draft. There will be time at the end of the committee meeting devoted to a discussion on what form of ballot should be used to vote on the preliminary draft document, as a whole.

The object of the committee is to create a document that upholds the core concepts of the Society, and is clear, concise and current on SCST protocol and the current membership process. All changes to the original document are recorded on the tracking document, which is available by request from the Executive Director.

BLUE TEXT = language from the Membership Handbook

RED TEXT = completely new language

Elizabeth Bada,RST  
Chair, SCST Constitution and By-Laws committee  
Nunhems USA  
1200 Anderson Corner Road  
Parma, Idaho 83660

Email; [elizabeth.bada@nunhems.com](mailto:elizabeth.bada@nunhems.com)

Phone; 208-674-4158

Fax; 208-674-4002

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## SCST Historian's Report

Jennifer Pernsteiner

Many thanks to Laurie Conradson for her time spent as SCST Historian. Laurie has recently passed her duties on to Jennifer Pernsteiner. Please contact Jennifer with any information you may have on members or former members of SCST who have passed away. Also, please forward photos and information related to the history (old or new) of SCST. You can contact her at [Jennifer.pernsteiner@biodiagnostic.net](mailto:Jennifer.pernsteiner@biodiagnostic.net).

We have the sad duty to report the passing of a past president of SCST. Cecilia M. Kollack, 96, of Aviston, died Tuesday, December 19, 2006 at Countryside Manor in Aviston. She was born October 26, 1910 in Aviston, daughter of Henry F. and Mary E. (Ruetting) Schmuck.

She is survived by a daughter, Elizabeth "Betty" Steinbach of Arlington Heights, IL; three grandchildren, Scott Steinbach and wife Darlene of Atlanta, GA, Peter Steinbach and wife Sharon of Round Lake Beach, IL and Lynn Le and husband Son of Brentwood, TN; four great grandchildren, Andre, Marcus and William Le and Brennan Steinbach.

In addition to her parents, she was preceded in death by five brothers, Frank Schmuck, Herman Schmuck, John Schmuck, Henry Schmuck, Tony Schmuck; three sisters, Theresa Schmuck, Elizabeth Karas and Anna Millaway; two brother-in-laws, Peter Karas and Ray Millaway; and four sisters-in-law, Florence Schmuck, Annie Schmuck, Ellen Schmuck and Mary Schmuck.

Mrs. Kollack was a lab director and seed analyst at Vaughans Seed Company for 35 years before her retirement. She was a member of the Society of Commercial Seed Technologists and served as president in 1983 to 1984. She was awarded the SCST meritorious service award in 1983.

A Memorial Mass was celebrated at 1 p.m. on Saturday, January 20, 2007 at St. Francis Catholic Church in Aviston with Rev. Dan Friedman officiating. In lieu of flowers, memorials were made to St. Francis Parish and will be received at Hempen Funeral Home, 150 South Clinton, Aviston, IL 62216.

We also regret the passing of Michael Wayne Dideriksen, 53, of Fort Collins, who died suddenly on March 20, 2007.

Michael was born on January 17, 1954 in Shenandoah, Iowa to Eleanore and the late James Dideriksen. Along with his only brother, the late Robert Dideriksen, Michael grew up in a farming family. He always appreciated the warmth of his extended family and a close knit farming community. Michael felt the draw of the Rocky Mountains, and he moved to Colorado in 1974. Mike was a graduate of the Larimer County Voc-Tech Center Seed Analysis Program in 1984. He became a CSA (Certified Seed Analyst) in 1985 and an RST (Registered Seed Technologist) in 1998. He worked at the USDA's National Seed Storage Laboratory in Fort Collins from 1984 until 1989 when he began working at Hillehog Mono-Hy, a sugar beet seed company in Longmont, Colorado. In 2001, he was hired back at the National Seed Storage Laboratory, now known as the National Center for Genetic Resources Preservation. He took the position in Fort Collins because it allowed him to spend more time with his family.

Mike served the FRSA, SCST and AOSA in many capacities, as a representative to the ISST board of directors, the SCST Librarian, and most recently on the AOSA-SCST Consolidation Task Force.

He and his wife Janet have been together for 26 years and were married in 1991. The addition of their children, Sarah in 1993 and Daniel, in 1996, transformed Michael into the devoted soccer, baseball, “anything that my kids are doing, I’m there kind of Dad” for which he will be lovingly remembered. They have a wide circle of friends and family from Iowa, New Jersey, and Colorado. Mike also made many friends abroad during his trips to Europe for Hilleshog.

Recollections of Michael, whether from his youth or the recent past, always reveal an exceptionally outgoing, funny and genuine man who relished the simple pleasures in life. It should comfort all those who mourn Michael to know that he spent the last full week of his life doing what he unquestionably loved best – he was enjoying life to its fullest with his family. While on Spring Break in Florida he caught some beautiful sunsets while sitting on a balcony overlooking the ocean with a beer in his hand and bowl of peanuts by his side. Mike lived life as though he were playing baseball. He stepped up to the plate and swung the bat with everything he had.

Michael was laid to rest in the family cemetery in Hawleyville, Iowa on Saturday, March 24, 2007.

Many of us will remember Mike for his wit, humor, and kindness. He enjoyed life and helped those of us lucky enough to know him to do so as well. He will be greatly missed.

Memorial contributions may be made to the Michael Dideriksen Memorial Fund to benefit his children, in care of Allnutt Funeral Service, 650 W. Drake Road, Fort Collins, Colorado 80526. An online guestbook is available at [www.allnutt.com](http://www.allnutt.com).

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### **AOSA-SCST Consolidation Taskforce Report Summary**

Wayne Guerke, Chairman

Janine Maruschak, CFIA Saskatoon Seed Laboratory

Deborah Meyer, California State Seed Laboratory

Doug Miller, Illinois Crop Improvement Association

Larry Nees, Indiana State Seed Laboratory

Michael O’Neil, Pioneer Hi-Bred Int’l., Inc.

May, 2007

Detailed supporting information for the topics below can be found in the full Consolidation Committee Report. Please review the full report to understand the extensive research, organizational comparisons, historical data, and industry statistics that resulted in these recommendations.

#### **Justification for Consolidation**

- a. To ensure that the future seed testing needs of the seed industry and regulatory agencies are met.

- b. To promote seed research and development of standardized testing methods to maintain responsiveness to the needs of regulatory agencies and industry quality assurance.
- c. To ensure the continued financial health and growth of our organizations
- d. To improve the effective use of resources by eliminating duplication through pooling available human resources and expertise to meet organizational needs.
- e. To maintain stature to address the changing and expanding technological needs of the seed industry as well as maintain testing Rules and handbooks.
- f. To present a unified image to international counterparts and global markets in order to maintain a position of authority with standardized seed quality testing methods and thereby reduce trade barriers.

### **Proposed Structure of a Consolidated Organization**

**Article I – Name.** AOSA International. The taskforce strongly recommends that the title of the rules, AOSA Rules for Testing Seeds, be maintained. This would support the many state and federal statutes and regulations that reference that publication. The acronym, AOSA, has global recognition, which supports the identity of both the organization and the rules as well as links one with the other. Having one without the other would result in confusion and loss of identity. However, once merged, the title Association of Official Seed Analysts would no longer exist and only the acronym would be used. Individual accredited members would incorporate the SCST membership titles, such as the RST. The strengths of both AOSA and SCST would be retained in the consolidation.

**Article II – Purpose and Authority.** The purpose of the consolidated organization would be to develop and implement standardized, scientifically based seed testing methods to meet the needs for industry management of seed quality and regulatory enforcement of labeling requirements. The purpose would be obtained by 1) Promoting uniform laboratory methods and practices through seed research; 2) Fostering scientifically grounded, uniform seed control legislation and regulation; 3) Maintaining analyst proficiency through training programs, certification of analysts, proficiency testing and publication of literature on seed technology and research; 4) Furthering the exchange of ideas among laboratories and among individual workers; and 5) Improving seed testing in all its branches and to make it more useful to agriculture and society.

**Article III – Membership.** Two types of membership are proposed: Individual Members and Organizational Members. Individual Members categories: 1) Members; 2) Associate Member; 3) Student Member and 4) Honorary Member.

#### Members:

- Members would be seed analyst members, research members and retired members.
- They would have individual voting privileges.
- Seed analyst Members would be required to have accreditation in one or more accreditation categories offered by the association (RST, CGT, etc)
- Research Members would be actively engaged in teaching, research and outreach in the field of seed science and technology.
- Retired Members would be retired accredited seed analysts and seed researchers that were active members prior to retirement.
- Members would be eligible to serve as officers and appointment as committee chairs.



The other types of Individual Member, Associate, Student and Honorary, would not have voting privileges.

#### Organizational Members

- Federal and state seed laboratories, crop improvement laboratories, and university laboratories.
- Organizational Members would have a designated representative that would be a Member in good standing and meeting all Member requirements. The designated representative would vote for the organization but also have the right to vote as an individual member.
- Each Organizational Member would be allotted up to 12 individual Members covered under their membership dues and all such Members affiliated with an Organizational Member must satisfy the requirements for individual membership.

**Article IV – Officers and Executive Board.** The Executive Board would consist of a President, Vice President, five Directors and a non-voting Executive Director. The Executive Board membership would require a balance of Members from the government (3), industry (3) and university or crop improvement (1) sectors, with no single entity in a majority.

**Article V – AOSA Rules for Testing Seeds.** Maintain the current procedure where individual members and laboratory representatives vote separately and tallies are computed on an equal basis with a 2/3 majority required to pass.

## **AOSA-SCST Consolidation Taskforce Report**

Wayne Guerke, Chairman  
Janine Maruschak, CFIA Saskatoon Seed Laboratory  
Deborah Meyer, California State Seed Laboratory  
Doug Miller, Illinois Crop Improvement Association  
Larry Nees, Indiana State Seed Laboratory  
Michael O'Neil, Pioneer Hi-Bred Int'l., Inc.

May, 2007

A joint AOSA-SCST taskforce was established late in 2006 to review whether the Association of Official Seed Analysts (AOSA) and the Society of Commercial Seed Technologists (SCST) should consolidate into a single organization, and, if so, to propose an organizational structure for consideration and discussion by the joint membership. To obtain a perspective of changes in the broader seed industry and how these changes relate to the relevance of AOSA and SCST, a timeline and demographic data were compiled.

### **Historical and Demographic Review: Justification for Consolidation**

Appendix 1 titled "Important Events over the past 130 years relating to Seed Analysis" shows a timeline of selected important events that have shaped the seed industry and seed testing both domestically and globally. There are a number of trends reflected in the timeline, but the most prominent trends are 1) the maturation and globalization of the seed industry; 2) the increasing use of technology in cultivar development and the corresponding resources necessary for analysis of GMO seed; and 3) the establishment of Official AOSA laboratories and government regulatory programs and the shift late in the 20<sup>th</sup> century toward the decline in government seed testing facilities and expanded numbers of commercial/private seed laboratories and resources among private laboratories. The seed industry flourished in North America early in the 20<sup>th</sup> century as shown by the need for regulation and uniform seed testing rules. AOSA was founded in 1908 and proceeded to establish seed testing rules and recommend legislation for uniform state seed laws. The Federal Seed Act (FSA) was passed in 1926 to regulate and enforce the interstate shipment of seed through cooperation with state seed laboratories. With the expansion of crop production early in the 20<sup>th</sup> century and the subsequent development of new cultivars, there was increased need for seed certification and testing by the industry, which resulted in the founding of the Association of Official Seed Certifying Agencies (AOSCA) in 1919, the formation of SCST in 1922, the founding of the Commercial Seed Analyst's Association of Canada (CSAAC) in 1945, the first UPOV (International Union for the Protection of New Varieties of Plants) Convention in 1961, and the passage of the American Plant Variety Protection Act (PVPA) in 1970. Following World War II, with the increased activities among the seed trade and the need for uniformity in seed labeling and regulation of seed quality, the Association of American Seed Control Officials (AASCO) was formed in 1949 and they subsequently developed the Recommended Uniform State Seed Law (RUSSEL) to endorse uniform seed regulation and labeling between states to prevent trade barriers. Furthermore, the AASCO recognized the importance of representative seed sampling as the first step in seed testing when they published their AASCO Handbook on Seed Sampling in 1982 and updated it with a revised and expanded edition in 2006.

While these developments were occurring in North America, parallel expansion in development of seed testing rules was taking place internationally. The International Seed Testing Association (ISTA) was founded in 1924 with an initial participation of 26 countries. Four years

later in 1928, ISTA drafted their first International Seed Testing Rules. In 1953, ISTA adopted AOSA methods of purity analysis and pure seed definitions. In the middle of the 1990s, ISTA opened non-voting membership categories for private seed laboratories and seed companies, as well as established a laboratory accreditation program. ISTA assumed more central control in 2004 by moving the power to issue orange certificates from designated authorities to the ISTA executive. ISTA expanded further in 2006 by creating a person/individual non-voting category. During the latter part of the 20<sup>th</sup> century, AOSA worked with ISTA to harmonize seed testing rules, but this initiative was only partially successful. Also during this period, ISTA independently published several handbooks. ISTA portrays themselves as *The International Seed Testing Association* and considers the AOSA as only a regional organization despite 60-70% of global seed trade originating from the United States (Appendix II). Other important international developments that recognized North American seed testing during the last decade are the ratification of the 1991 UPOV Act by the USA in 1999; the recognition of the AOSA Certified Seed Analyst and the SCST Registered Seed Technologist accreditation programs by the Organization for Economic Cooperation and Development (OECD) in 2000 and the adoption of Trade Rules recognizing AOSA laboratories and AOSA Rules by the International Seed Federation (ISF) in 2005.

As the seed trade matured in the last half of the 20<sup>th</sup> century, intellectual property rights became an important issue as biotechnology was implemented in the development of new cultivars. Protection of the intellectual property rights of plant breeders was passed in 1970 by the American Plant Variety Protection Act. In 1983, PCR (polymerase chain reaction) was developed which provided a means to use molecular marker systems for incorporating biotechnological traits in crop cultivars. In 1992, the USDA/FDA approved Calgene's FLAVR SAVR tomato and, in 1996, the first herbicide tolerant crops were commercially available. In 1999, further recognition of the evolving role of biotechnology in foods was made by the Codex Alimentarius Commission, which was an intergovernmental taskforce to consider health and nutritional implications. The International Biosafety Protocol, an agreement on labeling genetically engineered crops, was approved by 130 countries in Montreal, Canada in 2000. In recognition of the developing need to test crops containing biotechnology traits, the SCST created the Genetic Technologist membership category with voting rights in their organization. Hence, it is clear that biotechnology will continue to become more prominent for seed crops and must be tested for breeding purposes, seed quality control and eventually for regulation.

Coinciding with the expansion and technological development within the domestic and international seed trade, official government laboratories in North America were reduced in numbers and funding resulting in lost resources. In 1982, the regional Federal Seed Laboratories were consolidated in the headquarters laboratory in Beltsville, MD and later moved to Gastonia, NC in 2003. Furthermore, in the late 1990s, AOSA experienced the loss of a number of member Official seed laboratories as well as the retirement of many senior certified seed analysts and researchers, which in many cases were not later replaced. The ability of AOSA to update its handbooks published during the 1980s and 1990s was diminishing due to these reductions. AOSA and SCST increasingly shared resources and collaborated on a number of projects as the industry gained greater diversity and technical expertise.

The AOSA-SCST Collaboration Committee was established in 1995 to study areas in which the two associations could establish stronger bonds and share resources. The committee recognized a long history of joint meetings dating from 1922 and cooperation with joint committee membership. They also recognized the trends of reduction in government, maturation of the industry and advances in technology and globalization. The committee

recommended that their report should be a starting point for discussions between AOSA and SCST to determine the most relevant, efficient and useful ways to respond to changes in the market place. To further illustrate the changes in North American seed testing laboratories over the past 26 years, a comparison of laboratory type and number is shown by region in Table 1. From 1981 to 2007, these data show an 18% loss in state seed laboratories, a 39% reduction in federal (USA and Canada) testing laboratories and a 26% increase in commercial seed testing laboratories. Figure 1 shows a similar trend of increasing SCST laboratories and decreasing AOSA laboratories for 1981, 1995 and 2007. The comparisons from 1981 and 1995 were taken from the Collaboration Committee Report and data for 2007 was added to make the comparison current.

**Table 1. A comparison of seed laboratory demographics in North America for 1981, 1995 and 2007.**

	1981	1995	2007
<b>Northwest Region I</b>			
State labs	8	6	6
Federal labs	0	0	0
Certification labs	0	0	0
University labs	0	0	0
Commercial labs	9	18	28
<b>Midwest Region II</b>			
State labs	13	13	10
Federal labs	1	1	2
Certification labs	1	1	1
University labs	-	-	1
Commercial labs	40	39	40
<b>Northeast Region III</b>			
State labs	11	7	7
Federal labs	3	2	1
Certification labs	0	0	0
University labs	0	0	0
Commercial labs	3	2	1
<b>Southwest IV</b>			
State labs	12	8	8
Federal labs	2	1	1
Certification labs	0	0	0
University labs	0	0	0
Commercial labs	16	24	21
<b>Southern V</b>			
State labs	12	11	9
Federal labs	3	2	2
Certification labs	0	0	0
University labs	0	0	0
Commercial labs	16	15	13
<b>Canada Region VI</b>			
Federal labs	9	4	2
Commercial labs	4	4	8

Table 1 (continued)

<b>Totals</b>			
State labs	51	45	42
Federal labs	18	10	7
Certification labs	1	1	1
University labs	-	-	1
Commercial labs	88	102	111

Figure 1. Total AOSA and SCST laboratory membership for 1981, 1995, 2007.

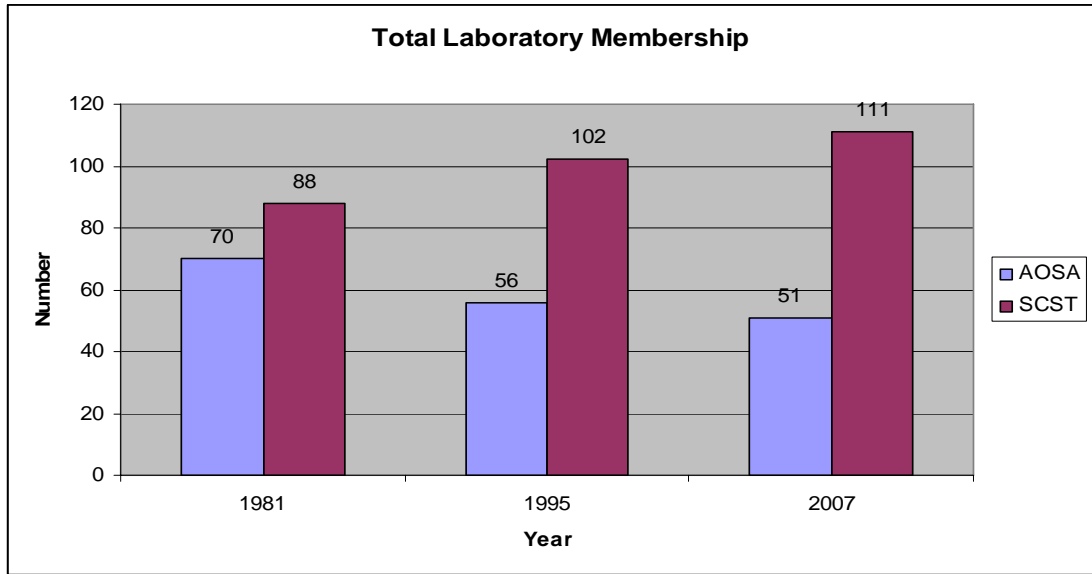
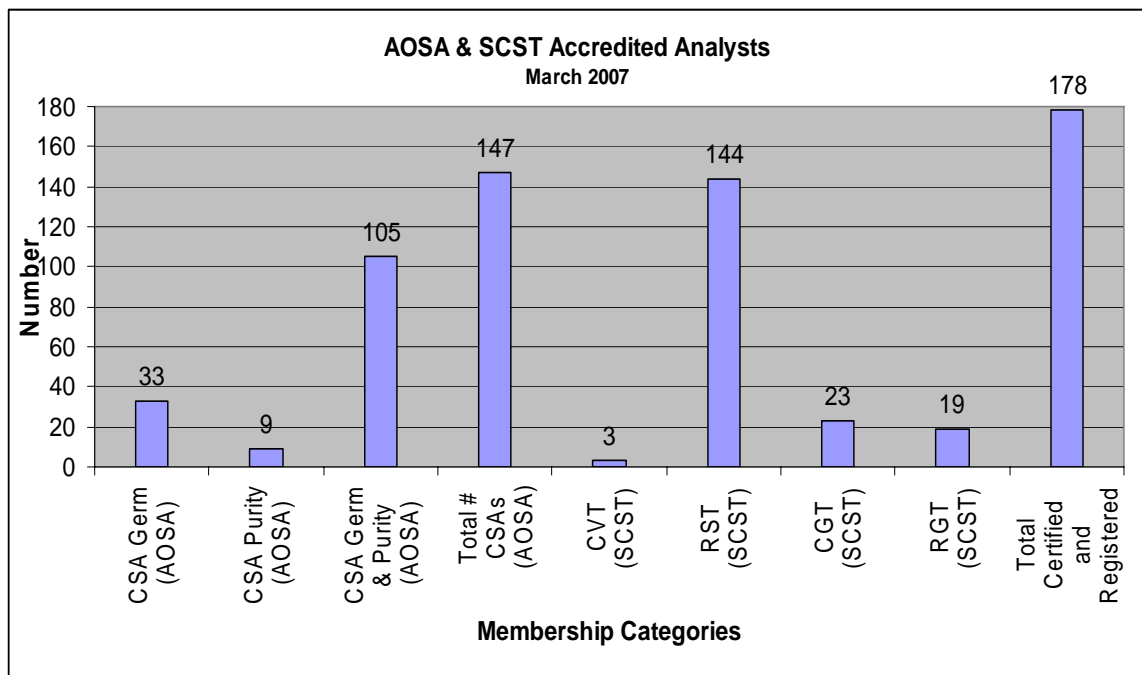


Figure 2 shows that the SCST has a larger number of accredited seed analysts and greater diversity and development in areas of new technology.

Figure 2. Comparison of AOSA and SCST accredited analysts for 2007



Key acronyms:  
 CSA: Certified Seed Analyst (AOSA); RST: Registered Seed Technologist (SCST); CVT: Certified Viability Technologist (SCST); CGT: Certified Genetic Technologist (SCST); RGT: Registered Genetic Technologist (SCST)

**Conclusion:** Based on this review of the historical and demographic changes in seed testing, the AOSA-SCST Consolidation Taskforce agreed that it is in the interest of the North American seed industry and seed testing to proceed with recommendations for consolidation. This recommendation is consistent with a speech given in 1940 by Dr. Porter, AOSA President, suggesting that someday there would be an organization of both commercial and official analysts with a separation between official analysts and official control officials.

### **Comparison of Strategic Planning Objectives and By-Laws for AOSA and SCST**

The taskforce reviewed the strategic planning objectives (Appendix III) of each organization and found them to be compatible with each other. AOSA and SCST goals are slightly different because of their respective histories of regulatory and commercial testing backgrounds, but they are essentially similar in their planning objectives. Themes consisted of consolidating committees, outreach projects to understand the needs of the industry to develop new and uniform testing methods and develop necessary publications; development of new membership categories to form a strong technologically qualified base; explore revenue expansion; promote education and standardization of protocols; and develop a continuing education system.

The taskforce also studied the differences between the by-laws (Appendix IV) governing each organization to determine what areas would require the most adjustment for a consolidated association. The taskforce members felt that a merged organization should have expanded membership categories to include certified individual members as well as laboratory, research, academic, retired and associate members; an effective authority over the professional conduct of its members with a code of ethics; the present voting scheme with a 2/3 majority would be maintained; a balanced Executive Board would be established with no single entity in a majority, and continuing education would be required to maintain membership. All areas considered appeared relatively easy to achieve, except the resolution of how to manage a membership composed of both individuals and laboratory members.

### **A case study: AOAC International**

To benefit from the experience and successful solutions developed by a counterpart laboratory organization composed of government laboratories and individual members including industry, the taskforce reviewed the history and development of the AOAC International. Their membership structure is of interest to illustrate how they resolved the conundrum of member government laboratories and individual members. Appendix V shows a timeline of the growth and development of the AOAC International. This is the recognized rule-making organization that is both domestically and internationally accepted for regulatory testing and quality control testing of feed, fertilizer, and dairy and food products. They were founded by the USDA as the Association of Official Agricultural Chemists in 1884 to adopt uniform methods of analysis for fertilizers. In 1885, they became an independent organization and expanded their coverage in 1887 to include fertilizers, feeds and dairy products and further expanded to include foods in 1889. During the 1950s, AOAC developed many new methods and techniques for regulatory work and state government laboratories were greatly expanded. Their name was changed in 1965 to the Association of Official Analytical Chemists and they expanded their membership to include scientists outside the USA in the 1970s and further expanded internationally in 1989 with the founding of their European section. In 1887, the AOAC extended full voting membership to industry scientists. In 1991, the AOAC changed their name to AOAC

International to recognize international laboratory accreditation, industry membership and expansion from strictly regulatory methods to inclusion of quality control methods. Today, over 60% of AOAC International members are from industry laboratories.

The membership structure of the AOAC International is of particular interest to illustrate a means to join laboratory and individual members in a single organization. They have three types of membership in their association: Individual Members; Sustaining Member Organizations; and Organizational Affiliates. The Individual Members are divided into four categories as follows: Members, Retired Members, Student Members and Honorary Members. Members are government, university and industry individuals and they must show qualifications such as academic training and accreditation. Retired members are those that have previously served the association as a member for 10 years. Members and retired members have full voting privileges. Student members are full time graduate or undergraduate students engaged in a field related to the association and they receive reduced dues and registration, but do not vote on association matters. Member Organizations are from government agencies, universities or industry and they are represented by an appointed Individual Member that meets the requirements for that category. Each Member Organization is allowed a certain number of Individual Members to be covered under their organizational dues.

While the AOAC International did not originate from the consolidation of two organizations from the government and industry sectors, they did expand their organization from strictly government agency members to include industry members and also expanded internationally. Furthermore, they continue to be the accepted laboratory methods organization used in the administration of state and federal regulation of feed, fertilizer, food and dairy products. Therefore, their example is very relevant to our current discussions on consolidation.

### **Proposed Structure of a Consolidated Organization**

Based on the forgoing study of our organizations and the example of AOAC International, the Consolidation Taskforce has assembled a proposed structure for a merged organization as outlined in Appendix VI – Proposed Bylaws of a Consolidated Organization. These proposed bylaws are only intended as a basis for discussion and development. They are limited to those basic aspects necessary to define what a merged organization might look like. Hence, the elements that are covered only include the name of the organization, purpose and authority, membership, officers and executive board and voting on the AOSA Rules for Testing Seeds. Other supporting elements, such as, committees, ethics, dues, analyst certification and proficiency, and budgetary matters would be developed after this initial stage is completed.

A commentary and justification of each article in the proposed by-laws (Appendix VI) is presented as follows.

**Article I – Name.** Following the example of AOAC International, the proposed by-laws show the name of the merged organization as AOSA International. The taskforce strongly recommends that the title of the rules, AOSA Rules for Testing Seeds, be maintained. This would support the many state and federal statues and regulations that reference that publication. The acronym, AOSA, has global recognition, which supports the identity of both the organization and the rules as well as links one with the other. Having one without the other would result in confusion and loss of identity. However, once merged, the title Association of Official Seed Analysts would no longer exist and only the acronym would be used. By adding the word 'International' to the title, it shows the intention to support the seed trade globally with

uniform testing rules rather than be restricted to North America. It is important to emphasize that SCST would not be morphed into AOSA by use of this acronym because the “Association of Official Seed Analysts” would no longer exist and the merged organization would consist of a balanced membership of government and industry with equal rights. Elements of SCST, such as the RST, would remain as an essential part of the new organization. The strengths of both AOSA and SCST would be retained in the consolidation.

**Article II – Purpose and Authority.** The purpose of the consolidated organization would be to develop and implement standardized, scientifically based seed testing methods to meet the needs for industry management of seed quality and regulatory enforcement of labeling requirements. The purpose would be obtained by 1) Promoting uniform laboratory methods and practices through seed research; 2) Fostering scientifically grounded, uniform seed control legislation and regulation; 3) Maintaining analyst proficiency through training programs, certification of analysts, proficiency testing and publication of literature on seed technology and research; 4) Furthering the exchange of ideas among laboratories and among individual workers; and 5) Improving seed testing in all its branches and to make it more useful to agriculture and society.

**Article III – Membership.** Two types of membership are proposed: Individual Members and Organizational Members. Individual Members would be divided into four categories: 1) Members; 2) Associate Member; 3) Student Member and 4) Honorary Member.

The Member category would include seed analyst members, research members and retired members. Only Members (seed analyst, research and retired) and Organizational Members would have voting privileges. Seed analyst Members would be required to have accreditation in one or more accreditation categories offered by the association. Research Members would be individuals actively engaged in teaching, research and outreach in the field of seed science and technology. Retired Members would be retired accredited seed analysts and seed researchers that were active members prior to retirement. Members would be eligible to serve as officers and appointment as committee chairs. Members serving as the designated representative of an Organizational Member would also be eligible to one vote on behalf of the Organizational Member.

The other types of Individual Member, Associate, Student and Honorary, would not have voting privileges. Associate Members would be non-accredited persons affiliated with seed analysis. They would be eligible for appointment to committees and committee chairs and may enter motions at meetings. They would not be eligible for election as an officer or to vote in association elections. Student Members would be full-time students working toward an undergraduate or graduate degree in the various areas of botany or plant science, agriculture or related scientific disciplines. They would receive reduced registration and special rates on publications, but could not hold office or vote in the business of the association. Honorary Members would be those recognized by the association for their substantial contribution toward the achievement of the objectives of the association. They may participate on committees, but may not vote or hold office. Honorary members would be exempt from dues or meeting registration fees.

Organizational Members would be federal and state seed laboratories, crop improvement association seed laboratories and university laboratories actively engaged in seed research, seed quality testing and/or seed regulatory testing. The designated representative of an Organizational Member would be a Member in good standing and meeting all Member



requirements. Each Organizational Member would be allotted up to 12 individual Members covered under their membership dues and all such Members affiliated with an Organizational Member must satisfy the requirements for individual membership.

**Article IV – Officers and Executive Board.** The elected officers of the association would be individual Members and designated Member representatives of Organizational Members. The Executive Board would consist of a President, Vice President, five Directors and a non-voting Executive Director. The Executive Board membership would require a balance of Members from the government (3), industry (3) and university or crop improvement (1) sectors, with no single entity in a majority.

**Article V – AOSA Rules for Testing Seeds.** The adoption and voting on rule amendments would not be substantially changed from the current procedure where individual members and government laboratory representatives vote separately and tallies are computed on an equal basis with a 2/3 majority required to pass.

## Appendix I. Important Events over the past 130 years relating to Seed Analysis

AASCO	Association of American Seed Control Officials
AOSA	Association of Official Seed Analysts
AOSCA	Association of Official Seed Certifying Associations
ASTA	American Seed Trade Association
CSAAC	Commercial Seed Analyst Association of Canada
CFIA	Canadian Food Inspection Agency
FSA	Federal Seed Act
ISF	International Seed Federation
ISTA	International Seed Testing Association
OECD	Organization for Economic Cooperation and Development
SCST	Society of Commercial Seed Technologist
USDA	United State Department of Agriculture

Year	Event
2006	AOSA and SCST establish committee to develop a single analyst exam.
2006	AASCO publishes updated and revised Handbook on Seed Sampling
2006	ISTA creates personal/individual membership category (non voting)
2006	USDA Process Verified Program in 2006 announces the USA Accredited Seed Sampling Program (ASSP) and USA Accredited Field Inspection Program (AFIP)
2005	CFIA recognized the US ASL Program as equivalent to the Seed Lab Accreditation Protocol (SLAAP)
2005	USA Accredited Seed Lab (ASL) Program developed by an industry task force with representatives from: AOSA, SCST, AASCO, AOSCA, ASTA and USDA-AMS.
2005	AOSA votes to change C&B to require that rules be approved by both the SCST and AOSA memberships.
2005	ISF adopts Trade Rules that recognize AOSA laboratories and AOSA Rules
2004	SCST members vote to add membership categories in Purity and Germination certification
2004	ISTA removes power to issue orange certificates from designated authorities to the ISTA executive
2004	FIS and ASSISNAL combine to form the International Seed Federation (ISF)

<b>2003</b>	USDA AMS Seed Regulatory and Testing Branch moves to Gastonia, NC
<b>2003</b>	Codex Alimentarius Committee (CAC) publishes Foods Derived from Biotechnology booklet.
<b>2001</b>	SCST publishes updated Seed Technologist Training Manual
<b>2001</b>	SCST creates Registered and Certified Genetic Technologist membership categories (voting)
<b>2000</b>	International Biosafety Protocol is approved by 130 countries at the Convention on Biological Diversity in Montréal, Canada. The protocol agrees upon labeling of genetically engineered crops, but still needs to be ratified by 50 nations before it goes into effect.
<b>2000</b>	OECD recognizes the AOSA Certified Seed Analyst and SCST Registered Seed Technologist accreditation programs
<b>1999</b>	USA ratifies 1991 UPOV Act (International Union for the Protection of New Varieties of Plants)
<b>1999</b>	The Codex Alimentarius Commission (CAC), established the ad hoc Intergovernmental Task Force on Foods Derived from Biotechnology to consider the health and nutritional implications of such foods. In particular, the Task Force would develop standards, guidelines or recommendations, as appropriate, for foods derived from biotechnology or traits introduced into foods by biotechnology.
<b>1998</b>	SCST creates Research Member category (voting)
<b>1997</b>	SCST, CSAAC form the International Society of Seed Technologists (ISST)
<b>1997</b>	AOSA and SCST jointly publish the journal, Seed Technology
<b>1996</b>	ISTA establishes laboratory accreditation program
<b>1996</b>	AOSA/SCST Collaboration Committee report
<b>1996</b>	First herbicide tolerant crops are commercially available
<b>1995</b>	ISTA opens membership to private laboratories and private seed companies (non voting).
<b>1995</b>	AOSA and SCST Establish the collaboration committee

<b>1992</b>	USDA/FDA approves Calgene's FLAVR SAVR tomato
<b>1992</b>	AOSA Published Seed Analysts Training Manual
<b>1985</b>	AOSA begins accrediting seed analysts in germination and purity testing
<b>1983</b>	PCR Technology developed
<b>1982</b>	AASCO publishes the Handbook on Seed Sampling
<b>1982</b>	NSTSL and Seed Branch consolidated to Beltsville, MD location and become the Seed Regulatory and Testing Branch
<b>1976</b>	National Seed Testing Standardization Laboratory (NSTSL) established
<b>1970</b>	American Plant Variety Protection Act passed (protects the intellectual property rights of plant breeders)
<b>1969</b>	AOSA Liaison Committee Activated
<b>1965</b>	Chair of the ASTA Seed Technology Committee proposes that industry fund an independent reference laboratory.
<b>1963</b>	SCST establishes Open Forum to informally discuss research, seed testing issues.
<b>1963</b>	Handbook of Tolerances By Miles published with AOSA and ISTA contributing
<b>1962</b>	AOSA board passes resolution requesting that USDA establish a National Seed Testing Standardization Laboratory. SCST passes a supporting resolution and adds the request that the lab adequately funded and staffed to research and develop new standardized testing methods.
<b>1961</b>	First UPOV (International Union for the Protection of New Varieties of Plants) Convention ratified by ratified by the United Kingdom, the Netherlands and Germany
<b>1953</b>	ISTA adopts AOSA methods of purity analysis and pure seed definitions
<b>1949</b>	AASCO created
<b>1946</b>	ACSC changes name to Society of Commercial Seed Technologists (SCST)
<b>1945</b>	Commercial Seed Analysts' Association of Canada (CSAAC) formed.

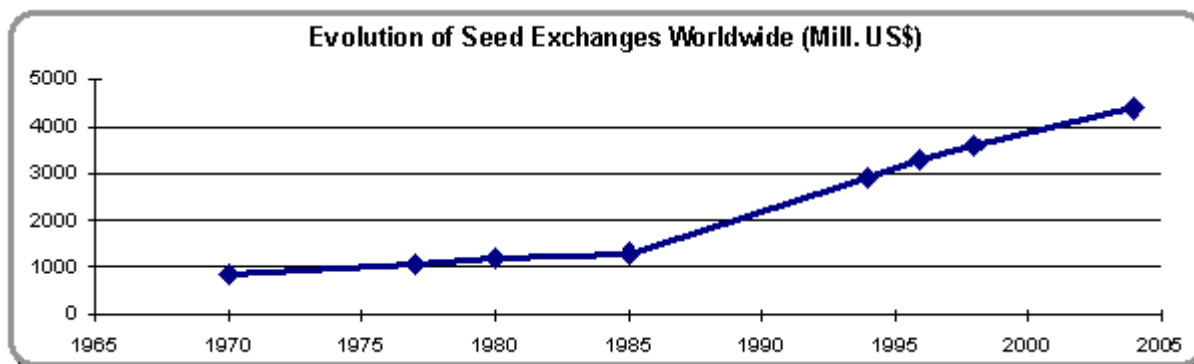
<b>1944</b>	First four Canadian analysts join SCST as RSTs
<b>1944</b>	SCST member asked to serve on AOSA Research Committee
<b>1943</b>	AOSA organizes Committee for the Standardization of Tests to coordinate various groups engaged in testing and enforcement. SCST members are appointed to committee.
<b>1942</b>	Federal Seed Schools attended by commercial analysts for the first time.
<b>1941</b>	ASTA and Iowa State University Seed Laboratory to act as a referee laboratory in cases of dispute.
<b>1940</b>	AOSA President Dr. Porter gives a speech suggesting that someday there would be an organization of both commercial and official analysts; he also suggested a separation between official analysts and official control associations.
<b>1939</b>	Federal Seed Act amended
<b>1937</b>	AOSA Rules and Regulations published separately from the Proceedings
<b>1928</b>	ISTA drafts first International Seed Testing Rules- AOSA recommends adoption with the addition of pure seed definitions.
<b>1927</b>	AOSA published first Newsletter
<b>1926</b>	Federal Seed Act Passed
<b>1924</b>	International Seed Testing Association founded (ISTA), 26 countries participated in the meeting held in Cambridge, England
<b>1923</b>	SCST members participate on AOSA referee projects.
<b>1922</b>	Association of Commercial Seed Analysts (SCST) formed to give commercial analysts a voice in their line of work, increase uniformity, serve as a connection between AOSA and ASTA, promote and maintain high membership standards
<b>1922</b>	AOSA suggested uniform vegetable seed law formulated
<b>1919</b>	AOSA proposes interstate seed law
<b>1919</b>	Michigan, Minnesota, North Dakota, South Dakota and Wisconsin meet with representatives from Canada and organized to form the International Crop Improvement Association (AOSCA)

<b>1917</b>	AOSA Suggested Uniform seed bill for field seeds adopted
<b>1915</b>	AOSA Uniform seed bill for field seeds proposed
<b>1914</b>	AOSA published first Proceedings, includes Legislative report (uniform seed law model)
<b>1912</b>	USA Seed Importation Act passed to stop importation of low-grade seed (precursor to FSA)
<b>1910</b>	AOSA Adopts first constitution- purpose is 1) to secure uniformity and accuracy in methods, results, and reports, and to 2) to afford opportunity for discussions between seed analysts. Qualifications for membership also set- official analysts, one vote per lab. Referee system established.
<b>1909</b>	AOSA Purity, Germination and Model Seed Law Committee give reports. The model seed law was developed with input from ASTA.
<b>1908</b>	AOSA Founded- a meeting of experiment station and agricultural college workers interested in seed testing is called by the USDA in Washington, DC. Sixteen states USDA and Canadian Department of Agriculture participate. Objective was to perfect and promulgate uniform seed testing methods. A committee was established to develop a uniform model seed law.
<b>1883</b>	ASTA founded
<b>1876</b>	Friedrich Nobbe publishes Handbook of Seed Science

## Appendix II. Seed Statistics

The following information was gathered from the International Seed Federation (ISF) website:  
<http://www.worldseed.org/statistics.htm>

**FIGURE 1 - Evolution in international seed trade, 1970 - 2004**



**TABLE 1 – Top 20 Countries with the largest estimated size of domestic market for seed (in USD million) (updated in March 2007)**

Country	Size of domestic market
USA	7,000
China	4,500
Japan	2,500
France	1,930
Brazil	1,500
India	1,300
Germany	1,000
Argentina	930
Italy	780
Canada	550
Russian Federation	500
Korea	400
Australia	400
Mexico	350
Taiwan	300
Spain	300
Poland	260
United Kingdom	257
Turkey	250
South Africa	250

**TABLE 2 - Seed Exports (FOB) of Top 20 Countries, 2005 (in USD million)**

Country	Agricultural Seeds	Horticultural Seeds	Total
USA	618	304	922
France	510	178	688
Germany	313	27	340
Canada	186	29	215
Denmark	141	37	178
Chile	128	43	171
Netherlands	127	557	784
Belgium	119	4	123
Italy	115	56	171
Mexico	100	9	109
Hungary	100	6	106
Australia	62	11	73
Austria	57	2	59
Spain	53	25	78
Argentina	45	11	56
Brazil	44	8	52
Poland	39	3	42
South Africa	35	4	39
China	32	29	61
United Kingdom	30	19	49

**TABLE 3 - Seed Imports (FOB) of Selected Countries, 2005 (in USD million)**

Country	Agricultural Seeds	Horticultural Seeds	Total
USA	339	167	506
Mexico	247	125	372
France	257	75	332
Netherlands	156	173	329
Spain	179	126	305
Germany	257	44	301
Italy	170	101	271
Canada	158	52	210
United Kingdom	97	37	134
Belgium	106	23	129
Japan	72	55	127
Poland	86	24	110
Russian Federation	69	40	109
Greece	69	18	87
China	43	38	81
Hungary	63	14	77
Austria	52	7	59
Ukraine	43	11	54
Turkey	20	34	54
Switzerland	42	10	52



## Appendix III – Comparison of AOSA and SCST Strategic Planning Objectives (2006)

### I. SCST

Combine committees and increase collaboration with AOSA to provide a positive, strong and united resource on seed technology for the seed industry

#### AOSA

Consolidate AOSA/SCST committees as appropriate

Reason: Too much redundancy in committee work equals lost time, missed opportunities and increasing costs. Combine people from both organizations with similar organizational projects and interests.

### II. SCST

Understand the needs of the seed industry and SCST members to better serve these groups.

#### AOSA

Collaborate with SCST and other organizations in the areas of education and publications both by pooling money and human resources

Reason: Out reach projects are necessary to determine seed industry requirements to better align the organization with uniform testing programs, proposing new seed testing rules, teaching and training issues and developing educational publications.

### III. SCST

Explore and develop potential new membership categories.

#### AOSA

Explore revenue expansion

Reason: Adding new membership categories that might include persons with expertise in seed pathology, seed physiology and other laboratory skills would be beneficial to the organizations. This would help give a merged seed analyst organization a full complement of expertise to support teaching and training activities, research and a full range of educational seed related publications.

One organization can be created to form a power base of technically skilled persons that is recognized by all entities of seed industry as **the** source of seed testing expertise and information.

### IV. SCST

Strive to achieve standardization of protocols and higher uniformity of test results.

#### AOSA

Promote education and “Rules” development by promoting referees and Proficiency Testing

Reason: Both organizations have expertise in teaching, training and examining seed analyst’s qualifications. Proficiency testing is a recognized way to determine uniformity and develop standardized procedures among laboratories. Certification of analysts and laboratories creates confidence in the industry and general public on the accuracy of seed testing information.

V. **SCST**

Expand funding to support prioritized SCST goals and objectives.

**AOSA**

Explore revenue expansion

Reason: The organizations need to build the membership to be self sustaining and to work on projects that are relevant to the seed industry's needs. This all takes time, expertise and money. Being able to offer support to graduate students with seed research funding is one objective to promote innovative seed testing methodologies and keep up with emerging technologies.

VI. **AOSA**

A. Develop a continuing education point system

B. Encourage and support joint workshops designed for continuing education and meeting the needs of new seed analysts.

**SCST**

SCST already has a continuing point system in place (By-Laws - Article I, Section 6, Maintenance of Membership – Continuing Education lines 51-82).

Reason: A continuing point program provides an incentive to keep analysts active in developing their technical skills and enhancing their knowledge of seed testing.

AOSA and SCST goals are slightly different because of our past histories of regulatory and commercial testing backgrounds, but we essentially have the same planning objectives.

## Appendix IV – AOSA-SCST By-Laws Comparison

Category	AOSA	SCST	Merged Organization
Power/Authority	No authority over professional conduct of members	Has authority over professional conduct of members	Maintains effective authority over professional conduct of members
Membership	Laboratory	Individual	Individual with certification; Laboratory; Research; Student; Retired; and Associate
Exam/Certification	No fee	Fee based	Fee based
Ethics/Membership	Member in good standing if dues paid	Based on SCST Code of Ethics	Based on compliance with Code of Ethics and dues payment
Voting	Each laboratory has 1 vote	Each individual has one vote	Equal voting scheme for all voting members with 2/3 majority
Leadership	10 person BOD	8 person BOD	BOD with Exec. Director (non-voting); no affiliation in majority
Committees	30 committees	19 committees	Merge committees with same function; reduce and consolidate for increased effectiveness
Continuing Education	No continuing education required	Continuing education required	Continuing education required to maintain membership and certification

## **Appendix V – Timeline of growth and development of AOAC International**

2007 – Over 60% of AOAC International members are from industry laboratories today

1991 – AOAC changes name to AOAC International to recognize international laboratory accreditation, industry membership and expansion from strictly regulatory methods to the inclusion of quality control methods

1989 – AOAC expands internationally with the founding of their Europe Section

1987 – AOAC extends full voting membership to industry scientists

1979 – AOAC becomes an independent organization with funding from federal, state and industry sources

1970s – AOAC expands membership to scientists outside the USA

1965 – AOAC's name is changed to the Association of Official Analytical Chemists

1950s – AOAC developed many new methods and techniques during the '50s for regulatory work and state government laboratories were greatly expanded during this decade

1927 – Sponsorship of AOAC Methods is passed from the USDA to the FDA for regulatory enforcement

1906 – AOAC is instrumental in the passage of the Federal Pure Food and Drug Act

1889 – AOAC Methods of Analysis is expanded to include foods

1887 – AOAC Methods of Analysis is expanded to include fertilizers, feeds and dairy products

1885 – AOAC publishes the AOAC Methods of Analysis (for fertilizers) and their membership votes to become an independent organization

1884 – Association of Official Agricultural Chemists (AOAC) is founded under the USDA to adopt uniform methods of analysis for fertilizers

## Appendix VI – Proposed Bylaws of a Consolidated Organization

### ARTICLE I – NAME

The name of this organization shall be AOSA International, hereafter referred to as the Association, a nonprofit corporation under the laws of the state of \_\_\_\_\_.

### ARTICLE II – PURPOSE AND AUTHORITY

The purpose of this Association shall be to develop and implement standardized, scientifically based seed testing methods to meet the needs for industry management of seed quality and regulatory enforcement of labeling requirements. The purpose shall be obtained through cooperative effort of its members by:

1. Promoting uniform laboratory methods and practices through seed research;
2. Conducting referee tests among seed analysts of the Association for the purpose of developing uniform techniques;
3. Maintaining analyst and laboratory proficiency through training programs, certification of analysts, proficiency testing and publication of literature on seed technology and research;
3. Furthering the exchange of ideas among laboratories and among individual workers;
4. Fostering scientifically grounded, uniform seed control legislation and regulation; and
5. Improving seed testing in all its branches and to make it more useful to agriculture and society.

### ARTICLE III – MEMBERSHIP

#### Section 1. Types of Membership

There shall be two (2) types of membership in the Association: Individual Members and Organizational Members

##### A. Individual Members

There shall be four (4) categories of Individual Members in the Association: Members, Associate Member, Student and Honorary Member. Members consist of seed analysts accredited by the Association, researchers actively engaged in seed research and retired accredited seed analysts and seed researchers.

##### B. Organizational Member

There shall be one (1) category of Organizational Member in the Association

#### Section 2. Qualifications for Membership

##### A. Members

Qualifications for seed analyst Members shall be accreditation in one or more accreditation categories offered by the Association; research Members shall be individuals actively

involved in teaching, research and outreach in the field of seed science and technology; and retired Members shall be retired accredited seed analysts and seed researchers which were active Members prior to retirement. Members shall be entitled to one vote in the election of officers and other business of the Association. Members shall be eligible to serve as officers and appointment as committee chairs. Members serving as designated representatives of an Organizational Member shall also be eligible to one vote on behalf of the Organizational Member.

#### B. Associate Members

Qualifications for Associate Members shall be non-accredited persons affiliated with seed analysis. Associate Members shall be eligible for appointment to committees and committee chairs and may enter motions in meetings of the Association, but shall not be eligible for election as an officer or member of the Executive Board of the Association or entitled to vote in Association elections or other business of the Association.

#### C. Student Members

Any full-time student working toward an undergraduate or graduate degree in the various areas of botany or plant science, agriculture or related scientific disciplines shall be eligible for Student Membership in the Association. Student members shall receive reduced registration for meetings and special rates on subscriptions and purchase of individual publications of the Association. Student members may not hold office or vote in any business of the Association.

#### D. Honorary Members

Honorary Members shall be recognized for their substantial contribution toward the achievement of the objectives of the Association. They may participate as a member on committees, but may not vote or hold office. Honorary Members of the Association shall be exempt from payment of dues and annual meeting registration fees.

#### E. Organizational Member

Qualifications for Organizational Members shall be state and federal seed laboratories, crop improvement seed laboratories and university laboratories actively engaged in seed research, seed quality testing and/or seed regulatory testing. The designated representative shall maintain any proficiency and accreditation that may be required by the Association and shall be entitled to one vote in the election of officers and the business of the association. The designated representative for an Organizational Member shall be a Member in good standing. Each Organizational Member is allotted up to 12 individual Members as part of their membership dues and all such Members affiliated with an Organizational Member shall meet requirements for individual membership.

### Section 3. Application for Membership

Applications or requests for membership shall be submitted to the Association's headquarters office. Membership shall become effective upon approval that the applicant meets all requirements, payment of any required membership dues, and assignment of a member number.

## Section 4. Expulsion

The Board of Directors, at any duly called meeting of the Board, by a two-thirds vote of those holding office, may terminate the membership of any member who in its judgment has violated the Bylaws or has been guilty of conduct detrimental to the best interests of the Association. Any member convicted of a felony is subject to immediate expulsion from the Association. Expulsion of a member by the Board of Directors shall be final and shall cancel all rights, interest, or privileges of such member in the services or resources of the Association. Any member, for whom expulsion is proposed, for reasons other than conviction of a felony, shall be entitled to not less than 60 days advance notice of the charges, the date upon which a hearing will be scheduled, and the right to present evidence in defense. The date and place of any such hearing, if held other than at the headquarters or annual meeting site of the Association, must be reasonable with respect to the location of any individual so charged.

## Section 5. Membership Dues

Annual dues for membership in the Association shall be fixed by the Board of Directors, subject to approval by two-thirds vote of the joint voting membership. The membership year and the delinquency date shall be determined by the Board of Directors.

# ARTICLE IV – OFFICERS AND EXECUTIVE BOARD

## Section 1. Elected Officers

The elected officers of the Association shall be Members and designate Member representatives of Organizational Members and shall comprise an Executive Board consisting of a President, Vice President, five (5) Directors and an Executive Director. Elected officers shall serve without compensation, except for reimbursement of personal expenses in service to the Association as may be authorized by a majority vote of the Executive Board.

### A. President

The President shall be the principal elected officer of the Association, shall preside at meetings of the Association and of the Board of Directors and of the Executive Committee, and shall be a member ex-officio, with right to vote, on all committees except the Nominating Committee. He or she shall also, at the annual meeting of the Association and at such other times as he or she shall deem proper, communicate to the Association or the Board of Directors such matters and make such suggestions as may in his or her opinion tend to promote the welfare and further the purpose of the Association and shall perform such other duties as are necessarily incident to the office of President or as may be prescribed by the Board of Directors. The President shall serve a two (2) year term of office.

### B. Vice President

In the absence of the President, or in the event of the President's inability to serve, the Vice President shall perform the duties of the President, and, when so acting, shall have all the

powers of and be subject to all the restrictions upon the President. The Vice President shall perform such other duties as from time to time may be assigned to him or her by the President or by the Board of Directors. The Vice President shall serve a two (2) year term of office and shall succeed the President

#### C. Directors

Directors shall be elected from the Members and serve a three (3) year term of office.

#### D. Executive Board

The Executive Board shall have the following general responsibilities:

- (a) Conduct the business of the Association when the Association is not in session;
- (b) Consider matters of policy and make recommendations to the Association concerning such matters; and
- (c) Act upon matters referred to it for decision or recommendation by the Association membership at an annual meeting.

#### E. Nominations and Election of Officers

The initial nomination of Directors shall be for two 3-year terms and two for 2-year terms to provide for staggered rotation. The Nomination Committee shall solicit the membership no later than February 15 for nomination of Members to fill the positions of officers completing their term at the end of the annual meeting for that year. Nominees receiving the majority of votes shall be considered elected to office. Voting shall follow the procedure specified in Article V for voting on amendments to the AOSA Rules for Testing Seeds with equal weighting of individual Member and Organizational Member votes and a 2/3 majority to elect a nominee. New officers shall be announced at the end of the annual meeting. The seven member Executive Board shall maintain a balance of government (3), industry (3) and university or crop improvement (1) members, with no single entity in a majority.

The Executive Board shall have full responsibility at all times for the following specific duties.

- (a) Make financial arrangements for the publication and distribution of the journal, newsletter, AOSA Handbook on Seed Testing, and other publications of the Association;
- (b) Set the time and place of annual meeting;
- (c) Approve special meetings of the Association or the Executive Board when the need for such has been determined to exist;
- (d) Decide elections in case of tie votes;
- (e) Approve tentative rules for testing seeds;
- (f) Approve minutes of annual meeting prior to publication;
- (g) Provide for the bonding of the Executive Director;
- (h) Approve disbursements from Association funds; and
- (i) Report all actions to the Association membership at each annual meeting.

#### E. Executive Director

The Executive Director is a non-voting position, selected by a search committee appointed by the elected officers, whose duties and compensation are determined by a majority of the



elected officers of the Association. The Executive Director shall maintain the duties of Secretary-Treasurer to the Association.

## **ARTICLE V – RULES FOR TESTING SEEDS**

1. All proposed changes and additions to the Rules must be sponsored or cosponsored by a Member, Organizational Member, committee or subcommittee. Proposed changes and additions to the rules shall be presented to the Rules Committee and must be accompanied by a summary of data or citation sufficiently adequate for proposed changes. Final determination of the adequacy of data shall be the responsibility of the Rules Committee.
2. Proposed changes and additions shall be reviewed by the Rules Committee for sufficient supporting evidence and proper format and published in the newsletter or otherwise submitted to the membership of the Association at least 90 days prior to an annual meeting at which such rules shall be adopted or rejected. Rules are voted on by voting Members and designated representatives of Organizational Members. Votes in favor and those opposed are converted to percentages based on the total number of votes cast within each respective membership type. The percentage designation is then dropped and the tally from each membership type is added together for a cumulative total based on 200 total combined points would be required. A two-thirds majority of the cumulative tally is required to adopt a Rule proposal. To pass with a two-thirds majority vote, a cumulative tally of 134 in favor out of 200 total combined points would be required. Those individuals representing Organizational Members may vote as Members as well as voting on behalf of their Organizational Member. Rule(s) changes or additions approved by the membership at the annual meeting shall have an effective date of October 1 in the year they are adopted, unless otherwise specified. The Rules Committee is responsible for preparing the final version of the approved rule(s) changes for publication.
3. Tentative Rules are accepted for publication as an addendum to the Rules for Testing Seeds upon review by the Rules Committee and the approval by a majority of the Executive Board, but shall have no official status. The Rules Committee will recommend to the Executive Board the acceptance or rejection of a tentative rule. This committee will provide a written rationale for their recommendation. The final decision for accepting or rejecting a tentative rule rests with the Executive Board. The purpose of a tentative rule shall be to give the membership of the Association an opportunity to apply and evaluate a new method of testing seed before the method is submitted as a proposed rule. For a tentative rule to become a part of the Rules for Testing Seeds of the Association, it must be submitted as a rule proposal to the Rules Committee, along with supporting evidence, and be adopted by the Association in accordance with Section 1 and 2 above.

## GENERAL AND TECHNICAL INFORMATION

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### Determination of Dormant Seed in the AOSA Rules

Sabry Elias and Riad Baalbaki

For seed lots containing dormant seeds, the germination test results do not always reflect the actual proportion of viable seeds in the lot, especially if the required dormancy breaking procedures (e.g., prechilling,  $\text{KNO}_3$ , light) have been disregarded. This phenomenon is more pronounced in native species where dormancy is a mechanism of survival with no breeding programs aimed at reducing the dormancy problem. At the end of a germination test, if some seeds remain ungerminated, the question that arises is 'do the AOSA Rules have procedures for the determination of dormant seeds in a sample?'

According to the AOSA Rules, the viability of ungerminated seeds of all species listed on table 3 may be determined by TZ or any other appropriate method or combination of methods if seeds fail to germinate when provided the specified germination conditions for the kind of seed in question" (section 4.2.e). These "specified germination conditions" include dormancy breaking requirements such as prechilling treatments, light, and  $\text{KNO}_3$  as indicated in the 'additional directions' column of Table 3. In some cases, seeds fail to germinate because one of those dormancy breaking requirements was not satisfied. This will affect the final result of the germination test, which should determine the maximum germination potential of a sample based on the ability of seeds to produce normal seedlings under favorable conditions. In many cases, prechilling speeds up and evens-out seedling growth. . The option of TZ testing of ungerminated seeds at the end of a germination test should be used if the prescribed dormancy breaking procedure fails. In some cases, nature provides prechilling treatments when seeds are planted in cold soil in the early spring or late fall, or when seeds are exposed to lower temperatures at night. In such cases, field emergence may correlate with laboratory germination test results, providing that other growing conditions are optimum.

Analysts wishing to bypass the dormancy breaking requirements can use the "paired test" (AOSA Rules, 4.2.h) which is used for seeds having an unknown degree of dormancy, where samples are tested both with and without prechill or other treatments prescribed for breaking dormancy. It is used for many tree and shrub seeds and can be used for other crops as well. To determine the percentage of dormant seeds when the paired test is used, the TZ test can be conducted on fresh seeds, then percentage dormant seeds can be calculated by applying the well known formula,  $\text{TZ \% (on fresh seeds) - Germination \% (warm or cold) = \% dormant seeds in a sample}$ . This method is used for *Hesperostipa comata* (Rules 4.8.q).

The two main tests for determining seed viability are the standard germination test and the TZ test. Although both measure seed viability, they have two different mechanisms and procedures, one measure physiological aspects (germination) and the other measure biochemical aspects (TZ) of the seeds.

The standard germination test determines seed viability based on the physiological performance of seeds, i.e., the ability of seeds to germinate and produce normal seedlings under favorable conditions. Breaking dormancy, as described in Table 3, AOSA Rules is a part of this test in order to achieve maximum germination potential of a sample. The extent of breaking dormancy in a sample depends on the species, the time of conducting the test after harvest (after ripening

effect), and the physiological condition of the seed lot. It should be emphasized that the main objective of the germination test is to determine whether the seeds in a sample are dead or alive rather than determining the percentage of dormant seeds.

The TZ test determines the viability of seeds based on the activity of a group of enzymes, dehydrogenases, regardless of their dormancy level. In principle, the TZ test should be conducted on fresh seeds as indicated in the AOSA "Tetrazolium Testing Handbook" in order to obtain objective results. When seeds are prechilled for a week, then germinated for 14 days, mold starts to grow, metabolic activities start to take place, and the TZ evaluation becomes more subjective and is more of an estimate than a determination. The recommendation for soaking seeds in water only over night (in preparation for the TZ test) for most species and not for 14 or 21 days is to avoid such problems.

The fact of the matter is that there is no a single test that can provide all answers and information regarding the quality of a samples (e.g., germination and dormancy); each test has limitations. Each test has to be correctly performed according to the described procedures in order to obtain objective results. Analysts who perform the tests should be well trained to increase consistency in test results among laboratories. Training programs and hands-on workshops may be needed, especially for achieving higher levels of uniformity in evaluating viable, abnormal, and dead seeds in TZ tests.



**Tall Fescue National Referee Study**  
Uniform Blowing Procedure to Assess Light Inert in Tall Fescue Samples  
**Adriel Garay, Sabry Elias, and Heather Nott**

## **Background**

The lack of a practical method to assess the amount of light inert matter in Tall fescue (TF) samples has become a serious constraint for seed testing laboratories and the grass seed industry. The current AOSA visual/manual method is time consuming, subjective and can lead to variation and stop-sales affecting the economy of seed growers, cleaners and trade. In addition, it requires breaking off multiples which lead to further increasing variability of test results among labs. Research conducted at the Oregon State University (OSU) Seed Laboratory has demonstrated that these problems can be overcome by using a uniform blowing procedure. To further validate the research results, a national referee study was conducted.

## **Purpose of the referee**

The purpose of the referee was to answer the following questions: 1) Does blowing separate lightweight inert uniformly? 2) Does blowing discard significant amount of germinable seeds? 3) How does the total inert separated by blowing procedure compare with the total inert separated by the current AOSA method? 4) Is any purity testing time saved by using the blowing procedure? and 5) Are labs interested in using a blowing procedure in Tall fescue? The answer to these questions will provide a broad basis to assess the overall value of the proposed blowing

procedure. Beyond these specific measurements, the national referee is invaluable because it provides an opportunity to familiarize other laboratories with new emerging testing methods.

### **Principles of the new method**

To achieve uniformity in separating light inert, TF Master Calibration Samples (MCS) of proven uniformity (prepared by the OSU Seed Lab) have to be used to calibrate general blowers in all laboratories. Once they find the optimum blowing point, the labs measure the equivalent air velocity (EAV) to subsequently use it for blowing samples. The use of air velocity to reproduce the optimum blowing point makes it easy to set blowers to the same point any and every time test samples need to be blown.

### **Referee procedure**

1. An announcement of the referee was distributed to all official and commercial labs in the USA and Canada through their national associations. Those that were interested communicated with the OSU Seed Lab and requested participation in the referee.
2. Participant labs were provided with detailed protocol for the study, a master calibration sample (MCS), and blind referee samples. Labs calibrated their general blowers using the MCS prepared by the OSU Seed Lab. This operation was followed by measuring the equivalent air velocity (EAV) using an anemometer. That air velocity value was used to set the blower to blow the blind samples.
3. All participants used the same protocol, performed all the required tests, and returned the data to the OSU Seed Laboratory. The data was collected, analyzed to make the statistical comparisons, and results and conclusions were prepared.
4. A total of 10 referees were evaluated in laboratories in WA, OR, ID, GA, KY, and Canada.

## **RESULTS AND DISCUSSION**

### **1. Does blowing separate light-weight inert uniformly?**

To answer this question, participants used blind samples representing three different light inert levels: 1) a clean sample, with light inert around 1%, which represents the majority of samples produced and cleaned in Oregon; 2) a borderline sample, with light inert around 2%, and 3) a sample that has been cleaned poorly, with light inert around 4%. To minimize sampling variability, near-identical sister samples were sent to all laboratories.

The results shown in Fig.1 indicate that **light inert has been separated uniformly by every blower/laboratory that participated in the referee.** This means that all testing laboratories, regardless of the sample conditions, were able to blow out comparable amounts of light inert from every sample. This demonstrates the value of the proposed blowing method.

If the uniform blowing procedure is standardized, this technique can also be used by seed cleaners to detect light inert just as easily as any laboratory in the future.

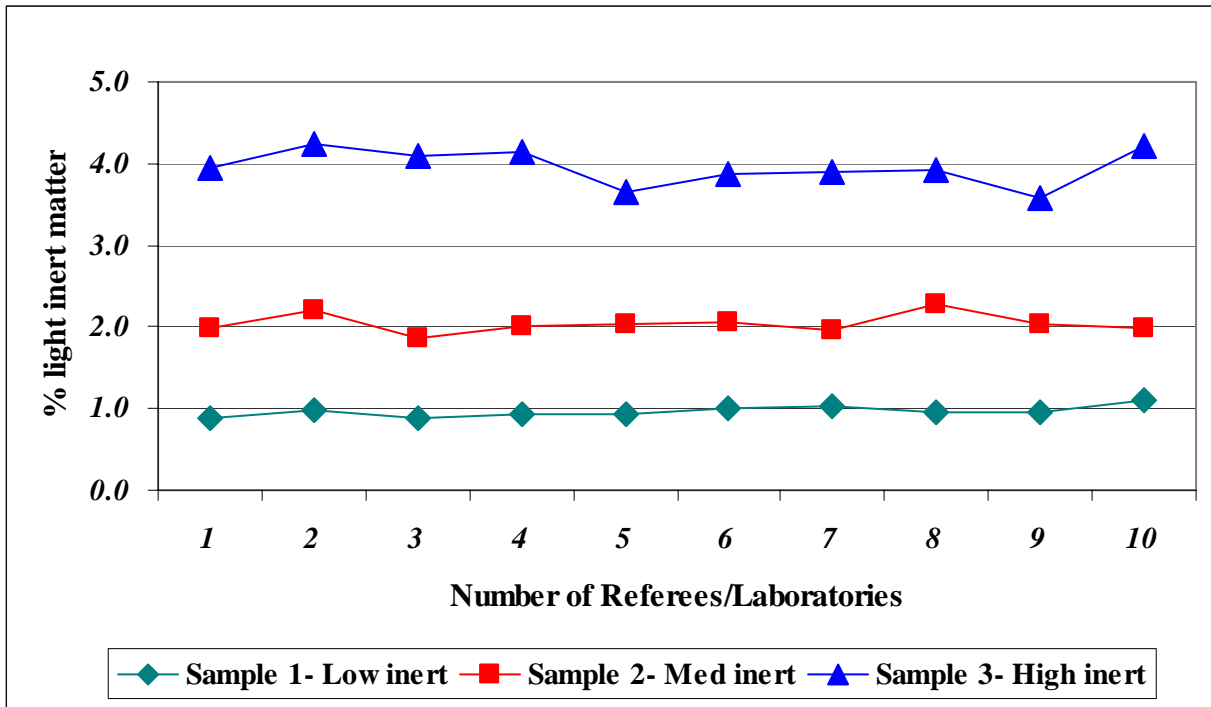
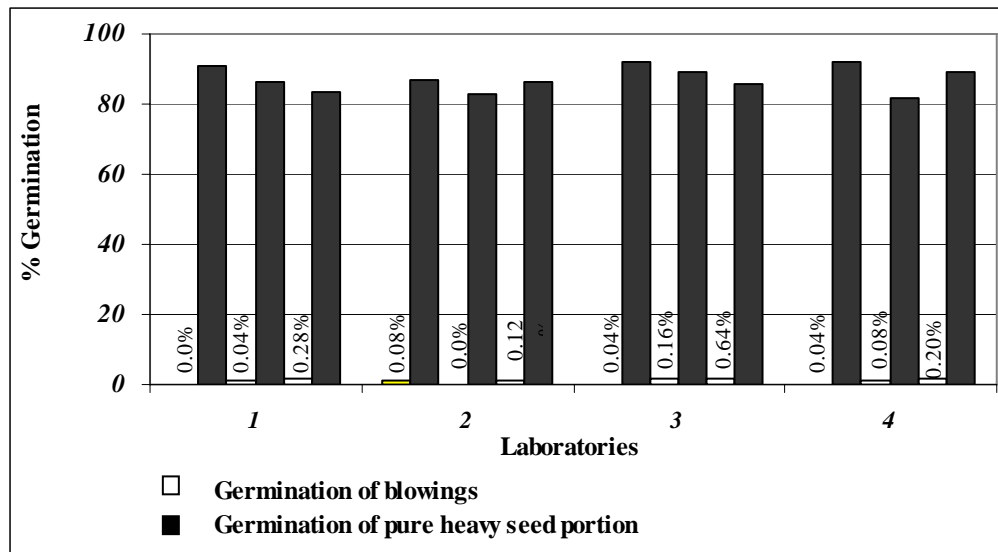


Fig. 1. All labs/blowers separated similar levels of light-weight inert from all Tall fescue samples

## 2. Does blowing discard a significant amount of germinable seeds?

One of the objectives of the blowing procedure is to separate only seeds with no/low planting value. The results that have returned so far showed that the **total number of germinable seeds found in the blowings was less than 1% of the 2500 seed purity sample** (Fig.2). These results confirmed previous research which had demonstrated that the number of germinable seeds discarded by the blowing procedure was also less than 1% of the total sample size. In contrast to the blowings, the average germination of the pure seed portion was consistently high (86.1%), which demonstrates that the seeds in the heavy portion are fully developed and were separated effectively by the blowing procedure. It is also worthy to note that the seeds that germinated in the blowings was smaller and weaker than those germinated in the heavy portion.



**Fig. 2. In contrast to the high germination of seeds in the heavy portion, the material blown out shows negligible numbers of germinable seeds.**

**3. How does the total inert separated by the blowing procedure compare with the total inert separated by the current AOSA method?**

To answer this question, three blind samples representing three contrasting conditions were used.

- a) Very clean samples, total inert less than 2%; contain medium number of multiples (33)**
- b) Samples with 4-5% inert and high number of multiples (52).**
- c) Samples around 3% inert and very high number of multiples (111).**

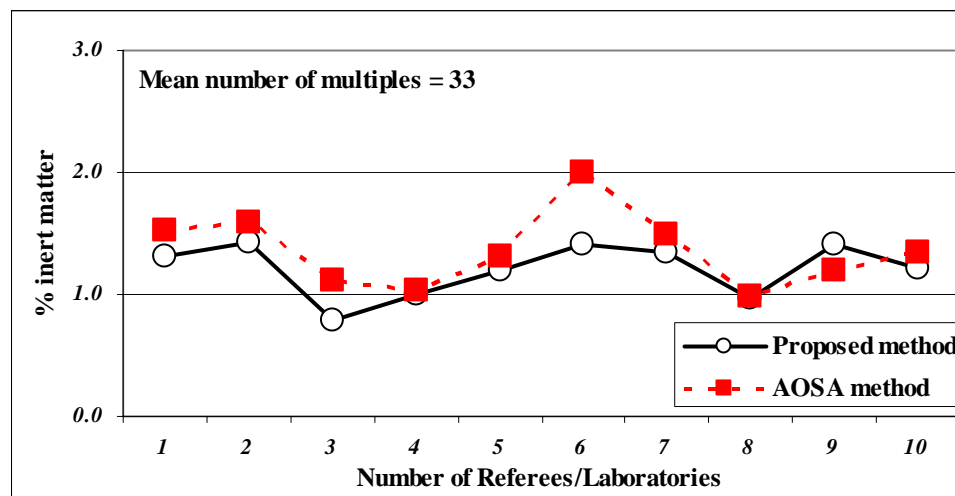
According to a previous study, the clean samples represent about 96% of samples received by the OSU Seed Lab in a year, whereas the samples with 3% inert or higher are unusual and represent only about 4% of samples in a year.

To separate inert by the blowing procedure, labs used the same blowing point determined in Study 1, light inert was separated by the blowing procedure and added to the heavy inert found in the heavy portion (e.g., soil, stems). All seed-like structures and multiples in the light portion were considered inert and all seed units including multiples in the heavy portion were considered pure seed.

For the AOSA method, the labs indicated that they use an in-house blowing technique as a preliminary aid to facilitate light inert separation in combination with visual /manual means. They also break off multiple seed units (MSU), and the inert found in the multiples is added to other inert. The results of each referee blind sample are reported separately as follows:

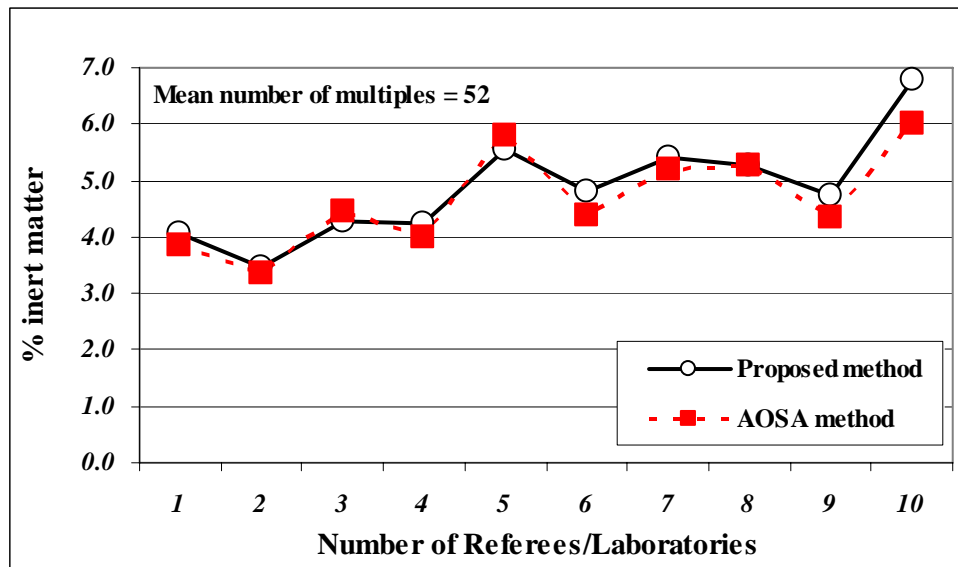
- a) Very clean samples, with less than 2% average inert and medium multiples (average of 33):** The results demonstrated that the amount of inert separated by both the blowing procedure and the AOSA methods were comparable, however the results of the

**blowing procedure were more uniform across labs** (Fig. 3). With one exception out of 10 cases, the inert matter separated by either the proposed blowing procedure or by the current AOSA method were statistically similar, i.e., within tolerance. **These results indicate that the inert produced by the blowing method is as reliable as the current AOSA method but more consistent across laboratories. The results also demonstrate the high value of the proposed blowing method to increase uniformity among labs.**



**Fig. 3. The total inert results of the proposed blowing procedure are similar to the inert separated by the current AOSA method but the results are more uniform across labs when the blowing procedure was used.**

- b) Samples with 4-5% inert and high multiples (average of 52):** These types of samples are infrequent but were included to evaluate both testing methods under difficult sample conditions. The results showed that **the amount of inert separated by both the proposed blowing procedure and the current AOSA methods were similar** (Fig. 4). The variation in inert results due to the different methods (blowing vs. AOSA) is smaller than the variation between samples and among labs. These results suggest that **under these difficult sample conditions, the blowing procedure is as reliable as the current AOSA method.**



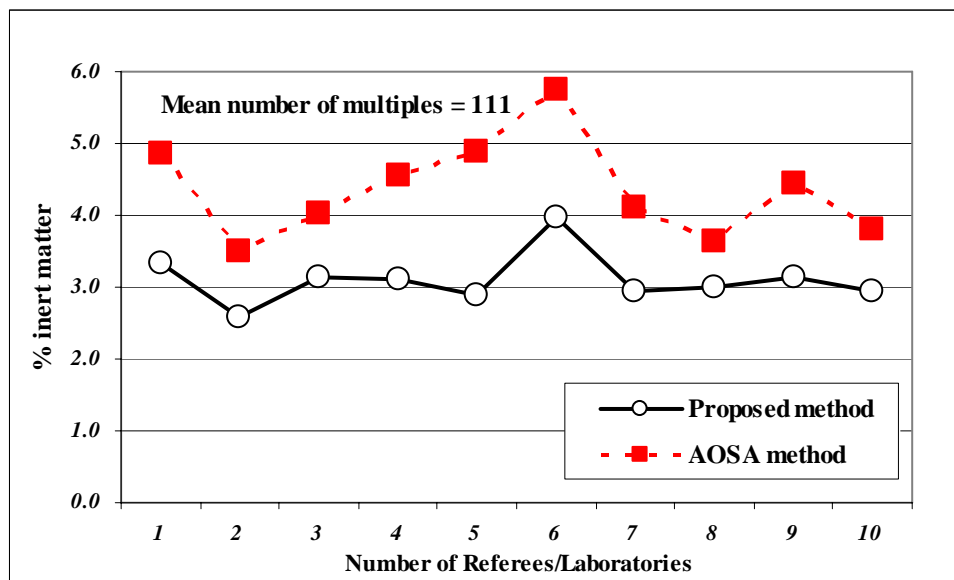
**Fig. 4.** The total inert result of the proposed blowing procedure was comparable to the total inert separated by the current AOSA method in all labs.

**c) Samples with more than 3% inert and unusually high number of multiples (average of 111):**

These types of samples are not frequent but were included in the study to evaluate the effect of high multiples in test results.

The blowing method produced a very consistent result in most labs (around 3.0%), showing only a variation of 1.37% inert between the highest and lowest results. In contrast; the current AOSA method increased the total inert considerably in every sample by pulling apart multiples and varied by 2.24% between the highest and lowest results. The levels of variation produced by the current AOSA method explains how easily mislabeling or stop sales can occur. For these reasons, **in these types of samples, the proposed blowing method increases the uniformity in inert assessment across labs. In addition, it does not distort the real condition of the sample and the seed lot; and keeps all sample components (including multiples) as they are used in the commercial channels and planting practices.**

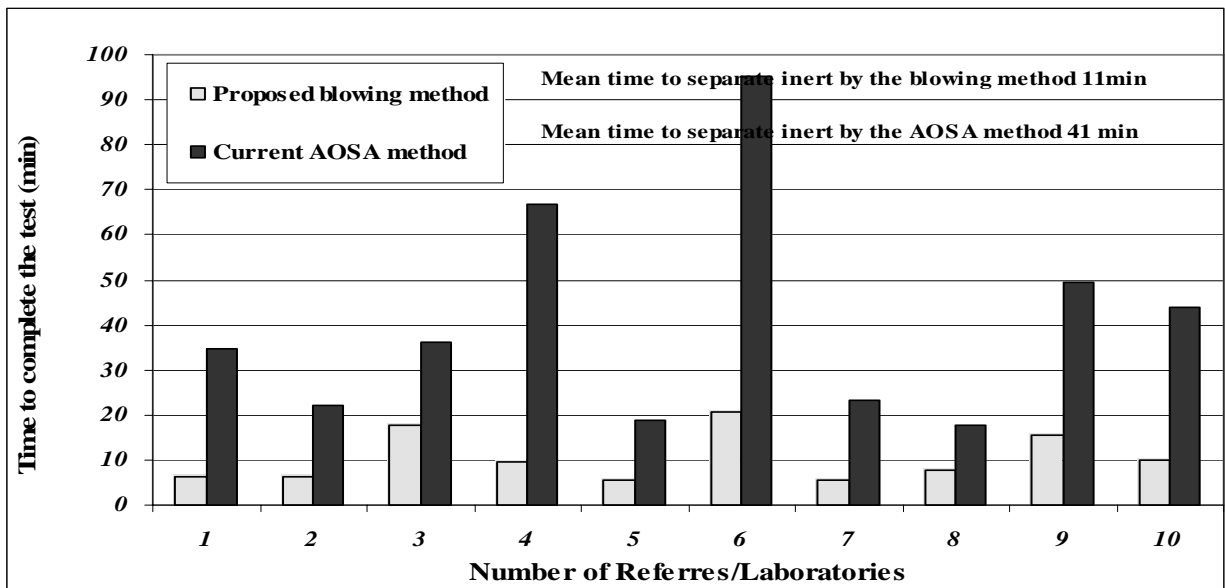




**Fig. 5. Blowing procedure detected the high inert level and produced uniform results. The AOSA method added inert from multiples and produced more variable results.**

**4. Is there any time saved in purity testing by using the blowing procedure?**

The total time used by the analyst in assessing inert by both methods was measured. **Every lab saved time by using the blowing procedure** (Fig. 6). It should be noted that the amount of time saved differed between labs. This was expected as different labs organize their work differently and have different skill levels, especially when addressing more difficult samples.



**Fig. 6. Significant time-saving in separating total inert was achieved using the blowing procedure in three Tall fescue samples with different levels of inert across labs.**

**5. Are seed testing laboratories interested in using the uniform blowing procedure?**

**In a survey conducted with participant labs, every lab indicated that they would use the proposed uniform blowing procedure for Tall fescue.** All labs reported that they are already using an in-house blowing technique as a preliminary aid to facilitate light inert separation in combination with visual /manual means such as purity board, lenses, microscope, and indirect light produced by the Diaphanoscope. These answers strongly indicate the need and the desire to use the uniform blowing procedure. Furthermore, since labs are already using some form of blowing, a uniform blowing procedure would simply help in standardizing the procedure across labs that test Tall fescue.

**CONCLUSIONS**

The following conclusions can be drawn from the results of the national referee study:

- 1) The uniform blowing procedure increases uniformity among labs in separating light inert.
- 2) The uniform blowing procedure does not discard significant numbers of seeds with planting value.
3. The uniform blowing procedure is as effective as the current AOSA procedure in estimating total inert. In addition, the blowing procedure produces more uniform inert results across labs.
- 4) The uniform blowing procedure saves time.

**All these findings indicate that the proposed uniform blowing procedure contributes to a reliable and uniform assessment of inert matter in Tall fescue samples**

**Note.** The results we have received so far sufficiently validate the value of the proposed blowing method. However, the OSU Seed Lab is still welcoming additional labs that want to participate in the referee and will continue adding any result that arrives before the AOSA/SCST convention in June 2007.

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**Ploidy by Cytometry - New Applications  
Oregon State University Seed Laboratory  
Adriel Garay and Sabry Elias**

In 1998, the Oregon State University Seed Laboratory introduced the cytometry method to determine the ploidy level in Annual ryegrass. The original goal was to distinguish tetraploid from diploid ryegrass varieties and to determine the percentage of tetraploid seeds in a sample. Since the method being used does not destroy the specimen, this test finding many applications by researchers, breeders, producers and certification. This test can be performed on leaves from seedlings or mature plants from the laboratory, greenhouse or field. This flexibility in testing the crop at different stages of development without destroying the seedling/plant is creating opportunities to detect potential problems early enough in breeding, production and marketing seeds.

Some conventional and new applications of the ploidy by cytometry method are:

- **To determine the ploidy level in Annual ryegrass varieties.** This was the original application and continues to be in both certified and commercial samples. New Perennial ryegrass tetraploid varieties are being tested also. The ploidy test determines if the sample is above the minimum 98% tetraploid level for certain marketing standard.
- **To screen out diploid seedlings/plants from breeder/original seeds.** This has become a critical tool for plant breeders who want to make sure that their original selections are pure tetraploid. After the test, the tetraploid plants are kept and the diploid plants are discarded. This assures starting any seed increase programs with pure tetraploid seeds.
- **To detect the presence of diploid contaminants in a tetraploid field.** This is used by growers, quality/production managers, and field inspectors. Customers simply bring representative leaf samples from the field to determine if that field is tetraploid. Also, if they suspect contaminants based on visual observations, they bring plants believed to be tetraploid and those suspected to be diploid for ploidy verification. If a problem is detected, the information can be used to make prevention/management decisions.
- **To make ploidy distinctions in other species.** This application has been used by researchers to make distinctions between fine fescue species (e.g., hard fescue, sheep fescue); rough bluegrass from Kentucky bluegrass; and to detect crosses between species. Currently, the OSU Seed Lab is developing a non-destructive method to distinguish *Glyceria*

*declinata* (diploid) from closely similar species such as *G. fluitans*, *G. occidentalis* or *G. leptostachia*, which are tetraploid.

For more information or questions, contact Oregon State University Seed Laboratory at 541-737-4464; [seedlab@oscs.oregonstate.edu](mailto:seedlab@oscs.oregonstate.edu)

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### Species without AOSA Rules Database Update

The database contains suggested purity and/or germination testing methods for species without AOSA Rules testing procedures and is located on the AOSA website at: <http://www.aosaseed.com/reference.htm>. Contributed information is cited by laboratory or publication in a document of references also posted on the webpage. Contributions to this database are always appreciated. Please send new species test methods can be submitted to:

Donna Grubisic  
Email: [RansomSL@silcom.com](mailto:RansomSL@silcom.com)  
Ransom Seed Lab,  
PO Box 300  
Carpinteria, CA 93014

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### RST/CVT/CPT Study Guide Update

The Study Guide has been significantly updated in the past few months. The seed identification list has been revised and clarified. Some species have been removed but at this time no new species have been added. A section has been added titled "What is This Question Asking"? This new sections focuses on assisting examines to understand the intent of questions asked on the written exams. It covers the different ways the same question can be asked; reading and dissecting a question before you answer; the difference between define, describe, compare, give process or procedure, theory or principle. The revised study guide can be downloaded at no charge from the SCST website: <http://www.seedtechnology.net/publications.htm>.

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### RST/CVT/CPT Practice Exams

The RST Board of Examiners has collected a number of practice exams from SCST and AOSA members. These are exams used by members to train analysts in their laboratories and are not 'official' exams. The practice exams have been posted on the joint AOSA/SCST Teaching and Training Committee webpage and can be downloaded from the SCST website: [www.seedtechnology.net/teaching\\_committee.htm](http://www.seedtechnology.net/teaching_committee.htm).

If you have exams you would like to donate for analysts in training to use in their studies, please send them to Anita Hall, SCST Executive Director. An immense amount of time and effort goes into creating these study resources and it greatly benefits potential seed analysts to share these resources.

## ANNUAL MEETING INFORMATION

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### 2007 AOSA/SCST Annual Meeting

Cody, Wyoming  
June 5<sup>th</sup> - 10<sup>th</sup>, 2007

The meeting is now only a few short weeks away and hopefully everyone has made their travel arrangements and is busy picking out their western wear!

**Registration must be received by May 10<sup>th</sup> in order to guarantee meals. Registrations received after May 1<sup>st</sup> are subject to a \$50.00 late fee.**

Forms can be downloaded from the AOSA or SCST websites.

[http://www.seedtechnology.net/2007/2007\\_meeting.htm](http://www.seedtechnology.net/2007/2007_meeting.htm)

[http://www.aosaseed.com/2007/2007\\_meeting.htm](http://www.aosaseed.com/2007/2007_meeting.htm)

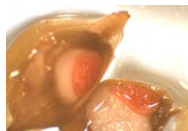
**Accommodations:** The meeting will be held at the centrally located Buffalo Bill Village Resort (includes the Holiday Inn, Comfort Inn, and Buffalo Bill Cabins), the room block will be released May 3rd. Rooms may still be available at the normal hotel rate. The Buffalo Bill Antlers Hotel is a very short walk from the meeting location (two blocks) for more information call 1-800-388-2084 or visit <http://www.antlersinn Cody.com>

**Workshops and Symposia:** Please note that if you have already registered for the meeting and would like to add a workshop no late fee will be applied. However registrations do need to be received by May 10<sup>th</sup> to endure meals.

#### **Native Seed Quality Symposium - June 5<sup>th</sup> (\$150)**

The morning session will include a panel discussion of native seed producers, conditioners, marketers, consumers, and seed technologist.

The afternoon session will focus on native seed viability research and testing methods.

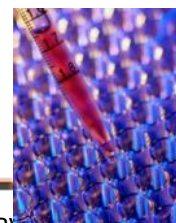


#### **Tetrazolium Testing Workshop June 6<sup>th</sup> (\$125)**

The goal of this workshop is to cover a wide variety of native species illustrating alternative preparation strategies and cutting techniques. This should result in an increased understanding of different embryo forms, metabolically active tissues and multiple embryos within a single seed.

#### **Genetic Workshop "New Technologies" June 6<sup>th</sup> (\$100)**

New and emerging technologies will be presented and discussed during the



morning session. In the afternoon participants will have the opportunity to meet in small groups with technology providers and vendors.

**Statistics Workshop** June 6th- Experimental Design and Data Analysis for Seed Testing Research (half day-morning, \$50)

The workshop will cover:

- Principles of experimental design
- Data Analysis
- Examples of using statistical package(s) in analyzing data

**Seed Pathology Workshop** (half day-afternoon, \$50)

Topics at this workshop will include the effect of pathogens on seed vigor, primary and secondary infection, and airborne disease safety.

**Annual Meeting Schedule  
4-23-2007**

All committee meetings will be held at the Buffalo Bill Village Holiday Inn  
All committee meetings are open to registrants unless followed with an (Ex.)

June 4	Monday	Event
	8:00am-4:30pm	<b>USDA Hosted Grader Accreditation Workshop</b>
	2:00pm-6:00pm	Registration
	4:00pm-8:00pm	Symposium Exhibitor Set-up
	7:00pm-7:30pm	Meeting with RGT Candidates
June 5	Tuesday	Event
	7:00am-5:00pm	Registration
	7:30am-5:00pm	<b>STRF Native Species Seed Quality Symposium</b>
	5:15pm-9:00pm	<b>Native Seed Symposium Tour &amp; Dinner</b> (offsite)
	8:00am-2:00pm	RGT/CGT Examination
	8:00am-5:00pm	RGT/CGT grading
	8:00am-4:30pm	<b>USDA Grader Accreditation Exam</b>
	8:00am-5:00pm	SCST Executive Board Meeting
	12:00pm-1:00pm	Lunch
	5:00pm	Symposium Exhibitor Take-down
	5:00pm-5:30pm	RGT Exam results
	5:30pm-6:30pm	Meeting with RST Candidates
June 6	Wednesday	Event
	7:30am-5:00pm	RST/CVT/CPT Examination (offsite)
	7:00am-5:00pm	Registration
	7:30am-5:00pm	<b>AOSA/SCST TZ Workshop</b>
	7:30am-12:00pm	<b>AOSA/SCST Statistics Workshop</b>
	7:30am-5:00pm	<b>STRF Genetic Workshop "New Technologies"</b>
	8:00am-5:00pm	AOSA Executive Board Meeting
	12:00pm-1:00pm	Lunch
	1:00pm-5:00pm	<b>AOSA/SCST Pathology Workshop</b>
	6:00pm-7:30pm	<b>Orientation and Greetings to all Reception</b>
	7:30pm-8:30pm	RST/CVT/CPT Exam Results
	7:30pm-8:30pm	AOSA/SCST Committee Chair Meeting
	4:00pm-8:00pm	Exhibitor Set-up
June 7	Thursday	Event
	7:00am-8:00pm	Business Office/Cyber Café/Registration
	9:00am-5:00pm	Exhibits
	8:00am-5:30pm	<b>Thermopolis Family Day Trip</b>

	7:00am-9:00am	<b>Opening Session and Breakfast</b> <b>Welcome to Wyoming- Frank Galey</b> Dean of UW College of Agriculture <b>Greetings from Affiliate Organizations</b>
	9:00am-10:00am	Newsletter Committee
	9:00am-10:00am	Computer Committee
	9:00am-10:00am	PCR Working Group
	9:00am-10:00am	AOSA Committee of Affiliates (Ex.)
	10:00am	Break
	10:15am-11:15am	Immunoassay Working Group
	10:15am-11:15am	SCST Constitution and By-law Review Committee
	10:15am-12:15am	Rules Committee (ex.)
	11:15am-12:15pm	SCST Proficiency Testing Committee
	11:15am-12:15pm	Referee Committee
	11:15am-12:15pm	Moisture Handbook Committee
	12:15pm-1:15pm	<b>Lunch - Introduce new SCST Analysts &amp; Awards</b>
	1:15pm-3:15pm	Herbicide Bioassay Working Group Clearfield® tolerant species Kyle Keller, BASF
	1:15pm-2:15pm	Native Species Task Force
	2:15pm-3:15pm	Vigor Committee
	2:15pm-3:15pm	Statistics Committee
	3:15pm	Break
	3:30pm-5:00pm	Seed Issues Forum and Posters
	6:00pm-7:00pm	<b>Dinner - Families Invited</b>
	7:00pm-9:00pm	Referee Projects/Buzz Session
	7:00pm-9:00pm	AOSA/SCST Joint Executive Board Meeting
<b>June 8</b>	<b>Friday</b>	<b>Event</b>
	6:00am-7:00am	Bean Buddy Walk
	7:00am-8:00pm	Business Office/Cyber Café/Registration
	8:00am-5:00pm	Exhibits
	7:00am-8:00am	<b>Breakfast - Anna Lute Award</b>
	8:00am-10:00am	Research Papers
	9:00am-10:00am	Electrophoresis Working Group
	10:00am	Break
	10:15am-11:15am	SCST Examination Committee (ex.)
	10:15am-11:15pm	Rules Issues and Review Discussion
	10:15am-11:15pm	Genetics Technology Committee
	11:15am-12:15pm	Conservation & Reclamation Species Comm.
	11:15am-12:15pm	Lab Standardization and Documentation- Six Sigma- LEAN Presentation Steve Schmidt, Pioneer Six Sigma Master Black Belt
	10:15am-12:15pm	Flower Committee
	12:15pm-1:15pm	<b>Lunch - Introduce new AOSA Analysts &amp; Awards</b>
	1:15pm	<b>Cowboy Training</b> - roping and other rodeo skills for the young and young at heart.
	1:15pm-2:15pm	Teaching and Training Committee
	1:15pm-2:15pm	Tetrazolium Committee
	2:15pm-3:15pm	<a href="#">Long Range Planning</a> - Consolidation Presentation
	3:15pm	Break
	3:15pm-5:15pm	AOSA Long Range Planning
	3:15pm-5:15pm	SCST Long Range Planning
	4:15pm-5:00pm	AOSA By-Laws
	5:30pm-7:00pm	<b>Dinner</b>
	7:00pm-10:00pm	<b>Rodeo</b>

June 9	Saturday	Events
	7:00am-8:00pm	Business Office/Cyber Café/Registration
	8:00am-5:00pm	Exhibits
	6:30am-7:30am	<b>Breakfast</b>
	7:30am-8:30am	Purity Committee
	7:30am-8:30am	Seed Pathology
	7:30am-8:30am	Meeting Place Committee
	9:45am	Break
	9:00am-12:15pm	Open Rules Committee Meeting
	12:15pm-1:15pm	<b>Lunch</b>
	1:15pm-2:15pm	Cultivar Purity Committee
	1:15pm-3:15pm	Germination and Dormancy Committee
	1:30pm-2:30pm	Journal Committee
	2:30pm-3:15pm	Journal Editors (Ex,)
	3:15pm	<b>Break</b>
	3:30pm-4:30pm	SCST Ethics Committee
	3:30pm-4:30pm	Tree, Shrub, & Native Forb
	3:30pm-5:30pm	Research Committee Chairs Meeting (ex.)
	3:30pm-4:30pm	Take down exhibits
	5:30pm-6:45pm	<b>STRF Silent Auction</b>
	5:30pm-6:30pm	<b>Reception</b>
	6:00pm	AOSA/SCST Group Photographs
	6:30pm-9:00pm	<b>Banquet</b>
	6:00pm-9:00pm	Kids w/Spouse Banquet
June 10	Sunday	Event
	6:30am-7:15am	Worship/Non-Denominational Service
	7:00am-4:00pm	Business Office/Cyber Café/Registration
	7:15am-8:00am	<b>Breakfast -Families Invited</b>
	8:00am-10:00am	AOSA/SCST Business Meeting Rules Voting & Committee Reports
	10:00am	<b>Break</b>
	10:00am-12:00pm	SCST Business Meeting
	12:00pm-1:00pm	<b>Lunch</b>
	1:00pm-3:00pm	AOSA Business Meeting
June 11	Monday	Event
	6:30am-8:00pm	<b>Post Convention Tour - Yellowstone</b>

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**2007 Research Presentations and Posters  
AOSA/SCST Annual Meeting  
Cody, WY June 5-10<sup>th</sup>, 2007**

**Oral Presentations:**

**Seed Moisture Determination: Principles and Procedures  
A New AOSA Handbook**

Sabry Elias, Oregon State University Seed Laboratory  
Riad Baalbaki, California Department of Food and Agriculture, Plant Pest Diagnostic Center  
Seed Laboratory  
Miller McDonald, Seed Biology Program Department of Horticulture and Crop Science, Ohio  
State University

**ABSTRACT**



Seed moisture content is an important aspect of seed quality. It influences production decisions related to harvest, conditioning, and storage. Knowledge of seed moisture content prior to treatment is essential for optimum seed enhancement protocols such as priming, pelleting, and coatings. Seed moisture must be monitored during storage to minimize microorganism development, maintain seed quality, and assist inventory management. Seed moisture also influences germination with respect to imbibitional damage, speed of germination and seedling development. As important as knowledge of seed moisture content is, the AOSA Rules for Testing Seeds have not provided standardized procedures for testing moisture content.

The purpose of the new Seed Moisture Determination: Principles and Procedures Handbook is to address this need and provide background regarding the factors internal and external to the seed that influence its moisture content. The relationship between seed moisture content and relative humidity, temperature, and seed chemical composition are discussed. Both primary and secondary moisture testing methods are described. The primary air-oven method and the secondary electronic moisture meter method and their procedures are presented as standardized tests for seed moisture for many crops. Both methods have been calibrated against other primary methods for many crops and they are proven to achieve reliable, consistent and reproducible results. Air-oven procedures for species not listed in Table 5 of the handbook are also provided. For each method, the following parameters are described: equipment, sampling and sub-sample size, sample preparation (e.g., grinding and cutting), drying procedures and moisture determination, number of replications per test, species suitable for each method, and proper calculation of moisture content on both fresh- and dry-weight bases. Two suggested secondary methods, microwave oven and near-infrared, are described but require further research before being considered standardized. Techniques for applying tolerances and reporting seed moisture results are presented as well as potential sources of errors in test results. This Handbook provides the first detailed protocols for seed moisture testing to be incorporated into the AOSA Rules for Testing Seeds.

The Handbook is dedicated to Dr. Don Grabe, Professor Emeritus at Oregon State University, for his outstanding service and contributions to seed moisture testing. He served as the Chair of the ISTA Seed Moisture Committee from 1980 to 1992. Dr Grabe first reported many of the results provided in Table 5 in this handbook and described the strengths and limitations of various seed moisture methods.

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### **Development of Standard Blowing Procedure for Tall Fescue**

Adriel Garay, Sabry Elias, and Heather Nott  
Oregon State University Seed Laboratory

#### **ABSTRACT**

The lack of a practical method to assess the amount of light inert matter in tall fescue (TF) samples has become a serious constraint for the seed industry. The current visual/manual method is time consuming, subjective and can lead to variation and stop sales affecting the economy of seed growers, cleaners and trade. The purpose of this study was to develop a uniform blowing procedure for TF to achieve accurate, efficient, and consistent separation of light inert from pure TF seed samples. Several studies have been conducted to 1) identify the optimum blowing point for TF and validate its effectiveness in blowing out empty single and multiple florets from various TF varieties across several years; 2) evaluated the relative

frequency of multiple florets in 336 TF samples; 3) determine if the chosen blowing point discards pure-germinable single and multiple florets; 4) determine the repeatability of light-weight separation using the new method across several blowers and laboratories around the nation; 5) compare the inert matter results and the time spent to separate inert by the new uniform blowing procedure and the current method; and 6) develop master calibration samples of TF to be used by all laboratories across the nation.

The results showed that regardless of the amount of light-weight inert in a sample, varieties, and years; the optimum separation point occurred at the same air velocity value, a condition which is critical to develop a blowing point that is applicable for all samples of this species. The germination of the blowings compared to the heavy pure seeds further confirmed the visual observations. The number of germinable seeds found in the blowing portion of tall fescue samples was less than 1% of the 2500 seeds, the total purity sample size. This indicates that blowing discards a negligible number of germinable florets. In contrast, the average germination of the pure seed portion was (93.4%). Likewise, the great majority of multiple florets that were blown out did not contain caryopsis and their average germination was only 2.5%; whereas the majority of multiples that remained in the pure seed cup contained caryopsis and had average germination of 63%. These results suggest that both single and multiple florets blown out should be considered inert and those remaining in the heavy portion should be considered pure seeds.

Comparable results across blowers and laboratories were obtained regardless of whether the sample contains high or low levels of light-weight inert material. Two principles make it possible to achieve and repeat such uniform results: 1) the use of a uniform master calibration sample to determine the optimum blowing point for all blowers; and 2) the use of equivalent air velocity value to reproduce the blowing point to test samples. These results strongly suggest that using a small but uniform number of "master" calibration samples to calibrate all blowers achieves consistent results across blowers. The inert matter content separated by the current and the proposed blowing method was similar (within statistical tolerance). Furthermore, a time saving above 50% was achieved using the new proposed method.

The new method would have several benefits including 1) time saving; 2) producing consistent test results in seed laboratories; 3) reducing discrepancies in test results between producing and receiving states; and 4) providing a useful tool for seed cleaners to monitor their cleaning level and achieve desired cleaning standards.

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### **Evaluation of Noxious-Weed Tolerances**

Sabry Elias, Oregon State University Seed Laboratory

Deborah Meyer, California Department of Food and Agriculture, Plant Pest Diagnostic Center  
Seed Laboratory

### **ABSTRACT**

The current Table 8 'Noxious-weed seed tolerances' in the AOSA Rules is designed for regulatory purpose to determine if a second test has significantly more noxious weed seed than stated on a label. The tolerance values in this table are based on one-way test at 5% probability level. However, the current AOSA Rules do not have a noxious-weed seed tolerance table to determine if two test results are comparable, i.e., within tolerance. Such a table can be used to compare test results within and among laboratories for referee studies, internal training, or

quality assurance purposes. The current Table 8 in the AOSA Rules is inappropriate for this purpose. A new table adapted from Table F1b, Miles, 1963 based on two-way test at 5% probability level is proposed to be added to the AOSA Rules.

Re-evaluation to the current AOSA Table 8 Noxious-weed tolerances is needed as it does not have an identifiable reference source and the formula used to calculate the tolerances is in error (Miles, 1963; Dodge and Canfield, 1972, and Elias et. at., 2000). These facts call into question the validity of Table 8 for regulatory use. In an attempt to locate the source of Table 8 it was discovered that although AOSA Table 8 is similar to Table F3 in the "Handbook of Tolerances", Miles, 1963, the two tables are not the same. The most obvious difference is that Table F3 (Miles 1963) shows accept and reject values, whereas Table 8 (AOSA Rules) shows applicable tolerances. Based on this information Elias et al. (2000, Seed Technology 22:5-14) proposed an alternative to the current AOSA Table 8. Table 1 of this paper is based on appropriate statistical procedure using the cumulative distribution function of the Poisson distribution with the SAS Program. The statistical construct for Table 1 (Elias, et al. 2000) is based on Table 7 of Person and Hartley, 1966, but with the advent of computers, it provides more accurate and precise tolerances by computing the accumulated probabilities under the Poisson distribution. The tolerances in Table 1 (Elias, et al. 2000) are slightly narrower than the current AOSA Table 8; for example, if the number of noxious weed seeds labeled or represented in a sample is "10", the current tolerance in Table 8 is "17", and in the tolerance in Table 1, Elias, et al., 2000 is "14". Not only does Table 1 (Elias, et al. 2000) address regulatory concerns of introduction and spread of noxious weeds and the cost of weed control, it also provides a sound statistical basis for noxious weed seed regulatory tolerances.

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## **Posters:**

### **Alternative Method for Coated Onion Treated with Pesticides**

Sue Alvarez, Seminis Vegetable Seeds

An alternative method for testing pelleted onion seed (*Allium cepa*) was developed. The need for a new method arose due to the phytotoxic symptoms that can develop in standard germination tests for pelleted onions that have been treated with certain pesticides, including the insecticide, "Trigard." The new test method incorporates the use of "organic growing media," a combination of peat moss and vermiculite, spread over pelleted onion seeds in heavy toweling. Two methods, one using the current towel method (T) and a second using organic growing media were compared, using 17 seed lots of pelleted onions, in two different laboratories. Consistently higher results were observed with the organic media method. The mean germination results were 60% and 69% for the two laboratories when using the standard germination method (T), while both laboratories received mean germinations of 85% using the organic growing media method.

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### **Germination of *Echinacea* Species Is Enhanced by Ethylene**

Laura A. Wood\*, Sharon Kester, Robert L. Geneve  
University of Kentucky, Department of Horticulture

*Echinacea* species (Asteraceae) are indigenous to North America and seed lots have some degree of endogenous physiological dormancy. For *Echinacea*, this type of dormancy can be

satisfied by a period of chilling stratification. Ethylene has also been used to break dormancy in *Echinacea* species in place of chilling stratification. The objective of this research was to investigate the effect of ethylene on dormancy and germination in five *Echinacea* species (*E. purpurea*, *E. tennesseensis*, *E. angustifolia*, *E. paradoxa*, and *E. simulata*). In untreated seeds, germination of each species was 90, 59, 99, 81, and 21%, respectively. Constant exposure to 5 mM ACC improved germination in *E. tennesseensis*, *E. paradoxa*, and *E. simulata* to 82, 99, and 82%, respectively, but there was no change for *E. purpurea* and *E. angustifolia*. Stratification at 5°C improved germination percentage in all species with the most dramatic response in *E. simulata*, where germination increased three-fold. With the loading treatments, pre-treating seeds with ACC or ethephon for 7 days at 5°C was more effective than 24 hours at 25°C for improving germination. For the *E. tennesseensis* and *E. simulata* seeds, germination in ethephon-treated seeds was comparable to stratified or constant ACC/ethephon treated seeds, while there was also no significant difference between ACC-treated and stratified or constant ACC/ethephon seeds of *E. angustifolia*. These data suggest that pre-treating *Echinacea* seeds with ethephon could be an alternative seed treatment to chilling stratification for low germinating (dormant) seed lots such as *E. tennesseensis* and *E. simulata*.

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**Seed Issues Forum 2007**  
**AOSA/SCST Annual Meeting**  
**Cody ,WY**  
 June 7, 2007 3:30 – 5:30 pm

The Seed Issues Forum provides an informal setting for analysts to present and discuss technical issues and concerns. Participants circulate between tables and most presentations include hands on activities.

1. Pelleted onion and a new alternative planting medium: Organic Growing Media versus the standard germination test (T).- Ha Ung, Incotec Inc., and Sue Alvarez, Seminis Vegetable Seeds
2. <i>Camelina</i> sp. identification- Harold Armstrong, Montana State Seed Lab
3. Seed Technology Training Modules- Miller McDonald, Ohio State University
4. US Seed Grader Accreditation and Lab Accreditation- Perry Bohn, Gene Wilson, USDA-AMS Seed Regulatory and Testing Branch
5. Seed Pathology Committee Webpage- Sandra Walker, USDA The Seed Pathology Subcommittee will introduce the web page that it created last year which has links to other web sites that are helpful in seed health testing. This is intended to provide seed analysts with a means to access information that will help them identify methods used to test for seed-borne pathogens and to information that would help them to identify seed-borne microorganisms. Visitors will be able to explore three web sites which provide seed testing methods; the National Seed Health System (NSHS), the International Seed Health Initiative (ISHI) and the International Seed Testing Association (ISTA). Visitors can also explore the American Phytopathological Society's Seed Pathology

Committee's links to Disease Identification and Pathogen Identification information. The site also provides a link to the Cornell University online glossary of technical terms in Plant Pathology.

Visitors will have the opportunity to use the web links and find information of interest to them.

6. Practice proficiency test for herbicide bioassay- Herbicide Bioassay Working Group

7. Results of Region II Corn Evaluation Referee, possible revisions to the Seedling Evaluation Handbook (corn section)- Mike Stahr, Iowa State University

8. Colorado State University- Seed Technology Educational Programs (STEP) - Loren Wiesner & Ethan Waltermire

9. Uniform Blowing Procedure to Assess Light Inert in Tall Fescue Samples- Sabry Elias and Adriel Garay, Oregon State University

The lack of a practical method to assess the amount of light inert matter in Tall fescue (TF) samples has become a serious constraint for seed testing laboratories and the grass seed industry. The current AOSA visual/manual method is time consuming, subjective and can lead to variation in test results among labs and stop-sales affecting the economy of seed growers, cleaners and trade. Research conducted at the Oregon State University Laboratory has demonstrated that these problems can be overcome by using a uniform blowing procedure. The method was further validated by a national referee study.

9. AOSA/SCST Seed Law Quick Reference Guide- Anita Hall, SCST Executive Director

10. Chickpea Germination - Victor Shaul and Nancy Ashby, Washington State Seed Laboratory

11. Uniform blowing of germination only samples- Victor Shaul and Nancy Ashby, Washington State Seed Laboratory

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## Draft SCST Long Range Planning Agenda

4/30/2007

June 8<sup>th</sup> 2:15pm - 5:30pm, Cody, WY

Please send Anita Hall, SCST executive director, any agenda topics you would like included on the agenda.

### I. Joint AOSA/SCST Session

A. CSU STEP Program (10 minutes)

Loren Wiesner

B. Consolidation Task Force Report

Facilitator: Wayne Guerke, Task Force Chairman (1 hour)

### II. SCST Independent Session

A. Proposed revised continuing education requirements

Facilitator: Jane Penrose (15 minutes)

B. Statement on dues notice affirming membership contracts

Facilitator: Stewart Oliver (15 minutes)

C. Revised Constitution & By-Laws

Facilitator: Quentin Schultz (15 minutes)

D. ISST- history, purpose, and future

Facilitator: Quentin Schultz (30 minutes)

E. Proposal to combine the AOSA/SCST Seed Testing Standardization Research Funding Committee (STSRF) with the Seed Testing Research Foundation

Facilitator: Diane Mesa (30 minutes)

F. Items from the membership

## BOOKSHELF

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Cindy Finneseth suggested that **Encyclopedia of Seeds: Science, Technology and Uses** might make a good book for the bookshelf. The Encyclopedia of Seeds, 2006, is edited by M. Black, D. Bewley and P. Halmer and published by CABI International, ISBN-10: 0-85199-723-6, 826pp. suggested list price \$350. That price was way too rich for me, so shop cautiously; you can purchase the book much more reasonably. The first two authors may be familiar, they authored some of the standards in seed physiology; **Seeds, Physiology and Development** and **Physiology and Biochemistry of Seeds (Volumes 1 & 2)**. There is a substantial list of contributors to the Encyclopedia.

The Encyclopedia is fantastic when you either encounter a faintly familiar term while reading and can not quite remember the exact definition or are searching for the correct word in describing something in the seed world. The Encyclopedia is a fairly comprehensive overview of seed science and technology. There are short articles that describe organizations, physiological processes, seed technology, seed structure and economic crops. There are descriptions of many of the processes during seed cleaning and storage.

I would use the Encyclopedia to research an idea or topic. The author(s) of that article is listed at the end of the paragraph or page(s). That reference provides an anchor for further investigation in the subject. You could look alphabetically in the text for your subject or use the "Network diagram of major Encyclopedia contents" or the various Appendices and indexes starting on page 769. Terms may be defined within a larger article so check the index.

I would suggest that this would be a helpful addition to the seed library of larger seed labs (which may have to train analysts who do not have a formal background in seed science), agronomists, plant physiologists and professional educators (for quick reference).

I have a suggestion for a cobbler's vacation if you are driving to Cody. The NRCS Plant Materials Centers across the nation screen native species collections and breeds varieties of

native species for reclamation, grazing and landscapes highlighting native species. The centers provide breeder seed for foundation seed programs and Identity Preserved systems. The Bridger PMC is located 2 miles south of Bridger turn East for about a mile and a quarter and North for about a mile, which is about 40 miles south west of Billings, just off Highway 310. This is about a five mile detour for those driving to Cody via Billings. Many of the native flowers and grasses will be in anthesis at this time. The staff has assured me that they would be more than happy to conduct a tour of the facility. The PMC has a very small cleaning plant that accommodates cleaning seed in a size range from Ponderosa pine to fuzzy-tongue penstemon.

You may reach me at if you have suggestions or hints of subjects to be covered in the future.  
[harmstrong@montana.edu](mailto:harmstrong@montana.edu)

Harold Armstrong  
Montana State Seed Lab  
PO Box 173145  
1901 S. 19<sup>th</sup>, Room 40 Marsh Lab  
Bozeman, MT 59717-3145  
(406) 994-2141

## ANNOUNCEMENTS

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### **AOSA and SCST Solicit Research Proposals to Study Seed Germination, Dormancy, Purity, or Related Seed Technology Projects - 2007**

The Association of Official Seed Analysts (AOSA) and the Society of Commercial Seed Technologists (SCST) are soliciting research proposals to support investigations of seed germination, dormancy, purity, or related seed technology project. The primary reason for this research funding is to improve seed testing by the promotion of uniform laboratory methods and practices through seed research. The AOSA/SCST has identified Seed Germination, Dormancy, and Purity as the principle areas of concern for this funding cycle, however other related seed testing areas will be considered. Species may include: native species, rangegrasses, field grasses, soybean, and corn. Other crops commonly tested in seed laboratories in North America will be accepted as well.

Research proposals will be accepted for investigations which cover a one to three year period, however funding will only be approved on an annual basis (July 1 to June 30). Present funding limits the annual financial support for these proposals to \$3,000 to \$5,000 per year. Two copies of all proposals (5 pages maximum) must be mailed or e-mailed by June 1, 2007, to:

Sabry Elias  
Oregon State University  
The Seed Laboratory

Specific guidelines to be followed when developing proposals are listed below. If you have questions pertaining to this request for proposals do not hesitate to contact me.

## GUIDELINES FOR AOSA/SCST SEED RESEARCH PROPOSAL

### A. Title Page

1. Concise descriptive title (100 characters or less)
2. Name of the organization submitting the proposal
3. Name, title, full mailing address and telephone number of the principal investigator and/or investigators
4. Proposed project starting date, duration and total cost

B. **Overall Aim and Specific Objectives** - This should be a concise statement of what you will actually do and why. It should not exceed one paragraph. Leave more detailed, context-setting to the "Background" section.

C. **Relevance to Seed Testing/Technology** - Discuss the relevance of this work to seed testing/technology. What differences will it make? How does it relate to the established research priorities? Discuss the potential for effective utilization of the results for the benefit of seed testing.

D. **Innovative Aspects** - Provide a brief statement describing the innovations of the proposed research, how it may improve an existing situation, how it relates to the state-of-the-art or develops new technology. Comparisons of methods among laboratories are generally not acceptable since these can generally be handled through the referee format.

E. **Background and Rationale** - Provide a substantive rationale for the proposed research. Explain the existing problem, the status of previous efforts to solve it, and the logic behind your new approach. Spell out your assumptions, theories, and research hypotheses; address the likelihood of success. Include a brief but complete literature review if appropriate. If you must cite unpublished work, please enclose copies.

F. **Technical Work Plan** - Describe in detail your experimental design (including any statistical issues) and research protocols (including any special techniques). Provide an estimated time schedule for meeting the research objectives.

G. **Staff and Resources** - List all investigators essential to the project and describe the institutional facilities and resources available for the proposed research.

H. **Budget Information** - Provide a full, detailed, justified budget for each year of the proposed project plus appropriate totals. Travel and training must be directly related to the research. No overhead is allowed.

Itemize:



1. salaries
2. equipment
3. materials and supplies
4. training (purpose, duration, when, where)
5. consultation (topic, amount, rate)
6. travel (purpose, duration, when, where)
7. other costs.

**I. Submission of Proposals (Not to exceed 5 pages)**

1. Submit two copies to the above address. An e-mail copy will be acceptable.
2. The deadline for receiving grant proposals is June 1, 2007, and investigators awarded grants will be notified before July 1, 2007. Grants will be funded on a fiscal year basis from July 1 to June 30.

**J. Selection of Proposals for Funding**

The proposals will be evaluated utilizing the following criteria:

- a. Scientific and technical quality of the proposal
- b. Scientific validity and quality of research approach
- c. Relevance of proposed research to seed germination, dormancy, or purity
- d. Feasibility of attaining objectives during proposed time period
- e. Adequacy of professional training or research experience of investigators

**K. Reporting Requirements**

1. **Progress Reporting** - A reporting schedule for major progress reviews will be developed based on the projected time requirements indicated in the original research proposal and the major developmental stages of the research. Additionally, an annual progress report form will be made available to be completed two (2) months prior to the annual AOSA meeting in June.
2. **Final Report** - The general format of the final report will be established at the project's beginning. The format and approach will depend upon the nature of the project. The final report shall be prepared in a publication format to document the entire effort. Reports shall be published for the AOSA/SCST membership in either the AOSA/SCST Newsletter or the Journal of Seed Technology. When handbooks or other reference materials logically result from research projects, this will not preclude a report in the AOSA/SCST Newsletter even if this report simply states that such material is being developed.



## Federal Seed School Announcement

The Seed Regulatory and Testing Branch will be hosting a Federal Seed School this year at our facility in Gastonia, NC on July 31-August 3, 2007. The focus will be purity and identification of similar crop and weed species, including Bromus, Brassica, Setaria, Poa, quackgrass and wheatgrasses. Other topics such as the uniform blowing procedure and ryegrass fluorescence will be covered. Presentation of topics will be on a level appropriate for experienced seed analysts. Limited training in quality management systems and accreditation will also be part of these two upcoming Federal Seed Schools.

This seed school is open to seed analysts from private and government seed testing laboratories. Enrollment will be limited to 20 participants due to the hands-on nature of the topics and one-on-one attention from the instructors. Participants from non-government laboratories will be charged a fee of \$112. Notice of acceptance will include payment instructions, travel and hotel information.

In order to have broad representation at the seed school, participants will be accepted on a first-come first-served basis, with no more than 2 participants from any given lab.

For more information about the seed school, please contact Botanist Patsy Jackson at [patsy.jackson@usda.gov](mailto:patsy.jackson@usda.gov) or Laboratory Supervisor Susan Maxon at [susan.maxon@usda.gov](mailto:susan.maxon@usda.gov).

Susan R. Maxon  
Laboratory Supervisor/Asst. Chief  
USDA AMS LS Seed Regulatory & Testing Branch  
801 Summit Crossing Place, Suite C  
Gastonia, NC 28054  
704-810-8870; fax 704-852-4189

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### Meeting Announcement

Translational Seed Biology: From Model Systems to Crop Improvement  
University of California, Davis  
September 17 - 20, 2007

The ability to modify seeds with specific developmental and compositional changes provides enormous potential to meet the growing global demand for food, but only if those discoveries can be adapted to the biological requirements of seeds as propagules and the pragmatic and economic demands of the marketplace. The objective of this symposium is to bring together leading public- and private-sector scientists across all aspects of seed biology in a format that emphasizes the connections between fundamental discoveries and their applications in agriculture, conservation, and ecology. An objective of the symposium is to identify high priority challenges and opportunities that can be targeted by complementary research in model, crop, and ecological systems. The focus on translational seed biology will demonstrate how public and private funding of fundamental work in model systems is being applied to benefit producers, consumers and the environment, particularly for applications in the regions of the world where the needs are greatest. We invite you to join a distinguished group of speakers and participants at this symposium.

Symposium website:

<http://www.plantsciences.ucdavis.edu/seedsymposium2007/index.htm>

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### **Mid-West Seed Services, Inc Seed Technologist Training Workshop**

May 14-18, 2007 Brookings, SD

The annual seed technologist training sessions will be held May 14-18, 2007 in Brookings, S.D. The five-day training is comprised of three different sessions, Purity & Seed Identification, Moisture, GMO & Germination and Tetrazolium Testing. Participants may attend any or all sessions.

Training will benefit seed analysts, seed technologists, genetic technologists, quality assurance personnel and others interested in seed testing analysis. They are helpful for those planning to take future seed technologist examinations or those working in seed companies and/or laboratories. Topics are taught through lectures on theory, demonstration of methods, along with considerable time spent doing hands-on analysis.

A full agenda is available at:

<http://www.mwseed.com/WorkshopsTraining/9thAnnualSeedTechnologistWorkshop/tabid/119/Default.aspx> or by contacting us at [workshops@mwseed.com](mailto:workshops@mwseed.com).

### **Mid-West Seed Services, Inc. Seed Sampler Training Workshop**

May 23-24, 2007 Brookings, SD

Mid-West Seed Services, Inc. (MWSS) announces a seed sampling workshop to be held in Brookings, SD, on May 23-24, 2007. ISTA, AOSA and CFIA sampling rules will be reviewed, as will sampling methods, sealing seed lots, subdividing samples and a review of ISTA certificates. Participants completing the workshop will be taking the first step towards accreditation to sample for ISTA certificates. This workshop is an excellent education experience for anyone sampling seed, regardless if it will be exported or not. Milt Haugen, Croplan Genetics, participated in a seed sampling workshop and suggests "To do justice to your customer and your company's product, everyone should attend a sampler workshop."

The session will begin at 8:00 a.m. on May 23rd and conclude at noon on May 24th. The workshop will be held at Mid-West Seed Services, Inc. Please see our website, [www.mwseed.com](http://www.mwseed.com), or contact us at 605-692-7611 for more details.

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### **Announcement of Forthcoming Book "Seed Purity and Taxonomy"**

By Doris Baxter and Lawrence O. Copeland

Finally, after many years of preparation and review, our book entitled "Seed Purity and Taxonomy" is expected to be available from Michigan State University Press in early 2008.

This book is largely an application of purity testing procedures to specific groups (families) of seeds. It presents a taxonomically oriented coverage and incorporates the insights, experience, and special talents developed by the senior author throughout her long career in

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seed testing. It contains illustrations of most of the crop and weed species encountered in purity testing. The book contains approximately 3,000 seed images including most of the drawings originally published in USDA Handbook 30 as well as additional drawings and photographs available from the public domain and others contributed by friends in the seed testing community. Doris and I hope that this book will help meet the needs of the seed testing community and be valuable to analysts-in-training, to experienced analysts, to students, and other laypersons in and out of the seed industry.

The vision for this book originated in the early 1970s when it became clear to the authors that Handbook 30 needed to be revised, enlarged, and updated. The senior author was at that time Analyst-In-Charge of the Federal Seed Laboratory at Sacramento, CA and approaching retirement. However, with her long experience in seed testing and her background in Botany at the University of Michigan (M.A., Botany), along with her many years of teaching federal seed testing workshops and training analysts, she wanted to pass on her expertise to successive generations of future analysts. We believe this work will help achieve this goal.

Further information and updates about the forthcoming availability of this book can be accessed by visiting the MSU Press website at [www.msupress.msu.edu](http://www.msupress.msu.edu). Specific information on this website will become available throughout the summer. All the images in this book, plus many other color images not used in the book, will be available on an accompanying CD or a special website.

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## 2007 STRF Quilt

### The State Flower Quilt

This beautiful 40"x60" quilt will be raffled off June 9th in Cody, WY at the AOSA/SCST Annual Meeting.

- You do not have to be present to win!
- Tickets can be purchased ahead of time or at the meeting!
- All donations to STRF are tax deductible!

The ticket order form can be downloaded from the meeting website, [http://www.seedtechnology.net/2007/2007\\_STRF.htm](http://www.seedtechnology.net/2007/2007_STRF.htm), or by contacting Anita Hall: [scst@twcny.rr.com](mailto:scst@twcny.rr.com), 607-256-3313.

Support seed research!

Order now!



## STRF Silent Auction

The 2007 silent auction will be held June 9th prior to the banquet. You don't want to miss this chance to impress your friends and colleagues by donating a hand made or specialty item from your state!

### Items donated to date:

- Custom tied fly fishing flies, Greg Lowry
- Gift basket of Midwest Products, Seed Analysts of the Midwest
- Gift basket of South Dakota Products, Mid West Seed Services
- 2 person 3 day Pheasant hunt, Tim Gutormson
- "Spring Fever" (signed pheasant print), Mid West Seed Services
- 2008 Photo Calendar "Flowers", Brent Reschly
- 2008 Photo Calendar "Bugs", Brent Reschly
- 100 Digital Seed Images, Oregon State University Seed Lab
- Gift Basket of Montana Products, Montana State Seed Lab

Be creative, have some fun and support a worthy cause! Items can be homemade or purchased  
All donations are tax deductible!

Please contact Anita Hall (607-256-3313 or [scst@twcny.rr.com](mailto:scst@twcny.rr.com)) if you would to donate or have questions.

## CALENDAR

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### 2007

#### May

- 1-3 ISTA Workshop on Statistics Aspects of GMO Detection. Iguassu, Brazil. Information: [www.seedtest.org](http://www.seedtest.org).
- 1- 3 ISTA Vigour Testing Workshop. Cascavel, Brazil. Information: [www.seedtest.org](http://www.seedtest.org).
- 5-11 28th ISTA Congress and Seed Symposium. Iguassu Falls, Brazil. Information: [www.seedtest.org](http://www.seedtest.org)
- 21-23 ISF Congress. Christchurch, New Zealand. Information: [www.seedtest.org](http://www.seedtest.org).

#### June

- 5-10 AOSA/SCST Annual Meeting. Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).
- 5 Native Species Seed Quality Symposium, Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).

- 6     Tetrazolium Testing Workshop, Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).
- 6     Genetic Technology Workshop, Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).
- 6     Seed Pathology Workshop, Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).
- 6     Statistics Workshop, Cody, WY. Information: [www.aosaseed.com](http://www.aosaseed.com) or [www.seedtechnology.net](http://www.seedtechnology.net).

#### July

31 – Aug. 3   Federal Seed School, Gastonia, NC. Information: Patsy Jackson ([patsy.jackson@usda.gov](mailto:patsy.jackson@usda.gov)) or Susan Maxon ([susan.maxon@usda.gov](mailto:susan.maxon@usda.gov)).

#### September

9-13   Seed Ecology II Conference. Perth, Australia. Information: [www.seedtest.org](http://www.seedtest.org)

17-20   Translational Seed Biology: From Model Systems to Crop Improvement University of California, Davis. Information: <http://www.plantsciences.ucdavis.edu/seedsymposium2007/index.htm>