

Seed Testing

INTERNATIONAL

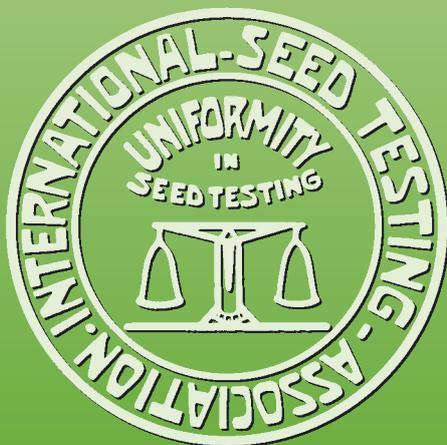
ISTA News Bulletin No. 140 October 2010



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Seed Testing International
No. 140 October 2010

Produced on behalf of the
ISTA Executive Committee

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Dear Reader,

Welcome to this latest issue of Seed Testing International. This October issue gives you a report on the most important event of ISTA, occurring every three years, the Congress. We have a new President and Vice-President, and new members were elected to the Executive Committee, who introduce themselves in this issue. The three-day ISTA Seed Symposium also attracted a large number of seed scientists to Cologne.

You will also find in this issue an article by seed scientists in the Netherlands who are developing computer imaging systems for the automatic optical recognition of germinating seeds. This may well become an important topic for ISTA in the years to come, and one which will surely be followed with interest.

With regard to our membership, we can report that the ISTA family has been joined by a new country: we have our first Member from Jordan.

We must also report with sadness the passing of three colleagues who had distinguished themselves in seed science: Haya Gelmond from Israel, Franz Ader from Germany and Ray Harty from Australia. We thank their colleagues and friends for taking on the sad task of writing their obituaries for us.

For us at the ISTA Secretariat, after the Congress is always also before the next Annual Meeting, and we therefore bring you the first information on the 2011 Annual Meeting, which will take place in the Japanese science city of Tsukuba. We are confident that our ISTA colleagues and friends there will give us a warm and well-organized welcome.

Also, as usual, even before the 2011 Rules come into effect, we will soon be receiving here the first proposals for the 2012 Rules, which we will present to you in the following issue. And so the cycle of ISTA activities goes on.

So, please enjoy this issue of Seed Testing International.

Yours sincerely,

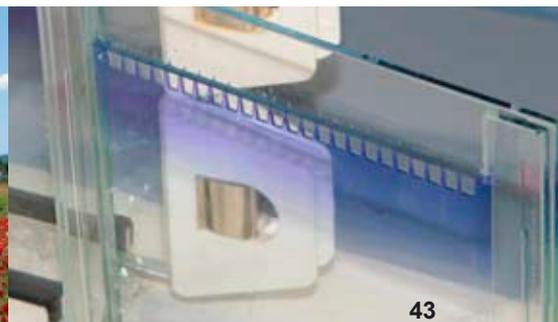
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President's Report

John Hampton



The 29th ISTA Congress, hosted so successfully by our German colleagues, is now several months behind us. The Gürzenich, in the ancient city of Cologne, was a magnificent venue, with its excellent facilities and helpful staff. On behalf of all of us, I thank the German Designated Authority, the staff of the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) and ISTA's German Members for their enthusiastic welcome, efficient organisation and superb hospitality. Over 400 participants from 65 countries enjoyed the unique experience that is an ISTA Congress.

As has become a tradition, the Congress was preceded by three ISTA Workshops in Germany, on GMO Testing (held in Oberschleissheim), Viability and Germination Testing (held in Augustenberg), and Species and Variety Testing and Protein Electrophoresis (held in Hanover). Feedback from the participants who were fortunate enough to attend the Workshops was unanimously positive, and the local organisers and contributors from the relevant Technical Committees are deserving of our sincere thanks and congratulations.

Congratulations and thanks also to Alison Powell for once again organising an informative and well-attended Seed Symposium "Application and improvement of

established and advanced technologies in seed testing". The five sessions (Technologies for improved seed supply; Aspects of purity – genetic, technical and physical; Basic approaches to physiological processes in seeds; Approaches to the evaluation and improvement of germination; Assessment and improvement of seed performance in practice) were introduced in keynote presentations by the session chairpersons, all internationally recognised experts in their fields. These presentations were followed by oral and poster presentations from researchers from around the world. The book of Abstracts will long serve as a reminder of all these presentations, and the keynote and contributed oral presentations can be downloaded from the ISTA web site. Congratulations to the winners of the Seed Symposium Awards, and thank you to the members of the Awards Committee who had the difficult task of deciding on the three best oral and poster presentations. Once again, one of the five sessions at the Symposium was run in conjunction with the International Society for Seed Science, and it is pleasing that our two seed organisations can continue to collaborate in this way.

ISTA is a unique organisation, and its major strength is its people – an international community, many of whom are Members, but others who are not, who voluntarily serve ISTA through their work for our Technical Committees. For two and a half days, our TCOM chairs presented the important work of their TCOM teams. These reports were without exception clear, concise, informative and professional. With the establishment of these annual TCOM reports (which are also available on the ISTA web site), we are compiling a valuable resource and source of information about our technical work. To those TCOM chairs and members who retired from their positions at this Congress, a sincere thank you for your contributions to the development of ISTA. To those who agreed to carry on their TCOM

work, and to those who agreed to become new TCOM chairs or committee members, thank you and welcome.

The declaration from the 2009 2nd World Seed Conference emphasized the important role of both the public and private sectors to meet the challenges ahead in the seed sector, and noted the benefits to be gained when the two work together. This is nicely illustrated within our TCOMs, where volunteers from both the public and the private sector are working together for ISTA and our vision of "Uniformity in Seed Quality Evaluation Worldwide".

An ISTA Congress sees a change of personnel within the ISTA Executive Committee, and I warmly welcome Joel Léchappé (France) as our new Vice-President, Mary Chipili (Zambia), Alison Powell (UK), Masatoshi Sato (Japan), Grethe Tarp (Denmark) and Rita Zecchinelli (Italy) as returning Members-at-Large, and Steve Jones (Canada), Francisco Krzyzanowski (Brazil) and Alexander Malko (Russia) as new Members-at-Large. A warm welcome also to Kamil Yilmaz (Turkey) who, as the representative of the country hosting the 30th ISTA Congress, also becomes a Member-at-large. I thank retiring ECOM members Udo von Kröcher (Germany – and the last ever ISTA 2nd Vice-President), Jorge Rosales King (Bolivia), and Susan Maxon (USA) for their contributions to our Association. And of course my thanks to Katalin Ertsey, our President from 2007 to 2011, for her tireless work on our behalf, particularly in encouraging membership of ISTA and accreditation of laboratories in Eastern Europe, Russia and Eurasia.

One of the important decisions made by our members during the 2010 Ordinary Meeting was to approve the ISTA Strategic Plan 2010–2013. We now have a revised Mission which is:

"We, as ISTA Members, work together to achieve our vision. Our Association produces internationally agreed rules for seed sampling and testing, accredits laboratories, promotes research, provides

international seed analysis certificates and training, and disseminates knowledge in seed science and technology. This facilitates seed trading nationally and internationally, and also contributes to food security”.

To me one of the significant changes in our Mission statement is the inclusion of the words “We as ISTA Members”. ISTA is an Association of Members, and we do need our Members to contribute towards the implementation of our Strategic Plan. While the ECOM provides leadership, the TCOMs technical input and advice and the Secretariat operational support, they need your contributions as well; together we can keep our Association active, progressive and relevant.

In approving the Strategic Plan, our members agreed on the following seven key areas for ISTA in 2010–2013.

Membership and Participation in ISTA
 ISTA Rules, Method Development and Validation
 Accreditation
 Facilitation of the Movement of Seed
 Disseminating Knowledge in Seed Science and Technology
 Communication
 Management of ISTA’s Affairs

The aims and methods for achieving the aim for each of the seven key areas are available on the ISTA web site, and comment on them is welcome. Implementing the Strategic Plan requires an Action Plan which prioritises projects, proposes time frames for their implementation and indicates the resource requirements. The ECOM has a Draft Action Plan. During its meeting in November this year, it will discuss this Draft and modify it as required. The Draft Action Plan will then be circulated to our members, with a request for comments and suggestions to be received by the Secretariat before the February 2011 ECOM meeting, at which time the Action Plan will be produced.

Note that this time frame does not imply that nothing will be happening within ISTA while we wait for the Action Plan! For all of the seven key areas there are elements of ‘business as usual’, which is to be expected from a vibrant organisation such as ISTA. The TCOM terms of reference, which have been aligned with the Strategic Plan, will be considered and approved by the ECOM in November. ECOM Working Groups are continuing to work on proposals including accreditation, training and education, and finances. Unfortunately, we do not have the resources to undertake all the activities that the ECOM, TCOMs and our Members would like – we must ensure that we allocate our resources wisely and productively.

At the Ordinary Meeting, our members also approved a Notice of Motion from Australia and New Zealand regarding the ISTA auditing of accredited laboratories and the cost of doing so. The ECOM is to:

- undertake a rigorous review of the audit process to improve its cost effectiveness and to report on the outcome of the review to the 2011 Ordinary Meeting;
- provide an accurate and detailed set of accounts for the laboratory auditing programme to the 2011 Ordinary Meeting;
- reset the audit fee, in a transparent manner, to reflect the true cost of a performance-based audit process (to apply from January 1, 2012);
- ensure that all future proposals to amend the audit fee be approved by the members.

The ECOM Working Group on Accreditation has been working on the audit process for over a year now, and the Secretary General and the ECOM Finance Working Group are working to improve the system for ISTA’s financial reporting so that there can be more transparency. The required deadlines will be met.

Before I close, I would like, on your behalf, to acknowledge and thank the Secretary General and the Secretariat staff for their dedication and professionalism. Their time spent working on our behalf often far exceeds the hours per week that many of us work – I know that when an e-mail from the Secretariat arrives in my inbox at 9 a.m. in New Zealand, it was sent at 8 p.m. from Bassersdorf! Michael Muschick and his staff always endeavour to help ISTA members with their enquiries and requests, often to their own detriment in terms of time at the office. While I am not suggesting that we stop contacting the Secretariat, could I ask that you first consider where your request should best be sent? A very large proportion of messages that the Secretariat receives are technical in nature – where possible, please contact the relevant TCOM chair (with a cc to the TCOM co-ordinator at the Secretariat), rather than the Secretariat directly.

Apart from ensuring that ISTA continues successfully with its core activities during my term as your President, there are four things I would like us to achieve in the next three years. First, the introduction of an accounting system that will improve our ability to make sound financial decisions. Second, a rationalisation of the work of the Secretariat to ensure we keep our excellent staff. Third, an expansion of ISTA membership in Africa. Fourth, an increase in ISTA-accredited laboratories in Asia, and particularly China.

I wish you all every success in your work for ISTA. ■

See page 9 for some visual impressions from the Congress

The Germinator automated germination scoring system

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Fundamental and applied seed biology research relies heavily on accurate quantification of seed germination. Nowadays, large-scale experiments using large genetic populations or mutant collections are popular tools to unravel the molecular aspects of seed development, germination, dormancy and seed performance. The scientific community has embraced *Arabidopsis thaliana* as the ultimate model species for plant science, and it has also become a very useful model plant to study seed biology. However, so far, germination of the very small *A. thaliana* seeds can only be evaluated by binocular microscope, making this a very laborious task. This often hampers the collection of cumulative germination data in large-scale experiments.



Figure 1. Four-week-old *Arabidopsis thaliana* plant.

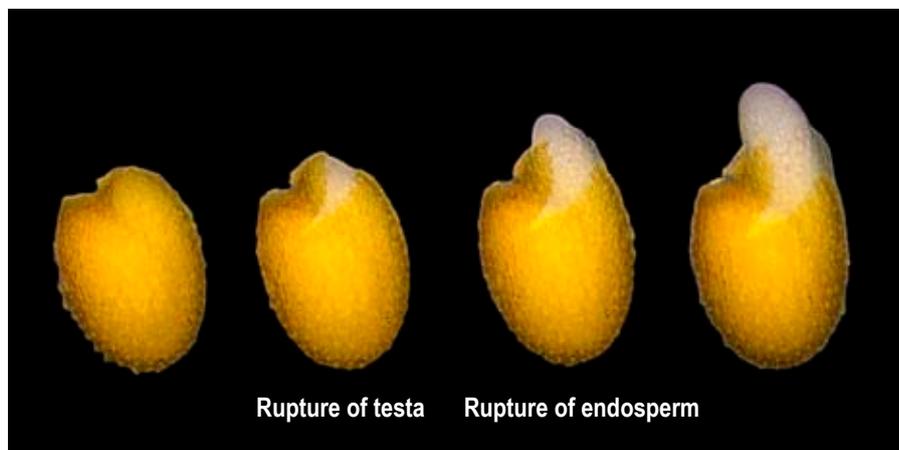


Figure 2. In *Arabidopsis*, germination is a two-step process. First the testa ruptures, then the endosperm. See www.wageningenseedlab.nl for time-lapse movie.

With this in mind, we developed a cost-efficient and flexible procedure for high-throughput automatic scoring of germination that can be implemented without the use of complex robotics. We tested and optimized the package for *Arabidopsis* seeds and show that it also works for *Brassica* spp. seeds. It can probably also be used for other species. Furthermore, we developed a module for curve fitting and extraction, recap and visualization of various germination parameters. This module enables the analysis of general cumulative germination data and is not restricted to specific plant species. This article describes a tool developed for fundamental research but with clear possibilities in commercial seed testing.

Arabidopsis for seed science

In the past decades, *Arabidopsis* (Fig. 1) has become the favourite model species for many plant scientists. It is a self-fertilizing genus in the family *Brassicaceae* with a small plant size and fast regeneration time which allow efficient use of space and time. Large collections of mutants are available, and, owing to the availability of efficient transformation protocols, reverse genetics approaches are fast. The complete sequence

of the relatively small genome was the first to be published. The wide distribution of *Arabidopsis* ecotypes provides insights into processes involved in the adaptation to various environments and allows efficient generation of recombinant inbred and other genetic populations. Together, this has led to a very useful model species which has proved its value for gathering insights into many common physiological processes that can be translated to economically important crops.

The uptake of water during seed imbibition is triphasic, and consists of a rapid initial uptake (phase I), followed by a plateau phase (phase II) and a further increase (phase III). During this last phase, the embryo axis elongates and breaks through the testa, which consists of dead tissue.

The next step is the morphological completion of germination, which is characterized by the protrusion of the radicle through the endosperm (Fig. 2). The single-cell endosperm layer in *Arabidopsis* contains living cells; therefore, enzymes which modify the cell wall are required to weaken resistance and allow the radicle to protrude. For an accurate quantification of germination, it is essential to score for rupture of the endosperm and not of the testa.

GE-ArabidopsisRJ.xls										
	A	B	C	D	E	G	H	I	J	
1	GE-ArabidopsisRJ				Add new experiment	Check files				default directory
2										Germinator table file
3	Experiment name	Tables	Results	Curve-Fits	directory	Strat.	Temp.	Light	Samples	Details
4	gt005	Delete gt005_tables	C gt005_results	C gt005_results	C	Yes	20°C	Continuous	Other	Test the accuracy of automa
5	gt007	Delete gt007_tables	C gt007_results	C gt007_results	C	No	20°C	Continuous	Other	salt stress series of 25 mm
6	gt008	Delete gt008_tables	C gt008_results	C gt008_results	C	No	20°C	Continuous	BxS RILs-ABC	first series of bayxsha fresh
7	gt009	Delete gt009_tables	C gt009_results	C gt009_results	C	No	20°C	Continuous	BxS RILs-ABC	second series of bayxsha fr
8	gt010	Delete gt010_tables	C gt010_results	C gt010_results	C	Yes	20°C	Continuous	BxS RILs-ABC	first series of bayxsha fresh
9	gt011	Delete gt011_tables	C gt011_results	C gt011_results	fi C	No	20°C	Continuous	BxS RILs-ABC	third series of bayxsha fresh
10	gt012	Delete gt012_tables	C gt012_results	C gt012_results	C	Yes	20°C	Continuous	BxS RILs-ABC	germination of fresh harvest

Figure 3. Screenshot example of the experiment database.

For many seed traits such as dormancy, stress tolerance and seed aging it is essential to describe the cumulative germination curve fully and extract parameters such as start, rate and uniformity of germination. However, the small size of *Arabidopsis* seeds (200–400 µm) requires the use of a binocular microscope or magnifying glass to monitor germination visually. This laborious method is prohibitive to large-scale experiments, and therefore often only the percentage of germination after a nominated period of time is used to describe the germination performance of a seed lot. Development of a procedure which allows high-throughput detailed phenotyping of seed germination could further extend the prospects for *Arabidopsis* as a model for seed scientists.

Germinator

Most approaches to the automatic evaluation of germination based on image analysis extract information from a time series of images. For example, change in seed size over time can be used to evaluate the progress of germination very precisely. However, this analysis requires fully aligned images, which are often obtained by using fixed setups in specialized cabinets, flat-bed scanners or camera systems over Jacobsen tables. This setup has important consequences for the amount of samples that can be measured and the flexibility to follow germination under various environmental conditions. Especially this flexibility and level of throughput are essential characteristics of the procedure that we have developed.

Evaluation of germination by using image analysis requires good contrast between background, seed and the protruding radicle. Therefore, we use blue filter paper specially designed for germination

tests. By using two different colour threshold levels on a single image we can distinguish between background and seed testa, or background, seed testa and radicle. This allows germinated and non-germinated seeds to be distinguished.

To ensure the most accurate scoring, we use the number of non-germinated seeds to monitor germination. With this approach it is not necessary to obtain fully aligned images between the various time points at which germination is evaluated.

For the germination assay we use stackable transparent plastic trays. With the help of a mask made from a thin flexible plastic sheet we position six individual germination tests into one tray. After the onset of germination, we photograph the trays at various time intervals, making sure that we have at least three images during the exponential phase of the germination curve. Automatic image analysis separates each image into the six individual germination tests, and counts the number of non-germinated seeds. We use the first image to determine the initial number of seeds used. After image analysis, we perform curve-fitting to extract parameters such as start, rate and uniformity of germination.

The package is separated into three modules, based on the components of our procedure: I. experiment design, II. image analysis, and III. curve fitting.

Module I: Experiment design

Module I uses Microsoft® Excel® combined with Visual Basic® scripts to create an database of experiments, and assists in experiment design (Fig. 3). A unique experiment code is generated for each experiment in the database. Information on the characteristics of the experiment is coupled to this code, as well as the various output

files that are generated throughout the procedure.

Pressing the <Create experiment> button generates a form with several questions about the experiment. Here, you can enter the number of samples, treatments and repetitions. Also, a sample file can be uploaded if custom sample names are required. Because we use stackable trays to perform the germination experiments, and climatized cabinets to create the desired environment, we need to correct for any position effect. There is therefore an option to randomize the samples. The experimental setup is visualized using a clearly formatted table, which can be used in the laboratory to start the imbibition (Fig. 4). The sample numbers and their positions are indicated for each individual tray. The exact time of the start of imbibition can be indicated, and is later used to calculate the exact intervals for the cumulative germination curve.

Module II: image analysis

Germination is documented by photographs taken manually at various time points. The first picture, taken before any germination, is used to define the total number of seeds in the assay. For a fast-germinating species such as *Arabidopsis*, it is sometimes necessary to photograph three times a day during the exponential phase of germination. For the photography we use a digital camera (Nikon® D80) with macro lens, mounted on a reprographic stand and connected to a computer. This standard setup reduces the time necessary for photographing large numbers of germination trays, because the photographs are stored directly on the computer with a single touch of the <Enter> key, with the time and sample number in the filename of each image.

	A	B	C	D	E	F	G
1	Experiment name:		gt007				
2	details:		Germination on a concentration range of NaCl without stratification				
3							
4							
5							
6	samples:	1					
7	repetitions:	6					
8	treatments:	8					
9							
10	start date:	15-9-2008					
11	start time:	10:00					
12							
13	tray	position	sample	repet.	treatm.	Time	details
14	1	1	Col	1	1	10:00	0 mM NaCl
15	1	2	Col	2	1		0 mM NaCl
16	1	3	Col	3	1		0 mM NaCl
17	1	4	Col	4	1		0 mM NaCl
18	1	5	Col	5	1		0 mM NaCl
19	1	6	Col	6	1		0 mM NaCl
20	2	1	Col	1	2	10:04	25 mM NaCl

Figure 4. Screenshot example of the experimental setup table.

H	I	J	K	L	M	N	O	P	Q
			number of pictures:	1620					
Calculation mode :	Area		filename summary+:	gt007YUVsummary+.txt					
variance of area (%)	15%		filename summary-:	gt007YUVsummary-.txt					
variance of xy (mm):	0.4		filename results+:	gt007YUVresults+.txt					
			filename results-:	gt007YUVresults-.txt					
code	# seeds								
t		7.5	27.5	35.5	45.0	50.5	54.5	60.0	69.0
0 mM NaCl	78	0	0	13	71	78	78	78	78
0 mM NaCl	67	0	2	11	60	65	66	67	67
0 mM NaCl	58	0	1	7	53	57	57	58	58
0 mM NaCl	63	0	0	12	57	62	63	63	63
0 mM NaCl	49	0	0	12	47	49	49	49	49
0 mM NaCl	119	0	8	32	113	118	118	119	119
t		7.6	27.6	35.6	45.1	50.6	54.6	60.1	69.1
25 mM NaCl	67	0	0	12	62	66	67	67	67
25 mM NaCl	85	0	0	11	81	83	84	85	85
25 mM NaCl	52	0	3	10	47	47	50	50	52
25 mM NaCl	90	0	0	8	86	89	90	90	90
25 mM NaCl	104	0	1	25	99	103	104	104	104
25 mM NaCl	88	0	0	11	78	87	87	88	88
t		7.7	27.7	35.7	45.2	50.7	54.7	60.2	69.2

Figure 5. Screenshot example of the cumulative germination results. The time (hours) is indicated in the rows marked with a “t” and is corrected for the time of start of imbibition.

The images are then analysed with Adobe® Photoshop® and ImageJ®. For both packages we have developed automated scripts to minimize user input as much as possible. With the help of ImageJ, a two-colour-threshold analysis is performed on each individual image: first, a colour threshold that selects the seed testa only, and second, a colour threshold that selects both the seed testa and the protruding radicle. The specific settings for the colour thresholds can be adjusted for each seed type during a system calibration. The output of the image analysis consists of four tables with information about the total number of seeds and the position and size of each individual seed that has been detected. The four output tables are then coupled with the experiment setup tables from module I, and a cumulative germination curve is calculated (Fig. 5). The calculation uses position and seed size in the various colour threshold analyses to determine whether a seed has germinated. The first image is used to calculate the total number of seeds, and the subsequent images to determine the number of non-germinated seeds present at those times. Image timestamps are used to automatically calculate the interval between the onset of imbibition and the time at which the picture was taken.

Module III

Module III performs a curve-fit analysis of the cumulative germination data. We use the data generated by the image analysis of module II, but all other cumulative germination data (for example derived from manual counting) can be used as well. This module also uses Microsoft Excel complemented with Visual Basic scripts. We perform a curve fit using the four-parameter Hill function, which can accurately fit the typical sigmoid curve that describes the course of germination (Fig. 6). As soon as the best-fitted curve has been determined, typical germination parameters are extracted from the curve. We generally determine G_{\max} (maximum percentage of germination), t_{50} (time to reach 50% germination), tx_1 (time to reach $x\%$ germination), uniformity (time interval between $x_2\%$ and $x_3\%$ of viable seeds to germinate), r^2 fit (determination coefficient) and AUC

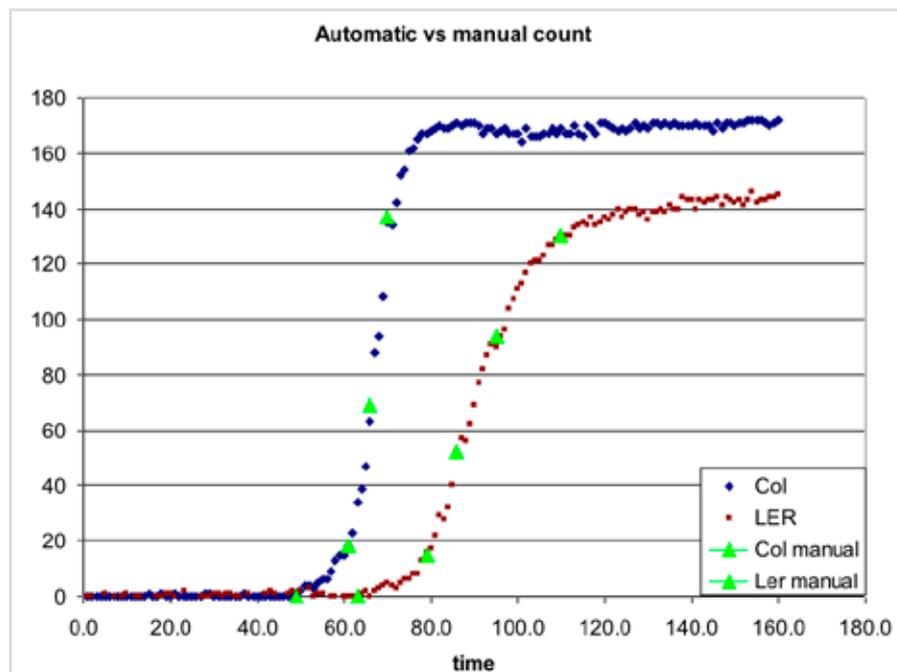


Figure 6. Comparison of manual and automated scoring of the germination of two *Arabidopsis thaliana* cultivars (Col-0 and LER). Green triangles indicate manual scoring.

(integration of area under the germination curve until time x_4) (Figure 7). The limits for x_1 to x_4 can be set, as well as the threshold for r^2 and the allowance to extrapolate a germination curve beyond the maximum germination that was measured.

After the curve fit we automatically perform basic statistics on samples with identical names. Averages and standard errors are calculated and plotted in bar graphs. The bar graphs can be sorted for each individual parameter in ascending order, to judge the effect on the other parameters. To determine whether two samples differ significantly, we perform a t test and plot results using alphabetical representation (Fig. 8). The significance threshold for the t test can be set by the user.

Applications

We have described the development of the Germinator: a software package for automated scoring of *Arabidopsis* germination. *Arabidopsis* seeds are very small and require a binocular microscope for manual germination scoring. This severely limits the number of samples that can be handled, and many scientists choose to score only endpoint germination. However,

information on the onset, rate and uniformity of germination are important characteristics of germination performance. With our package, a single person can handle up to 1000 germination assays and monitor germination precisely over time. This greatly facilitates large-scale screenings of mutant collections or genetic populations such as recombinant inbred lines. Although we tested and optimized our procedure for *Arabidopsis*, we have also shown that the same setup can be used for *Brassica* seeds. In our approach we create optimal contrast between background, testa and radicle by using blue filter paper for the germination assays. Due to the blue filter paper there is good contrast between many different testa colours, which allows a wide range of species to be analysed. If the use of filter paper is problematic, it is also possible to use clear agar, and photograph this on a blue background.

Successful automatic scoring strongly depends on seed morphology. For example, large seeds might need different optics to enable efficient imaging, and flat seeds, in which the radicle often protrudes from the underside, might need manual manipulation, thus preventing the use of an automated scoring system.

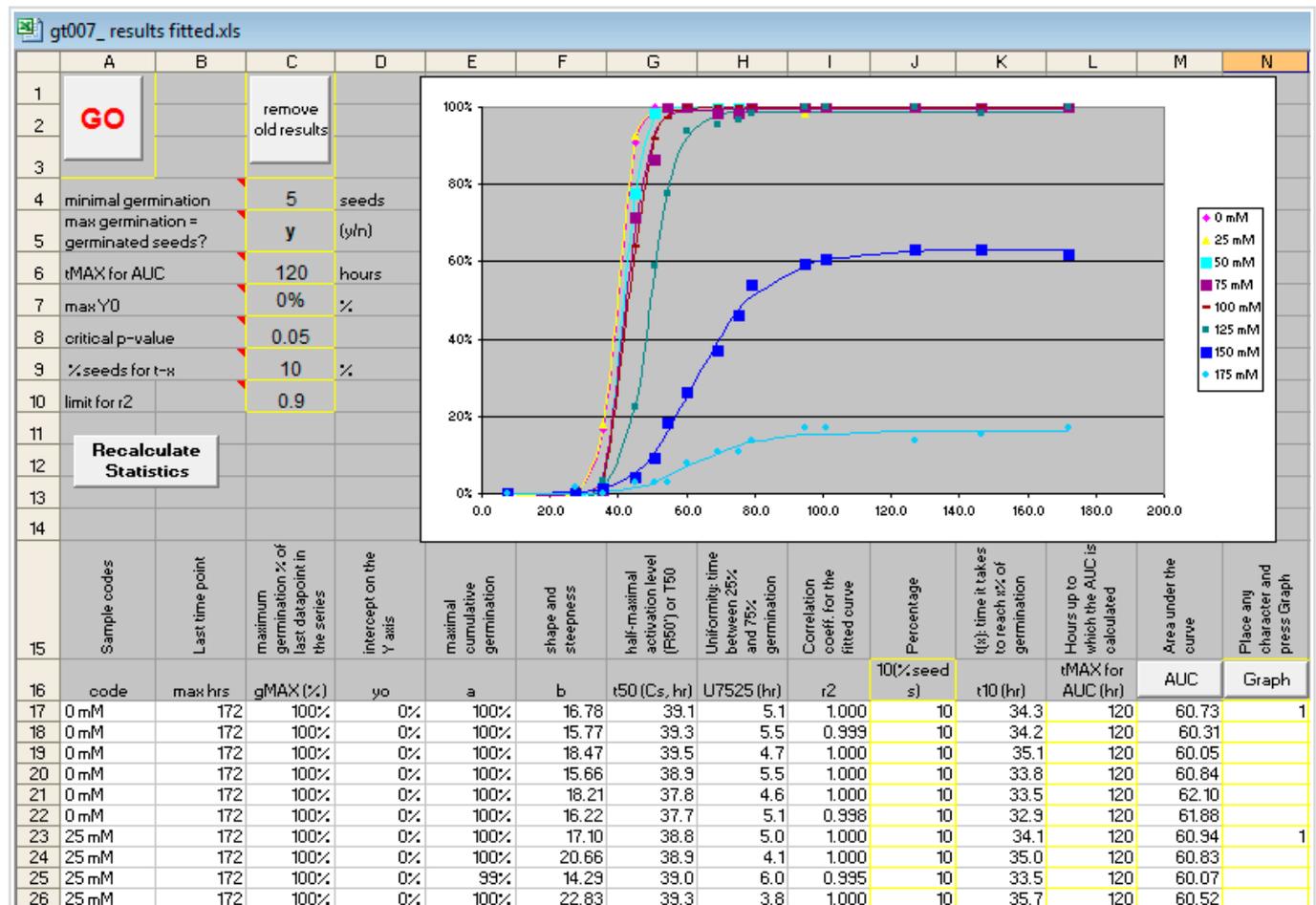


Figure 7. Screenshot example of the curve fitting module.

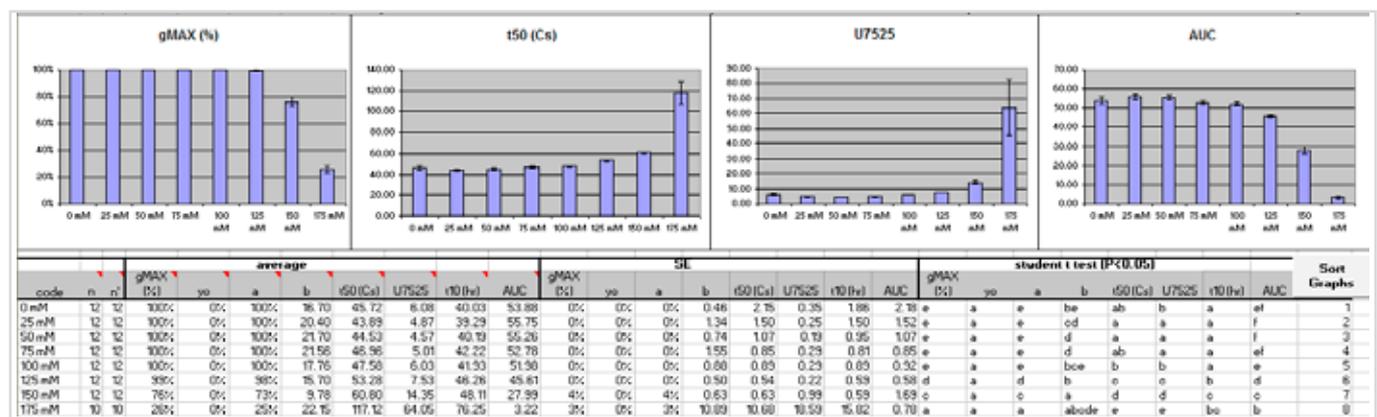


Figure 8. Screenshot example of the statistics module of the curve-fitting script.

The curve-fitting module III can be used independently of the other two modules, and allows the input of general cumulative germination data. It can handle a virtually unlimited number of curves, and the clearly formatted output allows rapid analysis of the results. This might be very useful not only for many seed scientists, but also for commercial seed testing.

Availability

The whole germinator package, including a manual and video tutorials, is available from <http://www.wageningenseedlab.nl>. A detailed description of the package was published in the Plant Journal (Joosen et al., 2010).

References

Joosen, R.V.L., Kodde, J., Willems, L.A., Ligterink, W., van der Plas, L.H.W. and Hilhorst, H.W.M. (2010). Germinator: a software package for high-throughput scoring and curve fitting of *Arabidopsis* seed germination. *Plant Journal*, **62**, 148-159.

29th ISTA Congress: impressions from Cologne



View of Cologne from one of the spires of the 'Kölner Dom'.



Dr. Robert Kloos, State Secretary of the Federal Ministry of Food, Agriculture and Consumer Protection.



Eckhard Uhlenberg, Minister for the Environment and Conservation, Agriculture and Consumer Protection of North Rhine-Westphalia.



Udo von Kröcher, ISTA 2nd Vice-President.



Dr. Katalin Ertsey, outgoing ISTA President.



ISTA Secretary General Dr. Michael Muschick.



Dr. Christoph Amberger, Dr. Robert Kloos and Udo von Kröcher.



Dr. Kloos with Dr. Ertsey and Dr. Muschick.



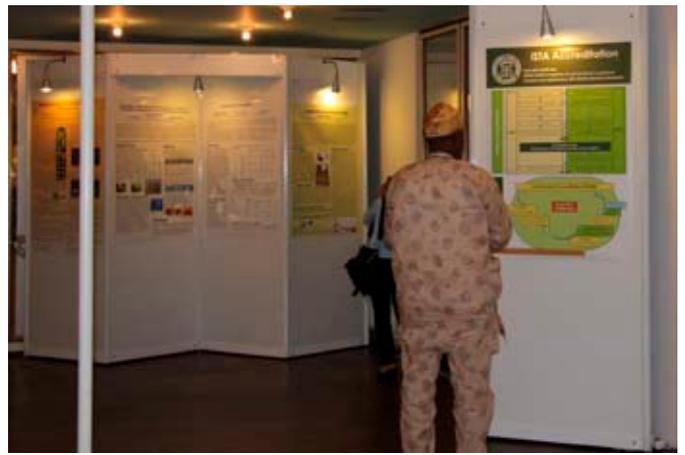
Udo von Kröcher, ISTA 1st Vice-President Prof. John Hampton and Friedel Cramer.



Participants at the Opening Ceremony.











The panel members of the Policy Forum.



Thanking the Technical Committee Chairs for their work.



The Voting Delegates at the Ordinary Meeting.



The incoming ISTA President, Prof. John Hampton (centre), with the Secretary General and Attilio Lovato, Past President and Honorary Life Member.



Mr. Kamil Yilmaz presenting the venue of the 30th ISTA Congress in Turkey.



The new Executive Committee.



Installation of the newly elected Executive Committee.



Changes to the *International Rules for Seed Testing* 2011 Edition

As every year, a number of proposals for changes and amendments to the ISTA *International Rules for Seed Testing* were proposed at the Annual Meeting under Agenda point 9.

There were no new species added to the Rules this year, but two seed health methods were affected by nomenclature changes to two seed pathogens.

This year, the bulk of the changes were in Chapter 5: The Germination Test, which was extensively revised by the Germination Committee. A proposed change to the rule on seed disinfection (5.6.3.4) was withdrawn. All other proposals were accepted, in some cases after modification.

Apart from changes requiring a vote, the editorial changes and corrections included a revision of all cross-references in the Rules to other chapters and sections, to reflect past changes.

The Rules proposals document, now containing only the accepted proposals, and with the modifications in green, can be downloaded from the ISTA web site at http://www.seedtest.org/en/om_approved_documents_content---1--1319.html.

Chapter 2: Sampling

- Cargo sampler now approved for seeds of the size of *Triticum aestivum* and larger
- Hand halving method approved for *Gossypium* spp.
- Harmonization of sample sizes in Table 2A Part 1

Chapter 5: The Germination Test

- Complete revision of Chapter 5
- Revision of Table 5A
- Revision of tolerance tables to allow tests with 100 or 200 seeds and up to three

retests, and addition of flow chart (Fig. 5.2) to illustrate the retesting procedure

Chapter 6: The Tetrazolium Test

- Tetrazolium test for *Chloris gayana*

Chapter 9: Moisture Content

- Resolution of inconsistency between 9.1.5.5 and 9.1.5.2
- Increase in moisture test duration for *Lolium* spp.

Chapter 15: Seed Vigour Testing

- Conductivity test for *Glycine max*

Chapter 17: Bulk Containers

- Amendment of Table in 17.5: Calculation and expression of results

Report from the ISTA Seed Symposium 2010

Alison A. Powell

ISTA Executive Committee Member, ISTA Seed Vigour Committee Chair and Seed Symposium Convenor

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Cologne, with its long tradition of welcoming visitors, proved to be a good choice as the location of the 29th ISTA Seed Symposium 'Application and improvement of established and advanced technologies in seed testing'. The National Organising Committee also made an excellent decision in selecting the Gürzenich as the venue. Here we found a welcoming atmosphere, a beautiful auditorium and superb technical facilities. Furthermore, the support offered by the technical assistants, National Organising Committee and ISTA Secretariat all contributed to the smooth running of the symposium. As Convenor, I could not have asked for more!

The symposium was made up of five oral and two poster sessions. The oral sessions were introduced by presentations from lead speakers from five different countries, who then went on to chair each session. Oral papers were given from 13 different countries, notably six from Germany, five from France and four each from Brazil and the UK, with either one or two papers originating from the remaining nine countries. The topics covered ranged from developments within standard methods to innovations based on physical, biochemical or molecular techniques that have potential for application in the future.

The first session, 'Technologies for improved Seed Supply', was introduced by Dr. Pramod Agrawal (India), who discussed how technical innovations in breeding have made a dramatic improvement to food production, with particular reference to India. The papers covered both novel advanced methods and improvements to established methods for the detection and control of seed-borne organisms. The second session, 'Aspects of purity: genetic, technical and physical', was led by Dr Enrico Noli (Italy). His presentation focused



The lead speakers (left to right): Dr. Joël Léchappé, Dr. Pramod Agrawal, Dr. Alison Powell, Dr. Gerhard Leubner, Dr. Stan Matthews and Dr. Enrico Noli.

on advanced methods of measuring genetic quality in seed. This was followed by papers that included image analysis and DNA-based approaches to the assessment of physical and genetic quality.

Session 3, 'Basic approaches to physiological processes in seeds', was held in collaboration with the ISSS and was led by Dr. Gerhard Leubner. He illustrated how an evolutionary approach can help in the study of mechanisms for the control of dormancy and germination. The papers presented focused on seed storage and longevity, and water activity. Dr. Joël Léchappé chaired Session 4, 'Approaches to the evaluation and improvement of germination'. He emphasised how method development over time has been important for improving test performance. The topics in this session ranged from improving germination conditions to rapid assessment of germination potential and the maintenance of germination during storage. The final session, 'Assessment and improvement of seed performance in practice', was chaired by Dr. Stan Matthews. He presented evidence for the hypothesis that the basis of all vigour tests is seed ageing. Three papers examined the potential for rapid assessments of vigour, and three discussed approaches to seed invigoration.

A new feature of the oral sessions was the projection of the images of the speakers during their presentations. This was very much appreciated and contributed to the understanding of each presentation. The speakers should also be congratulated on the high standard of their presentations.

The poster papers were allocated more time at this symposium, with two poster sessions of two hours. Participants took good advantage of this to view the 105 posters and to discuss them with the authors. The activity in seed technology in Brazil and India was clearly evident, with substantial contributions also from Germany, Turkey, UK, Iran, France and Italy. The topics were wide-ranging, from the use and evaluation of farm-saved seed to the effects of seed storage and molecular approaches to pathogen and variety identification. The posters certainly reflected the theme of the symposium.

There were clearly good interactions and stimulating discussions throughout the symposium, encouraged by the excellent social arrangements for coffee, lunch and the evening events. We are grateful to all involved in the organisation of the symposium; their discussions ahead of the event and their hard work all contributed to a successful and enjoyable occasion. ■

The ISTA booths at the 29th ISTA Congress

Agnes Hegedues
ISTA Secretariat

We started planning the ISTA booths already at the beginning of 2010. Step by step, we decided on how to set it up. Two new posters were specially designed by the Secretariat staff for this purpose, and we decided to display a map of the world at the booth. One poster featured what ISTA stands for; the other aimed to provide an overview of ISTA Accreditation.

For the background for the booth upstairs, we used a world map, showing all ISTA Member Laboratories and Accredited Laboratories. ISTA Member Laboratory DKDL0100 sent us calibration samples for display, for which we are very grateful, and ISTA System Auditor Mary Jane Kelly kindly lent us her seed analyst working tools from the early 1900s, her seed collection from 1902 and her East German seed atlas from 1955 for display at the booth.

We had two booths at the Congress, one on each floor. The booth on the ground floor (above right) was looked after mainly by Branka Opra (ISTA System Auditor and Accreditation administration) and Cannice Gubser (ISTA Membership & Financial Administration), who answered questions about registration (since the registration desk was right next door), and about membership and voting.

The first floor booth (below) was run by Mary Jane Kelly (ISTA System Auditor) and Agnes Hegedues (responsible for ISTA book sales & subscriptions), and



concentrated on questions about publications and sales and general issues about ISTA. We were asked a lot of questions about ISTA publications, online access to Seed Science and Technology, the ISTA Rules, and forthcoming ISTA publications such as the ISTA Pure Seed Definition Handbook.

On both booths we had displays of the latest ISTA Handbooks, general information pamphlets about ISTA, and information material about ISTA accreditation and membership. Most of the pamphlets were taken by the participants, and there were also many books ordered.

We also organized expert sessions on GMOs, ISTA accreditation and ISTA membership during the coffee breaks at the Seed Symposium. Christoph Haldemann and Cheryl Dollard kindly volunteered to answer questions about GMOs. For the sessions on ISTA accreditation and membership, our ISTA staff, Branka Opra and Mary Jane Kelly were on hand.

We received a lot of positive feedback from the participants, and we believe the ISTA booths were a success. ■



Auditors' Meeting 2010

Mary Jane Kelly and Rasha El Khadem

System Auditors, ISTA Accreditation Department

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The annual Auditors' Meeting was held during the 29th ISTA Congress in Cologne, Germany on 16 June from 17:00 to 20:30. The evening ended with a lovely meal at a nearby restaurant which was heartily enjoyed by all.

The attendees from the ISTA Secretariat were the Secretary General, Michael Muschick, and the three system auditors Mary Jane Kelly, Branislava Opra and Rasha El Khadem, who is also the head of the Accreditation Department.

The ten technical auditors present were Joost van der Burg, Ronald Don, Joël Lechappé, Norbert Leist, Augusto Martinelli, Anny van Pijlen, Zita Ripka, Anja Ritserveldt, Silvia Zanetti and Rita Zecchinelli.

The following is a summary of the issues discussed from the agenda and planned actions to carry them out.

Document revisions

The document Acc-D-01 "Procedure for Termination, Suspension and Withdrawal of ISTA Accreditation" was changed to allow earlier suspension of laboratories with poor proficiency test (PT) performance if no corrective actions are taken by the laboratory and forwarded to the Accreditation Department for review.

Previously, a laboratory was suspended when it scored an overall PT performance rating of 'below minimum performance' (BMP) after six test rounds. It could not be suspended before the sixth PT round, even when it was already obvious that an overall score of BMP was inevitable.

Changes were also made which allow a laboratory to be suspended for just one part of its accreditation, e.g. for moisture testing only.

It is important to remember that in certain cases, suspension for one type of test will lead to another. For example, if accreditation for the purity test is suspended, it must also be revoked for the germination test, since the planting of pure seed is a requirement for the germination test.

Acc-G-03, the "Guideline for Developing Quality Documentation" was revised to remove references to obsolete documents and provide updated examples.

Conflict-of-interest concerns

It was agreed by the auditors that they must not audit laboratories located in their own countries or conduct assessments at any laboratory where they were once employed. It was also agreed that auditors must not audit labs for which they had been consultants. Similarly, auditors must not accept consultancies offered by laboratories that they had just audited.

Travel documents for technical auditors

It was proposed by several of the auditors that it would be beneficial to have an ISTA photo identification card when travelling to different countries. This is to be researched.

Audit timetable discussion

The average time to conduct an on-site assessment is 10 hours 21 minutes. The time needed for lunch can vary from laboratory to laboratory, and it was decided to again emphasize to the laboratory staff that the lunch break should be 30 to 45 minutes at most, and should be on the laboratory premises.

The current timetable should be adjusted to reflect the possibility of a later finishing time depending on audit findings. The main reason for longer audits is the fact that the auditors type up their audit findings immediately, in order to provide the

auditees with a printout of all system and technical non-conformities. These are described in the Audit Detail Report and are discussed at the closing meeting.

The Head of Accreditation will make a draft proposal for a new timetable.

Timelines for reporting back to laboratories

Reporting back to a laboratory regarding the approval or refusal of their corrective actions can be quite time-consuming and may turn into a very long process (53 days for one lab). This was reflected in some poor ratings given on completed audit feedback forms.

It was decided to implement a two-week deadline for the Audit Report, and a four-week deadline for Corrective Action Reports. This will be evaluated next year, when it is hoped that new averages would reflect a faster turnaround.

Uniformity in auditing

Many auditors have a preference for what to look for during an on-site assessment. The Head of Accreditation, Rasha El Khadem, stated that sampling from the lot, dividing the composite sample and drawing a moisture sample (if these are in the Scope of Accreditation) must be audited at every laboratory, since sampling is the first step of any test to be conducted. The test results are only valid if a representative sample was drawn from the seed lot and the submitted sample.

In preparation for an on-site assessment, it is important for the auditors to meet beforehand to discuss the quality documents received, the PT performance, or any other issue that will be particularly focused on during the audit.

The use of universal checklists and procedures was considered, and further work will be undertaken on this.

Subcontracting (ISTA Accreditation Standard 3.11)

The following points offer clarification regarding subcontracting:

Sampling will be used as an example.

Situation A

Lab 1 (accredited for sampling and testing) uses Lab 2 (accredited for sampling and testing) to draw their ISTA samples.

The Orange Certificate is issued by Lab 1, and states under the "Sampling by" section that Lab 2 performed the sampling.

In this case, the responsibility of sampling and testing is clearly separated and stated as such on the Orange Certificate. Lab 1 must only ensure that Lab 2 holds ISTA accreditation for sampling of the crop group in question. This is not considered to be subcontracting under the terms of the ISTA Accreditation Standard.

Situation B

Lab 1 (accredited for sampling and testing) uses Lab 2 (accredited for sampling and testing) to draw their ISTA samples.

The Orange Certificate is issued by Lab 1, and states under the "Sampling by" section that Lab 1 performed the sampling. On the Orange Certificate, Lab 1 states under the "Other determinations" section that sampling was subcontracted to Lab 2.

In this case, Lab 1 has subcontracted the activity of sampling to Lab 2. A mutual agreement (contract, memo of understanding, service level agreement) must be available for review, and Lab 1 must ensure that Lab 2 holds accreditation for the activities that have been subcontracted.

Situation C

Lab 1 (accredited for sampling and testing) uses Lab 2 (accredited for sampling and testing) to draw their ISTA samples.

The Orange Certificate is issued by Lab 1, and states under the "Sampling by" section that Lab 1 performed the sampling. No additional information is given on the Orange Certificate. This is not a case of subcontracting. In this case, Lab 1 is fully responsible for both activities. During the sampling process, the samplers who draw the sample are considered to be employees of Lab 1, and Lab 1 must be able to provide training records of staff employed to sample.

Removing tests from the current scope of accreditation at the audit

If a laboratory cannot show evidence that it has maintained its expertise to perform tests for which it holds accreditation, the accreditation for these may be cancelled from their scope of accreditation (for example, if the laboratory has not carried out a particular test for several years, or staff that carried out a particular test have resigned or retired and the laboratory has no longer anyone trained in the particular test method).

Application for new tests to be added to the current scope of accreditation at the audit

For tests for which no Proficiency Test rounds are available or which are not covered by Proficiency Tests, the laboratory must demonstrate repeatability and reproducibility of the test results. This can be achieved through a process of repeat testing within the laboratory and comparative tests with other laboratories accredited for the test method.

Preparation procedure for a first audit of a laboratory

It is important that the auditors receive all the documentation that has been requested. For a first audit, the laboratory's full quality manual, work instructions and standard operating procedures are required in English. These provide a very good indication whether a laboratory is ready for its audit. To ensure an effective accreditation process, a quality management system must be in place.

Copies of the ISTA Certificates

The auditors must have access to copies of all the Orange Certificates issued to clients during the preceding three years. Computer versions that do not carry the stamp or signature will not be acceptable during an audit, since copies identical to those provided to clients must be scrutinized.

Miscellaneous

The auditors discussed a range of questions received during on-site assessments. The number of remaining audits for 2010 was discussed, as well as the preliminary audit plan for 2011.

Future challenges of the Accreditation Department were discussed.

Conclusion

As always, this meeting was a beneficial forum for all participants.

Those attending found the meeting extremely valuable, and it was suggested that further discussion and debate would have been possible if more time were available. The Secretary General suggested that next year's meeting might be scheduled for a full day. ■

ISTA post-Congress tour to Bavaria

23–25 June 2010

Berta Killermann

Head, ISTA Seed Testing Station, Freising, Chair of the ISTA Variety Committee

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Institut für Pflanzenbau & Pflanzzüchtung
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After a very busy and successful ISTA Congress in Cologne, we started the post-Congress tour to Bavaria in the early morning of Wednesday, 23 June. The tired participants from Brazil, the UK, Kenya and the USA were waiting with me (also tired) for the coach in front of the Gürzenich Congress Center. Peter, the driver, started punctually at 6 a.m.

On the way to Freising, Upper Bavaria, we passed through the Hallertau the largest hop plant area in the world. The participants had an impressive view of the hundreds of hop farms where the famous Hallertauer hop varieties are grown. On arrival, the participants were cordially welcomed to the ISTA seed testing station of the Bavarian State Research Centre for Agriculture in Freising by Peter Doleschel, the head of the institute. After a very interesting tour through the purity, germination and electrophoresis laboratories, guided by Benno Voit, the quality manager and technical head of the lab, the participants, together with the seed testing team, enjoyed



The group at the Freising seed testing station

a typical Bavarian lunch with Bavarian veal sausages, radishes, cheese, pretzels and wheat beer in front of the institute in bright sunshine under a typical white-blue Bavarian sky.

At the next stop, the Bavarian Plant Breeding Station Steinach in the Bayerischer Wald in southeast Lower Bavaria, Dr. Eckardt and his colleague Mr. Knon gave us an extensive tour of the breeding station, especially the seed-cleaning facilities. This was most interesting, because Steinach is a breeding station which deals

with 26 different species, e.g. grasses and large- and small-grained legumes, and therefore a lot of machines were developed and manufactured for these purposes. After dinner we arrived at Regensburg for our first overnight stay. Regensburg, located in the Upper Palatinate on the river Danube, was founded by the Romans 2000 years ago. The participants enjoyed a guided tour through the city at night. This was really spectacular; because of the football match Germany vs. Ghana at the world championships in South Africa, the



Guided tour through the Freising lab



At the Steinach plant breeding station



Watching the football match



In the fields at the Bauer breeding station, Niedertraubling

historic city centre was quite deserted, quiet and peaceful. We finished the first day with beer in a kind of beer garden, then returned to our hotel through a crowd of people, very loud, noisy and happy, since Germany had won the match, and the Bavarians had developed their skills in how to blow the vuvuzela.

The oldest Bavarian plant breeding station, Bauer, located nearby in Niedertraubling, was our first stop on the second day. Founded in 1863, it is where a huge number of famous and important wheat, barley and oat varieties were developed. The owner, Mrs. Bauer, the breeder, Uwe Stephan, and Mrs. Neumann from the IG Pflanzenzucht gave the group an introduction to the family firm, and showed us the

breeding farm and the collection of the current registered varieties.

Next, we visited the highly sophisticated seed-processing facility of Baywa, the largest Bavarian warehouse company for cereals, in nearby Obertraubling. The chief storekeeper, Mr. Schreglmann, presented the facility in detail and had a lot of questions to answer. The participants were impressed mostly by the fact that during the year, this huge warehouse is run by only two employees. Only during the season are they assisted by two additional staff.

After lunch in the warehouse, we continued to Teisendorf, a little village in the northern pre-alpine region in Upper Bavaria where the Bavarian Forest Tree Seed Testing and Breeding Station of the

Bavarian State Ministry of Nutrition, Agriculture and Forestry is located. Dr. Konnert, the head of the lab, gave a short overview about the history and tasks of the institute. During the guided tour through the laboratories by Dr. Konnert and her colleagues, we asked and learned a lot. At the coffee break in the garden of the old building, Dr. Konnert served a homemade Bavarian cake which the participants enjoyed very much.

In the evening, we had dinner on a typical Bavarian alp located near the Chiemsee – our second overnight stay. After a short uphill walk, the participants enjoyed Bavarian hospitality with a traditional Bavarian meal in impressive and beautiful mountain scenery, accompanied by typical



Our Bavarian dinner up on the alp



Bavarian folk music. We all enjoyed this evening because of the nice music and the great weather with a clear sky. Even other hikers stopped by to listen to the music. Some of us even recorded the music on their mobile phones. Tired but happy we went to our hotel.

On the third day, we went to the Chiemsee, where the famous fairytale King Ludwig II of Bavaria built the beautiful Herrenchiemsee Castle on an island in the middle of the lake. After a short boat trip we had a guided tour through the monumental castle, unfinished because King Ludwig II built many castles and finally ran out of money. Afterwards, some took the opportunity to visit the museum, while others took a small walking tour or had lunch or a coffee on the island.

We returned to our coach park in time and Peter the driver started off punctually at 2 p.m. for Munich, Frankfurt and Cologne airports. At the end all the participants had the feeling that they were exhausted but happy. Benno and I also enjoyed the tour, because it was a very harmonic group, nobody fell ill and everybody got home safely.



Our musical entertainers on the alp near the Chiemsee

We sincerely thank the following institutions for sponsoring the ISTA post-Congress tour to Bavaria:

- the Bavarian State Ministry for Nutrition, Agriculture and Forestry;
- the Bavarian State Research Centre for Agriculture;
- the Seed Breeding Station Steinach;
- the Seed Breeding Station Bauer;
- the Bavarian Warehouse Company Baywa;
- the Secobra seed breeding company;
- the Bavarian State Forest Tree Seed Testing and Breeding Station.

The new Executive Committee 2010–2013

John Hampton

President



John Hampton is Professor of Seed Technology at Lincoln University, New Zealand. He is also Director of the Lincoln University Seed Research Centre and a senior member of staff of the Bio-Protection Research Centre.

After graduating from Lincoln with a MAgSc in Plant Pathology, he joined the then New Zealand Official Seed Testing

Station as a seed scientist. He then spent three years in the UK, graduating from the University of Nottingham with a PhD in Agronomy. On his return to New Zealand he joined the Seed Technology Centre at Massey University as a Senior Lecturer, and then moved south to his present position at Lincoln in 1998.

His involvement with ISTA began in 1978 when he joined the Vigour Committee, and since then he has also served on the Rules and Seed Analyst Training Committees, the Method Validation Advisory Group, and the Editorial Board of Seed Science and Technology. He became a member of the ISTA Executive Committee in 2001.

John's work in research, teaching and training in seed technology, with seed consultancies and for ISTA has taken him all over the world and provided experiences and friendships which he will forever treasure. Currently he is research leader for two major New Zealand government-funded programmes, one on biocontrol of the seed-borne bacterial disease blackrot in Brassicas, and the other on seed yield and quality in indeterminate species.

In his spare time John enjoys having time with his family, participating in musical theatre, and a relaxing game of lawn bowls.

Joël Léchappé**Vice-President**

Joël Léchappé graduated at the Universities of Nantes and Rennes (France) in Botany, Zoology, Ecology, Biochemistry and Plant Physiology.

After a PhD in Plant Pathology (root diseases on *Phaseolus*), he joined INRA (National Institute for Agronomical Research) in the Group for Study and Control of Varieties and Seeds (GEVES) as head of the Germination Laboratory of the National Seed Testing Station. He has been Director of the Station since 1993.

He made contact with ISTA in 1987 with Professor Lennart Kåhre in Uppsala. Since then, he has contributed to ISTA work via the Germination, Proficiency Test, Vigour and Rules Committees. He has been a Member of the Executive Committee since 2001.

Being part of the ISTA team of technical auditors offers him a great opportunity to learn and exchange more about the situation in the seed world and the world in general.

Spare time is shared with family and hobbies, among which are botany, bird watching and fly fishing.

Mary Chipili**Member-at-Large**

Mrs. Mary Mwanza Chipili has been the Controller of Seeds in Zambia, and Director of the Seed Control and Certification Institute, the country's seed certifying Authority, since 2003. She is the Seeds Focal Point for the Southern African Development Community (SADC) in Zambia.

She holds a Master's Degree in Seed Technology from Edinburgh University (Scotland), having previously gained her BSc degree in Agronomy at Tsaul

Agricultural Institute, Moldavia, USSR. She has training in the Organization and Management of Seed Programs (Sweden), Forage Seed Quality Control (Ethiopia), International Seed Testing on Tropical Seed Species (Austria), Varietal Identification and GMO Detection (South Africa) and Management Development for Senior Managers (Zambia).

With about 23 years of experience in seed services, seed quality is her paramount interest. This is her second term of office as Member of the Executive Committee.

Alison A. Powell**Member-at-Large**

My interest in seed science began with my PhD studies at the University of Stirling, Scotland, and my first ISTA Congress was in Madrid in 1977. Subsequently, as a member of staff at the University of Aberdeen, I worked with postgraduate students and visiting researchers from more than 20 countries on aspects of seed vigour in both temperate and tropical crops. My contribution to seed science was recognised by the award of the degree of DSc in 2004.

I have always been interested to see research transferred into practice, and I have been able to work towards this during my 15 years with the Vigour Committee as new vigour tests have been introduced. Communication of science has always been important to me, both written and in oral presentations. As an editor of *Annals of Botany* and Chief Editor of *Seed Science and Technology*, I am able to keep up with aspects of research and to assist authors. I also have the opportunity to help in the communication of science to a wider audience as the Convenor of the ISTA Seed Symposium since 2002.

I am no longer in University teaching, but I am able to continue my interest in education and training by participation in ISTA Workshops.

Grethe Tarp**Member-at-Large**

Grethe Tarp, from Denmark, received her MSc in Horticulture from the Royal Veterinary and Agricultural University, Copenhagen, in 1976. After graduate studies in plant pathology at the University of Illinois and training in seed testing at the Danish State Seed Testing Station, Lyngby, she went to Swaziland as an Agricultural Officer for the FAO in 1978. From 1980 to 1988, she was Seed Quality Control Expert, Officer-in-Charge and acting Director at the National Seed Service, Maputo, Mozambique.

Returning to Denmark in 1988, she first worked as Research Officer in Certification at the Danish State Seed Testing Station at Lyngby, before promotion to Head of the Department of Germination at the Danish Plant Directorate in 1990, and of the Seed Department in 1992. Apart from a period in Vietnam as a Senior Adviser on Seed Sector Development, she has remained in that post to the present day.

Grethe Tarp has been a member of the Germination Committee since 1992, and was elected to the Executive Committee in 1995.

Masatoshi Sato**Member-at-Large**

Masatoshi Sato is from Japan, and graduated from Iwate University in horticulture in 1982. After graduation, he joined the National Center for Seed and Seedlings (NCSS), an Incorporated Administrative Agency, and was involved in the development of potato virus diagnostic methods in seed-potato production systems. Through the efforts of his research activities, he received a PhD in Plant Pathology from Hokkaido University (Japan) in 2001.

He has been an inspector and head of the Seed Health Testing Laboratory in the Seed Testing Division of the NCSS since 2003. His first ISTA meeting was the 2004 Congress in Budapest, since when he has been involved in the ISTA activities. He is a member of the Seed Health Committee.

Participating in ISTA provided him with a good opportunity to learn about the situation of seed testing in the world, including Asia.

This is his second three-year term as a Member of the Executive Committee.

Rita Zecchinelli

Member-at-Large



Rita Zecchinelli is from Italy, and is Head of the Seed Testing Laboratory in Tavazzano, not far from Milano. The laboratory is part of the Ente Nazionale Sementi Elette (ENSE), the Italian public body which carries out seed certification on behalf of the Ministry of Agriculture and Forestry.

Before joining the laboratory in 1998, she worked in the seed certification unit of Milan for eleven years, being involved in various tasks related to seed certification.

The laboratory is organized in various departments, carrying out a wide range of analyses (traditional seed testing and variety and GMO tests). The lab has been ISTA accredited since 2000. In 2006, new tests were included in the scope of accreditation, including of specified traits.

Rita is a member of two Technical Committees: the Flower Seed Testing Committee and the Proficiency Test Committee. She is also an ISTA technical auditor.

This is Rita's second three-year term in the Executive Committee.

Steve Jones

Member-at-Large



Steve Jones grew up in the UK, and started his scientific life studying tulips and daffodils at the Glasshouse Crops Research Institute. He graduated from the Institute of Biology in 1987, and moved to work on tree seeds with Dr. Peter Gosling, long-time Chair of ISTA's Forest Tree & Shrub Committee, at the Forestry Commission. In 1995 he completed his PhD with Peter and Prof. Richard Ellis at The University of Reading on the dormancy of Sitka spruce seeds. Steve's first contact with ISTA was as a participant in the 1989 post-Congress Forestry Tour.

In 1997, he moved to work with agricultural seeds at the National Institute of Agricultural Botany, and became the Chief Officer of the Official Seed Testing Station for England & Wales in 2000. At the same time, Steve also inherited the position of Rules Chair, and attended his first ISTA Congress in Angers, France in 2001. Steve has presented the Rules proposals at every ISTA voting meeting since then, and has also been a member of the Purity Committee.

As the elected ECOM member for the UK from 2004 to 2007 and then as *ex-officio* ECOM member for 2007 to 2010, Steve has seen ISTA become an important part of his life. He is very proud to have been elected to serve as the ECOM member for his new home of Canada for 2010 to 2013, having moved there in 2008. The title of 'Chief' has followed Steve to Canada where he is the Chief, Purity, Germination & Accreditation at the Canadian Food Inspection Agency's Seed Science & Technology Section in Saskatoon. In his ECOM role he sees himself as a representative of not only the ISTA Members in Canada, USA and Mexico but all ISTA Members.

In his spare time he enjoys vegetable gardening, bird watching and hiking along with his lifelong friend and wife Jo. Gardening in the new climate is a challenge, as is hiking and snowshoeing at -35°C .

Alexander Malko

Member-at-Large



Alexander M. Malko was born in the south of European Russia. He studied agronomy at Timiriazev Agricultural University in Moscow, from which he received an MSc in 1987. He then worked for ten years for the seed breeding chair of Timiriazev University, where he received a doctorate for his work on the methodology of research in seed breeding. At the same time he took part in the development of the legislation of the Russian seed industry, based on seed certification in Russia as well as the University's scientific knowledge. The experiences of countries with great success in seed growing were taken into account. Important support and backing in the development of the modern legislative basis were given by international organizations.

Alexander Malko is the author of over 180 scientific and educational articles and papers. He wrote and co-edited several scientific books. He participated in developing national seed quality standards in Russia for important crops, with a production for seed of more than 20 million tonnes annually.

He currently represents the Russian Agricultural Centre, a federal organization with headquarters in Moscow and 78 representative offices at the regional level. It is the largest organization in the agrarian sector in the country. Its primary goals consist in the definition of varietal-purity qualities and sowing qualities of seeds, i.e. their certification. Besides this, the organization carries out phytosanitary monitoring of Russian territory, and develops forecasts of phytosanitary conditions.

He believes that the further development of agriculture in Russia will be positively influenced by close cooperation with ISTA and other international organizations such as the OECD, UPOV and the ISF, harmonization of the seed certification process, the adaptation of national to international standards, and development of international trade.

Kamil Yılmaz**Member-at-Large**

Kamil Yılmaz is the director of Variety Registration and Seed Certification Centre of Turkey, which has been ISTA accredited since 2001. He graduated from the Faculty of Agriculture, Field Crops department, of Atatürk University in 1983.

He started his career at the Turkish Development Agency, where he was engaged in rural development projects between 1983 and 1987. He then joined the Ministry of Agriculture, and worked in the plant-breeding programmes of some field crops, particularly maize at the Sakarya Agricultural Research Institute from 1987 to 1995. He was appointed Assistant Director at the Variety Registration and Seed Certification Centre from 1995 to 1999. He has been working as Director at the same organization since 1999.

In his latest job he became familiar with ISTA and issues such as seed quality, seed technologies and accreditation, all of which fall within the remit of ISTA. However, he has experience with various aspects of seed and plant breeding matters from the start of his career.

Mr. Yılmaz attended a short-term course of six months at the CIMMYT (International Maize and Wheat Improvement Center) on Maize Breeding and Genetics in 1991. He has participated in many seminars, workshops, symposia and congresses

on seed technologies, seed quality tests, seed systems, management of seed programmes and plant breeders' rights in Turkey, and in overseas training programmes in several countries such as France, Germany, the UK and the Netherlands. From 2002 to 2008, he acted as the country coordinator for the studies carried out with the purpose of harmonizing the regulations on seed, seedling quality and plant variety protection between Turkey and the EU. Since 1995, he has also taken an active part in several assignments on the preparation of primary and secondary seed legislation, integration with the international seed system, development and continuation of the Turkey's relations with OECD, ISTA and UPOV.

During his free time he reads, goes for a walk, enjoys being with his family members and participates in the activities of vocational organizations.

Francisco Krzyzanowski**Member-at-Large**

Francisco Carlos Krzyzanowski is from Brazil. He graduated in 1971 at the Paraná Federal University in Agronomy (Agronomic Engineer), and 1974 gained a Master of Science in Agronomy–Seed Technology from the University of São Paulo (USP/ESALQ), Brazil, in 1980 a PhD in Agronomy–Seed Technology from

Mississippi State University, and in 2000 a postdoc in Seed Physiology from the University of Florida, USA.

He started his career in seed technology in 1973 at the Campinas Agronomic Institute (IAC), Campinas/São Paulo, and has since held posts at research institutes in this field: 1974–1987 at the Agronomic Institute of Paraná State (IAPAR), and finally becoming researcher at Embrapa Soybean in 1987, Londrina/Paraná. He has been editor and associated editor of the Brazilian Seed Journal (RBS) of the Brazilian Association of Seed Technology (ABRATES) since 1994 and ABRATES President since 2007. He has been a member of the Scientific Committee of the Brazilian Seed Congress since 1994. He has been adviser and co-adviser of students in the post-graduate programs of several Brazilian Universities, and a member of the postdoc program in soybean seed production and technology at Embrapa Soybean.

As researcher in seed science and technology he has been working through these years in the physiology, analysis, quality control, production, processing, drying and storage of seeds, mainly soybean. He is co-editor of the Brazilian Seed Vigor Handbook of ABRATES and of the chapter on the Tetrazolium Vigor Test of the new AOSA Seed Vigor Testing Handbook.

With about 39 years of research experience in seed science and technology, the new technologies for soybean seed vigor and analysis are his paramount interest.

His experience with ISTA was as a temporary member of the Vigour Committee, and this is his first term of office as member of the ISTA Executive Committee. ■

ISTA ANNUAL MEETING 2011

TSUKUBA, JAPAN, 13–16 JUNE 2011

The International Seed Testing Association (ISTA) takes pleasure in inviting you to its Annual Meeting, to be held in Tsukuba, Japan, from 13 to 16 June 2011. The National ISTA Designated Authority of Japan is delighted to be hosting the next ISTA Annual Meeting and would like to cordially invite you to Japan.

The ISTA Annual Meeting provides the opportunity to meet other seed experts and to exchange experiences. The aim of the meeting is to discuss and decide on proposals for changes to the ISTA International Rules for Seed Testing, and business items of the Association, with the international participation of ISTA delegates and representatives from both the seed industry and governments, including experts in seed technology, scientific research and laboratory accreditation.

Registration

Registration for the full Annual Meeting includes the Germination Seminar on 13 June, the technical presentations on 14 and 15 June, and the Ordinary Meeting on 16 June.

Registration is also possible for the Germination Seminar only. Students may benefit from a reduced fee for the Seminar.

Provision is made for both Members and non-members of ISTA.

Online registration is now possible at www.seedtest.org/AM11.

Registration will close on 15 May 2011.

Accompanying persons

The category 'accompanying persons' is applicable only for the spouse, companion and/or children of a delegate. Registration as an accompanying person does NOT include participation in any of the meetings or sessions, but only to social events, lunches and coffee breaks, the Welcome Reception and the Official Dinner.

Trade exhibition

Reach seed professionals from laboratories and organizations worldwide. Only a limited number of exhibition stands are available.

The registration fee includes 1 booth (10 m²) and 1 exhibitor at social events, lunches and coffee breaks, the Welcome Reception and the Official Dinner. An additional person may register as an accompanying person.

Registration fees

Periods	Events	EARLY registration (up to 28 Feb 2011)	LATE registration (1 March– 15 May 2011)
ISTA Members			
13–16 June	Annual Meeting incl. Seminar	600 €	660 €
13 June	Seminar only	200 €	
Non-members			
13–16 June	Annual Meeting incl. Seminar	1000 €	1200 €
13 June	Seminar only	250 €	
Students			
13 June	Seminar only	40 €	
Accompanying persons			
13–16 June	Annual Meeting incl. Seminar	200 €	
Exhibitors (Members)			
13–16 June	Exhibition booth	1400 €	
Exhibitors (non-members)			
13–16 June	Exhibition booth	1600 €	

Preliminary programme

Sunday 12 June 2011

19:00 Welcome Reception

Monday 13 June 2011

08:30–18:00 ISTA Seminar on Germination

Tuesday, 14 June 2011

08:30–18:30 Presentation of ISTA's technical work

18:30 Visit to the Seed Testing Laboratory of the National Centre for Seeds and Seedlings

Wednesday, 15 June 2011

08:30–18:30 Presentation of ISTA's technical work (cont.)

19:00 Official Dinner

Thursday, 16 June 2011

09:00–17:30 ISTA Ordinary Meeting



Accommodation

Hotel Grand Shinonome

488-1 Onozaki
Tsukuba City

To benefit from the special ISTA room rate, participants are requested to write 'ISTA' in the column 'Indicate any special requests'. Otherwise, the special rate will not be available.

Rates

- Single room per person and night including breakfast: JPY 7500
- Twin room per person and night including breakfast: JPY 7500 (occupied by 2 persons)

Booking & more information:
www.hg-shinonome.co.jp

Okura Frontier Hotel Tsukuba EPOCAL

2-20-1 Takezono
Tsukuba City
Booking & more information
www.okura-tsukuba.co.jp

Okura Frontier Hotel Tsukuba

1-1364-1 Azuma
Tsukuba City
Booking & more information
www.okura-tsukuba.co.jp

Meeting venue

The ISTA Annual Meeting 2011 will take place at the Tsukuba Office of the Research Council Secretariat of the Ministry of Agriculture, Forestry and Fisheries (MAFF).

Tsukuba

Tsukuba is a city located in the south of Ibaraki Prefecture, 60 km northeast of Tokyo.

It is known as Tsukuba Science City, a planned city developed in the 1960s, allowing visitors a glimpse of Japan's most advanced technology, including the fields of agriculture and biology. The city is home to more than 300 public and private institutes, universities and firms, with a total of about 13 000 researchers.

Transport

The Tsukuba Express rail service, or simply the "TX", provides Tsukuba with a rapid connection to the Akihabara Station in Tokyo. It is operated by the Metropolitan Intercity Railway Company, and takes 45 minutes between Tsukuba Station and Akihabara Station.

The closest major airport is Narita International Airport, which is connected to Tsukuba centre by bus. Travel time is 2 hours.

There is also a bus connection to Tokyo International Airport (Haneda). Travel time is 1.5 hours.

Key attractions

Mount Tsukuba-san with two peaks, called Male and Female, is located north of Tsukuba city. Visitors can get a fine view of the Kanto Plain from the peaks, which are accessible by cable car.

The Tsukuba-san Shrine is one of the oldest shrines in Japan, and is located on the mountainside. The shrine makes Mount Tsukuba-san the object of worship, and is also known as the god of thriving business, talismans, and matchmaking.

The Senso-ji Temple is an ancient Buddhist temple located in Asakusa, Tokyo. It is Tokyo's oldest temple, and one of its most significant. Dominating the entrance to the temple is the Kaminarimon or 'Thunder Gate', with a massive paper lantern dramatically painted in vivid red and black tones to suggest thunderclouds and lightning.

The Tsukuba Botanical Garden (14 hectares, 36 acres) is one of Japan's foremost botanical research facilities, and reproduces the environments of a wide range of plant life from every region of Japan and the world. It currently contains about 5000 taxa of domestic and exotic plants from temperate and tropical regions worldwide, with particular emphasis on the vascular plants of central Japan, East Asian ferns, Cycadaceae, Colocasia, and South American orchids.

The Tsukuba Agricultural Research Gallery shows exhibits on up-to-date results and achievements from agriculture, forestry and fisheries. ■

In memory of Dr. Haya Gelmond (1916–3 February 2010)



Official Seed Testing Laboratory & Institute of Plant Sciences
Volcani Center, ARO, Israel

Dr. Haya Gelmond was born in the USA in 1916. In her childhood she emigrated to Israel and, studied at the Herzliya Gymnasium in Tel Aviv. Later on she studied agriculture in Nahalal. Her academic studies were at the University of Reading, England.

In 1939, Haya began her work at the Experimental Station in Rehovot, at the Department of Forage and Seed Growth, headed then by Prof. M. Plaut. She obtained her Ph.D. degree at the Hebrew University in Jerusalem in 1952. Her thesis was on the dormancy of wild *Lathyrus* seeds. Dr. Haya Gelmond headed the Seed Testing Laboratory in Rehovot, and with its transfer to Bet Dagan, established the Seed Department which she directed for twenty years. Dr. Gelmond successfully incorporated applicable research with scientific service. Fields of research included ripening and seed production, germination and seed dormancy, as well as developing methods for determination of seed vigor. The Israel Official Seed Testing Laboratory acted within the framework of the scientific service.

In 1976, Dr. Gelmond was nominated Head of the Field and Garden Crops Institute at the Volcani Center, and directed it until her retirement in 1981.

Dr. Gelmond initiated and activated two important Israeli laws in the field of agriculture:

1. In 1956, the Seed Act and its regulations concerning seeds for local marketing and imported and exported seeds, as well as regulating seed quality in the country. These regulations form the basis for the work of the Official Seed Testing Laboratory until today. Furthermore, the Seed Authority was established by Dr. Gelmond, enforcing seed regulations, and is responsible for the forming of the Committee for Varieties Eligible for Sale, whose object was to determine the list of field and garden varieties eligible for sale in Israel.
2. In 1973: the Plant Breeders' Rights Law, granting breeders' rights to new varieties of plants.

Dr. Gelmond served as Chairman of the Plant Breeders' Rights Council and represented Israel at UPOV. She also represented Israel at ISTA. Dr. Gelmond was much appreciated and respected by her colleagues in the agricultural scientific community, both locally and internationally. In ISTA, her colleagues affectionately called her 'The Peanut Lady' for her innovative research and wide knowledge of peanut growth and germination.

Dr. Gelmond was a dominant, dynamic figure, among the first scientists in

agriculture in Israel. She published over 70 papers in Hebrew and over 20 in English. Haya has mentored many generations of scientists who acted in the light of her path and admired her gifted work.

For her co-workers at the Seed Department, Haya Gelmond with her extraordinary dynamic personality was the ultimate director. So typical was the epigram in her room saying: "The director is not always right but he is always the director". Haya was authoritative and tough. She excelled in delegating responsibilities and activating her employees to their maximum capacity. However, what she expected of her co-workers, she first and foremost expected and demanded of herself. She thus served as an exemplary model for high moral work standards to her co-workers. Haya was a gifted scientist, thorough and very wise, a pioneer in the agriculture research in Israel. She was perfectionist and never tired until her work, be it a paper or a meeting she prepared for, reached her complete satisfaction.

Dr. Gelmond was known for her sense of humor and sincerity. One always knew how she felt. To her credit, she never hesitated to compliment when pleased with someone's work or to reprimand when angry and dissatisfied.

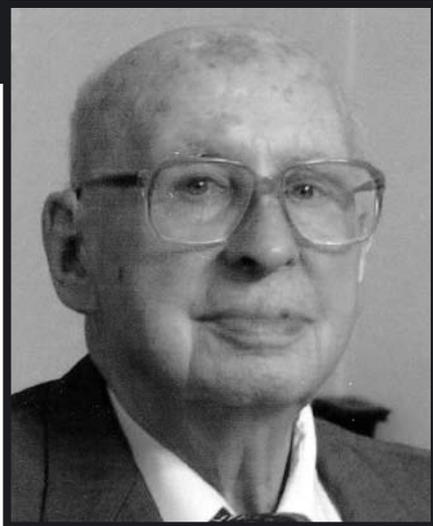
After her retirement, we visited her at her home where we were always warmly received. She was always curious and eager to hear about the work and research conducted at the seed laboratory and at the Volcani Center.

We mourn her passing, and with love, we shall always cherish her memory. ■

Esther Solomon and Lea Mazor¹

¹Member, ISTA Germination Committee

In memory of Dr. Franz Ader (21 February 1913–27 March 2010)



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On 27 March 2010, Dr. Franz Ader, retired State Agricultural Director of the Agricultural Experiment and Research Station Speyer (LUFA), Rhineland-Palatinate, Germany, died at the age of 98. Born on 21 February 1913 in Ludwigshafen/Rhein and living in Zweibrücken, Freising and Ettal, after returning again to Zweibrücken he graduated from high school in 1932. When studying agriculture at the Technische Universität Munich, he earned a Master's degree in 1937, and a Ph.D. degree in 1939 with a dissertation entitled "On the living conditions of the mould fungus *Aspergillus niger*". After military service during World War II in France and Russia, in the autumn of 1945 he returned safely home to his beloved Palatine native country. Employed by the Agricultural Trading Service, he rebuilt the seed division and the marketing of plant protection products and fertilizers.

In 1952, Dr. Ader moved to the LUFA Speyer and became Chief Officer of the Division of Seed Testing. Along with this, in 1953–1958 he was also in charge of botanical-microscopical testing of feeding stuffs and in 1953–1973 of virus testing in seed

potatoes. In addition, he ran the local variety testing of maize, soybeans, sunflowers and other agricultural crops for the German Variety Office.

In 1953 he became a member of the Seed Group of the Association of German Agricultural Testing and Experiment Stations (VDLUFA) and of ISTA. Parallel to leading work in official seed testing he was actively engaged in both associations.

In 1968–1976 he was chairman of the Seed Group of VDLUFA. During the VDLUFA Congress 1969 in Würzburg he organized the symposium "100 Years of Seed Testing" with a large international participation.

Within ISTA, Dr. Ader was a long-serving member of the Tetrazolium, Vigour and Pelleted Seed Committees. In 1968 he became chairman of the Pelleted Seed Committee. The present Chapter 11: Testing Coated Seed of the *International Rules for Seed Testing* is based to a large extent on his commendable work. In 1971 he introduced Appendix A: Preliminary Rules for Testing Pelleted Seed into the ISTA Rules. He also paid special attention to tolerances in seed testing, disseminating the tools provided by S.R. Miles in the latter's Handbook of 1963.

In performing his tasks, Dr. Ader attended the ISTA Congresses in Paris 1956, Lisbon 1962, Munich 1965, Washington D.C. 1971, Warsaw 1974, Madrid 1977 and, even after retirement, the Vienna Congress in 1980. More than 35 publications show his diverse work and research activities with vigour testing of maize seed and testing of various types of coated seeds as focal points.

A.M. Steiner¹ and M. Kruse²
¹ISTA Alumnus and ²ISTA Personal Member

In spite of retiring in 1978, together with his colleagues Dr. B. Mackay (UK) and Dr. C. Hutin (France), Dr. Ader continued the German editorship of the ISTA journal *Seed Science and Technology*, formerly the *Proceedings of the International Seed Testing Association*, until 1983, when he handed over editorship to Prof. A.M. Steiner. He also continued beekeeping and gardening until the middle of the 90s. He had started these activities in the postwar period to provide food for his family, his dear wife Brunhilde and his daughter and three sons. Until recently he followed with passionate interest the further development of the Seed Group in VDLUFA and in ISTA. Dr. Ader was honoured by VDLUFA for his achievements by the award of the Sprengel-Liebig Medal in Gold and Honorary Membership.

Dr. Ader was highly regarded by everyone as a friendly, open-minded, honest personality and as a competent, experienced and always helpful seed scientist. While he possessed a good sense of humor, he was ever so dedicated to his commitment. At all times he was sincere while performing his professional duties. On the other hand he enjoyed his leisure time with joie de vivre. The national and international workshops in Speyer will remain unforgettable, where after many a long, hard and successful working day you would find Dr. Ader in a snug winegrower's pub playing the guitar and singing old folk songs with his colleagues.

That was how Dr. Ader dedicated his life in the seed scientific community and remained associated with the Seed Group of VDLUFA and with ISTA until the end of his life (the photo shows Dr. Ader at the age of 95). Many colleagues and friends all over the world will miss Dr. Ader and keep him in faithful and grateful fond memory.

In memory of Ray Harty (2 October 1932–21 May 2010)

Colin Beavis



BeavisCS@gmail.com

ISTA is sad to report the death of Mr Ray Harty of Brisbane, Australia, who died on 21 May 2010 at the age of 77. Ray was a member of the Executive Committee of ISTA from 1983 to 1992, during which time he organized the 21st ISTA Congress in Australia.

Ray was actively involved in seed quality and testing as a member of numerous ISTA committees, developing testing methods for many tropical pasture species which were subsequently incorporated into the ISTA rules. He conducted research into storage of tropical pasture seed, and authored many articles on various aspects of seed quality and production. He became known to many in ISTA through his involvement in committees, international consultancies and training.

Ray was an Australian of Irish descent, who worked from 1950 to 1992 with the Queensland Department of Primary Industries. He started as a cadet agronomist and developed an interest in seed production issues. In mid 1970, with a Masters degree in Agriculture, Ray took responsibility for the new Seed Laboratory at Indooroopilly in Brisbane – a modern, well-designed laboratory that was to become well known to many international visitors as a training venue for testing of tropical seeds.

Ray is survived by his beloved wife of 53 years, Meg. Ray and Meg had 7 children, 13 grandchildren, and 1 great-grandchild. His family was very important to him. Ray's personal interests included playing the mandolin, investigating his Irish heritage, and taking an active involvement in his Christian faith in practical ways, including support for the Vietnamese community in Australia.

His many friends admired his integrity, wisdom and loyalty. He was a sociable man of many interests, entering actively into conversations on a wide range of topics. Ray never stopped learning, and returned to university after his retirement to gain an Arts Degree. As a kind and thoughtful man, he continued to take the effort to meet with colleagues even through his final illness.

Ray lived out his beliefs, setting an example of integrity, reliability and true friendship. He will be sadly missed. ■



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Status 1 September 2010

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CHF 414.00 (approx. USD 404.00/EUR 317.00)
from the ISTA Secretariat
(for contact details, see back cover)



Report of the Accreditation Department

Rasha El Khadem
Head, ISTA Accreditation Department

This update of the Accreditation Department was presented at the 29th ISTA Congress in Cologne.

Since October 2009, responsibility for the Accreditation Department has been in the hands of Rasha El Khadem.

The Accreditation Department has three members of staff to fulfil its duties, which can be summarized into six main areas:

- maintenance of the accreditation documents;
- auditing of laboratories;
- the Proficiency Test programme;
- sales of ISTA Certificates;
- organization of quality assurance workshops;
- support for ISTA's international representation.

Accreditation documents

The document Acc-D-01 "Procedure for Termination, Suspension and Withdrawal of ISTA Accreditation" was changed to allow earlier suspension of laboratories with poor proficiency test (PT) performance if no corrective actions are taken by the laboratory and forwarded to the Accreditation Department for review.

Previously, a laboratory was suspended when it scored an overall PT performance rating of 'below minimum performance' (BMP) after six test rounds. It could not be suspended before the sixth PT round, even when it was already obvious that an overall score of BMP could not be avoided.

Changes were also made which allow a laboratory to be suspended for just one part of its accreditation, e.g. for moisture testing only.

It is important to remember that in certain cases, suspension for one type of test will lead to another. For example, if accreditation for the purity test is suspended, it must also be revoked for the germination test, since the planting of pure seed is a requirement for the germination test.

Acc-G-03, the "Guideline for Developing Quality Documentation" was revised to

remove references to obsolete documents and provide updated examples.

Auditing

In 2009, audits were conducted on 47 laboratories. Of these, 25 were audited for the fourth time. Thirteen laboratories faced their very first ISTA audit. Six of these were located in Europe, three in North America, two in Asia, one in Africa and one in South America. A summary of non-conformities was given providing more details regarding the major three areas where improvements were required. These were related to Quality Assurance, Calibration/Equipment and Methods/Procedures.

Workshops

There were two quality assurance workshops in 2009. The first was held at the ISTA Secretariat in Switzerland, and provided detailed information for experienced laboratory staff. The second, in New Zealand, was aimed at laboratories that are currently setting up a quality management system.

The next quality assurance workshop is planned for the end of September 2010 in Canada.

Proficiency Test Programme

In Proficiency Test Round 09-3 on *Oryza sativa*, the Member Laboratories were asked to submit the results of one sample on a specimen of an Orange Certificate. The certificates were evaluated, and a summary was given of the issues that were identified. The date format used to record the testing date and issuing date was frequently not in accordance with the ISTA Rules. Species names were often misspelt or not fully stated, and the laboratory code was often missing. This is very much in line with the findings of auditors when reviewing ISTA Certificates during on-site assessments.

Acknowledgements

The Accreditation Department would like to express their gratitude for the support received. Special thanks go to the Proficiency Test Committee, in particular to Günter Müller, the team of technical auditors, the hosting laboratories and the entire ISTA Secretariat staff. ■

Laboratory accreditation changes

Status 1 September 2010

Re-accreditations

Brazil BRML0800

Matsuda Seed Testing Laboratory
Rodovia Raposo Tavares, SP 270, Km. 575
P.O. Box 37
CEP 19160-000 Alvares Machado, SP
Phone: +55 18 3226 2000
Mail: takashi@matsuda.com.br

Denmark DKML0600

Hunsballe Seed Laboratory, Hunsballe Frø A/S
Hunsballevej 6, Sørbymagle
4200 Slagelse
Phone: +45 58 57 14 70
Mail: cb@hunsballe.dk

Egypt EGDL0100

Central Administration for Seed Certification (CASC), Giza Seed Testing Station
8 Gamaa Street, P.O. Box 147
Rabee EL Gezee-Giza, 12211
Phone: +202 35 72 4721
Mail: casc@casc.gov.eg

Finland FIDL0100

Finnish Food Safety Authority Evira
Plant Analysis Laboratory, Seed Testing
Tampereentie 51, P.O. Box 111
32200 Loimaa
Phone: +358 207725350
Mail: sinikka.koylijarvi@evira.fi

France FRDL0200

GEVES
Station Nationale d'Essais de Semences
rue Georges Morel, B.P. 90024
49071 Beaucouzé Cedex
Phone: +33 241 22 5800
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Germany DEDL0300

LUFA Nord-West, Institut für Düngemittel und
Saatgut, Saatgutprüfung
Finkenborner Weg 1a, Postfach 100655
31787 Hameln
Phone: +49 51519871920
Mail: axel.goeritz@lufa-nord-west.de

DEDL0900

Landwirtschaftskammer Nordrhein-Westfalen
LUFA NRW
Nevinghoff 40, P.O. Box 59 80
48135 Münster
Phone: +49 251 2376 642
Mail: andrea.janssen@lwkn.nrw.de

DEDL1300

Staatliche Betriebsgesellschaft für Umwelt und
Landwirtschaft
Fachbereich 64: Saatgutprüfstelle
Bergweg 23
01326 Dresden-Pillnitz
Phone: +49 351 205 0291
Mail: gisela.wustmann@smul.sachsen.de

DEDL1500

LELF, Landesamt für Ländliche Entwicklung
Landwirtschaft und Flurneuordnung
Referat 44, Saatenanerkennung
Steinplatz 1, Ortsteil Wünsdorf
15806 Zossen
Phone: +49 33702 73650
Mail: saaten@lelf.brandenburg.de

DEDL1700

LLFG Sachsen-Anhalt, Prüf- und Anerken-
nungsstelle für Saat- und Pflanzgut
Heinrich- und Thomas-Mann-Str. 19
06108 Halle (Saale)
Phone: +49 345 212380
Mail: gunter.assmann@llfg.mlu.sachsen-anhalt.de

India INML0400

Advanta India Limited
104-105, 1st floor, Bhuvana Towers, S.D. Road
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500003 Secunderabad
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Israel ILDL0100

Official Seed Testing Laboratory
The Volcani Center A.R.O., P.O. Box 6
Bet-Dagan 50250
Phone: +972 3 9683463
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Luxembourg LUDL0100

Administration des Services Techniques de
l'Agriculture, Division des Laboratoires de
Contrôle et d'Essais
B.P. 75
L-9001 Ettelbruck
Phone: +352 810081240
Mail: danielle.ruckert@asta.etat.lu

Netherlands NLDL0300

Seed Testing Station, NAK
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P.O. Box 1115
8300 BC Emmeloord
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Mail: poosterveld@nak.nl

Poland PLDL0500

Plant Protection and Seeds Service
Seed Testing Station Poznan
ul. Grunwaldzka 250B
60-166 Poznan
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Mail: son-poznan@piorin.gov.pl

Romania RODL0200

Forest Research and Management Institute
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Sos. Stefanesti 128, sector 2, oficiul II
077190 București
Phone: +40 21 350 32 45
Mail: genetica@icas.ro

RODL0500

Central Laboratory for Quality of Seeds and
Planting Material
Al. Sandu Aldea 10, sector 1
01265 București
Phone: +40 21 2228420
Mail: lccsms@b.astral.ro

Slovakia SKDL0100

Seed Testing Laboratory ÚKSUP-Bratislava
Central Controlling and Testing Institute of
Agriculture, Department of Seeds and Planting
Material
21 Matuskova
Bratislava, 83316
Phone: +421 7 54775485
Mail: Monika.Holubicova@uksup.sk

SKDL0200

National Forest Center, Control of Forest Re-
productive Material, Seed Testing Laboratory
Dr. J. Gasperika 598
03 301 Liptovský Hrádok
Phone: +421 44 5222315
Mail: suskova@nlcsk.org

South Africa ZADL0100

Official Seed Testing Station
Directorate Plant Production Systems
Private Bag X250
Pretoria 0001
Phone: +27 12 8085395
Mail: PamelaS@nda.agric.za

Turkey TRDL0100

Ministry of Agriculture and Rural Affairs
Seed Registration and Certification Centre
Fatih Sultan Mehmet Cad. No: 62, P. O. Box 30
06172 Yenimahalle, Ankara
Phone: +90 3123154605
Mail: kyilmaz@tagem.gov.tr

New accreditations**India INML1400**

Bejo Sheetal Seeds Pvt. Ltd.
Bejo Sheetal Corner, Mantha Road
Jalna 431203, Maharashtra
Phone: +91 2482 232588 / 236588
Fax: +91 2482 230398
Mail: bejosheetal@hotmail.com

Moldova MDML0100

State Center for Certification of Seed Material
str. Mesterul Manole 4
2004 Chisinau
Phone: +373 22 47 60 35
Fax: +373 22 47 60 35
Mail: sccsm.rm@gmail.com

Workshop on Biotechnology Trait Detection Osijek, Croatia, 11–16 May 2009

Beni Kaufman¹, Cheryl Dollard, Bruno Zaccomer and Jean-Louis Laffont
ISTA GMO Task Force

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The Information Exchange Working Group of the ISTA GMO Task Force held a workshop on Biotechnology Trait Detection in Osijek, Croatia. The workshop took place at the Institute for Seed and Seedlings (ISS), and was the first held by the GMO Task Force in Croatia. It provided training in theory and methods of GMO detection for 15 participants from regulatory organizations and universities, including government inspectors, laboratory staff, program and policy officers, students and professors from the Ministry of Agriculture, Fisheries and Rural Development, the Ministry of Health and Social Welfare, the ISS Seed Testing Laboratory, the Croatian Food Agency, the Ministry of Culture, the Agricultural Institute of Osijek and the University of Zagreb.

The event was sponsored by the FAO, and was the final component of a Technical Cooperation Programme of the Government of Croatia entitled: 'Capacity building of regulatory agencies for handling and

monitoring genetically modified crops, products and processed food'. The workshop was designed for persons required to provide technical and advisory information related to GMOs as part of their work, and to provide them with the tools to build capacity for analysis and monitoring of GMOs. The Working Group members who developed and presented the workshop were Dr. Benjamin (Beni) Kaufman (BioDiagnostics, USA), Dr. Bruno Zaccomer (Monsanto, France), Jean-Louis Laffont (Pioneer, France) and Cheryl Dollard (Canadian Food Inspection Agency). There was also a session presented by Dr. Jelena Novak of the Croatian Institute for Public Health.

The workshop opened with a day on Sampling and Testing Plans, presented by Jean-Louis Laffont. During this session, participants learned theory and basic statistical concepts applied to seed testing, including development of qualitative and quantitative testing plans and an introduction to Seedcalc. Practical computer exercises were incorporated to give the students the opportunity to become familiar with the theory and software, and to practice applying these tools.

The following days were organized as a combination of lecture and hands-on practical laboratory exercises related to analytical methods used for GMO testing. These sessions were delivered by Beni Kaufman, Bruno Zaccomer and Cheryl Dollard. The following topics were covered:

- sample preparation and tracking;
- grinding and homogenization;
- methods for DNA extraction (2 protocols);
- DNA quantification & normalization;
- introduction to PCR;
- PCR for GMO testing (2 protocols);
- Introduction to real-time PCR and application to GMO testing;
- data analysis and interpretation;
- protein-based assays;
- best practices and quality assurance.

Students were organized into teams of three to carry out the laboratory exercises, and experiments were designed to expose participants to the different approaches and methods that can be used for GM testing. Each group was given a set of spiked flour samples that contained two different corn GM events at different spiking levels. Each group tested the samples for the presence or absence of GM content, and was





required to quantify the content following the protocols provided. The design of the program illustrated how GM products can be detected and quantified using different approaches – including different DNA extraction techniques, PCR-based screening and event-specific protocols, and protein-based lateral-flow strip tests. The hands-on portion of the workshop gave participants practical experience in using a variety of different high-tech instrumentation, including automated DNA extraction and real-time PCR machines. The statistical tools introduced at the beginning of the week were then applied to the data generated by the students during the course of the workshop, which demonstrated the exact practical application of these tools to real data sets. The exercises enabled participants to experience first-hand the realities of these types of analysis, and to develop an appreciation of the technical complexities involved in developing and executing appropriate diagnostic testing for GMOs.

The last day included a special presentation by Dr. Jelena Novak on GMO detection in food and feed, and a presentation by Cheryl Dollard on the ISTA Rules for GMO detection. This presentation

introduced the participants to the performance-based approach for biotech trait testing in seed, and the process for ISTA accreditation under this system. The workshop was closed with an open discussion among participants and instructors on the challenges to GMO testing, quality assurance and good lab practice associated with GM testing, and brainstorming on how challenges can be overcome. This provided an excellent forum for an exchange of questions, answers and ideas within the group.

The laboratory facility where the workshop took place is new – built just a year ago – and is well designed for performing molecular diagnostics. There are systems for controlled air filtration and exchange, good equipment, dedicated work spaces for different laboratory activities associated with molecular testing, and a spacious lecture room and area for coffee and lunch. The students were very enthusiastic and the program was very well received.

The city of Osijek was alive, vibrant and very beautiful. We were also fortunate to have an opportunity to take in some of the local surroundings and culture – including the Sv Petar I Pavao (Church of St. Peter and St. Paul), the main square Trg Ante

Starcevic, the Tvrda (Citadel), the promenade along the river Drava, and the Kopački Rit nature reserve, located in Baranja, where the group enjoyed a traditional meal of fish, paprika and venison stews cooked over an open fire, local Baranja wine, and ‘makovnjaca’ and ‘orehnjaca’ – traditional rolled cakes filled with ground poppy seeds and walnuts.

Many thanks to Ms. Renata Hanzer, manager of the host laboratory at the ISS, for tireless coordination activities at the lab site before and during the workshop – including a variety of “above and beyond” activities such as chauffeur, laboratory assistant, supply procurement, IT technician, lab clean-up, tour guide, financial officer, and meal hostess. Thanks also to Ms. Nevena Alexandrova, representing the FAO, who was able to join the group mid-week to observe the training. Finally, thanks to Patricia Raubo and the ISTA Secretariat for helping to facilitate the organization of the session.

The work program was very busy, but the overall atmosphere was informal, and the combination of lecture and lab work created many opportunities for discussion among the participants and lecturers. The course closed with a presentation of completion certificates to students, and many expressions of thanks to everyone. ■

The Secretariat wishes to apologize for the late appearance of this report.

ISTA Workshop on Quality Assurance in Seed Testing Palmerston North, New Zealand, 19-23 October 2009

Rasha El Khadem¹, Jette Nydam and Craig McGill

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The second ISTA Quality Assurance Workshop in 2009 took place in Palmerston North, New Zealand. There were 17 participants from 8 different countries. The workshop was hosted by Massey University, and organized by Craig McGill of the Institute of Natural Resources, College of Sciences, together with his team.

The workshop was opened by the Pro Vice Chancellor of the College of Sciences, Professor Robert Anderson, who presented an overview of agriculture in New Zealand and the role of the University. John Hampton, as 1st ISTA Vice-President, introduced ISTA and its strategy of uniformity in seed testing, and explained how ISTA is organized and how it operates. Creating a bridge to the importance of quality assurance in laboratories, Don Scott (former ISTA President) illustrated how quality assurance was established within ISTA by setting up an Accreditation Standard.

The workshop started with introductions and gave the participants the opportunity to provide their expectations of the workshop. Jette Nydam, Head of the ISTA Ac-



creditation Department, gave the lectures on quality management systems.

The first lecture dealt with the question of how quality is defined and how it can be measured. The importance of customer complaints was discussed in connection with defining the quality requirements of the customer.

The main points of the quality management systems of ISTA-accredited laboratories were also discussed, using the current ISTA Accreditation Standard as a requirement.

The lectures alternated with sessions of group work, with each group presenting their outcome to all participants. Each group developed its own work cards, training plans for employees, non-conformity process, customer complaint procedure and root-cause analysis sheet. The lecture also covered detailed explanations on how to check the suitability of the germination substrate and how to record temperature profiles in an appropriate way. Balance and divider checks were discussed, and real laboratory examples were provided.

After the lecture on the internal audit process, each group had the opportunity to practise their performance as internal auditors.

The internal quality control approach was reviewed as a suitable way for measuring the performance of a laboratory. The setup of this monitoring tool was discussed for the various tests available in a seed testing laboratory.

On request from the participants the schedule was changed to include more details on how Proficiency Test results are calculated, and which information is contained on the final result sheet.



Craig McGill (Chair of the ISTA Moisture Committee) gave a lecture on “Quality Assurance in Seed Moisture Determination”. The theoretical knowledge was practised in the laboratory by performing a capacity check, also called the soft wheat test, and by checking the suitability of moisture-proof containers.

The workshop excursion covered five different areas. The first visit was to Masterton Vegetable Seeds Ltd., with a guided tour of the processing facilities. Next, the group visited “Paua World”, where detailed information was given on how paua (abalone) and mother-of-pearl shells are crafted. Gifts made of Paua (typical for this region of New Zealand) were available from the factory shop. The next stop was the Palliser Estate Winery, where the group were given a tasting of a selection of New Zealand wines. At the Pukaha Mount Bruce National Wildlife Centre, different bird species could be observed during a walk through the extensive park. Because



of the constant rain we arrived at the dairy farm too late, and unfortunately missed the milking process.

The feedback about this workshop to the ISTA Secretariat was very positive. The participants, from different countries with different backgrounds in seed testing

and quality assurance, took full advantage of this opportunity to exchange opinions, knowledge and experiences. ■

The Secretariat wishes to apologize for the late appearance of this report.



ISTA Seed Health Workshop

Angers, France, 2–5 March 2010

Valérie Grimault

Member, ISTA Seed Health Committee

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This ISTA seed health workshop covered the detection of *Botrytis cinerea* on *Linum* seeds and on sunflower seeds, and the detection of *Fusarium* spp. on wheat seeds. It was organized at the French national seed testing station GEVES-SNES by Valerie Grimault and Valerie Cockrell. There were 21 participants from 16 countries (Europe, Kenya, Israel, Brazil), of whom some had experience with both pathogens and some with only one, and some were having their first training.

The workshop was organized in two sessions, one on *Fusarium* and one on *Botrytis*, with 11 lectures dealing with epidemiology, taxonomy, current detection methods and future possible detection methods. Lectures were given by scientists from INRA and the University of Angers, and by pathogen detection specialists from Canada, Scotland and France. More than half the workshop was dedicated to demonstrations (PCR for *Fusarium*, placing of seeds on media or blotters) and practical exercises in observing the identification criteria of the various species.

For *Fusarium*, we compared the identification of 48 isolates belonging to 13 species

on various media: malt agar + streptomycin, malt agar, PDA Difco + streptomycin, PDA Difco, SNA, DCPA, and a specific medium for *F. graminearum*. We observed differences of morphology of some isolates of the same species on the same medium, and differences between media for all species. We described all morphological criteria on the different media. We discussed about the need for a new ISTA method to detect and identify *Fusarium* species, complementary to the one for *Microdochium nivale*. The morphological criteria described and the better media identified during this workshop will be used as a basis to develop a new ISTA method.

For *Botrytis*, we compared the identification on blotters with and without malt, and discussed what laboratories exactly do when using the existing ISTA method. There were some differences in the interpretation of this method. We described morphological criteria of *Botrytis* identification on the plate, under low and high magnification. Observations will help to improve the existing ISTA methods, particularly in the description of morphological criteria of identification.

Beside all this intensive work, the participants took the opportunity to visit the city of Angers, and on Thursday we had a nice trip along the Loire river to Saumur, where we had a look at the castle. We then went to visit a mushroom cave (where we



were particularly interested in the inoculum production on very old Petri dishes!), and had dinner in a 'troglodyte' restaurant (i.e. in a cave).

We enjoyed this workshop and again thank participants, lecturers, GEVES staff, and ISTA for putting this event together. ■



ISTA Workshop on Variety Testing and GMO Detection

Bangalore, India, 6–9 April 2010

G.V. Jagadish¹ and Norbert Leist²

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The ISTA Workshop on Variety Testing and GMO Detection was organized at the ISTA-accredited seed-testing laboratory and biotechnology laboratory of Indo-American Hybrid Seeds, Bangalore, and was attended by twenty seed scientists and academicians from public-sector and private-sector institutions. The participants came from India, Kenya, Thailand and Sudan, from such notable institutes as the Indian Agricultural Research Institute, New Delhi, the Directorate of Seed Research, Mau, the National Seed Research and Training Centre, Varanasi, the state agricultural universities in Bangalore and Hyderabad, the Orissa State Seed and Organic Products Certification Agency, Bhubaneswar, the Indian Institute of Horticultural Research, and from private seed companies from India and abroad, namely Nuzevedu, Vibha, Rasi Seeds,



and Chai Tai, and from the Kenya Bureau of Standards.

The workshop was an initiative of Dr. G.V. Jagadish of Indo-American Hybrid Seeds, and was led by Prof. Dr. Norbert Leist, former President of ISTA, and former Chair of the GMO Task Force; Mr. Rainer Knoblauch, member of the ISTA Variety Committee from the Centre

for Agricultural Technology Augustenberg, Karlsruhe, Germany; Dr. Benjamin Kaufman, Bio-Diagnostics Inc., USA; and Dr. Kirk Remund, Monsanto Life Science Co., St. Louis, USA, the latter two being members of the ISTA GMO Task Force (now GMO Committee).

The aim of the workshop was to provide standard protocols for variety testing using protein electrophoresis, and to introduce the polymerase chain reaction (PCR) and its applications for GMO testing. The first was done with ultra-thin-layer isoelectric focusing (UTLIEF) of storage proteins in *Zea mays*, *Triticum aestivum* and *Helianthus annuus* depicting modern method development with IEF and the malate dehydrogenase (MDH) method. Both variety determination and the evaluation of hybridity were dealt with in theory and practice.

The GMO testing portion dealt with statistical GMO testing plans using qualitative assays and introduction to SeedCalc, followed by exercises in DNA extraction, quantification and normalization for PCR for GMO testing. The participants were also given an overview of the activities of ISTA and the GMO Task Force



to determine genetically modified seeds. Thus, all participants had the opportunity for hands-on training of UTLIEF and PCR techniques for GMO detection.

The workshop location and equipment as well as the assistance of the local crew were excellent. For example, every participant had their own laptop for the training of calculations under the supervision of Kirk Remund.

The success of the workshop can also be attributed to the engagement of a number of sponsors: to Sinus, who supplied all the chemicals for IEF, and SARSTEDT, who supported us with two IEF machines which were then gifted to the biotechnology laboratory; to Macherey-Nagel, who provided DNA isolation kits through their local distributors DSS Imagetech Pvt. Ltd. Life Sciences Division, to Roche Applied Science, who supplied PCR reagents, and to Agilent Technologies, who made available a real-time PCR instrument and associated reagents for the workshop.

On the last day, a very tasty workshop dinner with typical Indian dishes was arranged at the Hotel Lalit Ashok and attended by all the participants and ISTA



experts, joined by Dr. K.P.V. Shetty, the Director of Indo-American Hybrid Seeds. The enjoyable atmosphere gave the opportunity for interesting discussions and exchanges on the scientific as well as the personal level.

At the end all the participants expressed good experience and were very pleased

with the arrangements. This was the first workshop organized by ISTA and IAHS on genetic purity testing and GMO detection. The workshop was educative and practical, and the participants were given hand-ons experience during the practice as well as prints and CDs with all the theoretical training records. ■



ISTA Workshop on Biotechnology Trait Detection

Oberschleissheim, Germany, 8–12 June, 2010

Beni Kaufman¹, Cheryl Dollard, Bruno Zaccomer, Clara Alarcon and Jean-Louis Laffont
ISTA GMO Task Force

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The Information Exchange Working Group of the ISTA GMO Task Force held a workshop on biotechnology trait detection at, at the 'Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit' (Bavarian State Office for Health and Food Safety), Oberschleissheim, Germany. This workshop provided training in theory and methods of GMO detection for 18 participants from 13 countries, including Saudi Arabia, India, Ireland, Australia, France, Brazil, Poland, Iraq, Serbia, Chile, Austria and Bulgaria. Participants came from a variety of backgrounds, including universities, industry, and government. Lecturers included Dr. Benjamin (Beni) Kaufman (BioDiagnostics Inc, USA), Dr. Bruno Zaccomer (Monsanto, France), Jean-Louis Laffont (Pioneer, France), Cheryl Dollard (Canadian Food Inspection Agency), and Dr. Clara Alarcon (Pioneer, USA) provided technical support. Dr. Ulrich Busch, head of the institute's biomolecular unit, coordinated activities locally, with indispensable assistance provided on site

throughout the week by Frau Krimhilde Posthoff and many other lab staff.

The first day of the workshop was opened with a welcome and introductions of all participants and lecturers. After a short presentation on laboratory safety, the workshop began! Day one focused on introducing GMO testing and sample preparation. There were on DNA extraction, quantification, normalization and sample tracking, and students then performed laboratory exercises to prepare their own DNA from ground seed samples.

Day two was led by Jean-Louis Laffont, and focused on statistics and test plans – statistical considerations for seed testing such as development of qualitative and quantitative testing plans and an introduction to Seedcalc. Participants applied these techniques through practical exercises, which enabled them to become familiar with Seedcalc during the day and the days that followed.

On days three and four, Bruno Zaccomer and Cheryl Dollard introduced PCR and the application of this technique for GMO testing, from qualitative, end-point test methods through quantitative, real-time and protein-based methods. Laboratory exercises were performed to illustrate these concepts and the data collected was analyzed using the statistical

methods taught by Jean-Louis Laffont. Cheryl Dollard also gave a presentation on ISTA's Rules for GMO detection, which introduced ISTA's performance-based approach for biotech trait testing in seed and the process for ISTA accreditation within this system. The last day introduced the concept of assay and process validation by Beni Kaufman, as well as an introduction to the approach to handling stacked traits by Jean-Louis Laffont.

Throughout the week, laboratory exercises that complimented the lectures were performed in groups of three. Each group performed replicate DNA extractions on spiked flour samples containing up to two different GM corn events at varying spiking levels, and then analyzed their samples using qualitative and quantitative PCR approaches, also including protein detection by lateral-flow strip tests. The hands-on exercises allowed participants to experience first-hand the workflow of this type of testing, including analysis of the data using Seedcalc, giving a true appreciation of the complexities of GM testing and all variables that must be considered when performing such analyses.

The course ended with an open discussion on quality assurance as it applied to GM testing, and the challenges that can be encountered. The session was informal,



and new ideas and thoughts were discussed. Participants had the opportunity to ask questions and share their own experiences, which lead to excellent exchanges! At the end of the session, participants were asked to fill in a satisfaction questionnaire. Their answers will help to improve the next ISTA workshops on biotechnology trait detection.

The hosting laboratory was an excellent facility, well equipped for delivery of such a workshop – including state-of-the-art molecular equipment, an excellent lecturing theatre, and a cafeteria, which provided wonderful lunches and coffee break treats.

Oberschleissheim is situated just 13 km north of Munich – a village within a beautiful and lush region of Bavaria. The weather during the workshop was spectacular, and we were lucky to be able to enjoy some of the local scenery, including the Schleissheim Palace, and local cuisine at several

Biergartens – including various types of sausage, asparagus, ‘Knödel’, ‘Brezel’ and ‘Weissbier’. The group were treated to a tour of Munich by our host, Dr. Ulrich Busch, and an official dinner, sponsored by Pioneer Hi-Bred (a DuPont company), held at the ‘Staatliches Hofbräuhaus’ – the state brewery in Munich – where we were treated to excellent food and cold beverages, served by waiters and waitresses dressed in traditional Lederhosen and Dirndl, and accompanied by performers of traditional music and dance, including oom-pah, yodeling, ‘Schuhplattler’ and alphorn.

The workshop was made possible by the continued support of our sponsors Macherey-Nagel, who provided DNA isolation kits; Roche Applied Science, that supplied PCR reagents, and Strategic Diagnostics Inc, who made lateral-flow strips available. The course was a success in no small part due to the tireless effort and support

of Krimhilde Posthoff; she welcomed us and provided us not only with everything we could ask for in terms of laboratory support, but also with much needed coffee boosts at the most perfect times! The most important contributors however, were the participants, who were all very friendly, eager and quick to learn, and enthusiastic.

Finally, thanks to Patricia Muschick and many others at the ISTA Secretariat for helping to facilitate the organization of the session. The work program was very busy, but the overall atmosphere was informal, and the combination of lecture and lab work created many opportunities for discussion among the participants and lecturers. The course closed with the presentation of completion certificates to the students, and many expressions of thanks to everyone. ■

ISTA Workshop on Viability and Germination Karlsruhe, Germany, 10–13 June 2010

Andrea Jonitz and Norbert Leist¹

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Just before the 29th ISTA Congress, held in Cologne, Germany, the Centre for Agricultural Technology (LTZ) at Augustenberg, near Karlsruhe, organized an ISTA Workshop on Viability and Germination. The Official Seed Testing Station

Augustenberg, established more than 130 years ago, is situated in an time-honoured building, surrounded by orchards. The event too was taking place from 10 th to 13th of June 2010 and brought together the ISTA specialists and analysts of this field of seed testing.

The species covered in this workshop were selected from those found in day-to-day seed testing, thus allowing typical problems, but also difficulties occurring in ISTA proficiency tests, to be worked on

and discussed in the group. A further item was an insight into quality assurance in germination testing.

These four days of training comprised theoretical courses and practical work for providing background information on seed physiology and test procedures, followed by an introduction into the practical work in the laboratory.

For the lectures we were able to engage Prof. Dr. Norbert Leist, past-President and Honorary Life Member, who shared





his experience and knowledge in theoretical courses on tetrazolium testing with the participants. Mr. Ronald Don, the current Chair of the Germination Committee, Vice-Chair of the Tetrazolium Committee and also Honorary Life Member, gave instruction in the ISTA theory of germination, and introduced aspects of quality assurance.

The practical courses on tetrazolium testing were supervised by Senior Analyst and ISTA Tetrazolium Committee Chair Mrs. Stefanie Krämer of the LTZ Augustenberg, while the germination courses were held by Dr. Günter Müller, Head of the Official Seed Testing Station at Jena, Germany, and Chair of the ISTA Proficiency Test Committee.

As honorary guests, Prof. Dr. Dr. h.c. Adolf Martin Steiner of the University of Hohenheim, Stuttgart, gave an excellent presentation on: "Occupation by the Allied Forces in 1945 – The Outset of Worldwide Dissemination of Tetrazolium Testing", accompanied by Mrs. Werth, a witness of the events of that time.

The workshop was vastly overbooked, showing the high interest of people working in this field. The 30 participants came from 17 different countries: Belgium, Cyprus, France, Hungary, Italy, Japan, Kenya, Latvia, Netherlands, New Zealand, Norway, Poland, Sweden, Switzerland, Thailand and the United Kingdom, thus representing Europe, Africa, Asia, and Australasia.

Apart from the theoretical background of germination of monocotyledons, dicotyledons, dormancy, chemistry and use of tetrazolium salts for viability and vigour testing, the lecturers also touched on aspects of quality assurance.

In the practical courses, samples of *Hordeum* (TEZ, GER), *Oryza* (TEZ, GER), *Lolium* (TEZ, GER), *Panicum* (TEZ, GER), *Medicago* (TEZ, GER), *Brachiaria* (TEZ, GER), *Pisum* (TEZ), *Vicia* (GER) and *Portulaca* (GER) were used to demonstrate the differences between the various methods, and their applications and uses in routine seed testing and scientific research.

A fundamental question in seed testing is how to cope with fresh seeds in a germination test. To illustrate how to deal with this problem, samples of *Hordeum vulgare* were selected and prepared. Then the whole procedure, from germination evaluation via selection of the fresh seeds for the tetrazolium test, evaluation of the tetrazolium test and reporting of results according to the ISTA Rules, was carried out by the participants and discussed in the group.

Additional items on the agenda were the discussion and work on items brought up by participants, for example the question of preparation and evaluation of *Tropaeolum*, and questions regarding quality assurance requirements in germination testing.

All workplaces were equipped with the relevant tools, including a binocular microscope, allowing all participants to perform all practical exercises by themselves. In addition, modern presentation techniques allowed the participants to follow the practical instructions on a screen.



The participants received all the workshop information on paper and on CD – for personal use and for the benefit of their home laboratories. Many thanks again to all the lecturers, instructors and participants, and last but not least to the Zeiss, Jena company, who sponsored the workshop with all the necessary optical equipment.

The pleasant summer weather allowed everyone to dine on typical local dishes outside in the beer garden. This, together with tasty official workshop dinner in the old city of Durlach, gave the opportunity for forging closer contacts with each other and the international specialists. There were also contacts made with local football

fans, since the opening of the 2010 World Cup was broadcast on television.

After a prosperous and interesting workshop, many of the participants would meet again at the ISTA Congress in Cologne. ■

ISTA Workshop on Species and Variety Testing: Protein Electrophoresis Hanover, Germany, 11–13 June 2010

Gabriele Kerschbaumer and Berta Killermann¹

¹Chair, ISTA Variety Committee

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The ISTA Workshop on Species and Variety Testing: Protein Electrophoresis 2010 was hosted by the German Federal Plant Variety Office (FPVO) in Hanover. The lecturers were Gabriele Kerschbaumer (laboratory head at the FPVO), Ute Kipping and Cornelia Tepper (senior analysts

at the FPVO laboratory). Nora-Sophie Schmidt from the FPVO was responsible for the practical organization, in cooperation with Berta Killermann from the Bavarian State Research Centre for Agriculture, head of the ISTA Seed Testing Station at Freising and Chair of the ISTA Variety Committee). The latter was also a lecturer at the workshop.

The preparation of the practical exercises and theoretical presentations was carried out by the laboratory team of the FPVO. The participants were seed analysts, scientists, professors, directors or heads of

institutes of state monitoring and research institutions, ISTA laboratories and universities from Brazil, Canada, Denmark, Germany and Iraq. All were more or less experienced in protein electrophoresis.

Prior to the workshop we had our first meeting in a beer garden in the city centre of Hanover.

The first aim of the workshop was to exchange knowledge and improve experience of the established protein electrophoresis methods described in the ISTA Rules (A-PAGE, SDS PAGE, IEF of seed storage proteins). The second was to introduce



In the beer garden



Lab explanations

further methods that are internationally used in seed variety testing, such as starch gel electrophoresis of isoenzymes.

The workshop timetable was fairly tight, owing to the extensive programme of lectures and practical work which had been prepared.

The first day started with a welcoming address and presentation of the FPVO by its president, Udo von Kroeher. The morning session went on with the introduction of the participants and lecturers, followed right away by the first lecture about seed sample preparation for electrophoresis. Afterwards, sample preparation for the various electrophoresis methods and cultivars was shown in the lab, and the

participants were invited to try things out for themselves.

After lunch, we paid a visit to the storage section of the FPVO for the standard seed samples. After national listing, a standard seed sample for each variety is stored in large cooling chambers for as long as the variety exists – comparable to a gene bank. For this purpose, the seeds are dried to a defined low humidity, portioned and packed in aluminium bags. Uta Schnock, head of the seed storage section, gave the participants an interesting lecture about seed sample management.

The afternoon session was dedicated wholly to the theory and practice of the methods polyacrylamide gel electrophoresis



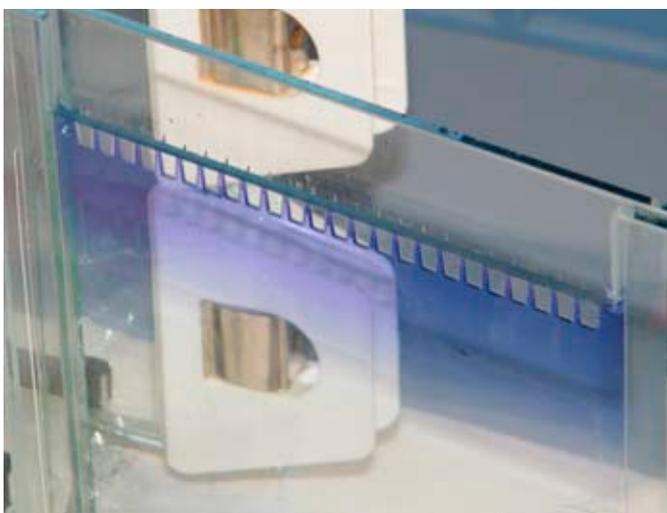
Sample preparation

(PAGE), SDS-PAGE, native PAGE and acid PAGE.

The participants gained insight into the handling of the methods in our lab: gel casting, electrophoresis runs and gel staining.

The morning session of the second day dealt with isoelectric focusing (IEF). This is a powerful method suitable for several purposes in seed testing, but somewhat tricky. After a short lecture in the theory of IEF, the participants were given the opportunity to learn about our IEF “tricks”.

In the afternoon we went on an excursion to a plant breeding laboratory: KWS-Lochow in the town of Bergen, near Hanover. The participants were given an interesting



Gels after pouring



Loading samples



Gel evaluation



At the KWS-Lochow plant breeding station

view of the management of huge seed lots in a breeders' lab. We sincerely thank the KWS-Lochow Breeding Company for giving the participants the chance to get a deep look into the breeding station, seed testing lab and seed processing facilities, and for inviting us to a coffee break with a typical Lower Saxony so-called "butter cake".

The day finished with the official dinner in the participants' hotel. We had a nice three-course meal, and the opportunity to talk a lot about the many impressions of the day and the workshop so far. As a consequence, we didn't get so much sleep that night...

Nevertheless, the third day brought along more concentrated work, this time on the method of isoenzyme examination

after starch gel electrophoresis. This method serves very well for various purposes; for example, if no seeds are available but only green material, or when bulk sampling isn't allowed for small seeds (e.g. forage grass). It's also often the method of choice when information is needed covering a large part of the genome.

In the afternoon, Berta Killermann gave an overview about ISTA and its Technical Committees and working groups, with prospects for the years to come. She invited everyone to volunteer to join the ISTA Technical Committees as active members or co-workers.

After this passionate plea, the time had come to sum up the results of the workshop. We all agreed that we had had three

days full of information and practice, giving everyone new impressions and ideas for their work. The different levels of knowledge, experience and skills in the use of protein electrophoresis for species and variety testing had been a fruitful soil for professional interchange in many lively discussions. There was agreement among the group that it would be useful for everyone to keep in touch, and continue to share experiences.

Before the participants set out for home, they were handed out their participation certificates, together with paper copies and a CD of the course materials. ■



The workshop lecturers and participants

CALENDAR

2010	13–15 October ISTA Workshop on Water Activity Measurement Applied to Seed Testing Montargis & Nogent-sur-Vernisson, France www.seedtest.org/workshops
2011	13–16 June ISTA Annual Meeting, Tsukuba, Japan www.seedtest.org
2012	11–14 June ISTA Annual Meeting, the Netherlands www.seedtest.org
2013	19–25 June 30th ISTA Congress 2013, Turkey www.seedtest.org

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See inside front cover



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