

Seed Testing INTERNATIONAL

ISTA News Bulletin No. 130 October 2005



Read the Report of the ISTA Ordinary Meeting 2005 in Bangkok, Thailand

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Seed Testing INTERNATIONAL



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Editorial

By Michael Muschick,
ISTA Secretary General

Dear Reader,

'... The editor of this ISTA News Bulletin sincerely hopes that this news bulletin will become a real help for the activities and tasks of ISTA Stations and individual ISTA Members. But that aim will be attained only with some help of others. Please keep the purpose of this issue in your mind. It is to keep you and me well informed. It is not only that the Executive Committee and the Secretariat informs you, but also that you inform the Editor of this Bulletin in order that the Editor can inform all others. I am thinking of new seed legislation, seed laws, changing export and import regulations. I am thinking of new laboratories, new equipment, even new inventions improving the quality of our work and diminishing the strenuous part of our activity. The Editor expects co-operation for the benefit of all...'

With these words, Dr. A.F. Schoorel from the Netherlands conveyed the idea of an ISTA News Bulletin to the ISTA Members as Editor of the very first issue of the ISTA News Bulletin in August 1959.

Today, almost half a century later, ISTA can be very proud of how that original idea of the ISTA News Bulletin - or Seed Testing International as it is now called - could be sustained and even advanced throughout all these many years and with the 'help of others'.

These 'others' are the authors of all the contributions and articles you can read and learn from in this and all previous 129 issues. And I would like to express my sincere gratitude to all persons that contribute their valuable time, interest, hard work and knowledge to this magazine and the Association in general. Without the help of these people, ISTA would not be what it is today.

Alone the activities that are proceeding in the ISTA Technical Committees are tremendous as we could learn from the presentations in Bangkok at the Ordinary Meeting and read in the corresponding reports on page 15 and

33 onwards.

One of the very important outcomes of the meeting in Bangkok was the inclusion of rules for determination of seeds with specified trait(s) under



the performance based approach. In association with this decision of the ISTA voting members, special attention should be paid to the newly released ISTA documents (pages 3 to 8), including some clarifications in an interview with one of the ISTA GMO Task Force experts (page 9).

It is vital for ISTA to receive any remarks, comments or questions you may have on these documents and you are therefore kindly invited to send this kind of input to the Secretariat anytime before November 30, 2005.

Further information on activities of ISTA can be found in the reports from the 5th ISTA Seed Health Symposium celebrated in France this May and the two workshops held in conjunction with FAO, including very interesting regional reports from some workshop participants. Moreover, we have five new ISTA Workshops to announce, nicely dispersed on the world's continents. The country with the highest frequency of ISTA events, at least for next year, will though be Switzerland, with the ISTA Annual Meeting 2006 to be held in Glattbrugg (Zurich), Switzerland, June 26 to 29, preceded by an ISTA Purity Workshop on June 22 and 23, and followed by a 3 days ISTA Quality Assurance Training Course starting on June 27.

I trust that after reading through this latest issue of *Seed Testing International*, you will admit that the activities going on in ISTA are remarkable.

All the same, I would like to encourage all other 'others' in the sense of the above citation from the first issue in 1959, to take active part in what is going on in ISTA. The above stated plead of back then is still entirely applicable!

**Yours sincerely,
Michael Muschick**

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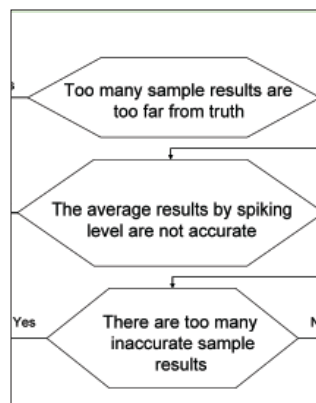
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Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots

Find all relevant documents to Accreditation for determination of specified trait(s)

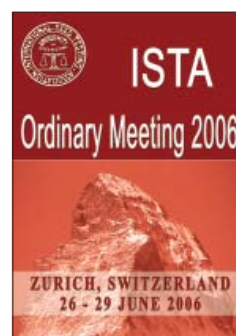
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ISTA Ordinary Meeting 2005 in Bangkok, Thailand

Report of the ISTA Ordinary Meeting 2005

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The first announcement and registration form for the ISTA Ordinary Meeting 2006 available in this issue

Online registration starts October 1, 2005

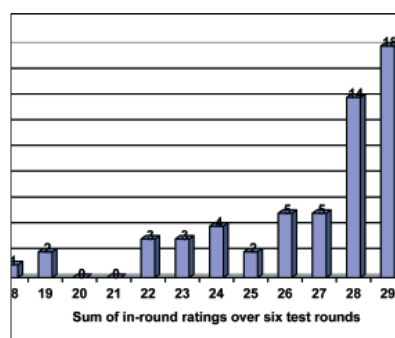
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Seed testing in the Caribbean and Central America

Read the regional reports about the seed industry in the Bahamas, Trinidad and Tobago, Belize, Mexico and Cuba

Page 27



Report of the ISTA Proficiency Test Committee

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President's Report

By Pieter Oosterveld, ISTA President

Last April, ISTA held its annual Ordinary Meeting in Bangkok, the capital city of Thailand. I myself have been to Thailand before and I was really looking forward to go again to this amazing country. Thailand is a beautiful country and the people are very friendly. Thailand and ISTA have been working together for a long time. The country is of main importance for the production of seed of many species. Our colleagues of the DOAE organised an excellent Ordinary Meeting and we would like to thank them again for all the efforts they took for making this meeting a success.

On Monday, the technical committees presented their work of the period since the ISTA Congress in Budapest. We discussed the amalgamation of the rules and annexes and we made big steps forward in this area and took important decisions. In fact, we decided to accept the proposal of the Bulking and Sampling Committee for a revised Chapter 2. The proposal of the committee did not only concentrate on the amalgamation of the chapter and the annexes, but included also a review of the chapter as a whole. The Bulking and Sampling Committee has set a trend and other committees will follow according to the time schedule we have decided on in Bangkok.

Over the past few years the GMO Task Force under the leadership of Professor Norbert Leist worked out a proposal for GMO testing. The final proposal of the task force has been discussed at length during the Ordinary Meeting in Bangkok. As agreed in Budapest 2004, ISTA has chosen for a performance based approach for GMO testing. In Bangkok we made the wording more precise by changing "GMO testing" into "testing for specified trait(s)".

The choice of a performance based approach instead of the approval of methods is at this time a logical one, since standardised methods for this specific tests are not available yet. The ISTA Members agreed on the new Chapter 8, including the testing on specified trait(s). However, the members showed some hesitation because the Executive Committee could not yet define precisely the standards

for accreditation of the laboratories, testing for specified trait(s) in accordance with Chapter 8. It was agreed that the Executive Committee would come up with a decision at the earliest possible date and that the new Chapter 8 will not come into force earlier than six months after the publication of the decision of the Executive Committee on the accreditation matter. As you all will have noticed, this publication has taken place at the end of July 2005 on the ISTA Website.

With the decision on the testing of specified trait(s) following a performance based approach, ISTA has written history. However, I would like to underline, that as before ISTA prefers to continue working with standardised methods. In this special situation however, it was decided to make an exception. I would like to thank everybody who contributed to the development of the new Chapter 8 for their efforts. It has been an enormous challenge to finalise the proposal as such.

The Executive Committee decided on a new phase of the experiment on 'Herbage Seed Lot Size'. For more information about the fourth phase, read the technical protocol on page 20 in this issue.

In May, I attended the ISTA Seed Health Symposium in Angers, together with 140 participants from all parts of the world. I really enjoyed the programme and concluded that ISTA still means a lot for many seed technologists. The programme included a visit to GEVES, the official seed testing station of France. The staff of GEVES organized the symposium in a very professional way. Thanks for that.

The decisions of the ISTA Ordinary Meeting were very well received by the International Seed Federation (ISF). ISF members expressed their appreciation during their congress, held in Santiago de Chile from 30 May till 1 June. During our stay in Chile, Michael and I took the opportunity to visit the Official Seed Testing Station. The laboratory is accredited by ISTA. The staff of the laboratory welcomed us very heartily and showed us the facilities. We were very impressed by their expertise and enthusiasm.



In June, I attended the Annual Meeting of AOSA and SCST, held in Saskatoon, Canada. The organization of the meeting was in the hands of our colleagues of the ISTA accredited laboratory in Saskatoon. I met many seed technologists and discussed with them about a number of items, e.g. harmonisation of ISTA and AOSA Rules. We agreed on the proposal to concentrate the efforts for harmonisation on the topics that bothers seed trade the most. ISF supplied us with a list of these topics. We have given a leading role to the rules chairs of both associations to organise the work. In practice they will invite chairpersons of technical committees to come up with proposals for further discussions within the respective association.

Indeed, I traveled a lot over the past months. I met many people in many countries. I am grateful to the fact that so many like to exchange information and ideas and contribute to the work of ISTA. I am impressed that so many seed technologists like to continue to develop new testing methods.

As announced in Bangkok, the Executive Committee is going to work on the future strategy of ISTA. We will have our first discussion in February, when we meet at the ISTA Secretariat in Bassersdorf, Switzerland. Those of you who would like to contribute to the discussion are invited to send ideas and proposals to the Secretariat.

Thank you all for your support.

Your President,
Pieter Oosterveld

ISTA Accreditation of Laboratories for Determination of Specified Trait(s) in Seed Lots

At the last Ordinary Meeting of the Association, voting delegates representing 34 national governments supported the inclusion of Rules for the testing of seeds with specified trait(s) (including the detection, identification and quantification of Genetically Modified Seed) into Chapter 8 of the ISTA International Rules for Seed Testing.

Under the performance based approach, the laboratory can freely choose a method, however has to fulfil three conditions before accreditation:

1. provide performance data on the successful implementation of the method in the laboratory as prescribed in the relevant ISTA documents, with a special focus on the parameters accuracy and repeatability
2. successfully participate in the ISTA Proficiency Test
3. successfully participate in the ISTA Audit Programme

With the positive vote of the governments in ISTA to include the performance based approach in the ISTA Rules, ISTA will now start with the accreditation of laboratories for determination of specified trait(s) in seed lots on February 2006.

The aim is to provide reliable and reproducible testing results on international level through the ISTA accredited laboratories.

The relevant ISTA accreditation documents can be downloaded free of charge from the ISTA Website www.seedtest.org:

1. Principles and Conditions for Laboratory Accreditation under the Performance Based approach (*this page*)
2. Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots (*see page 4*)
3. The ISTA Accreditation Standard (revised Version 4.0)

ISTA welcomes your input on the released documents published on page 3 and 4. Comments should be directed to ista.office@ista.ch before November 30, 2005.

ISTA Document: *Principles and Conditions for Laboratory Accreditation under the Performance Based Approach*

1. SCOPE

The scope of this document is to specify principles, conditions and requirements for laboratory accreditation for methods not standardised in the ISTA International Rules for Seed Testing but considered to fall under the category of 'performance approved methods' in accordance with clauses 8.1.2 and 8.2.3 of the ISTA Rules.

2. RELATED DOCUMENTS

- **ISTA Seed Testing Laboratory Accreditation Standard**
- **ISTA International Rules for Seed Testing**
- **Performance Data Evaluation Document(s)**
- **The ISTA Proficiency Test Programme**

3. PERFORMANCE APPROVAL OF METHODS

Under the Performance Based Approach a laboratory may develop and/or use a method not published in the International Rules for Seed Testing and apply for ISTA Accreditation to cover this method once the laboratory formally approves the method on the basis of performance data.

4. SCOPE OF ACCREDITATION

Performance approved methods to be included in a laboratory's scope of ISTA Accreditation must be defined in terms of the method used, the species tested and the specified trait that is to be determined.

5. ACCREDITATION PROCESS

5.1 General Conditions

- The ISTA Seed Testing Laboratory Accreditation Standard constitutes the reference document specifying the criteria which must be fulfilled by laboratories to qualify for ISTA Accreditation.
- Performance approved methods are limited to testing for specified traits (chapter 8.2.2 ISTA Rules).

- Evaluation of technical competence includes data from proficiency test participation and performance approval of test methods.
- Accreditation can only be granted for performance approved methods evaluated in accordance with relevant performance data evaluation documents.

5.2 Audit Process

5.2.1 Proficiency test participation

Relevant results from proficiency test participation will be taken into consideration for assessing technical competence. Satisfactory performance in relevant proficiency tests is a prerequisite for attaining or maintaining the status as an accredited laboratory.

5.2.2 Document evaluation

Part of the document review prior to the on-site assessment is an evaluation of performance data for each combination of species, test method and attribute.

5.2.3 On-site assessment

During the on-site assessment the audit team will assess whether implementation aspects are appropriately addressed and whether practice complies with the documented procedures. To that effect, training, equipment management, facilities, reporting and running the overall quality managements system will be assessed.

A complete practical demonstration of any performance approved method will not be required.

6. CHANGES TO THE SCOPE OF ACCREDITATION

Changes in a method covered by ISTA Accreditation must be reflected in the laboratory's scope of accreditation and, if justified by the nature of the changes, may require a full assessment of the latest performance data records for the changed method, and other relevant aspects. ■

ISTA welcomes your input on the released documents published on page 3 and 4. Comments should be directed to ista.office@ista.ch before November 30, 2005.

ISTA Document: *Performance Data Evaluation for the Presence of Seed with Specified Trait(s) in Seed Lots*

1. SUMMARY

This document describes how to present and evaluate performance data in the context of laboratory accreditation for determination of specified trait(s) under the Performance Based Approach.

This is related to Chapter 8 of the ISTA Rules, for the detection of seeds with specified trait(s) in seed lots, as no standardised method is included in the Rules for this type of test.

The laboratory shall specify the trait(s), and give information on the implemented method that it will use to test seeds.

Reference material for performance shall be seeds.

The laboratory shall show evidence of the ability to detect the specified trait(s), and to quantify the specified trait(s) in a range from 0.1% to 3%.

2. GENERAL INFORMATION ON TRAIT(S) AND METHOD

The specified trait(s) shall be defined by the laboratory (e.g., GTS-40-3-2, Bt11, 35S promoter, NOS terminator, Cry3Bb1 protein, etc).

Specified trait(s) as described by the laboratory

The method used shall be described by the laboratory in sufficient detail, to allow auditors to understand how the results are obtained.

The method is chosen by the laboratory (e.g., lateral flow strip, grow out assay of seedlings, sub-sampling strategy, quantitative

PCR method on ground flour, etc).

Description of the type of method used by the laboratory

Statement made by the lab about the way the method was validated and installed

Reference on documentation available, or other parties to contact, to be able to get information on validation of the method and its fitness for the purpose

3. REFERENCE SEED FOR PERFORMANCE DATA

The laboratory shall acquire seeds that will serve as reference material to obtain performance data to report to ISTA, for the ability to detect presence/absence of the trait(s), and to quantify the presence of the trait(s).

Statement of the laboratory on where and how it acquired reference seeds where the trait(s) is present

Statement of the laboratory on where and how it acquired reference seeds where the trait(s) is absent

4. THREE STEPS TO FOLLOW

The 3 steps are:

1. Check of reference seeds
2. Check of ability to detect presence and absence of the trait(s)
3. Check of ability to quantify the trait(s)

For checking reference seeds, the seeds shall be checked by the method declared, or by a method chosen in agreement with the provider of the reference seeds.

For ability to detect and quantify, samples shall be evaluated using the method declared.

As some levels of presence are pre-defined as described below, the tests can not be per-

Table 1: Approximate minimum number of seeds required to prepare the different samples:

Seeds with trait(s)	Seeds without trait(s)	step	comments	
Check for purity of seeds with specified trait(s)	400	--	check of reference seeds	seed by seed
Check for purity of seeds without specified trait(s)	--	30000	check of reference seeds	pooling is suggested
Ability to check for presence/absence of trait(s)	50	11950	ability to detect presence/absence of the trait(s)	30 samples of 400 seeds
Ability to check for quantification of presence of trait(s)	636	55584	ability to quantify the trait(s)	28 samples of 2000 seeds
Total for samples	1086	97534		
Total to gather	1100	100000		

formed completely blind by the laboratory. All samples shall be prepared and coded by a person, who will report the results; the tests shall be performed blind by other persons.

4.1 Check of reference seeds

(30000 seeds with absence of trait(s) and 400 seeds with presence of trait(s))

The check of reference seeds does not contribute to the evaluation of the performance of the laboratory, but is essential when internationally recognised seed certified reference material (CRM), is not available for presence of the trait(s), and for absence of the trait(s).

It is expected from this check that no seed with trait(s) is present in the 30000 seeds checked, and all of the 400 seeds individually checked have the expected trait(s). In that case the purity of the seeds with no trait(s) is 99.99% with 95% confidence and the purity of the seeds with the trait(s) is 99.25% with 95% confidence. With these figures and the fact that at least 2 seeds with specified trait(s) are spiked in the positive samples, the true value of the samples prepared for the ability to detect the presence is known with great confidence, as well as the level of presence in the samples for the ability to quantify the trait(s).

Reference seeds shall be checked, before their use to obtain performance data.

- 30000 seeds shall be checked for absence of the trait(s).
- 400 seeds shall be checked seed by seed for the presence of the trait(s).

It is suggested that the check of the reference seeds is performed both by the laboratory and by another party of trust and confidence (which can be the provider of the seeds).

From the above numbers (30000 and 400):

- 15000 seeds with absence of the trait(s) shall be checked by the laboratory.
- 15000 seeds with absence of the trait(s) shall be checked by another party.
- 200 seeds with presence of the trait(s) should be checked seed by seed by the laboratory.
- 200 seeds with presence of the trait(s) should be checked seed by seed by another party.

If the laboratory was not able to get re-

sults from another party, it has to check the amount of seeds that were expected from the other party, and indicate why it was not able to obtain results from another party.

Identification of the other party of trust and confidence

Statement of the laboratory about the absence of the trait(s) in 15000 seeds with absence of trait(s)

Statement of the other party about the absence of the trait(s) in 15000 seeds with absence of trait(s)

The expected result of this check is no presence of the trait(s) was detected in either of the 2 samples of 15000 seeds.

If the result indicates any presence of the trait(s), the laboratory shall indicate why it decided to use these seeds for performance evaluation.

Statement of the laboratory if presence of trait(s) detected

It is not reasonable to expect the laboratory to check seed by seed for the absence of the trait(s) on thousands of seeds. It is suggested that the laboratory use a pool size of 1000 seeds, i.e. check 30 pools of 1000 seeds. The laboratory shall indicate its pooling strategy even if 30 pools of 1000 seeds are checked. It is permitted to make more pools with less than 1000 seeds per pool, but it is not permitted to make less than 30 pools (of 1000 seeds).

Statement of the laboratory on the pooling strategy used, when check was not made seed by seed, for absence of trait(s) on 2 samples of 15000 seeds

Statement of the laboratory about the presence of the trait(s) in 200 seeds with presence of trait(s)

Statement of the other party about the presence of the trait(s) in 200 seeds with presence of trait(s)

The expected result of this check is presence of the trait(s) was detected in each of the 2 samples of 200 seeds.

If the result indicates any absence of the trait(s) in one, or more than one, seed the laboratory shall indicate why it decided to use these seeds for performance evaluation.

Statement of the laboratory if presence of trait(s) not detected

4.2 Ability to detect presence and absence of the trait(s)

(30 samples of 400 seeds)

30 samples shall be prepared to check the ability to detect presence/absence of the trait(s). They shall be randomly coded by a person from 1 to 30, and given blind to the staff who will perform the tests for presence/absence.

Statement of the laboratory about blindness of the 30 samples

The person who prepared the blind samples shall report the results.

- 10 samples of 400 seeds are to be prepared in which 3 seeds contain the specified trait(s) and 397 do not contain this trait(s) (spiking level 0.75%). The seeds with absence of trait(s) can be counted (397 seeds), or if counting is not possible obtained by weight of seeds based on the 1000 seed weight.

The laboratory shall indicate the result for each sample, whether the method showed presence of the trait(s) (P), or absence (A)

sample	1	2	3	4	5	6	7	8	9	10
result	x	x	x	x	x	x	x	x	x	x

10 P are expected. If this is not the case, the laboratory shall comment on its results.

Comments

- 10 samples of 400 seeds are prepared in which 2 seeds contain the specified trait(s) and 398 do not contain this trait(s) (spiking level 0.5%). The seeds with absence of trait(s) can be counted (398 seeds), or if counting is not possible obtained by weight of seeds based on the 1000 seed weight.

The laboratory shall indicate the result for each sample, whether the method showed presence of the trait(s) (P), or absence (A)

sample	1	2	3	4	5	6	7	8	9	10
result	x	x	x	x	x	x	x	x	x	x

10 P are expected. If this is not the case, the

laboratory shall comment on its results.

Comments

- 10 samples of 400 seeds where the trait(s) is absent in each seed are needed. The seeds with absence of trait(s) can be counted (400 seeds), or if counting is not possible obtained by weight of seeds based on the 1000 seed weight.

The laboratory shall indicate the result for each sample, whether the method showed presence of the trait(s) (P), or absence (A)

sample	1	2	3	4	5	6	7	8	9	10
result	x	x	x	x	x	x	x	x	x	x

10 P are expected. If this is not the case, the laboratory shall comment on its results.

Comments

If all 30 samples are true to type, the upper limit of a one-sided 95% confidence interval of the false rate (including both false positive and false negative) is 9.5%.

About 300 samples would be necessary to obtain a 95% confidence interval with 1% as the upper boundary of false rate. Given the size and required workload of many laboratories, it is impractical to require this ten-fold increase in the number of samples to achieve a 1% upper boundary of false rate. Therefore 30 samples are considered adequate.

4.3 Quantification of trait(s)

The laboratory shall state the quantification result in %, in the unit in which it will report its results. If more than one unit is to be used, the laboratory shall either show evidence for each unit chosen, or indicate how a result with a given unit can be derived from a result from a unit for which evidence has been shown.

It is obligatory to provide data on either % of seeds by number of seeds or in % of seeds by weight of seeds.

Statement of the laboratory on the unit used for the performance data, and reporting of results, if % of seeds by number of seeds

Statement of the laboratory on the unit used for the performance data, and reporting of results, if % of seeds by weight of seeds

Statement of the laboratory on the unit used for the performance data, and reporting of results, if % of seeds by the unit described below

The performance data evaluation aims at checking % results in the range from 0.1% to 3%.

Samples are all made up of 2000 seeds in total (by count, or by weight based on 1000 seed weight).

When a number of seeds with the specified trait(s) are spiked in the samples, the weight of seeds with the specified trait(s), and the weight of the seeds where the trait(s) is not present, shall be weighed for each sample.

For each of 7 levels, 4 samples of 2000 seeds shall be prepared, making 28 samples in total.

3 known levels of presence shall be checked: 0.1% (2 seeds spiked), 0.5% (10 seeds spiked), 1% (20 seeds spiked) by each laboratory.

4 levels of presence shall be selected by the person who prepares the sample, to be given blind to the testers.

- Blind level 1 shall be in the interval [0.1%, 0.5%] in number of seeds (2 to 9 seeds spiked)
- Blind level 2 shall be in the interval [0.5%, 1%] in number of seeds (10 to 19 seeds spiked)
- Blind level 3 shall be in the interval [1%, 2 %] in number of seeds (20 to 39 seeds spiked)

- Blind level 4 shall be in the interval [2 %, 3%] in number of seeds (40 to 60 seeds spiked)

For each of the blind levels, the person who prepares the samples shall select at random a number of seeds within the range, and prepare 4 samples with this same number of seeds having the specified trait(s).

The 28 samples for the ability to quantify the trait(s) shall be randomly coded from 1 to 28 and given blind of level to the staff that will perform the tests.

Statement of the laboratory about blindness of the 28 samples

5. DESCRIPTION OF SAMPLES, AND REPORT OF RESULTS (Table 3)

It is not permitted to give a table of results with missing samples. In case of problems with a sample, another sample of the same level shall be prepared and analysed.

The values given by the staff that performs the analysis shall be reported without any change by the person who prepared the coded samples (no retest, no re-evaluation if a value is far from the true value, etc).

Statement of the laboratory on the fact that the results obtained have been reported with no changes

Statement of the laboratory about how to derive a unit from another, if applicable

6. STATISTICAL EVALUATION OF PERFORMANCE DATA

Accuracy and repeatability shall be determined as an objective criteria to evaluate the

Table 2: The number of seeds required for the 28 samples is about:

x	Seeds with specified trait(s)	Seeds without specified trait(s)
0.1% level	2 x 4 = 8	1998 x 4 = 7992
0.5% level	10 x 4 = 40	1990 x 4 = 7960
1% level	20 x 4 = 80	1980 x 4 = 7920
Blind level 1	9 x 4 = 36 max	1998 x 4 = 7992 max
Blind level 2	19 x 4 = 76 max	1990 x 4 = 7960 max
Blind level 3	39 x 4 = 156 max	1980 x 4 = 7920 max
Blind level 4	60 x 4 = 240 max	1960 x 4 = 7840 max
TOTAL	636	55584

Table 3. Description of samples, and report results

		0.1% level	blind level 1	0.5% level	blind level 2	1% level	blind level 3	blind level 4
number of spiked seeds	sample 1							
number of spiked seeds	sample 2							
number of spiked seeds	sample 3							
number of spiked seeds	sample 4							
weight of spiked seeds	sample 1							
weight of spiked seeds	sample 2							
weight of spiked seeds	sample 3							
weight of spiked seeds	sample 4							
weight of seeds without trait(s)	sample 1							
weight of seeds without trait(s)	sample 2							
weight of seeds without trait(s)	sample 3							
weight of seeds without trait(s)	sample 4							
result in % number of seeds	sample 1							
result in % number of seeds	sample 2							
result in % number of seeds	sample 3							
result in % number of seeds	sample 4							
result in % weight of seeds	sample 1							
result in % weight of seeds	sample 2							
result in % weight of seeds	sample 3							
result in % weight of seeds	sample 4							
result in % other unit	sample 1							
result in % other unit	sample 2							
result in % other unit	sample 3							
result in % other unit	sample 4							

Table 4. Example for computation of repeatability std-dev in % of mean

True level	Sample	Result	Variance
0.1%	sample 1	0.12	0.003825
	sample 2	0.24	
	sample 3	0.11	
	sample 4	0.12	
Blind-0.3%	sample 1	0.3	0.00046667
	sample 2	0.34	
	sample 3	0.29	
	sample 4	0.31	
0.5%	sample 1	0.52	0.003
	sample 2	0.51	
	sample 3	0.49	
	sample 4	0.4	
Blind-0.6%	sample 1	0.6	0.001225
	sample 2	0.65	
	sample 3	0.68	
	sample 4	0.62	
1.0%	sample 1	1.1	0.01666667
	sample 2	1	
	sample 3	1.2	
	sample 4	1.3	
Blind-1.5%	sample 1	1.5	0.01666667
	sample 2	1.6	
	sample 3	1.7	
	sample 4	1.8	
Blind-2.2%	sample 1	2.5	0.04333333
	sample 2	2.6	
	sample 3	2.8	
	sample 4	2.3	
Average variance (repeatability variance)			0.01216905
Mean of the true levels			0.885714
Repeatability std-dev in % of the mean			12.45%

performance data.

Accuracy is a way to measure closeness of agreement between a test result and the true value.

Repeatability is a measure of dispersion of test results under repeatable conditions. It will be computed as the square-root of the average of the variances of the 4 samples per level and will be expressed in % of the mean of the true levels in the test.

The four samples per level have exactly the same true value expressed as % in number of seeds if the number of seeds is counted (spiked seeds with specified trait(s) and

seeds). In other cases, the true value of the 4 samples is very similar but not strictly equal. The 4 samples are not 4 repeats from a unique sample, as it might be the case in other types of repeatability assessments.

Example for computation of repeatability std-dev in % of the mean:

7. EVALUATION OF THE DATA SUBMITTED BY THE LABORATORY

The performance data are a part of the different elements of assessment for accreditation. The grades given below to evaluate the performance data are a help for the auditors.

7.1 Check of reference seeds with trait(s):

- Grade 1: 0 seeds with absence of trait(s) in 400 seeds
- Probability to create a false negative sample with 2 spiked seeds is 0.006%
- Probability to create a false negative sample with 3 spiked seeds is less than 0.001%
- Grade 2: 1 or 2 seeds with absence of trait(s) in 400 seeds
- Probability to create a false negative sample with 2 spiked seeds is 0.014% (1 seed found) and 0.025% (2 seeds found)
- Probability to create a false negative sample with 3 spiked seeds is less than 0.001%

COVER ARTICLES

ISTA Accreditation for Determination of Specified Trait(s) in Seed Lots

- Grade 3: 3 seeds with absence of trait(s) in 400 seeds
- Probability to create a false negative sample with 2 spiked seeds is 0.037%
- Probability to create a false negative sample with 3 spiked seeds is 0.001%

7.2 Check of reference seeds without trait(s) (minimum 30 pools):

- Grade 1: no pool with presence of trait(s)
- Probability to create a false positive sample with 400 seeds, based on estimate (realistic) is 0.000%
- Probability to create a false positive sample with 400 seeds, based on 95% upper bound of confidence interval (very conservative) is 3.9%
- No Grade 2
- Grade 3: 1 pool with presence of trait(s)
- Probability to create a false positive sample with 400 seeds, based on estimate (realistic) is 1.4%
- Probability to create a false positive sample with 400 seeds, based on 95% upper bound of confidence interval (very conservative) is 6.2%

7.3 Ability to detect the trait(s):

- Grade 1: all 30 samples correctly identified
- Grade 2: 1 or 2 samples wrongly identified
- Grade 3: more than 2 samples wrongly identified

7.4 Accuracy of trait(s) quantification:

In some documents +/- 20% or +/- 25% deviation from true value is stated as the maximum tolerable limit of accuracy. For low % values, in our case a range of 0.1%-3%, the distribution of data points is not symmetrical, and the difference (true value) – (quantile) is smaller below the true value compared to the difference with the same quantile above the true value. For this reason, the thresholds are established with an upper interval which is twice the lower interval. For instance the lower limit is 25% of the true value, and the upper limit is 50% of the true value.

For a true value of 1%, limits are then -0.25 and +0.5, where the accuracy is

$$\frac{[(\text{observed value}) - (\text{true value})]}{\text{true value}}$$

- Grade 1: all 28 samples have the accuracy within -0.25 and +0.5
- Grade 2: no samples have the accuracy smaller than -0.5 or greater than 1
- Grade 3: some samples have the accuracy smaller than -0.5 or greater than 1

7.5 Repeatability of trait(s) quantification:

- Grade 1: Repeatability std-dev in % of the mean is below 20%
- Grade 2: Repeatability std-dev in % of the mean is below 30%
- Grade 3: Repeatability std-dev in % of the mean, excluding 0.1% level, is below 30%


8. CONCLUSION

Auditors will use the information provided in the performance data evaluation document submitted by the laboratory, and will perform computations with the data provided.

Performance data evaluation is a part of the accreditation scheme when there is no ISTA method available in the ISTA Rules. ■

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Questions and Answers on Performance Data Evaluation for the Presence of Seed with Specified Trait(s) in Seed Lots

By Sylvain Grégoire, ISTA GMO Task Force Member
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Following the decisions taken in Bangkok to introduce testing for the presence of seeds with specified trait(s) in seed lots (Chapter 8 of the Rules), ISTA has established a performance data evaluation document for use if the performance based approach is to be used. This document describes the requirements which will be needed for a laboratory to demonstrate its performance for the method for which ISTA accreditation is being sought. The information will be used by the ISTA auditors as a component of the accreditation process. The document has been available on the ISTA Website since July 2005.

When does ISTA need an evaluation of performance data to accredit a laboratory?

Only for a given type of test, when there is no ISTA method available, and the performance based approach has been recognised as acceptable. This is the case for testing for the presence of seeds with specified trait(s) (8.2.2 in the new version of Chapter 8 of the Rules).

Can a laboratory use any method when the performance based approach is used?

Yes, in the sense that any method which is fit for the purpose and reliable can be used.

Yes, also in the sense that the method can be proprietary to the laboratory, or shared with other laboratories, or published and used widely, or recommended by national or international organisations.

No, in the sense that as a method must be reliable and established, it can not for instance be a method at an early stage of development where the laboratory is still looking at the influence of various parameters before deciding on a protocol. It is expected that any method used routinely has been validated prior to use, either by the laboratory, or more generally in a multi-laboratory process.

Does ISTA validate the method when the

performance based approach is used?

No. In the performance based approach, the laboratory only needs to demonstrate its performance to ISTA.

Is the performance data evaluation document applicable to any type of tests?

No, it is only applicable for some tests in Chapter 8 (8.2.2) for which the performance based approach is used.

The document title is "Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots". It does not cover for instance the estimation of % of seeds true to variety, which is also in the scope of Chapter 8.

Why is the scope of the document limited?

The first reason is that when an ISTA method is available, there is no need for performance data evaluation for the ISTA method, as the method has been validated prior to introduction to the Rules.

Another reason is that for any type of test there are practical aspects which need to be precisely described, and they may differ from one type of test to another. The sample size is an example. It differs for Purity or Germination testing, and it can differ for detection of presence/absence or quantification, etc.

It is the same for proficiency tests, where the same general principles apply, but technical details vary according to the type of test.

Does performance data evaluation replace ISTA proficiency tests?

No, participation in the ISTA proficiency test programme is required. The same principles apply as for Purity or Germination, for instance. A rating system for detection, and a rating system for quantification is applied for each proficiency test (A, B, C or BMP), and the 6 most recent proficiency test results are used to obtain a performance rating.

Are proficiency tests and performance data evaluation formally linked?

There is no formal link between them. It is not necessary, for instance, to submit performance data evaluation prior to participating in ISTA proficiency tests.

Remember that laboratories can also participate in proficiency tests, even if they are not ISTA laboratories, or if they are ISTA laboratories, but they do not seek accreditation.

If a laboratory seeks ISTA accreditation for Chapter 8.2.2, both proficiency testing and performance data evaluation are required.

Has ISTA looked at non ISTA documents on performance data evaluation?

Yes, for instance

- Codex alimentarius such as CX/MAS O4/10
- European norms such as CEN/TC 275/WG11
- ENGL Method Performance Requirements
- ISO/DIS 24276
- prEN ISO 21572
- IUPAC harmonised guidelines for single laboratory validation of methods of analysis

These have been used as a way to identify the common elements to prepare the ISTA document, so that it is consistent with documents of other international organisations.

It also reinforced the actual need to establish a specific ISTA document, fit for the purpose of ISTA, which is seed testing.

Did ISTA ask advice from ISTA and non ISTA laboratories, when defining the technical requirements?

Yes, a number of persons have been contacted in order to obtain their feedback about the technical and financial implications of the procedure. For instance, in the document the range to check quantification is 0.1% to 3%. As 0.1% might be difficult for some laboratories as it is their limit of quantification, repeatability excluding 0.1% is permitted. As some laboratories expressed concerns for quantification over 3%, the upper limit has been changed from 5% to 3% in order to take

into account this concern. If in the future there is a need to increase the range, it can be done.

Other concerns are more difficult to tackle. For instance it would be convenient to obtain free reference material from ISTA (seeds and flour) to perform the evaluation. Unfortunately this is not possible. It would also be nice to perform an evaluation on only 2 to 5 samples. As the performance is checked on a range, and an indication of laboratory variability is needed to check accuracy and repeatability, more than 5 samples are needed to obtain sufficiently reliable information.

The need is to have a procedure that can be applied by a wide range of laboratories and to a wide range of methods in the same way. With this, not only are all labs evaluated with the same rule (equity), but also ISTA is able to evaluate laboratories globally (compare and improve).

Has the number of samples, size of samples, computations been checked by statisticians?

Yes, in fact most of the input comes from the STA-GMO Task Force which combines the expertise of statisticians, laboratory expertise, and the ISTA Secretariat. The performance data evaluation document is con-

sistent with the 5 proficiency tests already completed. Great attention has been paid to obtaining a reliable true value of the samples, prior to analysis, in order to compute accuracy and repeatability which are true and fair for the laboratories. However the number of samples and the way to produce the samples is a workload that may be extensive if the envisaged number of tests to manage routinely is low.

Will the ISTA document and requirements change in the future?

If needed, ISTA will be able to update the document and the requirements, using the same procedures as for other documents linked to accreditation.

What do I do if I want my laboratory to join the process?

Formally, performance data evaluation is part of the accreditation process. When a laboratory applies to go through the accreditation process, the ISTA Secretariat will indicate how and when to proceed.

In practice the document is written in a way that the same document both describes what to do, and is used to return information back to ISTA by filling in tables. The document indicates how to proceed, how many samples,

etc. In case of questions the ISTA Secretariat will provide assistance.

Can I be accredited for detection, and later on for quantification?

Yes, in that case data for the presence/absence detection are needed, and the quantification part will be required later on.

If I want to be accredited for more than one species, or more than one trait, should I submit performance data evaluation for each possible combination?

It is not necessary to submit a full evaluation on each possible combination. However in such a case, it is necessary to contact the ISTA Secretariat to explain the scope of accreditation you seek, before to perform the sample preparation and the evaluation, to check what is possible, and what is not possible.

For instance if for a given trait, there is evidence that a laboratory competent in performing tests according to a method on species X, is also competent for the species Y, then it will not be necessary to perform two separate evaluations. It is possible to use the 35S promoter, respectively the NOS terminator, for different traits and/or different crops, rather than to perform independent series. ■

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ISTA GMO Proficiency Tests: Rating System for Quantitative Results

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Introduction

ISTA performs multi-laboratory proficiency tests (PT) with the goal to detect seeds with specified trait(s). In the PTs performed to the present date, laboratories were asked to provide the following information on the samples they received:

- presence or absence of GM seeds (qualitative test);
- quantification of the GM seed level using either a sub-sampling quantification method (also named semi-quantitative test) or a quantitative test (most often by PCR).

The same ISTA PT overall rating procedure, as used for Purity of Germination, is used here as described in Table 1.

Depending on the results obtained by a laboratory on a given PT, the laboratory is rated A, B, C or BMP. The definitions below show

the philosophy of the system which can be applied to many different types of tests:

- A: no problem has been detected in this test.
- B: there are small problems, but no specific investigation or action is suggested to the participant.
- C: problems, ISTA may indicate there are things the lab needs to explain or correct.
- BMP (Below Minimum of Performance): ISTA indicates by a letter that the results were poor and the laboratory has to explain and correct things.

Each rating communicates a number of points, the bigger the number, the better the results. The decrease from A to C and the "0 points" for BMP, are another way to understand the meaning of these ratings.

The rating for a given PT is an indication to

the laboratory on its performance in this test.

In the context of GMO detection, two rating systems are defined depending on the nature of the test ; qualitative to detect presence/absence, and semi-quantitative or quantitative test to quantify the presence. A computational procedure is used to establish the laboratory rate, and the final decision is left to appointed experts for the PT. In this article, we describe the computational procedure used in the rating system to quantify the presence of GM seeds.

General overview

The decision tree in Figure 1 exhibits the general definitions used for defining A, B, C and BMP ratings in GM quantification.

These general definitions have been translated into computational terms as exhibited in Figure 2.

The system is based on two main quantities: the true levels and the z-scores. They are described in the next two sections. Samples with a zero spiking level are not used in quantification rating, but they are considered in the rating system for qualitative tests as described in Seed Testing International N° 128 pages 8-10 October 2004. The computation

Table 1: ISTA rating system for 6 PTs based on the in-round rating values.

One test rating	One test Score Value	Overall rating on 6 tests	Range on 6 tests
A	5 points	A	28 – 30 points
B	4 points	B	21 – 27 points
C	3 points	C	16 – 20 points
BMP	0 points	BMP	below 16 points

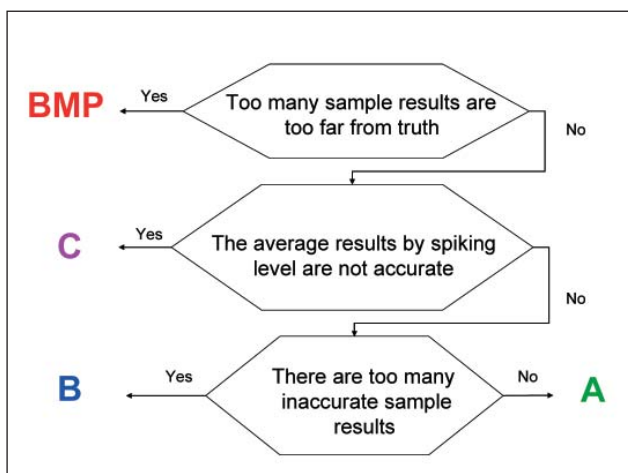


Figure 1: Decision tree defining A, B, C and BMP ratings in semi-quantitative/quantitative PTs

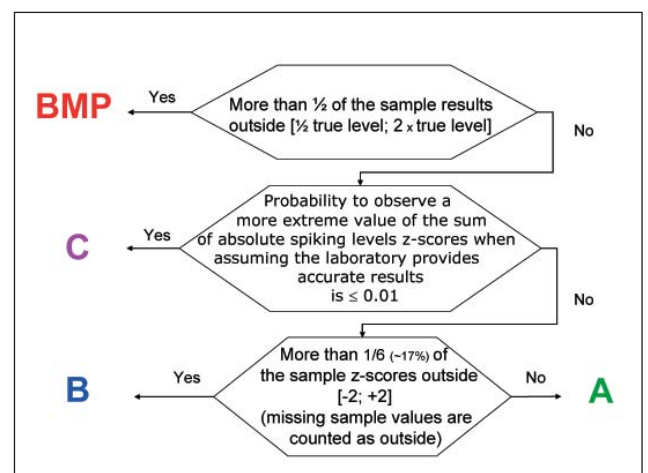


Figure 2: Analytical definition of A, B, C and BMP ratings in semi-quantitative/quantitative PTs

associated with each decision box in the decision tree in Figure 1 and 2 is illustrated with a graphic: each laboratory is plotted on the y-axis using an artificial number for the identification and a letter indicating the test used by the laboratory (S for semi-quantitative tests, Q for quantitative tests). An artificial number is used to prevent identification of laboratories by non appointed persons. There is one panel for each non-zero spiking level. Examples of these graphics are provided, using the 4th PT (PT4) for which 3 samples for each of 3 non-zero spiking levels were sent to the laboratories resulting in a total of 9 non-zero samples.

True level definition

In order to accommodate various measurement units, three true levels for each sample sent to the laboratories have been defined:

- Ratio of the number of GM seeds to the total number of seeds in the sample;
- Ratio of the weight of GM seeds to the weight of the sample;
- For a given spiking level, median of the sample results reported by the participating laboratories.

This results in three sub-rating systems and thus three ratings are available to the experts.

Z-scores

Z-scores are useful to establish rules from distributions with different means and/or different standard-deviations. They are already used in ISTA PT rating systems, on Germination and Purity for example.

The definition of a z-score is as follows:

Consider a value x from a distribution with mean μ and standard-deviation σ . The formula for converting x into its corresponding z-score is:

$$z = \frac{x - \mu}{\sigma}$$

This value indicates how far and in what direction x deviates from μ , in units of σ .

The distribution's mean and the distribution's standard-deviation of the z-scores are equal to 0 and 1 respectively. When the distribution of reference is normal, the z-scores distribution is also normal and thus the probability to have a z-score in the interval $[-2; +2]$ is approximately 0.95. This property is used in the PT rating.

BMP rating

The rule is:

If more than half of the sample results are outside the acceptance interval defined by $[\frac{1}{2}$ true level; $2 \times$ true level], then the rating is BMP.

This rule assigns a BMP rate when too many sample results are too far from the true level. As the variance of the results is an increasing function of the true level, the acceptance interval decreases with the true level as exhibited in Figure 3.

Figure 4 and Figure 5 visualize the results for PT4 when two different units are used for the true level, i.e. percent of GM seeds by number and percent of GM seeds by mass respectively.

In Figure 4, the two vertical purple lines for a given spiking level define the acceptance intervals. These intervals are the same across laboratories whereas they are unique for each sample in Figure 5 as the true level defined in percent seed by mass is unique for each sample.

When all the 9 sample results are available from a laboratory, the BMP rating is assigned if the number of samples out of the acceptance intervals is superior to 4. This limit might be different for laboratories not reporting for some reasons results for all the samples: for example, a laboratory might provide results for 6 samples only and thus, the limit is equal to 3 for this particular laboratory.

Laboratories with a BMP rating are identified in the top of the graphic.

In Figure 4, BMP rating is assigned to 6 labo-

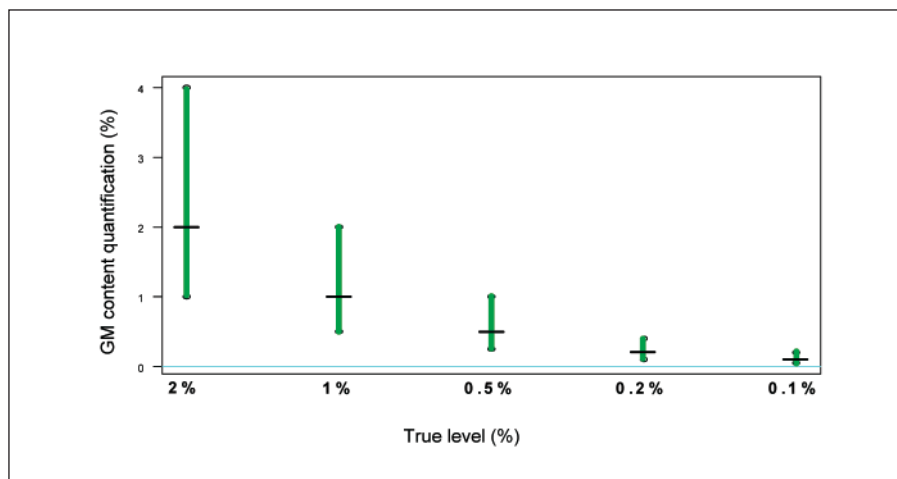


Figure 3: Size of the “acceptance” intervals (in green) as a function of the true level

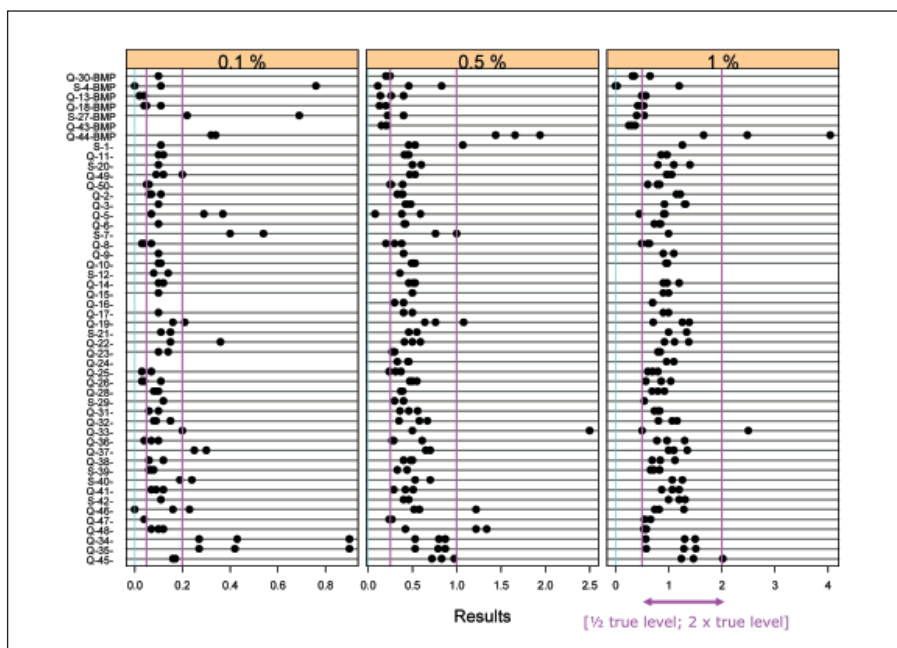


Figure 4: Graphic used for the BMP rating in PT4 when the true level is expressed in percent seed by number

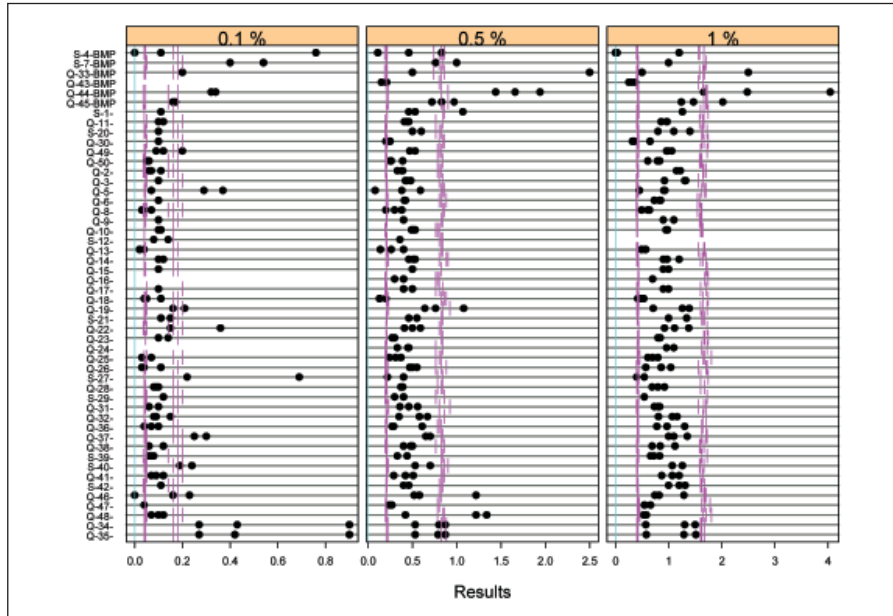


Figure 5: Graphic used for the BMP rating in PT4 when the true level is expressed in percent seed by mass

ratories. It is also assigned to 6 laboratories in Figure 5, 3 laboratories having a BMP rating for both units (Laboratory #4, #43 and #44). Using the percent seed by number is more appropriate when the sub-sampling strategy is used, using the percent by mass is more appropriate when quantification is made by a PCR method.

Reference intra-laboratory standard-deviation

Before going into the details of the C, B and A rating computations, let's define the reference intra-laboratory standard-deviation. Conceptually, this quantity represents the average intra-laboratory variation for a given spiking level. Computationally, we have used the following procedure to estimate it:

- For each laboratory k and each spiking level i , compute the variance of the sample results: $\hat{\sigma}_{ik}^2$
- Carry out the Cochran's test at the 95% level to see if the laboratory with the highest variance has an outlying spread of replicates.
- Estimate σ_i^2 by $\hat{\sigma}_i^2 = \text{mean of the } K \text{ variances } \hat{\sigma}_{ik}^2$ if no outlying variance has been identified with the Cochran's test, $\hat{\sigma}_i^2 = \text{mean of the } K-1 \text{ smallest variances otherwise.}$
- Estimate the reference intra-laboratory standard-deviation for spiking level i with: $\sqrt{\hat{\sigma}_i^2}$

C rating

The rule is:

If the probability to observe a more extreme value of the sum of absolute spiking levels z-scores when assuming the laboratory provides accurate results is ≤ 0.01 , then the rating is C.

This rule is stated using a terminology pertaining to statistical hypothesis tests. The idea here is to obtain an assessment of the overall accuracy of the average results by spiking levels and to rate C a laboratory for which this overall accuracy is not acceptable.

Computationally, this is done using z-scores and the reference intra-laboratory standard-deviation defined in the previous section. We first compute the following z-scores for each laboratory and each spiking level:

Notice that the reference laboratory standard-deviation above is divided by the square root of the number of sample results reported as this will constitute the reference standard-deviation of the mean of the sample results.

$$z = \frac{(\text{mean of the sample results}) - (\text{true level})}{(\text{reference lab stddev}) / \sqrt{(\text{number of reported samples})}}$$

Then we consider the theoretical distribution of the sum of these absolute independent z-scores. This distribution can be defined using simulations as described in Tattersfield publication (Seed Science and Technology, vol.7, No.2, pages 247-257) and will lead to the definition of the rejection regions at the 0.01 level to comply with the hypothesis testing statement in the rule. Table 2 provides these rejection regions when the number of spiking

levels varies from 1 to 5.

Table 2: Rejection region for C rating.

# of spiking levels	Rejection region at the 0.01 level
1	2.55
2	3.97
3	5.25
4	6.43
5	7.55

Thus, if a laboratory reported sample results for 3 spiking levels and if the sum of the absolute 3 z-scores defined above is superior to 5.25, a C rating is assigned.

Figure 6 visualizes the results for PT4 when the true level for a given spiking level is defined to be the median of the sample results reported by the participating laboratories.

In this graphic, the x-axis is the sum of the absolute z-scores for the mean of the result samples reported by the laboratories. Laboratories corresponding to a C rating are displayed in the bottom (17 laboratories). The rejection region is visualized with a vertical purple bar. There are 4 laboratories with a rejection region different to 5.25 (circled in blue): these two laboratories reported results for 2 samples only and thus the corresponding rejection region is 3.97. Note that a z-score can be positive or negative, but we use the absolute value to sum z-scores for a laboratory.

B and A rating

The rule is:

If more than 1/6 of the sample z-scores are outside $[-2; +2]$ (missing sample values are counted as outside), then the rating is B otherwise it is A.

In this rule, the z-scores for a given laboratory are computed for each spiking level by sample combination as follows:

$$z = \frac{(\text{sample result}) - (\text{true level})}{\text{reference lab stddev}}$$

As a z-score outside the interval $[-2; +2]$ has low probability (0.05) to occur for a laboratory providing accurate sample results, the interval $[-2; +2]$ is used to qualify the accuracy of a sample result.

Figure 7 visualises the results for PT4 when the true level is expressed in percent seed by

number.

Laboratories having an A rating are displayed on the top of the graphic, laboratories having a B rating in the bottom of the graphic. The two vertical purple lines for each spiking level visualize the interval [-2 ; +2] for the z-scores. A point outside these limits indicates an inaccurate sample result reported by the corresponding laboratory. Table 3 gives the maximum number of inaccurate sample results that can be accepted for an A rating.

Table 3: Maximum number of z-scores out of [-2 ; +2] that can be accepted for A rating.

# of samples with reported result	Max # of z-score-out of [-2;2]
1 to 5	0
6 to 11	1
12 to 17	2
18 to 23	3

Combining the different decisions

Figure 1 and 2 describe how the rating system is combining the different individual decisions that have been detailed in the previous sections. Figure 8 provides a summary of

the PT4 ratings for the 51 laboratories which provided quantitative results, using the three definitions of the true level.

The distributions of the PT4 rating are nearly identical for the different true level definitions.

The details of the different ratings for the different laboratories as well as all the graphics used to illustrate the different decisions and the comments provided by the laboratories are available to the appointed experts that make the final decision regarding the rating. ■

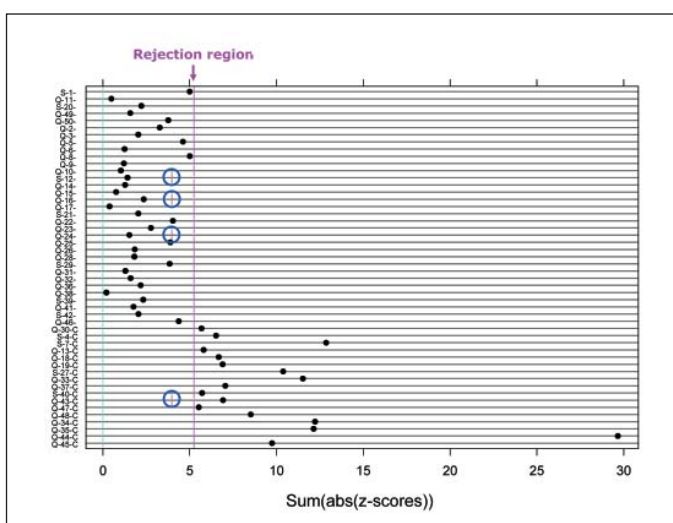


Figure 6: Graphic used for the C rating in PT4; the true level here is the median of the sample results.

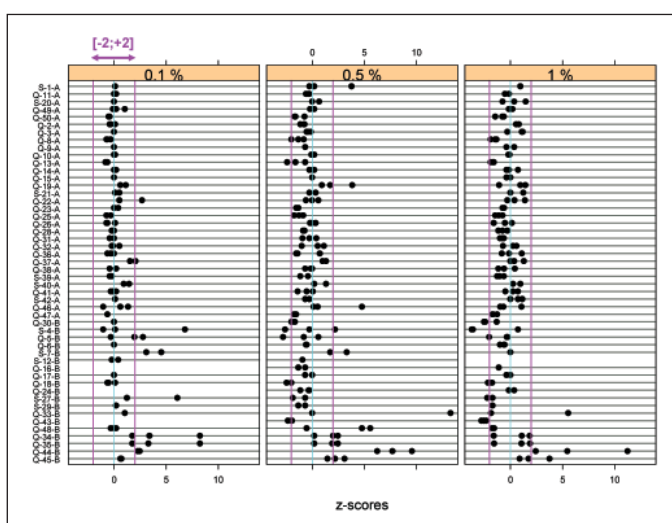


Figure 7: Graphic used for the A/B rating in PT4 when the true level is expressed in percent seed by number

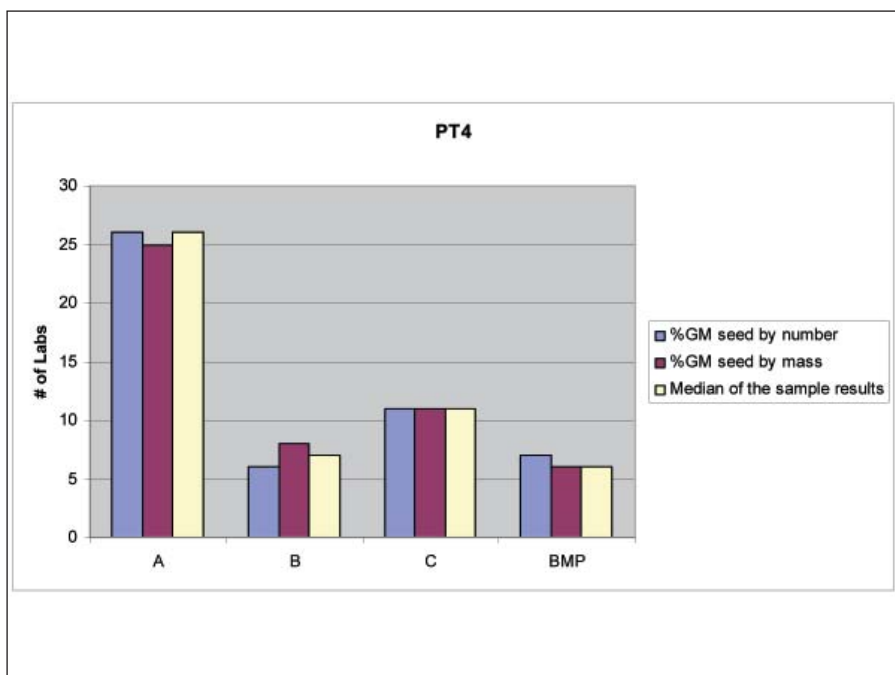


Figure 8: Barchart giving the number of the PT4 participating laboratories having rating A, B, C or BMP using three definitions of the true level

Announcement

6th ISTA Proficiency Test on GMO Testing on *Brassica napus*

The aim of the proficiency test is to check the ability of individual laboratories to detect the presence or absence of GM seeds and to quantify their presence in samples of conventional seeds of *Brassica napus*.

Each participating laboratory will receive oil seed rape test samples. Some of the samples will be positive (i.e. contain GM seeds) and others will be negative (i.e. contain no GM seeds).

A qualitative test result can be either derived from the quantitative test result or from a separate test on the sample. The GM seed material in the positive samples can be quantified either by a sub-sampling quantification or by a quantitative test (e.g. real time PCR). An estimate of percentage GM seeds per positive test sample shall be reported.

Laboratories interested in participating should please contact the ISTA Secretariat:
 Email: ista.office@ista.ch
 Fax +41-44-838-6001

More details can be found on the ISTA Website at www.seedtest.org

Report of the ISTA Ordinary Meeting 2005



This year the annual Ordinary Meeting of the Association was held in the capital city of Thailand, and the people who were not able to join this gathering missed the opportunity on a special meeting in a unique place with amazingly friendly and supportive people, hot temperatures (40°C!), a wonderful hotel and terrific (and also hot!) food. All this was enjoyed by 93 participants and 8 accompanying persons from 38 countries of all the 5 continents of the world.

The meeting commenced with a welcome reception on the Sunday evening, upon invitation by the Thai Seed Trade Association and the Seed Association of Thailand. The evening's welcoming speeches of the hosts were sustained by Thai food specialities, live acoustics and craft demonstrations.

The next morning traditionally begun with the Technical Committee Sessions during which each of the 17 ISTA Technical Committees updated the audience on the latest work, developments, and future endeavours of their committee in a 20 minute session. The presentations of each of these revealing sessions can be downloaded from the ISTA Website (see also reports on page 33 onwards).

Day number two was reserved for the extra burning issues: GMO testing, Accreditation and the Rules Committee Session with the topics of Rules Amalgamation and the Rules Change Proposals to be voted on at the next day. As expected, the most discussion arose on the proposal for a Rules Chapter for GMO Testing.

The presentations held during these sessions can again be found on the ISTA Website.

Naturally, the most attention was paid to the day of decisions, the day on which the delegates were to vote.

The morning of the actual Ordinary Meeting however started with the official Opening Ceremony and speeches were held by Dr. Chulhathep Pongsroyech, Director Bureau of Technology Transfer Development, the Department of Agricultural Extension in Bangkok and former long time member

of the ISTA Executive Committee; and Dr. Thongchart Raksakul, Director General of the Department of Agricultural Extension in Bangkok, and of course by the ISTA President, Ir. Pieter Oosterveld.

The first items for vote were the Proposed Changes to the ISTA Constitution (published in *Seed Testing International* No. 129), which related to a fixation of the subscription fees for ISTA on an annual basis (instead of a triennial as before); to the publication of the statement showing the financial position of the Association (to be published in the 'Activity Report of the ISTA Committees instead under 'Seed Science and Technology'); and to changes in the submission and notification period for ISTA Constitution Change Proposals (shortened down by one month in order to come to a workable and appropriate time frame to allow for annual Constitution Changes). All three motions were adopted by a clear majority of the voting delegates.

As to the Proposed ISTA Rules Changes presented by the ISTA Rules Committee Chairman Dr. Steve Jones, the items had been discussed in length during the previous days in the corresponding sessions, and so the voting of the items went smoothly; no vote was required on item 1, list of edits; items 2a-2ag (changes in Chapter 2 Sampling following the amalgamation of the Rules and Annexes of this chapter) were accepted and so was item 2ah (increase seed lot size for some species from 25 to 30 t) by a separate vote; Purity items 3a to 3k were accepted with the exception of 3d which had previously been withdrawn by the Purity Committee; Germination issues 4a to 4c were all voted in. So was also the new method 7-020 Detection of *Xanthomonas hortorum* pv. *carotae* (bacterial leaf blight) on carrot (*Daucus carota*) for the Annexe to Chapter 7 Seed Health Testing Methods.

Finally, the turn came to the vote on the revisions to Chapter 8 Species and Variety Testing (formerly Cultivar Testing). Again, thanks to the discussions and solutions presented during the previous days, Chapter 8 was voted into the ISTA Rules with a clear majority

vote. However, under the provision, as indicated by the ISTA President, that this last Rules Change would only come into force 6 months after the publication of the relevant accreditation documents on the ISTA Website (please read more about these documents in this issue on page 3 and 4).

In closing of this voting session, each Technical Committee represented by its chair or vice-chair was asked on stage to receive a personal appreciation from the President on behalf of the Association, supported by a thankful applause from the audience and a Thai souvenir.

Since it was still early afternoon, the suggestion of the President to proceed with the topics which were on the agenda for the next day was supported by the audience. Hence, the date and place for the next Annual Meeting was announced to be Glattbrugg (Zurich), Switzerland, June 26 to 29 in 2006.

After that, because no other business had been raised by any Member or by consent of the Executive Committee, there were only two agenda points left to tackle, and that was the President's closing address and the adjournment of the meeting – one full day ahead of the schedule.

And although the working programme of the meeting was over, nobody wanted to miss out on the official dinner still to be held in the evening. Again, as throughout the meeting, the food served was delicious, and in addition the guests were spoiled with a fantastic cultural show illustrating the sparkling, colourful and stunning traditions of several regions of Thailand.

A lot of thanks for their incredible support must go to the Department of Agricultural Extension for the great assistance in organising this first ISTA meeting in Asia, especially for the ladies who were organised to assist us from the Seed Division, Khun Puangthong and Khun Punee and Khun Ladda and all their colleagues which were of precious help to us all the time, making this event unforgettable to all partakers. ■

The International Seed Testing Association (ISTA) takes pleasure in inviting you to the ISTA Annual Meeting 2006

Dear Colleagues,

The International Seed Testing Association (ISTA) takes pleasure in inviting you to participate in the ISTA Annual Meeting, to be held from June 26 – 29, 2006 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.

The main subjects of the meeting will be:

- **GMO testing** – reports and evaluations on the international proficiency tests and update on the work of the corresponding ISTA GMO Task Force Working Groups
- **Accreditation of laboratories for testing for the presence of specified trait(s) by the performance based approach** – first laboratory experiences
- **Generic Method Validation** – latest update and future planning on the efforts of the Working Group
- **Amalgamation of the ISTA Rules** – latest update on the work
- **ISTA Quality Assurance Programme** – report and evaluation on the accreditation of laboratories world-wide

The Venue: Zurich, Switzerland

General Information

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 pretty old town, the trendy new Zurich West district and the glorious lake. With opera, ballet, theater premieres, shows, musicals, art exhibitions in over 50 museums and 100 galleries, time never drags in Zurich. The famous Bahnhofstrasse and the Limmatquai are a shopper's paradise. Over 1,700 restaurants and bars serve both traditional Zurich and Swiss dishes as 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
- Swiss National Museum
- Niederdorf - Old Town
- Bahnhofstrasse
- Zurich Zoo and Masoala Hall
- Trip to Uetliberg
- Lake Zurich boat cruise

Getting there

By plane

Regular scheduled flights from every continent and 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 city center in just ten minutes; the taxi journey takes about twenty minutes.

By rail

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

Getting Around

The region and city of Zurich are blessed with the densest public transport network in Switzerland. Regular services will take you out from the bustling city center to the tranquil countryside in no time at all - not something that a city traveller can necessarily take for granted.

Airport Transfer to Hotel

The NOVOTEL Shuttle bus runs between the Airport and the hotel every 30 minutes (distance approx. 10 minutes). For participants arriving at Zurich's main railway station,

there are direct trains from the station to the airport (train S7 and S2), where the shuttle can be taken to the hotel.

Accompanying Persons

The accompanying persons fee includes the official dinner, lunches and coffee breaks. Registration as an accompanying person does NOT include participation in 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.

Visa Application

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 organisers to provide any financial support.

Delegates requiring invitations for visa application must prepay registration before the invitation letter will be issued. Requests for visa invitation letters must be sent to the Secretariat by fax. Please take into consideration that the Secretariat will NOT deal directly with the Embassies for Visa requests for participants.

**For information or to
register online visit**

www.seedtest.org/AM2006



Preliminary Programme 2006

SUNDAY June 25, 2006 REGISTRATION

16:00 - 18:00 Registration of Participants at Novotel Zurich Airport
18:30 - 20:00 Welcome Cocktail

MONDAY June 26, 2006 SESSIONS (Presentation of Working Programmes and activities)

08:00 - 18:00 Registration of Participants at Novotel Zurich Airport
08:45 - 09:00 Welcome by ISTA
09:00 - 09:30 Bulking and Sampling Committee Session
09:30 - 10:00 Purity Committee Session
10:00 - 10:30 Germination Committee Session
10:30 - 10:45 Coffee break
10:45 - 11:15 Tetrazolium Committee Session
11:15 - 11:45 Vigour Committee Session
11:45 - 12:15 Moisture Committee Session
12:15 - 13:15 Lunch
13:15 - 13:45 Editorial Board Session (Seed Science & Technology)
13:45 - 14:15 Statistics Committee Session
14:15 - 14:45 Seed Health Committee Session
14:45 - 15:15 Proficiency Test Committee Session
15:15 - 15:30 Coffee break
15:30 - 16:00 Variety Committee Session
16:00 - 16:30 Flower Seed Committee Session
16:30 - 17:00 Forest Tree and Shrub Seed Committee Session
17:00 - 17:30 Nomenclature Committee Session
17:30 - 18:00 Seed Storage Committee Session

TUESDAY JUNE 27, 2006 SESSIONS (Discussion on current important issues)

09:00 - 10:30 GMO Testing issues
10:30 - 10:45 Coffee break
10:45 - 12:15 GMO Testing issues [cont.]
12:15 - 13:15 Lunch
13:15 - 14:15 Amalgamation of Rules and Annexes
14:15 - 15:15 Accreditation Session
15:15 - 15:30 Coffee break
15:30 - 17:00 Rules Committee Session

WEDNESDAY JUNE 28, 2006 ORDINARY MEETING

09:00 - 10:30 Opening Ceremony
10:30 - 11:00 Coffee break
11:00 - 12:30 Ordinary Meeting (Block 1)
1. Call to order
2. President's address
3. Roll call of Designated Members entitled to vote
4. Reading and acceptance of Minutes
12:30 - 13:30 Lunch
13:30 - 15:00 Ordinary Meeting (Block 2)
5. Report of the Executive Committee
6. Report of the Secretary General
15:00 - 15:30 Coffee break
15:30 - 17:15 Ordinary Meeting (Block 3)
7. Constitution changes
8. Consideration and Adoption of the proposed Rules Changes 2006
19:30 Official Dinner

THURSDAY JUNE 29, 2006 ORDINARY MEETING

09:00 - 10:30 Ordinary Meeting (Block 4)
8. Consideration and Adoption of the proposed Rules Changes 2006 [cont.]
10:30 - 11:00 Coffee break
11:00 - 12:00 Ordinary Meeting (Block 5)
8. Consideration and Adoption of the proposed Rules Changes 2006 [cont.]
12:00 - 13:00 Lunch
13:00 - 14:30 Ordinary Meeting (Block 6)
9. Announcement of the place and date for the next Ordinary Meeting
10. 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
11. Any other business raised by consent of the Executive Committee
14:30 - 15:00 Coffee break
15:00 - 16:00 Ordinary Meeting (Block 7)
12. President's closing address
13. Adjournment

ISTA Seed Symposium

Iguassu Falls, Brazil, May 7-9, 2007

CALL FOR PAPERS

This is the first invitation to people interested in presenting a paper during the Seed Symposium of the 28th ISTA Congress (May 5 - 11) under the theme

Diversity in Seed Technology

Intending participants are encouraged to present oral and poster papers dealing with a range of topics under the above theme. The research reported in offered papers can cover both the scientific basis of aspects of seed quality and its technological application in seed testing.

Each session will be chaired by a speaker who is well known for their research in a topic covered by the session. Details of the sessions, lead speakers and brief abstracts of the presentations that will be given by the lead speakers can be found in the following programme.

Offers of papers should be submitted online only at www.seedtest.org/seed-symposium in the form of an abstract (in English) of 1600 characters (maximum). Papers will be presented orally and in poster form, both forms having equal status. As the number of oral presentations will be limited by time constraints, oral presentation of your paper may not be possible and you may be asked to present your paper as a poster. The selection of papers for oral presentation will be 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 October 1, 2006.

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

October 2005	First call for papers
15 June 2006	Deadline for submission of proposed papers. Papers reviewed by the Scientific Programme Advisory Committee
15 August 2006	Authors of papers considered for oral presentation contacted for further information on experimental results, additional to the abstract
1 October 2006	Authors informed whether papers have been accepted for oral or poster presentation
1 February 2007	Deadline for payment of registration fee for authors of accepted oral and poster papers

If the author of an oral paper has not registered, the paper will be replaced in the programme. Poster abstracts will only be published in the abstract booklet for authors who have registered by this date

28th ISTA Seed Symposium Scientific Programme Advisory Committee

Alison A Powell (GB) Seed Symposium Convenor

Theresa Aveling (SA), Leopoldo Baudet (BR), Ronald Don (GB), Michael Kruse (DE), Joël Léchappé (FR), Lea Mazor (IL), Enrico Noli (IT), Anne Bülow Olsen (DK), Robin Probert (GB), Zdenka Prochazkova (CZ), Dennis TeKrony (USA)

SESSION 1 - DIVERSITY WITHIN AND AMONG SEED LOTS AND SPECIES

GM testing; varietal identification; identification of germplasm for breeding; seed lot heterogeneity and sampling; purity; automated and computer-based methods for seed identification and assessment.

Chair and lead speaker: Michael Kruse

Institute of Plant Breeding, Seed Science and Population Genetics, University of Hohenheim, Stuttgart 70593, Germany

Presentation title: Diversity within and among seed lots and species

Biological diversity is a characteristic trait of nature and as such indispensable for its future. However, diversity in seed lots is an ambivalent trait. Without diversity there would be no need for seed testing, but since seed lots are diverse, there are consequent problems and efforts in seed testing. Particularly relevant for seed sampling is that we still do not know how diverse seed lots in general really are. Thus, our sampling rules reflect our assumptions or apprehensions and not scientific evidence. By including GM testing into the seed testing portfolio we restarted investigating the varietal diversity in seed lots and its origins. The discussion about the traits for varietal purity assessments lead into a splendid diversity of opinions. The aim of the key note will be, to highlight recent scientific results in these areas and to introduce in a stimulating manner the diversity of presentations of this session.

SESSION 2 - PROBLEMS ASSOCIATED WITH THE DOMESTICATION AND USE OF NON-CROP SPECIES

Seed production and processing; germination; dormancy; contamination with other organisms; seed-borne pathogens. (This session includes flower, ornamental, tree, shrub and medicinal species).

Chair and lead speaker: Mirian Eira

Embrapa, Brasilia, Distrito Federal, Brazil.

Presentation title: Seeds of diverse non-crop species in Brazil

More than ten thousand years ago, when man shifted his lifestyle from hunting and gathering to agriculture, societies began the process of domesticating and selecting varieties of plants to meet their food, clothing and health needs. For a long period of time, these needs were met by a small variety of species. In the 20th Century, agriculture underwent major transformations and new species are now being studied which have great potential for exploitation. With more than 50,000 species, Brazil has one of the richest floras in the world, nearly 19% of the world flora. Brazil's forests and other ecosystems are also an invaluable source of medicinal plants for many human diseases. Several problems that can arise while producing and dealing with seeds of non-crop species will be discussed, including the importance of some knowledge of the biology of the species and how to deal with those seeds in seed testing laboratories.

SESSION 3 - DIVERSITY IN CONTAMINATING ORGANISMS

Detection and effects of seed borne pathogens, weeds, other species and parasitic plants; seed treatments: conventional and organic methods; effects on seed performance.

Chair and lead speaker: Gary Harman

Cornell University, Geneva, New York 14456, USA

Presentation title: Plant productivity enhancement by biological seed treatments

Biological seed treatments are becoming used increasingly frequently. Among the most commonly used organisms are nitrogen-fixing bacteria such as *Rhizobium* and related genera, *Bacillus* species and fungi in the genus *Trichoderma*. All of these, especially the most effective ones, must be considered as obligate (*Rhizobium* and related spp.) or opportunistic (*Bacillus* and *Trichoderma* spp.) plant symbionts. The most effective strains of all of these organisms are excellent root colonists—in many cases seed treatments are delivery systems to roots, and enhanced plant performance frequently occurs for the life of at least annual crops due to the symbiosis established between the plant and the root. While the largest (but by no means only) effects of *Rhizobium* spp. are due to nitrogen fixation, *Bacillus* and *Trichoderma* spp. have other modes of action. In general, as seed protectants these organisms are less effective than chemical pesticides but their beneficial effects last for months, and not just days or weeks. They have direct effects upon other microorganisms through antibiosis and parasitic modes of action. However, they also have dramatic effects upon plant growth and development and upon induced systemic resistance. The biocontrol effects of these microbes probably occur more as consequence of induced resistance than the direct effects upon other microbes. The same organisms also may directly increase plant growth and nutrient use efficiency, especially nitrogen. They now have been shown to dramatically affect the plant proteome and to alter plant gene expression. The summation of all these effects result in improved plant performance and can be utilized to understand basic plant physiology and crop yield.

SESSION 4 - SEED DEVELOPMENT, DORMANCY AND GERMINATION: PHYSIOLOGY AND METHODS (ISSS collaborative session)

Seed development and maturation; influence of seed production factors; viability; germination; dormancy; dormancy breaking; acquisition of desiccation tolerance.

Chair and lead speaker: Roberto L. Benech-Arnold

IFEVA-Cátedra de Cerealicultura. Facultad de Agronomía. University of Buenos Aires. Av. San Martín 4453. Buenos Aires. Argentina.

Presentation title: Physiological, molecular and environmental aspects of the control of dormancy in grain crops

In this paper we comment on some aspects of the environmental and hormonal control of dormancy in grain crops, using sorghum and barley as model systems. The relationship between the temperature experienced by the crop during grain development, and velocity of dormancy release after physiological maturity, has been quantified and is discussed in terms of its predictive value. The antagonism ABA/GAs in the imposition and expression of dormancy is especially dealt with. We investigated the nature of the differential sensitivity to ABA displayed by embryos from sorghum varieties with contrasting dormancy and concluded that a disruption in the ABA signalling pathway is most likely behind the reduced sensitivity to ABA displayed by embryos from varieties with low dormancy. Regulation of GA de novo synthesis upon imbibition in grains with different dormancy has been investigated through expression analysis of the genes that codify

for all the enzymes involved in GA biosynthesis. The significance of these findings to seed production and testing will be discussed

SESSION 5 - VIGOUR AND INVIGORATION

Causes of vigour differences (seed production, processing, physiological); vigour testing; impact of vigour on emergence and storage; priming and other invigoration treatments.

Chair and lead speaker: Kent J. Bradford

Seed Biotechnology Center, One Shields Ave., University of California, Davis, CA 95616-8087, USA

Presentation title: Diversity in seed vigour and invigoration

Of the types of diversity among seeds, both within and between seed lots, variation in vigour is perhaps the most ubiquitous. It is virtually inevitable that even among seeds that are all viable, there will be differences in their rates of germination, in their sensitivity to environmental stresses and in their susceptibility to pathogens. Among the causes of such variation are genetic and developmental factors, level of dormancy, and seed age. A consequence of the inherent diversity in vigour has been the development of technologies that attempt to both improve seed vigour and reduce the variation in performance among seeds in a seed lot. Such invigoration techniques, including seed priming, can have both positive and negative effects on the uniformity of seed performance, and the effects can differ in the short term versus after storage. Approaches to quantifying the effects of seed invigoration on seed diversity will be discussed.

SESSION 6 - SEED STORAGE AND GENETIC CONSERVATION

Desiccation sensitivity and alternative storage methods for recalcitrant seeds; orthodox seed storage: processing, drying and optimum conditions for long term storage; predicting storage potential; seeds for genetic conservation; physiological basis of seed deterioration.

Chair and lead speaker: Hugh W. Pritchard

Seed Conservation Department, Royal Botanic Gardens Kew, Wakehurst Place, UK

Presentation title: Seed storage: from first principles to application

Globally, millions of seed accessions are stored longer-term for genetic resources conservation and each year thousands of collections are processed for shorter-term storage, primarily for use in the seed trade. Such disparate end uses determine which conditions are selected for storage. However, whilst international recommendations exist for seed vigour assessment using ageing tests at high moisture content (e.g. ISTA) and for long-term seed banking (e.g. FAO), only general storage guidelines are available for species that constitute the bulk of the seed trade. Consequently, it is likely that seed quality is being lost, and 'capital' depreciating, faster than necessary. There are general 'rules' for seed responses to storage conditions spanning > 100°C and >200 MPa that have been developed from studies on > 50 species. I will show how these 'first principles' can be applied to most of our seed storage needs and provide some insight into the relations between controlled deterioration, accelerated ageing, seed banking and cryopreservation.

Submit your Papers online at
[www.seedtest.org/
seed-symposium](http://www.seedtest.org/seed-symposium)

ISTA / ISF Experiment on Herbage Seed Lot Size (Fourth Phase)

Technical Protocol

Introduction

From 1995 to 2003 ISTA and ISF have run an experiment on testing the possibility to extend the maximum size of herbage seed lots from 10 MT to 25 MT on a seed production plant basis. The results of the three phases of the experiment indicate that when using the proper facilities it is possible to have homogeneous enough 25 MT lots. However, the data obtained so far do not allow to make a final decision, thus, it is decided to prolong the experiment by a fourth phase.

This fourth phase will be implemented on the condition that the OECD Seed Schemes and the European Commission would also participate, this allowing the commercialization of the large seed lots that have an ISTA Certificate.

Aim of the fourth phase

The aim is to test in practice the conditions under which companies may produce sufficiently homogeneous large seed lots. Therefore, within this experiment the possibility is offered to interested companies that ISTA Certificates may be issued for seed lots larger than the maximum seed lot size. In order to get detailed information about the homogeneity, a minimum number of large seed lots per production plant has to be tested for heterogeneity. On the basis of the results of these heterogeneity tests a decision will be made whether the company can get ISTA Certificates within the experiment for large seed lots which are produced in the production plant and not tested for further heterogeneity.

The aim of the experiment is not to prepare a proposal for a general increase of ISTA maximum seed lot size for grasses. The lot size of 10 MT shall stay in table 2A, only exceptions shall be possible if companies showed for specified production plants the capability to produce homogeneous large seed lots. In case a company operates more than one plant, each plant has to show its competence,

unless the various plants use the same processing equipment and work according to the same procedures and instructions.

Principle and Timetable

The fourth phase of the experiment is subdivided into two periods: The first period from 1 January 2006 to 30 June 2007 and the second period from 1 July 2007 to the end of the fourth phase on 31 January 2008. Both periods start with testing a minimum number of large lots on heterogeneity. On the basis of the data of these heterogeneity tests a decision will be made whether the company is allowed to get ISTA Certificates within the rest of the respective period for large seed lots which are not tested for heterogeneity. Conclusions of the experiment with view to changes of the ISTA Rules shall be presented to the ISTA Ordinary meeting 2008.

Conditions for the experiment

General conditions

- A company interested has to apply for participation to the local ISTA Seed Testing Laboratory which pass on the application to the Chairman of the Bulking and Sampling Committee (BSC). The company must specify the species and the production plant for which the application is submitted.
- After confirmation of participation by the Chairman BSC, ISTA Certificates may be issued for large herbage seed lots that are produced in the production plant. All ISTA Seed Testing Laboratories will be informed about that.
- Companies taking part in the experiment need to have a quality manual which describes the procedures to enhance homogeneity. In the quality manual attention has to be paid to the following critical points:
 - the quality level of individual lots in case of mixing several lots as

obtained at the field inspection or in laboratory tests

- the blending of cleaned lots

The quality manual has to be checked by the local ISTA Seed Testing Laboratory.

- The experiment is focused primarily on rye grass. However, companies may prefer to focus on other species.
- The experiment is done with seeds in bags or containers with a lot size up to 25 metric tons.

Number of lots to be tested for heterogeneity

- In the first period, companies which participated during the first three phases of the experiment have to test at minimum 3 large seed lots for heterogeneity. Companies which participated not in the firsts phases have to test at minimum 6 seed lots. In the second period companies that participated already in the first period have to test at least 3 seed lots for heterogeneity.
- Companies that start participation in the second period have to test 6 lots for heterogeneity.
- Heterogeneity tests have to be done at the beginning of the respective period and up to the time the data of these tests are evaluated, ISTA Certificates may not be issued for further large lots without heterogeneity testing.

Sampling and heterogeneity testing

- The bags or containers (big bags, boxes) are the units to be traded. Therefore, heterogeneity has to be tested at that level. According to Table D.2 of the 2005 ISTA Rules, the maximum number of 20 independent container samples will have to be drawn.
- Seed testing for heterogeneity must be

done by an ISTA accredited seed testing laboratory. The responsibility for the correctness of the reported data of the heterogeneity tests is by the head of the laboratory.

- According to the ISTA Rules the independent container samples were tested for
 - purity: with 1,000 seeds
 - germination: with 100 seeds
 - other seeds by species and number: with 10,000 seeds
- The results of the 20 independent samples have to be reported for statistical evaluation. For reporting the data the attached form sheet has to be used.
- Together with the data additional information on the large lot will be provided by the company as indicated in the attached form sheet.
- The evaluation will be done according to Appendix D of the 2005 ISTA Rules. This test includes additional variation in addition to the random sampling variation. All attributes of purity and germination testing as well as other seed count will be used for testing heterogeneity.

ISTA Certificates for large lots not tested for heterogeneity

- Companies which participated in the former phases of the experiment will be allowed to get ISTA Certificates in the first period for large lots without heterogeneity testing when all 3 tested lots are homogeneous. If 1 out of the 3 lots is heterogeneous, further three lots shall be tested for heterogeneity and when all of them are homogeneous, the company will also be allowed to get ISTA Certificates for large lots without heterogeneity testing. In all other cases the companies will be allowed to get only ISTA Certificates for large lots which are tested for heterogeneity. The same procedure will be applied in the second period.
- Companies which participated not in the former phases of the experiment will be allowed to get ISTA Certificates for large lots without heterogeneity testing in the first period when all 6 or at least 5 of the tested lots are homogeneous. In all other cases the company will be allowed to get ISTA Certificates only for large seed lots which are tested for heterogeneity. At the beginning of the second period the procedure with testing 3

lots will be applied as described above.

- ISTA Certificates may only be issued for 25t seed lots which are produced in the production plant where the 3 or 6 seed lots had been evaluated for heterogeneity, or in plants that are considered equivalent by the relevant designated authority.
- For any ISTA Certificate issued for a large seed lot, the wording 'Lot Size Experiment' must be reported on the Certificate.
- Confidentiality of the data is assured, results will only be reported anonymously. The participating companies will be informed about the results when evaluation is finished. Conclusions of the experiment in total will be drawn by the ISTA Working Group Seed Lot Size.
- Application as well as data and additional information have to be send via the local ISTA Seed Testing Laboratory to the Chairman of the Bulking and Sampling Committee (BSC):

Prof. Dr. M. Kruse
 University of Hohenheim, Institute of Plant Breeding, Seed Science and Population Genetics, D – 70593 Stuttgart

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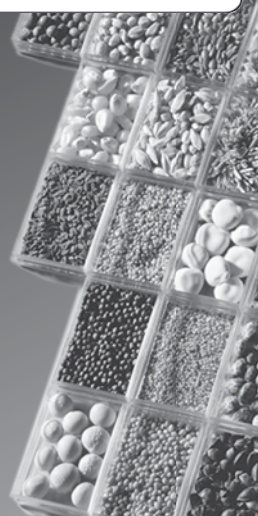
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ISTA Method Validation

By John Hampton

ECOM Method Validation Working Group Chair

New Zealand Seed Technology Institute, Lincoln University, P.O. Box 84, Canterbury, New Zealand, hamptonj@lincoln.ac.nz

Introduction

The ISTA Rules contain our internationally agreed methods for testing particular attributes of seed quality. Before being accepted into the Rules, many of these methods have gone through collaborative study among laboratories to ensure that the procedure gives reliable and reproducible results in accordance with the given specifications of the test method. Others may not have received the same scrutiny.

Method Validation was introduced to ISTA by the Seed Health Committee who produced the "ISTA Handbook of Method Validation for the Detection of Seed-Borne Pathogens" in 2000. The Vigour Committee followed with a version for vigour tests shortly after. The ECOM discussed method validation within ISTA, and decided that the principle should apply to all methods proposed for seed quality testing, not just those for seed health and seed vigour.

What is Method Validation?

Validation is defined by ISO as "Confirmation by examination and provision of objective evidence that the particular requirements for a specified use are fulfilled".

For ISTA, method validation is therefore

- A critical examination of a seed quality test to ensure that the description of the method is clear and complete, and that the procedures give reliable and reproducible results in accordance with the given specifications of the test method.
- A confirmation of the relationship between the results of a quality test and a practical expression of seed quality.

Why is Method Validation Necessary?

ISTA's International Seed Analysis Certificates are used by the seed trade every day. In signing a Certificate the signee is confirming

that the sampling and testing of the sample representing the seed lot has been conducted according to the ISTA Rules. Decisions made on the basis of the results of the testing are financially significant. The customer expects to be able to trust the results reported; if the result of a test can not be trusted, then it has little value, and the test may as well have not been carried out.

For any seed quality test, it is obviously important for a laboratory to be able to determine the correct result, and be able to show that it is correct. The result itself must be sufficiently reliable and repeatable that any decision made from it can be done so with confidence; it must be "fit for its intended purpose". Method validation allows this to be demonstrated.

What is the ISTA Validation Process?

ISTA method validation is a five-step process:

- Test method selection and/or development.
- Validation through either multi-laboratory characterisation of the test method performance, peer verification of the test method, or verification of performance claims for the test method.
- Review of data.
- Approval of the test method by the relevant ISTA Technical Committee, publication in ISTA Method Validation Reports and preparation of a Rules proposal for the test method.
- Final acceptance by the ISTA voting members and publication of the test method in the ISTA Rules.

But Doesn't ISTA Already Do This?

ISTA, through its Technical Committees, has a long involvement in multi-laboratory comparative testing before new test methods have been prepared as Rules proposals. However



comparative testing alone does not fill all the requirements of a validation process, and not all methods proposed for the Rules have gone through a comparative testing system. Using the ISTA validation process will ensure that the final product is a sound, validated seed quality test method.

Who Can Propose a Method for Validation?

ISTA's validation process is open, meaning that any individual, group or organisation can propose a method. ISTA is always pleased to receive proposals from its members (individuals, working groups, technical committees), but also pleased to accept proposals from non-ISTA sources (individuals, research groups, companies, etc).

What is the Scope for Test Method Proposals?

The scope for test methods in the validation process includes:

- New test methods (a new analytical method for a species already included in the ISTA Rules; a method already in the ISTA Rules but for a new species).
- Revisions of validated methods to extend their applicability or improve their performance (all methods currently included in the ISTA Rules are considered to be validated).
- Adaptations of methods to automation
- Applications of techniques to new analytical problems.

To Whom are Proposals Made?

Proposals for method validation can be made directly to the Chairperson of the relevant ISTA Technical Committee, or to the ISTA

Secretariat, who will then forward the proposal on to the Technical Committee.

What is the Purpose of ISTA Method Validation Reports?

ISTA Method Validation Reports contain peer reviewed information on validation studies which support ISTA Rules proposals. Reports are presented in a scientific paper format (i.e. Summary, Introduction, Materials and Methods, Results, Discussion, Conclusions and Recommendations, References), and published on the ISTA website to coincide with announcements of Rules proposals to be voted on at the next ISTA Ordinary Meeting. They provide scientifically and statistically rigorous information to help an ISTA voting delegate make an informed decision on the Rules proposal. Their publication also allows any interested party to comment on the methods, results, conclusions and recommendations.

Who Holds the Copyright?

Irrespective of the source of the data, the copyright for ISTA Method Validation Reports is held by ISTA (as it is for the ISTA Rules).

Is Further Information Available?

The Method Validation Working Group is currently preparing a new ISTA publication entitled "ISTA Method Validation for Seed Testing" which will explain the scope, purpose, and process. It will also incorporate a Standard Operating Procedure (i.e. what needs to be done and how it should be done) for those intending to submit proposals for method validation. The Working Group and Executive Committee intend to present this new publication to the ISTA membership at the 2006 ISTA Ordinary Meeting in Zurich.

Acknowledgment

The Working Group thanks the Seed Health and Vigour Committees whose Handbooks on method validation have formed the basis of "ISTA Method Validation for Seed Testing", and have been the source of some of the information used in this article. ■

Chilean National Seed Production

By **Guillermo Aparicio**, Agricultural Engineer of Seed Division and Head of Seed Certification Department

Introduction.

The Chilean seed industry is currently the sixth largest internationally, with around 5% of the global market. The most important products are maize and vegetable seeds.

Chile's seed industry success is based mainly on its Southern Hemisphere situation, the favorable agro-industrial conditions for seed production, the high technology skill level of Chilean companies, and the existing legal organization and its internationalization. All of this has allowed Chile to position itself as a leader in the supply of seeds for countries in the Northern Hemisphere.

Seed Certification Programme

Seed Certification began in Chile in 1958. In 1972, Chile was admitted into the Scheme for Varietal Certification of Seeds of the Organization for Economic Cooperation and Development (OECD), being the first Latin American country accepted in this system. At present Chile participates in the Grass and Legume Seed, Crucifer and Oil Seed, Cereals, Beet, Maize and Sorghum seed schemes.

In 1980 Chile was recognized as a third country by the European Union, which allowed the export of seed for that market.

Chile has been a member of the International Seed Testing Association since 1962, and the Central Laboratory is accredited by ISTA. This laboratory was re-accredited by ISTA in 2004.

In 1998 Chile was officially accepted as an International Affiliate Member by the Association of Official Seed Certifying Agencies, AOSCA.

All these international connections and achievements in this area have opened up possibilities for the country, strengthening seed exports.

Legal Aspects and Organisation of Seed Certification

The Law of Seeds (Decree – Law 1.764 of 1.977) and the Agricultural Decree (188 of 1978) established the fundamental principles of the certification programme. The general and specific requirements have been adapted to the OECD Schemes.

In accordance with the legislation, the Agricultural and Livestock Service (SAG) of the Ministry of Agriculture, is responsible for certification, both for internal as well for external markets.

Seed certification in Chile is voluntary, so the legislation recognises two kind of seeds: certified and commercial.

The SAG structure includes a Seed Division, which is in charge of operating the seed certification scheme. Field inspections are carried out by official inspectors of the Agriculture and Livestock Service.

Certified seed production

While the production of certified seed for the internal market has stayed constant over the last decade, seed multiplication for export has generally increased. From 1990 when around 3000 ha was under certification, in 2004/05 the area under certification for export was 16.401 ha (Figure 1).

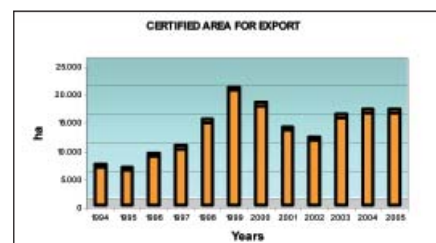


Figure 1

Maize and sunflower represent 90% of the total area under certification for export (Figure 2). Recently, the North American market has been the most important importer of maize seed. Among European countries, France is the main buyer followed by Holland and Germany.

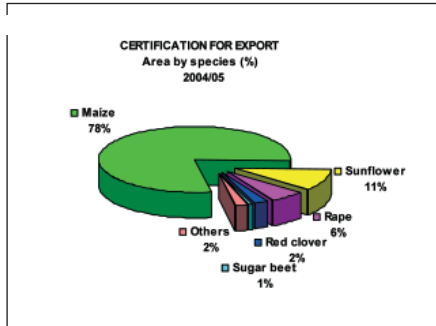


Figure 2

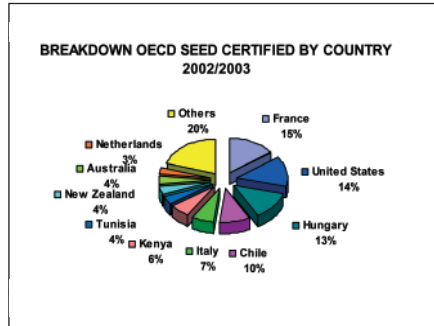


Figure 3

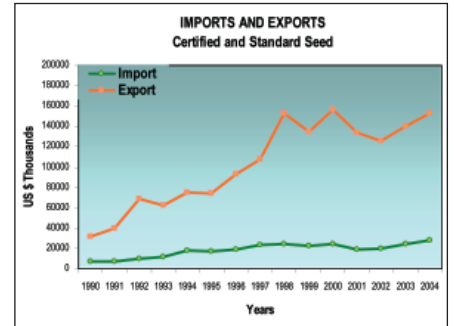


Figure 4

The majority of the seed is produced under OECD certification. Almost all the production is exported. According to OECD statistics in 2002/2003, Chile was the fourth largest producer of seed under the OECD system (Figure 3).

In 2004 Chile exported seeds (certified and standard) worth \$US 153 millions. Imports totalled \$US 27 millions (Figure 4).

ISF World Seed Congress

Between the 30st of May and 1st of June 2005 the ISF World Congress was held in Santiago, Chile. This successful event was attended by 1,083 participants from 60 countries who took part in the Congress and social events. The International Seed Federation (ISF) is a non-governmental, non-profit organization representing the seed industry. The National Association of Seed Producers of Chile had a

major role in the organisation of this event.

During the congress there was opportunity to discuss a number of subjects including: the protection of intellectual property; access to genetic resources; biotechnology, genetic engineering and its consequences for the seed industry and farming community; phytosanitary regulations and many others. ■

The Official Seed Testing Laboratory

By Patricia Espinosa

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For the Seed Division of the Livestock and Agricultural Service (SAG), seed analysis is provided by the Official Seed Testing Laboratory. This Laboratory belongs to the Laboratories and Quarantines Stations Department of SAG.

The Department is located in the environs of Santiago, 22km down Route 68 and comprises 13,500 m² of floor space, including all the central agricultural and cattle laboratories.

The Seed Testing Laboratory has a surface area of 440 m² divided into two large laboratories (purity and germination), the sample reception room, three germination rooms, germination and refrigeration chambers, a seed collection room, and a large sample storage and documentation room. On average 5000 seed samples a year are tested for export and for internal use; these samples mean an average of 15,000 analyses per year. The species tested are almost all temperate

ones. At present variety and GMO testing laboratories, are being established and they will begin to function in 2006. The Seed Testing Laboratory has 12 staff, including Agricultural Engineers (2), Agricultural Technicians (8), a Secretary and a Service Person. During the high season there are temporary personnel supporting the different activities.

This laboratory first received ISTA accreditation in 2001. It is the National Reference Seed Laboratory and supervises and audits the four other regional laboratories of SAG and 12 Private and Company Seed Testing Laboratories.

On Monday 30th of May 2005, the Laboratory was delighted to receive the important visit of the ISTA President, Mr. Pieter Oesteveld, and of the Secretary General, Mr. Michael Muschick, who were attending the ISF Congress in Chile. They arrived in the afternoon, and were received by

the head of the Department. They then were shown all the seed laboratory facilities and they took the opportunity to share ideas with the laboratory staff.

After the visit a meeting was held between the ISTA guests and the staff of the Official Seed Testing Laboratory, in order to share different experiences and knowledge.

For us this was a valuable opportunity to have this constructive meeting with these important representatives from ISTA, and to have the opportunity to get to know these previously remote persons, who turned out to be very warm and agreeable people. We thank and express our appreciation to both. ■



A Glance at Thailand's Seed Sector

By Pranom Saisawat

Former Director, Bureau of Agricultural Commodities Promotion and Management, DOAE and former Chief of Quality Control Section, Bureau of Seed Production, DOAE, pranomsa@yahoo.com

It is generally accepted that seed is an important input for crop production. In Thailand, its importance becomes particularly more apparent when there is a heavy flood or a long drought that destroys much of the crops and replanting is needed. Therefore, a sufficient supply of seeds is necessary to secure the country's crop production. Thailand's modern seed industry started in the early 1970's. It is relatively young as compared to that of Europe, North America, and other developed countries. Many of the pioneers who initiated and took part in our early seed projects are still actively living and capable of telling various details of the development. The author of the present paper tries to briefly describe various aspects of Thailand's seed sector.

Crop Improvement

Crop improvement had been carried out for a century before the importance of seed multiplication was fully recognized by the public sector. In 1907, the first rice variety contest was held in a town near Bangkok. Nine years later, the country's first rice experiment station was founded. In 1933, Thailand's Pinkaew rice won the first prize in the World Rice Contest held in Canada. The roles of crop improvement have always been emphasized and the government, mainly through the Department of Agriculture (DA), has released over 30, 48, and 11 improved varieties of rice, field crops, and horticultural crops.

State universities, various international organizations, and many developed countries have also contributed to the development, both directly in plant breeding projects and indirectly in training of personnel. Private seed companies entered to crop improvement about 25 years ago and some are now very active in it.

Seed Development Projects

Though several crop varieties were released

as a result of active plant breeding, only a small number of farmers around the experiment stations could get some seeds of those varieties. Other farmers had to depend on conventional seed sources because there was no seed multiplication scheme. Therefore, in 1972, a seed multiplication project was initiated in the Department of Agricultural Extension (DOAE) and the first seed production center was set up in Phisanuloke Province, 375 kilometers north of Bangkok. The project was carried out quite successfully and, later, a national seed development project was formulated and three more seed production centers were erected. The success of the first national seed development project was followed by several other projects financed by loans and grants from the U.S., Japan, Denmark, and EEC and also by regular budget from Thai government. There are now 23 seed production centers scattering throughout the country.

Private Seed Industry

There were a few private companies marketing vegetable seeds long before the establishment of the first public seed production center. For example, Chia Tai has been in this business since 1921. Early seed business was limited to importing vegetable seeds, mainly from China, and distributing the seeds to farmers through retail stores. Private sector's interest in seed industry increased dramatically following the establishment of the first few seed centers and the release of Suwan 1 corn variety in 1975. For instance, Charoen Pokphand (C.P.) formed new companies to handle its entry into the corn and sorghum. Cargill, Pacific, Pioneer, and Ciba-Geigy were among the earliest international companies that took the advantage of the opportunities in corn seed business in Thailand. Now there are more than 20 seed producing companies, some 6-7 companies also have active research and development programs.



Private sector has long been encouraged to take part in the seed industry. In fact, it was stated in the first national seed development project paper that the government seed programs would not compete with but enhance the private sector. The government, through the Board of Investment, provides investment incentives, such as tax holiday and repatriation of profits, for domestic and foreign firms entering the seed industry.

Seed Association of Thailand

In 1982, an informal organisation named "Seed Club" was set up by a joint effort between the government and the private seed sectors to serve as a center for coordination in the development of the seed industry. In 1990, the Seed Club was transformed to a legally accepted association which was later renamed "Seed Association of Thailand" as presently known. Its members include organizations and individuals from private and public sectors including educational institutes. Its executive committee meets regularly to follow up the progresses and problems in seed issues. The association has proposed several changes and modifications to government rules and regulations concerning seeds. It has organized various seed trainings, seminars, and conferences at regional, national, and international levels. The Seed Association of Thailand is now financially self-supported.

Recently, a more trade and business oriented association has been established under the name "Thai Seed Trade Association". Head offices of the sister associations are next door to each other.

Seed Regulatory

The present Seed Act was promulgated in 1975 and amended in 1992. In 1981, the first few crop kinds and their respective seed standards were specified. There are now 29 crop kinds that are regulated by the seed law, e.g. non-glutinous rice, corn, soybean, tomato, Chinese kale and lettuce. The purity and germination percentages of the regulated seeds must meet the specified standards if the seeds are offered for sale. There are also provisions for seed certification. However, since seed certification is not compulsory, it is practically not operational.

Recently, the Plant Variety Protection Act of 1999 was promulgated. Preparations of various provisions are in progress. So far, 42 new plant varieties have been filed for protection. It would not be long before the first protected variety is officially announced.

Promotion of Quality Seed

Using good seed has been a general recommendation for crop production but no details were given until the early 1970's. Following the initiation of the first national seed development project, the determinants and merits of good seeds were frequently discussed in various meetings, conferences, and training courses. The DOAE not only specified high quality seeds to be used in its demonstration plots but also launched an extensive rice variety replacement project which lasted for many years.

Private seed companies are very active in their promotion activities as they compete with each other in price and quality. Thai farmers are now more selective with regard to their planting seeds. Most commercial vegetable growers use only brand name seeds from reliable sources. Corn seed could hardly be sold if it was not of a singlecross hybrid.

Human Resource Development

Thirty five years ago seed technology was almost an unknown field in Thailand. Only few officers were sent abroad to study the subject prior to the initiation of the first national seed development project. Shortly later, many DOAE officers were sent to Mississippi State University for graduate study and non-degree training in seed technology. Other organizations including state universities also sent their staffs to study seed technology in the U.S.A., Europe, Australia and New Zealand. A few students went abroad to pursue

advanced study in the subject by their own resources. Nowadays there are quite a large number of people with advanced training in this field. In the Bureau of Seed Production (BSP) of the DOAE, for instance, there are over 30 such people. Presently, at least five state universities are offering courses in seed science and technology.

Seed Testing Capability

Seed testing was the earliest area of seed technology that caught the attention of public workers. That partially explains why we had a national seed laboratory long before the first seed production center was set up. Today if an education institute plans to include seed area in its curriculum, seed testing will likely be the first priority. It is not over-exaggerated to say that Thailand has sufficient capability in seed testing. The BSP has 24 quality control seed labs, one at the headquarters and one at each of the 23 seed production centers. The DA has a law enforcement seed lab at its headquarters and seed testing facilities at its various institutes and experiment stations. There is at least one seed lab at each of 4-5 major universities. A few seed companies have their own seed testing facilities. There are two seed labs which are long-time members of ISTA, one belongs to DA and the other to DOAE.

Seed Requirement and Supply

Of the 21 million hectares total planting area, 13 million hectares are planted to seed propagated crops. It is estimated that 710,000 tons of seeds are sown annually. Rice planting alone needs more 600,000 tons of seeds. Vegetable production requires 3,000-4,000 tons of seeds each year. Major seed-requiring field crops are corn, soybean, mungbean and peanut.

On the supply side, The Bureau of Seed Production is the largest public seed producer. The amount of seeds produced through its contract growers ranges from 35,000-50,000 tons per year. The combined amount of seeds produced by other government organizations, namely, the Department of Agriculture, the Department of Land Development, the Department of Livestock Development, and state universities, is a few thousand tons a year. The private seed sector produces 18,000-25,000 tons of corn seed annually. The private seed companies not only satisfy 80 % of domestic vegetable seed requirement but also export a substantial amount of veg-

etable seeds each year.

Over 45 farmers' cooperatives under the supervision of the Department of Cooperatives also produce seeds. During the past few years, their total annual production was a little over 20,000 tons. Recently, the DOAE initiated a community rice seed production scheme. Under this scheme, a group of 20-25 rice growers in each rice community is supported to produce rice seeds to be used in the community. There are now over 4,500 such communities and each is expected to produce 20 tons of rice seed aside from usual grain production.

Though there are many seed producers, there is still a big gap between the requirement and the supply of quality seeds, especially in the case of rice. The majority of farmers are using seeds of questionable quality from conventional seed sources.

Seed Import and Export

Thailand has been a net exporter of seeds for some time. As the import value increased from \$US 4.85 millions in 1996 to \$US 13.34 millions in 2004, the export value increased from \$US 13.07 millions to \$US 35.82 millions during the same period. The surplus ranged from \$US 8.22 millions to \$US 25.05 millions per year. In 2004, the import quantity was 6,240 tons while that of the export was 13,297 tons. Some seed kinds with high import values in 2004 were corn, sunflower, cabbage, coriander, Chinese kale, Chinese cabbage, Chinese radish, sorghum, cauliflower, hot pepper and lettuce. High export value seed kinds in that year were corn, watermelon, tomato, cucumber, hot pepper, convolvulus, sweet corn, cabbage, coriander and yard long bean. Some exported seeds were from the varieties developed in the country while some were produced from foreign varieties under custom production contracts. Some imported seeds were also re-exported.

It might be concluded that Thailand's seed sector has made a steady progress but it is not fully developed. In addition to the strong determination of the policy makers and dedication of administrators and technical workers, the assistance from several international organizations and certain developed countries has been essential to this development. Thailand is probably a good place to study or observe seed sector development at work. ■

Regional Reports from participants of the 6th ISTA/FAO Workshop in Jamaica

The 'University of West Indies' of Jamaica with Wayne McLaughlin as the local workshop organiser, kindly hosted the 6th ISTA/FAO Workshop on Electrophoretic and PCR-Techniques for Variety Verification and GMO Detection. We are very thankful to Wayne McLaughlin for his considerable help in both administrative and laboratory tasks.

As ISTA experts, Christoph Haldemann lectured the GMO part and Andrea Jonitz and Rainer Knoblauch the variety verification part. In addition, Monica Haueter was assisting for the GMO practical part.

The 18 participants of the workshop came from 9 countries out of the 21 in the Caribbean and Central American region: Bahamas, Barbados, Belize C.A., Cuba, Grenada W.I., Guyana, Jamaica, Mexico and Trinidad. The Participants were invited to prepare short presentations on their respective domicile region. This session of the workshop was very well received, both by participants and lecturers. Some participants prepared written reports, which are presented on the following pages.

See page 49 for the Workshop Report.

Bahamas: The Status of Seed Testing and GMOs

By **Kenneth Richardson**
Senior Agricultural Officer
The Ministry of Agriculture & Fisheries, The Bahamas
and **Bridget S. Hogg**, Lecturer
The College of The Bahamas, The School of Sciences & Technology



The Bahamas is an archipelago of 700 islands and cays surrounded by coral reefs and sand flats extending from about 50 miles east of Florida, USA, to 50 miles northeast of Cuba. The economy of the Bahamas is supported by the pillars of tourism and financial services industry. Tourism alone accounts for nearly 60% of the gross domestic product (GDP). Agriculture, fisheries and manufacturing industries combined account for less than 10% of the GDP (Department of Statistics, 2004)

Over US\$300 million dollars is spent annually on food import, representing more than 90% of the food consumption. The main import is from North America. The large-scale commercial production in the country is small. Subsistence farming is still important in the Family Islands, growing typically corn, cassava, sweet potatoes, beans and pigeon peas, but the number of farmers declined in the past two decades, while the average age of farmers increased.

About 70 metric tons (t) of the total annual seed import is mainly from the USA, including forage (15t), grass seeds (10t), ornamentals (6t), vegetables (30t) and fruit (9t) (Department of Agriculture, 2004). In addition,

some 30t of non-labeled maize seed for processing into animal feed is monthly imported from the USA. Currently the Department of Agriculture has no means to control whether the seed is genetically modified or not.

A recent local seed production project involved the preservation of the Bahamian Finger Pepper, in danger of extinction. In an effort to preserve and improve this valuable genetic resource, the assistance of the Food and Agriculture Organization (FAO) was obtained for improved seed production (FAO, 2004). The project involved farmers from various islands who have been trained for the high quality seed production. The various locally improved seed production fields help other farmers to improve seed production as well. By monitoring the seed production locations, Department of Agriculture ensures the production of Quality Declared Seed.



On January 15th, 2004, the Bahamas ratified The Biosafety Protocol to the Convention on Biological Diversity and is in the process of developing a national policy on biosafety. Due to limited national activities in the area of biotechnology, the production of Genetically Modified Organisms (GMO) by biotechnological techniques, does not exist (Bahamas Environment, Science and Technology Commission (BEST), 2003)

It is recognized that there is a need for seed testing for a number of reasons, above all concerns about food safety, preservation of natural resources, monitoring for genetic pollution, exploitation of niche markets for certified non-GMO products, enhancement of crop resistance and yield improvement (BEST, 2003). The available facilities and are only some germination and moisture testing equipment for moisture testing on the basis of fresh and dry seed weight.

Over the years, several officers of the Department of Agriculture have been trained in various aspects of seed science and technology, most recently during the FAO assisted hot pepper project. However, due to overall limits in facilities and expertise, no GMO testing is currently conducted locally (BEST 1997, Department of Agriculture, 2005). Food and feed import is accepted, based on United States Department of Agriculture (USDA) certification. Since the USDA does not require identification of GMO status of such products, the status of import is largely unknown (USDA, 2005). As the Bahamas seeks to build and spread the National Bio-

safety Policy, a number of elements will have to be considered, including:

- Ongoing training and research on biosafety and biotechnology, to expand knowledge and develop expertise in the field
- A GMO policy for the agricultural sector
- Establishment of specialist led multi-sectorial teams for GMO detection/risk assessment
- Establishment of a database for imported food and feed
- Increase the national inspection and diagnostics capacity
- Improvement of the technological capacity for biosafety and biosecurity issues
- Increasing the public awareness and improve information flow to the public.

The Bahamas is just on the beginning of its seed testing, GMO detection and monitoring, and related biotechnology tasks. There is much work to be done in the years ahead.

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Trinidad and Tobago: National seed testing and certification systems in the English speaking Caribbean

By Path Umaharan

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The Caribbean region consists of 25 island states and four associated continental countries, with a total land area of 61 million ha, of which 25% is under agriculture and only 11% is arable. The Caribbean island states consisting of 22.9 million ha (37% of the land area) has 94% of the total Caribbean population of 37 million. Hence, the per capita arable land area in most of the Caribbean island states with the exception of the larger Caribbean island states of Cuba, Dominican Republic and Haiti is below the minimum of 0.07 ha required to achieve food security (FAO, 2000). Furthermore, urban development is continuing to consume the limited arable lands available for agriculture, leading to a precarious food security situation.

The Caribbean islands, although within the tropics, have a remarkably variable agro-ecological environment due to the diverse geological origin and latitudinal positions. Therefore varietal adaptability varies considerably within relatively small distances. Traditionally most farmers grew indigenous crops, such as corn, hot pepper, cucurbits, beans, sweet potatoes, yams and pigeon peas, by recouping seed or vegetative underground organs. Seed of non-indigenous crops is imported by a number of companies, but require special care and attention in growing. The global trend of conglomeration of smaller private seed companies to form a few large ones has had an adverse effect on the Caribbean region, due to the focus of larger companies shifting away from niche breed-

ing. The escalation of seed cost has also had a debilitating influence on the region.

Agriculture development in the English speaking Caribbean region has continued to suffer due to the lack of a breeding and seed industry program. Historically there have been no seed policy or seed law to protect the farmers in this region. Therefore seed import and trade without adequate testing of seed adaptability and seed productivity has become common practice. The larger territories, such as Guyana, Belize, Jamaica and Trinidad and Tobago, have small national seed production programmes (government owned) but these are confined to only limited number of crops. In the absence of an independent seed certification service, seed test

REGIONAL SEED NEWS

Seed Testing in the Caribbean and Central America

ing is done within the national program itself following the ISTA Rules for seed testing. Seed produced within the national concept in most cases does not enjoy a high level of acceptance of the Caribbean farmers, since it does not provide any greater advantage over farmer recouped seed.

The seed production programme of the Chaguramas Agricultural Development Project (CADP) in Trinidad and Tobago was developed with support from the German government in the 1970's. Under government management and without the requisite partnership with breeding programmes in the region, it, however, has not been able to operate as a profitable entity. Currently, only corn, pigeon pea, cowpea and pumpkin seed are produced.

In the 1990's, in a bid to revitalize the seed industry in the English Speaking Caribbean, Food and Agricultural Organization (FAO) assisted in capacity building in the areas of germplasm conservation, characterization and documentation, as well as in seed production and certification. Under the FAO support, a regional seed policy was developed, but has not yet been adapted by governments.

To make the seed production industry profitable, a regional approach is necessary. To achieve this, the seed production program needs to be divested to private companies in the region. The Caribbean Community and Common Market (CARICOM) should provide a regional seed policy framework that can then be adapted by individual CARICOM countries. This policy should outline a

mechanism for coordinating various national and regional breeding programs, aimed at improving indigenous crops, with the privatized regional seed production system, so that regional farmers can benefit from these efforts.

The CARICOM policy should ensure that strategic alliances exist between the regional germplasm collections, regional breeding efforts and the seed production efforts. It is recommended that the national governments, within the CARICOM framework, develop seed legislation and a seed certification service, to protect farmers' interest. The Caribbean Agricultural Development Institute (CARDI) is best positioned to provide to private seed companies regional testing services for the various varieties. ■

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Belize: Status of Seed Testing using Electrophoretic and Molecular methods for Variety Verification and detection of Genetically Modified Organism (GMO)

By **Veronica Manzanero Majil**, Laboratory Officer

Citrus Research and Education Institute of the Citrus Growers Association, Belize, Central America



Introduction

Belize is a tropical country located in Central America with a population of approximately 300,000 inhabitants. The major industries that support the economy are Tourism, Citrus, Banana, Sugar, Papaya and Aquaculture. The country imports other agricultural plant products such as vegetables, tubers, and grains for human and animal consumption. These products originate from countries that grow genetically modified (GM) crops, therefore, some of these products may be of GM origin. Currently there is no framework in place to test for Genetically Modified Organisms (GMO) or to verify varieties.

Belize became a signatory of the Cartagena Protocol in 2003, and is thus obliged to develop national strategies to address commitments in the areas of biosafety and biodiversity. Under the Convention it was agreed that all involved countries would develop a National Biosafety Framework. Belize is currently the first phase of the project.

The National Seed Policy

The Ministry of Agriculture and Fisheries is the responsible for setting policy on agricultural production and food security in the country. So far, a seed policy has not been established. However, the National Seed Policy proposal exists and encompasses various components, such as broad technical categories, personnel needs and the commercial aspects of seed management. The proposal includes development and implementation of a seed certification system and a quality control programme, which will regulate technical aspects of plant breeding, varieties evaluation and the seed quality control. According to the legislation development on the seed certification, which is also part of the Policy proposal, the Government would be responsible for the research activities on the

basic seed production and related tasks such as variety development.

Even though there is no seed policy in Belize, to date, related work is conducted by the Caribbean Agricultural Research and Development Institute (CARDI). CARDI provides technical assistance and training for the agricultural sector. CARDI also multiplies and distributes selected varieties, i.e. conducts varietal trials and variety selection based on the adaptability to the local environmental conditions, best yield, pest resistance and marketability. The main crops involved are legumes, cereals, grains and hot peppers. The hot pepper industry both imports seed and maintained those locally produced and selected by CARDI, while the citrus industry imports germplasm material, produce seeds and multiplies grafting material. The Banana industry imports tissue culture meristems. The Sugar industry imports cuttings and seed, conducts varietal trials, selects best performing varieties, multiplies selected varieties and distribute cuttings to growers. The Papaya industry imports seed of desired commercial varieties for planting.

Biotechnology Uses in Agricultural Industries in Belize

Belize is still at a young stage when it comes to the use of advanced technologies in the agricultural sector. Plant breeding, precision agriculture, genetically modified organisms are things that we read about existing in other countries. As mentioned before, industries import most of the propagation materials. The Citrus industry at the moment is the only one that has a well established research institution, the Citrus Research and Education Institute of the Belize Citrus Growers Association, with the citrus health certification program which ensures that all citrus propaga-

tion materials are certified free of pests. For supporting the health certification program, the Citrus industry developed laboratory capacities for citrus diseases detection and diagnostics by biological, serological and molecular assays. Disease diagnostic capacities for the citrus industry include the biological and serological detection of most citrus graft transmissible diseases (figure 2). Currently standardization protocol for the citrus viroids and viruses' detection by the Polymerase Chain Reaction is in preparation.

Conclusion

There is no laboratory in Belize currently equipped for seed variety verification or GMO testing using Electrophoretic and Molecular methods. However, through the ISTA/FAO training program the Citrus Growers Association has prepared one person for such tests, and has noted the need for very specific equipment to be able to conduct the analysis.

Future Biotechnology tasks of Belize are that the Citrus industry implements the In vitro Shoot-tip micrografting for local Citrus varieties cleaning, to provide disease diagnostic services to other industries and to provide capacities for variety verification and GMO detection. ■



Mexico: Seeds for the Global World

By **Adi Estela Lazos Ruíz**

Intellectual Capital and Competitiveness Centre

Mexico was the largest country participating at the 6th ISTA/FAO workshop at Mona Campus, Jamaica, with its surface of almost 2'000'000 km² and the population of over 100 million people. It is not hard to recognize the vast resources this country has and the importance of agriculture to boost the economy and feed its population.

Since today's world has opened its boundaries, and being competitive is the only way to survive at the global hyper competition, each country has to identify its comparative advantages and convert them into sustainable advantages. The particular case of the participation of Mexico in the NAFTA (North America Free Trade Agreement), is an example of the urgent need of improving competitiveness, especially in the agricultural sector. In just a few years, Mexican production has been challenged to compete with analogous imported products from USA and Canada. Even when part of the Mexican agribusinesses were able to adapt and achieve the required quality and prices, some others face serious difficulties and troubles to update obsolete practices and technology.

One of the main necessities in the agricultural sector is production of good quality seed, i.e. certified seed, pathogen- and pests-free, that guarantees minimal risk of poor germination and development. To enhance the expres-



sion of the plant genetic potential, regionally adapted varieties are also needed, along with a good agricultural practice.

The main institution for seed verification in Mexico is The National Service for the Inspection and Verification of Seeds (SNICS for its name in Spanish). It is a decentralized branch of the Ministry of Agriculture, Animal Husbandry, Rural Development, Fisheries and Alimentation (SAGARPA for its name in Spanish), which directly depends on federal funds.

SNICS is in charge of standardizing and assessing legal matters regarding seed and varieties. SNICS's three main activities are:

- To verify and certify the origin and quality of seed
- To legally protect the right of new variety breeders
- To coordinate actions regarding phyto-genetic resources for feeding and agriculture.

SNICS uses ISTA rules and methods for seed testing, and intend to apply for OECD (Organization for Economic Co-operation and Development) certification program. Nowadays SNICS provides different certification labels for original, basic and commercial seed.

SNICS certifies mainly cereals such as corn (basic food in Mexico - corn tortillas), wheat, barley and oats, and vegetables like tomato, pepper, carrots and broccoli. Seed certifica-



tion is less well established for fruit and forest species; however, there is a starting demand for certification from avocado, orange, lime and coconut producers, mainly for exporting purposes. It is very important that producers are developing awareness on the significance and usefulness of seed certification.

Some other highlights of SNICS work consist on the elaboration of technical guides for the varietal description of corn (*Zea mays*), prickly pear cactus – edible flat cactus (*Opuntia* spp.), beans (*Phaseolus vulgaris*), avocado (*Persea americana*), amaranthus (*Amaranthus* spp.), cherimoya (*Annona cherimola*), dalia (*Dalia* spp.), marygold (*Tagetes erecta*), tomatillo (*Physalis ixocarpa*), chickpeas (*Cicer origildum*), garlic (*Allium sativum*), cotton (*Gossypium* spp.), oats (*Avena sativa*), onion (*Allium cepa*), citrus (*Citrus* spp.), strawberry (*Fragaria vesca*), potato (*Solanum tuberosum*) and tomato (*Lycopersicon esculentum*).

In terms of Mexican policy, there are two important laws: Federal Plant Variety Law and Law of Production, Certification and Trade of Seeds. Their objectives are to set up the ground and procedures for plant breeders' rights protection, and seed trade regulation. The Federal Government, through the Ministry of Agriculture, Animal Husbandry, Rural Development, Fisheries and Alimentation, is in charge of implement such laws .

Mexico certainly achieved progress in the seed certification system, but it is still neither completely effective, nor widely spread. Only elite farmers benefit from certified seed, since these are much more expensive than non-certified seed. The integration of the supply chain, making certified seed available to low-income farmers, and farmer's competitiveness, is the big task for future. Mexico still has a long way to go. ■

¹ Villarreal, René. The Agribusiness Systemic Competitiveness Model in the Global Value Chain. CECIC, 2005.

² SAGARPA. <http://www.sagarpa.gob.mx> July, 2005

Cuba: Some aspects of seed multiplication, testing and certification system

By José M. Machado Rodríguez¹, Araís Fernández Herrera² and Marlen Navarro Boulander³

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Introduction

Traditionally, Cuban farmers maintained their crop varieties by constant selection. Sometimes they had certain levels of differences due to environmental changes, mutations and recombination.

The aim of this article is to present shortly how the seed multiplication and certification in Cuba is currently organized.

Actual situation

Cuban seeds production is established in the 90's, on the basis of an alternative and ecological agriculture (Rodríguez and Ríos, 2003). Seed multiplication and certification in Cuba, as well as seed quality parameters, are regulated by the Cuban decree No. 175, from 1992. Seed multiplication, certification and testing are under the responsibility of the Ministry of Agriculture and the Ministry of Sugar.

Present conditions in the country allowed us to develop a sustainable seed production, combining the governmental program and production of private farmers in some regions of the country. This approach enabled us to have a significant success with minimum resources (Figure 1).

The national program of seed production is governed by the Ministry of Agriculture and supported by technical consulting from

national scientific institutions (Figure 2). A network of biofactories is set up for in vitro multiplication, testing and certification of pathogen-free biomaterial.

The Seed Inspection and Certification System (SICS) founded a laboratory in each province of the country. Their main responsibility is to test the seed quality by experimental laboratory assays, variety entries and field inspection. They also service information to farmers and technicians regarding technical procedures and seed legislation.

The Ministry of Agriculture yearly publishes an Official Commercial Variety Catalogue for the use on the national territory. Only the director of the National Center of Plant Health is authorized to permit using of varieties not listed in the Official Commercial Variety Catalogue. In this document are given horticulture, cereals, grains and oleaginous, roots and tubercles, plantains and bananas, pasture and forage, citrus and fruits, forestall, tobacco, coffee and cacao varieties.

Laboratory assays

Laboratory testing is carried out at a basic level, in provincial laboratories. It is based on the phenotypic characteristics, germination efficiency, pathogen and plague diagnostics and the moisture content test. Due to the lack of financial resources, it has been impossible to introduce more specific meth-

ods like PAGE and SDS-PAGE electrophoresis, electrophoresis of isozymes, isoelectric focusing in ultrathin layer (UTLIEF), as well as molecular markers using RAPDs and PCR for GMO testing. These analysis are carried out only in research institutes such as the National Center for Animal and Plant Health, Havana, and the Institute of Plant Biotechnology, Santa Clara.

In Cuba, the plant genetic engineering has been developed with some field trials on transgenic bananas and plantains, for resistance against fungal pathogen Black Sigatoka. It would be of great significance to have specific laboratory procedures for biomolecular detection and control of transgenic crops.

Looking forward

Some joint projects with FAO are initiated for developing of seed multiplication, certification and testing techniques, as well as for establishing of the national laboratory (TC/CUB/2204). This is also the first step for the future improvement of existing provincial SICS laboratories.

The ISTA workshops, with FAO collaboration, are a great source of knowledge and the best way to train specialists in each country on the latest progress in the seed quality research and GMO detection. At the same time, this type of activity can serve as a guide for project proposal on organizing a network of authorized seed testing laboratories in the Caribbean region.

References

- Decreto No. 175. Gaceta Oficial de la República de Cuba, La Habana, 31 oct. No. 13 pp. 139, 1992.
- Lista Oficial de Variedades Comerciales. Registro de variedades comerciales. Sub-dirección de certificación de semillas. República de Cuba. Ministerio de la Agricultura. 2005.
- Rodríguez, J.E. and Ríos H. Los bajos insumos agroquímicos: facilitando la descentralización y participación de los agricultores en Cuba.. LEISA. Revista de Agroecología. Vol 19, No. 3, 2003.

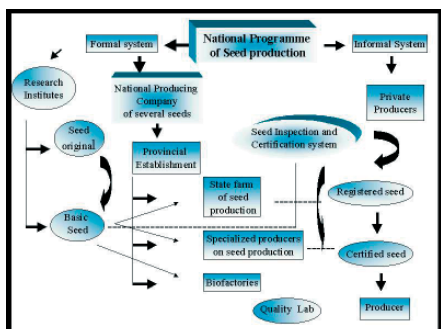


Figure 1

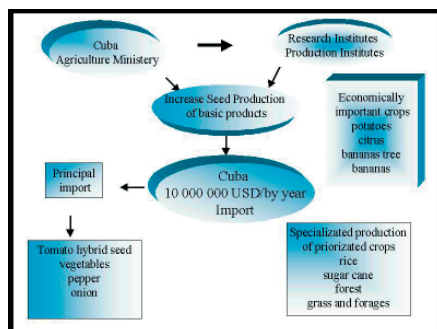


Figure 2

ISTA Ordinary Meeting 2005

Technical Committee Session Reports

Flower Seed Testing Committee

By **Zita Ripka**, Flower Seed Testing Committee Chair

The activity report of the FSC has been presented during the committee session on Monday, April 25. The presentation has been held by Rita Zecchinelli. After giving some general information (composition of the FSC, Working Programme for the 3-year period), the presentation gave an idea of the activities carried out in the last year. In particular these activities focused on two items:

- New working sheets to be included in the next ISTA Handbook on Flower Seed Testing
- Organisation of the first ISTA Proficiency Test on Flower Seed Testing

Handbook: 15 working sheets have been accepted until today:

Asteraceae: *Calendula*, *Gaillardia*, *Tagetes* (2001)

Balsaminaceae: *Impatiens* (2001)

Caryophyllaceae: *Dianthus* (2001)

Violaceae: *Viola* (2001)

Primulaceae: *Cyclamen* (2002)

Solanaceae: *Petunia* (2002)

Asteraceae: *Ageratum*, *Callistephus*, *Coreopsis*, *Cosmos*, *Gazania*, *Dahlia*, *Zinnia* (2003)

Five draft working sheets have been prepared in 2004:

Asteraceae: *Aster*, *Bellis*, *Centaurea*, *Helichrysum*, *Rudbeckia* (2004)

It is expected that the first edition of the ISTA Handbook on Flower Seed Testing will be available early in 2006; it will be in a binder format so that it can be updated with new sheets easily.

For other five species the preparation of the working sheets will start in the next months:

Scrophulariaceae: *Antirrhinum*

Amaranthaceae: *Celosia*

Lamiaceae: *Salvia*

Acanthaceae: *Thunbergia*

Verbenaceae: *Verbena*

ISTA Proficiency Test (PT) on Flower Seed Testing

In 2005, the first PT on Flower Seed Testing has been organised by our committee, in co-operation with the Proficiency Test Committee and the Secretariat. Following, some figures:

- Species: *Zinnia elegans*
- Kind of test: germination
- Number of lots: 3
- Number of participants: 65 (44 labs accredited for flowers + 21 volunteers)
- Deadline for sending the results: May 2, 2005

Moreover, the membership has been informed on the identification of two new species to be proposed for the inclusion in the ISTA Rules:

- *Catharanthus roseus* (Madagascar periwinkle)
- *Eustoma grandiflorum* (Lisianthus)

Also the possibility to organize a workshop on Flower Seed Testing during the next year (2006) has been discussed. Costs and some other practical difficulties are still in consideration. ■

Moisture Committee

By **Harry Nijenstein**, Moisture Committee Chair

Introduction

The ISTA Moisture Committee has three major goals for this triennium:

1. A major revision of the present rules chapter

2. Publishing a Moisture Handbook

3. Organising Moisture Workshops

Over past years the committee has been busy in starting the above mentioned projects.

In addition we have been able to start a series of proficiency tests. The preliminary results appear to be satisfying.

It is planned to have two proficiency tests per triennium, of which one will be on a species that requires grinding.

1. A major revision of the present rules chapter

The committee receives many questions in two areas. One is asking for the introduction of new species for moisture testing in the Rules. The other one deals with requests for clarification on several parts of the present chapter.

Introduction of new species in the Rules requires a comparison between the chosen oven method and the Karl Fischer (KF) reference method. Unfortunately, none of the members of the Moisture Committee has access to KF-equipment. After a broader enquiry within ISTA it appeared that no lab has direct access to KF. Two labs knew of other labs possessing the required apparatus. This explains why no new species have been added to the Moisture Chapter lately: it is very difficult to fulfil the requirement of comparing oven results with the basic reference KF-method.

A comparative testing is underway. Several species are compared in different oven methods, in order to find an oven method that can be used as basic reference method.

At present, species are listed in separate tables in Chapter 9. Specifications for individual species may be described on more than one place in the chapter. It was decided to gather all information related directly to a method per species in one table. This table will contain information for grinding, temperature, duration of the test, and predrying.

In addition more information with regard to quality assurance will be introduced in

Chapter 9. Information will be gathered from proficiency tests, enquiries on orthodox and non-orthodox seeds, remarks made during workshops, and from individual requests received by the committee.

In Bangkok the first draft of the new chapter was discussed, still without any new species introduced. A second draft, including a new basic reference method, will be discussed during the Ordinary Meeting of 2006.

It is our aim to have the revised chapter ready to be voted on in the Ordinary Meeting of 2007.

2. Publishing a Moisture Handbook

The committee agreed on the table of contents for the handbook. Chapters have been assigned to a number of member of the Moisture Committee.

Deadline for publication is 2007.

3. Organising Moisture Workshops

The next workshop will be held in New Zealand in February 2006.

A request for organising a workshop in conjunction with the AOSA/AOSCA meeting in June 2006 has been received. ■

Nomenclature Committee

By **John H. Wiersema**,
Nomenclature Committee Chair

The ISTA Nomenclature Committee is responsible for maintaining and updating the *ISTA List of Stabilized Plant Names (List)*. The last (2001) edition continues to be available as a web document at <http://www.ars-grin.gov/~sbmljw/istaintrod.html> on the Germplasm Resources Information Network (GRIN) of the U.S. Department of Agriculture. This is easily accessible via a GRIN link from the ISTA web page for the NOM Committee. A web page for searching this nomenclature exists at <http://www.ars-grin.gov/cgi-bin/npgs/html/taxassoc.pl> with versions in French, German, Portuguese, and Spanish in addition to English. The names on this *List* can be searched in conjunction with other GRIN data, such as distribution, economic uses, or common names, and easy access to these other data is available via links from the entries on the *List*. A hardcopy

edition of this publication is planned for the fall of this year.

Names on the *List of Stabilized Plant Names* are stabilized for a period of at least six years, but because of the many changes made for the 2001 edition we have refrained from proposing changes to any names for this period. However, additions or revisions will once again be entertained for the 2007 ISTA Congress, culminating in a new edition of the *List*. ISTA Technical Committees and other ISTA Members seeking modification to the existing *ISTA List of Stabilized Plant Names* should submit these items to the Nomenclature Committee for consideration within the next (2006) year so that proposals for modifying the *List* can be prepared before the 2007 Congress.

The other major activity of the Nomenclature Committee will be a revision of the ISTA publication "*A Multilingual Glossary of Common Plant-Names*" for which "*1. Field crops, grasses and vegetables*" was last revised in 1982, and "*2. Trees*" in 1971. We have already built an electronic version of part 1, searchable at <http://www.ars-grin.gov/~sbmljw/cgi-bin/seedglossary.pl>, and anticipate adding part 2 later this year. We are working on an electronic submission form, linking from the above page, to allow ISTA Members from various countries to review existing data and submit corrections and/or additions for any species treated in the ISTA Rules.

In conformity with the past edition of part 2, but not part 1, we will include both the original script and a romanized version. For those crops with infraspecific groups, these will be treated in the new *Glossary*, providing both botanical names (subspecies, varieties) and cultivated plant names (groups) for cross-referencing. We would also like to make the *Multilingual Glossary* a more complete online reference by providing images or links to images as well as linkage to other relevant data sources for as many plants as possible. We invite members from various countries to contact us about possible contributions and/or feedback regarding these items in the next year. Interested collaborators can reach us via the web interface or, if lacking internet access, communicate directly with our Vice-Chair Michel Porcher (Faculty of Land and Food Resources, The University of Melbourne, Victoria, Australia 3010), who will be managing this project. ■

Seed Storage Committee

By **David Mycock**,
Seed Storage Committee Chair

The committee comprises 16 participants from 8 countries. The common goal of the committee is the development and/or improvement of effective medium- and long-term storage methods. To achieve these goals it is important to have an appreciation of the biological processes that underlie the seed storage behaviour and how these processes are affected by actual storage. This is particularly true of recalcitrant (non-orthodox) seed germplasm. The committee has therefore divided its efforts into two working groups. The first of these is considering aspects of orthodox seed storage. In particular, the impact of micro-organisms, long-term storage via cryopreservation, investigations into seed invigoration and lastly the development of storage methodology. The second working group considers storage of non-orthodox seeds. The working group places emphasis on the effects of micro-organisms, storage and stress on the seed tissues and members of the committee are actively pursuing the development of storage methods for this recalcitrant seed type. ■

Proficiency Test Committee

The Proficiency Test Committee Report can be found on page 54. ■

GMO Task Force

Reports of the GMO Task Force:
- *Principles and Conditions for Laboratory Accreditation under the Performance Based Approach*, page 3
- *Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots*, page 4
- *Evaluation of performance data for the presence of seed with specified trait(s) in seed lots*, page 9
- *ISTA GMO Proficiency Tests: Rating System for Quantitative Results*, page 11 ■

Purity Committee

Working programme, activities, special projects

By Maria Rosaria Mannino¹, ISTA Purity Committee Chair
Gerarda de Boer², Steve Jones³, ISTA Purity Committee Members

¹ GEVES-Station Nationale d'Essais des Semences, rue Georges Morel, BP 90024, 49071 Beaucouzé Cedex, France

² Seed Testing Station, NAK, Randweg 14, P.O. Box 1115, 8300 BC Emmeloord, Netherlands

³ NIAB Huntingdon Road, Cambridge, CB3 0LE, United Kingdom

The Purity Committee is composed of 12 members (Table 1) and is organised into 6 working groups with 10 other persons collaborating in the projects.

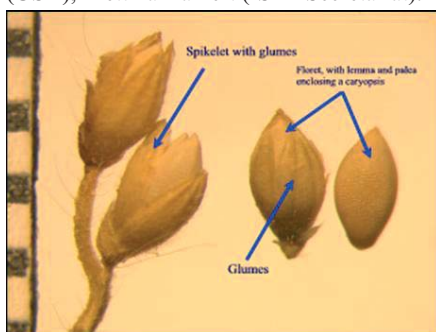
Table 1. Purity Committee composition

Maria Rosaria Mannino (Chairperson)	France
Jane Taylor (Vice Chairperson)	United Kingdom
Ken Allison	Canada
S.C. Aswatharayana	India
Gerarda de Boer	Netherlands
Fabio Ferrari	Italy
Axel Goeritz	Germany
Steve Jones	United Kingdom
Monica Moreno	Argentina
Deborah Meyer	United States
Andreas Ratzenboeck	Austria
Zita Ripka	Hungary

During the Ordinary Meeting in Bangkok, the programme, the activities and the special projects were presented for each of the working groups.

1. Pure Seed Definitions Working Group

Leader: Steve Jones (GB). Participants: Ken Allison (CA), Fabio Ferrari (IT), Zita Ripka (HU), Corinne Sahuguède (FR), Jane Taylor (GB), Helen Appleyard (GB), Debbie Meyer (USA), Bettina Kahlert (ISTA Secretariat).



The main project of this working group for the period 2004-2007 is the new edition of the ISTA Handbook of Pure Seed Definitions with illustrations. The aim of this handbook is to help analysts during analysis. A very important task is the correct application of the relevant Pure Seed Definition to separate the working sample in the right way and to calculate the proper percentage composition.

In the new handbook, each of the pure seed definitions will be presented in numeric order, as specified in the ISTA Rules, together with a list of all the families and genera that are covered by that number. The new handbook will be characterised by a loose-leaf format, with the PSD number on the side of pages for easy access. Statements about species that cannot be easily distinguished, e.g. *Brassica* sp., *Lolium* sp. will also be added. The handbook will contain up to six images of seeds per page, included species from tropical and sub-tropical countries and also a glossary with illustrations to help analysts in the interpretation of botanical and technical terms.



2. Blowing Working Group

Leader: Gerarda de Boer (NL). Participants: Corinne Sahuguède (FR), Deborah Meyer (US), Jette Nydam (DK), Jane Taylor (GB), Dorothy van Horsen (CA).

The programme of this working group for the period 2004-2007 is to work on the blowing of split samples of *Poa* spp., *Dactylis glom-*



erata and mixtures. A second item is the comparison of the ISTA and AOSA calibration samples.

Some laboratories analyse *Poa* spp. and *Dactylis* spp. using two half working samples. At present, ISTA provides only "whole" calibration samples. The question is: can the *Poa* or *Dactylis* half working sample be blown using a "whole" calibration sample? Are the results obtained correct? If not, which procedure can we suggest for blowing half working samples of each species?

The work is organised following these steps:

1. Identify all of the kinds of procedures in use in the largest number of laboratories that analyse half working samples of *Poa* and *Dactylis* by means of a questionnaire. Different laboratory experiences will constitute the starting point of the study
2. Organise, on the basis of the questionnaire results, a collaborative study to test different blowing methods
3. Determine the procedure to be suggested

Regarding the blowing of seed mixtures, the aim is to determine if components of *Poaceae* seed mixtures can be blown or not and how. Also, in this case, we will start with an evaluation of practices in use at present by the mean of a questionnaire.

The questionnaire will be sent in August to ISTA laboratories accredited for grasses (about 70 laboratories) and also to AOSA laboratories. The result is expected for October 2005.



3. Rules Development Working Group

Leader: Maria Rosaria Mannino (FR). Participants: all the members of the committee.

On the basis of the technical discussion that we had during the last workshop in Budapest and after discussion among the Purity Committee Members, we proposed 11 points of Rules Developments to be discussed in Bangkok. The aim was to clarify the purity rules, to harmonise some paragraphs of Chapter 3 and improve PSDs 4, 10, 21, 23 and 25. The proposals have been voted on and accepted by the Ordinary Meeting.

During the last year we also discussed the Rules amalgamation proposal. A suggestion of purity rules amalgamation has been elaborated: amalgamation of Chapter 3 and Annexe (excluding lists of 3.2.1.A.1 Part 1 & Part 2. and glossary) (PSD lists and glossary) that we would like to keep separately. We also proposed moving Chapter 11 (coated seeds) into the relevant Chapters 2, 3, 4, 5.

4. Tropical and Sub-Tropical Species Working Group

Leader: Monica Moreno (AR). Participants: S.C. Aswathanarayana (IN), P. Balamurugan (IN), Rosilma Pelsoni (BR), Pamela Strauss (ZA), Izelle Allison (ZA)

The last year we included on the programme: to work on *Chloris gayana*, to establish liaison with the ISTA Tropical Seed Task Force in order to introduce new species from tropical and sub-tropical countries into the ISTA Rules, and to improve analysis methods for these species.

The group is participating in the revision of the PSD handbook by finding images and seeds of tropical and sub-tropical species to be included in the new version. The group is also involved in the organisation of the workshop that will be held in Kenya in January 2006.

5. Seed Identification Working Group

Leader: M.R. Mannino (FR). Participants: Ken Allison (CA), Liciniu Dragos (FR), Fabio Ferrari (IT), Axel Goeritz (DE), Monica Moreno (AR), Andreas Ratzenboeck (AT), Zita Ripka (HU)

The programme established last year was to work on the Universal List of Weeds and Crops and other related items, such as the seed descriptions for the species present in the list with glossary and images, a bibliography for seed identification, a list of seed specialists

and botanical gardens. The committee also had feedback from the Executive Committee on the work done on the Universal List and some suggestions for the future work. The Executive Committee Members agreed to support the establishment of a universal list of weeds and crops following an option that takes into account the differences among regions. As was suggested by the Chairperson, two types of lists will be established:

- one basic list including a limited number of very common species that all laboratories should have in their seed collection and that they should be able to recognise;
- different complementary lists, each including typical species of one particular region.

Each ISTA laboratory should have in its collection all the species of the basic list and also the species of the list established for its region. In this case, a laboratory that would be accredited on crops typical of regions other than its own region should have in its collection the appropriate complementary list.

6. Workshop Development and Organisation Working Group

Leader: Ken Allison (CA). Participants: Maria Rosaria Mannino (FR), Zita Ripka (HU)

The working group published a report of the ISTA Purity Workshop in Budapest (May 11-12, 2004) on Seed Testing International No 128.

The group is now working on the organisation of two purity workshops in 2006: in Kenya (Nakuru, January 26-27) and in Switzerland (Zurich, June 22-23) at the occasion of the next Ordinary Meeting.

Conclusions

We have a lot of work yet started already. Our main objectives for 2006 are:

- to finalise the new ISTA Handbook on Pure Seed Definition
- to finalise the Universal List of Weeds and Crops
- to progress on the improvement of the blowing method
- to organise two Purity Workshops.

Concerning our planned work for 2007, the organisation of a purity workshop and the preparation of a training publication on species of the "Universal List of Weeds and Crops" have been discussed. ■

Tetrazolium Committee

By Stefanie Krämer,
Tetrazolium Committee Chair

List of Committee Members:

Stefanie Krämer, Chair (DE), Ronald Don, Vice-Chair (GB), Augusto Martinelli (AR), Christofer Wood (GB), Anny van Pijlen (NL), Valerie Blouin (FR), Sharon Davidson (US), Maria B. Aranguren (AR), Teresita Farras (UY), Gary Duffy (IE), Linda Maile (GB), Irena Jumburga (LV), Jose B. Franca-Neto (BR), Izelle Allison (ZA), Sergio Pasquini (IT)

According to the Working Programme the committee is working on the following items:

A. Rules Development

- **Reorganisation of Rules and Annexe:** The preparations are in work and it is expected to be completed in 2006.
- **New version of Table 6A Part II Tree and Shrub Seeds:** The discussion has been newly initiated in the FTS Committee to make the table consistent with the rules and annexe regarding tetrazolium solution percentage, optimum time, anatomical details and to correct obvious defaults. It is expected to complete this until 2006.
- **Introduction of new species:** The work on *Brassica* and *Glycine* is finalised and it is expected to present the proposal at the Ordinary Meeting 2006. The methods for *Larix* and *Picea* are elaborated and a ringtest for validation is in preparation.
- Ringtest test results are expected in 2006.

B. Publications

- **Reorganisation of ISTA Handbook on Tetrazolium Testing:** The task has been started with collection of publications and the initial plan for a new structure and layout. The completion will not be possible before 2007.
- **Continue ISTA Working Sheets on Tetrazolium Testing, Volume I and II:** 52 new sheets are finished for 40 non-

woody and 12 woody species. They are circulated in the committee. Publication of the working sheets is expected in 2006.

These are the species:

Volume I:

Adonis spp., *Ageratum* spp., *Allium ursinum*
Aster spp., *Barbarea* spp., *Bellis perennis*,
Callistephus chinensis, *Catharanthus* spp.,
Cicer arietinum, *Cichorium* spp., *Cirsium*
spp., *Coreopsis grandiflora*, *Coreopsis tinctoria*,
Cosmos spp., *Dahlia* spp., *Foeniculum vulgare*,
Gazania spp., *Gentiana lutea*, *Gentiana septemfida*,
Glechoma hederacea, *Helichrysum bracteatum*,
Lepidium sativum, *Lepidium* spp., *Lepidium virginicum*,
Meconopsis spp., *Passiflora* spp., *Perilla*
spp., *Pimpinella* spp., *Polygonum* spp., *Quamoclit*
spp., *Rhinanthus* spp., *Ricinus communis*,
Rudbeckia hirta, *Salvia* spp., *Securinega*
spp., *Urtica* spp., *Valeriana officinalis*, *Valerianella*
spp., *Veronica* spp., *Zinnia* spp.,

Volume II:

Chamaedorea elegans, *Chimonanthus praecox*,
Citrus limon, *Citrus reticulata*, *Gosypium* spp.,
Musa spp., *Pachypodium* spp., *Panax ginseng*,
Phoenix spp., *Pittosporum* spp., *Yucca* spp.,
Zelkova spp.

At that occasion, some working sheets of the current edition shall be improved and reprinted. The discussion about a separate set of working sheets for tropical and sub-tropical species showed no need to extract these species from Volume I and II.

C. Workshop and Seminars

In 2004, two workshops on agricultural species have been held in Uruguay (national and international). In 2005, one workshop on tree and shrub species has successfully been succeeded in Karlsruhe, Germany.

The preparations for a workshop in the Netherlands in 2006 has been started. Also planned in 2006, is a seminar on Tetrazolium. For 2007, it is intended to arrange a workshop on tropical seeds. For this workshop, the committee is looking for an appropriate hosting laboratory. Furthermore, a workshop in South America, timely corresponding with the ISTA Congress in Brazil, would be very much welcome.

D. Proficiency Test

The Proficiency Test on *Triticum aestivum* has been conducted and reported by Ronald

Don, Vice-Chair of the committee, in *Seed Testing International* No. 129, April 2005. The results showed the high power of the method and very good comparable results between the laboratories.

The next proficiency tests are planned with *Panicum maximum* and *Medicago sativa* for 2007.

E. Special Projects

The committee starts investigations to find the fields and species the committee shall concentrate on in the future.

Finally, I want to thank all members of the Tetrazolium Committee and all collaborators from other committees for their time and input. ■

Variety Committee

By Rainer Knoblauch,
Variety Committee Chair

List of Committee Members

Rainer Knoblauch, Chair (DE), Kae-Kang Hwu, Vice-chair (TW), Robert John Cooke (GB), Kalyn Brix-Davis (US), Emanuela Casarini (IT), C. C. Debashree (IN), W. Drost M. Sc (CA), Jerzy Drzewiecki (PL), Berta Killermann (DE), Paul Koranyi (HU), Uri Kushnir (IL), Anne Middleton (CA), Chandgi Ram (IN), Amar Tahiri (MA), David Zhang (FR)

According to the working programme the committee is working on the following items:

A. Rules Development

The Chapter 8 is now accepted by the membership with the inclusion of the testing for specified traits.

- Method for *Zea mays*: For testing of hybridity with IEF two enlargements of the method shall be included regarding extraction buffer and pH range.
- Method for *Triticum* and *Avena*: The IEF shall be incorporated as an alternative method. Comparative tests showed that results of IEF are well comparable with the current ISTA method. At the same time, the IEF method is quicker

and cheaper.

- Both items are under discussion in the committee. A decision shall be presented in 2006.

B. Workshops and Seminars

In the period of 2004/2005 the committee has held ISTA/FAO Workshops on electrophoresis together with the GMO Task Force in the following countries: Slovenia, Egypt, China and Jamaica.

In 2006, a workshop on 'protein electrophoresis with IEF' is planned in Germany and in 2007 a workshop on 'non electrophoretical or DNA based methods for variety testing' is in preparation. For the latter a hosting laboratory would be welcome.

C. Special Projects

1. A questionnaire has been sent out to the committee members to find out fields of special interest, species with special difficulties or tasks to be covered.
2. At the same time, working groups shall be installed for the different methods: field growth morphology, anatomy, chemistry, physics like fluorescence, cytology and biochemistry. The molecular biology working group will be incorporated after final decision of the ECOM in 2007. This activity is intended by the observation that many methods are in use on a national basis but have not been brought to the level of an international ISTA Rules method. It is expected, that these working groups start their activity in 2005.
3. The committee will define the fields of special interest and find sponsors for research work.
4. The committee will check the need of variety test methods for tropical and medical plant species.
5. A survey will be done to find:
 - specialists who have methods available; and
 - specialists who are prepared to collaborate with the committee.
6. A searchable database will be designed from all data obtained from the survey. The database will be made available to all ISTA Members
 - a. via the ISTA Website, and
 - b. through a hardcopy version.

This task has been initiated from the Vice Chair Kae Kang Hwu

7. Proficiency tests will be initiated together with the Proficiency Test Committee. Proposed species are *Triticum* and *Zea*.
8. A new Variety Handbook will be designed.

Finally, I want to thank all members of the VAR Committee, especially my Vice Chair Kae Kang Hwu for their time and input in our ISTA work. ■

Bulking and Sampling Committee

By Michael Kruse,
Bulking and Sampling Committee Chair

The BSC meeting during the Ordinary Meeting 2005 was chaired by the BSC chairman Michael Kruse. The Bulking and Sampling Committee presented the work of the last year which was mainly the new version of Chapter 2 of the ISTA Rules. In the presented draft, the brown and the white pages were merged. Because there were considerable overlaps between the former rules and annexes, a review of the merged test was required. Also, sampling procedures and requirements were changed as well as relevant parts from chapter 11 and the Appendix D were included in Chapter 2, so that a completely new chapter was presented.

The proposals submitted to the membership were discussed during the BSC session and a few proposals for editorial changes were collected and included into the final version for adoption by the Ordinary Meeting. The next major topic of the BSC session was the discussion about the future of the "ISTA/ISF experiment on herbage seed lot size". The BSC proposal was to terminate the experiment as there were no encouraging signals from EU commission that they would accept this experiment as an exception from EU seed certification regulations. However, during the further meeting it was agreed to start a 4th phase and to approach the EU commission to get the above mentioned exception.

With the recalling of the 2nd edition of ISTA Handbook on Seed Sampling and a look to the year period up to the next Ordinary Meeting 2006, the BSC session was closed. ■

Vigour Committee

By Alison Powell,
Vigour Committee Chair

Much of the work of the Vigour Committee in the last year has involved the establishment and organisation of working groups and preparation for a proficiency test. The working groups are focusing on three areas of test development, validation, extension of the species base for validated tests and the development of new tests.

The validation of the Controlled Deterioration test is being carried out with seven participating laboratories. Preliminary tests have been carried out involving laboratories who are less experienced in completing the test before the main work of the group begins. Four working groups are examining the extension of the species base for the validated vigour tests. Three groups are focussing on the application of the Conductivity test to other species, namely *Brassica napus* subsp *oleifera* (seven participating laboratories), *Phaseolus vulgaris* (six laboratories) and *Glycine max*.

Seeds of *B. napus* subsp *oleifera* and *P. vulgaris* have been sent to the participating laboratories and some results have already been returned. We continue to try to source suitable soyabean seed within Europe for use by the third working group. Work by the fourth working group to examine the extension of the Accelerated Ageing test to maize, has not yet started due to changes within the laboratory of the group leader.

The development of new vigour tests has involved work on tetrazolium in wheat in collaboration with the Tetrazolium Committee (reported in STI) and work on the application of assessments of the rate of germination in vigour evaluation of rice, onion and maize is currently in progress.

In addition to the activities of the working groups, the second proficiency test for the Conductivity test for *Pisum sativum* has been organised with the ISTA Accreditation Department for October 2005. ■

Seed Health Committee

By Valerie Cockerell,
Seed Health Committee Chair

The ISTA Seed Health Committee has a very challenging two years ahead of them. Not only have we committed to maintaining and moving forward with the 'ISTA Seed Health Method Validation Programme (SH-MVP)', we also want to push forward with a comprehensive 'Seed Health Handbook' and a Seed Health Proficiency Test Programme. Both initiatives aim to complement Chapter 7 of the ISTA Rules with the latter moving us in the right direction to meet the needs of the ISTA Accreditation Programme.

The SHC-Method Validation Programme

The SHC-MVP had one successful submission last year from ISHI-Veg. A selective media method for *Xanthomonas hortorum* pv *carotae* was approved by the SHC in January 2005 after successful reviews of the Method Validation Report and Method Sheet. The method was proposed as Method 7-020 in the Annex to Chapter 7, "International Rules for Seed Testing" and was accepted by the ISTA Membership at their Ordinary Meeting in Bangkok, April 2005. Method 7-020 will be sent out with the 2006 updates and become effective from the January 1, 2006. The method will also be available to download from the ISTA website from November 2005.

Three SHC working groups expect to submit method proposals to the SHC-MVP this year: *Xanthomonas axanopodis* pv *phaseoli* on *Phaseolus*; *Microdochium nivale* on *Triticum* spp.; and *Leptosphaeria maculans* on *Brassica*.

Subject to timely submission, review and approval by the SHC, it is hoped these three methods will be proposed for inclusion in the Annex to Chapter 7 at the ISTA Ordinary Meeting in Zurich, June 2006.

Seed Health Testing Handbook

The Seed Health Handbook was discussed at an SHC Meeting held prior to the ISTA-SHC Seed Health Symposium, in Angers May 2005. The Meeting clarified that the Handbook was to be aimed at two different groups:

1. The bench analyst, for training in basic techniques and for the provision of useful information and knowledge on issues surrounding seed health testing; and
2. The laboratory manager, as a reference source for the provision of information that would allow the laboratory to help meet the requirements and requests of customers e.g. sampling and sample sizes, seed storage, QA etc.

The proposed chapter outline for the Handbook is given in Table 1. At present we are working with the detailed outlines of each chapter that have been produced by each contributor to ensure there is no significant overlap between chapters. The aim is to have a first draft of the Handbook by May 31, 2006 for discussion at the 2006 Ordinary Meeting in Zurich. A final draft should be available by the March 31, 2007, for discussion at the ISTA Congress in Brazil.

Proficiency Testing for Seed Health

The SHC recognises the importance of having an effective proficiency test programme for seed health and it is my task to ensure that such a programme begins as soon as possible. However, it is important to focus on what the requirements of such a programme are within ISTA and how we can best accommodate the needs of the ISTA Accreditation Standard and ISTA Member Laboratories. The ISTA Rules for Seed Testing form an integral part of the ISTA Accreditation Standard, as they constitute the methods, which must be used for the issuance of ISTA Certificates by accredited seed testing laboratories. Accreditation can only be granted for methods stated in the ISTA Rules. A proficiency testing programme for seed health must allow laboratories to:

1. Extend their scope by showing competence in a particular test
2. Monitor their performance in a particular test

At present the Annexe to Chapter 7 Seed Health describes 19 methods. A survey of ISTA laboratories (Accredited and Member) in 2003 showed a total of 51 laboratories were either accredited for a selection of methods or wished to extend their scope to include further methods. There was a requirement/interest for proficiency testing in all methods (figure 1). This gives us a degree of complexity that perhaps does not exist for other

technical areas and this will increase as more methods are introduced. It therefore is important to have a procedure that defines how we can best meet the requirements of the ISTA standard and the resources that are required. At present a report is being produced and this will be circulated within the SHC before being circulated more widely within ISTA. It is anticipated that an agreed programme will be initiated in 2006.

I have highlighted three of the areas that have priority within our programme over the next 2 years. There are many other activities going on which either complement or are in addition to the priority areas and they are highlighted in Table 2.

To finish with I would like to congratulate the organising committee of the 5th ISTA-SHC Symposium for a most successful symposium, enjoyed by over 140 participants from 41 countries. A report from the symposium can be found on page 50.

Table 1 Proposed Chapters for the Seed Health Testing Handbook

Chapter Title
Introduction
Sampling
Working Sample/Sub-sample sizes
Basic Techniques
Fungal Testing
Bacterial testing
Viral testing
Seed Pests
Immunology
Molecular Biology
Quality Assurance
Uncertainty of Measurement
Seed Storage
Seed treatment
Appendices
• Example Validation Study
• QA Guidelines for Seed
• Health Laboratories
• Glossary
• References

Table 2 Seed Health Committee Working Programme

Topic/Subject Area	Leader
Method Validation: <i>Pyrenophora</i> spp./ <i>Hordeum vulgare</i> Working Group (WG) <i>Aphelenchoides besseyi</i> / <i>Oryza sativa</i> WG SqMV/ <i>Cucumis melo</i> WG	K Sperlingsson, Sweden P Remeeus, Netherlands H Koenradt, Netherlands
Method Development/Review: <i>Ustilago nuda</i> / <i>Hordeum vulgare</i> <i>Sclerotinia sclerotiorum</i> / <i>Phaseolus</i> Molecular tests for viruses in tomato & pepper	V Cockerell, Scotland J Machado, Brazil C Omero, Israel
Molecular Testing WG	K Ophelkeller, Australia
Amalgamation of Chapter 7 with Annexe to Chapter 7	V Cockerell
Review of Methods in Annexe to Chapter 7- Questionnaire	H Koenradt
Survey of ISTA Member Laboratories (Seed Health Methods: Validation requirements)	H Hansen, Denmark
Seed Health Training Course: Philippines	H Hansen/H Koenradt/V Cockerell/APSA
ISTA-SHC Symposium 2008	T Aveling

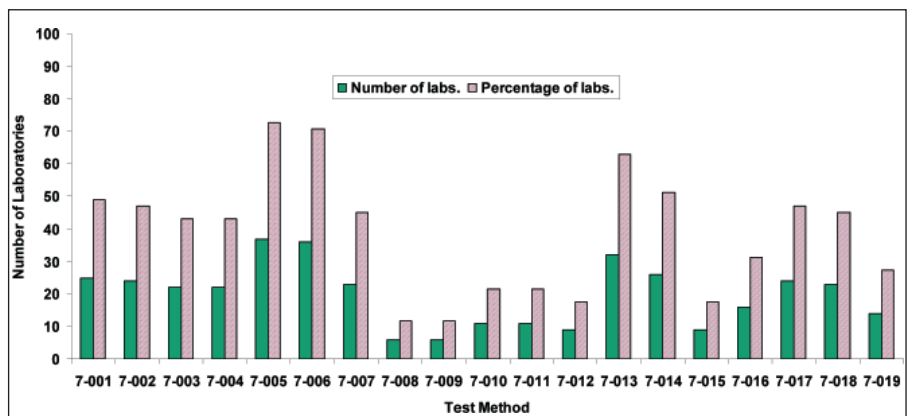


Figure 1 Number of ISTA laboratories accredited for or requiring accreditation for Methods in Annex to Chapter 7 ISTA Rules (2003).

Germination Committee

By Ronald Don,
Germination Committee Chair

The main aims of the Germination Committee are:

- To update and contribute to improve the test methods in application of the increasing knowledge, the technical and technological progresses or the regulations requests as ISTA standard of accreditation, ISO 17025
- To improve the rules in Chapter 5 of the ISTA Rules
- To introduce methods for species (i.e. tropical and sub-tropical) not covered by the rules
- To share the knowledge among laboratories and seed testing people to facilitate the exchange and improve the standardisation
- To create and improve training material e.g. Handbooks

Since the 2004 ISTA Congress in Budapest the main areas of activity have related to:

1. Clarifying areas of the ISTA Rules relating to the reporting of ungerminated seed and tolerance checks to be carried out on germination tests.

1a) Ungerminated Seed

In the 2006 ISTA Rules ambiguity relating to the classification and reporting of fresh seed is removed. If more than 5% ungerminated seeds are found at the end of the germination test a method is required to check whether they are fresh or dead. Whatever method is used for the check, the subsequent classification should be into fresh or dead.

1b) Application of Tolerances

ISTA auditors have stated that the Rule 5.8.A - "Calculation and expression of results – Tolerances" is not clear. The Germination Committee discussed this and decided that the statement: "Tolerances are to be applied at least on the category of normal seedlings" should be added to the 2006 ISTA Rules to make it clear that only the number of normally germinated seedlings in the replicates need to be checked using tolerances.

2. Introduction of Mixed Growing Media (Compost) as a Primary substrate for the germination of Sunflower (*Helianthus annuus*).

At the Budapest Congress in 2004, details of the results of a comparative study on germination substrates for sunflower involving 10 ISTA and 6 AOSA laboratories were given by working group leader Sylvie Ducournau. The ISTA Method Validation Program was followed throughout this comparative test. The results have been analysed and a report "Method Validation Report of Investigation into substrate use for Sunflower seed Germination" was published by ISTA.

The main findings were that Sunflower germination results were:

- More repeatable and reproducible in compost (figure 1a and 1b)
- Compost results in the achievement of the maximum germination of sunflower (figure 2)

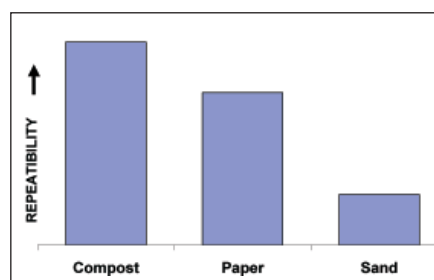


Figure 1a. Repeatability of sunflower results

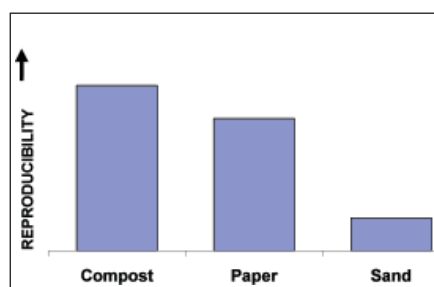


Figure 1b. Reproducibility of sunflower results

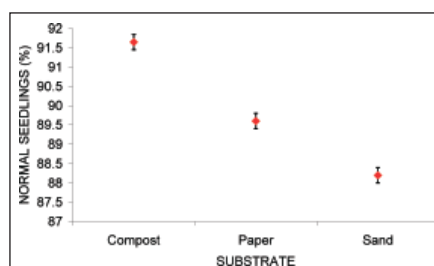


Figure 2. Percentage of normal seedlings

As a result of this study the 2006 ISTA Rules will include compost as a primary substrate for Sunflower germination.

3. Revision of Substrate Definitions in line with European Standards definitions for Growing Media.

The addition of compost as a primary substrate made it necessary to review the section within the ISTA Rules dealing with substrates. It was decided that better definitions based on International Standards were required.

New Germination Media Definitions in the 2006 ISTA Rules:

"Growing Media" as a generic term for all substrates – paper, sand and other media such as the organic mixtures of peat, sand, perlite, etc. Mixtures of peat, sand, perlite, etc. are referred to as "Organic Growing Media" rather than Compost since the meaning of the term compost is difficult to translate in some languages.

Germination Media Parameters:

General definitions are given for the main parameters to be taken into account for all the media. The parameters dealt with are:

- Water retention, pH, Conductivity, and Cleanliness and Innocuity.

According to the soil scientists, the same parameters can be applied to all media and it should be easier to fulfil these requirements for the Organic Growing Media than it is for the pure Sand.

4. Revision of the ISTA Handbook on Seedling Evaluation to reflect Quality Assurance requirements

To assist laboratories in ensuring that the germination media they use in germination tests meet the specifications given in the ISTA Rules for the above germination media parameters, it was agreed that demonstration Standard Operating Procedures (SOP) should be produced and included in the Handbook and published in Seed Testing International. The SOPs have been drafted and it is hoped they will be finalised and published before the 2006 ISTA Ordinary Meeting. All the SOPs will contain flow charts with photographs.

5. Introduction of New Species

Activity in this area was limited to a comparative test involving seed of *Crambe abyssinica*. The results of this comparative test uncovered an unusual reaction to dormancy breaking treatment. As shown in Figure 3 cold pre-treatments induced dormancy.

A report of the results of this comparative test will be presented by Günter Müller, the leader of this comparative test, in the next issue of Seed Testing International with the recommendation that KNO₃ and/or an alternating temperature regime should be used when germinating *Crambe abyssinica*. Cold pre-treatments should not be used for this species.

6. The use of KNO₃ for dormancy breaking in temperate cereals.

For the second year a working group of the committee led by Günter Müller investigated the use of different dormancy breaking techniques for freshly harvested *Hordeum vulgare* (Barley) seed.

The trial in 2003 had been disappointing since levels of dormancy in the trial samples had been extremely low and transient in nature. In 2004 dormancy levels were much higher breaking dormancy proved challenging to the participating laboratories.

A range of dormancy breaking techniques were investigated:

- Control without dormancy breaking treatment
- 3 days pre-chilling
- 5 days pre-chilling
- Gibberellic Acid (GA₃) (0.1%)
- GA₃ (0.1%) and 3 days pre-chilling
- GA₃ (0.1%) and 5 days pre-chilling
- KNO₃ (0.2%)
- KNO₃ (0.2%) and 3 days pre-chilling
- KNO₃ (0.2%) and 5 days pre-chilling

When cold pre-treatments, GA₃ and KNO₃ were used alone levels of dormant seed remaining at the end of the germination test were greater than 5% on a combination of GA₃ or KNO₃ with a cold pre-treatment was required to reduce the levels of fresh seed at the end of the test to less than 5% (Figure 4).

At the present time KNO₃ is not included in the ISTA Rules as a dormancy breaking pre-treatment for temperate cereals and Günter

Dormancy Treatment	Germination Temperature							
	20°C				20°- 30°C Alternating			
	%G	%Ab	%Fr	%D	%G	%Ab	%Fr	%D
Nil	73	4	13	10	86	5	2	7
KNO ₃	82	6	3	9	88	4	1	7
5 Day Fridge	21	2	63	14	45	4	38	13

Figure 3. Overall results of a comparative test investigating the germination of *Crambe abyssinica*

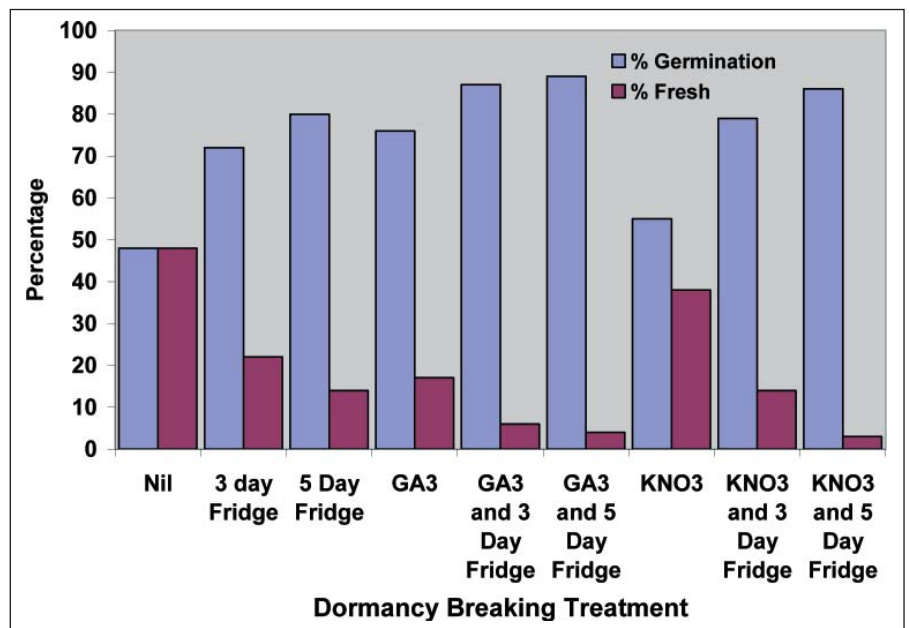


Figure 4. Overall result of the 2004 dormancy breaking comparative test.

Müller will present a report of the trial to the next Ordinary Meeting with the recommendation that KNO₃ is added to the arsenal of dormancy breaking treatments that can be used for temperate cereals.

6. Future work of the Committee

The Germination Committee has a full working program and examples of some of the areas of work that will be progressed over the coming year are listed below:

ISTA Handbook on Seedling Evaluation

Work by the whole committee on the revision of the Handbook will continue. It is hoped that a demonstration SOP on the measurement of temperature can be finalised in the coming year. Anny van Pijlen and Gillian McLaren will be continuing their work on the evaluation of new codification used in the 2004 Handbook and whether it should be used in the Rules.

Comparative trials

Sylvie Ducournau and Loren Wiesner will

continue their work on Sunflower germination and organise a comparative trial, involving ISTA and AOSA laboratories, investigating the effect of different germination temperatures.

A comparative trial has been organised by Jeremy Smith, from a private company laboratory in the UK, to investigate the effect of the germination temperature on physiological necrosis in *Lactuca sativa* (lettuce) with the aim of having 15°C added to the Rules. Tim Gutormson, from Mid-West Seed Services in the USA is considering organising a comparative trial on the use of a combination of creped cellulose paper and sand for the germination of a range of different species.

Introduction and improvement of germination methods for tropical and sub-tropical species

Progress in this area has been slow. However with three committee members actively working on this (Doris Groth, Lea Mazor and Pamela Joan Strauss) it is hoped that significant developments can be reported soon. ■

Early Questions on Implementing EU Directive 1999/105/EC in Tree Seed Testing

By **Zdenka Prochazkova**, ISTA Forest Tree and Shrub Committee Chair

Forestry and Game Management, Research Institute, Research, Station Uherske Hradiste, 686 04 Kunovice, Czech Republic, prochazkova@vullmuh.cz

The membership of the FTS are at an early stage of collating information, reactions, thoughts and questions on the new EU Directive (1999/105/EC) on the marketing of Forest Reproductive Material. There are already at least three fundamental questions under debate.

Article 2, para k states that **“Official body: an authority may delegate the tasks in this Directive provided that such person, and its members ... has no personal interest in the outcome of the measures it takes.”**

This would appear to imply that an independent, private seed testing station could be licensed by the government of an EU country to test tree seeds - because it would have ‘no personal interest in the outcome of the measures it takes’. But it is less clear whether a private seed testing laboratory could be part of a commercial seed trading company - be-

cause the seed company would obviously have a financial interest in the outcome of tests whether on its own or others samples.

Article 14, para 2 states that **“...seeds shall be assessed, as far as possible, by internationally accepted techniques”**. To the best of our knowledge, most EU countries continue to interpret this phrase to mean the ISTA Rules, but it has come to our attention that e.g. the UK has published a Guideline on the new Directive which does not contain any sampling instructions and does not describe ISTA methods.

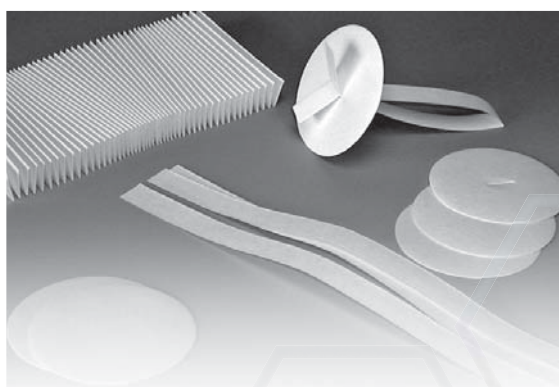
Annex VII, Part A, para 1 states that **“Fruit and seed lots of the species listed in Annex 1 may not be marketed unless the fruit or seed lot reaches a minimum species purity level of 99%”**. The most literal interpretation of this is that a seedlot containing less than 99% by weight of pure seed would fail

to meet the standard. However, this would mean that a seedlot with 1.1% of impurities whether they are made up of either ‘other seed’, ‘inert matter’ or a mixture of the two will fail. As a specific example, with this interpretation a seedlot with 98.9% pure seed, 1.1% inert matter and 0.0% other seed would fail the new definition.

This is certainly a major shift from the ‘old’ EU Directive (71/161/EEC) where any percentage of ‘inert matter’ was allowable, and the object was to avoid the presence of seeds of other tree species within a seedlot. Hence a table at Annex 1 used to clearly stipulate that there was a maximum percentage by weight of seeds of other tree species which would be permitted in any seedlot.

The FTS is investigating how different EU countries are interpreting these and other anomalies. ■

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Non-Orthodox Seed Moisture Testing Survey - Responses

By Craig McGill, ISTA Moisture Committee Member

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Introduction

At the 2004 ISTA Congress in Budapest the Seed Moisture Committee decided to survey ISTA Laboratories to determine:

1. the extent to which non-orthodox seed is tested for moisture content and
2. if there was a demand for specific non-orthodox species to be brought into Chapter 9: Determination of Moisture Content of the International Rules for Seed Testing.

For the purposes of the survey non-orthodox seed was defined as seed that loses viability when desiccated to a moisture content below 10-12%, or does not survive storage at these low seed moisture contents and low temperature (5-15°C). This definition was adapted from Hong, *et al.*, 1998.

Table 9B (species for which the low constant temperature oven method shall be used) in Chapter 9 includes “All tree species” and therefore already includes species that would be defined as non-orthodox using the definition above. However, not all non-orthodox species are tree species and there are no non-orthodox species specifically mentioned in Tables 9A, 9B or 9C of the International Rules for Seed Testing.

The survey was distributed to 155 ISTA Laboratories. Responses were received from 39% of the laboratories surveyed (60 laboratories). The response from the European laboratories (38 out of the 60 laboratories), at 64% of the total number of laboratories that responded, was higher than may have been expected from the percentage of ISTA Member Laboratories (53%) that are in Europe (Table 1). Similarly, the number of South American, and Asian and Pacific laboratories that responded was lower than may have been expected from the percentage of member laboratories in these regions.

Survey Responses

The first question in the survey asked wheth-

Table 1: Percentage of laboratories that responded to the survey separated by region compared to the percentage of ISTA member laboratories in each region.

Region	Percentage (%) of laboratories separated by region (number of laboratories responding in brackets)	Regional distribution of ISTA member laboratories in 2004 (%) ^a
Europe	64 (38)	53
North America	8 (5)	6
South America	3 (2)	7
Africa	7 (4)	9
Asia & Pacific ^b	18 (11)	25
Total	100 (60)	100

^a Source: International Seed Testing Association. ISTA Online, Membership Services, Membership Profile: <http://www.seedtest.org/en/content---1--1002--256.html>.

^b Asia and Pacific laboratories responding includes Eastern Asia (7%), Central Asia (3%), Western Asia (3%) and Australasia (5%).

Table 2: Non-orthodox species tested for seed moisture content and the methodology used.

Species	Temperature used (°C)	Drying time (hours)	Number or weight of seeds per replicate	Is the seed ground, tested intact or as individual components?
<i>Acer pseudoplatanus</i>	103	17	10 g	Cut off wing
<i>Acer pseudoplatanus</i>	103	17	5 g	Whole seed intact
<i>Aesculus hippocastanum</i>	103	17	20 g	Cut into small pieces
<i>Araucaria angustifolia</i>	103	17	50 g	Whole seed
<i>Castanea sativa</i>	103	17	5 seeds	Whole seed ground
<i>Castanea sativa</i>	103	17	20 g	Cut into small pieces
<i>Quercus petraea</i>	103	17	5 seeds	Whole seed ground
<i>Quercus petraea</i>	103	17	20 g	Cut into small pieces
<i>Quercus robur</i>	103	17	5 seeds	Whole seed ground
<i>Quercus robur</i>	103	17	20 g	Cut into small pieces
<i>Quercus rubra</i>	103	17	5 seeds	Whole seed ground
<i>Quercus rubra</i>	103	17	20 g	Cut into small pieces

er the laboratory tested non-orthodox seed for moisture content. Of the 60 laboratories that replied 54 (90%) did not test non-orthodox seed for moisture content. The overwhelming reason for this was there was no demand for testing non-orthodox seed (47 out of 54 laboratories). Two other laboratories did not test for seed moisture and one had non-orthodox seed tested elsewhere. Four laboratories did not indicate why they did not test non-orthodox seed. Several laboratories gave other reasons, in addition to no demand, for not testing non-orthodox seed. These were the methodology was not available (three laboratories) or the species they wished to test were not in Chapter 9 of the International Rules for Seed Testing (two laboratories).

Six laboratories (10%) indicated that they did test non-orthodox seed for moisture content. The laboratories were in Europe (5) and South America (1). There was a range of species tested, but, all were tree seeds. These included *Acer pseudoplatanus*, *Aesculus hippocastanum*, *Araucaria angustifolia*, *Castanea sativa*, *Quercus petraea*, *Quercus robur* and *Quercus rubra*. All laboratories used the low constant temperature method ($103 \pm 2^\circ\text{C}$ for 17 ± 1 hours) and carried out the tests in duplicate as prescribed in Chapter 9 of the International Rules for Seed Testing. Chapter 9 also allows for grinding (9.1.5.4 *Grinding*) or cutting (9.1.5.5 *Cutting*) of large (less than 5000 seeds per kilogram) tree seeds and different laboratories choose to either grind or cut the seed (Table 2).

In addition to choosing to either cut or grind the seed the other differences between laboratories was whether they used a number or weight of seeds for the test and, for one species (*Acer pseudoplatanus*), the weight of seed used (Table 2). Irrespective of whether the laboratories cut or ground the seed or used a number or weight of seed for the test all laboratories reported that the seed moisture contents determined for *Castanea sativa*, *Quercus petraea*, *Quercus robur* and *Quercus rubra* were in tolerance. Only one laboratory reported whether *Acer pseudoplatanus* (5 g of sample used per replicate) was in tolerance for the test, which it was. Similarly, the seed moisture test results for *Aesculus hippocastanum* were also in tolerance.

One comment made in the survey responses was that because many non-orthodox seeds are large compared to orthodox seeds a mini-

mum number of seeds, rather than a weight of seeds, may be a more accurate way of assessing seed moisture in non-orthodox species. The issue of selecting working sample sizes for determining seed moisture content for tropical tree seeds has also been raised in the ISTA Tropical and Sub-tropical Tree and Shrub Seed Handbook (1998).

Other comments in the survey responses were:

1. Cutting rather than grinding the seed is preferable as grinding encourages water loss.
2. Should the moisture content determination on non-orthodox seed be on clean, firm and "apparently alive" seed?

In answer to the question which three non-orthodox species should be given highest priority for inclusion in Chapter 9, again, all the species listed were tree species.

Conclusions

The response to the survey was low with only 39% of laboratories surveyed responding. Of these only 10% indicated they tested seed of non-orthodox species for moisture content. The non-response of 61% of member laboratories may indicate that few of these laboratories test non-orthodox seed for moisture content. If so, the number of laboratories testing non-orthodox seed for moisture content may be less than 10%.

The conclusions, based on the laboratories that responded, are:

1. For most laboratories there is no demand for testing the moisture content of seed of non-orthodox species.
2. Where there is a demand for determining the moisture of non-orthodox seed, all the species tested or that the laboratories had an interest in testing, were tree species.
3. Three issues were raised in relation to testing non-orthodox seed (tree) for moisture content. Should a minimum number of seeds rather than weight of seeds by specified for testing, should seed be cut rather than ground and should only "healthy" seed be tested for moisture?

References

- Hong, T.D., Linington, S. and Ellis, R.H. 1998. Compendium of Information on Seed Storage Behaviour. Volume 1 A-H. Royal Botanic Gardens, Kew.
- Poulsen, K.M., Parratt M.J. and Gosling P.G. 1998. Tropical and Sub-tropical Tree and Shrub Seed Handbook. International Seed Testing Association, Zurich. ■

International Rules for Seed Testing - Edition 2006

Available Now!



Complete set in two parts (Rules & Annexes to Chapter 7, including Amendments 2006)

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 standardised definitions and methods to be used in, for example, sampling, testing and reporting on seed lots for transactions in international trade. The ISTA Rules are also a useful reference guide to germination conditions and methods for over 1000 species of seeds.

Valid as per January 1st, 2006

PRICE:

Complete Rules 2006	CHF 379.00
Amendments 2006*	CHF 103.00

* The Rules Amendments were adopted at the Ordinary Meeting held in Bangkok, Thailand, April 27, 2005. Only the changed pages are included in this package. The chapters and pages to be replaced are clearly specified in a table in the preface.

ISTA Rules Latest

By **Steve Jones**, ISTA Rules Committee Chair and **Bettina Kahlert**, ISTA Technical Committee Administration

At the Bangkok meeting the membership voted through the merged and updated versions of Chapters 2 and 8. It was also agreed to merge and review the other Chapters by 2008. The aim is to merge the Rules and Annexes to avoid duplication and improve clarity. It is also an opportunity to adopt a generic style for the chapters as well as to check, review and improve the text.

Each Chapter will have:

- Object
- Definitions
- General principles
- Apparatus (Equipment)
- Procedures (including retesting)
- Calculation and expression of results

Followed by any:

- Tables, maintaining current numbers, e.g. Table 2A, 5A
- Detailed methods, e.g. 7-001a, 7-001b, 8.6.A.1, 8.6.A.2
- Tolerance tables

A scrutiny team of ex-ISTA Executive Committee Members is being used to verify when 'editorial only' changes have been made that do not require a vote at the annual meetings. Any major changes, amendments or alterations will still require a voting proposal.

On the right are the proposed timetable and summary of changes. If you need any further information about the Rules mergers or have suggestions for Rules proposals please contact

Steve Jones at steve.jones@niab.com or **Bettina Kahlert** at the ISTA Secretariat at bettina.kahlert@ista.ch

Table 1 Actions, allocation of chapters and timetable for actions

OLD Chapter	Actions	Committee responsible for progress	NEW Chapter	Target voting meeting
-	-	Rules & Executive	Introduction and methods for Rules Changes	2008
1: Introduction	Editorial and revision, separate out and no longer a Chapter	Rules & Accreditation Department	1: Certificates	2007
2: Sampling	Editorial and revision	Bulking and Sampling	2: Sampling	Completed in 2005
3: Purity	Editorial and revision	Purity	3: Purity	2007
4: Other Seeds by Number	No changes Paper colour only	Rules	4: Other Seeds by Number	2006
5: Germination	Editorial and revision	Germination	5: Germination	2007
6: Tetrazolium	Editorial and revision	Tetrazolium	6: Tetrazolium	2006
7: Seed Health	Editorial only	Seed Health	7: Seed Health	2006
8: Verification of Species & Cultivars	Editorial and revision	Variety	8: Verification of Species & Cultivars	Completed in 2005
9: Moisture Content	Editorial and revision	Moisture	9: Moisture Content	2007
10: Weight Determination	Editorial only	Rules	10: Weight Determination	2006
11: Coated seed	Revision and split between Chapters 2, 3, 4 & 5	Bulking and Sampling, Purity and Germination	11: Coated Seed	2007
12: Excised embryo	Editorial only	Forest Trees and Shrubs	12: Excised embryo	2006
13: Weighed replicate	Editorial only	Germination	13: Weighed replicate	2007
14: X-ray	No changes Paper colour only	Rules	14: X-ray	2006
15: Seed vigour	Editorial only	Vigour	15: Seed vigour	2006
16: Tolerances	Editorial only	Rules	16: Tolerances	2008
17: Certificates	Move to Chapter 1. Editorial and revision	Rules	1: Certificates	2008
Appendix A: Size grading	Becomes Chapter 17. Editorial only	Rules	17: Size grading	2008
Appendix B: Bulk containers	Becomes Chapter 18. Editorial only	Rules	18: Bulk containers	2008
Appendix C: Seed cleaning	Removed from Rules	Rules	-	Completed in 2004
Appendix D: Heterogeneity	Moved to Chapter 2	Bulking and Sampling	-	Completed in 2005

Germination Rounding Procedure

By **Ronald Don**, ISTA Germination Committee Chair

Official Seed Testing Station, for Scotland, 82, Craigs Road, East Craigs, Edinburgh EH12 8NJ, United Kingdom, ronald.don@sasa.gsi.gov.uk



Rounding the Normal Seedling Result

The normal seedlings percentage is rounded to the nearest whole number.

- XX.0 or XX.25 are rounded to XX for instance 88.25 to 88
- XX.5 or XX.75 are rounded to XX+1 for instance 88.5 to 89 and 88.75 to 89.

Rounding all Components in a Germination Test Result

The rounding procedure when all components have to be reported (normal and abnormal seedlings, hard, fresh and dead seeds) is carried out in 4 steps.

Step 1- Round the normal seedling percentage and add this to the integer component of all the other values. If the total is 100 report the values. If the total is less than 100 proceed to step 2.

Step 2- Round the value with the greatest decimal part to the upper whole number. If values have the same decimal parts then rounding up is only carried out on one according to the priority:
abnormal seedlings are rounded up before hard seeds which are rounded up before fresh seeds which are rounded up before dead seeds.

Step 3- Reduce all values to their integer component and total the values. If the total is 100 report the values obtained. If the total is less than 100 proceed to step 4

Step 4- Repeat steps 2 and 3. After the repeat the total will be 100 and the values obtained are reported.

In example 1 rounding the normal seedlings and adding this to the integer parts of the other components of the germination test results in a total of 100. The values obtained once completing step 1 are reported therefore.

In example 2 after rounding the normal seeds and adding this to the integer values of all other components a value of 98 is obtained (Step 1). The other components have therefore to be rounded. The component with the great-

Example 1

	Normal Seedlings	Abnormal Seedlings	Hard Seeds	Fresh Seeds	Dead Seeds	Total
Values	90.5	2.5	2	4	1	100
Step 1	91	2	2	4	1	100

Example 2

	Normal Seedlings	Abnormal Seedlings	Hard Seeds	Fresh Seeds	Dead Seeds	Total
Values	90.25	2.5	2.5	4	0.75	100
Step 1	90	2	2	4	0	98
	90	2.5	2.5	4	0.75	
Step 2	90	2.5	2.5	4	1	
Step 3	90	2	2	4	1	99
	90	2.5	2.5	4	1	
Step 4 (Repeat of Step 2)	90	3	2.5	4	1	
Step 4 (Repeat of Step 3)	90	3	2	4	1	100

Example 3

	Normal Seedlings	Abnormal Seedlings	Hard Seeds	Fresh Seeds	Dead Seeds	Total
Values	90.5	2.5	2.5	3.75	0.75	100
Step 1	91	2	2	3	0	98
	91	2.5	2.5	3.75	0.75	
Step 2	91	2.5	2.5	4	0.75	
Step 3	91	2	2	4	0	99
	91	2.5	2.5	4	0.75	
Step 4 (Repeat of Step 2)	91	2.5	2.5	4	1	
Step 4 (Repeat of Step 3)	91	2	2	4	1	100

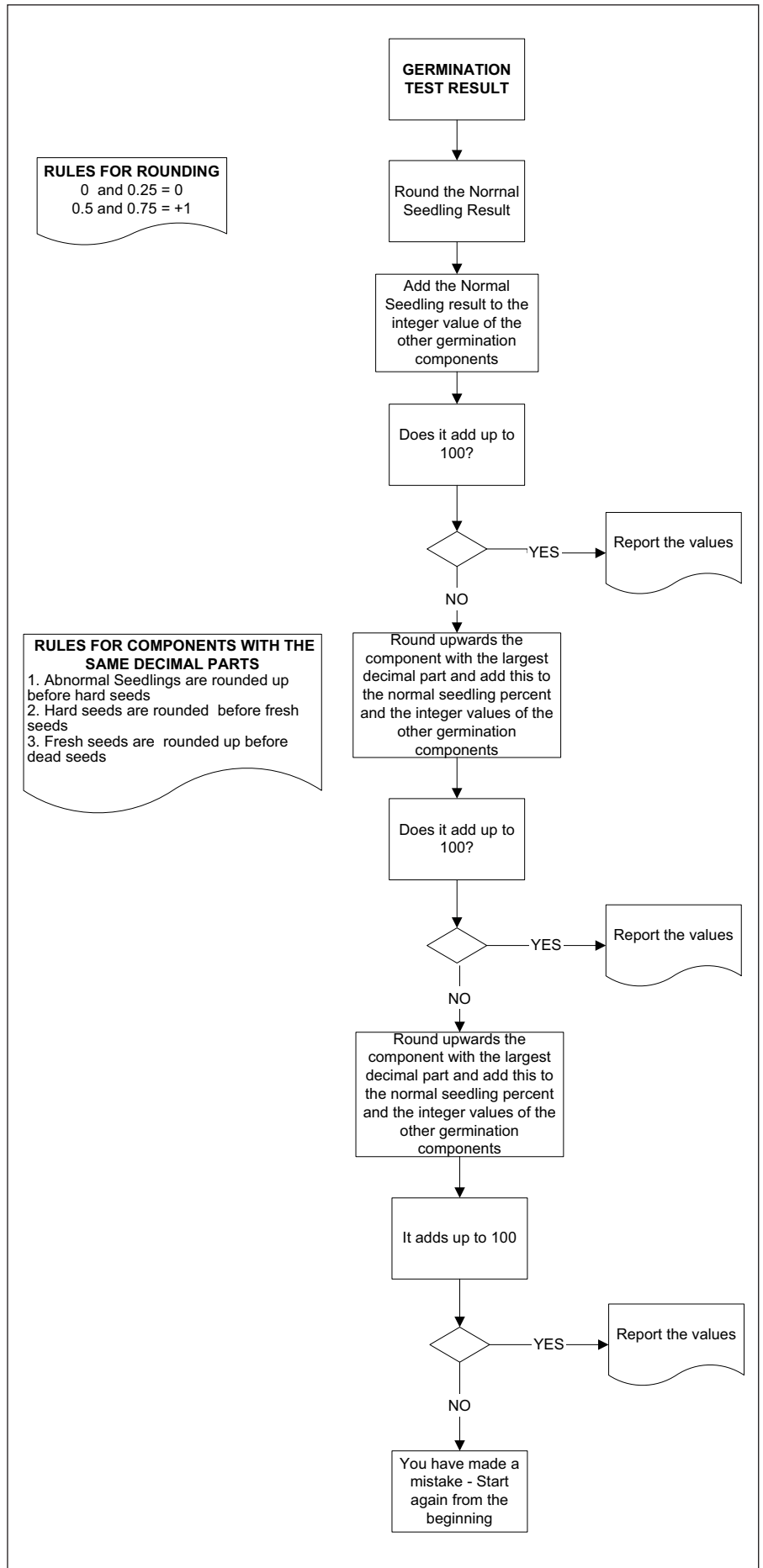
est decimal part is rounded first. The dead seeds have a decimal parts of 0.75 which is greater than the decimal parts of the other components (Step 2). After rounding the dead seed and adding this to the integer parts of all the other components a value of 99 is obtained (Step 3). Rounding is continued and the component with the greatest decimal part is rounded. Both abnormal seedlings and hard seeds have decimal parts of 0.5 and abnormal seedlings is given the priority over hard seeds (Step 4). The abnormal seedlings are rounded upwards. After rounding the abnormal seedlings and adding them to the integer parts of all the other components a value of 100 is obtained (Step 4). The results obtained are reported.

In example 3 after rounding the normal seeds and adding this to the integer values of all other components a value of 98 is obtained (Step 1). The other components have therefore to be rounded. The component with the greatest decimal part is rounded first. Both fresh and dead seeds have decimal parts of 0.75 and fresh seed is given the priority over dead seed (Step 2). After rounding the fresh seed and adding this to the integer parts of all the other components a value of 99 is obtained (Step 3). Rounding is continued and the component with the greatest decimal part is rounded. The dead seed is rounded upwards. (It has a decimal part of 0.75 which is greater than the decimal part of abnormal seedlings and hard seeds) After rounding the dead seed and adding this to the integer parts of all the other components a value of 100 is obtained (Step 4). The results obtained are reported.

A flow chart of the procedures involved is shown on the right.

Copies of a computer program that will carry out the calculations for you automatically are available on request from Joël Léchappé (Joel.lechappe@geves.fr)

Please Note: For multigerm seed units only one normal seedling per unit is counted to calculate the result. On request, the number of units producing one, two or more than two normal seedlings may also be reported, expressing the results as a percentage of the total number of units which have produced at least one normal seedling or alternatively the total number of seedlings produced by a given number of seed units. ■



FAO/ISTA Workshop on Seed Quality Testing and Evaluation

– Strengthening Regional Co-operation

New Delhi, India, April 24 - 30, 2005

By **Sushil Pandey**

Division of Seed Science & Technology, IARI, New Delhi, India

The Seeds and Plant Genetic Resources Service of Food and Agriculture Organization (FAO) along with the International Seed Testing Association (ISTA) and the Indian Council for Agricultural Research (ICAR) of India organized a Workshop on Seed Quality Testing and Evaluation for selected Asian countries. The main objective of the course was to provide hands-on experience to technicians in seed testing technologies and strengthen cooperation and information exchange in the field of seed testing in the region. The workshop was held at Division of Seed Science & Technology, Indian Agricultural Research Institute, New Delhi, India, from 24th April to 30th April 2005.

The course attracted a total of 36 nominations from various countries like India, Iran, Pakistan, Nepal, Bangladesh, Afghanistan, Myanmar, Uzbekistan and Sri Lanka. 21 participants from 9 countries were selected finally for this workshop. Out of the total 21 participants, 10 were from private sector and 11 were from government sector, which shows a positive balance between the two sectors.

After the brief inaugural session on 24th April, 2005, the training course started with lectures and practical exercises in Seed Testing. The lectures were scheduled in two phases, with the first three days taken by Indian resource persons and later three days taken by ISTA resource persons. There were a total of 40 lectures; of which 15 were practicals and the rest 25 were theoretical. The course covered different aspects of seed testing viz. seed sampling, purity estimation, germination and seedling evaluation, tetrazolium testing, moisture estimation, GMO detection, seed health testing and biochemical and molecular techniques for cultivar purity testing. Daily sessions were comprised of laboratory exercises interspersed with oral presentations on various topics pertaining to seed quality testing.

The practical materials represented the main field crops of the region namely, rice, maize, soybean and tomato. In consultation with ISTA, seed samples of different quality were used in the training, which lead to interesting interpretation and discussions. The participants made full use of the Indian and ISTA experts to discuss a wide range of topics and problems relating to their daily work. The programme provided plenty of opportunities to practice seed testing techniques and every participant went home with new knowledge that can be introduced and used at home.

All information namely, power-point presentations, lecture write-ups and any other desirable literature as desired by the participants were made available to every participant on CD as well as the printed version.

The formal and informal feedback on the workshop was satisfying. The participants went back to their home laboratories with the assurance that they will put seed testing procedures into practice more efficiently. In the final discussions, requests were made by the participants for further courses of this kind. Most participants were of the view that the duration of the course was too short and should have been extended over a period of two weeks.

Our thanks are due to Dr. Kakoli Ghosh (Agriculture Officer for capacity building from Seed and Plant Genetic Resources Ser-

vices of the Agriculture Department, FAO), Dr. Michael Muschick (Secretary General, ISTA) and Ms. Branislava Opra (ISTA Membership Department), offering valuable information and suggestions for this workshop. Thanks are also due to Prof. Norbert Leist and Ms. Andrea Jonitz (ISTA resource persons) for taking special pains to reach New Delhi for the training programme in spite of their other engagements, and also to plan the practicals effectively. Special thanks are due to Dr. Michael Larinde (Agricultural Officer, Seed Production, Seed and Plant Genetic Resources Services, Plant Production and Protection Division, FAO) who has been so helpful in the conduct of this training right from his efforts in selection of participants. Dr. Larinde reached New Delhi on 24th April, 2005 and was present for the whole duration of the course and attended all the sessions. For these untiring efforts for the success of the course, the organizers are grateful to him.

The proceedings of the workshop comprising of the lecture notes on various topics can be made available upon request on the email id: sushilpandey_iari@rediffmail.com ■



6th ISTA/FAO Workshop on Electrophoretic Methods and PCR-Techniques for Variety Verification and GMO Detection

Kingston, Jamaica, May 9 - 13, 2005

By Wayne McLaughlin

Department of Basic Medical Sciences, University of the West Indies, Mona, Kingston 7, Jamaica



The 6th ISTA/FAO workshop on electrophoretic methods and PCR techniques for variety verification and GMO detection was organized by the International Seeds Testing Association (ISTA), funded by the Food and Agriculture Organization of the United Nation (FAO) and hosted by the University of the West Indies (UWI), Mona Campus in Kingston, Jamaica. The workshop was for seed analysts and biotechnologists from laboratories in the Caribbean and Central American region. The aim of the workshop was to train seed technicians in methods for the verification of species, cultivars and hybrids as well as for qualitative and quantitative detection of genetically modified seed. The aim was also to strengthen the network between seed analysts within the Caribbean and Central America. There were 18 participants from 10 Caribbean and Central America countries, namely Antigua, Bahamas, Barbados, Belize, Cuba, Grenada, Guyana, Jamaica, Mexico, and Trinidad. Participants were scientists and technicians from research organisations and universities within the region, with different degree of expertise in seed testing, biotechnology and molecular biology. The number of received applications exceeded the budget for funding, which indicates the growing importance for training in the field of variety testing and GMO detection.

Vice Chancellor and Principal, Professor Kenneth Hall, opened the workshop, by emphasising the importance and timeliness of such training, particularly in providing opportunities for capacity building in the region, for meeting the challenges of the world trade. The Principal pointed out the need for developing of biosafety protocols, related to increasing concerns about genetically modified organisms. The Dean of the Faculty of Pure and Applied Sciences, Professor Ronald Young, also welcomed the participants and lecturers to the UWI Mona Campus. Dr. Wayne McLaughlin, from UWI Department of Basic Medical Sciences, coordinated the workshop.

Resource persons were Dr. Christoph Haldemann, ISTA GMO Task Force member, Mr Rainer Knoblauch, ISTA Variety Committee Chair, Ms Andrea Jonitz, ISTA Lecturer and Ms Monika Haueter, assistant. Local technical assistants were Mr. Winston Young and Ms. Jodi Spence.

The workshop provided both theory and hands-on experience in electrophoresis and PCR methods for variety verification and GMO detection. The workshop programme was divided into two parts, electrophoretic methods of variety verification, and PCR based methods for GMO detection. Ms. Andrea Jonitz gave an overview of the workshop objectives and programme, and led presentations on the principles and applications of PAGE and SDS-PAGE electrophoresis, isoenzymes electrophoresis and isoelectric focusing in ultra-thin layer (IEF), while Mr. Rainer Knoblauch performed the practical part. The theory of DNA structure and function, sample preparation, DNA extraction and purification and PCR based methods for GMO detection were presented by Dr. Christoph Haldemann, and the experimental part by Ms. Monika Haueter. Lecturers did an excellent job and provided detailed explanations and handouts, which were very well received by participants.

Isoelectric focusing in ultra-thin layer (IEF) of seed storage proteins from *Zea mays*, *Triticum aestivum*, *Cucumis sativa* and *Oryza sativa* was a very exciting exercise, since participants had the opportunity for testing seed samples from their own research programs. Seed of *Phaseolus vulgaris* (kidney beans), *Capsicum chinense* (Scotch bonnet pepper) and *Cocos nucifera* (coconuts) had been also analysed. Additionally, there was an interest in the internationally famous Jamaican coffee (*Coffea Arabica*), which only gave an indication of the wide applicability of IEF in the basic and applied research.

Detection of *epsps* gene in RR-Soybean, *Cry1Ab* in Bt176 maize and *Cry1Ab* gene in Bt11 maize was done using nested PCR and PCR products, analysed by agarose gel electrophoresis. Competitive PCR for the detection of CaMV 35S promoter, as well as qualitative GMO detection by immunostrips, a protein based method, had also been practiced.

Participants had a chance to present their country reports focussing on the activities in the areas of crop improvement, variety testing, development of transgenic crops and national strategies for biotechnology, and development and implementation of the National Framework on Biosafety through the UNEP/GEF project (UNEP – United Nations Environment Program; GEF – Global Environment Facility). Currently, none of the laboratories in the Caribbean is designated for the GMO testing. However, laboratories at the University of the West Indies at the Mona Campus in Jamaica and the St Augustine Campus in Trinidad, have the capability for seed variety verification and GMO analysis, but need key equipment, such as Real-Time PCR thermal cycler for quantitative assays.

It was not all work at the workshop, since participants had some time to visit Kingston, and to visit the Hellshire beach for *escoveitched* fish and *bammy*. Some also had time to visit Hollywell Recreational Park.

At the closing session participants received ISTA/FAO certificates of attendance and a CD with lectures notes, laboratory protocols and their results. Overall, the workshop was very successful and we wish to thank everyone who made it possible. Our appreciation goes to FAO, ISTA lecturers' good work and to Ms. Branislava Opra from the ISTA Secretariat. ■

5th ISTA Seed Health Symposium

Angers, France, May 10 - 13, 2005

By **Véronique Binoit**

GEVES - SNES, Rue Georges Morel BP 90024, 49071 Beaucouzé Cedex, France, veronique.binoit@geves.fr

After Ottawa in 1993, Cambridge in 1996, Ames (USA) in 1999 and Wageningen in 2002, it was Angers' turn to host the 5th ISTA Seed Health Symposium from May 10 - 13, 2005. 144 participants (42 from Angers) from 41 countries took part in this 5th Seed Health Symposium. 84 communications and posters were presented before a public that was attentive from beginning to end.

The themes covered, which mostly concerned applied research, included the fields of diagnosis, chemical, physical and microbial control, and epidemiology. The communications were grouped into 7 thematic sessions:

- **Session 1:** Methods of standardisation and quality-assurance in seed-health testing
- **Session 2:** Seed contamination
- **Session 3:** Characterisation of seed pathogen populations

- **Session 4:** Seed health and the international movement of seed
- **Session 5:** New diseases and emerging seed-born pathogens
- **Session 6:** Innovation and technical improvement in seed-health testing
- **Session 7:** Chemical and physical seed treatment

The symposium's opening session was presided by Guy Riba, Delegate Director General of the National Institute for Agricultural Research and Pieter Oosterveld, President of ISTA. The symposium was organised by INRA, GEVES, Angers University, the National Laboratory of Plant Protection and ISTA, with the collaboration of the Congress Centre of Angers. Local communities, such as the Angers-Loire Region, the County Council of Maine et Loire and the County of Pays de la Loire provided their support to this event. The seed industry, represented by

GNIS, also provided support.

The convivial atmosphere of the symposium helped, as always, the cementing of future collaborations.

The Seed Health Committee of ISTA met on the 9th and 13th May at SNES in order to follow the progress of the symposium preparations and to set up new programmes.

19 people participated in visits to the SNES-GEVES seed laboratories, the INRA apple and pear collection orchard (Genhort mixed research unit), and the National Plant Protection laboratory.

On behalf of the organising committee:

Joël Léchappé, Charles Manceau, Philippe Simoneau, David Caffier, René Mathis, Valérie Olivier, Jean-Luc Gagnard, Michel Guénard, Véronique Binoit ■

Announcement of 3rd ISTA Workshop on Statistical Aspects of GMO Detection

Buenos Aires, Argentina, October 31 - November 4, 2005

The ISTA GMO Task Force and the Argentine National Seed Institute (INASE) have the pleasure to announce the 3rd ISTA Workshop on Statistical Aspects of GMO Detection, to be held in Buenos Aires, Argentina from October 31 to November 4, 2005.

This course will focus on the seed sampling plan design for testing lots for the adventitious presence of transgenic sequences and proteins. It will also provide knowledge on good GMO laboratory practice.

The aims of the Workshop are to give and exchange information and expertise in sampling plan design, specially for testing the adventitious presence of transgenic sequences and proteins, to give notions on DNA am-

plification and good laboratory practice to avoid contamination, and to analyse real case results from semi-quantitative and quantitative approaches and reporting results.

This workshop is for 13 participants from the South American region. The detailed programme of the workshop can be found on the ISTA Website.

Participation fee is 300 US dollars, including the workshop material, official dinner, daily breaks and lunches from Monday to Thursday.

An optional post-meeting Buenos Aires City Tour is scheduled for Friday afternoon (November 4, 2005).

Workshop lecturers:

- Sylvain Grégoire, ISTA Statistics Committee Chair
- Kirk Remund, ISTA Statistics Committee Vice-Chair
- Jean-Louis Laffont, ISTA Statistics Committee Member
- Enrico Noli, GMO Task Force Member

Local organizers

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ISTA Purity Workshops in 2006

By **Maria Rosaria Mannino**¹, ISTA Purity Committee Chair
Ken Allison², **Monica Moreno**³, **Zita Ripka**⁴, **Jane Taylor**⁵,
ISTA Purity Committee Members

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2 Ottawa Laboratory (Carling) - Seeds, Canadian Food Inspection Agency, 960 Carling Avenue, Ottawa, ON, K1A 0C6, Canada
3 Laboratorio Central de Análisis de Semillas, Paseo Colón 922 - 1063 Buenos Aires, Argentina
4 National Institute for Agricultural Quality Control, 1024 Budapest Kelety K. u. 24, Hungary
5 NIAB Huntingdon Road, Cambridge, CB3 0LE, United Kingdom

The organisation of workshops is an important activity for ISTA Technical Committees. These meetings associate theoretic and practical sessions on the main technical matters of seed quality testing and other related subjects. They are also the occasion for seed specialists coming from different countries to initiate mutual exchanges on subjects related to their work. Also during personal discussions it is easier to detect ambiguous sentences in the text of Chapters 3 and 4 of the ISTA Rules and to be able to make the necessary corrections.

The expected results of the workshops are:

- improvement of the uniformity in seed testing;
- progresses in technical skills for participants and their laboratories;
- identification of better seed testing methods and consequent perspectives of ISTA rules changes.

One of the main objectives of the Purity Committee work for the period 2004-2007 is the development of workshops. With this aim, we developed a general workshop programme with constant parts that can be updated according to the current activities within ISTA and the actual interest of the participants. We started in June 2004 with the organisation of a successful workshop in Budapest as a part of the pre-congress ISTA activities (see Seed Testing International, No. 128, October 2004). We are today working on the organisation of two purity workshops: the first one in Kenya in January 2006, the second one in Switzerland in June 2006.

Purity Workshop in Kenya (Nakuru, 26-27 January 2006)

The workshop will be held at the Kenya Plant Health Inspectorate Service in Nakuru.

This workshop has been organised with the objective of covering topics related to tropical and sub-tropical species. The workshop will start with the presentation of the Purity Committee, its work and Purity Rules Changes. Afterwards, some sessions with practical exercises have been planned. These will include the evaluation of pure seed in the genera *Brachiaria*, *Digitaria*, *Panicum*, *Setaria*, *Urochloa*, *Cenchrus* and *Chloris*. Aspects of the purity analysis of other species such as *Tanacetum cinerariifolium* and vegetable species of the genus *Brassica* will also be covered. A session will be dedicated to the analysis of mixtures. A part of the programme will be devoted to the future increased coverage of tropical and sub-tropical species in Rules: introduction of new species, needs for ring tests and referee tests, presence in the Universal List of Weeds and Crops. The workshop will end with a visit to the hosting laboratory.

The structure can accommodate up to 30 participants and arrangements will be provided for transport of participants to and from the hotel.



Purity Workshop in Switzerland (Zurich, 22-23 June 2006)

The workshop will be held at the Research Institute for Ecology and Agriculture of Zurich.



As with the previous workshop in Kenya, it is planned to start with the presentation of the Purity Committee, its work and Purity Rules changes. The programme is still in the planning stage, but some sessions on the following topics will be included: Universal List of Weeds and Crops, use of nomenclature and taxonomy, identification of *Festuca* spp., reporting purity and other seeds determination results, identification of inert matters in purity analysis, purity training programme for new analysts, monitoring for accredited laboratories. All lectures on technical aspects of identification and purity analysis will include practical exercises. Also in this case, a visit of the hosting laboratory has been planned.

The structure can accommodate up to 25 participants.



Conclusions

The first announcements will soon be published on the ISTA web site. This will give interested persons the opportunity of pre-register and to offer suggestions for additional lectures to be included in the programme.

We hope that these two workshops will be well-attended by seed analysts. The success of such a meeting contributes to the improvement of ISTA Rules and of ISTA laboratories' skills in seed quality tests and uniformity in seed testing. ■

2nd ISTA Moisture Workshop

Palmerston North, New Zealand
April 10 - 13, 2006

General

The ISTA Moisture Committee and Massey University in New Zealand have the pleasure to invite you to their Workshop on Moisture Testing.

Scope:

The aim of the workshop is to create discussion and exchange of information in the field of moisture testing.

Programme:

- Background to seed moisture
- Quality Assurance with reference to moisture testing
- Future of moisture testing
- New species and methods (method validation)
- Development of handbook for moisture testing
- Demonstrations
- Practical work
- Oven test (soft wheat test)
- Calibration of moisture meters
- Excursions

Registration:

The number of participants is limited to 20. Registration fee for ISTA members is US\$400 and for non-members it is US\$600. Registration fee includes participation, handouts, refreshments during breaks, lunches, official dinner and excursion.

Preliminary Registration Form

Title	Position:
Name	First name:
Company / Instiute.....	Address
Postal Code	City
Phone number	Fax number
Email	ISTA Member code:

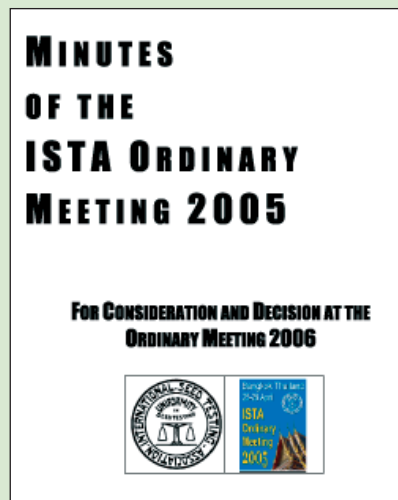
Return this form to:

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Minutes of the ISTA Ordinary Meeting 2005

Cited and Published
By the ISTA Secretariat



This document summarises and concludes the discussions and decisions of the ISTA Ordinary Meeting 2005 in Bangkok, Thailand, April 27, and contains a complete list of all participants of the meeting. All documents and presentations mentioned in these minutes are available from the ISTA Secretariat.

Price*: Swiss Francs CHF 73.- (approximately EUR 48.- / USD 60.-) or free download from the ISTA Website.

***Note:** The document will be distributed electronically to all ISTA Members, Designated Authorities and the participants of the ISTA Ordinary Meeting 2005 as a free service.

(--> see more details on upcoming ISTA Meetings on page 16 and 18)

ISTA Vigour Testing Workshop

Beaucouzé, France

May 10 - 12, 2006

The ISTA Vigour Committee and Station Nationale d'Essais de Semences, GEVES invite you to their workshop on seed vigour testing, to be held in Beaucouzé, France from May 10 - 12, 2006. The workshop will be made up of lectures and practical experience in vigour testing. It will also offer the opportunity for general discussion of seed vigour and time for participants to ask specific questions regarding vigour testing procedures.

Workshop content

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 as a vigour assessment

- Precision in vigour testing
- Tolerances

Practical work

All participants will complete the conductivity test, carry out stages in the accelerated ageing and controlled deterioration tests and assess results from accelerated ageing, controlled deterioration, cold and rate of germination tests. In addition, the results of a range of vigour tests on maize will be evaluated as a preliminary to a discussion of vigour tests.

Question and answer sessions

These will consider questions on all aspects of seed vigour and any vigour test.

Presenters of the workshop

The workshop will be presented by Dr Alison Powell (Chair of the Vigour Committee, University of Aberdeen), Dr Dennis TeKrony (University of Kentucky), Dr Stan Matthews (University of Aberdeen), Sylvie Ducournau (SNES) and Marie-Helene Wagner (SNES).

Location

The workshop will take place at SNES,

Beaucouzé, France, situated 1h 30min from Paris by TGV. Accommodation will be in the city of Angers. Transport will be provided to SNES.

Registration

There will be a minimum number of participants required for this workshop to take place, with a maximum number of 20. The cost of the workshop is 300 Euro for ISTA members, 410 Euro for non-members. The registration fee includes participation in the workshop and all supporting literature, breaks, lunches, daily travel from the hotel to laboratory, workshop dinner, a visit to the Castle of Angers and to Cointreau.

Accommodation

Accommodation has been reserved at the IBIS Hotel, Angers. The price of a room for one night is 71€ without breakfast (6.50€ for breakfast). Details regarding reserving a room at the hotel will be given later.

To register please visit

www.seedtest.org

Update your calibration samples.

Does your calibration samples of *Dactylis glomerata* and *Poa pratensis* need recalibration?

If the samples are more than 3-4 years and has been used frequently, perhaps it is time to have them checked !

The Danish Plant Directorate has specialised in recalibration of grass seed samples according to ISTA Rules. You can have your samples recalibrated at a cost of **135 Euro/sample.**

For further information please contact:

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Report of the ISTA Proficiency Test Committee

By **Günter Müller**, ISTA Proficiency Test Committee Chair

Thüringer Landesanstalt für, Landwirtschaft TLL, Camburger Str. 74, 07743 Jena, Germany, g.mueller@jena.tll.de

Since the introduction of the new rating system in 2002, eight proficiency test rounds have been organized and the results of germination and other seed determination (OSD) have been reported to the participants. Since this time the rating system has been improved several times but has not been finalised yet as far as the in-round rating system for OSD is concerned. In the case of purity and germination testing only one component namely pure seed or normal seedlings are considered when determining the in-round rating. Z-scores for abnormal seedlings and ungerminated seeds are reported as well but do not affect the in-round rating. They should, however, be used for information and corrective action purposes by the laboratories.

Proposed in-round rating system for OSD

For determining the laboratory's in-round rating, the following proposal is being discussed among the PTC members. The in-round rating for OSD is based on the retrieval and identification rate of the seeds added by the Proficiency Test Leader. In order to make the system more objective, a score (table 1) has been introduced based on the actual retrieval rate of all laboratories in order to take into account the different degrees of difficulty. The thresholds have been set as follows:

Table 1. Score system for OSD

Total retrieval rate (%)	Assigned value
≥90	3
≥85	2
≥80	1

Table 2. Thresholds for retrieval and identification

Score	Percentage of retrieved and identified seeds
A	≥90
B	≥80
C	≥70
BMP	<70

This score is then multiplied by the number of seeds added and the number of seeds found. The percentage of retrieved and identified seeds then determines the in-round rating of the laboratories. An example of this procedure is given in table 3.

Germination test results since 2002

Since 2002 Proficiency Test Rounds with *Pisum sativum*, *Trifolium incarnatum*, *Zea mays*, *Lycopersicon esculentum*, *Brassica napus*, *Helianthus annuus*, *Phleum pratense*

and *Zinnia elegans* were organized and germination and other seed determination test results were reported.

Most laboratories performed very well and obtained a A score for germination testing (table 4). However, some laboratories did not meet the minimum standard of performance and received a BMP.

The sum of all in-round ratings after six test rounds is presented in figure 1. Altogether 16 accredited laboratories reached full marks in

Table 3. Example laboratory results (Test round 04-1, *Brassica napus*)

Species	# of seeds added	Total retrieval rate (%)	Assigned value (AV)	# of seeds found	# of seeds added x AV	Seeds found x AV
<i>Galeopsis tetrahit</i>	2	88	2	2	4	4
<i>Galium aparine</i>	3	93	3	3	9	9
<i>Sinapis alba</i>	4	83	2	4	8	8
<i>Chenopodium sp.</i>	3	84	2	3	6	6
<i>Polygonum aviculare</i>	3	91	3	3	9	9
<i>Sinapis arvensis</i>	3	61	1	3	3	3
<i>Lotus corniculatus</i>	4	72	1	0	4	0
<i>Raphanus sativus</i>	4	81	2	4	8	8
<i>Thlaspi arvense</i>	2	79	1	0	2	0
Sum	28			22	53	47
Percentage						89
In-round rating						B

Table 4. Germination in-round rating results after seven test rounds

Test Round		A	B	C	BMP
		% of all laboratories			
02-3	<i>Pisum sativum</i>	64	20	10	6
03-1	<i>Trifolium incarnatum</i>	76	12	2	10
03-2	<i>Zea mays</i>	78	14	4	4
03-3	<i>Lycopersicon esculentum</i>	69	20	3	8
04-1	<i>Brassica napus</i>	73	14	5	8
04-2	<i>Helianthus annuus</i>	76	11	4	9
04-3	<i>Phleum pratense</i>	68	20	5	7
05-1	<i>Zinnia elegans</i>	71	24	4	2
Average		71.8	16.8	4.6	6.8

all test rounds they have participated in. Congratulations to these ISTA member laboratories because these are very good results! Despite some BMP ratings in single test rounds, it is encouraging to see that no ISTA accredited member laboratory scored an overall BMP rating.

In order to determine the overall-rating over six test rounds all numerical values of the in-round-ratings were added. Laboratories with values from of 28 to 30 receive an A overall-score as shown in table 5. If the value had been below 16 the laboratory would have received an overall BMP.

Altogether 49 accredited laboratories have scored an A, 21 laboratories obtained a B overall rating and only 3 laboratories scored a C overall-rating. No accredited laboratory obtained an overall BMP rating for germination.

OSD results since 2002

Since the introduction of the new rating system 2002 four test rounds were organized for other seeds determination (OSD) and provisional results have been reported to the laboratories not yet containing an in-round rating. OSD is a problem in countries where the laboratories do not frequently encounter the species added by the test leader. Table 6 shows the OSD in-round rating applying the abovementioned rating system. Particularly difficulties caused the test round 04-1 with *Brassica napus* where 16% of the laboratories received an BMP in-round rating. Proficiency Test Round 04-3 with *Phleum pratense* led to the best results.

In the end the four test rounds can be summarized in order to tentatively assess the laboratories' overall performance. Altogether, 29 laboratories retrieved and identified nearly

all seeds added to the samples and received always A in-round ratings. However the five laboratories with numerical values less than 16 are likely to obtain an overall BMP as shown in figure 3.

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Table 5. Overall rating for all test types

Score	Attributed value	Range	Overall score
A	5	28-30	A
B	4	21-27	B
C	3	16-20	C
BMP	0	below 16	BMP

Table 6. Tentative OSD in-round rating after four test rounds

Test Round		A	B	C	BMP
		% of all laboratories			
03-1	<i>Trifolium incarnatum</i>	65	15	11	9
03-3	<i>Lycopersicon esculentum</i>	81	8	6	5
04-1	<i>Brassica napus</i>	63	17	4	16
04-3	<i>Phleum pratense</i>	85	9	4	2
Average		73.6	12.2	6.2	8.0

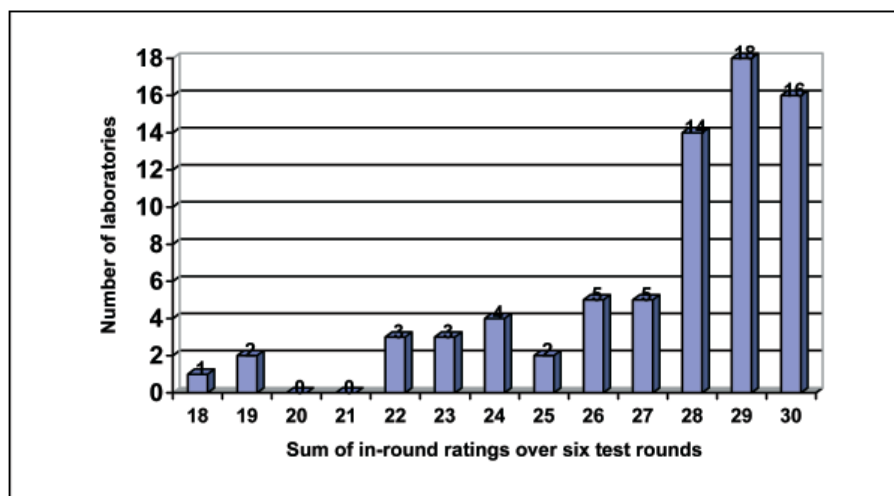


Figure 1. Scope germination; Laboratories' overall-rating after six test rounds (n=73)

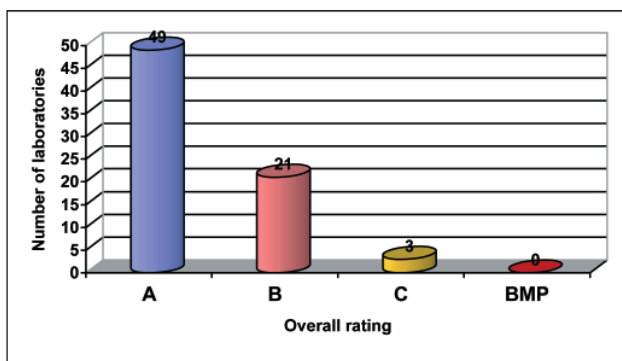


Figure 2. Laboratories' overall-performance after six test rounds (n=73).

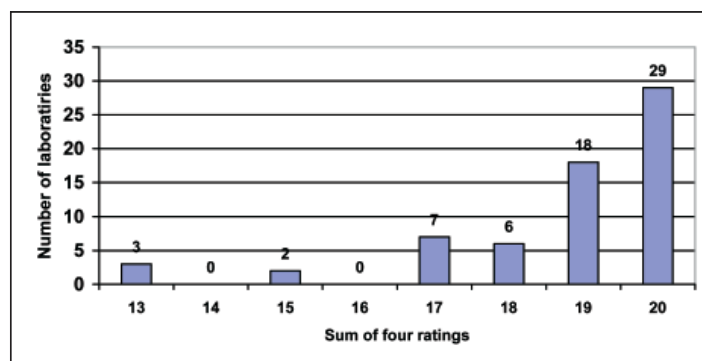


Figure 3. Scope OSD; Laboratories' in-round rating after four test rounds (n=65)

New Quality Management Course

By **Anders Lomholt**

Danish Plant Directorate, Skovbrynet 20, 2800 Lyngby, Denmark, alo@pdir.dk

This year, Danish Plant Directorate has started a new 8 weeks training course in ISTA Laboratory Quality Management.

The primary aim of the training is to teach the participants about quality management in an ISTA accredited laboratory and get them started on writing a quality manual for their own laboratories. An important part of capacity building to become ISTA accredited, is a quality manual following the ISTA accreditation standard. The participants in this year's course, all had the intentions to apply for ISTA accreditation in the near future.

The first course had four participants from Bangladesh and Uganda. The program was made as a very intensive combination of practical work in the laboratory, lectures in quality management and writing of the participants own quality manual. After completion of the training, they are able to finalise a quality manual upon return to their home country.



Participants of the first Quality Management Course

If you are interested in further information about the training course, please look at our homepage (www.pdir.dk/training) or contact Dr. Anders Lomholt (e-mail: alo@pdir.dk)

ISTA Accreditation - New Document published

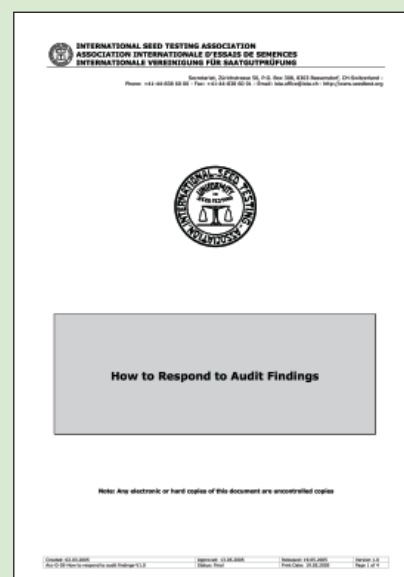
How to Respond to Audit Findings

The Accreditation Department has published a new document which shall give guidance on how to report on corrective action taken and measures implemented following an ISTA Accreditation assessment. The aim is to ensure that laboratories know what they are expected to provide in order to avoid undue delay of the accreditation process.

This document outlines the corrective action procedure, laboratories should be following. General principles, timing and language requirements are indicated. The guidelines also explain what kind of documents are to be submitted in order to pro-

vide sufficient evidence to the audit team that the corrective action procedure has been implemented and is effective. An example appended to the document illustrates how corrective action may be reported. The Accreditation Department hopes that the laboratories will find this document useful and that it will help to make the accreditation process more efficient.

The document 'How to Respond to Audit Findings' can be downloaded from the ISTA homepage under: <http://www.seedtest.org/en/content---1--1115.html>. A paper copy of this document is available upon request.



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Voting Rights in the International Seed Testing Association (ISTA)

The voting rights in an association naturally are of special interest to its members.

In general, the members of an association hold the voting rights in the association. Also in ISTA the members of the Association hold the voting rights. However, not every member of ISTA automatically is entitled to vote on the affairs of ISTA. As governed by its constitution, ISTA has one vote allocated to each member country or distinct economy. The person eligible to exercise that vote must firstly be an ISTA member, secondly, have been designated by their government, and thirdly, be present at the Ordinary Meeting.

This short article explains the current voting rights for an ISTA Member in more detail, addressing a number of questions the ISTA Secretariat has recently received. Note that in this article the term "ISTA Member" refers to a person, not a laboratory.

Can any ISTA Member become designated to execute the voting right?

Any member of the Association is eligible to become designated by their respective government to vote on behalf of that government, irrespective of whether the person is employed by a governmental or private institution or company.

Members of the Association who are designated by their respective government to execute the voting rights on behalf of their government are called Designated Members of the Association (ISTA Constitution Article IV (b)).

What is the procedure for an ISTA Member to become designated to execute the voting rights on behalf of their government?

A precondition to becoming an ISTA Designated Member is the existence of an ISTA Designated Authority in a country.

A Designated Authority is an authority designated by a government of a country or distinct economy to act on its behalf in designating Designated Members (ISTA Constitution Article IV (a)).

The Designated Authority in quite a number of countries is the Ministry of Agriculture itself, where a certain section of the Ministry of Agriculture is responsible for handling the affairs of ISTA.

In some countries special agencies or bureaus which are responsible for seed, seed certification or seed quality control are designated by the Ministry of Agriculture to be the Designated Authority for ISTA.

An ISTA Member who would like to execute the voting rights on behalf of their government in a country where no ISTA Designated Authority is nominated, has to submit the corresponding ISTA application form (Application Form A: Application for Recognition of an ISTA Designated Authority) to the Ministry of Agriculture in their country. The Ministry has to nominate an ISTA Designated Authority by filling out this form and sending it back to the ISTA Secretariat.

If there is already an ISTA Designated Authority in the country, or after the recognition of the Designated Authority by ISTA, any ISTA Member can ask its Designated Authority to become designated by filling out a corresponding application form (Application Form B: Application for Recognition of an ISTA Designated Member) to be signed by the Designated Authority, assigning the ISTA Member as an ISTA Designated Member.

In both cases (country with and without designated Authority) the ISTA Member has to take the initiative, but can rely on support through the ISTA Secretariat if necessary.

Information regarding the Designated Authority in a country can be received from the ISTA Secretariat or the ISTA Website.

Can there be more than one Designated Member in a country?

The Designated Authority has the right to nominate as many Designated Members as there are ISTA Members in a country. Therefore, theoretically all ISTA Members in a country can be nominated as Designated Members through their respective Designated Authority. However, only one Designated Member from that country can vote at ISTA Ordinary Meetings.

Can a person who is not a member of the Association but appointed by the Designated Authority execute the voting rights?

No. Only ISTA Members can become a Designated Member and execute the voting rights on behalf of their respective governments.

What is the voting procedure in the ISTA Ordinary Meeting?

Following the ISTA Constitution Article IX (a), only one vote may be cast on behalf of a government.

All motions require a two thirds majority (for Constitution change) or a simple majority (for all governance matters) of all voting governments as defined in Article IX (b) of the ISTA Constitution.

Before an ISTA Ordinary Meeting, each Designated Authority is requested by letter from ISTA to nominate one voting delegate from the list of Designated Members, to execute the voting rights at the ISTA Ordinary Meeting.

At the time of the roll call during the Ordinary Meeting, when the ISTA Designated Members executing the voting rights on behalf of their government receive their voting cards, the ISTA Secretary General has a list with all ISTA member countries and correspondingly the name of the nominated voting Designated Member of that country.

Summary

- Voting rights in ISTA lie in the hands of the governments of the member countries.
- The voting rights are executed through one Designated Member per country, who has been nominated by their government to vote on their behalf.
- One government or distinct economy has only one vote in all affairs of the association, irrespective of the number of nominated voting members (called Designated Members) in one country.
- Providing they are an ISTA Member, the nominated Designated Member may come from the public or private sector.
- The right to nominate an ISTA Member to become a Designated Member and to appoint them to execute the voting rights at the ISTA Ordinary Meeting is solely under the authority of the Designated Authority of a country.

International Seed Testing Association

- develops, adopts and publishes standard procedures for sampling and testing seeds
- promotes uniform application of these procedures for evaluation of seeds moving in international trade
- promotes research in all areas of seed science and technology
- Accredits Member Laboratories
- to participate in conferences and training courses
- has established & maintains liaison with other organisations having common or related interests in seed

ISTA Membership offers you

- ✓ free access to the 'International Rules for Seed Testing', an internationally standardised publication containing seed testing procedures and techniques, which is constantly revised and updated
- ✓ valuable information through all ISTA publications, including Seed Science Technology and Technical Handbooks, which are free for members
- ✓ involvement in seed testing methodology development
- ✓ ISTA proficiency testing, quality assurance standards and auditing services, which assist you in attaining the highest quality assurance levels in today's business environment
- ✓ the possibility of issuing ISTA international certificates
- ✓ easy access to leading seed experts worldwide

**"ISTA, providing methods & services
for the testing of seed moving
in international trade..."**

ISTA



International Seed Testing Association
Association Internationale d'Essais de Semences
Internationale Vereinigung für Saatgutprüfung

REQUEST FORM

✓ **Yes, please send me more information on how to become an ISTA Member**

Laboratory Membership (including one person)

Personal Membership

Contact Person

Organisation

Address

Postal Code City

Country

Phone Fax

Email

Please forward the attached request form to the

ISTA Secretariat
PO Box 308, 8303 Bassersdorf, CH-Switzerland
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to receive a membership information package.

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Mass *contra* Weight, a 75 Years Old Debt

By A. M. Steiner and M. Kruse, ISTA Members

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When the first issue of the ISTA International Rules for Seed Testing appeared in 1931, the term weight was used in connection with any determination of mass, and this was carried on until today. Already more than twenty years ago when the Rules were split up into a Rules part and an Annexes part, the senior author addressed the then Rules Committee Chairman, late John Tonkin, that according to The International System of Units (Le Système international d'unités, SI) ISTA should urgently replace the term weight by the term mass. However, the onus of getting the Rules split into the two parts saddled colleague John already with such a burden of troubles that he refrained from doing this in addition. Nota bene, this would have meant changes in a multitude of places in practically all Chapters of the Rules and Annexes in days when electronic data processing was not yet available. In 1996 when John Tonkin anew gained great merit in revising the Rules, he was of the opinion that just this very correction should be a task of his successor. Now these days, contrariwise, the amalgamation of the Rules and Annexes is intended again and data processing is common. So this seems to be the point of time for ISTA to settle the debt and to eventually correct the long lasting incorrect use of the term weight.

Well, why should the term weight be replaced by the term mass? According to the SI, mass is a base unit and the kilogram is the unit of mass. It is equal to the mass of the international prototype of the kilogram made of platinum-iridium (Kilogramme des Archives), which is kept at the International Bureau of Weights and Measures (Bureau International des Poids et Mesures, Pavillon de Breteuil, Sèvres, France, BIPM) under defined conditions. Already in 1887 the International Committee for Weights and Measures (Comité International des Poids et Mesure, CIPM) adopted this specification, which was endorsed by the 1st General Conference on Weights and Measures (Conférence Général des Poids et Mesure, CGPM) in 1989. Finally, the 3rd CGPM in 1901 amended the definition of the kilogram to state specifically that

the kilogram is the unit of mass and reserved the term weight to refer to the gravitational force according to $\text{weight} = \text{mass} \cdot \text{gravity}$ [$\text{kg} \cdot \text{m} \cdot \text{s}^{-2}$]. According to the SI the weight alternatively force is a derived unit with special name. The special name of the unit is the newton [N]. At this Conference the following resolution was adopted (quotation):

“Considering the necessity to put an end to the ambiguity which in current practice still subsists on the meaning of the word weight, used sometimes for mass, sometimes for mechanical force;

The Conference declares:

1. The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram;
2. The word weight denotes a quantity of the same nature as force; the weight of a body is the product of its mass and the acceleration due to gravity; in particular, the standard weight of a body is the product of its mass and the standard acceleration due to gravity;
3. The value adopted in the international Service of Weights and Measures for the standard acceleration due to gravity is $980,665 \text{ cm/s}^2$, value already stated in the laws of some countries.”

Thus, the following applies:

- The base unit
 $\text{mass} = \text{international prototype of kilogram [kg]}$
- The derived unit with special name
 $\text{weight} = \text{mass} \cdot \text{gravity} = \text{force [N = kg} \cdot \text{m} \cdot \text{s}^{-2}]$

In spite of this crystal clear distinction already more than a century ago between mass and weight alternatively force, there is still the ambiguity in the use of the term weight as a quantity to mean either mass or force. In everyday use and for instance in retail weight is still wrongly used in the sense of mass in connection with the SI unit kilogram. This is in particular the case in the USA, and TIME

Magazine, July 12, 1999, reported that yet 18 American States had rejected metric weights and measures despite national spending of more than \$ 70 million on metrication. However, practically all international scientific journals nowadays request imperatively the use of the Metric System, i.e. SI units. Hence, ISTA should join the scientific community and change from weight to mass latest with the new amalgamated Rules starting in 2006.

To add a true story, the so-called MCO Scandal: in 1999 the Mars Climate Orbiter got lost after 10 months flight and a path of 416 million miles. The reason was that the NASA used the Metric System SI, but the manufacturer Lockheed Martin Astronautics still used the U.S. Customary System or British Engineering System of Units, respectively. In the latter system the confusion between mass and weight is fostered by using the term pound for both mass and force alternatively weight. As used in metrology the pound is a base unit of mass, termed pound-mass, but as used in engineering the pound is a base unit of force, termed pound-force. The mix-up of the metric system and the engineering system when calculating the propulsive force resulted in a difference of approximately 10 % (1 pound-mass = 0.453 592 37 kilogram), which was not noticed. However, this difference led to the loss of the orbiter and with it of \$ 125 million, a disastrous and expensive experience. The NASA Failure Review Board put it that way: the ‘root cause’ of the loss of the spacecraft was the failed translation of English units into metric units in a segment of ground-based, navigation-related mission software. Yet, comforting for seed scientists is that this spacecraft carried no seeds.

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Obituary Leroy E. Everson

1914 - 2005

By **Hans Arne Jensen**, Ex-ISTA Member

Valmuevej 3, Slagslunde, 3660 Stenløse, Denmark

Professor, Dr. Leroy E. Everson, former professor of botany and plant pathology and director of the Seed Science Centre at Iowa State University, died in Sequim WA, USA on July 1, 2005, at the age of 91.

Everson worked at Iowa State University from 1948-1980, where he became an outstanding professor and leader of the seed science activities and he contributed extensively to making the University and the seed testing activities in Ames, Iowa world famous.

His main contribution to seed testing was development of the blowing method for purity analyses of *Poa*, *Dactylis* and a number of range grasses, and the extensive work on preparing instructions and introduction of the blowing method into the AOSA and the ISTA Rules (Everson L.E. et al.(1965). A comparison of the uniform blowing and hand methods for the purity analysis of *Poa pratensis* seed. *Proceedings of the International Seed Testing Association* 30(3), 493-511; Everson, L.E. and Hotchkiss, D.K. (1977). A comparison of the blowing and hand methods for the purity analysis of *Dactylis glomerata* seed. *Seed Science and Technology*. 5, 451-462.

Professor Everson was chairman of the ISTA Purity Committee from 1962 to 1977. In this period the blowing method for *Poa* and *Dactylis* was introduced into the ISTA Rules. Also through leadership of the committee and in planning and participation in ISTA workshops Everson contributed considerably to the development of seed testing in ISTA. He played, naturally, also an important role in AOSA and in the harmonisation of the ISTA and the AOSA Rules.

Personally, I experienced his capacity as university teacher during a 3 weeks visit at Ames, Iowa in 1970. The carefully prepared programme for my stay included introduction to seed production and seed testing in Iowa State, visit to other famous teachers of the University and meeting his kind and helpful family and friends.

Leroy Everson was born in Westboro, Wisconsin, and married to his wife Barbara in 1941. He served in the United States Navy as an anti-submarine warfare trainer in the Pacific and Atlantic from 1943-1946.

He earned his Bachelor of Science, Master of Science and Doctorate degrees from University of Minnesota in agronomy and botany.

After retirement from his position at Iowa he was visiting professor at Centro Internacional Agricultura Tropical in Cali, Columbia, South America from 1981-1983.

Barbara and Leroy Everson moved to Sequim, Washington in 1990, where Christmas letters informed us about a very active life as member of Trinity Methodist Church, Master Gardeners, 'Over the Hill' Hikers and a number of other activities. He is survived by his wife Barbara, one son John and two daughters Karin and Mary and seven grandchildren.



Leroy E. Everson with Mrs. Jensen

Professor Leroy Everson was a true friend, a genuine seed scientist and university teacher and a dedicated ISTA member, and his name will be remembered with respect and honour within the ISTA family. ■

Sad Notice

Dr. Claude Anselme

The Secretariat received the regrettable information that Dr. Claude Anselme has passed away on August 12, 2005.

Dr. Claude Anselme has been the head of the pathology laboratory that he had created at SNES (National Seed Testing Station of France) and later on he became the Director of SNES. Within ISTA he has been active in seed health testing and was the Secretary Treasurer of ISTA as an Executive Committee member for many years. Due to the shortage of time before going to print with this issue, an obituary for Dr. Claude Anselme will merely be published in the next number of Seed Testing International.

Affectionate condolences of his colleagues and friends in ISTA go to his wife, family and friends.

8th International Workshop on Seeds

Brisbane, Australia, May 8 - 13, 2005

By **John Hampton**, ISTA Executive Committee Member

New Zealand Seed Technology Institute, Lincoln University, P.O. Box 84, Canterbury, New Zealand, hamptonj@lincoln.ac.nz

The International Society for Seed Science's 8th International Workshop on Seeds, "Germinating New Ideas", was held in Brisbane, Australia from May 8 - 13, 2005. Around 200 delegates from 28 countries attended the Workshop, which was extremely well organised by Prof Steve Adkins and his team from the University of Queensland.

The four days of 86 oral and 112 poster presentations were organised into themes which included seed development, seed biotechnology, seed germination and dormancy, seed desiccation and conservation, seed ecology, and seed biology of Australian native species. Lead papers were presented by Wanda Waterworth, UK (Seed development transported into the post-genomic era); Kent Bradford, USA (Seed biotechnology: translating promise into practice); Patricia Berjak, South Africa (Desiccation tolerance/sensitivity of seeds and long-term germplasm conservation); Henk Hillhorst, Netherlands (Are dormant seeds lazy and germinating seeds not?); Ken Thompson, UK (Seed ecology comes of age); and Kingsley Dixon, Australia (Origins and future of Australian native seed science). The Michael Black Founders Lecture was presented by Julia Buitink, France on "Desiccation tolerance in the -omics era: new tools for an old enigma?"

Trying to report on all the presentations is not possible. The following is a very brief snapshot of seed testing related topics for Seed Testing International's readers:

- automatic single seed respiration measurements can provide a rapid and accurate evaluation of seed lot homogeneity, dormancy, germination rate, and presence of fungi which may affect germination (contact: Bert van Duijn b.vanduijn@voeding.tno.nl).
- oxides of nitrogen are potent dormancy breaking agents for seeds, and nitric oxide may be an endogenous regulator of seed dormancy (contact: Richard Jones rjones@nature.berkeley.edu).
- Federal Noxious Weed Disseminates of the US is a computer-based matrix-type interactive identification key, created using Lucid software. It covers the fruits and seeds of all the plant taxa (about 100) on the US federal noxious weed list (contact: Julia Scher julia.l.scher@aphis.usda.gov).
- seeds of two cabbage cultivars were sorted visually by seed coat colour; "light" seed coat coloured seeds had poorer germination (more abnormal seedlings), a reduced ability to withstand hot water soaking, and higher conductivity than "dark" seeds (contact: Joshua Klein vcjosh@agri.gov.il).
- dormancy in fresh papaya seeds was broken by pre-soaking in GA₃ (2 mM for 15 - 30 min) or KNO₃ (0.25 M for 2 - 3h) (contact: Chris O'Brien chris.obrien@griffith.edu.au).
- the promises of seed biotechnology have yet to be translated into practice, and thus far, no biotech-based products affecting seed biology or quality have reached the market place. The utilisation of biotechnology to improve seed traits is making little progress due to regulatory and marketing constraints (contact: Kent Bradford kjbradford@ucdavis.edu).
- image analysis of germinating seeds on a Jacobsen germinator was used to produce algorithmic curves for sunflower, oilseed rape and maize. The algorithmic curves were validated by both independent readings of images by analysts, and germination hand counting. The data provided a reliable characterisation of seed lot quality (contact: Marie-Helene Wagner marie-helene.wagner@geves.fr).

ISTA has had very close links with ISSS ever since the Society was incorporated, and has a representative on the ISSS Executive. At this one Workshop there were some 40 papers dealing with aspects of dormancy breaking and/or methods for germination and vigour testing, many for species not included in the ISTA Rules. However, many of the authors either had not heard of ISTA, or did not know ISTA has very active technical committees. I believe that ISTA should strengthen its links with ISSS, to the benefit of both organisations. Perhaps the next ISSS Workshop in Olaszyn, Poland (June 8 - 14, 2008) is the place to do so? ■



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SST publishes original papers and review articles in all areas of science and technology which may be applied to the production, sampling, testing, storing, processing and distribution of seed. The journal is designed to meet the needs of research workers, advisers and all those involved in the improvement and technical control of seed quality.

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Internationale Vorschriften für die Prüfung von Saatgut Ausgabe 2005

(Titel der englischen Originalausgabe: International Rules for Seed Testing – Edition 2005)



Die „Internationalen Vorschriften für die Prüfung von Saatgut“ vermitteln standardisierte Definitionen und Methoden, welche bei der Beurteilung von Saatgut im internationalen Handel angewandt werden.

Die ISTA Vorschriften umfassen 17 Kapitel, z.B. Probenahme, Reinheitsuntersuchung, Bestimmung der Keimfähigkeit und Nachprüfung von Art und Sorte.

Ausserdem sind sie eine hilfreiche Referenzsammlung von Keimfähigkeitsbedingungen und Prüfmethode für mehr als 1000 Arten.

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CALENDAR

2005

October

- 09-11 ESA Annual Meeting
(Brussels, Belgium)
- 27 UPOV Council
(Geneva, Switzerland)
- 31-4 **3rd ISTA Workshop on Statistical Aspects of GMO Detection**

November

- 07-11 APSA Asian Seed Congress
(Shanghai, China)
- 13-15 EESNET Annual Meeting
(Sofia, Bulgaria)
- 17-18 Les 3^{èmes} Rencontres du Végétal
(Angers, France)
- 29-1 International Seed Trade Conference in
CWANA Region
(Antalya, Turkey)

December

- 07-09 ASTA Annual Meeting, Corn & Sorghum
(Chicago, USA)

2006

January

- 09-11 **ISTA Purity Workshop**
(Nakuru, Kenya)

March

- 28-31 AFSTA Annual Congress
(Entebbe, Uganda)

April

- 10-13 **ISTA Moisture Workshop**
(Palmerston North, New Zealand)

May

- 10-12 **ISTA Vigour Testing Workshop**
(Beaucouzé, France)
- 29-31 ISF Congress
(Copenhagen, Denmark)

June

- 22-23 **ISTA Purity Workshop**
(Zurich, Switzerland)
- 26-29 **ISTA Annual Meeting**
(Zurich, Switzerland)



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