

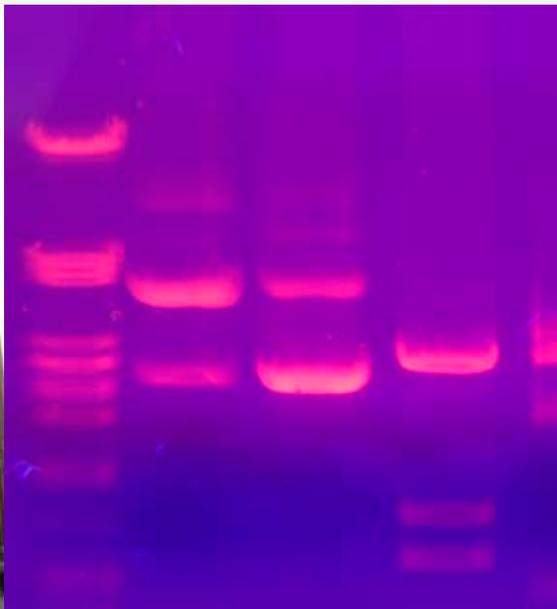
Seed Testing

INTERNATIONAL

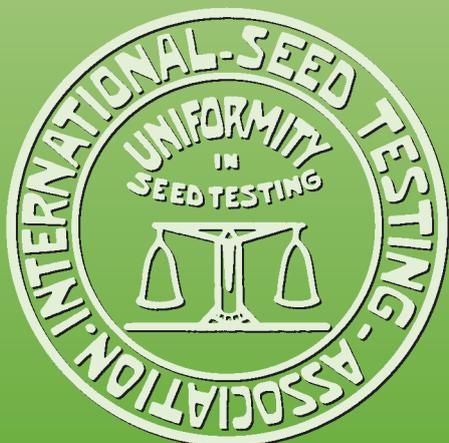
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Dear Reader,

You are holding the October issue of Seed Testing International in your hands, and naturally you will find a report on the ISTA Annual Meeting 2008 in this issue. This meeting was very interesting not only content-wise, but also from the point of view of participation. The ISTA family is growing in regard to member laboratories as well as member countries, underlining the increasing interest in agriculture and necessary enhancements in agricultural production.

At the Annual Meeting, there was a special focus on specified trait testing. The ISTA GMO Task Force prepared an excellent 'Seminar on Specified Trait Testing', held on the first day of the Annual Meeting. GM seeds and GM seed testing are, and will remain, hot topics over the coming years. In this issue of Seed Testing International, the chairman of the ISTA GMO Task Force, Dr. Christoph Haldemann, presents the history and current work of the task force, as well as a report regarding this year's Seminar on Specified Trait Testing. Furthermore, the draft ISTA Position Paper on the units for the reporting of quantitative results on adventitious presence of seeds with specified traits in conventional seed lots is included herein for your information. This important position paper was discussed during the Ordinary Meeting of the ISTA Annual Meeting 2008, and will be voted on by the government representatives at the ISTA Annual Meeting 2009.

This brings me to the next important topic – the ISTA Annual Meeting 2009. It will take place from 15–18 June in Glattbrugg (Zurich), Switzerland. The preliminary programme, registration information and organizational details can be found in this issue. At this meeting, there will be a one-day seminar on purity testing, organized by the ISTA Purity Committee and chaired by Dr. Maria Rosaria Mannino.

Planning is ongoing not only for the ISTA Annual Meeting 2009, but also for the 29th ISTA Congress, to be held in 2010 in Cologne, Germany, of which an important part of the programme is the ISTA Seed Symposium 2010. This issue contains a first call for papers for this event from the Symposium Convenor, Dr. Alison Powell, as an invitation to interested persons to present a paper on the topic 'Application and improvement of established and advanced technologies in seed testing'.

In closing I would like to draw your attention to the ISTA Method Validation Programme. In this issue of Seed Testing International, you will find an article from the ISTA President explaining the future development of method validation, a standard operating procedure (SOP) for performing a validation study, and also an article on the historical development of method validation within ISTA.

I hope you will enjoy and benefit from reading this issue of Seed Testing International.

Yours sincerely,

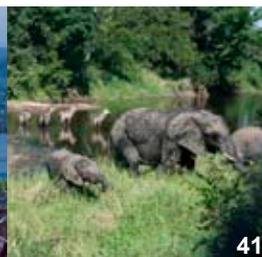
Michael Muschick



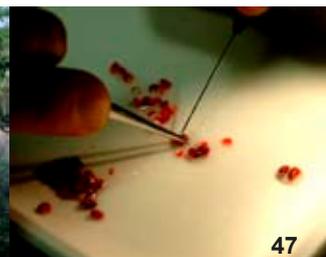
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President's Report

Dr. Katalin Ertsey



First of all I would like to thank the organizers and participants of the excellent ISTA Annual Meeting in Bologna. Besides the technical and scientific results, the Members and external experts were able to meet in a friendly Italian atmosphere. The pleasant and quiet venue was a good background for the discussions. During the social events and the visit to the new Seed Testing and Research Station of Bologna University, the city showed us both its old and new faces.

It was a good decision to restructure the Annual Meeting, starting with a one-day scientific seminar – this year with the ISTA Seminar on Specified Trait Testing. The Seminar covered the overall technical and political situation of specified trait testing around the world, as well as laboratory work. With the help of Christoph Haldemann, Chair of the GMO Task Force, a number of excellent lecturers were selected. The speakers were experts from the public and private sectors, universities and seed companies.

As part of the ISTA strategy, an ECOM/TCOM Chairs Meeting was held on the Sunday before the official events. This is the floor for regular information exchange between these two important bodies. We had a long, intensive meeting, where we agreed upon proposals to be presented at

the Ordinary Meeting, and other important topics, such as:

- revision of the ISTA tolerance tables;
- ISTA publications;
- the future ISTA copyright policy;
- the activity of the TCOM Enhancement Working Group;
- the Universal List of Plant Species;
- support for the execution of the GMO and Seed Health Proficiency Tests;
- workshops.

We reported the results of various events held directly before the Annual Meeting.

The ISF Congress in Prague (25–29 May) was a great success, with over a thousand participants, and many presentations and meetings. Both the President and Secretary General were there, and it was an unique opportunity to meet representatives of seed trade companies and associations from all parts of the world.

I gave a short report from the AOSA/SCST Joint Annual Meeting (6–12 June), where I attended for the second time. The meeting was organized at a high level, with many interesting topics. One was the possible testing and labelling procedure of native seeds. There was a one-day Native Seed Quality Symposium, and during the discussion of other Technical Committees this question arose again and again. The seed industry strongly requests quick and uniform methods for testing and labelling native seeds. The Consolidation Task Force presented the evaluation made last year for the merger of AOSA and SCST.

The ISTA Annual Meeting continued, as every year, with the TCOM Reports.

The Ordinary Meeting had a large quorum, with 46 voting delegates.

After full reports from the ECOM and the Secretary General, the delegates accepted the Changes of Rules Proposals and the Method Validation Reports.

Some interesting open questions remained for further discussion, such as the position of the Second Vice President, and the possible process of seed analyst training.

The honouring of two outstanding colleagues was a highlight of the Meeting.

Ronald Don was made an Honorary Life Member, and the valuable work of Sylvan Grégoire was recognized with the award of a Certificate of Appreciation. Both have supported the new developments in ISTA with not only high competence but also much energy.

This summer was rich in seed events. Immediately after the ISTA Annual Meeting was the 1st Global Conference on GMO Analysis, in Como, Italy. The ISTA Secretary General was a member of the organizing committee. Our attendance highlighted the importance of the question of GM threshold levels in seed lots besides feed and food.

The Annual Meeting of the OECD Seed Scheme, where the Secretary General is a regularly invited expert, took place on 1–3 July in Chicago. Important topics of collaboration are the Working Group of Varietal Identity and Varietal Purity, and the current discussion on the Strategic Plan of the Seed Scheme.

ISTA is active in all parts of the world so we have several target markets, including Africa, South America and Eastern Europe. After the spring meeting with the African seed associations in Casablanca, ISTA will be giving in October a presentation on seed quality and seed trade at the XXI. Pan-American Seed Congress and Business Session in Cartagena, Colombia, and in November at the 9th EESNET Meeting (Eastern European Network) in Siofok, Hungary.

The outcome of these international exchanges is twofold. On the one hand, all information gained helps us to form our strategy under global conditions, in the interests of our Members, and of maintaining seed quality in the market. On the other we use the opportunity to offer our services and show the benefits of joining ISTA. I hope that in the short term, these activities will come to fruit. ■

ISTA and biotech/GM crops

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The aim of this article is to provide an overview on the current status of commercial biotechnological and genetically modified (GM) crops worldwide, to give a short introduction on the history of the ISTA GMO Task Force, and to present its main activities.

Status of commercial biotech/GM crops

As a result of consistent and substantial benefits during the first dozen years of commercialization from 1996 to 2007, farmers have continued to plant more biotech crops every single year. In 2007, for the twelfth consecutive year, the global adoption of biotech crops continued to soar. Remarkably, growth continued at a sustained double-digit growth rate of 12%, or 12.3 million ha – the second-highest increase in global biotech crop area in the last five years – reaching 114.3 million ha.

In 2007, the number of countries planting biotech crops increased to 23, comprising 12 developing and 11 industrialized countries. These were, in order of hectareage, the USA, Argentina, Brazil, Canada, India, China, Paraguay, South Africa, Uruguay, Philippines, Australia, Spain, Mexico, Colombia, Chile, France, Honduras, the Czech Republic, Portugal, Germany, Slovakia, Romania and Poland. Notably, the first eight of these countries grew more than 1 million hectares each. This strong growth across all continents in 2007 provides a very broad and stable foundation for the future global growth of biotech crops.

The two new biotech crop countries in 2007 were Chile, producing over 25 000 ha of commercial biotech crops for seed export, and Poland, an EU country, growing Bt maize for the first time. The cumulative hectareage from 1996 to 2007 exceeded two

thirds of a billion hectares for the first time at 690 million ha, with an unprecedented 67-fold increase between 1996 and 2007, making it the fastest adopted crop technology in recent history. Notably, 2007 was the first year in which the accumulated number of farmer decisions to adopt biotech crops exceeded 50 million.

In 2007, the USA, followed by Argentina, Brazil, Canada, India and China continued to be the principal adopters of biotech crops globally, with the USA retaining its top world ranking with 57.7 million ha (50% of the global biotech area). Notably, 63% of biotech maize, 78% of biotech cotton, and 37% of all biotech crops in the USA in 2007 were stacked-trait products, containing two or three traits delivering multiple benefits. Stacked-trait products are a very important current and future trend, meeting multiple needs of farmers and consumers, and are now increasingly deployed by ten countries: the USA, Canada, the Philippines, Australia, Mexico, South Africa, Honduras, Chile, Colombia and Argentina, with more countries expected to adopt stacked traits in the future.

From 1996 to 2007, the proportion of the global area of biotech crops grown by developing countries increased consistently every single year. In 2007, 43% of the global biotech crop area (up from 40% in 2006, and equivalent to 49.4 million ha), was grown in developing countries, where growth between 2006 and 2007 was substantially higher (8.5 million ha or 21% growth) than in industrial countries (3.8 million ha or 6% growth). It is noteworthy that the five principal developing countries committed to biotech crops span all three southern continents: India and China, Argentina and Brazil, and South Africa. Collectively they represent 2.6

billion people or 40% of the global population, with a combined population of 1.3 billion who are completely dependent on agriculture, including millions of small and resource-poor farmers and the rural landless, who represent the majority of the poor in the world. The increasing collective impact of these five principal developing countries is an important continuing trend, with implications for the future adoption and acceptance of biotech crops worldwide (International Service for the Acquisition of Agri-biotech Applications, ISAAA).

Testing for GM seed – the ISTA strategy

To address this challenge, ISTA began to discuss this highly controversial issue under the leadership of one of its former presidents, Prof. Dr. Norbert Leist, with the goal of publishing a position paper. In 2001, the final version approved by the Executive Committee (ECOM) was published (www.seedtest.org/upload/cms/user/42ISTAPositionPaperonGMOapproved14.11.2001.pdf). The focus of this position paper lies in its strategy, where it is stated that ISTA will concentrate its activity on developing a system to achieve uniformity in testing for GM organisms (GMO), not only through uniformity in methodology, but also by a performance-based approach (PBA). The action plan for implementing this strategy, also included in the position paper, is the responsibility of the ISTA GMO Task Force, established in 2001, and initially led and managed by Prof. Leist.

The Task Force will be active in the following directions:

- An ISTA Rules Chapter for the detection, identification and quantification of GMO in conventional seed lots will be established. This chapter will not contain specific methods, but will

Table 1. Overview of the ten completed proficiency tests, including the rating results

PT	Crop	Event(s)	Participants (n)	Dispatch date	Qualitative rating				Quantitative rating ¹			
					A	B	C	BMP	A	B	C	BMP
1	Maize	T25/MON810	42	1 May 2002	33	4	2	3	0	0	0	0
2	Maize	MON810	50	1 February 2003	42	2	2	4	15	0	3	4
3	Maize	T25/MON810	40	1 December 2003	32	2	1	5	4	1	13	7
4	Soybean	GTS40-3-2	51	1 September 2004	42	3	4	2	27	8	9	4
5	Soybean	GTS40/A2704	58	1 July 2005	32	1	25	0	10	13	28	4
6	Canola	GT73	49	10 November 2005	45	1	1	3	21	2	5	7
7	Maize	MON863, NK603	57	1 June 2006	47	4	2	4	14	3	23	10
8	Soybean	GTS40-3-2	52	1 January 2007	47	1	0	4	26	7	13	4
9	Maize	MON863, NK603	56	1 August 2007	48	2	3	3	27	11	1	13
10	Cotton	MON531, MON1445, MON531 × MON1445	25	1 April 2008	24	0	0	1	11	3	4	2

A = No problem was detected in this test.

B = There are small problems, but no specific action is suggested to the participant.

C = Problems: ISTA indicates that there might be things for the laboratory to consider for explanation or correction.

BMP = Below minimum performance: ISTA indicates in writing that the results were poor and the laboratory has to explain and correct things.

¹ Participation in quantitative testing was not compulsory, and not all laboratories chose to participate.

define a level of reproducibility required to report test results on an ISTA International Seed Lot Certificate.

- The Task Force will organize proficiency tests on GMO testing in conventional seed.
- The Task Force will set up a platform for exchanging information between laboratories.

For the time being, the ECOM has decided not to integrate the Task Force into a technical committee until the next ISTA Congress in 2010.

Working programme 2007–2010 and recent main activities

The tasks below have been identified to be of importance in the work of the Task Force for 2007–2010. The programme is divided into permanent and temporary tasks.

Permanent tasks:

- continuation of the proficiency tests;
- continuation of the accreditation programme (performance-based approach);
- information exchange: web site and workshops;
- distribution of reference material in the framework of the performance-based approach.

Temporary tasks:

- participation in the Organizing Committee of the first global conference of GM analysis;
- implementation of the ISTA Seminar on GM Analysis at the Annual Meeting 2008;
- identification of stacked genes;
- publication of the proficiency test results.

Accreditation and the performance-based approach

ISTA neither develops its own methods for GMO testing nor limits the methods laboratories may use for GMO testing. Instead, each laboratory is free to choose the testing methods they consider best for their purposes. Therefore, ISTA has chosen for a Performance Based Approach (PBA) for GMO testing. With the decision to base testing of specified trait(s) following a performance based approach, ISTA has written history. The choice of a performance base approach is at this time a logical one because internationally standardized methods for these specific tests are not yet available.

Under the PBA, minimum requirements for performing test runs, including criteria for evaluating accuracy and repeatability for a given analysis, are defined.

Under the performance based approach, the laboratory can freely choose a testing method, but is required to fulfil three conditions before accreditation:

- provide performance data on successful implementation of the method as prescribed, with special focus on accuracy and repeatability;
- pass the ISTA Proficiency Test;
- pass the ISTA audit programme (on-site audit).

The relevant documents for accreditation for testing of specified traits under a performance-based approach can be downloaded at www.seedtest.org/gmaccred.

Proficiency tests

The aim of proficiency tests (PT) is to assess the ability of individual laboratories to detect the presence or absence of GM seeds and to quantify and identify their presence in samples of conventional seeds. Participants may choose their own methods.

Since GMO testing has been included in the ISTA Accreditation Programme, participation in the ISTA PTs on GMO testing is compulsory for those laboratories currently in the process of accreditation in GM seed testing.

The first PT was launched in 2002. PT 11 will be announced soon.

Table 2. Workshops conducted 2001–2007

Date	Organizers	Event	Place
3–7 December 2001	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Buenos Aires, Argentina
18–22 February 2003	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Pretoria, South Africa
10–14 November 2003	ISTA GMO TF, FAO	GMO Detection	Pretoria, South Africa
25–29 November 2003	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Nakhon Pathon, Thailand
8–9 December 2003	ISTA	ISTA Open Forum Discussion on (Semi-) Quantitative GMO Testing	Bassersdorf, Switzerland
1–2 April 2004	ISTA STA	Statistical Aspects of GMO Detection	Toulouse, France
10–14 July 2004	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Ljubljana, Slovenia
17–19 November 2004	ISTA STA	Statistical Aspects of GMO Detection	St. Louis, USA
18–22 December 2004	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Giza, Egypt
27 Feb–5 March 2005	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Beijing, China
9–13 May 2005	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Kingston, Jamaica
31 Oct–4 Nov 2005	ISTA STA	Statistical Aspects of GMO Detection	Buenos Aires, Argentina
20–24 February 2006	ISTA GMO TF, FAO	Varietal Verification and GMO Detection	Izmir, Turkey
27–30 March 2007	ISTA	GMO Detection and Statistical Aspects	Izmir, Turkey
1–3 May 2007	ISTA	Statistical Aspects of GMO Detection	Iguaçu, Brazil

Table 1 gives an overview of the ten completed PTs, including the ratings for the qualitative and quantitative results.

The most difficult and time-consuming task in preparing PTs is the procurement of the seed material for both the ‘positive’ and ‘negative’ seeds.

Proficiency test data rating

Rating systems for qualitative (presence/absence) and quantitative results are developed and tested by the ISTA Statistics Committee. Detailed information was published in Seed Testing International Nos. 128 and 130, which can be downloaded at www.seedtest.org/sti.

Workshops

On behalf of the FAO, and in co-operation with the Statistics Committee and the GMO task force, ISTA organizes workshops on the statistical aspects of GMO detection, usually with a first part, covering methods for GMO detection (DNA- and protein-based approaches), and a second, dealing with the statistical aspects. These workshops are unique opportunities to assist in transferring technology from one laboratory to another, as well as

promoting the international trading of improved seed varieties for agricultural, horticultural, vegetable, and forest tree seeds. Furthermore, they offer excellent opportunities for international participants to establish networks. Workshops that have taken place to date are listed in Table 2.

Information platform for GM seed

An information platform for GM seed, complete with relevant information and links (transgenic event descriptions, analytical methods, statistical tool, reference materials, literature, ISTA accreditation for specified traits, ISTA GMO Task Force) has been established (www.seedtest.org/gmaccred). This information is updated regularly.

Stacked genes

One of the challenging topics in which ISTA is also playing a leadership role is the issue of stacked genetic events. A plant with stacked genes or stacked traits is a plant containing two or more transgenes, usually as a result of the crossing of two (or more) transgenic plants with different transgenes. Since certain testing procedures may count a GMO with stacked genes

twice or more, depending on the stacking level, stacked traits may be difficult or even impossible to account for when quantifying the GMO content of a sample. At present, there is no testing method to distinguish between stacked and non-stacked events in a ground sample. This is a huge problem for all countries with legislation in which a threshold for GMOs is in force; for example, in the EU for authorized specified traits there is a threshold of 0.9% for food and feed (Regulation (EC) No. 1829/2003).

The Chair of the ISTA Statistics Committee, Jean-Louis Laffont, is developing, together with other ISTA members, a statistical tool which for the first time will allow discrimination between stacked and non-stacked events in conventional seed lots. He presented a preliminary version at the ISTA Seminar for Specified Trait Testing in Bologna, Italy on 16 June 2008. This tool will be made available on the ISTA website in due course.

In the future, the fast-changing field of biotech and GM crops will remain challenging, with many new requirements to be fulfilled. ISTA stands ready to meet these challenges. ■

Draft position paper on ISTA's view regarding the units for the reporting of quantitative results on adventitious presence of seeds with specified traits in conventional seed lots

This document was established, discussed and agreed by the ISTA GMO Task Force, and submitted to the ISTA Executive Committee for consideration. It was submitted to all ISTA Designated Authorities, ISTA Members and ISTA Observer Organisations for information prior to the ISTA Ordinary Meeting 2008. It was discussed during the Ordinary Meeting 2008, held on Thursday, 19 June 2008 at the Hotel Savoia Regency, Bologna, Italy, under Agenda Point 13: 'Any other business raised by consent of the Executive Committee'. The final version shall be submitted for vote at the Ordinary Meeting, 18 June 2009, Glattbrugg (Zurich), Switzerland.

This draft position paper is in accordance with the 'position paper on ISTA's strategy regarding methods for the detection, identification and quantification of genetically modified seeds in conventional seed lots'. It was presented for discussion at the ISTA Ordinary Meeting 2008 in Bologna.

1 Introduction

The detection and quantification of seeds with specified traits is a challenging area, with continual technical developments and open questions.

There are various approaches on regulatory, trade and political aspects throughout the world.

ISTA supports a scientifically based approach where various methods are available for the detection, identification and quantification of seeds with specified traits in conventional seed lots, as well as in whole seed lots with the specified traits.

Since 2002, ISTA has been organizing worldwide proficiency tests (PTs) on GMO testing to support laboratories in their quality management and for the documentation of laboratory performance, which is a necessary requirement for the ISTA accreditation scheme. In these PTs, the units for reporting quantitative results are linked with the analysis methods used; consequently, the units accepted for reporting quantitative results play a crucial role in the evaluation of laboratory performance.

2 Situation at the end of 2007 and outlook

2.1 Methods used for quantitative analysis

It is widely recognized that, among the various methodologies available, real-time PCR-based quantification is, for the time being, the most appropriate way for the quantification of adventitious presence (AP) of GMOs in processed food and feed. However, alternative methods, based on the identification of individual plants or seeds (particularly by means of bioassays), or on the analysis of bulk seed (subsampling approach) and relying on protein-based or end-point PCR methods, can also be used for the measurement of AP in seeds and grains.

Subsampling, which can be carried out with any kind of qualitative assay, such as endpoint PCR, is robust and efficient when the results are to be expressed in % number of seeds.

2.2 Units of expression of quantitative results

Various units have already been extensively used. The most common are % number of seeds, % mass of seeds, and % DNA copies. In the ISTA PT programme on GMO testing, all three units can be used for reporting results. However, reporting in % DNA copies is ambiguous, since results can be expressed per haploid genome or not, and the zygosity of the certified reference material (CRM) used can vary.

The unit % DNA copies should be understood as 'the percentage of numbers of specified-trait DNA copies in relation to numbers of target-taxon-specific DNA copies, calculated in terms of haploid genomes'. Laboratories reporting their

results in % DNA copies should prepare calibration curves of haploid genome numbers for both GM and taxon PCR targets.

Since quantification based on real-time PCR is relative and directly linked to the calibration curve used, laboratories should report their results by % mass if they prepare their calibration curve using a CRM by mass fraction (g/kg) and without taking into account the zygosity of the CRM used. This is true even if the laboratories obtain the number of copies by multiplying the DNA quantity by a constant (number of haploid genomes per ng DNA). Most of the CRM in use for quantification of seeds with specified traits is produced by composing mass fractions (g/kg).

A first CRM for MON810 on the basis of % DNA copies has been available since December 2007.

2.3 Impact of biological factors (or genetic structures) of seeds or kernels on quantification based on real-time PCR

It is well known that biological factors, both of the CRM used for preparing the calibration curve and of the sample to be analysed, can impact significantly the final quantitative results (Trifa and Zhang, 2004; Papazova et al., 2006; Holst-Jensen et al., 2006; Zhang et al., 2007).

In maize, for example, different seed tissues have different ploidy levels (embryo: 2n; endosperm: 3n; tegument: 2n). This influences the number of trait copies in a seed depending on the traits carried by the mother (2 transgenic copies for the endosperm) or father (1 transgenic copy for the endosperm) of the hybrid. Since the endosperm accounts for 80–90% of total kernel weight, this tissue has a major impact. Furthermore, the relative contribution of these tissues can vary depending on the cultivar. These facts can influence quantification in % DNA copies. This issue is still an open question with research going on.

2.4 Detection and quantification of AP in seeds

Analysis of seed lots has several purposes. Requirements for trade and regulatory affairs differ from country to country. A single method can not fulfil all needs at a reasonable cost and in a reasonable time.

PCR and bioassays are seen in some countries as two well-accepted techniques for quantification, the one or the other being selected depending on the aim of the test and the level of precision required.

Subsampling methods allow quantification based on presence/absence per subsample (pool) of seeds. They also allow possibilities to detect and quantify single and stacked genes in a given seed lot via ISTA methodology developed by the Statistics Committee.

For the time being, the detection and quantification of single and/or stacked genes cannot be achieved by real-time PCR on a single bulked sample.

Acceptance of more than one unit can avoid the difficult question of conversion factors. A simple mechanical conversion between units is complex or even impossible, due to the diversity of situations. Buyers, sellers and competent authorities can select the unit and methodology that are best fitted for their particular purpose.

For non-experts it is difficult to interpret results in % DNA copies. For trading in seeds that will be grown to become plants, the unit % number of seeds can be, in several circumstances, the most appropriate.

Real-time PCR is a rather expensive approach; there are situations where simple and fast methods such as strip tests in the field are needed or preferred, rather than sending samples to a laboratory for PCR analysis.

There is a high demand for methods for the detection of unapproved traits. This goal cannot always be achieved by real-time PCR. In some instances, accessibility to the sequence or to an approved method to detect and quantify an unauthorized trait is a problem, even for competent authorities.

Micro-array chip technology might in the near future serve as a screening tool to detect many traits simultaneously at a reasonable cost and effort.

3 ISTA's position

ISTA holds the opinion that any restriction to one single technique could impair the capability to detect and quantify seeds with specified traits. Methods that have been proved to be fit for the purpose, repeatable and reproducible, shall be

accepted. ISTA believes that, in order to cope with the various aims and situations where quantification of seeds with specified traits is required, more than one unit should be accepted for reporting quantitative results of seeds with specified traits in conventional seed lots. Three units are available and shall be accepted:

- % DNA copies;
- % mass fraction;
- % number of seeds.

When laboratories report their results in % DNA copies, the comments in 2.2 should be taken into account in order to avoid ambiguity in the comparison of results between laboratories.

There is no generic conversion factor between % number of seeds and % DNA copies. However, in certain cases with appropriate knowledge, specific conversion of the different units is possible.

Lot sampling variability must be taken into account.

Various reliable ways (method + testing plan + decision rule) are available to define appropriate tests at a reasonable cost and in a reasonable time. ■

International Rules for Seed Testing Edition 2009

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Complete set in two parts (Rules & Annexe to Chapter 7, including Amendments 2009)

The *International Rules for Seed Testing* are ISTA's primary instrument to promote uniformity in seed testing. The ISTA Rules have 17 sections that provide definitions and standardized methods to be used in, for example, sampling, testing seed lot quality and reporting results for international trade. The ISTA Rules are also a useful reference guide to germination conditions and methods for over 1000 species.

The *International Rules for Seed Testing* are approved by and amended at ISTA Ordinary Meetings on the basis of advice tendered by the ISTA Technical Committees. The Edition 2009 (effective 1 January 2009) includes the latest changes which were passed at the ISTA Ordinary Meeting 2008, held at Bologna, Italy, on 19 June.

Price: CHF 393.00 (approx. USD 357.00/EUR 243.00) from the ISTA Secretariat (for contact details, see back cover)



Report from the ISTA Annual Meeting 2008

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The ISTA Annual Meeting 2008 was held in Bologna from 15 to 19 June, and was organized in collaboration with the Laboratorio di Ricerca e Analisi Sementi (LaRAS), the University of Bologna seed testing laboratory, celebrating its centenary this year. The venue was the Savoia Hotel Regency, where all the major events took place. Some participants were also hosted by the Savoia Country House and the nearby Holiday Inn.

The registration for the meeting opened on the afternoon of 15 June, and this was followed by a cocktail reception to welcome all the participants.

On 16 June, the Annual Meeting was preceded by the ISTA Seminar on Specified Trait Seed Testing, which was attended by 170 people (see separate report on page 14). At the closing of the Seminar, Mr Sylvain Grégoire, for whom it was



The welcoming reception around the olive tree in the hotel courtyard.

the last occasion working with ISTA, was honoured with a certificate of appreciation expressing gratitude for all his dedicated work on behalf of the Association and for the substantial assistance he had given to

many of his colleagues in ISTA in the past. During that day, in a parallel session, the ISTA Technical Auditors came together separately for their annual gathering (see separate report on page 12). In the evening,



Awaiting the onslaught...



Sylvain Grégoire with his newly awarded certificate of thanks.



Critical appraisal of lab equipment during the tour of LaRAS.



Discussing the problems of germination tests on pleated paper (note escaped seeds scattered over the table).



Analysis of specified traits.



Prof. Dr. Attilio Lovato welcoming the guests to the centenary party at LaRAS.

the LaRAS used the occasion to celebrate its 100th anniversary with the ISTA members by organizing a fabulous cocktail party and guided tours of their laboratories at the University of Bologna.

The two following days were dedicated to the presentations of the technical work of the Association by the Technical Committees. These presentations are available for you on the ISTA web site at <https://www.seedtest.org/AM2008>.

Some Technical Committees held additional meetings on 17 June, to which interested participants were invited: the Advanced Technology, Bulking and Sampling, Germination, Moisture, Proficiency Test, Purity and Variety Committees, and the GMO Task Force.

On 19 June, ISTA held its Ordinary Meeting, attended by 152 participants. All of them witnessed the President calling Mr Ronald Don on to the stage during her welcome address, to make Mr Don an Honorary Life Member of the Association. This was only the second time ever that a person has been honoured with this award by the Executive Committee. The Members approved this well-earned gesture to Mr. Ronald Don by giving him a standing ovation.

The day continued with the approval of last year's meeting minutes, the report of the Executive Committee and the report of the Secretary General, which included



The Bologna University building that is home to LaRAS.

the financial results of the Association. The members then approved a 2% increase in the membership subscription rates for 2009, as recommended by the Executive Committee. Thereafter the proposed changes to the International Rules for Seed Testing 2008 were up for debate and vote by the ISTA voting delegates. With the exception of items *C.3.2: Reporting the weight of the purity working sample*, and *C.4.1: Modification to the precision to use when weighing samples for other seeds determination by number*, which were withdrawn from the vote upon the recommendation of

the Purity Committee, all proposed changes were accepted by vote, with only some minor editorial changes suggested.

The next item on the agenda of the Ordinary Meeting was the consideration and adoption of reports. Each chairperson of a Technical Committee or Task Force was asked to come on stage to receive questions from the members and a small present of acknowledgement from the President. At this point the two parting staff members of the ISTA Secretariat, Ms Martina Roesch (Head of the Accreditation Department) and Mr Gerhard Schuon



The ISTA Annual Meeting 2008 at the Savoia Hotel Regency, Bologna.



Ronald Don with his certificate of Honorary Membership.



Official photo of the participants of the Annual Meeting 2008.

(TCOM Coordinator) received a round of applause and a vote of thanks from the President and the meeting for the work they had carried out for the Association.

The place and date for the 2009 Annual Meeting were then announced: Zurich, Switzerland, 15–18 June (more on p. 17).

Items on Agenda point 13 were now considered. The Executive Committee had announced two issues for discussion with the members. First, the future of the position of a 2nd Vice President of ISTA was discussed. The Executive Committee suggested to bring forward a constitutional change for decision of the ISTA voting delegates at the Ordinary Meeting 2009. The constitution change would involve the removal of the position of a 2nd Vice-President. Instead, the person responsible for the organization of the next Congress

would be appointed as a Member-at-Large of the Executive Committee, and the number of Members-at-Large of the Executive Committee would be increased from the current eight members to nine.

Second, a draft position paper on ISTA's opinion regarding the units for reporting quantitative results of the adventitious presence of seeds with specified traits in conventional seed lots was presented (see p. 6). It was suggested that this would be voted on by the ISTA voting delegates at the 2009 Ordinary Meeting in Zurich.

Both these items found the agreement of the members and will therefore be put forward for voting at next year's Ordinary Meeting.

As a third item under this agenda point, a presentation was given on a suggested way forward with regards to the

implementation of the ISTA seed analyst training programme. As this item caused a lot of discussion and requests for clarification from the members, it was decided to return to this subject with more information and continue discussions next year.

At the closing of the meeting by the President, Prof. Dr. Attilio Lovato, Honorary President of ISTA, and Dr. Enrico Noli, who had initiated the invitation to hold this Annual Meeting in Bologna, were thanked and honoured for the excellent organization and choice of conference facilities. Particular note was made of the superb location chosen for the official dinner, the Villa Guastavillani, an ancient Villa in the Bologna hills, which was host to 170 participants from 50 different countries. ■



The Honorary President and President

Coming soon...

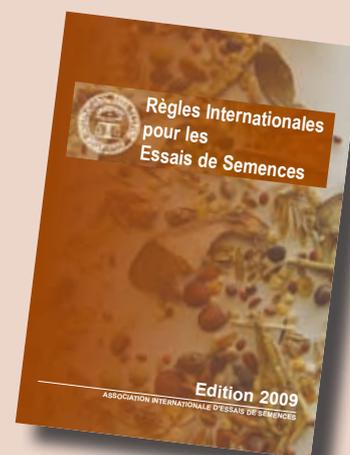
Règles Internationales pour les Essais de Semences Edition 2009

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French translation of the International Rules for Seed Testing

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Auditors' Meeting, Bologna 2008

Jette Nydam

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Introduction

On the occasion of the ISTA Annual Meeting 2008, the auditors gathered for a whole-day meeting on 16 June. This meeting was organized as a workshop by the Accreditation Department, and the chairpersons from the Germination and Bulking and Sampling Committees were invited to give presentations on their committees' views on particular problems raised during the audits. The first subject was 'Temperature measurements and their uncertainty', and the second 'Automatic sampling and check of dividers'. Unfortunately, only seven of ISTA's technical auditors were able to participate.

Temperature measurements and their uncertainty

Ronald Don, the chairman of the Germination Committee, presented an introduction to temperature measurements. A summary of this introduction and the discussion is given below.

Required accuracy

The required accuracy of the thermometer depends on the test; e.g. for an accelerated aging test, a much higher accuracy is required than for temperature measurements in moisture and germination testing.

Uncertainty

An uncertainty of 0.5 means that a temperature reading of 1 °C may mean an actual temperature between 0.5 and 1.5 °C.

Relation of accuracy

The accuracy is related to the actual reading. For example, an ice point reading of 1 °C indicates that all readings with that thermometer shall be adjusted by 1 °C to arrive at the true temperature.

Immersion

On partial-immersion thermometers, there is line or other sign indicating the point to which the thermometer must be inserted for correct measurement of the temperature.

A full-immersion thermometer must be fully immersed in the subject of which the temperature is to be measured, e.g. *inside* a refrigerator.

With Copenhagen tanks, neither partial-immersion nor full-immersion thermometers can be used. A special probe with a thermocouple (contact probe) is required in order to measure at the level of the seeds. With Copenhagen tanks, it is especially important to measure the temperature of the wet filter paper, and not that of the water bath beneath the samples. To achieve a temperature of 30 °C at the level of the seeds, a water temperature of 40 °C may be required.

Exceeding tolerances

The question arose how long the temperature may exceed the tolerance of ± 2 °C, e.g. when measured using data loggers. It was concluded that it shall be verified whether such variations occur without any obvious reason, or because the door of the germinator was opened. If there was no obvious reason, and there are frequent measurements outside the ± 2 °C tolerance, the laboratory shall investigate and change the settings of the germinator in order to be able to keep the temperature within the prescribed range.

Alternating temperatures

For alternating temperature equipment, the recommendation is to have at least three readings per day, of which at least one is at the low temperature. It is recommended to check the change over time between the high and low temperature phases once per month.

Number of thermometers

The number of thermometers required for daily monitoring of the temperature in germination chambers depends on the size of the room. In large, walk-in rooms, three thermometers are required. The recommendation for the maximum difference between these three thermometers is 2 °C. This is to ensure that the tolerance in the room of ± 2 °C is not exceeded.

The temperature profile shall be established before the equipment is taken into service. In most cases, 9 points in each climate chamber shall be measured. The profile shall be repeated in the case of breakdowns or major repairs of the climate chamber's temperature regulation, etc.

Automatic sampling and check of dividers

Leena Pietilä, the Chairperson of the Bulking and Sampling Committee, presented an introduction to automatic sampling and checks of dividers. The summary of the presentation and the discussion is given below.

Automatic sampling

Since an automatic seed sampler is a piece of equipment like any other used in seed sampling and testing, the checking of such equipment shall follow the same requirements as for other types of equipment (see the Accreditation Standard). This means that there shall be a programme for the checking of automatic samplers (e.g. yearly). When purchased and installed, the automatic sampler shall be checked. This can be done by following the protocol presented in the ISTA Sampling Handbook, i.e. sampling of 10 seed lots using the automatic sampler and comparing the results with those from a manual sampling. It is recommended to draw the samples and analyse seed for purity, content of other seeds and/or germination, depending on the species for which the automatic sampler is to be used.

Check of dividers

Dividers, like other items of equipment, must be checked and meet relevant specifications. There are various types of dividers; the checking of their suitability should be adapted to the type of divider. Dividers where the user may not have an influence on the dividing procedure when using the equipment must be checked for proper function. Both the divider and the person using the divider must be checked when the way it is being used may influence the dividing process.

Sealing

Chapter 2 states that a seed lot does not need to be sealed as long as it is under the control of the seed sampler. If the seed lot leaves the warehouse, it must be sealed.

Subcontracting and authorization of sampling

There was a discussion on the difference between subcontracting and authorization of sampling schemes operated by an organization different from the accredited laboratory. Authorization is directly linked to or included in the quality management system of the laboratory accredited for sampling. The laboratory must ensure that relevant requirements for sampling are met. Subcontracting is done with a laboratory having its own accreditation, e.g. for sampling.

Other items

The meeting also dealt with the main changes in the Moisture and Germination chapters, as well as on the issuance of certificates. The working group in charge of reviewing the whole Germination chapter for improvement potential is still collecting suggestions. It was agreed that the working group shall receive a list of non-conformities that have been recorded by the Accreditation Department with regard to germination testing.

Conclusion

All participants agreed that this year's meeting was a success, and that they would like to continue with this type of meeting in the future. ■

Changes to the *International Rules for Seed Testing*

Again this year, a number of proposals for changes and amendments to the ISTA *International Rules for Seed Testing* were submitted for voting by the nominated ISTA Designated Members on behalf of their respective Governments, under Agenda point 9.

This year saw the continuation of the project to re-arrange the chapters and merge the Rules with the Annexes. The 'old' Chapter 1, which was the Introduction, was revised and made into a separate introduction. This was to allow the renumbering of the most important chapter of the ISTA Rules, Chapter 17 Certificates, as the 'new' Chapter 1.

Among the further changes are the following:

New species

Addition of *Cucumis* spp., *Cucurbita* hybrids, *Cucurbita* spp., *Lycopersicon* hybrids and *Lycopersicon* spp.

Introduction

Revised Introduction, without chapter number; new form "Proposal for inclusion of new species in the ISTA Rules".

Chapter 1: Certificates

Renumbering and of Chapter 17; improvements to processes described.

Chapter 2: Sampling

Increase in seed lot weights for sorghum and pulses to 30 000 kg.

Chapter 3: The Purity Analysis

Modification to 3.7 Reporting results. (The proposal "C.3.2 Reporting the weight of the purity working sample" was withdrawn.)

Spinacia was moved to PSD 2, and PSD 2 was modified.

Modification to 3.2.3.5 to correct erroneous deletion of *Berberidaceae*, *Pinaceae* and *Taxaceae*.

Chapter 4: Determination of Other Seeds by Number

The proposed modification to 4.7 Reporting results was withdrawn.

Chapter 5: The Germination Test

Changes to germination conditions for *Cynara cardunculus*.

Addition of new method to the ISTA Rules for *Pisum sativum*: "Top of Crepe Paper with Sand (TPS)"

Chapter 6 Tetrazolium Test

Addition of new procedures for *Allium*, *Lycopersicon*, *Lactuca* and *Cucumis*.

Chapter 7: Seed Health Testing

Addition of new method: 7-025: Detection of *Aphelenchoides besseyi* on *Oryza sativa* L.

Chapter 8: Species and Variety Testing

Improvements to the testing method to detect bitter seeds in lupin samples (*Lupinus* spp.): Section 8.8.2.

Chapter 17: Certificates

Renumbering to Chapter 1. ■

ISTA Seminar on Specified Trait Testing

Dr. Christoph Haldemann
Chair, ISTA GMO Task Force

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It was a decision of the ECOM to have, prior to the official annual meetings, a seminar related to one of its activities. This year the very first ISTA Seminar on Specified Trait Testing took place in Bologna, Italy, on 16 June.

The aim of the seminar was to provide new and important information regarding the overall situation of specified trait testing in seed worldwide, as well as to provide education and present useful tools regarding work in the laboratory.

The seminar was divided into three sessions:

- Information regarding the political and technical situation;
- Useful information for the work in the laboratory;
- Work and progress within ISTA.

The first session was opened by Marcel Bruins, Secretary General of the ISF. In his presentation he gave an excellent overview of the situation in the international seed trade, and its challenges and consequences.



He pointed out that since 1996 the total area of biotech crops worldwide has been continuously increasing and new GMOs with new traits have been developed, such as drought-resistant rice, flood-resistant corn and rice, non-allergenic soybeans, rice and wheat, crops with increased nitrogen efficiency etc. He spoke about the economic aspects of GMOs, including the challenges and consequences of higher regulatory burdens.

Yves Bertheau, Director at the Institut National de Recherche Agronomique (INRA), Versailles, France, and coordinator of the EU Co-Extra programme (GM and non-GM supply chains: their CO-EXistence and TRAcability) gave an overview of the GMO situation in Europe and the Co-Extra project, financed by the EU.

According to the Eurobarometer, 76% of European public opinion is against GMOs, but public opinion may change.

There is a strong demand in the EU for rapid and cost-effective methods which do not affect the price of the end product.

There is a high requirement for the detection of unknown, i.e. not approved GMOs.

The objectives of the Co-Extra project were presented: coexistence, traceability and practical implementation, where the technical, economic and legal aspects must be taken into account. (regularly updated information is available at www.coextra.eu/news/)

The first session was closed with a presentation on the GMO situation in Argentina, where GM seed is grown, given by Ana Laura Vicario from the Instituto Nacional de Semillas (INASE), Buenos Aires, with the following topics:

- organization of the political bodies;
- regulatory bodies: new GMO events approval;
- the regulatory process;
- GMOs in Argentina;
- production of seeds with non-commercial events.

In the second technical session, much very useful and practical information for day-to-day work in the laboratory was presented.

The first presentation, given by Enrico Noli, LaRAS, University of Bologna, Italy, was an overview of the latest developments in the field of detection methods. He presented the whole range of available methods, ranging from bioassays, protein-based methods and DNA-based methods to high-throughput methods such as microarrays. He explained the pros and cons of the various methods and for which tasks they are best used.

The next presentations, given by Sylvain Grégoire, GEVES, France and Kirk Remund, Monsanto US, dealt with the Seedcalc program. Seedcalc is an Excel application written for Windows 2000 and XP and can be downloaded free of charge from the ISTA web site (www.seedtest.org/en/content---1--1143.html). It can be used to design seed testing plans for purity and impurity characteristics, including testing for adventitious presence levels of biotech traits in conventional seed lots. It can also be used to estimate purity or impurity in lots or samples when results are available. Sylvain Grégoire gave an introduction on the background of the mode of operation of Seedcalc, and on how to use it to design testing plans.

In the following two presentations, the designs of plans for testing for the adventitious presence of GM seed in non-GM seed lots (Sylvain Grégoire) and the genetic purity of seed lots of GM varieties (Kirk Remund) were given. The subject matter was explained in detail with the help of most illustrative examples.

In the next presentation, also by Sylvain Grégoire, the controversial issue of units of measurements was discussed. Based on the evaluation of ISTA Proficiency Tests, he showed that results reported in the three units % mass fraction, % seed number and % number of haploid genome copies can be equally accurate, reliable, repeatable and reproducible. However, in some

laboratories, with all three units there were serious problems regarding under- and overestimation of the results. In another example it was shown that using a different unit could lead to different results. The message is to select the unit which is fit for purpose.

On this basis, the ISTA GMO Task Force wrote a draft position paper on ISTA's view regarding the units for reporting quantitative results on the adventitious presence of seeds with specified traits in conventional seed lots (www.seedtest.org/am2008).

The second session ended with a presentation given by Jean-Louis Laffont, Pioneer, France, in which worldwide for the first time in public a statistical tool was presented which allows the quantitative estimation of a mixture of stacked and non-stacked genes in a seed lot (a plant with stacked genes or stacked traits contains two or more transgenes, usually as a result of the crossing of two transgenic plants with different transgenes. Since certain testing procedures may count a GMO with stacked genes twice, stacked traits may be difficult to handle when the GMO content of a sample is quantified). The sophisticated mathematical model is based upon a 'maximum-likelihood' estimation and runs on the R package, a free software package for statistical computing and graphics. The generalization of the model to n-stack assessment is possible. The introduction of assay uncertainty, i.e. false-positive and false-negative rates into the formulas, is one of the next steps in the further development of this computing model.

ISTA is also playing a leadership role in the most challenging issue of stacked genetic events. This tool is planned to be made available on the ISTA web site.

The third and last session started with a presentation by Christoph Haldemann, ALP, Switzerland, and Chair of the ISTA GMO Task Force. He gave an overview of the ISTA strategy and the action plan. The strategy is based on the Position Paper on ISTA's Strategy regarding Methods for the Detection, Identification and Quantification of Genetically Modified Seeds in Conventional Seed (www.seedtest.org/pos-paper). Of note in this context is that ISTA is focusing its activity on developing a system to achieve uniformity in GMO testing results by a performance-based approach (www.seedtest.org/

gmaccred), and that the development of methods for detection, identification and quantification of specified traits in seed lots is not in the scope of ISTA's activities, owing to issues such as questions of intellectual property. The activities and outcomes of the past year were also presented.

The following presentation, given by Martina Roesch, Head of the ISTA Accreditation Department, Switzerland, covered the ISTA Accreditation Programme for laboratories testing for specified traits in seed. The three elements of accreditation were listed: participation in proficiency testing, performance data evaluation and on-site assessment, with detailed illustrative examples.

Gerhard Schuon, Head of the ISTA Technical Committee Co-ordination, Switzerland, presented the ISTA Proficiency Test programme, an element of the ISTA Accreditation Programme for laboratories testing for specified traits in seed. In detail he explained the PT concept, the PT programme so far, the result rating,

the situation of the PT result units reported by the laboratories, and finally the plan for the future rounds.

To complete the proficiency test issue, Jean-Louis Laffont ended the seminar with a presentation on the retrospective analysis of the ISTA GM proficiency tests. For the analysis he used a mixed-effect model. In summary it can be said that the mixed-effect model analysis of the ISTA GMO PTs allowed the estimation of some parameters useful for quantitative test plan design with Seedcalc, and that the mixed-effect model did not reveal differences in precision (not to be confused with accuracy) when different methods or units of measure were used for estimating GMO %.

The seminar was chaired by Christoph Haldemann, ALP, Switzerland, Chairman of the ISTA GMO Task Force (Sessions 1 and 2) and Kirk Remond, Monsanto, USA (Session 3).

All seminar presentations are available at www.seedtest.org/am2008. ■

New Chair of the ISTA Moisture Committee

Craig McGill



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Craig McGill is from New Zealand, where he is a Research Officer at the Institute of Natural Resources at Massey University, Palmerston North. After completing a Bachelor's degree in Science at Massey University, he joined the Seed Technology Centre there in 1986. Since

then, Craig has completed a Master's of Applied Science in Plant Science, also at Massey University.

His research interests are the germination and storage problems in seed from the New Zealand flora, particularly desiccation tolerance and non-orthodox storage behaviour, and the use of natural plant products to protect seed from insect damage during storage.

Craig teaches in the areas of seed quality and storage at both the undergraduate and postgraduate levels. He has also organized training courses for industry in these areas.

Craig has been a member of the ISTA Moisture Committee since 2001.

For more information on the ISTA Moisture Committee, visit www.seedtest.org/moi. ■

The new ISTA Executive Committee

(continued)

Susan R. Maxon

Member-at-Large



Susan Maxon has been a member of the ECOM since 2004. She has worked for the United States Department of Agriculture throughout her professional career. She joined the USDA Agricultural Research Service, Seed Research Laboratory, Beltsville, Maryland (ISTA Member Laboratory) in 1975, working for Dr. Lowell Woodstock, who was Chair of the ISTA Vigour Committee at that time. She transferred to the Seed Regulatory and Testing Branch of the Agriculture Marketing Service (AMS) in 1976 as a biological laboratory technician in germination testing, but in 1977 was reclassified to the position of botanist and about that time added noxious weed seed examinations and purity testing to her duties. From 1984 to the present she has taught more than 25 Federal Seed Schools, with topics including purity testing, seed identification and germination testing, and has been responsible for identification of unknown seeds since 1988. Over the years, she has been a member of several committees of the Association of Official Seed Analysts (AOSA) and ISTA. Since 1989, her responsibilities have included various aspects of ISTA lab accreditation within the Branch (USDL01). Other international activities include the OECD Seed Schemes, in which she represented the USA from 2001 to 2006.

Since 2003, Susan Maxon has been Assistant Branch Chief and Laboratory Supervisor at the AMS, Gastonia, North Carolina, and also Designated Member for the USA at ISTA meetings. She has also been a member of the ISTA Coated Seed Committee (1983–86) and the ISTA Germination Committee (1992–99).

Jorge A. Rosales King

Member-at-Large



Jorge Rosales King is an agricultural engineer. During his professional career, he has been a field inspector, a laboratory analyst, Chief of field inspectors and Chief of the seed analysis laboratory; all within the Oficina Regional de Semillas de Santa Cruz, Bolivia, where he is has been Executive

Director since 1983. He is currently part of an MBA programme on Seed Technology from the Federal University of Pelotas, Brazil, in association with the Universidad Autónoma Gabriel René Moreno of Santa Cruz, Bolivia, and the International Center for Seeds PROSEMILLAS.

Jorge is Bolivia's national Designated Authority for ISTA, UPOV and the OECD. He gives a specialization course on seed technology at the Federal University of Pelotas, Brazil.

He has been awarded top distinctions by Bolivia's National Seed Program, the Latin American Seed Federation (FELAS) and the Federal University of Pelotas. ■

New membership certificates

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ISTA has released a new layout of the membership certificate, which was introduced at the Annual Meeting in Bologna.

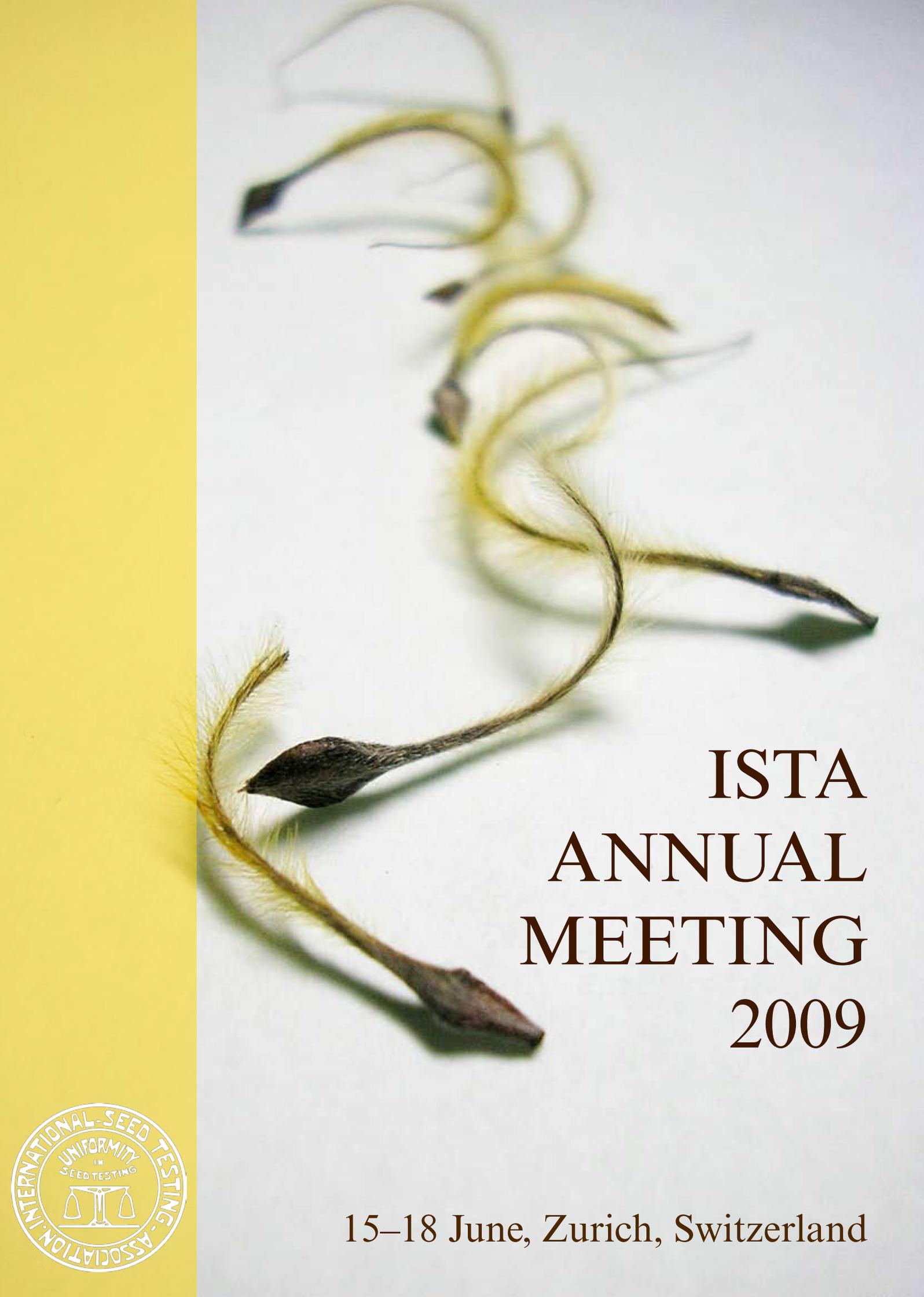
The modified certificates are aimed at clearly indicating the category of ISTA Membership: Laboratory Member, Personal Member, Associate Member and Corporate Member, with the unique membership identification code.

The new certificate has space for four membership stickers for four membership years. As hitherto, the stickers prove the validity of the certificate. There have been no changes to the layout of the stickers.

The new certificate will be issued to members in the coming membership year on payment of the annual membership fee, or in the case of changes in membership or



to the name of a Member. Detailed address information is no longer shown on the new certificate. The text in the certificate is in English only. ■



ISTA
ANNUAL
MEETING
2009

15–18 June, Zurich, Switzerland



ISTA Annual Meeting 2009

Glattbrugg (Zurich), Switzerland, 15–18 June, 2009

The International Seed Testing Association (ISTA) takes pleasure in inviting you to participate in the ISTA Annual Meeting 2009, to be held from 15–18 June in Glattbrugg (Zurich), Switzerland.

The meeting is aimed at discussing and deciding 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. Focal points of

the discussion and voting will be the implementation of the ISTA Seed Analyst Training Programme, the voting on the position paper of the GMO Task Force regarding the unit of measurement and report on the progress on developing Rules for Seed Mixtures.

Furthermore, a one-day Seminar will be held on 15 June which will cover aspects in the important areas of analytical seed purity testing, seed identification and application of the pure seed definitions based on botanical seed structure.

We look forward to seeing you in Zurich!

Preliminary programme

Novotel Zurich Airport Messe, Lindbergh-Platz 1, 8152 Glattpark-Opfikon, Switzerland

SUNDAY 14 June 2009

16:00–20:00 Registration of participants

19:00 Welcome Cocktail

MONDAY 15 June 2009

08:30–18:00 ISTA PURITY SEMINAR

TUESDAY 17 June 2009

PRESENTATION OF ISTA's TECHNICAL WORK

08:30 Opening by the ISTA President, Dr. Katalin Ertsey

08:30–10:00 Session I

- a) Report from the Purity Committee
- b) Report from the Germination Committee
- c) Report from the Moisture Committee

10:00–10:30 Coffee break

10:30–12:30 Session II

- a) Report from the Tetrazolium Committee
- b) Report from the Vigour Committee
- c) Report from the Seed Health Committee
- d) Report from the Variety Committee

12:30–13:30 Lunch break

13:30–14:00 e) Report from the GMO Task Force

14:00–15:00 Session III

- a) Report from the Flower Seed Committee
- b) Report from the Forest Tree and Shrub Seed Committee

15:00–15:30 Session IV

- a) Report from the Editorial Board of Seed Science and Technology

15:30–16:00 Coffee break

16:00–18:30 Meetings of individual ISTA Committees

WEDNESDAY 17 June 2009

PRESENTATION OF ISTA's TECHNICAL WORK

08:30 Opening by the ISTA President

08:30–12:30 Session V

- a) Report from the Bulking and Sampling Committee
- b) Report from the Statistics Committee
- c) Report from the Nomenclature Committee

10:00–10:30 Coffee break

d) Report from the Storage Committee

e) Report from the Advanced Technologies Committee

f) Report from the Method Validation Advisory Group

12:00–13:30 Lunch break

13:30–14:30 Session VI

a) Report from the Proficiency Test Committee

b) Report from the Accreditation Department

14:30–15:00 Session VII

a) Report from the Seed Analyst Training Committee

15:00–15:30 Coffee break

15:30–18:30	Session VIII a) Meeting of the Rules Committee	12:30–13:30	Lunch break
19:30–22:00	OFFICIAL DINNER at the UTO KULM (Uetliberg/ Zurich)	13:30–14:30	7. Constitution changes 8. Fixation of annual subscriptions 9. Consideration and adoption of the proposed Rules Changes 2009
THURSDAY 18 June 2009			
ISTA ORDINARY MEETING			
09:00–10:00	Welcome by the ISTA President, Dr. Katalin Ertsey Presentation on the development of the seed industry in Europe, by ESA	15:00–15:30	Coffee break
10:00–10:30	Coffee break	15:30–17:30	10. Consideration and adoption of reports 11. Announcement of the place and date for the next Ordinary Meeting of the Association 12. Any other business raised by a Member, of which notice in writing has been received by the Secretary General two months prior to the date of the meeting 13. Any other business raised by consent of the Executive Committee 14. President's closing address 15. Adjournment
10:30–12:30	1. Call to order 2. President's address 3. Roll call of Designated Members entitled to vote 4. Reading of Minutes 5. Report of the Executive Committee 6. Report of the Secretary General		

About Zurich City, Switzerland

Zurich is conveniently located at the heart of Europe. Nestling beside Lake Zurich with stunning views of the Swiss Alps, this exciting city is just 10 minutes away from its international airport. In Zurich everything is that bit smaller – but with so many things to do, this simply means you have all the more time for an unforgettable visit.

Enjoy the picturesque old town, the trendy new Zurich West district and the glorious lake. With opera, ballet, theatre premieres, shows, musicals, art exhibitions in over 50 museums and 100 galleries, time never drags in Zurich. The famous Bahnhofstrasse and Limmatquai are a shopper's paradise. Over 1700 restaurants and bars serve both traditional Zurich and Swiss dishes and well as exotic specialties. The evenings will leave you spoilt for choice: indoors or outdoors, anything is possible as far as the nightlife in Zurich goes.

Key attractions

Grossmünster Church, Fraumünster Church, St. Peter's Church, Opera House, Arthouse Zurich, Swiss National Museum, Niederdorf – Old Town, Bahnhofstrasse, Zurich Zoo with the Masoala Rain Forest Hall, trip to Uetliberg, Lake Zurich boat cruise.

Getting there

By air

Regular scheduled flights from every continent, most countries and major cities of the world land at Zurich's international airport. A train service every quarter of an hour whisks passengers to the Zurich city centre in just ten minutes. The Novotel and Ibis Hotel provide free airport transfers from Zurich airport from 05:00 to 23:10 every 30 minutes (5 minutes travel) from Terminal 2, Zone 2.

By train

Over a thousand trains stop daily at Zurich's centrally located main railway station. Direct and frequent services to all large Swiss cities and major European destinations guarantee a pleasant journey.

Novotel (meeting venue)

From Zurich main station, trains on the S7 line stop at Opfikon, 500 m from the hotel. Glattbrugg station on the S5 line is 800 m from the hotel.

Ibis Hotel

From Zurich main station, trains on the S2, S5, S6, S8, S14 and S16 lines stop at Zurich Oerlikon. From here take the No. 45 bus (direction Rohwiesen) to Riedbach. The Riedbach bus stop is 3 minutes from the Ibis Hotel.

By car

Novotel (meeting venue)

From all directions (Zurich city centre, A1, A3 or A4 highways), follow signs to the airport (Flughafen), then head north towards the A51 highway and Flughafen. Take exit No. 8 towards Glattbrugg. Cross the highway bridge and immediate turn right towards Zurich and the A51 highway (heading south). Take the next exit, No. 9, and head towards Oerlikon. After 600 m, the Novotel is on the right-hand side.

**All the latest information on the Annual Meeting 2009 at
www.seedtest.org/AM2009**

Ibis Hotel

From Bern/ Basel/ Zurich Airport/ Winterthur: direction St. Gallen, take exit Wallisellen, direction Zurich-Oerlikon 3 km straight ahead. From Zurich City: highway direction Flughafen, take exit Schwamendingen and follow Messe-Oerlikon.

By taxi

The taxi journey from the airport to the Novotel and Ibis Hotel takes about 5 minutes and should cost approx. 30 CHF. A taxi from the train station or city centre to either hotel will cost you approx. 50 CHF.

Currencies

Accepted currencies in Zurich (in most shops, restaurants, hotels): Swiss franc (CHF), Euro (€), major credit cards such as Mastercard, VISA, Eurocard, American Express.

Accommodation

Rooms have been pre-reserved at the meeting venue:

Novotel Zurich Airport Messe
Lindbergh-Platz 1
CH-8152 Glattpark-Opfikon (Zurich)
Phone: +41 (0)44 829 90 00
Fax: +41 (0)44 829 99 99
www.novotel.com

The Novotel Zurich Airport Messe is conveniently situated within the Glattpark international office and commercial development and World Trade Center, close to the A1/A4/A53 highway with ideal tram and rail links to Zurich city centre and Zurich Airport.

For reservations please contact Mr Andreas Pfluger via fax at +41 44 829 99 99 or via e-mail at h0884-re@accor.com (reference code: ISTA meeting).

Further accommodation is available at:

Hotel Ibis Zurich Messe-Airport
Heidi Abel-Weg 5
CH-8050 Zurich-Oerlikon
Phone: +41 (0)44 307 47 00
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www.ibishotel.com

For reservations please contact ISTA by fax at +41 (0)44 838 60 01.

Accompanying persons

The Accompanying Persons fee includes the Welcome Cocktail, Official Dinner, lunches, and coffee breaks. Registration as an Accompanying Person does NOT include participation at any of the Meetings.

Please note that there is no official programme for Accompanying Persons. However, guided tours and trips can be arranged through the hotel or the Zurich Tourism Office: Zürich Tourismus, Tourist Service in Central Station, 8021 Zürich.
Phone: +41 (0)44 215 40 00
Fax: +41 (0)44 215 40 44
e-mail information@zuerich.com
web site: www.zuerich.com.

Visas and letters of invitation

The Secretariat will send out letters of invitation to participants upon written request. However, it should be understood that this letter is only to help delegates to raise travel funds or to obtain a visa, and is not a commitment on the part of the organizers to provide any financial support.

Delegates requiring invitations for visa applications must pay the registration fee before the invitation letter is issued. Please take into consideration that the Secretariat will NOT deal directly with Embassies for visa requests for participants.

Need more information? E-mail us at meetings@ista.ch. ■

Trade fair at the ISTA Annual Meeting 2009

Reach up to 200 seed science professionals
from labs and organizations worldwide

Limited number of exhibition stands available

Prime location immediately outside auditorium

Size of exhibition space: 3.10 m x 2.75 m

1400€ for ISTA Members – 1600€ for non-members

includes 1 booth and 1 exhibitor at all events:

welcome reception, official dinner and all coffee breaks and lunches

Please contact the organizers at meetings@ista.ch

More new faces at the ISTA Secretariat

Nadine Ettl

Meeting Organizer



Nadine Ettl was born in Hanover, Germany and studied at the Gottfried Wilhelm Leibniz University of Hanover at the Faculty of Natural Sciences. She had previously worked as a trainee in a tree nursery and on a vegetable farm. Her BSc thesis was on the physiological basis and production method of artichokes. In 2007 she completed her degree and gained her MSc in Horticulture Science, with a thesis on the vegetative propagation of cherry and plum cultivars and the possibility of *in vitro* propagation. During her academic studies she had a first glimpse of seed test procedure. She also performed stratification tests with dormant rose seeds.

During and after her academic studies she worked as a graduate assistant at the Fruit Science Section, Institute of Production Quality, at the Tree Nursery Science Section, Institute of Floriculture and Tree Science, and at the Institute of Soil Science in Hanover. During this time she worked on various scientific experiments and outdoor and laboratory tests. Among other things she was responsible for data capture and test evaluation. She was also involved in planning and maintenance of biological tests.

Nadine Ettl joined the ISTA Secretariat in August 2008; her area of responsibility is the organization of meetings, workshops and congresses.

Mary Jane Kelly

Systems Auditor



Mary Jane Kelly is from Canada. Her father, a school teacher, also had a large “pick-your-own” raspberry farm. Thus began her interest in horticulture and agriculture.

Since she wanted more of an agricultural crop background, she attended Kemptville Agricultural College, where she was awarded the horticultural scholarship in her second year. She worked as a researcher for the college after graduation, doing UV light testing on freshly pressed apple cider and maple syrup, to see whether running them through UV light at varying flow rates would slow deterioration.

Shortly after, she joined Agriculture Canada, working in various technical positions, until an opportunity to train as a seed analyst arose in the Toronto laboratory.

She became a permanent employee and attained her certificate as accredited seed analyst in 1990. Since then, she has trained inspectors and junior analysts, attended workshops and participated in the many ISTA audits and proficiency tests sent to the lab. The Toronto lab closed in 1995, and she returned to the Cultivar Verification Unit of the Central Seed Laboratory in Ottawa, which she had left to become a seed analyst. This lab also closed shortly after the 100th anniversary of seed testing in Canada in 2002. Her final position there was Quality Assurance Manager, conducting audits of the plant and animal health laboratories at the Fallowfield Animal and Disease Research Institute in Ottawa.

Mary Jane Kelly joined the Accreditation Department at the ISTA Secretariat as a Systems Auditor in September 2008.

Norberto De Atrip

TCOM Co-ordinator



Norberto De Atrip was born in Argentina, but moved to Denmark at an age of 10 years. He studied agronomy at the Royal Veterinary and Agricultural University, Copenhagen. His interest and commitment to seed sciences is reflected in his education and academic achievements. He completed an MSc in Seed Science and Technology at the University of Aberdeen, Scotland. Furthermore, in 2005, he received a PhD in Plant and Seed Physiology from University College Dublin, Ireland, with the thesis: “Effect of seed moisture content on dormancy and storage characteristics of alder and birch seeds.”

In 2006, he joined the Danish company Pindstrup Mosebrug, one of the biggest companies in the peat moss growing-media industry. Relocated to Burgos, Spain, as product manager, his main activities were project management, research and development, complaint process and quality control.

Norberto De Atrip joined the ISTA Secretariat as TCOM Coordinator in October 2008. ■

29th ISTA Congress Seed Symposium Cologne, Germany, 16–18 June 2010

Call for papers

This is the first invitation to people interested in presenting a paper during the Seed Symposium of the 29th ISTA Congress, under the theme:

“Application and improvement of established and advanced technologies in seed testing”

The ISTA Seed Symposium shall consist of five oral sessions, detailed on page 23, and two poster sessions, each of two hours, covering the same topics. Each oral session shall be chaired by a speaker well known in the field of seed science and technology.

Interested participants are encouraged to present oral and poster papers dealing with a range of topics under the above theme. The research reported in the proposed papers may cover both the scientific basis of aspects of seed quality and technological applications in seed testing. In all sessions, we welcome papers based on both established seed testing methods and new or advanced technologies, such as automated and computer-based methods, or non-destructive techniques. Papers may be on crop species, flowers or trees and shrubs, or on newly or potentially cultivated species. We encourage papers on both tropical and temperate species.

Papers should be submitted online only (www.seedtest.org/en/seed-symposium2010.html) in the form of an abstract, in English, of a maximum of 1600 characters. Papers will be presented orally or in poster form in English, both forms having equal status. As the number of oral presentations will be limited by time constraints, a paper may be required to be presented as a paper instead of orally. The selection of papers for oral presentation will be made by the Scientific Programme Advisory Committee.

Funding

Authors of proposed papers are encouraged to explore possible sources of funding for their attendance at the symposium as early as possible. ISTA cannot offer any financial support to authors of papers. However, a letter of acceptance of a paper for presentation (subject to funding) can be provided to assist in funding applications after 1 November 2009.

Deadlines

The timetable for submission and acceptance of papers is as follows:

October 2008: first call for papers;

15 July 2009: deadline for submission of papers. Papers reviewed by the Scientific Programme Advisory Committee;

17 September 2009: authors of papers considered for oral presentation shall be contacted for further information on experimental results, in addition to the abstract;

1 November 2009: authors informed whether papers have been accepted for oral or poster presentation;

1 March 2010: deadline for payment of registration fee for authors of accepted oral papers (if the presenter of an oral paper does not register, the paper will be replaced in the programme);

1 March 2010: deadline for acceptance of an invitation to present an proposed oral paper as a poster;

2 April 2010: deadline for payment of registration fee for authors of accepted poster papers (if the author does not register, the poster and the abstract will not be published).



ISTA Seed Symposium 2010: “Application and improvement of established and advanced technologies in seed testing”

Programme

Session 1: Technologies for improved seed supply

Chair and lead speaker:

P.K. Agrawal, international seed consultant, India

- Aspects of seed production related to seed quality during conventional and organic production
- Genetic conservation for breeding and diversity
- Participatory plant breeding
- Seed supply and development of seed testing in developing countries
- Seed health issues during production
- Physical and chemical seed treatments
- Seed moisture testing

Session 2: Aspects of purity: genetic, technical and physical

Chair and lead speaker:

E. Noli, University of Bologna, Italy

- Varietal identification
- Seed lot heterogeneity and sampling
- Automated and computer-based methods for seed identification and assessment
- Seed processing
- GM testing, the co-existence of GM and conventional seed production
- Contamination with fungal fruiting bodies, weeds and parasitic plants

Session 3: Basic approaches to physiological processes in seeds

(in collaboration with the
International Society for Seed Science)

Chair and lead speaker:

G. Leubner, University of Freiburg, Germany

- Seed development and maturation
- Desiccation tolerance and its acquisition
- Water activity in seeds
- Regulation, induction and breaking of dormancy
- Genomics
- Genetic regulation and initiation of germination
- Stress tolerance
- Physiology of priming

Session 4: Approaches to the evaluation and improvement of germination

Chair and lead speaker:

J. Léchappé, GEVES, France

- Germination testing methods
- Dormancy in seed testing
- Viability testing
- Influence of storage and storage conditions on germination
- Seed collection and handling effects on germination and longevity
- Effects of insect pests and seed-borne pathogens

Session 5: Assessment and improvement of seed performance in practice

Chair and lead speaker:

S. Matthews, University of Aberdeen, United Kingdom

- Causes of vigour differences (production, processing, physiological)
- Vigour testing
- Impact of seed vigour on crop and transplant establishment
- Priming and other invigoration treatments
- Vision systems for seedling selection

Scientific Programme Advisory Committee

Alison A. Powell (United Kingdom), Seed Symposium Convenor
Theresa Aveling (South Africa)
Valerie Cockerell (United Kingdom)
Michael Kruse (Germany)
Joel Léchappé (France)
Julio Marcos Filho (Brazil)
Augusto Martinelli (Argentina)
Lea Mazor (Israel)
Enrico Noli (Italy)
Anne Bülow-Olsen (Denmark)
Robin Probert (United Kingdom)
Zdenka Prochazkova (Czech Republic)
Brent Turnipseed (USA)
Joost van der Burg (Netherlands)

International Seed Federation press release: World Seed Congress 2008

Prague, Czech Republic, 26–28 May 2008

International Seed Federation
Chemin du Reposoir 7
1260 Nyon, Switzerland

The annual ISF World Seed Congress was held from 26–28 May 2008 in the Czech Republic, the home country of Gregor Mendel who is generally considered as the founder of modern genetics. Members of the seed industry in 59 countries, including a good number from Central and Eastern Europe, totaling 1480 persons attended the congress. International organizations such as FAO, ISTA and UPOV, and the regional associations AFSTA, APSA, ESA and SAA were represented and participated in the debates. Numerous presentations on interesting topics such as drought tolerance in maize, hybrid cereals, the International Plant Protection Convention (IPPC) and the Clean Seed program were made.

Topics on the agenda of the various crop sections and technical committees included overviews from the Czech seed industry on the different crop groups, GM vegetables, royalty collection, adventitious presence,

essential derivation and seed health testing, just to name a few. A proposed position paper on Essential Derivation was discussed at great length before deciding that further input was required of the relevant Working Group. The ISF Trade and Arbitration Rules Committee (TARC) proposed numerous amendments to the ISF Rules and Usages for the Trade in Seeds for Sowing Purposes as part of the regular review process. ISF Members approved the adoption of most of the changes and the remaining few will be on the TARC's agenda in preparation for the next congress.

The General Assembly voted in favor of merging of the Cereal & Pulse, the Maize and Sorghum and the Industrial Crops Sections into a new Field Crops Section. In the past there was a great deal of overlap between meeting participation and agenda topics, and this merger will streamline the working of the Federation.

The General Assembly approved the presidency of Mr. Orlando de Ponti, who will take over the helm from Mr. Deon van Rooyen. In his acceptance speech, the new ISF President expressed his content that

agriculture and food were back at the top of the agenda of all the major world fora. He spoke of the role the seed industry can and will play in alleviating the current food crisis. He added that the seed industry was in a position to contribute substantially to manage the threats of this crisis and reminded the audience of the words 'Seed is Life' on the ISF logo.

In his keynote address to the congress participants Mr. Bernard Le Buanec, Senior Advisor to ISF spoke of the "Evolution of the Seed Industry during the Past 40 Years" and emphasized once again the importance of a good national seed association.

In conjunction with the congress, a Seed Treatment Seminar was organized on 29 May in Prague. It drew 120 participants and saw interesting presentations on seed treatment processes, stewardship in seed treatment and commercial aspects of seed treatment.

The next annual World Seed Congress will be held in Antalya, Turkey from 25–27 May 2009. The post congress seminar on 28 May will be on phytosanitary matters. ■

NEW...

ISTA Handbook on Flower Seed Testing

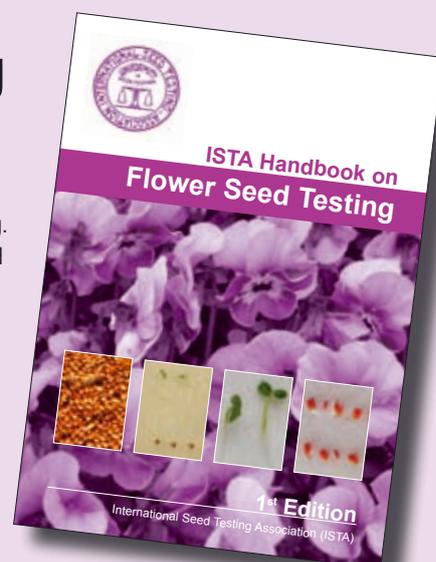
By the ISTA Flower Seed Testing Committee; editor Z. Ripka

ISBN 978-3-906549-45-3

This handbook is a new ISTA project to collate current specialized knowledge of flower seed testing. It forms a comprehensive collection of methods for the most frequently tested species. It is intended to assist the practising seed analyst by providing as many illustrations and descriptions as possible to aid in everyday laboratory testing of purity, germination and viability. The handbook will also help in training new analysts for flower seed testing in accordance with international principles.

The handbook contains an initial 24 method sheets, covering 13 families, in an A4-size ring binder with a series of procedures and detailed descriptions, full-colour pictures, and instructions and conditions of the most important laboratory seed tests on flower species or genera. For easy reference the genera are arranged in alphabetical order. A glossary explains the expressions used in seed analysis.

CHF 270.00 (approx. USD 245.00/EUR 167.00) from the ISTA Secretariat
(for contact details, see back cover)



ISTA membership changes

Status 15 October 2008

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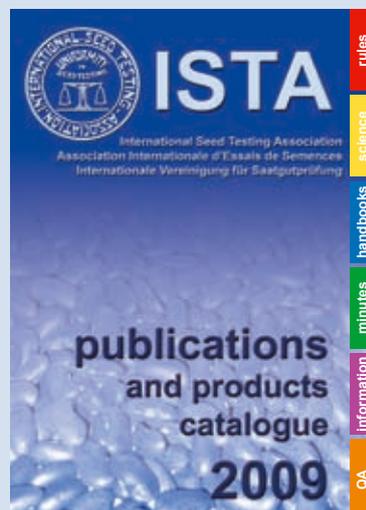
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Tolerances in ISTA moisture testing: a discussion paper

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Introduction

One of ISTA's objectives is to improve the tolerances in the ISTA Rules. This paper describes the current situation of the tolerances in Chapter 9: Determination of Moisture Content.

This information will be used for improving existing moisture tolerances, and for developing new tolerances for moisture test situations not yet covered.

Current situation

The current situation is summarized in Table 1.

For explanations of the types of tolerances, see the discussion paper "Tolerances in ISTA Moisture Testing" (http://www.seedtest.org/en/documents_content---1--1172.html).

For 4 of the 11 situations described in Table 1, there are no tolerances.

Of the remaining 7 with tolerances, only two are based on scientific evidence.

Situation 1b is based on experiments published in SST (see § 2.1 of the discussion paper for details).

Situation 4a is derived from the comparative testing organized by the Moisture Committee in 2005 (see § 5.1.5. of the discussion paper).

The origin of the 0.2% in situation 1a is not known.

Situation 1c is based on 1a.

Situations 2b, 2c and 4b are based on results from other organizations.

How to continue

When we proposed to include Table 9C in the Rules (situation 4b), barley was considered a chaffy seed, and of the cereals only maize and wheat were non-chaffy. The purity definitions have now changed, and barley is considered non-chaffy. This may be acceptable for many types of test, but not for moisture testing, since the fused seed coat of barley makes it like other chaffy seeds, and causes increased variability compared to non-chaffy species such as wheat. Because of this decision of the Purity Committee, it is suggested to make a Rules Change Proposal for 2009 for barley, and if relevant also for oats.

The Moisture Committee has discussed the possibility of using the results of ISTA proficiency tests on moisture content for developing tolerances.

However, laboratories are requested to report results only when they are within tolerances. Using the proficiency test results would thus result in too narrow tolerances.

The results of recent comparative testing cannot be used for calculating tolerances between labs; since there were no repeat samples per lab, the within-lab tolerance must be calculated from other sources.

The Committee has also discussed the possibility of using the proficiency test results and/or tolerances of other organizations (e.g. ISO, ICC, OIML, USDA, BIPEA-France). It appears, however, that such results have not been published in scientific journals, nor are they available from these organizations.

It is suggested to gather the information required for the various tolerance situations from the validation experiments to be organized during the coming years.

The following effects on accuracy and precision should be taken into account:

- the differences between whole and ground seeds;
- the influence of oven temperature (high vs. low).

The approaches of other ISTA Committees such as Germination should be considered with a view to harmonization, if statistically valid and possible. ■

Table 1. Tolerances in moisture testing

Type of tolerance		Type of seeds	Tolerance
1. Replicates in one test (same sample, one lab)	1a. oven	Agricultural	0.2%
	1b. oven	Tree & shrub	Table 9B
	1c. meter		0.2%
2. Comparisons of routine tests (same sample, one lab)	2a. oven-oven		N/A
	2b. meter-meter		Table 9E
	2c. oven-meter		Table 9D
3. Comparisons of routine tests (different samples, same/different labs)	3a. oven-oven		N/A
	3b. meter-meter		N/A
	3c. oven-meter		N/A
4. Validation of new methods/species (different samples, different labs)	4a. oven		max. 0.3% for 75% of results
	4b. meter		Table 9C

Further development of method validation within ISTA

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Publication of a detailed Method Validation Programme by ISTA in 2007 represented a further step in the evolution of seed test method development and standardization that has gone on since the work of Nobbe in the 19th century and the subsequent establishment of ISTA in 1924. Striving to achieve uniformity through proven and standardized methods was an early objective, and progress in method development and standardization, from Nobbe's work until 2006, is eloquently described in the accompanying article by Professors Steiner, Kruse and Leist. This article clearly illustrates the firm foundation upon which the present day ISTA has built.

The decision by the ECOM to set up a Method Validation Programme (MVP), which lays down in writing the approach to standardization for new methods, was thought to be a wise move in today's working environment. It is a logical accompaniment to the accreditation of laboratories, and without it there would be a danger that international recognition of ISTA's accreditation procedures could be seriously challenged by standards agencies. There would also be a danger to the integrity of ISTA

as it is presently constituted. Furthermore, the MVP is a safeguard to the Association's reputation in case problems arise that could lead to litigation.

The development of such a programme so that it is suitable for all Technical Committees (TCOMs) and all possible eventualities is not easy. The ECOM therefore recognizes that, in the same way that method standardization has evolved, the MVP will also evolve further with time. The aim of the MVP was to establish a set of guidelines for the standardization of test methods. Even though these guidelines are set in a formal document, this document is not intended to be strict and inflexible in its structure. The ECOM recognizes that every proposed method is different, and that differences in approach may be required. Individual TCOMs are the best judge of what is appropriate for the tests that they work with, and can therefore exercise their judgement about how to handle applications for test validation. It is the TCOMs who drive the programme within their specialty, and it is their responsibility to guide people who wish to enter a test method into the programme through it. The TCOMs concentrate on the scientific

aspects of the validation studies, while the ISTA Secretariat provides invaluable support for the detailed administration of the programme. Such support has been much appreciated by those TCOM chairs who have already handled applications for test validation.

The complexity and length of the MVP document has been criticized. However, a simpler flow chart and a brief Standard Operating Procedure document for method validation has recently been prepared. This has been reviewed by the TCOM Chairs and welcomed as a clear outline of the procedures to be followed.

The ECOM encourages comments on the validation programme, directly to the Secretariat, through the TCOM Coordinator, or to the Method Validation Advisory Group, so that the guidelines within the MVP can further evolve and remain user friendly and appropriate to the environment in which the TCOMs work. Above all, the ECOM, along with the Secretariat, wishes to encourage and assist the TCOMs and ISTA Members to develop methods that are appropriate for all in the seed world in a rapidly changing working environment. ■

ISTA Method Validation 2007: a historical retrospect

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In 2000, Sheppard and Cockerell published the “ISTA Handbook of Method Validation for the Detection of Seed-borne Pathogens”, and in 2007 ISTA published the document “ISTA Method Validation in Seed Testing”. Neither contains references referring to the role of method validation in the past. In 2005 Hampton wrote: “Method validation was introduced to ISTA by the Seed Health Committee ... in 2000.” In a paper from 2007 he repeated this statement, adding *inter alia* “the process is new to most other TCOMs.” Again no references are given. Seed scientists recognizing the value of ISTA’s work, and that of the five decades before ISTA’s inception in 1924, are surprised at words such as “introduced” and “new”, because there is a long and commendably well-documented history of method validation in seed testing which is much older than ISTA.

Definition of validation

The ISO definition of validation [8402:1994] is: “Confirmation by examination and provision of objective evidence that the particular requirements for a specified use are fulfilled.” The term “method validation” is new in seed testing; it was previously called “method standardization” or “method elaboration”. Likewise, “objective evidence” is new; it was previously called “scientific evidence” or “supporting evidence”.

Development of method validation 1869–1924

In 1869, Prof. Dr. J.C.F. Nobbe published his Statute, with recommendations for sampling and sample sizes, and a review of germination determination. He did this to the best of his knowledge

and experience. There was no validation (Steiner and Kruse 2007).

In preparation for the “1st Meeting of the Heads of Seed Testing Stations and other interested Persons in Graz 1875”, each of the 31 participants from Central Europe received in advance rules proposals from Nobbe, to allow in-house verification and discussion. The proposals were then seriously discussed at the meeting and finally voted on by the heads of the seed testing stations for “unanimous application”. Consequently, the description of methods, in-house verification and discussion, discussion at the meeting and voting by the responsible persons became the first step of validation.

In 1876, at the 2nd Meeting of the Heads of Seed Testing Stations in Hamburg, with Nobbe presiding, the main topic discussed was “uniformity in seed testing”, now the motto of ISTA. In 1877, at the 3rd Meeting in Munich, the first comparative test was initiated by Nobbe for improving and standardizing germination testing in Kentucky bluegrass. In 1878, at the 4th Meeting in Cassel, the results of the comparative test were presented and discussed, and the method approved for general application. Accordingly, discussion of method development, formulation of a test plan, comparative testing, evaluation of test results and discussion and voting at a meeting by the test participants became the second step of validation. In subsequent years, seed testing methods were standardized on this basis. Incidentally, the minutes of the meetings, including the discussions, have been published.

In 1888, the Association of Agricultural Experiment Stations in the German Empire (LVS) was founded, today the Association of German Agricultural Experimental and Research Stations (VDLUFA). Nobbe was elected President. In 1893 in Würzburg, at the General Assembly of this association, a Permanent Committee for Seed Testing was established “mainly for the elaboration of standardized seed testing methods” (Steiner 2000). Thus, monitoring by

a committee, preparation of a test plan, comparative testing, evaluation of the test results, formulation of a proposal and discussion and voting by the test participants became the third step of validation. At the same time, similar developments along with mutual information exchange were taking place in other countries, resulting in national seed testing rules, as communicated at the 1st International Conference for Seed Testing in Hamburg 1906 (Steiner and Kruse 2006).

A landmark example of method validation in 1901–1905

At the end of the 19th century, the German Agricultural Society (DLG) contemplated introducing quality standards for the trade of seed. In this connection, in order to randomly monitor standardization in seed testing, sampling, influence of transport and germination testing in red clover, and thousand-seed mass determination in orchard grass, were reassessed. The DLG and the LVS formed a committee of three experts, all renowned pioneers in seed testing: Wilhelm Edler (1855–1936), from Jena; Oskar von Kirchner (1851–1925), from Hohenheim; and Hermann Rodewald (1856–1938), from Kiel (Fig. 1; Steiner 1998). Their task was to organize the reassessment and standardization in four independent test runs from 1901 to 1905. Altogether, 23 seed testing stations cooperated under the leadership of the DLG. The original documents are in the archives of the Division of Seed Science and Technology at the University of Hohenheim. The letters and draft test plans of the committee are handwritten in German or Latin script; the minutes of the meetings of the committee and of the meetings of the heads of the seed testing stations are typed; the test plans for distribution to the participants are calligraphically handwritten in German script or typed. The standardization procedure was, as approved at that time:

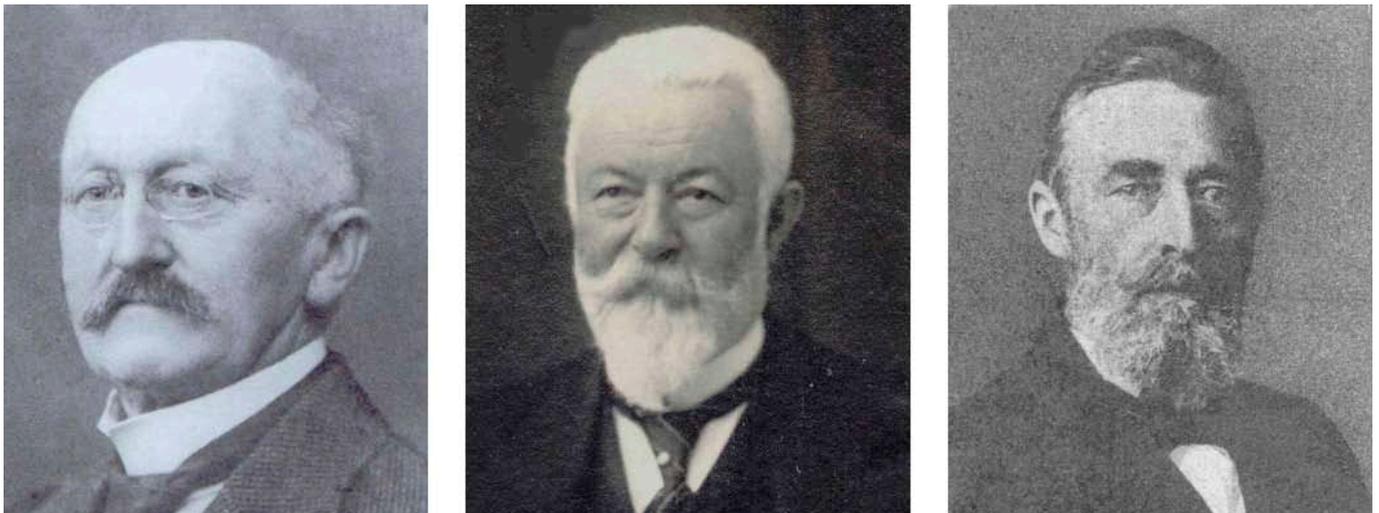


Figure 1. The three members of the standardization committee (from left): Wilhelm Edler, Oskar von Kirchner and Hermann Rodewald (Steiner, 1998).

1. description of the method to be standardized and preparation of a test plan by the committee;
2. discussion of the test plan by the participants and, if necessary, revision;
3. selection of appropriate samples after in-house testing and their distribution; distribution of the final test plan along with recording sheets for reporting results by the committee;
4. reporting of the results to the committee;
5. evaluation of the results by the committee and, if necessary, additional reviewing by external specialists, e.g. in connection with statistical evaluation;
6. discussion of the results at a meeting of the committee with the test participants. If necessary, revision of the test plan for a further run starting again at stage 3;
7. in the case of approval of the results by the committee and participants, formulation of the standardized method as proposal;
8. distribution of the proposal by the committee to the heads of the seed testing stations for verification and discussion.

At the following annual meeting of the heads of the seed testing stations, after discussion the proposal would be approved, revised or rejected in a vote by the heads.

To demonstrate the work of more than 100 years ago, three documents are illustrated. For elaborating a test plan, among others five letters were communicated written on one page consecutively on the front and the rear, in the style of a present-day e-mail exchange: 1903-09-11, Friday,

Kirchner to Rodewald; 1903-09-14, Monday, Rodewald to Edler; 1903-09-15, Tuesday, Edler to Rodewald; 1903-09-18 Friday, Rodewald to Kirchner, the letter being forwarded from Hohenheim to Garmisch-Partenkirchen, where Kirchner was on leave; 2003-09-23 Kirchner to Rodewald (Fig. 2, front page of the letter). Five letters exchanged within only 12 days, highly laudable not only for the committee, but also for the German postal and railway services, the more so as it includes a response from Kirchner who was on leave! Figure 3 shows the first page of the minutes of the first meeting with the list of the attending heads representing the participating seed testing stations, and mentioning

famous names. Eight of the stations are today ISTA Accredited Laboratories; one is represented by a Personal Member. Figure 4 shows the front page of a test plan in calligraphic German script as distributed to the participants.

In principle, the procedure for method standardization at the end of the 19th century does not differ from method validation of 2007, except in three minor points. Firstly, there was no mention of any time schedule or deadline. The commitment at that time was so serious that this was not necessary. Secondly, reviewing was done by the committee and, only if necessary, by external specialists. And thirdly, to inform anybody by the internet was not yet

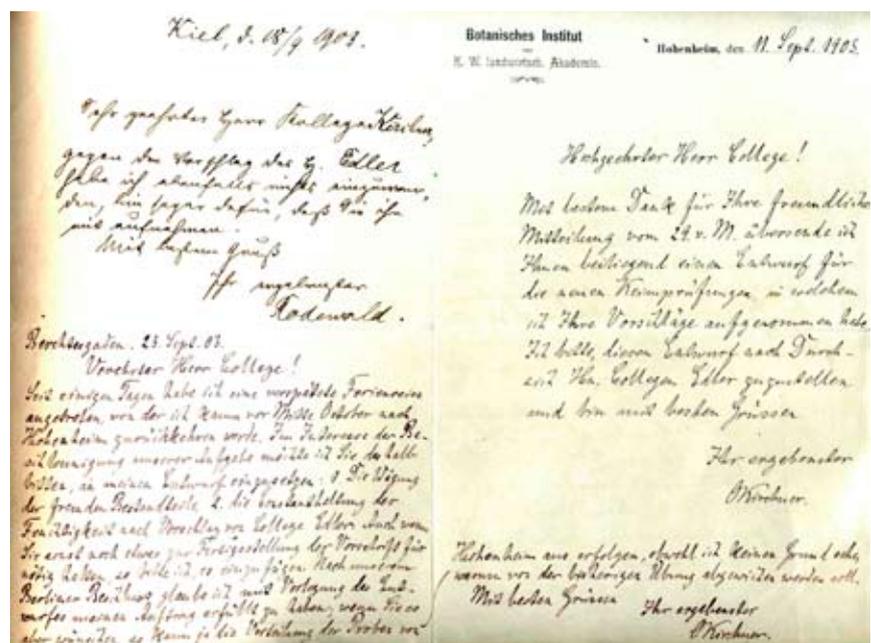


Figure 2. One of the standardization committee's letters.

possible, so the postal service was used to communicate information to the heads of the seed testing stations and affiliated persons.

This example by itself is sufficient to show that seed testing methods did not “evolve” (Rules Change Proposals 2008), but were from the beginning the result of inventive, purposeful, well-organized, diligent and painstaking work by dedicated colleagues in seed testing.

ISTA method validation since 1924

In 1921, the European Seed Testing Association was formed in Copenhagen and began comprehensive experimental and theoretical activities aimed at achieving internationally uniform seed testing rules, the great dream of Nobbe since 1876. Method standardization as described above was directly transferred from the national to the international

level. After its founding in Cambridge in 1924, ISTA, following up the activities begun in Copenhagen, entrusted its Research Committee for Countries with Temperate Climate to prepare the ISTA International Rules for Seed Testing. The Committee had its first meeting in Copenhagen in 1925 and its second in Wageningen in 1926. A draft set of Rules was circulated before the Congress in Rome in 1928. There, the draft was extensively discussed. There followed several meetings of the Committee and three parallel meetings of the ECOM: 1929 in Munich, spring 1930 in Budapest and autumn 1930 in Cambridge. All activities were accompanied by an extensive exchange of letters. Prior to the Wageningen Congress in 1931, a revised draft of the ISTA Rules was circulated, prepared under the leadership of W.J. Franck, ISTA Vice President and Chair of the Research Committee for Countries with Temperate Climate. Finally, in 1931 the first ISTA

International Rules for Seed Testing were adopted after all-inclusive discussion at the Wageningen Congress.

In particular, these ten years of dedicated work clearly show that the ISTA Rules have been from their inception the result of responsible, target-oriented and concerted work of committees, affiliated seed scientists and representatives of the seed industry. One example of the commitment involved is the contribution of colleagues from the USA. In those days, travelling was onerous, since there was no air traffic. Nonetheless, E. Brown, from Washington, D.C., attended the 1928 Rome Congress, and M.T. Munn, President of AOSA and ECOM and TCOM Member since 1924, crossed the Atlantic twice to take part in the 1930 Cambridge ECOM meeting and the 1931 Wageningen Congress. Both did this in order to contribute American knowledge and experience to the first ISTA International Rules.

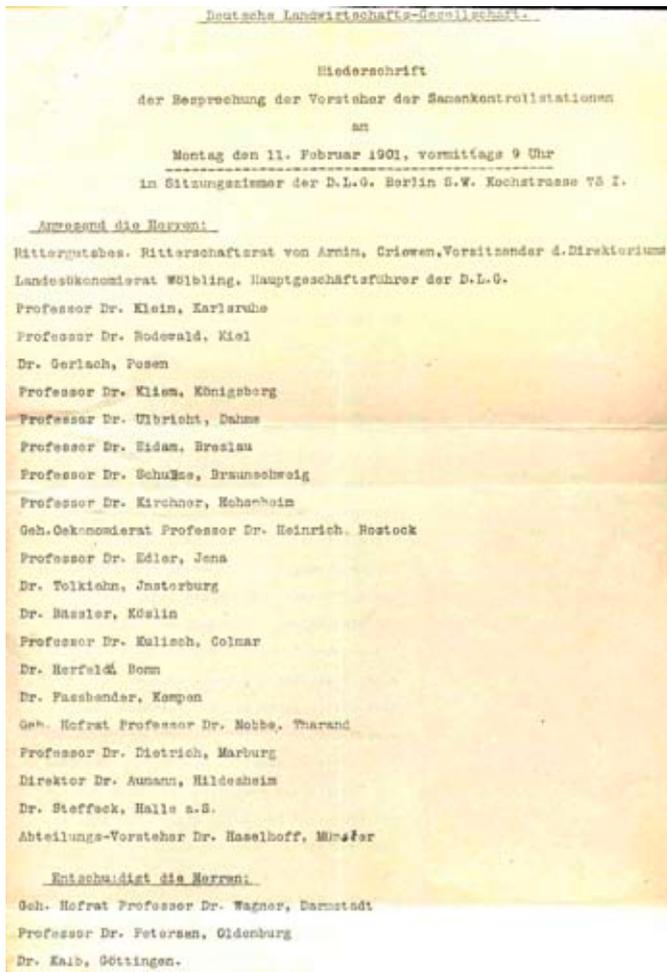


Figure 3. The minutes of the first standardization meeting.

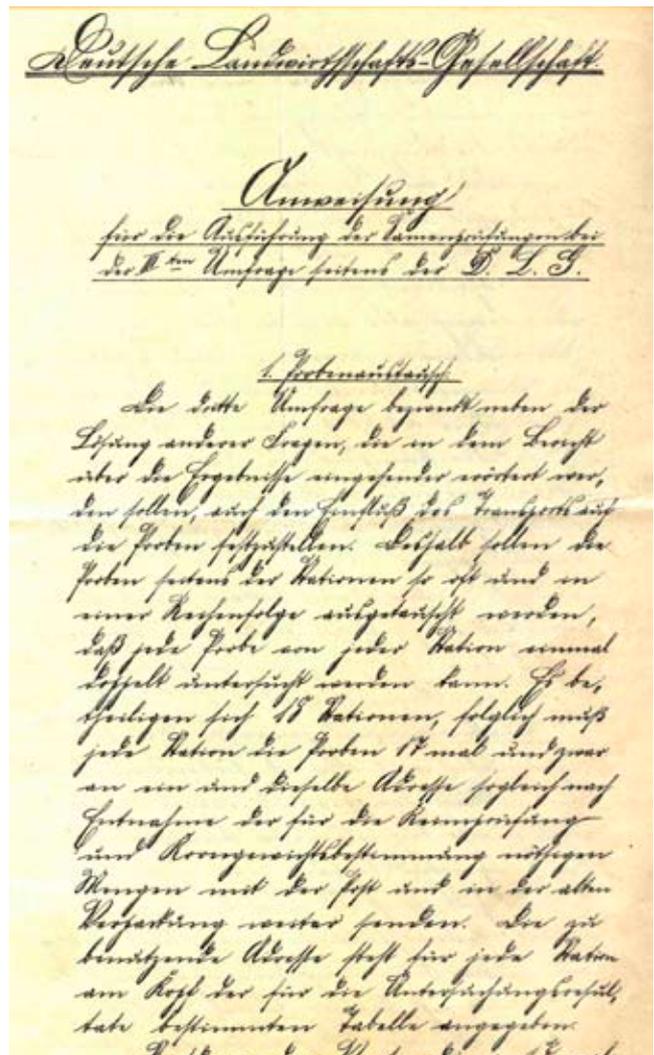


Figure 4. One of the standardization test plans.

The role of the ISTA Technical Committees

From the start, method standardization has resided with the TCOMs, because only they are competent in their specific fields (Steiner 1998). Since then, by agreement within the community of seed scientists, method standardization has been observed in a reasonable and responsible way, always with regard to the specific task. Thus, standardization was issue-related, dynamic, flexible and efficient. Dedication and commitment to method standardization was not impeded by any fixed guidelines or bureaucratic restrictions. In the end, the decisive steps of control remained (1) voting of the test participants and (2) voting of the TCOM members. Thereafter, the proposals were submitted and checked for compatibility by the Rules Committee, and finally (3) voted on by the designated delegates. In consultation with the ISTA Secretariat, a flowchart showing ISTA method validation was published only ten years ago (Steiner 1997) and was disseminated in ISTA workshop proceedings.

Since Graz 1875, the proceedings of national associations, and after its founding the Congress proceedings of ISTA, as well as original publications, have shown method validation reports and the discussions before voting. These published proceedings are a rich source of documented information relating to method standardization and handling of rules proposals.

ISTA Method Validation 2007

ISTA Method Validation 2007 presents at length in detail the procedure to be observed today. Firstly, a person intending to validate a method has to file a "Test Method Validation Application Form" asking for consent to start a project. If the project is approved, any further procedural step is defined, standard reporting forms and reviewing forms are mandatory and a strict time schedule is obligatory. Everything is completely monitored. Method validation is thus undoubtedly transparent and well documented. However, these directives and supervision could prevent initiative and spontaneous experimentation and impede the creative activity of inventive, innovative and autonomous freelance seed scientists who have always been ISTA's greatest assets. Rather, ISTA should devise

method validation procedures that are as lean and as well thought out as possible, in order to improve cooperation, efficiency and input, and thus advance the science of seed testing.

Whereas hitherto method validation was handled flexibly with regard to the specific task, now Method Validation 2007 truly appears to give no leeway. Therefore, in order to be efficient and effective, scientists must make exceptions by skipping or modifying one or more steps. This is often necessary to avoid unnecessary work and save time. For example, when validating the viability determination of four vegetable species, the test plans and reviewing of the test plans were replaced by the proven and tested ISTA Working Sheets on Tetrazolium Testing, thus saving work and time. In addition, not the total TCOM but only a peer group was involved, again saving workload and time (Herr and Kruse 2008). But who is competent nowadays to decide which exceptions may be made? And who is considered competent to decide which type of method validation should be applied, whether it be a multi-laboratory or a peer-validated test? And who decides on the scope of the testing required? From the beginning, in all these cases, only the TCOMs were competent. Understandably, the ECOM and the Validation Advisory Group can only be of help in formal concerns; they are certainly not competent in the specific tasks of the currently 17 TCOMs. So, actually the situation is as before: the TCOMs make scientifically based decisions regarding the validation procedure. This is done on an ad-hoc basis, as reasonably and responsibly as possible. The TCOMs also apply issue-related flexibility in order to be efficient and effective. Hence, in essence Method Validation 2007 does not differ from the method standardization of more than 100 years ago; the basics remain the same.

Incidentally, Method Validation 2007 is only suitable for experimental tasks. Conceptual and cognitive issues, such as formulation of objects, definitions and principles, and also defining descriptions and directions, are not covered (e.g. Steiner, Kruse and Fuchs 1999). These important and often constitutive tasks are handled by the TCOMs as they always have been.

Conclusions

Method standardization, also known as validation, was developed at the end of the 19th century and observed by competent, responsible scientists in a reasonable, flexible, efficient and effective way. Objective evidence, reproducibility and practicability were the basics and goals of standardization. We should not hold back but appreciate the achievements of our predecessors. With regard to the ISTA Rules, method validation was never a problem. Instead of giving the impression that validation was "introduced" and "new" in 2007, ISTA should rather take pride in stating that the ISTA Rules were validated, right from the beginning, on the basis of a non-written unanimous consent, and from now on in a further step on the basis of a formal prescription.

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Standard operating procedure for method validation process administration

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Scope

Description of processes and activities within the ISTA Secretariat related to method validation, from submission of the draft study report until filing of the final Method Validation Report.

Abbreviations

TCOM = Technical Committee
 TCord = TCOM Coordinator
 STA = Statistics Committee

Related documents

- Appendix 4 form: Test Method Validation Application Form
- ISTA Method Validation for Seed Testing
- Appendix 5 form: Instructions for Reviewers: Draft Test Plan
- TCM-F-2-ISTA Validation – review process checklist
- Appendix 6 form: ISTA Method Validation for Seed Testing
- Appendix 7: Instructions for Reviewers: The Validation Report

Process description

Application

The stakeholder (TCOM, third party, individual) submits a method validation application to the Secretariat. This application is often made after consultation with the TCOM concerned, who may

provide the stakeholder with assistance in the completion of the necessary forms. The application shall consist of a test plan and a completed Appendix 4: Test Method Validation Application Form. Guidance on the drafting of test plans can be found in the document “ISTA Method Validation for Seed Testing”, which can be downloaded from the ISTA web site (www.seedtest.org/upload/cms/user/ISTAMethodValidationforSeedTesting-V1.01.pdf), as can the Appendix 4 forms (www.seedtest.org/en/method_validation_programme_content---1--1254.html).

The application may also contain supporting evidence, such as results of preliminary studies or published papers.

The application form and related documents are forwarded to the relevant TCOM Chair. The TCOM members are provided with copies of the application by the Chair, and decide whether to support the valida-

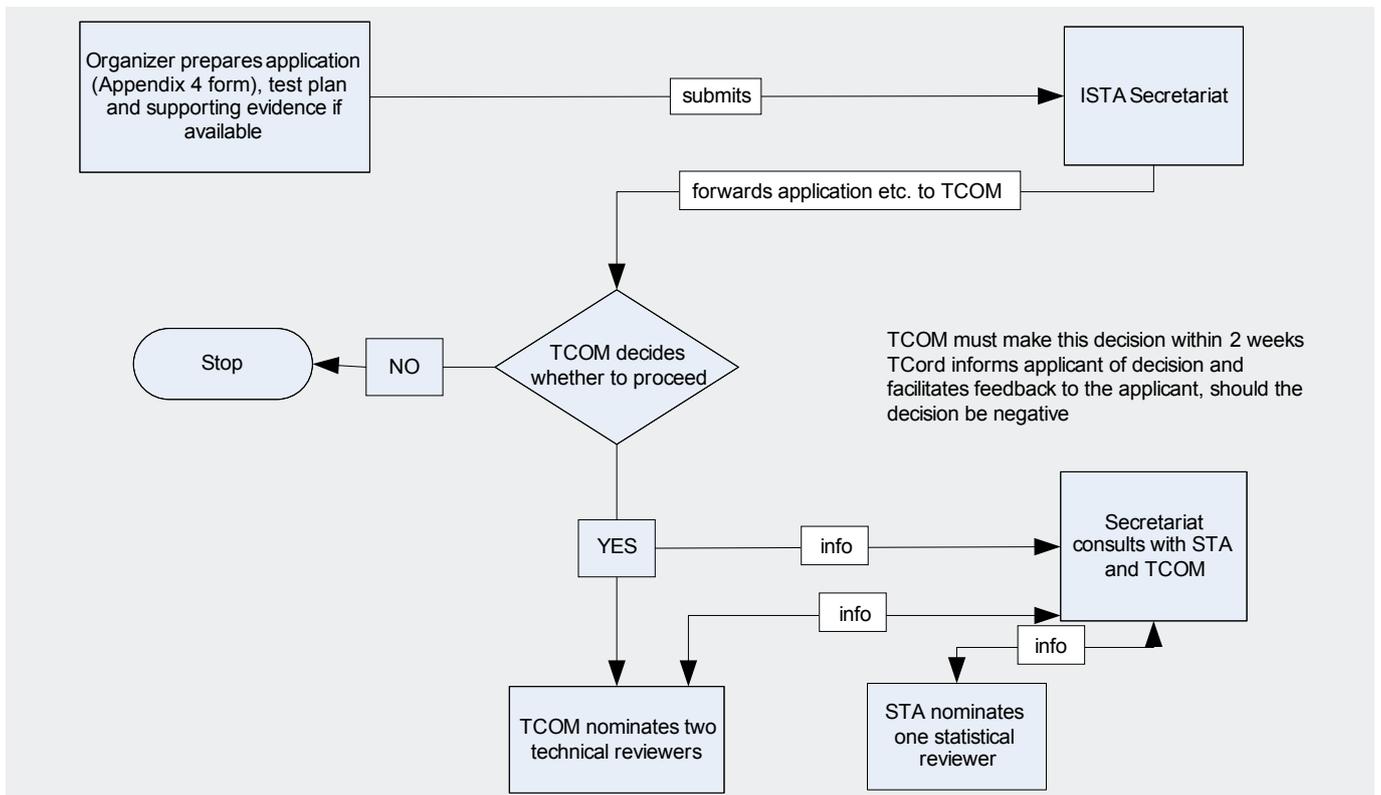


Figure 1. Process initiation and decision on whether to proceed with the validation study.

tion study. The TCOM members are given two weeks to make this decision.

The TCOM Chair informs the TCord of the TCOM's decision.

The TCord informs the applicant of the TCOM's decision and facilitates feedback from the TCOM to the applicant, should the decision be negative. If the majority of TCOM members support the study, the TCOM Chair shall nominate two technical reviewers, and the TCord shall contact the STA with a request to appoint a statistical reviewer (note: the TCOM Chair may propose a statistical reviewer and, through the TCord, forward this name to the STA for approval).

Test plan

Once all reviewers have been confirmed, the TCord ensures that they are aware of formal requirements, and distributes to them the application and the Appendix 5 form: "Instructions for Reviewers: Draft Test Plan". The TCord records dates and individuals involved on the "TCM-F-2-

ISTA Validation—review process checklist" and the validation database. Reviewers are expected to complete their deliberations and return the completed Appendix 5 form to the TCord within four weeks.

The TCord sends the completed Appendix 5 forms to the TCOM Chair, who forwards them to the TCOM members. The TCOM members decide within two weeks of receiving the forms whether to:

- a) approve the Test Plan without revision;
- b) approve the Test Plan following minor revisions;
- c) defer a decision pending major revisions and further review, or
- d) reject the Draft Test Plan.

In cases where reviewers are willing to be identified to the applicant, and only minor revisions are suggested, the TCOM Chair may send the completed Appendix 5 forms to the applicant, to enable amendments to be made before the TCOM makes its decision.

The TCOM Chair informs the applicant of the TCOM's decision, and provides advice on any revisions and reasons for the decision, if required.

Should the TCOM require any revision to the test plan, the applicant must resubmit the amended plan to the TCord and the TCOM Chair. The TCOM Chair shall forward the revised test plan to the TCOM, who must decide within two weeks whether to approve the amended test plan or return it to the applicant for further revision. This process is repeated until the test plan is approved or the applicant withdraws the application.

Once the test plan has been approved, it is the responsibility of the applicant to manage the validation study, either in person or through the services of the test organizer. The test organizer's responsibilities are detailed in the "ISTA Method Validation for Seed Testing" document, as are those of the participants of the validation study.

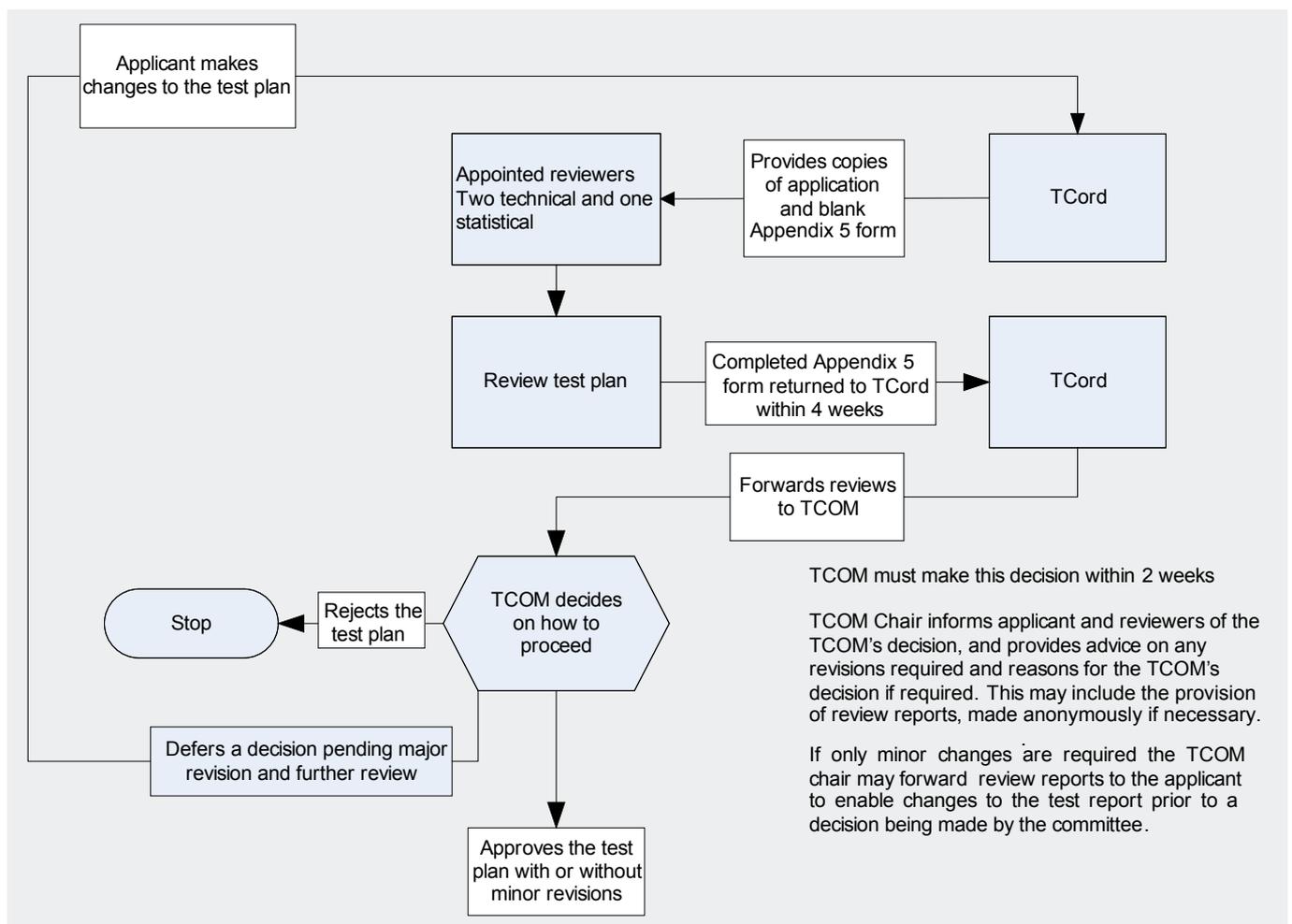


Figure 2. Review of test plan.

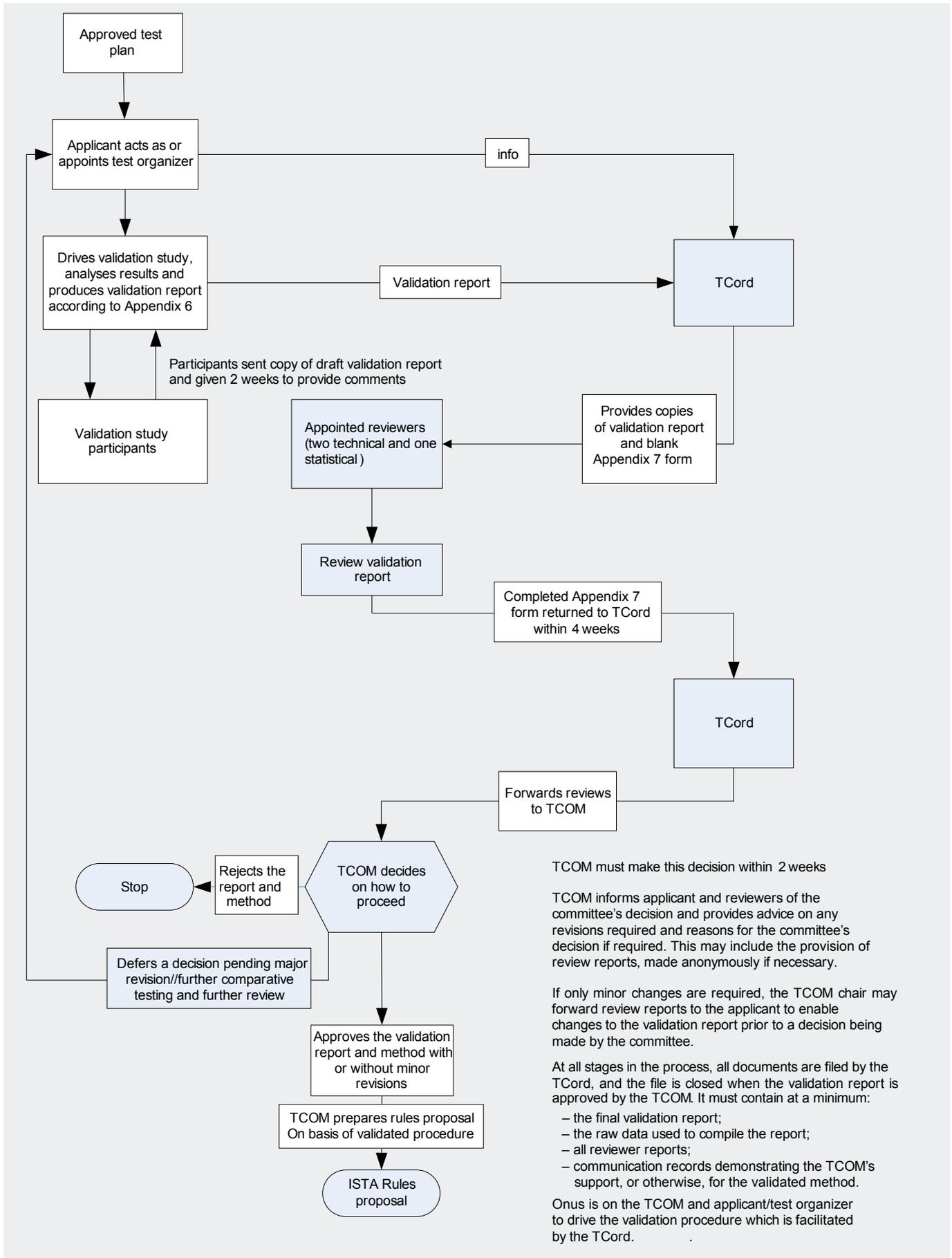


Figure 3. The validation study, review of validation report and preparation of Rules Proposal.

Draft Validation Report

Once the experimental work is completed, and the data checked and analysed, the test organizer will produce a draft validation report, according to the guidelines in the “ISTA Method Validation for Seed Testing” document (Appendix 6), which is sent to the participating laboratories for comments. Participants must send any comments back to the test organizer within one month. Based on comments received, the test organizer will finalize the report and submit it to the TCord within two months of the distribution of the draft report.

The TCord forwards the report to the technical and statistical reviewers (with copy to the TCOM Chair), as per test plan, together with a blank Appendix 7 form: “Instructions For Reviewers: The Validation Report”. Reviewers must return their completed reports (Appendix 7) to the TCord within four weeks. The TCord monitors the review process and reminds reviewers if the reporting period is exceeded.

The TCord forwards the completed Appendix 7 forms to the TCOM Chair, who forwards them to the TCOM members with the Validation Report. The TCOM members decide within two weeks of receiving them whether to:

- a) approve the report and the method without revision;
- b) approve the report following minor revisions;
- c) defer a decision pending major revisions; or
- d) reject the method.

In cases where reviewers are willing to be identified to the applicant, and only minor revisions are suggested, the TCOM Chair may copy the completed Appendix 7 forms to the applicant to enable amendments to be made before the TCOM makes its decision. Where technical and/or statistical reviews are considered inadequate, or reviewers do not agree, the TCOM will, at its discretion, make a final decision or seek the advice of additional reviewers. The TCOM Chair informs the test organizer and reviewers of the TCOM’s decision, and provides advice on any revisions and reasons for the decision, if required.

Should the TCOM require any revision to the validation report, the applicant must resubmit the amended report to the TCord

and the TCOM Chair. The TCOM Chair shall forward the revised report to the TCOM, who must decide within two weeks whether to approve the amended report and method. Should significant revisions be required, the TCOM may require the report to undergo a further independent review. Completion of revisions will not guarantee approval, and a further validation round may be requested by the TCOM.

Method Validation Report

Following approval of the method by the TCOM, the method receives Validated status. The TCOM shall then prepare a proposal for the ISTA Rules and submit it to the ISTA Rules Committee. The Method Validation Report and the Rules proposal shall be listed on the ISTA website prior to a vote by the membership. Copies of both will be available from the ISTA Secretariat. Any interested party may submit comments and data in writing to ISTA for or against the adoption of the proposal. The TCord will forward copies of all comments to the TCOM for resolution. Methods accepted by a majority vote at the ISTA Annual Meeting shall be published in the International Rules for Seed Testing.

At all stages in the process, all documents and correspondence shall be filed by the TCord in the relevant folders, i.e.:

- test plan in progress;
- test plan completed;
- validation study in progress;
- validation study completed.

In addition, the data shall be recorded in the Access database (TCOM WP and Membership)

Once the validation study has been completed and a validation report approved by the TCOM, the file is closed and must to contain at minimum:

- the final validation report;
- the raw data used to compile the report, should this not be contained within the report;
- review reports from all reviewers involved;
- communication records demonstrating the TCOM’s support (or the lack of it) for the validated method.

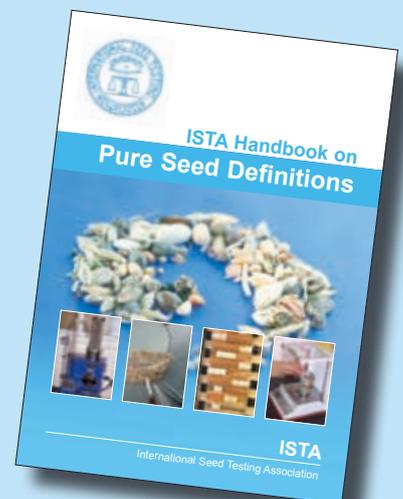
The onus for driving the validation process is on the TCOM involved and the applicant/test organizer. The TCord and the Secretariat support the TCOMs by keeping records of the process and providing TCOM Chairs with the information they require (e.g. database queries) to monitor the process. ■

ISTA Handbook on Pure Seed Definitions, 3rd Edition, 2009

By the ISTA Purity Committee; editors M.R. Mannino, J. Taylor and S. Jones

This handbook will expand on and illustrate the pure seed definitions (PSDs) of the *International Rules for Seed Testing*. This will help in the training in purity testing according to international principles. Illustrations of the most relevant genera within a PSD will provide practical guidance on the application of each definition. Each PSD is illustrated with scaled colour photographs or line drawings. A comprehensive glossary of scientific terms applying to seed purity is also included.

CHF 270.00 (approx. USD 245.00/EUR 167.00) from the ISTA Secretariat (for contact details, see back cover)



Publication planned for 2009

Laboratory accreditation changes

Status 15 October 2008

<p>Re-accreditations</p> <p>Australia AUDL0200</p> <p>Queensland Seed Technology Laboratory The University of Queensland Gatton Campus Queensland, 4343 Mail: seedlab@mailbox.uq.edu.au</p> <p>Bolivia BODL0100</p> <p>Oficina Regional de Semillas Comite de Semillas Santa Cruz Avenida Santos Dumont Calle Dardo Arana No. 180 CP 2736 Santa Cruz Mail: jorgerosales@semillasantacruz.org</p> <p>Chile CLDL0200</p> <p>Laboratorio Oficial de Análisis de Semillas Servicio Agrícola y Ganadero Correo Central, Km.22, Ruta 68 Cas. 4088, C. Cen. Santiago Email: laboratorio.semillas@sag.gob.cl</p> <p>Croatia HRDL0300</p> <p>Seed Testing Laboratory The State Institute for Seed and Seedlings (SISS) Vinkovacka 63 Osijek, 31000 Mail: i.djurkic@zsr.hr</p> <p>Denmark DKDL0300</p> <p>DLF Trifolium A/S Ny Østergade 9 P.O. Box 59 4000 Roskilde Mail: dot@dlf.dk</p> <p>DKDL0400</p> <p>DLF-Trifolium A/S Hadstenvvej 20 8900 Randers Mail: dlf@dlf.dk</p> <p>DKDL0500</p> <p>DLF-Trifolium A/S Faborgvej 248 5250 Odense Mail: dlf@dlf.dk</p>	<p>Greece GRDL0100</p> <p>GR01 Seed Testing Station of Athens Ministry of Rural Development and Food Antheon 2, Maroussi 151 23 Athens Mail: an2u001@minagric.gr</p> <p>Hungary HUDL0100</p> <p>Central Agricultural Office Keleti Károly u. 24 1024 Budapest Email: ertseyk@ommi.hu</p> <p>Ireland IEDL0100</p> <p>Seed Testing Laboratory Department of Agriculture & Food Backweston Campus, Youngs Cross, Celbridge, Co. Kildare Email: thomas.cullen@agriculture.gov.ie</p> <p>Malawi MWDL0100</p> <p>Seed Testing Laboratory Chitedze Agricultural Station P.O. Box 158 Lilongwe Email: seed@malawi.net</p> <p>Spain ESDL0100</p> <p>Estación de Ensayos INIA Carretera de la Coruña, Km. 7,500 28040 Madrid Email: luismv@inia.es</p> <p>Turkey TRDL0100</p> <p>Seed Registration and Certification Centre P.O. Box 30 06172 Yenimahalle/Ankara Email: kyilmaz@tagem.gov.tr</p> <p>United States USDL0100</p> <p>Seed Regulatory and Testing Branch USDA, AMS, LS 801 Summit Crossing Place, Suite C Gastonia, NC 28054 Email: Susan.Maxon@usda.gov</p> <p>USDL0300</p> <p>National Seed Laboratory USDA Forest Service 5675 Riggins Mill Road Dry Branch, GA 31020-9696 Email: rkarrfalt@fs.fed.us</p>	<p>Uruguay UYDL0200</p> <p>Instituto Nacional de Semillas INASE Laboratorio Cam. Bertolotti s/n y, Ruta 8, Km 28.8 P.O. Box 7731 Pando, Canelones Mail: inase@inase.org.uy</p> <p>Zimbabwe ZWDL0100</p> <p>Zimbabwe Seed Testing Section Seed Services Ministry of Agriculture Causeway, fifth st. ext. P.O. Box CY 550, Causeway 550 Harare Email: seedserv@mweb.co.zw</p> <p>Newly accredited</p> <p>Bulgaria BGD0100</p> <p>Executive Agency for Variety Testing, Field Inspection and Seed Control Central Seed Testing Station 125 Tzarigradsko Shosse Blvd, Block 1 Sofia, 1000 Phone: +359 2 870 31 57 Fax: +359 2 870 8027 Mail: bistrapavl@mail.bg</p> <p>France FRDL0700</p> <p>Pioneer Genetique S.A.R.L. Seed Quality Laboratory Chemin de l'Enseigne 31840 Aussonne Phone: +33 5 61 06 20 00 Fax: +33 5 61 85 54 69 Email: hortense.faucher@pioneer.com</p> <p>Italy ITDL0700</p> <p>Laboratorio Analisi Sementi c/o Cooperativa Agricola Cesenate Via Calcinaro 1450 47020 Martorano di Cesena (FC) Phone: +39 0547 643511 Fax: +39 0547383417 Mail: laboratoriocac@libero.it</p> <p>Hungary HUDL0200</p> <p>Syngenta Seeds Kft Quality Control Laboratory Industrial Park 5400 Mezőtúr Phone: +36 56 887 550 Fax: +36 56 887 560 Email: erika.szegedi@syngenta.com</p>
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ISTA Workshop on Seed Moisture, Germination and Vigour Nakuru, Kenya, 3–7 November 2008

The ISTA Moisture, Germination and Vigour Committees and the National Seed Quality Control Service Seed Testing Laboratory, Nakuru, Kenya, invite you to their workshop on moisture, germination and vigour testing in Nakuru (Kenya). The workshop will cover lectures and practical work on seed moisture, germination and vigour testing.

Location

National Seed Quality Control Service Seed Testing Laboratory, Nakuru, Kenya

Local organizer

Joseph Ahenda
National Seed Quality Control Service Seed Testing Laboratory, P.O. Box 1679, Nakuru 20100, Kenya
Phone: +254 051 850106 Fax: +254 051851268
E-mail: kephissq@africaonline.co.ke

Workshop content

Moisture: principles and methods of seed moisture determination, including the oven moisture test and grinding and tolerances (lecture/discussion and practical work)
ISTA Rules Chapter 9 Moisture (lecture/discussion)
Quality assurance in moisture determination (lecture/discussion and practical work)
New species (incl. tropical and subtropical species) for the Rules (lecture/discussion and practical work)
Work of the Moisture Committee (discussion)
Germination: ISTA Rules Chapter 5 Germination (lecture/discussion)
Quality assurance in germination testing (lecture/discussion and practical work)
Practicals and theory on selected species (*Phaseolus* spp., *Allium cepa*, *Desmondium* spp., *Arachis hypogaea*, *Daucus carota*, *Helianthus annuus*) for germination testing
Principles and methods of germination testing (lecture/discuss.)
Work of the Germination Committee (discussion)
Seedling evaluation handbook (lecture/discussion)
Vigour: The concept of vigour (lecture)
Vigour tests (lecture)

Lecturers

Craig McGill, Massey University (ISTA Moisture Committee Chair)
Anny van Pijlen, General Dutch Inspection Service (NAK) (Member of the ISTA Germination Committee, Tetrazolium Committee and Training & Education Working Group)
Gillian McLaren, Official Seed Testing Station, Scottish Agricultural Science Agency (ISTA Germination Committee and Vigour Committee Member)

Participants

Maximum 30
There will be a minimum number of participants required for this workshop to take place.

Registration fees

ISTA Members: USD 430
Non-members: USD 645

The registration fee includes all literature and supporting material for the workshop, lunches and coffee breaks, workshop dinner and transfer between the workshop venue and hotels, but not between Nairobi and Nakuru (see below). Details for payment will be provided on receipt of your registration.

Accommodation (bed and breakfast)

Details for payment will be provided upon reception of your registration.

Hotel	Merica	Midland	Kunste	Waterbuck
Single room	75	75	30	45
Double room	120	95	50	60
Triple room	165	–	50	90
Junior suite	140	–	50	–
Executive suite	150	–	60	–

Accommodation prices are in USD. The approximate exchange rate is USD 1 = KES 65.

Additional information

Minibuses from Jomo Kenyatta International Airport and return at the conclusion of the workshop may be arranged. Participants who wish to travel by minibus are asked to advise their arrival and departure times at the airport. Cost of the minibus will be based on the number of participants using the service and will be advised closer to the Workshop. Should you not wish to utilize the minibus, a taxi from the airport, Nairobi, to the Seed Testing Station, Nakuru, 155 km away, is approximately 230 USD. The Seed Testing Station is about 10 km from Nakuru town. Transport during the workshop and from the hotels to the seed testing station will be organized. A one-day post-workshop tour of Lake Nakuru National Park can be arranged at an extra cost of USD 55. Applicants interested in the post-workshop tour should indicate it in the application form.

Registration form

The registration form can be downloaded from the workshop detail page at:

<https://www.seedtest.org/workshops>

ISTA Seed Vigour Workshop

Mashhad, Iran, 18–21 April 2009

The ISTA Vigour Committee and the Department of Crop Science, the University of Ferdowsi, Mashhad, Iran invite you to their workshop on Seed Vigour. The aim of the workshop is to offer an introduction to the concept of seed vigour and seed vigour testing. It will be made up largely of lectures with some practical experience in completing vigour tests. It will also offer the opportunity for general discussion of seed vigour and time for discussion of specific questions from participants regarding seed vigour testing procedures.

Location

The workshop will be held in the Seed Research Laboratory of the Department of Crop Science, Faculty of Agriculture, the University of Ferdowsi. The University has 16 000 students and over 600 academic staff. It is situated within the city and has a regular bus service. Mashhad is the second largest city of Iran, and is an extremely popular city for pilgrims visiting the Shrine of Imam Reza. The Shrine and surrounding buildings, known collectively as the Āstān-é-Qods-é Razavī, make up one of the marvels of the Islamic world. As well as the shrine this area includes mosques, museums, madrasahs, several courtyards and libraries as well as many other religious buildings.

Local organizer

Dr Mohammad Khajeh Hosseini
 Department of Crop Science
 Faculty of Agriculture
 University of Ferdowsi
 Mashhad, Iran
 Phone: 0098-(0)511-8795612
 Fax: 0098-(0)511-8787430
 E-mail: workshop@acejs.com

Presenters

The workshop will be presented by Dr Alison Powell (Chair of the Vigour Committee, University of Aberdeen), Dr Stan Matthews (University of Aberdeen) and Dr Mohammad Khajeh Hosseini (University of Ferdowsi; member of Vigour Committee).

Lectures

- Background to seed vigour
 - Importance of seed vigour in crop production
 - Two ISTA validated vigour tests:
 - accelerated ageing test for *Glycine max*
 - conductivity test for *Pisum sativum*
 - Controlled deterioration test for small-seeded vegetables
 - Cold test for maize
 - Rate of germination test for maize and other crops (e.g. oilseed rape)
 - Precision in vigour testing
 - Where a knowledge of seed vigour is useful.
- Please note that the language for the workshop will be English.

Practical work

All participants will:

- Complete the conductivity test for pea and chickpea and the rate of germination test for maize and evaluate their results;
- See demonstrations of the accelerated ageing, controlled deterioration and cold tests and example results;
- Interpret data from the demonstrated tests.

Question and answer sessions: these will consider questions on all aspects of seed vigour and any vigour test.

Group participatory work:
 Participants will work in groups to discuss/comment on defined topics and report to the whole group for further discussion.

Participants

There will be a minimum number of participants required for this workshop to take place, with a maximum number of 17.

Registration fees

ISTA Members: 300 Euros
 Non-members: 450 Euros
 Deadline for registration is 6 January 2009.
 The workshop fee includes participation in the workshop and all associated literature, coffee breaks, lunches, the workshop dinner, transport from Mashhad International Airport to the hotel and daily transport to the laboratory. The registration fee also includes an afternoon's visit to the Shrine of Imam Reza.

Accommodation

Accommodation will be available at the Pardisan Hotel (<http://www.pardisanhotel5star.com/>), which is a short distance from the University Campus. A single room with breakfast costs 45 Euros per night, and a double room 65 Euros per night. Please indicate the dates for which you require accommodation on the registration form.

Registration form

The registration form can be downloaded from the workshop detail page at:

<https://www.seedtest.org/workshops>

8th ISTA Seminar on Statistics in Seed Testing

Aussonne, France, 6–10 April 2009

Location	Preliminary programme
Pioneer Génétique Chemin de l'Enseigne 31840 Aussonne France	The planning of the programme for this seminar is currently under way. We envisage alternating theoretical presentations with practical presentations around statistical aspects of seed testing. Concerning the theoretical aspects, we envisage lectures on the Linear Model, the Generalized Linear Model and Bayesian statistics. For the more practically oriented presentations, there will be readings on the analysis of proficiency tests, statistical aspects of GMO detection, repeatability/reproducibility computations, detection of outliers and tools for visualizing data. Also, participants are welcome to suggest any topics for consideration or for a presentation by themselves.
Nearest airport: Toulouse Blagnac, France	
Participants	Registration form
Maximum 20–25	The registration form can be downloaded from the workshop detail page at:
Contact	https://www.seedtest.org/workshops
Please contact Charlotte Philip for further information. email: charlotte.philip@pioneer.com	

ISTA Workshop on Seed Health

Pretoria, South Africa, 7–11 April 2008

Prof. Dr. Theresa Aveling
Chair, ISTA Seed Health Committee

University of Pretoria
Pretoria, South Africa
terry.aveling@fabi.up.ac.za

The Seed Health Workshop was hosted by the University of Pretoria and took place in the laboratories of the Department of Plant Sciences. There were 21 participants from 11 countries [Brazil (1), Israel (1), Kenya (1), Nigeria (1), Seychelles (1), South Africa (10), Spain (1), Sudan (1), Tanzania (2), United States (1), Zambia (1)]. The instructors for the section on fungi were Prof. Reyes Blanco from the University of Almeria, Spain (Seed Health Committee [SHC] member) and Prof. Krystyna Tylkowska from the Agricultural

University of Poznan, Poland (SHC member). Prof. Carmen Nieves Mortensen from the University of Copenhagen, Denmark and Dr. Teresa Goszczynska from the Plant Protection Research Institute, South Africa were responsible for the section on bacteria and Dr. Rick Mumford from the Central Science Laboratory, United Kingdom (SHC member) for the virus section. Mr Moses Lesufi (Department of Agriculture, South Africa) jumped in at very short notice to present the section on nematodes.

Prof. Theresa Aveling (SHC Chair), from the University of Pretoria, opened the workshop and welcomed the delegates. The workshop brought together seed health specialists and provided opportunities for

South African and other researchers, analysts and students to learn the international seed health testing methods accredited by ISTA. The workshop provided a forum for both theoretical and practical exposure to seed health testing and promoted exchange of ideas and collaboration between the participants and presenters of the workshop. The equivalent of a two-day period was dedicated to fungal seed health testing, and one day on each of bacterial, viral and nematode seed health testing. The workshop included theory and hands-on practical work within a laboratory. Lectures were supported by practical demonstrations and focused on the use of standardized ISTA seed health assay procedures. Our appreciation goes to all the lecturers who did an



excellent job and provided detailed explanations and information for the workshop manual. The manual was well received by the participants, and every participant was exposed to new information that will be very useful in their home countries. The participants made full use of the international lecturers to discuss a wide range of seed health topics and problems, and also evaluated the ISTA seed health testing protocols used in the workshop, making suggestions for improvements where

possible. Prof. Aveling presented the ISTA certificates of attendance during the closing lunch ceremony.

Special thanks goes to Veloshinie Govender (University of Pretoria), who tirelessly helped with all the practical preparation before and during the workshop, and to the postgraduate students Delphin Kandolo and Renaan Thompson, who helped with cleaning and clearing of the laboratory. Thanks are also due to

Kassie Kasdorf, Teresa Goszczynska and the Plant Protection Research Institute, Pretoria for providing healthy and infected plant material, and to the various seed companies and research institutes in South Africa that provided infected seed samples. Prof. Marion Meyer and the Department of Plant Sciences are acknowledged for the use of their laboratories and tea facilities, and the National Research Foundation, University of Pretoria and Syngenta SA for funding and sponsorship. ■



6th ISTA Seed Health Symposium

Kruger National Park, South Africa, 14–18 April 2008

Prof. Dr. Theresa Aveling
Chair, ISTA Seed Health Committee

University of Pretoria
Pretoria, South Africa
terry.aveling@fabi.up.ac.za

The 6th ISTA Seed Health Symposium was hosted by the University of Pretoria, and took place at the conference venue of the Berg en Dal restcamp in the Kruger National Park. This is the first time that this symposium has been held in Africa. There were 65 participants from 28 countries. There were 22 paper and 14 poster presentations and 2 workshops.

The Seed Health Workshop (Pretoria, South Africa, 7–11 April) was followed by a meeting of the ISTA Seed Health Committee on 13 April in Berg en Dal with attendance by 12 of the 14 members. The 6th Seed Health Symposium started on 14 April with a welcome reception, and delegates were welcomed by traditional dancers complete with spears and drums. Many of the delegates joined in to learn the new dance style but it came naturally for Terry Aveling's 22-month-old daughter. This was followed by a traditional barbecue on the terrace overlooking the river and free drinks to get everyone to relax after the long bus trip from Pretoria or Johannesburg.



Traditional dancers at the welcome reception.

The next morning Prof. Terry Aveling, as chair of the symposium organizing committee, officially welcomed all the delegates, and Dr Michael Muschick (ISTA Secretary General) opened the symposium. Mr Kosy Dongo (Department of Agriculture, South Africa) gave an opening address, which was followed by the session on "Seed treatments and other control measures" and a plenary lecture by Dr Gina Swart (Syngenta, Switzerland).

Lunch was followed by a workshop on "Treated seed and seed health testing", during which members of commercial seed companies, chemical companies, research institutes and government representatives and members of the ISTA Seed Health Committee conducted a healthy debate. Many delegates chose to go for a free game drive after close of session, whilst others relaxed before the "potjie dinner" – a scrumptious stew made in big black pots over an open fire.

Wednesday morning started off with a session on phytosanitary issues, and excellent overviews of the Southern African situation were given by the Southern African Seed Organisation (SANSOR) and the Department of Agriculture. Phytosanitary issues in Syria and Israel were also addressed.

The poster session on seed health testing after lunch drew a great deal of interest, as each poster presenter had 5 minutes to introduce their poster and a further 5 minutes for questions. The organizing committee found that this type of interactive address received more attention for the posters than merely allowing an open session for poster viewing. Ms Valerie Cockerell addressed the progress and problems of the



Elephant and waterbuck in the Kruger National Park.



The poster session.



The open-bush gala dinner.

ISTA Method Validation Programme, and then chaired a workshop with Mr Harrie Koenraadt on seed sampling for seed health testing. This again resulted in an interactive discussion among the delegates.

At the close of day some of the delegates jumped aboard the open game-viewing vehicles armed with big spotlights to try their luck at spotting the Big 5. Others chose to go for early morning game walks following close behind well-armed game rangers.

The final day of the symposium was opened by a plenary lecture by Dr Guro Brodal (Norway), followed by various papers on seed-borne pathogens and mycoflora and seed health testing techniques. The poster presentations on seed-borne mycoflora were made after lunch, followed by a summary of the symposium by Prof.

Reyes Blanco. Prof. Terry Aveling closed the symposium.

That evening the gala dinner took place beneath the African sky. Delegates were loaded into game-viewing vehicles and taken for a sundowner game-viewing experience. Most were incredibly lucky and succeeded in spotting lion, leopard, elephant, rhino and buffalo (the big 5) on this one drive – talk about beginner’s luck! Spotlights focused on the green eyes of impala buck in the darkness on the way to the site of the open-bush dinner. The staff of the Kruger Park treated the delegates to a wonderful dinner under the stars, and many of the delegates were relieved to see the game rangers patrolling the perimeter

of the site with their big guns. A memorable end to the symposium before the long bus trip back to Pretoria and the airport the next morning and farewell to South Africa.

Special thanks to the 6th SHS organizing committee. Thanks also to Ms Veloshinie Govender and Dr Quenton Kritzinger for their audiovisual technical assistance during the symposium, to Ms Kerien van Dyk who played taxi driver, to Dr Eugenia Barros who kept the peace, and to Agricultural Tours Worldwide, who made sure that everyone arrived safely and had a roof over their heads. The National Research Foundation, University of Pretoria, Pannar, CSIR, Bayer Cropscience and Syngenta are gratefully acknowledged for funding and sponsorship. ■



ISTA Workshop on Seed Vigour Testing Bologna, Italy, 15-18 April 2008

Jane Taylor

Chief Officer, Official Seed Testing Station for England and Wales

National Institute of Agricultural Botany (NIAB)
Cambridge, UK
jane.taylor@niab.com

The ISTA vigour workshop was held at the Laboratorio di Ricerca e Analisi Sementi (LaRAS – Seed Research and Testing Laboratory), which is part of the Department of Agroenvironmental Sciences and Technologies (DiSTA) of the University of Bologna, Italy. The testing laboratory is a designated ISTA laboratory and ISTA-accredited laboratory, and it was a great pleasure for the participants that we could celebrate with LaRAS the occasion of the centenary of its establishment in 1907/1908. The workshop was the first ISTA workshop held at the laboratory, and we are grateful to Dr Ennio Noli and the staff of LaRAS, Dr Emanuela Casarini, Emma Beltrami, Eugenio Grassi and Giovanni Urso, for hosting it, and for all their hard work in the organisation and preparation of the practical materials. Everything needed for the workshop had been thoughtfully anticipated and prepared.

Participation in the workshop was worldwide, with 18 participants representing both government and private seed company laboratories from nine countries:



China, Italy, India, Iran, South Africa, Romania, Spain, the Netherlands and the United Kingdom.

The purpose of the workshop was to explain the theory of seed vigour testing, look at existing validated ISTA vigour-testing procedures and other recognised vigour tests, and, most important of all, to provide the opportunity to carry out practical work on vigour tests. This was achieved throughout the workshop by excellent

lecturing from acknowledged experts in this field, Dr Alison Powell, Dr Stan Matthews and Dr Emanuela Casarini. The participants also benefited greatly by the contributions from Prof. Attilio Lovato, Honorary President of ISTA, who joined us in the workshop.

On day 1, the workshop covered most of the vigour-testing theory that was to be demonstrated in practical exercises later in the week. Sessions concentrated on the





importance of seed vigour, explanation of the testing procedures, application of testing criteria and critical points regarding test conditions.

We completed the ISTA-validated conductivity test on *Pisum sativum* and the suggested tests of rate of germination (maize) and controlled deterioration (vegetable brassicas) and evaluated the test results. The ISTA-validated accelerated-ageing test (AA) and cold test were demonstrated for maize, and seed material showing the results of both tests was provided. We evaluated the results of all three tests carried out on maize, and had a lively discussion, emphasising the common basis (ageing) behind all the tests.

During the four-day workshop there was opportunity for discussion within the whole

group, in small working teams and with partners during the completion of practical exercises. This was very useful, since our experience of vigour testing varied, and we were able to benefit greatly by sharing experiences. I would like to acknowledge the contribution to the workshop discussion from Mohammad Khajeh-Hosseini, Iran, on the basis of his experience on vigour testing.

During the workshop we were able to visit the excellent facilities of LaRAS, and we were also very kindly taken on a city tour, with interesting details about the city of Bologna provided by Prof. Attilio Lovato together with Dr Enrico Noli. Following the walking tour of the historic city centre we were taken for a short drive up into the hills behind Bologna for

a memorable evening meal. Thanks were made to the workshop lecturers Alison, Stan and Emanuela and also to Enrico and the staff of LaRAS.

I'm sure that all workshop participants would agree that they have benefited greatly from participation in the workshop, not only by increasing their awareness and understanding of seed vigour testing, but also through the opportunity to meet and make new friends and contacts with other individuals involved in seed testing and research.

The workshop concluded with a review of the data for the vigour tests covered during the week and presentation of certificates, and lots of thanks and good wishes!

ISTA Workshop on Species and Variety Testing/Verification Munich/Freising, Germany, 21–25 April 2008

Berta Killermann
Chair, ISTA Variety Committee

Bavarian State Research Center for Agriculture
Freising, Germany
berta.killermann@LfL.bayern.de

The ISTA Workshop on Species and Variety Testing/Verification was organized and run by Berta Killermann (Chair, ISTA Variety Committee) and Benno Voit, and held at the Seed Testing Laboratory of the Bavarian State Research Centre for Agriculture, in Freising, Germany.

The organization and preparation of all the practical exercises and lectures was carried out by the seed testing group at

Freising. There were 21 participants: seed analysts, scientists, professors, directors and heads of institutes. They came from state control and research institutions, ISTA laboratories, universities and seed companies from nine different countries: Germany, the USA, the Netherlands, India, Latvia, Belgium, Austria, Serbia and South Korea.

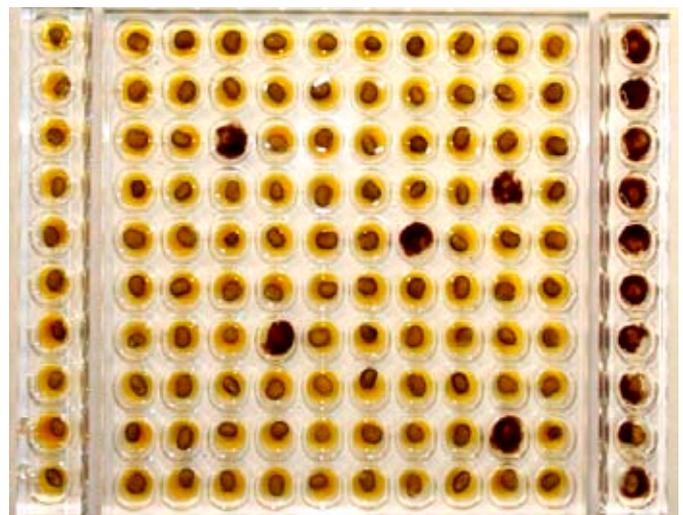
After the welcome and introduction to the Research Centre by Peter Doleschel, Berta Killermann gave an introduction to the ISTA Seed Testing Station Freising and introduced the seed testing group. She explained the objectives of species and variety testing and gave an overview over the

various methods for determining the variety and/or species of a seed lot, beginning with chemical and morphological methods via fluorescence tests and finishing with biochemical methods (electrophoresis).

The subject matter of the first practical exercise was the determination of bitter seeds in lupin samples (*Lupinus* spp.). The presence or absence of alkaloids is a diagnostic feature for *Lupinus* spp. The participants analysed two samples, one according to the current ISTA method (cutting method), and one newly developed by the German seed testing group organised in the VDLUFA (= Association of German Agricultural Analysis and Research



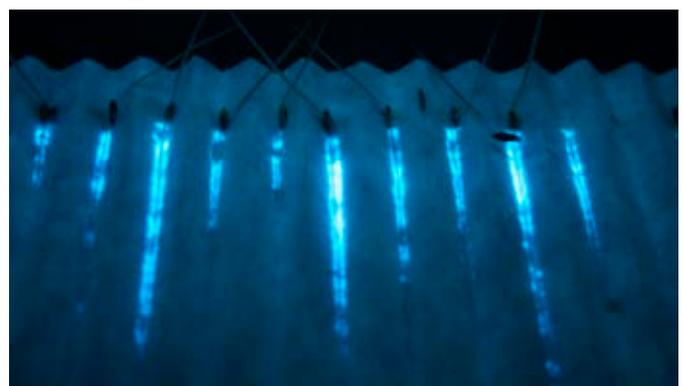
Species and variety testing by electrophoresis.



The newly developed alkaloid test for bitter lupin seeds, showing five positive results.



An example of a field trial.



Root fluorescence in *Lolium*.

Centres). This latter method has many advantages over the ISTA method, especially regarding evaluation and speed, and therefore also lower costs. It was thus proposed for acceptance into the ISTA Rules. This new and superior method convinced all the participants.

To conclude the first day, Peter Büttner presented the Research Centre's Institute for Plant Protection, and conveyed an insight into the work of a diagnostic laboratory, especially seed health methods.

The second day started with a presentation about ISTA's history and organization, since for a third of the participants, it was the first time that they had contact with this organization.

Next was a demonstration, by means of a field trial, of the differentiation between two-rowed and six-rowed barley using morphological traits. Not all characteristics of a variety can be determined in the purity analysis. Field trials are hence a good way of determining the remaining traits.

The afternoon session started with a cordial welcome by the President of the Research Centre, Mr Jakob Opperer. He emphasized the importance of development, improvement and international harmonization of seed testing methods, and was proud of the opportunity to host this important workshop at Freising.

The afternoon was then fully dedicated to the identification, using morphological features, of the various meadow-grass species: annual meadow-grass (*Poa annua*), common meadow-grass (*P. pratensis*), rough meadow-grass (*P. trivialis*), wood meadow-grass (*P. nemoralis*) and supina bluegrass (*P. supina*). The distinction of meadow-grasses in seed production is very important, as *P. annua* and *P. pratensis* occur in almost every arable field. The identification of meadow-grass species is extremely demanding. It requires on the one hand staff with many years' experience in grass examination, and on the other good laboratory equipment (microscope, live-image camera) is necessary. The morphological traits of the lemma (veining, keeling, form, filigree hairs) and palea (veining, little teeth on the keels), and the filigree hairs of the rachilla can be used. *P. annua* and *P. supina* can only be distinguished by means of protein electrophoresis. The participants first had to examine simple samples of each meadow-grass species, and then a difficult one. They were allowed to take the samples home for practice. This exercise demanded high concentration, and the participants were very glad when the afternoon was over. A guided tour through the greenhouses and grounds of the Research Centre cleared everyone's heads and rounded off the day.

In the morning of the third day, identification of species and varieties by means of fluorescence (UV light) was on the agenda. The fluorescence test can be carried out on seeds or seedlings, depending on the species. For oats (*Avena sativa*), the glume colour under UV light is diagnostically useful. For most varieties of Italian ryegrass (*Lolium multiflorum*), the root courses of almost all seedlings show fluorescence under UV light, while in most varieties of perennial ryegrass (*L. perenne*), root fluorescence is rare. Moreover, hybrid forms (*L. hybridum*) between the two species show an intermediate reaction. In the case of red fescue (*Festuca rubra*) and sheep fescue (*F. ovina*), the roots shine respectively either yellow-green or bluish green in an ammonia atmosphere. When wild mustard (*Sinapis arvensis*) is put on filter paper soaked with potassium hydroxide, it can be distinguished from rape seed (*Brassica rapa*), because the filter paper surrounding the wild mustard shows a blueish fluorescence. The methods for identification of yellow and white oats, wild mustard in rape seed, red fescue and sheep fescue, and, with reservation, the methods for perennial, Italian and hybrid ryegrass were demonstrated and intensively discussed.

In the afternoon, there was a visit to a seed-processing facility of a famous Bavarian seed company. All were very



Glume fluorescence in oat seeds.



Fluorescent wild mustard seeds among non-fluorescent rape seed.



impressed by this highly sophisticated facility, especially with respect to the maintenance of industrial health and safety standards. This was followed by a visit to the artistically and historically very important church of Weltenburg monastery, guided by Father Leopold. The participants were allowed to pause somewhat, and they learnt interesting things about the history of the monastery and its brewery.

Thursday was completely taken up by electrophoresis methods. For species and variety identification and homogeneity testing, three types of electrophoresis methods have become established: acid polyacrylamide gel electrophoresis (A-PAGE), sodium dodecylsulphate polyacrylamide gel electrophoresis (SDS-PAGE) and isoelectric focusing of storage proteins (IEF). The pattern of protein bands produced (electropherogram) is related to the genetic make-up and can be considered as

a fingerprint of a variety or breeding line. These fingerprints can be used to identify unknown samples, mixtures and the purity of hybrid samples by single seed or bulk seed analysis.

The participants learned all steps of electrophoresis: sample preparation (pliers, scalpel, coffee grinder, catsccept, tissue striker), preparation of gels, sample loading onto gels, running the electrophoresis in the electric field, staining and destaining of the gels, and evaluation. For wheat (*Triticum*), barley (*Hordeum*) and oat (*Avena*) the A-PAGE, for peas (*Pisum*), ryegrass (*Lolium*), wheat (*Triticum*), Triticale (\times *Triticosecale*) and meadow-grasses (*Poa*) the SDS-PAGE and for maize (*Zea mays*) the IEF were demonstrated, carried out and discussed. This long day ended with the official dinner, a typical Bavarian evening at the Bräustüberl on the hill of Weihenstephan, where the

oldest brewery of the world is located. On Friday, the last day of the workshop, Berta Killermann presented the activities, tasks and aims of the ISTA Variety Committee, and was able to recruit more members for active collaboration. In the final discussion, the methods which had been practised and demonstrated, and the knowledge won from the workshop were compared with the participants' own experiences. Finally, all agreed that the development, improvement, simplification and harmonization of seed testing methods is a necessary and important task and needs active collaboration. The workshop ended with the award of the participation certificates.

Before the participants set out for home, there was a final typical Bavarian lunch, with veal sausages, pretzels and wheat beer, well-deserved by all after this demanding week. ■

ISTA Quality Management Training Course Bangalore, India, 12–16 May 2008

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The 5th ISTA Quality Management Training Course was held from 12–16 May, 2008, in Bangalore, India. The training course was kindly hosted by the ISTA Member Laboratory of Indo-American Hybrid Seeds (India) Pvt. Ltd. It was attended by 13 participants from five different countries. The lecturers were Anny van Pijlen, ISTA Technical Auditor and member of several Technical Committees, and Martina Rösch, Head of ISTA Accreditation and ISTA System Auditor.

The main objective of a training course on the basic principles of quality management is to train laboratory staff in introducing and maintaining a quality management system which complies with the requirements of the ISTA Accreditation Standard and the ISTA Rules. After the workshop the participants were able to:

- know details about the ISTA Accreditation Programme;
- understand the requirements of the ISTA Accreditation Standard;
- evaluate the situation of their laboratory with regard to conformity with the ISTA Accreditation Standard;

- document the quality management system in a manual and related documents for their laboratory.

The training was divided into technical and system aspects of quality management. Topics for the system part were:

- the ISTA Accreditation Programme;
- introduction to quality management definitions;
- implementation of QM systems;
- quality audit and management review;
- quality documentation;
- corrective action.

For the technical part:

- good laboratory practice;
- staff training;
- germination;
- training, licensing and monitoring seed samplers;
- calibration equipment.

The presentations were supplemented by group work in which the participants worked on specific tasks and exchanged their views and experience.

On the third day, we visited the ISTA Member Laboratory IN07 of Indo-American Hybrid Seeds (India) Pvt., Ltd., in order to demonstrate how a quality system is implemented in day-to-day work. For this purpose, a mock internal audit was carried out by the two lecturers and observed by the participants. The participants could thus see how an audit is conducted, but also what kind of activities and documents are associated with quality management. The laboratory prepared a demonstration seed lot and seed samples, to make this exercise as close to reality as possible. The laboratory staff very competently demonstrated their work and made this an unforgettable visit.

On Wednesday there was an excursion to some of the points of interest in Bangalore. The first stop was at the Lal Bagh Botanical Garden, where everyone enjoyed the very warm temperatures and a large collection of tropical trees, including the “climb” up to one of the oldest rock formations on earth, dating back to 3000 million years. After an extended walk through the park, the participants visited the Nandi temple,



Course participants at the premises of Indo-American Hybrid Seeds (India) Pvt. Ltd.

used exclusively for worship of the sacred Hindu demi-god, the bull Nandi. After a visit to Bangalore Palace, the excursion continued to the ISKCON temple of the Hare Krishna movement, before the participants gathered for the workshop dinner where everyone enjoyed the excellent Indian food.

The workshop ended on the Friday afternoon after a short evaluation and the awarding of the certificates of attendance. ISTA would like to thank the host laboratory for the excellent preparation and organization of the event. ■



Participants in front of the Glass House of Lal Bagh Botanical Garden.

ISTA Forest Tree Seed Workshop Peri (Verona), Italy, June 12-14, 2008

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The fifth ISTA Forest Tree Seed Testing Meeting was held in Peri (Verona), Italy, from 12–14 June 2008. Previous venues were Guildford (England) in 1973, Macon (Georgia, USA) in 1978, Prague (Czech Republic) in 2003 and Verona (Italy) in 2006. Twenty-two participants from 14 countries had the opportunity

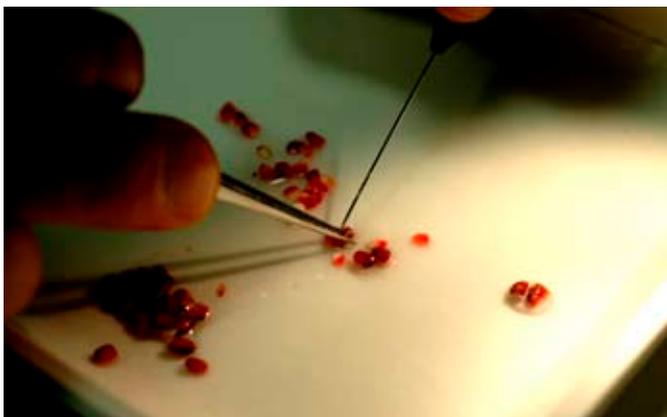
to improve their knowledge of sampling, tetrazolium and moisture.

The event was hosted by the Corpo Forestale dello Stato, at the National Centre for Forestry Biodiversity, where there is also the only ISTA-accredited laboratory for tree seed testing in Italy (ITML0600). The participants were greeted by very cold and rainy weather.

The workshop was opened by the Chair of the Forest Tree and Shrub Seed Committee, Zdenka Procházková, who presented the Committee activities since

2001. It was also the opportunity to announce a comparative tetrazolium test on *Abies alba*, with the participation of more than 20 laboratories.

The first day of the workshop was dedicated to the tetrazolium test and led by Steffi Kraemer, the Tetrazolium Committee Chair. After a theoretical part, the participants started a preparation of *Abies alba*, *Acer pseudoplatanus*, *Carpinus betulus* and *Crataegus monogyna* seeds for determination of viability. This first day was closed with two interesting presentations



Tetrazolium testing.



A demonstration of sample dividing.



on the flora of New Zealand, by Craig McGill, and oak testing in Austria, by Ilse Strohschneider. There was also with a presentation on *Jatropha curcas*, in order to join efforts around this species and its testing, as recently requested of the FTS Committee by the ISTA Secretariat.

The second day was dedicated to both sampling and tetrazolium testing. The sampling session was led by the Chair of the ISTA Sampling and Bulking Committee, Leena Pietila. First she presented theoretical aspects of sampling, followed by the practical part, dedicated to the same species tested the day before with tetrazolium. The official sampler of ITML0600, Paolo Beltrame, demonstrated sample reduction by both the Boerner and soil dividers.

A relaxing presentation by Michael Aberle on California and its native tree and shrub species delighted the participants and closed the working part of the second day. The day was concluded by a delicious official dinner held on the shore of Lake Garda, even though the weather was implacable, cold and rainy.

The third and final day of the workshop was dedicated to the moisture aspects of testing. The chair of this session was Zdenka Procházková, and it was opened by Sergio Pasquini, the quality manager of ITML0600, who presented both theoretical and practical aspects of moisture content testing, followed by an interesting

presentation by Fabienne Colas, Canada, and Patrick Baldet, France, on water activity as an alternative to moisture testing. Craig McGill, the incoming Moisture Committee Chair, focused his speech on quality assurance of moisture testing.

The evaluation of some of the species tested with tetrazolium closed the working part of the meeting. After receiving their certificates of attendance, the participants made an evaluation of the whole workshop.

It was really an honour for the Peri Centre to have simultaneously four Committee Chairs at the same workshop, allowing the participants to discuss several aspects of forest seeds in the ISTA Rules.



CALENDAR

2008

3–7 November ISTA Moisture, Germination and Vigour Workshop, Nakuru, Kenya
www.seedtest.org

2009

6–10 April 8th ISTA Seminar on Statistics in Seed Testing, Aussonne, France
www.seedtest.org

18–21 April ISTA Seed Vigour Workshop, Mashhad, Iran
www.seedtest.org

15–18 June ISTA Annual Meeting, Zurich, Switzerland
www.seedtest.org

27 April–1 May ISTA Workshop on Seed Sampling, Lusaka, Zambia

2010

16–22 June 29th ISTA Congress, Cologne, Germany
www.seedtest.org

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