Seed Testing INTERNATIONAL

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IN THIS ISSUE

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International Seed Testing Association (ISTA)

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Editorial

By Michael Muschick,
ISTA Secretary General

Dear Reader,

The 27th ISTA Congress 2004 in Budapest, Hungary from May 13 - 24 is coming in big steps and it will be the most important and biggest event in regards to seed science and technology on the international level for the past 3 years.
As usual the Congress is divided into three parts, starting with the meetings of our 16 Technical Committees (May 13 - 15), then the Seed Symposium (May 17-19) and finally the Ordinary Meeting (May 20 - 21).
The 27th ISTA Congress will definitely be a milestone for ISTA. Not only because the latest development in seed science will be presented and discussed by the leading seed scientist in a unique forum, but also essential questions in regards to ISTA's governance will not only be discussed but also decided on by the ISTA voting delegates at this event. These decisions could change the countenance of ISTA completely and lead to a new way in the future. Hence it is indeed my special pleasure to invite you all to join this interesting and exceptional Congress and to participate in the discussions around seed science, seed technology and seed policy to some extend. Please read more about this happening later in this issue.

On the technical level intensive discussions and efforts continue on the question of GM seed testing and the adventitious presence of GM seed in non-GM seed lots. The results of the second ISTA GMO Proficiency Test round is published in this issue and show good progress on the harmonisation of the qualitative test results. Intensive discussions on the evaluation of the results of the proficiency test take place in our very active Proficiency Test Working Group of the GMO Task Force. Please take part in their considerations by reading the articles published in this journal.
Next to GM, seed health questions are of high interest and hence in this issue you will also find interesting articles around this topic.

Adding some paint to the colourful picture of our ISTA family, it is a great pleasure for me to present you an article about seed testing in Brazil, the biggest country on the South American continent. Learn something about seed testing in Brazil and elope to the wonderful and fascinating country of salsa and Cai Pirinha.
Then the journey continues to the Far East with an interesting contribution to find out particulars about the supervision and management of seed quality in China.

Last but not least I would like to mention the Extraordinary Meeting 2003 in Zurich. I am proud to state that the meeting was a full success and would like to take the opportunity here to thank all my staff for their enthusiasm and their hard work in the organisation of this event. And - as without the excellent contributions of the representatives of the ISTA Technical Committees this meeting could not have been as successful as it was - special thanks should be praised to them. Do not miss out to read about the interesting discussions from the Extraordinary Meeting in Zurich in this issue.

Now I hope you will enjoy reading your issue of Seed Testing International.

Yours sincerely,
Michael Muschick

P.S. As usual we appreciate your reactions and comments to articles published and the journal.

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Dr. Julianna Bányai, among others, was presented with flowers and a plaque to thank her for outstanding services for the Association.

Read about the Extraordinary Meeting 2003 as well as a section of the Technical Committee Reports.

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The ISTA Secretary General talks about the milestone for ISTA - the 27th ISTA Congress.

Also included is the Preliminary Programme

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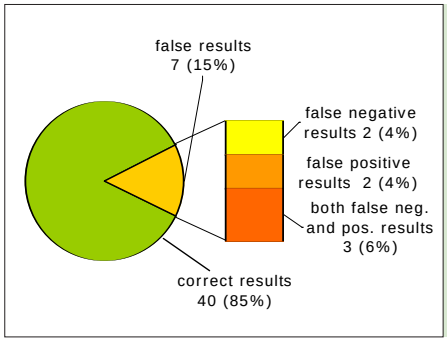

Find the Summary of the Results from the 2nd ISTA Proficiency Test on GMO Testing

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Read about the AFSTA Congress 2003, as well as the combined initiative of ISTA/ AFSTA/ ASTA to hold Seed Technology Training workshops in Africa

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The ISTA Flower Seed Committee hold the 1st Flower Seed Testing Workshop in Budapest, Hungary

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President's Report

By Norbert Leist, ISTA President

Dear Members and friends of ISTA,

Today we have received the second issue of the Seed Testing International, No. 126. Both the content and the layout has reached a high standard, that contributes excellently towards the aim of our Association, the distribution of knowledge in all areas of seed, and the presentation of ISTA. In the last issue I was overwhelmingly surprised to read the article about the 60 year old ISTA President. I would like to take this opportunity to thank all the people who sent their congratulations and best wishes for my health and strength. I wholeheartedly received these good wishes and found them to be most encouraging.

In the first part of this year the ISTA Executive Committee held their meeting in Lilongue, Malawi, on the kind invitation of their Executive Colleague, Jeffrey Luhanga. Here, in the heart of Africa, along with the preparation of the 2nd Extraordinary Meeting, further projects were discussed and many decisions were made.

Our Secretariat, with excellent preparation, saw to the effectiveness of the meeting, while Jeffrey spiced up the evenings with typical Folklore. We were honoured with personal greetings from the Minister of Agriculture himself. On the final day the Executive Committee met with delegates from regional governmental and company laboratories. An adhoc working group was established to work on tropical species, however it must still be activated.

A special event in the first half of the year was the 125 Year Anniversary of the Institute of Seed Research of the University Hohenheim, to which I was invited by Michael Kruse. A workshop on GMO was held in Pretoria, South Africa, together with FAO and one on Flower Seed Testing held in Budapest, Hungary, supported the development of these fields. Both were well organised, with good attendance, and contributed to the progress of our Associations aim: "Uniformity in Seed Testing". The relationship with ISF was further cemented at their annual meeting, held in Bangalore, India. It appears that through the many years since 1924, it has been a fruitful development for both sides. The same can be said for OECD, who will have held their annual meeting in Paris.

The highlight of this year has been the 2nd ISTA Extraordinary Meeting, held in Glattbrugg, Switzerland, June 30 - July 3, 2003: A high number of participants, from more than 40 countries showed a high level of interest in our Association. The meeting was very successful. We realised that the annual meetings would speed up the work, and thus this year we received an impressive picture of the ISTA activities. This was also noticed and mentioned by the non-ISTA delegates. The meeting was clearly well organised by the Secretariat, who can be accredited with a great success!

The event began on Sunday, June 29th, with a full day meeting of the GMO Task Force which reported on the results of the single working groups and future plans. Thus the planning for the 3rd ISTA GMO Proficiency Test took place, and a new proposal for the inclusion of GMO testing in the International Rules for Seed Testing was established. Also on this day the ISTA Auditors reviewed, and evaluated the work done, and agreed on uniform evaluation of critical issues.

Monday saw the beginning of the official programme, with the Technical Committee Presentations. All written reports of the Committees were accepted by the membership through applause.

On the 2nd day the discussion included the reports of the implementation of the new ISTA Proficiency Test as well as Accreditation. The 3rd day was dedicated to the Ordinary Meeting. From the actual 70 Voting Delegates, 39 were present. The Executive Committee and the Secretary General gave their annual reports, both of which were accepted by the members.

The discussion on ISTA's position included on the one side the wish of the Company Laboratories to be accepted as equal partners with voting rights within ISTA, whereas on the other side the Designated Authorities wished to keep ISTA as a independent governmental association. In this situation the adjustment of the Constitution requires much discussion to obtain to the right compromise. Accordingly, the discussion within the meeting was lively. The Executive Committee plans to use the collective opinions of the ISTA Membership, obtained in Switzerland, to draft a proposal regarding the changes of the voting rights within ISTA, to be presented at the Congress 2004 in Hungary. This was followed by a session on the Authorisation rights to Issue ISTA Certificates.

At this meeting two long-time ISTA members were honoured with ISTA plaques: Dr. Julianna Banyai, who celebrated her 80th Birthday at the time of the meeting, has made great contribution to the ISTA aims within the ISTA Statistics Committee, and Dr. Hans Arne Jensen, who recently went on retirement after his excellent work within the ISTA Purity Committee. We wish both of them all the best for the future.

There is only 8 months until the 27th Congress in Budapest next year. Our Secretariat will give special presentation in this issue so that I do not need to elaborate on the subject. At the Congress all aspects of Seed Science and Technology will be addressed. Scientists and Technical Experts, who work in the field of Seed, delegates of governments and seed companies from all over the world will discuss the newest developments regarding applied seed testing research, the enhancement of the ISTA Rules and the work of the Technical Committees.

Important discussions and decisions about the structure and leadership of our association, which effects us all deeply, awaits us, - therefore I encourage you to meet me in Budapest!

In closing I would like to thank everyone for your contributions towards the success of the Extraordinary Meeting, and I would like to appeal to you that we work together to achieve our aims, so that we may all travel to the riverside of the Donau in Budapest with good results and plans.

Your President
Norbert Leist

ISTA - an association of seed testing laboratories from the public and the private sector: What does this mean in regards to governance and voting rights?

Some considerations

By Michael Muschick, ISTA Secretary General

Change in the environment

Undoubtedly, over the last decade big changes and evolutions have occurred in the political and agro-industrial environment in which ISTA operates. While in the past the seed certification process was carried out by official Seed Certification Agencies with official field inspectors and official seed testing stations, nowadays most national governments and international governmental organisations started experiments to allow participation of the seed industry in the seed certification activities. Evidently the governments want the seed industry to play a more important role in quality control and the certification of seeds and consider the seed certification not any longer a strictly governmental task.

In Australia for example, seed quality management has become a completely private sector business, without any direct governmental involvement. In 1998 the EU Commission organised a temporary experiment with the aim of assessing whether seed sampling for the purpose of seed testing and seed testing under official supervision may constitute improved alternatives to the procedures for official seed certification, without a significant decline in the quality of the seed (EU experiment 98/320/EC).

On international level, the OECD Seed Schemes started a derogatory experiment on seed sampling and seed analysis in the year 2000, where persons and laboratories not being under the direct and exclusive authority of the National Designated Authority may be authorised to draw samples and analyse these samples under the Schemes.

Therefore in large parts of the world seed quality assurance becomes more and more a responsibility of the private seed sector and less a governmental task.

A tremendous change in ISTA has happened in the year 1995 when the Designated Authorities of ISTA decided that ISTA membership should be opened to all kind of seed testing laboratories.

How does ISTA respond to this development?

Since the beginning of ISTA, the official seed testing stations, being responsible for the seed quality control in the laboratory as part of the national seed certification scheme, have come together in ISTA to discuss and harmonise technical questions regarding seed sampling and testing and - as it is stated in the ISTA Constitution until today - to develop, adopt and publish standard procedures for sampling and testing seeds, and to promote uniform application of these procedures for evaluation of seeds moving in international trade. ISTA was and is mainly concerned with technical questions and challenges.

Being concerned with technical questions, ISTA has indisputably been an intergovernmental organisation since its beginning in 1924 until 1995, where the ISTA Constitution clearly stated:

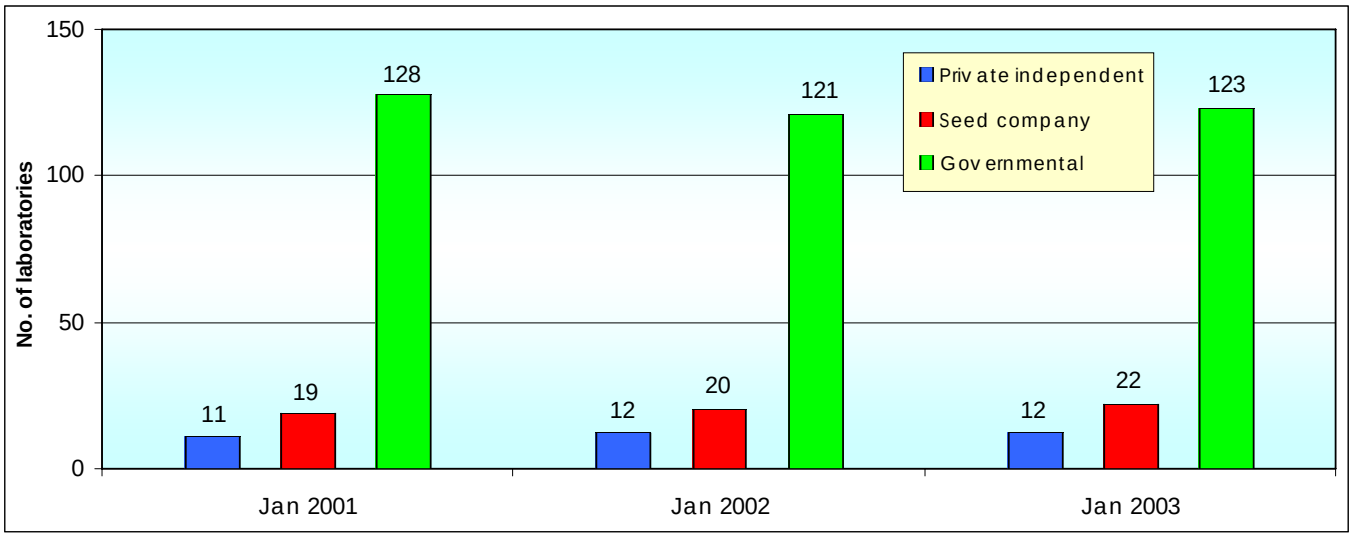
Article IV (a) "Accredited members are persons engaged in the science or practice of seed testing or in the technical control of such activities, who are designated by their respective Governments to participate in the affairs of the Association on behalf of such Governments." and Article IV (b) "Accredited Laboratory Members are seed testing stations, designated by their respective Governments and are authorised to cooperate with the Association on behalf of such Governments."

As clearly were the voting rights:
Article IX (a) "Irrespective of the number of accredited members designated by a single Government, only one vote may be cast on behalf of that Government."

To say it more simple, all persons and laboratories needed to be designated by their national government to participate in all affairs of the Association. Work within ISTA was only possible with the agreement of the corresponding national government. Consequently the voting rights were also held by the government and the financial sources of the Association came form the government as tax payers money.

A tremendous change in ISTA has happened in the year 1995, when the Designated Authorities of ISTA decided that ISTA membership should be opened to all kind of seed testing laboratories, disregarding governmental, private or company status.

Table 1. Composition chart of the ISTA laboratory membership 2001-2003



After the Constitution Change in 1995 the corresponding article currently reads as follows (Article IV):

"(a) A Designated Authority is an authority designated by a government to act on its behalf in designating Designated Members and in liaison with the Association, in particular regarding the accreditation of member laboratories."

"(b) Designated Members are persons and/or laboratories engaged in the science or practice of seed testing or in the technical control of such activities, who are designated by their respective Designated Authority and admitted by the Association to participate in the affairs of the Association."

"(c) A Member is a person or seed laboratory who/which supports the Association and its objects and is admitted by the Association."

"(d) The duly designated Designated Members shall be entitled to vote in meetings of the Association, subject to the provisions of Article IX."

"(e) An Accredited Laboratory is a member laboratory accredited by the Executive Committee according to the Accreditation Standards approved under Article VII(c)(14) of the Constitution and fulfilling the requirements for independence given in these standards."

Hence, after 1995 also company and private independent laboratories could become members of the Association and consequently, since 1995, ISTA could observe an increase in its membership by laboratories from the private sector. Today these generate 22% of all ISTA laboratory members.

In the year 1999, the Designated Authorities decided in a postal vote that company laboratories could become accredited and authorised to issue ISTA Certificates. Consequently today a number of company laboratories participate in this experiment and finally are authorised by the Designated Authority to issue ISTA Certificates.

Clearly seed testing laboratories from the private sector should be included in the affairs of ISTA following ISTA's vision of "Uniformity in Seed Testing" at an international level.

With the Constitution Change in 1995 and the start of the experiment on the accreditation and authorisation of company laboratories to issue ISTA Certificates in 1999, the membership and the accreditation program have been opened up for all kind of seed testing laboratories. Unquestionably it was the wish of the Designated Authorities to include seed testing laboratories from the private sector in the affairs of ISTA, following ISTA's vision of "Uniformity in Seed Testing" at an international level.

Today we have members participating in ISTA on behalf of their governments as well as members from the private sector participating in ISTA. Consequently groups with different backgrounds and, different expectations towards the Association are coming together in ISTA. This development makes the discussions inside ISTA definitely more interesting, however not always easier.

Financial aspects and the Changes in the source of finances

Members from the private sector have the same duties in ISTA as members from the public sector. Both groups pay the same membership fee. By talking about the finances, we need to be aware that 10 - 20% of ISTA's finances come directly from the private sector as membership fees for these laboratories.

Another trend and change that occurred over the last decade for the governmental laboratories also needs to be taken into consideration:

More and more governmental laboratories become financially autonomic, meaning that their source of income is no longer the tax payers money, but they have to gain their own income through business activities of their laboratories.

These laboratories have an official mandate from the government to fulfil official duties like the official seed certification program, however in regards to finances they are independent from the government.

The ISTA membership fee in most of the above mentioned cases is paid by the laboratories themselves, as of money gained from their business activities and no longer from the tax payers money from the government. This tendency of privatisation in regards to the finances of governmental laboratories still seems to continue in an increasing number of countries.

Consequently the Association needs to be

aware of the fact that a continuously growing part of our financial income is coming from the business activities of our members and not from the tax payers money.

While before 1995 a split in regards to finances between governments and governmental laboratories would not really have made sense since all charges were covered by tax payers money, the situation looks quite different today.

The financial sustainability of ISTA is more and more carried by the ISTA member laboratories, which have to gain that money from their own business activities.

Summarising the above mentioned facts:

1. In large parts of the world governments change/have changed their policy in regards to seed certification and seed quality control by sharing the responsibilities between the public and the private sector.

2. ISTA reacted to this development by opening up its membership, the Technical Committees and the accreditation program to seed testing laboratories and personal members from the private sector.

3. The ISTA membership today is slowly growing, mainly by incoming member laboratories from the private sector, while the number of governmental laboratories is gradually reducing.

4. The membership fees securing the financial sustainability of the Association increasingly come from business activities of ISTA members and not any longer solely from tax payers money.

But what does this opening up of all ISTA activities for the private sector mean for the voting rights and the governance structure in ISTA? Until today all voting rights lay in the hands of the governments. The ISTA Constitution states:

Article IV (b) "Designated Members are persons and/or laboratories engaged in the science or practice of seed testing or in the technical control of such activities, who are designated by their respective designated Authority and admitted by the Association to participate in the affairs of the Association" and Article IX (a) "Irrespective of the number of Designated Members designated by a single Government, only one vote may be cast on behalf of that Government".

Noticeably the Governments decided that the load of seed certification and seed quality assurance should be split between the public and the private sector and apparently the governments of the ISTA member countries wish that seed testing laboratories from the private sector can participate in all affairs of the Association.

But are ISTA's member governments also in favour of sharing the voting rights between the public and the private sector and consequently to allow the private sector to play an active role in the governance of the Association?

Will private seed testing laboratories join the Association if they on one hand are also responsible for the performance and financial sustainability of the Association, but on the other hand do not have any kind of voting rights inside the Association and do not have the chance to be involved in the governance of the Association?

and

Since the load of seed certification and seed quality assurance is already split between the public and the private sector by decision of the governments, what does it mean for the "Uniformity in Seed Testing" (ISTA's vision) and ISTA's sustainability, if the private sector is not largely joining the Association?

for me at least one thing remains clear: no rights without duties, but also no duties without rights.

Three important questions, which should be intensively discussed at the upcoming 27th ISTA Congress in Budapest. The Executive Committee of ISTA is already working towards coming to a decision from the Designated Authorities of all the 73 ISTA member countries in that questions. Undoubtedly, this discussion and decision will not only be an outstanding discussion and decision for ISTA, it will also be a milestone in the history of the Association.

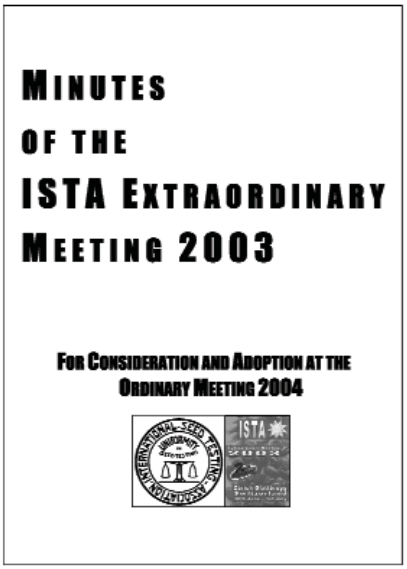
Indisputably these decisions will have a major influence on the future development but also on the sustainability of ISTA.

Difficult to tell what the future brings, however, for me at least one thing remains clear: no rights without duties, but also no duties without rights. ■

Press Release

Minutes of the ISTA Extraordinary Meeting 2003

Cited and Published
By the ISTA Secretariat



This document summarizes and concludes the discussions and decisions of the ISTA Extraordinary Meeting 2003 in Glattbrugg/Zurich, Switzerland, July 2 and 3. The full spoken text of the meeting is not quoted in these Minutes. However, the whole Extraordinary Meeting has been recorded on tape, and is at disposal of any interested person.

As minutes of the subsequent meeting of the ISTA membership, this transcript proceeds the Minutes of the Extraordinary Meeting 2002 in Santa Cruz, Bolivia [Internal Items/M/D(2003)06]. These minutes contain a complete list of all participants of the meeting.

Available as of October 2003 from the ISTA Secretariat.

Price: Swiss Francs **CHF 70.-** *(approx. US$ / EUR 49.-)

***Note:** This publication will be delivered as a free service to all ISTA Members, Designated Authorities as well as to the participants of the ISTA Extraordinary Meeting 2003. It will also be distributed to all participants of the upcoming ISTA Congress 2004 to be held in Budapest, Hungary, May 13-24 *(see more details on upcoming ISTA meetings on page 12).* ■

ISTA Extraordinary Meeting 2003

General Report

By Sarah Anne Meier, ISTA Marketing

The 2nd ISTA Extraordinary Meeting 2003 was held in Zurich, Glattbrugg, Switzerland from June 30th to July 3rd. It was attended by 138 delegates and accompanying persons from 45 countries. The success of the meeting can be attributed to Switzerland's central position in Europe, and easy accessibility from around the world, as well as the efficient organisation of the event by the Secretariat. Also to be considered was the promise of lively discussions from the full programme, covering many interesting topics.

ISTA appreciated the representation from many associated international organisations, including the International Seed Federation (ISF), the Organisation for Economic Co-operation and Development (OECD), the European Commission, the International Union for the Protection of New Varieties of Plants (UPOV), the Eastern European Seed Network (EESNET), the Society of Commercial Seed Technologists (SCST), and the Asian Pacific Seed Association (APSA).

The first 2 days gave the opportunity to all the ISTA Technical Committees to make short presentations of their activities. Sessions were also dedicated to various technical subjects, including Testing of GM Seeds - Chapter in the ISTA Rules and international harmonisation, Generic Method Validation Programme, ISTA Quality Assurance Programme, Accreditation of Laboratories world-wide - latest developments and international collaboration, Discussion on ISTA's relationship with governments.

Day 3 saw the start of the Ordinary Meeting, which over the allotted 2 days covered such topics as discussion on Governance, including Authorisation Rights, Voting Rights and Voting Procedures, and the consideration and adoption of the Proposed Rules Changes. Special presentations were made to Dr. Hans Arne Jensen and Dr. Julianna Bányai for outstanding services for the Association. The timing of the meeting coincided with the retirement of Dr. Jensen and a special birthday for Dr. Bányai.

From left to right: Dr. Hans Arne Jensen, Prof. Dr. Attilio Lovato (seated), Prof. Dr. Norbert Leist, Ms. Patricia Raubo.

The Extraordinary Meeting was also the venue for separate ISTA Technical Committee meetings, many of which were open to all the delegates, providing the opportunity for interested persons to find out more about the committees, and of course for impromptu workshops and lively discussions between committee members.

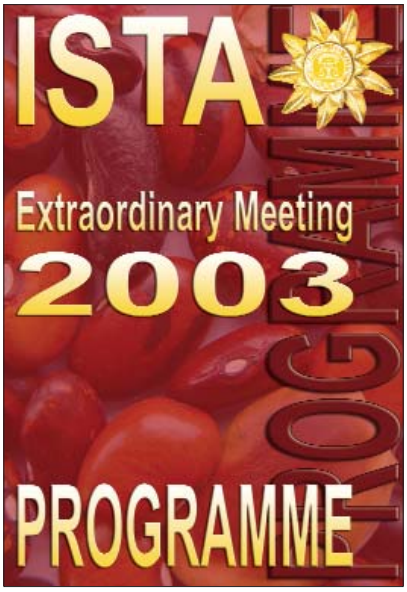
Above: Dr. Julianna Bányai

The official dinner was held on the Wednesday evening including a pre-dinner drink in the lobby, followed by a typical Swiss dinner, which was enjoyed by all. As is the tradition at ISTA meetings, after the dinner many of the members joined in the dancing, and the foxtrot, two-step and tango were most professionally performed to the pleasure of all the delegates!

The Secretariat would like to take this opportunity to thank all the delegates for their support of the Extraordinary Meeting, many of whom travelled a great distance to participate and ensure that the meeting was the great success that it was.

Technical Committee Reports from the Extraordinary Meeting

Zurich, Switzerland, June 30 - July 3, 2003



Flower Seed Committee Meeting

June 30, 2003

By Zita Ripka, ISTA FSC Chair

ISTA Flower Seed Committee Meeting

6 members were present: Lea Mazor, Sylvie Ducournau, Rita Zecchinelli, Sharon Davidson, Petra Remeeus, Hakon Tangeras. Discussion points:

1. Handbook proceedings: Main general chapters and 6 work sheet drafts are before final editorial works (*Calendula, Gaillardia, Tagetes, Impatiens, Viola, Dianthus*). 2 draft work sheets are before circulation within FSC members (*Cyclamen, Petunia*).
Next species and genera will be in the handbook mainly from the Asteraceae family and other species, which were on the list of the most frequently tested species. For these next work sheets questionnaires will be circulated within FSC members to prepare a draft and detect difficulties.

2. Shared information about the work of AOSA/SCST Flower Seed Committee proceedings: new handbook is under edition there also from the procession and production point of view.

3. Future programme of the committee:
- basically we will continue the preparation of work sheets
- establish a proficiency test programme for ISTA laboratories that listed flower seed testing in their scope of laboratory accreditation

4. Establish a Working Group within FSC members for a comparative germination test of Begonia semperflorens.

Meeting with ISTA Proficiency Testing Committee

Since the future programme of ISTA for technical committees will stress the importance of proficiency testing FSC will have to take part in this activity in the next 3 year period. ISTA PTC started preliminary discussions with the technical committees about the possibilities of cooperation in this field. Presently we collect data about the number of interested laboratories and their activities from the ISTA Secretariat to be able to make a long term proficiency testing programme for flower seed testing (germination first and purity later).

Vigour Committee Meeting

June 30, 2003

By Alison Powell, ISTA VIG Chair

Six members of the Vigour Committee were present at the EOM and able to attend the committee meeting, namely Alison Powell (Chair), Michael Kruse (Vice Chair), Ernest Asiedu, John Hampton and Charlotte Leonhardt. In addition four other participants in the EOM attended.

The meeting considered the progress of the committee in achieving its terms of reference. Many of the terms of reference had been completed (see report of the Vigour Committee). The targets for the outstanding work in the next year were discussed -

· The proficiency test for the Conductivity Test for garden peas had been successfully completed, although the results have yet to be reported. A similar programme of proficiency testing will be set up for the Accelerated Ageing test for soyabean.

· The progress of the working groups was discussed. Targets were established for work to be completed by the working groups on Accelerated Ageing for wheat and the Conductivity Test for soyabeans. Appropriate conditions for completing AA for wheat would be established before the next ISTA meeting and comparative tests for conductivity of soyabean would be underway by the end of 2003. A round of comparative testing for AA of maize would also be completed.

· A programme for the development of a joint ISTA/AOSA Vigour Test Handbook would be developed.

Possible future targets of the committee for 2004-2007 were also discussed.

· The approach of the committee to extend the species base for the two validated vigour tests was generally supported. Proposals were put forward to continue examining the application of the Conductivity test to soyabean and to consider its application to *Phaseolus vulgaris* and possibly cowpea (*Vigna unguiculata*). For Accelerated Ageing, establishment of appropriate test conditions for wheat would enable comparative tests to go forward and tests on maize could be continued.

· It was also proposed that the comparative tests on the Controlled Deterioration test, that have been completed for eight years, provide a basis on which the test could be put through the ISTA Method Validation Programme. This drew the attention of the committee to consider whether specific requirements for the validation of vigour tests were needed within the Method Validation Programme.

· The committee noted the intention to develop a rating system to indicate the proficiency of laboratories to complete specific testing procedures. The meeting felt that proficiency tests for seed vigour testing should be planned to include two in every three-year period, which would enable the committee to develop the basis on which laboratories can be rated on their performance in completing the tests.

Moisture Committee Meeting

June 30, 2003

By Harry Nijënstein, ISTA MOI Chair

Future improvements of the Moisture chapter in the Rules

Seed moisture tests are often carried out because of their relationship with the storage potential of seeds: only dry seeds can be stored safely. The constituents of a seed influence this relationship between seed moisture content and longevity.
The relationship between the relative humidity of the air in between seeds and longevity is more direct. Seed banks often use this method for assessing moisture content already. It is a non-destructive method. Therefore it was decided to develop a Rules-chapter describing how to measure percentage Relative Humidity of a seed sample.

At present the Karl-Fischer-method is considered to be the basic reference method for moisture. This method is mentioned in the general part of the Rules. But it is not described in the Rules. If we would want to keep this method as basic reference method, we would need to develop a chapter for it.
However, this method has as the main disadvantages that it is expensive, difficult to learn, and not widespread available among ISTA members. Alternatives have the same or more disadvantages. During our meeting it was suggested to use the oven for validating new species. The committee will develop a Rules-chapter describing method validation by means of an oven procedure.
The present Rules chapter for the oven method needs major revision. Auditors indicated that many inconsistencies exist, and that vital information is missing. It was therefore decided to revise the moisture chapter. At the same time the white and yellow pages will be amalgamated.

Proficiency testing

The results of the proficiency testing of February 2003 (Trifolium) look promising. The results will be distributed to the participants in December.
It is planned to have a next proficiency test for moisture in February 2004. This will be an extra round, in combination with tetrazolium. The species will be a cereal, for which grinding will be involved.
This second proficiency test round will also be used for obtaining information about the need for grinding and about the state of the art of seed testing. This means that the seeds will be accompanied by a questionnaire. Questions will include: type and size of containers, calibration of thermometers and oven, presence of fan in oven, and more).
The Z-scores resulting from proficiency tests in 2003 and 2004 will be the basis for developing a rating system in 2004. The results of both test rounds will also be used for determining the frequency of future proficiency tests.

Workshops

The first ISTA workshop on moisture testing will be November 3-7 in Denmark. There are still a number of places available. If you are interested you can register through the ISTA website.
We are planning a second workshop in autumn 2004. This has to be confirmed by the local organisers however.

Statistics Committee Meeting

July 1, 2003

By Sylvain Gregoire, ISTA STA Chair, Christoph Haldemann, Jean Louis Laffont and Kirk Remund.

The Statistics Committee works for different committees, nevertheless as GMO testing was an important matter on the agenda in Zurich, only the work about **GMO testing** has been presented during the committee session.
Last year the Statistics Committee acted mainly as a support to the **Proficiency Test subgroup** lead by Bettina Kahlert from the Secretariat, and more generally as a support to the GMO task force and ISTA Secretariat. Sylvain Gregoire, Christoph Haldemann, Jean Louis Laffont and Kirk Remund made some presentations about this work to the audience.

The theoretical background of these proposals is well established from classical methods used broadly in Statistics (sampling, quality control, confidence intervals, generalised linear models, Bayesian statistics, etc).
From these general methods, the Statistic Committee has produced original proposals and developed interactive computer programs to **fit ISTA and more general needs such as:**
- Provide tools to define sample size and decision rule appropriate to present or future levels of detection, and the associated statistical risks,
- for qualitative assays to help to define sampling plans which are robust to false positive or false negative results, in view to secure the decisions when laboratories can not ensure they have a zero error rate,
- for quantitative assays to help define sampling plans which are robust to observed sample preparation and method variability in the laboratories,
- provide criteria to help experts to define whether laboratories performed well or not in a given proficiency test,
- provide methods to use results from a set of proficiency tests.

If we focus on the interpretation of the results from individual proficiency tests, we worked on three types of results:
- qualitative results, when the laboratory gives presence or absence as the result,
- semi-quantitative results, when from presence or absence in a number of independent sub samples the laboratory can tell about compliance to threshold(s),
- quantitative results, when the laboratory quantifies an amount of material.

Error rates, confidence intervals, expected and observed variability are used as objective elements. In ISTA proficiency tests the "true value" of the samples sent to the laboratories is known in advance. Great care is taken for both kind of samples, those containing specifically spiked seeds, and those containing only one source of material.
Without the help of statistics the answer would only be "the laboratory made X mistakes from the Y samples received".
Statistics shows that if you have enough samples you can prove a good performance even when you make a few mistakes, but also that -if you do not have enough samples- a perfect match can not prove your error rate is low.

Now looking at the possible uses of a set of proficiency tests, we developed different proposals to compute all available data together. This allows a better use of available information, and computation of statistical risks associated to a global decision.
These proposals received a positive feedback from Statisticians as well as from GMO experts. To make it easy, we associated green (ok), grey (to be looked at) and pink (problem) colour codes to the statistical values and the suggested decisions, in the papers and spreadsheets that were made available for the experts.

The general approach in ISTA for other types of tests is to rank the laboratory with A, B, C, or BMP (Below Minimum Performance) separately on each proficiency test; and to compute a cumulative score on the last set of 6 proficiency tests. For the sake of simplici-

ty and harmonisation ISTA will probably use this scoring technique also for GMO tests.

The experience shared among experts, the internal papers produced, the tools that are available in a toolbox on the ISTA website constitute a solid basis for ISTA and non ISTA future work. It is important to note most of the features that have been developed are not "GMO tools", but could be applied for other types of tests on seeds.

Germination Committee Meeting
July 1, 2003

By Joël Léchappé, ISTA GER Chair

The committee, gathering 11 persons from the committee or working groups and Bettina Kahlert, Doug Ashton, discussed the main items for the coming period.

Handbook on seedling evaluation
The main item is to finalise the handbook for seedling evaluation. After a 3 days meeting in November 2002 and several exchanges among the committee, Ron Don the author of the revised version has proposed a near finalised version. The final editorial and technical points quite numerous should be achieved soon.

Quality assurance
A feed back from other meetings, as the auditors meeting leads the committee to consider to make the rules more consistent with QA requirements. E.g. Is it compulsory to apply the tolerances on all categories of germs at the end of a germination test? Is the duration of prechilling recommended in table A compulsory? This is a long terms work which will go step by step.

Use of artificial compost as primary substrate
More and more laboratories are interested in using the artificial compost as a primary substrate. This item initiated in Angers 2001 is in quick progress. Leaded by Sylvie Ducournau (France) and Loren Wiesner (USA) the work is following the main steps of the "program for method validation". Several laboratories from ISTA and AOSA have participated.

Breaking dormancy
A proposal to check the accuracy of the use of KNO3 treatment to break the dormancy of cereal seeds has been discussed. Günter Müller (Germany) volunteered to lead a work in order to set up a rule proposal for Budapest in 2004.

Germination of tropical and subtropical species
Doris Groth from Brazil has joined the committee working programme proposing to share her experience in tropical and subtropical species. The objective is to propose the introduction of new species into the rules. The experience is based on more than 20 years of experience in Brazil. We can expect more tropical species into the rules in the next few years.

Other items have been discussed on
- Harmonisation between ISTA and AOSA
- The use of X-ray.

Purity Committee Meeting
July 2, 2003

By Maria Rosaria Mannino, ISTA PUR Vice-chair

During the Committee Session, the Committee work programme and the main results obtained by the working groups were presented to the participants. The future aims were also exposed. Different meetings were-also organised on most items of the Purity Committee.

Universal List

The committee have started work on developing a list of species that all seed testing stations would be expected to retrieve and identify. These species have to be present on the seed collections of ISTA laboratories. On this objective, a survey form was sent to all ISTA members for whom species are important in their regions. On the basis of the responses, a preliminary draft had been prepared, distributed to the members of the committee and discussed during the meeting.

The participants agreed on the necessity of adding other species, for example from tropical and subtropical countries. The list should be extended to 120-130 also by adding species which are important in relation to the quality standards (ex. *Cuscuta*). This is a project which has already been started.

The Proficiency Test Committee suggests that this list should not to be too big because it represents only the minimum requirement for laboratories. It should be an aim of the committee to prepare a document on how to improve the technical ability to identify the seeds from the universal list. With the contribution of ISTA laboratories, it would be useful to list the botanical gardens or the seed stations holding seed samples. We also discussed the list diffusion on the ISTA web site.

Purity of *Poa pratensis*

The committee members discussed changing the blower setting for *Poa pratensis*. In fact, the current uniform blowing pressure is not satisfactory for the small seeded varieties. After blowing, the inert matter contains a certain percentage of pure seed according to PSD 41. During the meting in Zurich, Harry Nijenstein presented the results obtained in the two ring tests that have been organised in order to find out how this problem could be solved.
A joint ISTA-AOSA working group lead by Anny van Pijlen and Sharon Davidson will work on this subject with the aim of preparing a Rule change proposal (ISTA, AOSA). 3 members of the Purity Committee shall join the working group.

Seed mixtures

As the EC asked, an ISTA working group has prepared a draft of rule for seed mixture analysis. In Zurich the group exchanged about some technical points:
- the size of working sample, when only a germination analysis is required and when purity and germination analysis must be carried out;
- the percentage of each specie: by weight or by number;
- the method of sample division, rotary, riffle, or conical divider;
- blowing of *Dactylis glomerata* (barnyard grass), *Poa pratensis* (Kentucky bluegrass) and *Poa trivialis* (rough bluegrass);
- the number of seeds for the germination test in relation to the sample size;
- tolerances should be used when comparing the results for component percentages;
- result report on the Orange International Certificate.

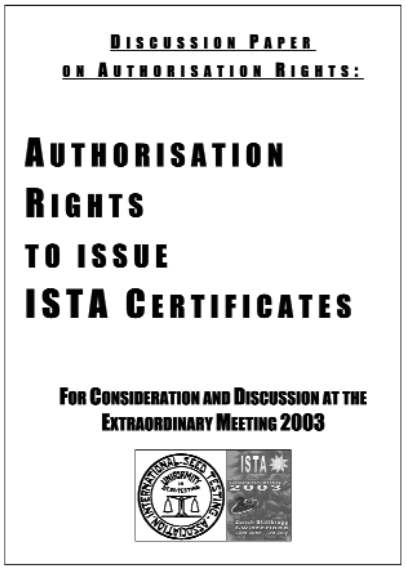
During the meeting, we noticed the importance of clearly understanding the objective of the EC request for structuring in consequence the work. The EC has been asked and a first response has been given at the end of the meeting in Zurich.

Purity workshop in Budapest

The main aims of a purity workshop are improving the uniformity in seed testing and discussing on new ISTA proposal (rules, products, publications). In relation to these objectives, some suggestions have been discussed about the subjects that we want to include on the program:
a. correct use of PSD (explanation and practical works).
b. difficulties of seed identification
c. new proposal of ISTA rule changes
d. discussion about the Universal List

Discussion Paper on Authorisation Rights: Authorisation Rights to Issue ISTA Certificates

Distributed at the ISTA Extraordinary Meeting in Zurich, Switzerland June 30 - July 3, 2003



STRATEGIC DIRECTIONS FOR ISTA - AUTHORISATION RIGHTS

Discussion paper by the Executive Committee distributed to the members for consideration and discussion at the Extraordinary Meeting 2003 in Zurich

The political and agro-industrial environment in which ISTA operates has changed dramatically over the last decade. Historically, ISTA sprang from times when government by necessity, had to pay closer attention to regulation of seed quality in the interests of food security. However, in most of the developed world and many areas of the developing world this argument for continued regulation is now politically difficult to sustain. Regulation of seed quality and the provision of public sector seed quality assessment facilities is being questioned and in many countries it has become the policy of governments to devolve as much as is politically possible of such functions to the private sector.

Seed quality management is increasingly becoming a private sector function. A large number of countries want the seed industry to play a more important role in quality control and the certification of seed lots and these countries have developed structures of licensing and/or accreditation of such private sector involvement. ISTA has responded with some vigour to these developments:

- In 1995 changes to the constitution allowed private independent seed testing laboratories to become ISTA Member Laboratories which could be, accredited and allowed to issue ISTA certificates; and

- In 1999 an experiment on the accreditation and authorization of company seed testing laboratories was initiated.

Private independent and company laboratories have the same duties in ISTA and are paying the same membership fees as governmental laboratories.

Despite these changes and initiatives the majority of the ISTA laboratories are governmental/or governmental sponsored. The number, and growth in the numbers, of private independent laboratories and company laboratories that have become ISTA Members is less that predicted by the seed trade who were keen to have ISTA membership opened up.

At the present time National Designated Authorities have a defacto veto right on whether an ISTA accredited member laboratory can issue ISTA Certificates. After being accredited a member laboratory whether governmental, private or company is only authorised to issue ISTA Certificates once agreement is obtained from the laboratory's Designated Authority. Should agreement of the Designated Authority not be forthcoming the laboratory is not allowed to issue ISTA Certificates.

The ISTA Secretariat is aware of a number of commercial ISTA Member Laboratories, in a number of different countries, that have been unable to get the agreement of their national Designated Authorities to issue ISTA Certificates for their clients and/or companies. To such laboratories this situation seems to be an injustice and gives them the feeling that they are not recognised as full members of the ISTA with equal rights. In addition, they see the role of the Designated Authority in deciding who can, or can not, issue ISTA Certificates as being political interference in something that should be purely a technical matter.

At the 2001 ISTA Congress in Angers the Designated Authorities agreed to the following Mission Statement/Vision for ISTA:

"An international seed science and technology-based association, non-political and not-for-profit, legally independent from both governments and commerce, for seed technology, development and validation of sampling and testing methods, accreditation of laboratories and issuance of certificates"

This Mission Statement/Vision underlines the technical nature of ISTA as well as the fact that ISTA accreditation and authorisation should be based solely on the technical competence of seed testing laboratories.

The question arises therefore:

Does a national Designated Authority need to have a veto right on the issuance of ISTA Certificates when a Member Laboratory has proven it's technical competence in ISTA proficiency tests and in the ISTA audit and accreditation programme?

At the Zurich Extraordinary Meeting in 2003 Designated Authorities, ISTA Members and other stakeholders are invited to intensively discuss the above mentioned question. The outcome of this discussion will influence further discussion and future actions of the ISTA Executive Committee in regards to that question.

THE PROS AND CONS OF INVOLVING GOVERNMENTS IN THE DECISIONS ON THE AUTHORISATION OF LABORATORIES

To stimulate discussion on the above question the ISTA Executive Committee has listed some of the advantages and disadvantages of involving governments in decisions relating to the authorisation of accredited laboratories to issue ISTA Certificates.

International Seed Lot (ISTA) Certificates are used by a number of organisations:

- Governments and Governmental organisations use ISTA standardised sampling and testing procedures as a technical basis for their regulatory framework and ISTA Certificates as the basis for the world-wide trade in seed.

- The Seed Industry uses ISTA Certificates to make informed decisions regarding the purchase of seed from other countries and to facilitate the sale of seed to other countries.

- Growers use ISTA Certificate to make informed decisions they make on the purchase of seed.

- Inter-governmental organisations (FAO, other UN agencies, OECD, UPOV, World Bank etc.): use ISTA as the standard procedures setting authority and the ISTA Certificate as a measure of seed quality.

- International organisations of the seed industry, such as ISF, AFSTA, APSA and ESA using the ISTA Certificate as a report on quality of seed and this information is used to inform marketing decisions and facilitate international trade.

Before any change to the authorisation process is contemplated it is important to consult all of these users. Of particular importance are the Designated Authorities who presently have to agree before an accredited public or private sector laboratory, located in their country, is granted authorisation to issue ISTA Certificates.

1. Pros of involving Governments

The Designated Authority represents the Government of a country and the support of governments is vital for ISTA's continued existence. Although there has been a decrease in government members through public policy initiatives, government sponsored members and laboratories form the largest grouping within the Association. It is important for the viability of the ISTA that caution is applied in contemplating changes in the relationship between governments and ISTA. From the discussion on voting rights at the extraordinary meeting in Bolivia (2002) it was clear that the majority of governments and members see change as a gradual process occurring with the agreement of governments.

In some cases changes to the present authorisation procedure may pose legislative problems for governments. In countries where ISTA standardised sampling and testing procedures are used as a technical basis for marketing regulations and ISTA Certificates as the basis for trade agreements it may be essential for the government to maintain a veto on authorisation. Without such a veto the countries legislation would be subordinate to ISTA. Constitutionally this would pose many problems and could lead to a disengagement of governments from their activities within ISTA and a removal of mention of ISTA (Rules and Certificates) from legislation and trade agreements.

2. Cons of involving Governments

The involvement of governments in authorisation decisions is purely political and it undermines ISTA accreditation and the independence and non-political status of ISTA. Accreditation pertains to the technical and managerial competence of a seed testing laboratory and accreditation is form of recognition of that competence, based on an assessment of compliance with the ISTA Standard.

The conditions and requirements for laboratory accreditation are the same for all categories of ownership (public, private and company). In essence, a laboratory has to adhere to the ISTA Rules for Seed Testing, have competent staff and appropriate equipment and demonstrate its independence of judgement and integrity in relation to sampling and testing. Accreditation also covers the reporting of results and by granting accreditation ISTA is giving formal recognition that a laboratory is competent to issue ISTA Certificates. By granting accreditation to a seed testing laboratory, the International Seed Testing Association recognises the laboratory's competence for seed testing, the validity of its analysis and the results it reports.

By allowing Designated Authorities to have the power of veto over who can or cannot issue ISTA Certificates introduces a political aspect into a process that should be entirely technical and undermines the validity of the entire accreditation process and the ISTA Accreditation Standard. Government and government sponsored laboratories are the largest grouping of accredited laboratories within the association and this is likely to remain the case until the veto of Designated Authorities in the authorisation process is removed. Accreditation is an expensive process for seed testing laboratories and there is no incentive for private or company laboratories to become accredited if Designated Authorities have the power of veto over their right to issue ISTA Certificates after they have become accredited. ■

The 27th ISTA Congress - A Milestone for ISTA

Budapest, Hungary, May 13 - 24, 2004

By Michael Muschick, ISTA Secretary General

Time is running really fast and after the very successful ISTA Congress in 2001 in Angers, France, ISTA is today standing shortly before its 27th Congress. On May 13th, 2004 the 27th ISTA Congress will begin in Budapest, Hungary, in the midst of the heart of Europe.

As usual the ISTA Congress will be the most outstanding event for seed scientists and technicians around the globe. In a two week period - from May 13 until May 24 - the 27th ISTA Congress will tackle nearly all aspects of seed science and technology. Seed scientists and seed technicians, governmental officials and seed industry representatives from around the world will discuss about the latest developments in applied seed science, improvements to the International Rules for Seed Testing, the planning of further enhancements in regards to the Quality Assurance System of ISTA, enhancements and enlargements of the International Rules for Seed Testing and important discussions and decisions in regards to governance items of the Association itself.

The 27th ISTA Congress in Budapest will be separated into three official parts: from May 13 - 15 the ISTA Technical Committees will meet, then from May 17 - 19 the Congress continues with the ISTA Seed Symposium, followed by the Ordinary Meeting of ISTA on May 20 - 21, 2004. The remaining time from May 22 - 24 has been reserved for the Post-Congress Tours.

The **Technical Committee Meetings from May 13 - 15**, should bring together all of our 300 Technical Committee Members from the 17 ISTA Technical Committees and Task Forces. Discussion will mainly evolve about the further enhancement of the International Rules for Seed Testing, the training and education programme including new publications of the Technical Committees and discussion on the presented Rules Changes 2004.

Of special interest is clearly the elaboration of the Terms of References, the strategic working programme of the Technical Committees, defining the priorities of the work of each Technical Committee for the upcoming triennial period until the next Congress in 2007. The meetings are open to everyone and we welcome all and hope that representatives from the public and the private sector as well as all interested seed scientist and technicians will give their input to these meetings.

Furthermore the planning of the upcoming workshops will be discussed and decided on during these meetings.

The **ISTA Seed Symposium from May 17 - 19**, will not only be *'the largest international gathering of scientists from applied seed science and a unique forum for the interchange of ideas between seed scientists and technicians'* as stated in the newsletter of the International Society of Seed Science, but it will bring together the leading seed scientists from all over the world to discuss research and the developments in applied seed science over the last three years under "Towards the future in seed production, evaluation and improvement", the theme of the Seed Symposium, structured into the following 7 sessions:

Session 1: Application of advanced technologies
Session 2: Organic and conventional seed production
Session 3: Viability and vigour: evaluation and impact
Session 4: Seed systems in emerging and developing economies
Session 5: Seed Lot hygiene
Session 6: Seed improvement
Session 7: Physiological basis of seed quality

Next to these 7 sessions there will also be a poster session. ISTA is looking much forward to welcoming all the experts in seed science and technology and everybody who is curious to learn more about the latest results in the research in applied seed science.

The last two days of official Congress will be occupied by the **Ordinary Meeting of ISTA from May 20 - 21**. As usual the voting delegates appointed by their respective governments of the currently 73 ISTA member countries will decide about the latest Rules change proposals. But also important questions on the governance will be discussed during this important meeting. Essential questions like the voting rights and the authorisation rights to issue ISTA Certificates will be discussed and possibly decided during that Ordinary Meeting.

While there is a consensus within ISTA to continue the work with the governments, the question should also be discussed whether the ISTA member laboratories will get some kind of voting rights as well.

After the historic changes of the ISTA Constitution in the year 1995 (please read more on this subject in the article *'What will be the role of the Governments in ISTA in the future?'* on page 3 in this issue), this Ordinary Meeting in Budapest could see new changes, which could transform the face of ISTA tremendously. This Ordinary Meeting could become a significant milestone in the history of ISTA.

We would like to specially encourage representatives of the Designated Authorities to participate in this Ordinary Meeting and discuss the important questions of the role of the governments within ISTA.

To summarise the above mentioned, the 27th Congress of ISTA will be a highly interesting event in all areas of seed science and technology; the planning and decision on technical working programmes of every ISTA Technical Committee for the next three years will be prepared during the Technical Committee meetings, the latest progress in regards to applied seed science will be presented during the Seed Symposium and tremendous changes in the governance of ISTA will be discussed during the Ordinary Meeting.

Undoubtedly for all person involved in the seed area, the ISTA Congress will be a must-participate and an exiting event. ■

Please find on page 13 & 14 the Preliminary Programme for the 27th ISTA Congress

Preliminary Programme 27th ISTA Congress

ISTA TECHNICAL COMMITTEE MEETINGS

TIME	Thursday, May 13, 2004			TIME	Friday, May 14, 2004	
8.30 - 9.55	Nomenclature Committee Meeting	Editorial Board Meeting	Tetrazolium Committee Meeting	8.30 - 9.55	Flower Seed Committee Meeting	Forest Tree & Shrub Seed Committee Meeting
9.55 - 10.10	Coffee Break			9.55 - 10.10	Coffee Break	
10.10 - 11.35	Bulking and Sampling Committee Meeting			10.10 - 11.35	Germination Committee Meeting	
11.35 - 11.50	Coffee Break			11.35 - 11.50	Coffee Break	
11.50 - 13.15	Purity Committee Meeting			11.50 - 13.15	Seed Health Committee Meeting	
13.15 - 14.15	Lunch			13.15 - 14.15	Lunch	
14.15 - 15.40	GMO Task Force Meeting			14.15 - 15.40	Proficiency Test Committee Meeting	
15.40 - 15.55	Coffee Break			15.40 - 15.55	Coffee Break	
15.55 - 17.20	Statistics Committee Meeting			15.55 - 17.20	Moisture Committee Meeting	Vigour Committee Meeting
17.20 - 17.35	Coffee Break			17.20 - 17.35	Coffee Break	
17.35 - 19.00	Variety Committee Meeting	Storage Committee Meeting		17.35 - 19.00	Rules Committee Meeting	

OPENING CEREMONY AND SEED SYMPOSIUM

TIME	Monday May 17, 2004	TIME	Tuesday May 18, 2004
08.30 - 10.00	**OPENING CEREMONY** - Official Address by the Representative of the Hungarian Minister of Agriculture & Regional Develop. - Opening by the ISTA President - Welcoming Address by the ISTA Secretary General - Welcoming Address by the Organisers - Greetings from other International Organisations	08.30 - 10.00	**KEYNOTE -** Future Developments in the Seed Industry in Eastern Europe Zoltan Syposs, Hungary
		08.30 - 10.00	**SESSION 3 -** Viability and Vigour: Evaluation and Impact (cont.)
10.00 - 10.30	Coffee Break	10.00 - 10.30	Coffee Break
10.30 - 11.00	**KEYNOTE -** Development of Education and Training in Seed Science and Technology Murray Hill, New Zealand	10.30 - 11.30	**SESSION 4 -** Seed Systems in Emerging and Developing Economies Chaired by - Per Andersson, Sweden
11.00 - 12.30	**SESSION 1 -** Application of Advanced Technologies Chaired by - Enrico Noli, Italy	11.30 - 12.30	**POSTER SESSION 1**
12.30 - 13.30	Lunch	12.30 - 13.30	Lunch
13.30 - 14.00	**SESSION 1 -** Application of Advanced Technologies (cont.)	13.30 - 14.30	**SESSION 4 -** Seed Systems in Emerging and Developing Economies (cont.)
14.00 - 15.00	**SESSION 2 -** Organic & Conventional Seed Production Chaired by - José de Barros França Neto, Brazil	14.30 - 15.30	**SESSION 5 -** Seed Lot Hygiene Chaired by - Ákos Mesterhazy, Hungary
15.00 - 15.30	Coffee Break	15.30 - 16.00	Coffee Break
15.30 - 16.30	**SESSION 2 -** Organic & Conventional Seed Production (cont.)	16.00 - 17.00	**SESSION 5 -** Seed Lot Hygiene (cont.)
16.30 - 17.30	**SESSION 3 -** Viability and Vigour: Evaluation and Impact Chaired by - Joël Léchappé, France		

27th ISTA Congress - Preliminary Programme

SEED SYMPOSIUM (CONT.)	
TIME	**Wednesday, May 19, 2004**
08.30 - 09.00	**KEYNOTE -** Application of Modern Diagnostic Techniques in Seed Health Testing G. Sadler, United Kingdom
08.30 - 10.00	**SESSION 6 -** Seed Improvement Chaired by - Hugh W. Pritchard, United Kingdom
10.00 - 10.30	Coffee Break
10.30 - 11.00	**SESSION 6 -** Seed Improvement (cont.)
11.00 - 12.30	**POSTER SESSION 2**
12.30 - 13.30	Lunch
13.30 - 15.00	**SESSION 7 -** Physiological Basis of Seed Quality Chaired by - Françoise Corbineau, France
15.00 - 15.30	Coffee Break
15.30 - 16.00	**SESSION 7 -** Physiological Basis of Seed Quality (cont.)
16.00 - 17.00	**SYMPOSIUM CONCLUSION**

19.30	**OFFICIAL CONGRESS DINNER**

Theme of the Congress.

"Towards the future in seed production, evaluation and improvement"

to registration, please visit:

www.seedtest.org

ORDINARY MEETING	
TIME	**Thursday, May 20, 2004**
08.30 - 10.30	1. Call to order 2. President's address 3. Roll call of Designated Members entitled to vote 4. Reading and acceptance of Minutes 5. Report of the Executive Committee (2001-2004) 6. Report of the Secretary General 7. Discharge of the Executive Committee
10.30 - 11.00	Coffee Break
11.00 - 12.30	8. Strategic Presentation of the President 9. Constitution Changes
12.30 - 14.00	Lunch
14.00 - 15.30	9. Constitution Changes (cont.) 10. Governance of the Association
15.30 - 16.00	Coffee Break
16.00 - 18.00	10. Governance of the Association (cont.) 11. Experiment of the accreditation and authorisation of seed company laboratories
TIME	**Friday, May 21, 2004**
08.30 - 10.30	12. Fixation of annual subscription fee 13. Consideration and Adoption of Reports of the Technical Committees; Terms of Reference for the coming period
10.30 - 11.00	Coffee Break
11.00 - 12.30	14. 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 15. Any other business raised by consent of the Executive Committee
12.30 - 14.00	Lunch
14.00 - 15.30	16. Election of Officers and Members-at-large of the Executive Committee
15.30 - 16.00	Coffee Break
16.00 - 18.00	17. Installation of new officers 18. Announcement of the location and date of the next Ordinary Meeting 19. President's closing address 20. Adjournment

2nd ISTA Proficiency Test on GMO Testing on *Zea mays* (MON810)

Summary of the Results

By Bettina Kahlert, Proficiency Test Working Group Leader, ISTA GMO Task Force

1. AIM

The aim of this 2nd ISTA Proficiency Test on GMO Testing is to check the ability of individual laboratories to detect and, on a voluntary basis, to quantify the presence of GM seeds in samples of conventional seed of *Zea mays* L.

The object of data analysis will not be to identify deviating laboratories but to compile the performances in the laboratories and to provide data for the laboratories' internal performance data base.

2. EXPERIMENTAL DESIGN

For this proficiency test two different maize seed lots were provided: a non GM and a MON810 GM seed lot. The MON810 material was kindly provided by KWS Saat AG, Germany. For checking genetic purity, 30,000 seeds of the negative seed lot were tested and proved to be negative. This test was made in the laboratory of Norbert Leist, Staatliche Landwirtschaftliche Untersuchungs- und Forschungsanstalt Augustenberg, Germany. From the positive seed lot 400 seeds were individually tested and proved to be positive. These results were kindly provided by KWS Saat AG.

The samples to be sent out were prepared by Michael Kruse and his personnel of the Institute of Plant Breeding, Seed Science and Population Genetics, University of Hohenheim. Each participating laboratory received a set of 10 maize samples. Samples were numbered randomly from 1 - 10, for example, positive samples due to MON810 sent to laboratory 1 could have the same or a different number as compared to those sent to laboratory 2. Each sample contained about 3000 seeds (determined by weight) and was labelled only with a random sample and laboratory number. Based on the testing of the negative seed lot, the potential accidental content of positive seed is below 0.01% with 95% confidence.

Three samples were negative (no GM seeds added) and 7 samples were positive. The positive samples were made positive by adding seeds from the MON810 seed lot to negative seeds. For three samples, 7.3g seeds from the MON810 seed lot were added to 1036.7g g negative seeds so that the expected value for the GMO content in these positive samples is 0.7% by weight (approximately 21 seeds in 3000). For four samples, 14.6g seeds from the MON810 seed lot were added to 1029.4 g negative seeds so that the expected value for the GMO content in these positive samples is 1.4% by weight (approximately 42 seeds in 3000). To avoid cross contamination, the negative samples were prepared first, whereas the positive samples were prepared after sealing all negative bags. The samples were packed in aluminium foil bags to avoid any cross contamination during sample handling and shipment.

The shipment of the samples to the participants started on 28 February 2003 after the laboratories signed the Material Transfer Agreement. No laboratory reported open bags per shipment.

Obligatory qualitative test

Only a qualitative result was requested. Laboratories could use the method they thought appropriate for this test. The results for the qualitative test, i.e. a sample is positive or negative, had been submitted for each sample along with the sample identification number provided by ISTA. Participants were not expected to identify the events in the positive samples.

Optional quantification of GMO in positive samples

On a voluntary basis laboratories could do a quantification of the GMO content in the positive samples by either a semi-quantitative test (sub-sampling strategy) or by a quantitative test.

Semi-quantitative test (sub-sampling strategy)

A semi-quantitative test using the sub-sampling strategy was optional to the participants. The participants should report as a result of this test whether the GMO content in the test sample was above or below the level of 1% and the testing plan, i.e. number of sub-samples, size of sub-samples (number of seeds), the number of positive sub-samples per sample, the false positive and false negative rate which was used for calculation of results, and the decision rule (maximum number of positive samples to accept = 1%). The laboratories could use the method they thought appropriate for this test. The SEED-CALC programme was recommended to use for designing the testing plan (available on the ISTA Website).

Quantitative test

The quantitative test was also optional. This quantitative test is for checking the ability of the laboratories to quantify the GMO content in a sample. The participants should report the quantitative estimated value of the GMO content of the test sample, the 95% confidence interval lower and upper limit, and should give information about the method used. The laboratories could use the method they thought appropriate. It was optional to report if the result is above or below 1%.

The Summary of Results is continued on page 16

3. RESULTS

The acceptance of results for the evaluation was closed on 27 June 2003. 51 laboratories out of 52 received the samples and 47 submitted their results. All 47 laboratories reported qualitative results that could be evaluated. 13 laboratories reported semi-quantative test results that could be evaluated. 19 laboratories reported quantative test results, with evaluable data, and performed in total 20 test series since one laboratory applied two different methods.

The identity of the individual laboratories is kept confidential.

3.1 Descriptive Statistics of the Qualitative Results

Each laboratory reported for the individual sample whether this is a negative sample or a positive sample. There was no identification or quantification requested. So, for a given sample, the result reported by the laboratory can be either correct or false.

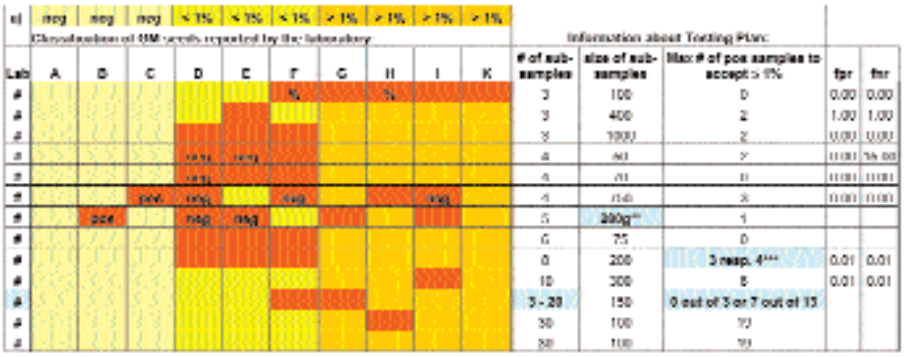
Out of the 47 laboratories:

- 40 laboratories reported results without any false results, all 10 tested samples were classified correctly. This is 85% of the laboratories.
- 96.4% of the 470 samples were reported correctly by the 40 laboratories.
- In total, 7 laboratories reported false results, 3 laboratories reported both, false positive results and false negative results, 2 laboratories only false negatives and 2 laboratories only false positives.
- 5 laboratories reported false positive results (between 1 and 3 out of the 3 negative samples (1/3) and 3/3) with a total number of 7 out of 141 negative samples tested. This is 10.6% of the laboratories and 5.0% of the negative samples.
- 5 laboratories reported false negative results (between 1/7 and 3/7) with a total number of 10 out of 329 positive samples tested. This is 10.6% of the laboratories and 3% of the positive samples.
- With respect to the spiking level, 5 laboratories reported false negative results with positive samples of a 0.7% GMO content. Between 1/3 and 2/3 samples were classified falsely as negative with a total number of 8 samples out of the 141 positive samples of 0.7% GMO content. These are 10.6% of the laboratories and 5.7% of the 0.7% content samples.
- With respect to the spiking level, 2 laboratories reported false negative results with positive samples of a 1.4% GMO content. Each classified 1 out of 4 samples falsely as negative with a total number of 2 samples out of the 188 positive samples of 1.4% GMO content. These are 4.3% of the laboratories and 1.1% of the 1.4% content samples.

Table 1: Number and percentage of all, negative and positive samples reported incorrectly.

	# of samples tested	# of samples reported incorrectly	# of samples reported incorrectly
All samples	470	17	3.6%
Negative Samples	141	7	5.0%
Positive samples all	329	10	3.0%
0.7% GMO content	141	8	5.7%
1.4% GMO content	188	2	1.1%

Table 2: The table shows the negative samples (column A to C, light yellow), the samples with a GMO content of <1% (0.7%, column D to G, dark yellow) and of >1% (1.4%, column H to K, orange), respectively. Further, information about the testing plan, i.e. number of sub-samples, size of sub-samples, maximum number of positive samples to accept =1%, and the false positive and false negative rate is given. The rows are sorted first by number of sub-sample and second by size of sub-samples. If a laboratory reported that a sample with a GMO content of 0.7% has a GMO content >1% or that a sample with a GMO content of 1.4% has a content <1%, the cells are marked red. If a laboratory reported false positive or false negative results the cell is also marked red and pos and neg, respectively.



* Test plan reported by laboratory:

#	# of sub-samples	A	B	C	D	E	F	G	H	I	K
		20	19	19	13	13	3	13	3	3	3

** 200g is approximately 600 seeds.
*** 3 at 99% CL; 4 at 95% CL.

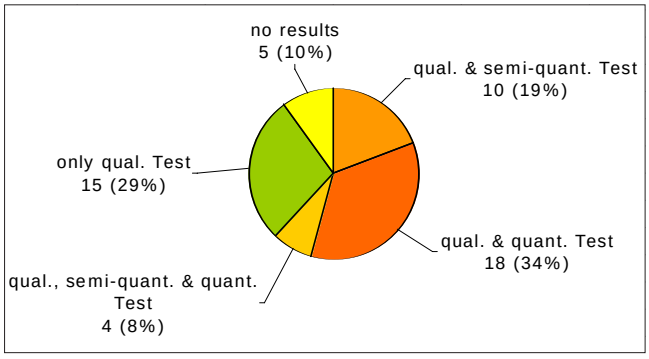


Figure 1: Performed tests by the participating laboratories.

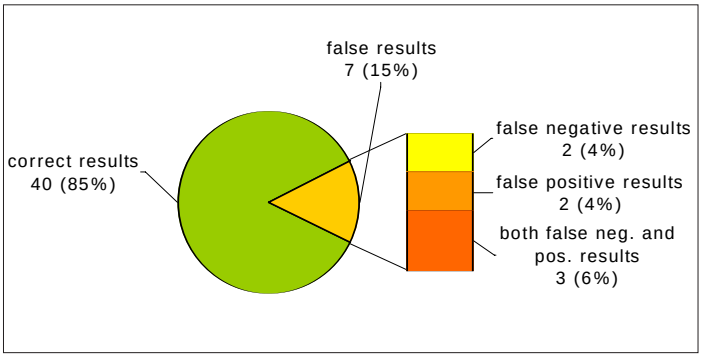


Figure 2: Percentage of laboratories reporting correct and false results.

3.2 The Semi-quanitative Results

Each laboratory reported for the individual sample as a result of this test whether the GMO content is below or above 1% as well as the testing plan. One laboratory out of 13, which used this approach, classified all samples correctly above ore below 1% GMO content. Eleven laboratories had difficulties in categorizing the samples accordingly. Between one and five samples were classified falsely. More misclassifications are reported in case of a low number of sub-samples and if only a fraction of the whole samples was used for testing.

3.3. The Quantitative Results

Nineteen laboratories, performing the quantitative test in 20 test series, reported for the individual test sample the estimated value of the GMO content as the percentage of e.g. haploid genomes, DNA or seed by mass (Fig. 3 and 4).

Twenty one laboratories reported (in 22 test series) for each sample if the value was above or below 1% (Fig. 5). Three laboratories did not report values for the GMO content of the samples but categorised the samples. Four laboratories classified correctly. Eight laboratories reported the samples with the 0.7% GMO content as above 1%. Between 1 and 3 out of 3 samples were classified falsely. Nine laboratories reported (in 10 test series) the samples with the 1.4% GMO content as below 1%. Between 1 and 4 out of 4 samples were reported falsely. ■

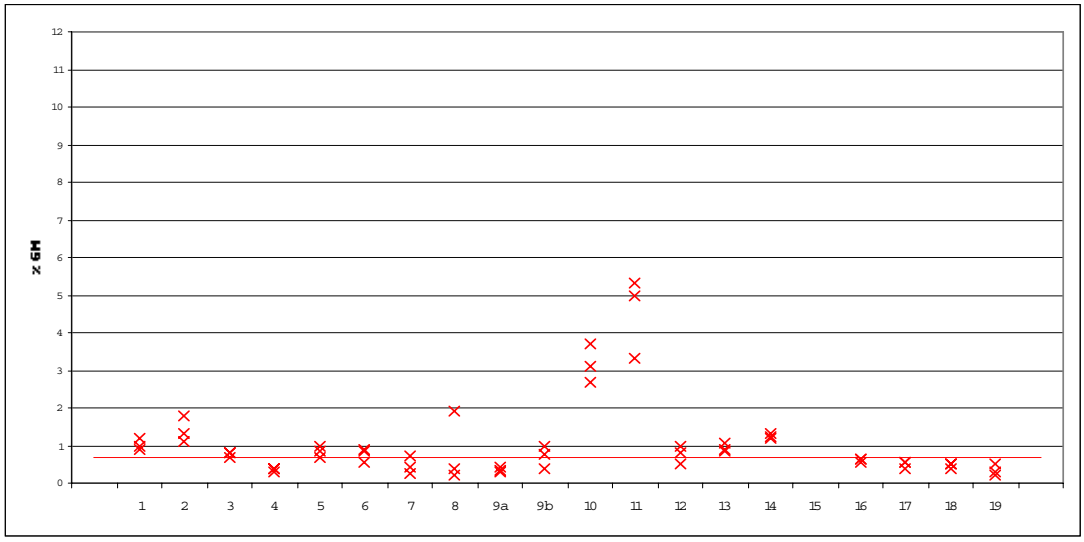


Figure 3: Percentage of GMO (based on e.g. haploid genomes or seed by mass) reported by the laboratories for the seed samples with a spiking level of 0.7% (3 samples per laboratory). (The results of laboratory 15 exceed 12%.)

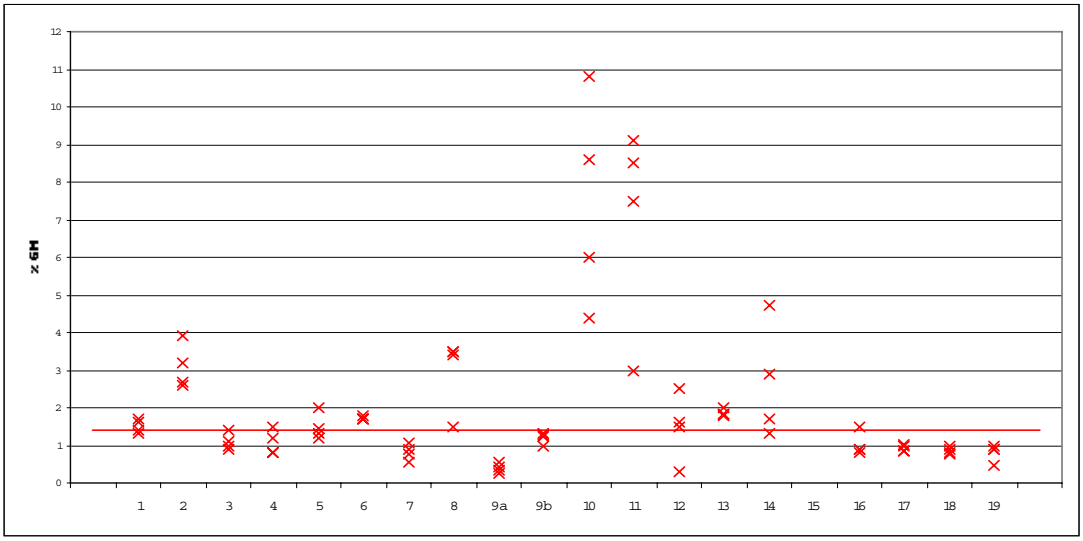


Figure 4: Percentage of GMO (based on e.g. haploid genomes or seed by mass) reported by the laboratories for the seed samples with a spiking level of 1.4% (4 samples per laboratory). (The results of laboratory 15 exceed 12%.)

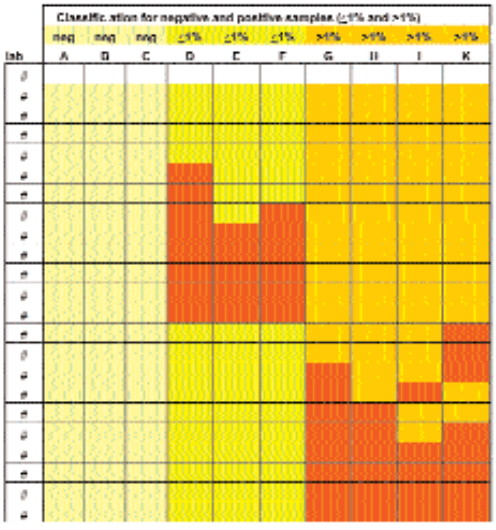


Figure 5: Classification for negative (light yellow) and positive samples: <1% (dark yellow) and >1% (orange), reported by the laboratories performing the quantitative test. If a laboratory reported for samples with a spiking level of 0.7% that the GM content was >1% and for samples with a spiking level of 1.4% that the GM content was <1%, respectively, the relevant table cell is marked red. Laboratory in the first row did not report a classification for the samples.

ISTA GMO Proficiency Tests - Use of Results from one or more tests

By Sylvain Grégoire, ISTA Statistics Committee Chair and **Christoph Haldemann,** ISTA GMO Task Force Member

Sylvain Grégoire

Christoph Haldemann

Introduction

ISTA performs multi-laboratory proficiency tests on GMO detection.
The samples sent to the laboratory are either with or without GM seeds:

- samples without GM seeds are prepared from lots specially selected for the very high probability to contain no GM seeds. A specific control is also performed on enough seeds to check for absence of GM seeds.

- samples with GM seeds are prepared by spiking one or more GM seeds in a sample.

No samples are prepared from a "natural lot" where the presence of GM seeds is known. This is a difference with most of the proficiency tests in seed testing, where laboratory test samples are from the same lot, but the actual value of each sample may vary.
The ISTA Secretariat code samples prior to the sending.
With this protocol, all samples sent to the laboratory have an expected value (with or without GM seeds) which is supposed to be the correct answer.

Laboratories receive information on what they are supposed to detect. The proficiency test checks the technical ability of the laboratories to correctly classify the samples.
Of course the laboratory might technically work well but mislabel the samples in the analysis process, or make a mistake when typing the results on the result sheet.
The results are collected and kept at the ISTA Secretariat.

How can we use the results obtained in the proficiency tests?

ISTA provides a descriptive analysis, showing the discrepancies between expected and received results. This already gives a good impression on the false positive and false negative rates for each laboratory, and for the whole test.

If no specific decision has to be taken on the results, this descriptive analysis may be sufficient.
If ISTA needs to qualify the performance of the laboratories, descriptive statistics are not sufficient and decision rules have to be defined.

We have to find an answer to the following question: "How can we qualify the performance of a laboratory?"

A classical approach is to define quality criteria; a minimum and a maximum tolerated error rate; and to derive from these criteria a number of samples to check. The problem with this approach is that when we wish to check low error rates, we need too many samples to check in comparison with the acceptable costs of the proficiency tests.

In practice we organise proficiency tests with a reasonable number of samples. The present proposal is to use the values of the error rates and their interval of confidence to classify the performance in 3 categories:

- Green: The error rates are low enough, and we have enough samples to conclude the laboratory performed well.
- Gray: The error rates and/or the number of samples does not allow us to draw a firm conclusion
- Red: The error rates are too high, indicating a problem.

NB: The two approaches are not contradictory at all. They both rely on the same approach and the same mathematical properties.

Illustrated example:
The 1st ISTA proficiency test had 30 samples,

- 12 negative samples
- 6 T25 positive samples.
- 6 MON810 positive samples.
- 6 T25 + MON810 positive samples.

We have different ways to consider the results:
- we can sum all errors (30 samples are then available).
- we can look separately at false positive (12 samples) and false negative rates (6*3=18 samples).
- we can look separately at the 3 types of false negatives (6 samples for each type).
Let us look to error rates and their confidence intervals, and see how we can explore decision rules.

In part 1 are the error rates.

We have to define values we decide to be satisfactory or on the contrary too high.
In this example
Blue was coloured when the error rate was less than 6%,
Orange was coloured when the error rates was between 6 and 20%
Pink was coloured when the error rate was greater than 20%

Part 1: table of error rates

number of samples tested	*number of false results*						
	0	*1*	*2*	*3*	*4*	*5*	*6*
6	0.0%	16.7%	33.3%	50.0%	66.7%	83.3%	100.0%
12	0.0%	8.3%	16.7%	25.0%	33.3%	41.7%	50%
18	0.0%	5.6%	11.1%	16.7%	22.2%	27.8%	33.3%
30	0.0%	3.3%	6.7%	10.0%	13.3%	16.7%	20.0%

blue false rate<6% orange false rate < 20% pink false rate > 20%

Part 2: table of 95% confidence intervals of error rates

number of samples tested	number of false results						
	0	*1*	*2*	*3*	*4*	*5*	*6*
6	0-46%	0-64%	4-77%	12-88%	22-96%	36-100%	54-100%
12	0-26%	0-38%	2-48%	5-57%	10-65%	15-72%	21-79%
18	0-19%	0-27%	1-35%	4-41%	6-48%	10-53%	13-59%
30	0-12%	0-17%	0-22%	2-26%	4-31%	6-35%	8-39%

green lower bound 0% and upper bound less than 30%
yellow lower bound less than 3% and upper bound less than 40%
pink lower bound > 3% upper or upper bound > 40%

Part 3: table of suggestion for the present proficiency test

number of samples tested	number of false results						
	0	*1*	*2*	*3*	*4*	*5*	*6*
6	expert	expert	problem	problem	problem	problem	problem
12	OK	expert	problem	problem	problem	problem	problem
18	OK	OK	expert	problem	problem	problem	problem
30	OK	OK	OK	expert	problem	problem	problem

Tables 1 to 4 show, in accordance to the 4 above mentioned classification procedures, the laboratories which would not fulfil the requests for the ISTA PT1:

Table 1: Laboratories with errors higher than 1 for each of the 3 positive sample types.

Lab_Nr	fp	fn_t25	fn_m810	fn_t25_m810	fn_agr	f_total
4	0	2	1	1	4	4
5	0	3	3	4	10	10
332	0	4	2	1	7	7
372	0	6	0	0	6	6
42	0	6	6	6	18	18

Table 2: Laboratories with errors higher than 1 for the 12 negative samples.

Lab_Nr	fp	fn_t25	fn_m810	fn_t25_m810	fn_agr	f_total
31	2	0	0	0	0	2
32	2	0	0	0	0	2
43	3	0	0	1	1	4

Table 3: Laboratories with errors higher than 2 for the aggregated positive samples (3x6 = 18 samples).

Lab_Nr	fp	fn_t25	fn_m810	fn_t25_m810	fn_agr	f_total
4	0	2	1	1	4	4
5	0	3	3	4	10	10
332	0	4	2	1	7	7
372	0	6	0	0	6	6
42	0	6	6	6	18	18

Table 4: Laboratories with errors higher than 3 for all samples (positive and negative = 30 samples).

Lab_Nr	fp	fn_t25	fn_m810	fn_t25_m810	fn_agr	f_total
4	0	2	1	1	4	4
5	0	3	3	4	10	10
332	0	4	2	1	7	7
372	0	6	0	0	6	6
42	0	6	6	6	18	18
43	3	0	0	1	1	4

In part 2 are the lower and upper limits of the confidence interval of the error rates.

Green was coloured when the lower bound was 0% and the upper bound less than 30%. Yellow was coloured when the lower bound was less than 3% and the upper bound less than40%.
Pink was coloured when the lower bound was greater than 3% or the upper bound greater than 40%.

In part 3 is a suggestion for a decision rule, which integrates part 1 and part 2.

Green stands for ok.
Pink stands for problem.
Grey stands for the intermediate situation where we can not have a firm conclusion, experts will have to look at these cases.
Of course the choice of values in this example are only possibilities among many others.

What we would like to introduce here is:
- both the error rate and the confidence intervals shall help us,
- we have a method and a tool to explore the effect of rules that can be discussed among partners, and written objectively.
- the principle is very simple, and all situations can be explored a priori, without any need to have actual sets of data.

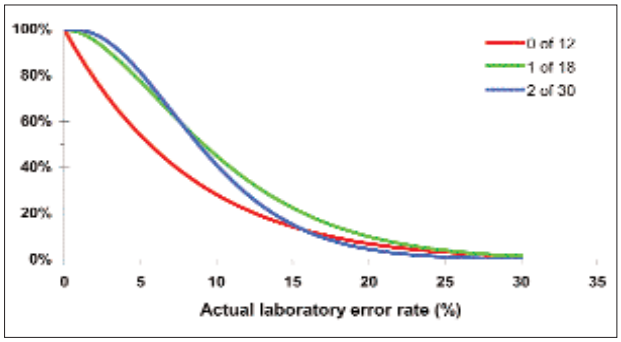
Discussion on the use of the method in more than a single test:

This method can be used to qualify performance in a single test, as shown in the example above.

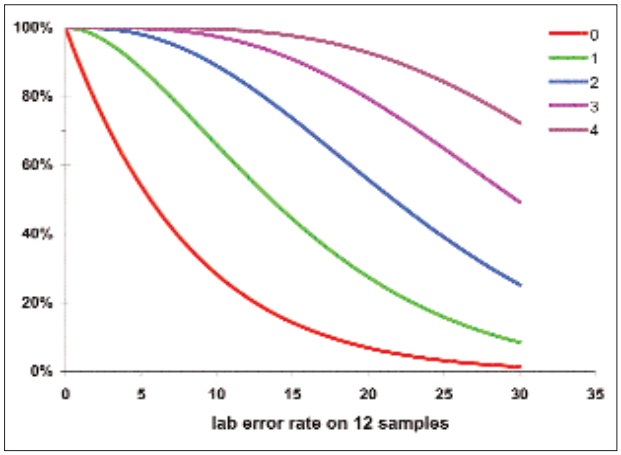
ISTA GMO Proficiency Tests - Use of Results from one or more tests, is continued on page 20.

Abbreviation used in the tables:

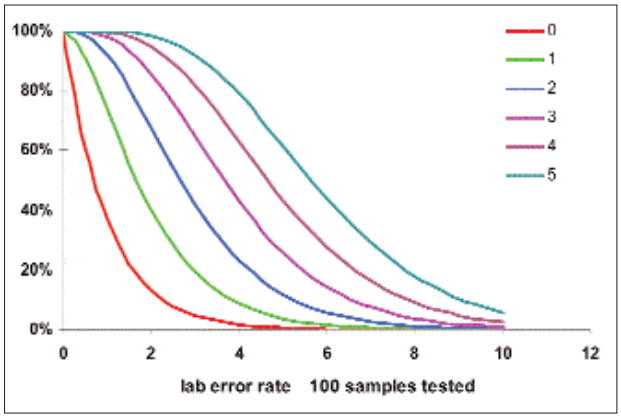
Lab_Nr
laboratory number
fp
false positive results
fn_t25
false negative results for positive sample type T25
fn_m810
false negative results for positive sample type Mon810
fn_t25_m810
false negative result for positive sample type T25 and Mon810
fn_agr
false negative results total
f_total
false results total



0 of 6 samples is not on the graph. In this proposal 6 samples are not enough to give a green signal.
The efficiency of different decision rules for a given sample size can also be shown graphically. For instance the 5 decision rules from 0 tolerated errors and up to 4 errors out of 12 samples are shown here.



The next graph shows when a bigger number of samples is available, we can check for lower error rates (on X axis error rates are from 0 to 10, instead of 0 to 30 or more with 12 samples)



Note that If we wish
to accept error rates lower than 1% (AQL)
with alpha=5% and reject error rates of 5% (LQL) with beta=5%-10%,
136 samples are necessary and we shall reject when more than 3 samples out of 136 are an error

If experts agree successive proficiency tests can be analysed together, the same method can be applied to a set of proficiency tests.
The advantage to consider successive tests, is to use information obtained on a bigger number of samples than in a unique test. This gives more confidence to the error rates observed.

In the perspective of ability check, it also allows to use a set of the more recent results, as it is already the case in ISTA proficiency testing.

If non ISTA tests are conducted with the same principles (very high confidence in the expected correct answer, blind samples, enough seeds by sample,…), non ISTA tests could be included in the set of values to analyse.

How to tackle a laboratory with a bad performance?

This is not specific to GMO testing, but is also a question for any proficiency test, or quality control.
If a lab performed badly, what shall be the consequence? (this it not in the scope of this paper, but is discussed within the GMOTF)

If we use successive tests, the question from the laboratory is also "How long my bad test will be used in the decision rule?". Of course if the laboratory claims he has explained why he failed and take appropriate decisions to avoid the problem, he can claim the bad test shall be removed from it's data set.

The principle described in this paper allows both types of decisions, keep or remove the bad test.

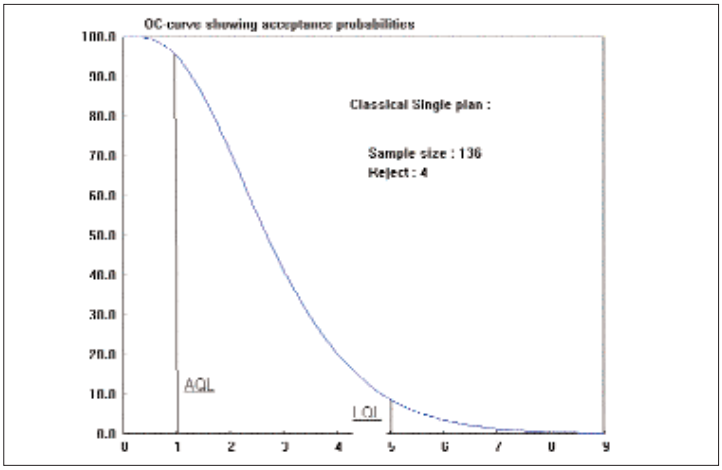
Comparing the proposal with the classical approach (define AQL and LQL):

If we look at the efficiency of the sample plans proposed in this illustrated example, we see the choices corresponds
- to a low level of quality (LQL) of 20% (error rate of 20% is often rejected)
- an acceptable level of quality (AQL) of 2-3% as soon as we have 18 samples
We also see a 0 tolerance plan with not many samples give a high producer risk (risk to reject labs having in fact a low error rate)
The Y axis is the probability to accept the laboratory as "ok", the X axis is the laboratory error rate.

Watching list / Warning list

To classify laboratories it might also be worth discussing the so called 'watching lists' or 'warning lists'. All laboratories mentioned on this list are considered as 'good' laboratories but they are warned that something is wrong. Only the PT organizer, i.e. the ISTA secretariat, has access to this list and the concerned laboratories are informed about it.
Application for such a list might be useful in the following situations:

· A lab handed out very good results in a PT and in the next PT it has not fulfilled the ISTA requests.
· For laboratories which are in the grey evaluation zone.
· For PT's without enough information for to make a wise evaluation with regard to classify laboratories, e.g. if the PT design does not allow a design demanded by the statisticians as a result of technical reasons.



Seed Vigour - An Important Component of Seed Quality in Brazil

By R.D. Vieira, S.R.M. Bittencourt and **M. Panobianco**, UNESP, Departamento de Produção Vegetal, 14884-900 Jaboticabal, SP, Brazil

R.D. Vieira

1. Introduction

The physiological quality of seeds is routinely evaluated by the germination test. However, in view of the frequent discrepancy between the results of germination tests and seedling emergence in the field, vigour tests have been developed. These tests are conducted in order to obtain additional information on seed quality to that provided by the germination test within a relatively short period of time. Thus, efficient quality control programs for the production of seeds of a given species should include vigour evaluation in the laboratory.

Vigour tests have proved to be useful in the following stages of seed production programs: selection of lots for sowing, evaluation of storage potential, evaluation of the degree of deterioration, control of post-maturity quality, as an aid to selection methods during plant breeding, and evaluation of the effect of mechanical and thermal injuries, fungicidal treatment, and pre- and post-harvest adverse factors (Marcos-Filho, 1999). In the US, most of the companies that produce large-seeded crops have used vigour tests to identify seed lots which do not reach minimum company standards, to develop a ranking system for in-house quality control, to evaluate potential of carryover seed, to assist in conditioning and marketing decisions, and to answer customer inquiries about seed lot performance (Spears, 1995).

A survey conducted in the US and Canada showed that, during the period 1976-1990, the vigour tests of highest acceptance were the cold, tetrazolium and accelerated aging tests (TeKrony, 1983; Ferguson, 1993). On the other hand, a similar survey conducted with laboratory members of the International Seed Testing Association - ISTA, in 1990, showed a predominant use of the electrical conductivity and cold tests (Hampton, 1992). Corn and soybean seeds were those most frequently evaluated, followed by wheat, sorghum and cotton seeds (Spears, 1995). More recently, in an ISTA Seed Vigour Survey (TeKrony, 2001), the cold test (including saturated) was the vigour test conducted most frequently by the majority of seed laboratories in North America. Although the cold test was also conducted frequently by ISTA laboratories, the cool germination and seedling growth vigour tests made up a greater number of tests annually. The cool test and accelerated ageing tests were also frequently used in North America, however the total number was well below that for cold test.

In Brazil, the recent alterations in the seed-producing market and consequently the competition among companies has led to increasing concern about more efficient programs of quality control, in which vigour tests are rigorously included. In this respect, the objective of the present survey was to determine how, where and at what intensity the vigour tests have been utilized in the country.

2. Use of the vigour tests in Brazil

A total of 100 questionnaires were sent to different laboratories of public institutions and of private firms during the year 2000, covering the major areas of agricultural production. This included the states of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Goiás, Tocantins, Maranhão and Distrito Federal.

On the basis of the responses to the questionnaire (Table 1), it was noted that vigour tests are routinely performed at most of the private (60%) and public (71%) laboratories and only occasionally in few laboratories. On the other hand, a considerable percentage of private laboratories do not perform these tests. When the data supplied by large seed-producing companies are analyzed, it can be seen that the use of vigour tests within quality control programs is a fundamental practice for the internal decision-making process, especially with respect to the management of the use of the different lots produced.

This view became more clear after the approval of the law of cultivar protection by the

Table 1. Survey of the use of seed vigour testing in Brazil, including private and public laboratories. 2000.

Questions to be sent to Laboratories to be answered	Private Laboratories	Public Laboratories
1. Number of laboratories responding	20	7
2. Is your laboratory conducting seed vigour testing?		
Yes, routinely	12 (60%)[1]	5 (71%)
Yes, occasionally	1 (5%)	2 (29%)
No	7 (35%)	-
3. Reason to conduct seed vigour testing		
Service	-	4 (57%)
Quality control	13 (65%)	2 (29%)
Research	4 (20%)	6 (86%)
Others	-	2 (29%)
4. Do you include, routinely, a control sample when conducting seed vigour testing?		
Yes	4 (20%)	1 (14%)
No	9 (45%)	6 (86%)
No Answer	7 (35%)	-

[1] The numbers in parentheses represent, from those seed labs that responded, the percentage of labs that conduct certain vigor test for each crop.

Brazilian congress. This has permitted companies to invest with safer expectations of a return, not only with respect to cross-pollinated species such as corn, which already presented natural protection, but also with respect to self-pollinating species such as soybean. For these companies, it is of fundamental importance to use reliable information about the physiological quality of the seed lots produced and marketed.

The main reason for performing these tests in private laboratories was for quality control (65%), followed by research (20%) (Table 1). Conversely, research came in first place in public laboratories (86%), followed by routine service (57%); to complement this information, 29% of them use the tests for both quality control and for other activities (extension and teaching courses). The inclusion of a control sample when the vigour test was conducted was not routine in either private or public laboratories (Table 1).

The study in question was extended to determine the vigour tests commonly applied to the major Brazilian crops of economic interest. Table 2 refers to the use of the vigour test for large-seeded crops. This shows that in public laboratories the accelerated aging test was carried out most frequently for soybean, cotton and dry bean seeds, and the cold test for corn seeds (57%). The major test used in private laboratories was the tetrazolium test for soybean seeds (20%), followed by the accelerated aging test for soybean and sorghum (10%), and the cold test for corn seeds (10%).

It should be pointed out that the tetrazolium test is intensely used in Brazil to evaluate the vigour of soybean seeds, whereas this is not the case in the US, which is considered the major producer of this legume.

Analysis of the data for vegetable and forage species (Table 3) led to the conclusion that the private laboratories used only the cold and accelerated aging tests for sweet corn with no data received about other crops. The tests most often adopted by public laboratories (14%) were accelerated aging, electrical conductivity, controlled deterioration, and potassium leaching. Brachiaria sp. was the only grass forage species cited in the questionnaire distributed to public laboratories, with accelerated aging tests being applied to evaluate the vigour of its seeds. A predominant trend observed in this study was the use of two vigour tests for the evaluation of seed vigour of the same crop. Tables 2 and 3 refer to primary tests as those that are run routinely and secondary tests as those run occasionally.

In a survey carried out in Brazil ten years ago, Krzyzanowski & França-Neto (1991) observed that the vigour tests best accepted by seed producing companies were accelerated aging (soybean, corn and wheat), the tetrazolium test (soybean), and the cold test (corn). According to this report, the evaluation of vigour as part of the routine of the seed industry in Brazil was considered an incipient activity limited to few crops and to determined regions. In contrast today vigour is being increasingly used and valued as a component of the physiological quality of a seed lot, particularly by large companies.

Thus, the results of the 2000 survey show that there has been a concern to evaluate seed vigour in a larger number of crops, including vegetables. In addition, the survey showed the adoption of other tests, especial electrical conductivity, controlled deterioration, and potassium leaching.

3. Conclusion

Vigour tests represent a tool increasingly used by the seed industry of Brazil to determine the physiological quality of the material. The private seed producers and official institutions have included these tests in internal quality control programs and have also used them to guarantee the quality of seeds to be commercialized.

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Table 3. Seed vigour testing (primary and secondary) conducted, annually, for vegetable and forage seed species.

Crop	Private Laboratory		Public Laboratory	
	Vigour Test		Vigour Test	
	Primary	Secondary**	Primary	Secondary**
Tomate	-	-	AA (14%)	CD (14%) EC (14%)
Carrot	-	-	EC (14%)	SpG (14%)
Okra	-	-	EC (14%)	KL (14%)
Cucumber	-	-	CD (14%)	SpG (14%)
Sweet Corn	CT (5%)	AA (5%)	CT (14%)	AA (14%)
Bean	-	-	TZ (14%)	KL (14%)
Green Pepper	-	-	AA (14%)	CD (14%) EC (14%)
Onion	-	-	AA (14%) EC (14%)	CD (14%) EC (14%) KL (14%)
Cauliflower	-	-	EC (14%)	KL (14%)
Brachiaria	-	-	AA (14%)	-

* EC= Electrical Conductivity; CD= Controlled Deterioration; AA = Accelerated Aging; SpG= Speed Germination; CT= Cold Test; TZ= Tetrazolium Test; KL= Potassium leaching.
** Secondary test (occasionally run) is one run besides a primary ones (routinely run) which are considered the main vigor tests conducted by the seed laboratory.

Table 2. Seed vigour testing (primary and secondary) conducted, annually, for agricultural seed species*.

Crop	Private Laboratory		Public Laboratory	
	Primary	Secondary**	Primary	Secondary
Soybean	TZ (20%) AA (10%)	AA (5%) TZ (5%) SVC (5%)	AA (71%) TZ (29%) EC (14%)	AA (14%) TZ (14%) EC (14%) CD (14%)
Cotton	CT (5%) SVC (5%)	TZ (5%)	AA (43%)	GLT (43%)
Peanut	-	-	AA (14%)	EC (14%)
Coffee	-	-	AA (14%)	TZ (14%)
Rice	SVC (5%)	-	AA (29%) TZ (14%)	EC (14%)
Dry Beans	-	-	AA (43%) TZ (14%)	EC (14%)
Corn	CT (5%) AA (5%)	CT (10%) AA (5%)	CT (57%) AA (29%)	AA (29%) CT (14%) TZ (14%)
Wheat	-	-	AA (29%)	CT (14%)
Sorghum	AA (10%)	CT (5%)	EA (14%)	CT (14%) EC (14%)

* SVC= Seedling Vigor Classification; EC= Electrical Conductivity; CD= Controlled Deterioration; AA = Accelerated Aging; GLT = Germination at Low Temperature; CT= Cold Test; TZ = Tetrazolium Test
**Secondary vigor test (occasionally run) is one run besides a primary vigor tests (routinely run) which are considered the mainly vigor tests conducted by the seed laboratory.

Insight into Brazil's Seed Industry

By Silmar Peske, Editor of ***Seed News*** and ISTA Editorial Board Member

Seed quality assurance program in Brazil

Seeds are big business in Brazil, involving more than 1.2 billion dollars per year. The main crops propagated by seeds are soybeans, corn, rice, wheat, cotton, forages (tropical ones) and vegetables (tomato, onions..).

The production and commercialization are organized by a law that contemplates the quality of the seed, who is the certification agency, producers and dealers registration, varietal protection, among other things.

In terms of international insertion, Brazil is affiliated to ISTA, OECD, ISF and UPOV through the 1978 convention; and in the region it joins FELAS (Latin American Seed Federation). Even though well prepared for exportation, the country does not export much, however the exportations are increasing. The main seed exported is the forage brachiaria to the neighbors countries.

It can be considered that the farmers are quite aware of the benefits from a high quality seed from an improved variety and/or hybrid. Soybean, for instance, has an usage seed index higher than 60%, meaning that from those 18 millions hectares planted, more than 10.8 millions are with commercial seed, which passed through a quality assurance program.

Seed Testing

As almost everywhere else, seeds must have certain quality in order to be commercialized, which is determined by germination and purity percentage.

Brazil has seed laboratories since 1959, and today there are 270 distributed throughout the country, most of them are private owned and being a part of a seed company. Only a few laboratories are run by itself, meaning that are not owned by a seed producer. Each laboratory has a well trained professional with university degree in charge of it.

The seed laboratories must be registered with the state government, who besides doing the paper work, also holds meetings to follow new developments and other issues. Right now all seed laboratories are in the process to obtain the quality standard ISO 17025. This process is coordinated by the state laboratory, where each state has one.

Brazil has its own rules for testing seeds which are pretty close to the ISTA Rules, however with some additional tropical seeds. There is a movement from the seed people to have just ISTA Rules with an added annex of those seeds that are not contemplated. It would save time and effort and would help seed business as far as exportation is concerned.

Brazil has its own rules for testing seeds which are periodically updated by a commission coordinated by the government. The rules are pretty close to the ISTA ones, however with some additional tropical seeds. There is a movement from the seed people to have just ISTA rules with an annex of those seeds that are not contemplated. It would save time and efforts and would help seed business as exportation is concerned.

Lately the laboratories are being requested to perform seed health tests to help farmers to decide if the seed must be treated. From those 270 laboratories for the classic analysis, only 22 are prepared to do also seed health tests. These laboratories require special equipments as well as well trained personnel on diseases identification. There is a motion by the Brazilian Seed Technology Association (ABRATES) that all foundation seed should be tested for health. Just to have an idea how the diseases are considered in Brazil, more than 90% of all soybean seeds used, are treated with fungicide.

The Laboratories

Every seed laboratory must have a minimum equipment to do routine analysis, besides other requirements, like good water and trained personnel. Something that points out is that for the germination test most laboratories use a special room where the temperature is lowered to most of the time to 20oC, and then using a germinator with constant temperature. With this procedure it is possible to run many samples at the same time minimizing the problem of microorganisms contamination. Another advantage is that it lowers the equipment costs.

Tetrazolium test

Besides germination and purity test used to commercialize the seeds, most of seed producers use the tetrazolium test on their internal quality control programs. It is commonly used to identify field deterioration during harvesting for soybeans, with this procedure it is decided if the field will or will not be harvested. The process consists of getting a sample from the field one day before harvesting, so, early in the morning of the next day, seed quality is already known.

The test is also widely used on forage seeds to avoid waiting for the germination test which can take one month, depending on the species. The commerce accepts the results of the test.

Vigour tests

Even though, with a lot of research done on many crops, vigour tests in Brazil are done just for internal quality program on soybean and corn seeds. For corn, most of the seed producers use the classic cold and accelerated aging tests (Brazil is mostly a tropical country), while for soybean seeds the most common test is the accelerated aging test followed by tetrazolium 1-3.

It can be considered that, even though using the standard germination or a vigour test, all seeds producers check their seed through a field emergence test, they say that "it is important to see in order to believe".

Other comments

Considering seed technology used by farmers, two deserve registration: 1- more than 80% of all soybean seeds lots are classified according to three width classes. This helps planting where the seed weight goes from 04 to 09 seeds/gram. This idea came from corn seeds, which are classified since many years ago worldwide; 2- nowadays, corn seeds are sold based on number of seeds per bag, besides weight, which also is being a reference for soybean where the constant will be the number of seeds per bag instead of weight. In Brazil, a bag of corn seeds has 60,000 units, where for soybean the proposal is to have 300,000 units. In order to have a trustful number, it is important to have uniform seeds to determine the weight for 1,000 seeds.

Table 1 - Summary of seed business in Brazil

CHARACTER	COMMENTS
Seed Laboratories	270 - Mainly private
Laboratories for Seed Health Test	23
Testing Rules	Brazilian Testing Rules
Vigour Testing	Just for internal quality control
Agronomysts involved	1800
Seed Processing Plants	1750
Seed Business	1.2 Billion per year
Seed Usage	60% of the farmers use commercial seeds
Seed Importation	Mainly vegetable seeds
Seed Exportation	Mainly tropical forage seeds
Cash Crops	Soybean, corn, rice, cotton and wheat
Seed Laws	Production & Commercialization- (up dated 2003) Plant Protection since 1997 (UPOV 1978) Bio - Safety since 1995
Seed Associations	ABRATES - Seed Tecnologysts ; ABRASEM - Seed Producers

The AFSTA Congress 2003

Nairobi, Kenya, March 26 - 28, 2003

By Bettina Kahlert, Head of ISTA Technical Committee Administration

Bettina Kahlert, ISTA Secretariat and Justin Rakotoarisaona, AFSTA Secretary General

The African Seed Trade Association (AFSTA) invited ISTA to participate in their 3rd Congress held in Nairobi, Kenya, the host country for the AFSTA Secretariat, March, 16 - 28, 2003. The congress were attended by about 150 participants including representatives from African and international seed companies, national and international organisation related to seed trade, and African countries' ministries.

The congress was extremely well organised, and efficiently run. Considering that due to the political unrest in Zimbabwe, the venue was changed to Nairobi at the last minute and the organisers were given only a couple of months to prepare. It shows that although the African Nations have many unique regional difficulties to overcome, they do so with a practicality and efficiency that is impressive.

The 3rd AFSTA Congress was opened by a ceremony and speeches by Mr. Hans Schupbach, Chair of the Seed Trade Association of Kenya (STAK), Dr. Nathaniel K. Tum, Chair of the National Organizing Committee of the AFSTA Congress, Mr. Guy Blaise Satsa, President of AFSTA, and by the Minister for Agriculture of the Republic Kenya.

Afterwards, the main part of the congress, the two days plenary sessions, started. In contrast to the two previous AFSTA congresses, the only non-African organisation to be given time for a presentation was ISF. Dr Bernard Le Buanec presented *'Evolution of the seed trade: constraints, challenges and opportunities'*. The official programme included presentations from AFSTA members on various topics dealing with the African seed industry which were of legislative/technical, as well as of political nature, such as the use of modern agricultural technologies, breeders' and farmers' rights, implementation of plant variety protection,

Optional visit to a local Seed Company

liberalization of the seed market, biosafety protocols for the safe use of modern biotechnology improving the food security, harmonisation of seed policies and regulations in the different regions of Africa, and the position of the African industry in the international market and the effect of globalisation. It was obvious that there still exist big differences between the different countries. Some presenters reported countries successfully facing the challenges to improve the national seed industry, having the positive effect of national seed trade associations, and being straight forward with the privatisation of the seed industry. Others reported that there is no success and that a lot of efforts are needed such as appropriate government policies, market reforms as a long-term continuous process, training courses, and the breakdown of barriers which prevent the moving of seeds within Africa and the participation in the international market.

The AFSTA Congresses was also an important event in terms of exchange of information and knowledge between local African seed companies and representatives from the international seed market. The seed companies made great use of the trading sessions to present their products and also negotiate. There was a great interest in the ISTA activities, membership, and the issuing of orange certificates.

One important outcome of this congress, announced at the AFSTA General Assembly, was the planning of four training courses for the different African regions with the objective to support the African Seed Trade of private African companies on the international market. ISTA received the official invitation to send representatives for lecturing subjects such as seed testing and the ISTA accreditation of laboratories (see for more details the following reports of the training courses). ■

ISTA Partners with AFSTA and ASTA in Providing Seed Technology Training in Africa

The International Seed Testing Association (ISTA), the African Seed Trade Association (AFSTA), the American Seed Trade Association (ASTA) and other groups recently participated in two short courses in Africa on seed technology, seed quality and accreditation. Funded by the American Seed Trade Association and held in Kampala, Uganda and Douala, Cameroon during June/July 2003, the courses were five-day training sessions consisting of visits to seed fields and facilities (laboratories and processing plants) as well as lectures and practical training. The objective of these workshops was to enhance Africa's private sector capacities for international seed trade and the viability of emerging African seed companies.

The training provided by these workshops was intended to reinforce AFSTA members' capacity to face challenges related to the agricultural sector. The objectives for the workshops were to:

- Provide participants with tools and methods that will enable their seed companies to enhance seed quality assurance.
- Bringing together the African Seed industry to reach an acceptable level of understanding in terms of technical capacity.
- Increase awareness of participants of the latest developments in the seed technologies.
- Increase the credibility of AFSTA vis-à-vis all seed stakeholders.
- Demonstrate the value of their membership to current AFSTA members and attractnew members to AFSTA.
- Develop capacity of National Seed Associations in Africa to undertake seed certification presently handled by the public sector and improve, among other things, private seed testing capabilities.
- Improve quality of seeds supplied to farmers.

The training was designed for professionals in managerial positions in the seed sector with either have a bachelor degree or strong working experiences in the seed industry. While giving sound academic knowledge and key information, the course contents were mainly of practical use so that they will be immediately implemented in their career. The workshops, presented by African experts and representatives from international organizations including ISTA focused on a variety of pertinent seed issues.

Workshops of these kinds are vital to Africa and other developing nations in order to help them face current challenges in seed trade and agricultural production. ISTA was pleased to play a vital role in these workshops. ■

Seed Technology Training for Eastern Africa

Kampala, Uganda, July 7 - 11, 2003

By Simon Cooper, ISTA Past-President

This training course, which was organised by the African Seed Trade Association (AFSTA) and the Uganda Seed Trade Federation (USTA) took place from 7-11 July at the Speke Resort and Country Lodge near Kampala, Uganda. About 60 people attended, around 40 of whom were delegates and the remainder, facilitators, observers and support persons. The delegates came from the core East African countries of the new East African Community, Kenya, Tanzania and Uganda, plus Ethiopia, Rwanda and Sudan. Most delegates were from seed companies but there was also a number of regulators.

The subjects covered included the seed industry, basic seed production and related topics, new technologies, international developments, and regional issues with talks from a wide range of speakers. A full list of topics is given in table 1. Generous time was allowed for discussion and this was well used by the delegates who produced a series of lively debates on a range of issues, particularly GMOs and intra-regional trade.

The talks on the seed industry and all its components were given by speakers from Kenya and Uganda using local examples which the delegates could easily relate to. From the international perspective, Miller McDonald (Ohio State University) and Micah Rosenblum (USDA) described the activities of the International Society of Seed Technology (ISST) and the Association of Official Seed Control Agencies (AOSCA) while Bertrand Degallier spoke about the OECD Seed Certification Schemes and Simon Cooper covered ISTA laboratory accreditation. Miller McDonald also spoke about some of the latest developments in seed testing.

The GMO lectures were given Dr. Charity Gichuki from A-Harvest Biotechnology Foundation International, an organisation set up by the distinguished Kenyan Scientist Florence Wambuku. These were very pro-GMO, particularly with regard to vegetatively propagated crops. However, the subsequent discussion showed a deep awareness of the problems associated with seed crops eg co-existence issues, together with a lot of concern about ownership of genetic constructs and the role of multi-national companies. There was also interest in the EU's position on the importation and labelling of adventitiously contaminated foodstuffs following the recent agreement of the European Parliament on new labelling rules.

On intra-regional trade, the main issues were to do with the timetable for removing internal barriers, mainly phytosanitary but also for some aspects of seed certification, for example replacement of ISTA Certificates with national ones. Kenya dominates trade in the region and is the only country with a plant variety protection law.

During the workshop our hosts organised a visit to the Uganda Government's Kawanda Research Station where we were shown round the seed laboratory, visited DUS plots and saw work on the improvement of fruit trees.

This was a very well organised meeting, held in very nice surroundings on the shores of Lake Victoria. The delegates were very appreciative of the opportunity to participate in the course and most felt they had benefited greatly from the experience. As the ISTA representative I had the opportunity to reacquaint myself with the "Pearl of Africa" after more than 30 years absence and to meet some old friends.

I would like to thank Josephine Okot (USTA) and Justin Rakotoarisaona (AFSTA) for the invitation to attend, ISTA for nominating me as its representative and the United States Department of Agriculture for funding the trip.

Table 1. Subjects Covered at the Training Course

Seed Industry	**Variety Description and Field Inspection**
Latest Developments in Seed Technology	**Plant Pathology, Seed Import and Quarantine**
OECD Seed Certification Schemes	**QA and Management**
AOSCA Seed Certification Schemes	**Processing, Treatment and Storage of Seed**
Seed Testing and ISTA Accredition of Labs	**Plant Variety Protection**
Seed Production	**GMO's**
Plant Breeding	**Regional Issues**

Seed Technology Training for Western Africa

Cameroon, August 4 - 8, 2003

By Anny van Pijlen, ISTA Technical Auditor

The training course started on Monday August 4 2003. The opening session was held by the president of l'Association du Commerce des Semences du Cameroun (ACOSEC), president of the African Seed Trade Association (AFSTA) and the representative of the Ministry of Agriculture. Concerning the rest of the program speakers of different organisations were invited to held lectures about the subjects mentioned below. Approximately 35 participants from Madagascar, Burundi, Democratic Republic of Congo and Cameroon, mainly French speaking countries, were present. Three guest speakers were invited, from France, Canada and the Netherlands.

Lectures were held on the following subjects:

- Clarification of the seed certification system of North America to stimulate the seed trade between the USA and Africa
- Up to date seed technology and the possibilities for the African seed industry
- Management for practical production on seed
- GMO's
- Phytosanitary tests; objectives, procedures and principles
- Phytosanitary rules and procedures
- General principles on production of seed
- Plant selection, development and maintenance of varieties
- Assurance and control system of the quality of seed
- Trade of seed; opportunities and challenges
- Storage and packaging of seed
- The role of AFSTA in the African seed industry
- Variety description and owner rights
- Seed projects of OECD and accreditation system of private seed companies
- ISTA Seed quality testing and the management of seed laboratories
- ISTA accreditation for company seed laboratories

The guest speaker Dr. Jean Marie Debois, Head of the OECD Seed Schemes, presented the OECD projects and the speaker from Canada Mrs. Betty Girard, ISST President, explained the ISST.

Two lectures were held on behalf of ISTA. The first lecture was about the management of a seed laboratory. The presentation contained all steps that have to be arranged by the management and the staff to run a laboratory. After this lecture lively discussions were held on how to operate a laboratory and what the input of the staff can be.
The second lecture was on Quality Assurance and Accreditation of private seed companies.
Here the question arose what the added value of ISTA is, this also with a view to the future.

The last day of the meeting an excursion was held to a private seed company in Bafoussam a town 300 km north of Douala.

ISTA Member Laboratories in AFRICA

Côte d'Ivoire
CIDL01, Laboratoire d'Analyses et de Technologie des Semences, LANADA, P.O.Box 731, Yamoussoukro

Egypt
EGDL01 *(Accredited)*, Central Administration for Seed Certification (CASC) Giza Seed Testing Station, 8 Gamaa Street, P.O. Box 14712211, Rabee EL Gezee-Giza

Kenya
KEDL01, National Seed Quality Control Service, Seed Testing Laboratory, P.O. Box 1679, Nakuru
KEML02, Kenya Seed Company Limited, Seed Testing Laboratory, P.O. Box 553, Kitale

Morocco
MADL01, Lab. National des Analyses de Semences, Service du Contrôle des Semences et des Plantes, B.P. 1308, Rabat

Malawi
MWDL01 *(Accredited)*, Seed Testing Laboratory, Chitedze Agricultural Station, P.O. Box 158, Lilongwe

Tunisia
TNDL01, Laboratoire de Contrôle de Semences, DGPA, Min. de l'Agriculture, 30, rue Alain Savary, 1002 Belvédère - Tunis

Tanzania
TZDL01, Seed Testing Laboratory, Tengeru, P.O. Box 2060, Arusha
TZDL02, National Seed Testing Laboratory, P.O. Box 1056, Morogoro

South Africa
ZADL01 *(Accredited)*, Official Seed Testing Station, Directorate Genetic Resources, Bag X973, Pretoria 0001

Zambia
ZMDL01 *(Accredited)*, Seed Control and Certification Institute, Official Seed Testing Station, Mount Makulu, P.O. Box 350199, 13201 Chilanga

Zimbabwe
ZWDL01 *(Accredited)*, Zimbabwe Seed Testing Section, Seed Services, Ministry of Agriculture, Causeway, P.O. Box 8100, Harare
ZWML02, Seed Co Ltd., Seed Testing Laboratory, Shamwari Road, Stapleford, P.O. Box WGT 64, Westgate, Harare
ZWML03, Tobacco Research Board, Kutsaga Research Station, Airport Ring Road, P.O. Box 1909, Harare

125 Years Seed Research Hohenheim

By Adolf Martin Steiner, University of Hohenheim/retired ISTA Member, and **Michael Kruse,** University of Hohenheim/ISTA Member

A mirror image picture of the emblem of the Royal Württemberg Seed Testing Station Hohenheim bearing the signet of the Kingdom Württemberg. The emblem made of copper and mounted on a wooden block was temporarily handed over to the printer for the printing of seed testing certificates.

On January 2nd, 1878, the Royal Württemberg Seed Testing Station Hohenheim was established. To celebrate the 125th anniversary, on March 26th, 2003, the Division of Seed Science and Technology of the Institute of Plant Breeding, Seed Science and Population Genetics of the University of Hohenheim invited to a festive ceremony and reception in the Great Hall of Hohenheim Castle.

Opening the ceremony, University Rector Magnificus Prof. Dr. H.-P. Liebig highlighted the long and successful tradition of Seed Research Hohenheim as well as the ever present importance of quality seeds as the irreplaceable basis for plant production. Congratulations followed by Dr. R. Schultz, Head of the Section Plant Production of the State Ministry for Rural Affairs, and by Dr. Petra Schwarz, Chair of the Seed and Seed Science Committee of the Association of German Agricultural Experimental and Research Stations (VDLUFA), as well as Dr. Karin Förster, Chair of the Joint Working Group on Seeds and Varieties of the Association of Plant Breeders (GPZ) and of the Association of Crop Sciences (GPW).

In a historical retrospect, Prof. Dr. Dr. h. c. Adolf Martin Steiner reported that the move of a local Farmers Association in 1873 eventually lead to the founding of seed testing and concomitantly seed research in 1878 by Prof. Dr. F. von Fleischer, who died shortly thereafter. His co-worker and successor Prof. Dr. Dr. h. c. O. von Kirchner (1878 - 1917) and his co-worker Dr. J. Michalowski (1881 - 1913) are recognised among the leading pioneers in the establishment of seed testing methodology. Their successor Prof. Dr. G. Lakon (1913 - 1951) gained international respect for elaborating the topographical tetrazolium test for viability determination in resting seeds. Moreover, he initiated and chaired the ISTA Forest Tree Seed Committee from 1928 to 1950. Later on, Prof. W. Lindenbein (1953 - 1967) and his co-worker Dr. Helene Bulat (1944 - 1973) chairing the Tetrazolium Committee drafted Chapter 6, Biochemical Tests for Viability, of the ISTA International Rules for Seed Testing. By the way, in those days up to 13.500 samples were yearly tested including up to 1.500 woody plant seed samples.

In 1973 seed testing was transferred to Karlsruhe-Augustenberg and Hohenheim concentrated instead on teaching and research. Nevertheless, Prof. Dr. Dr. h. c. A. M. Steiner (1973 - 2002) continued research in seed testing methodology adding studies on the genetical, physical, biochemical and physiological basis of seed quality and on technologies for preserving and improving seed quality. Also much of his work was devoted to ISTA as Vice-Chair of the Tetrazolium- and Statistics-, and Member of the Variety-, Editorial-, Rules- and Long-Range-Planning Committees. His former co-worker, Dr. Michael Kruse was appointed as his successor in 2002. Prof. Kruse's fields of research are sampling, particularly in connection with detection of GMO-seeds in conventional seed lots, heterogeneity of seed lots, the relationship between vigour and field emergence, growth and yield, storability of seeds and statistical evaluation of seed testing results. He also continued co-operation with ISTA presently as Chair of the Bulking and Sampling-, Vice-Chair of the Vigour- and Member of the Statistics- and Editorial Committees and the GMO-Task Force.

The historical retrospect was followed by four lectures considering seed science from the viewpoints of different parties involved in seed business: Prof. Dr. N. Leist, ISTA President, spoke on "Seed Research for ISTA - a Challenge for the Future". He pointed out that contributions by governmental institutions are decreasing, whereas contributions by universities and seed industry are increasing. The consequences of this for ISTA are yet unforeseen. Dr. R. Ranganathan, ISF Technical Director, lectured on "Seed Research and Seed Industry". She referred to the high need for research, but stressed a strict adherence to budgetary restrains. Prof. Dr. M. B. McDonald, ISST President, reported on "Seed Research in the United States - and its Future". Due to insufficient public funding for an up-to-date seed program, he recognised a shift of research from university to industry. Simultaneously he observed a need for the recruitment of junior staff. Hence, he recommended close co-operation between university and industry. Finally, Dr. C. Hubrich, representative of the Federal Ministry of Consumer Protection, Food and Agriculture (BMVEL), talked on "Political Expectations concerning Seed Research". He quite generally addressed actual issues of food and agricultural politics. The ceremony was organised and chaired by Prof. Kruse, who after summarising the lectures opened the reception, which was sponsored by the seed industry and the plant breeding industry. More than 160 guests of the German seed world had assembled to celebrate the anniversary. A commemorative brochure containing the congratulations and lectures was distributed.

The anniversary was flanked by two meetings, each with about 60 participants. Before the anniversary, there was a one day scientific meeting of the Joint Working Group Seeds and Varieties of the GPZ and the GPW under the title "Quality Seeds as viewed from breeding, production, testing and processing" with 14 lectures, six posters and fruitful discussions. This meeting was organised by Dr. K. Förster, Chair of the Working Group, and Prof. Kruse as local organiser. After the anniversary, there was the yearly one and a half day Spring-Working-Meeting of the Seeds and Seed Science Committee of the VDLUFA presided by Dr. Petra Schwarz, Chair of the Committee. This meeting predominantly dealing with actual issues in seed testing and seed regulations included an excellent workshop on sampling by Prof. Kruse, an illustrative lecture on ISST by Prof. McDonald and a fascinating visit to the famous German Agricultural Museum Hohenheim. All three events, a four days come-together focussing on seeds, formed a high-light for stimulating future work and co-operation.

Regional Multipurpose Workshops in the Baltic States

By Ramune Masiuniene,
Head of Seed Testing Laboratory,
Vilnius, Lithuania/ISTA Member

The idea of seed testing analysts' communication is not new for The Baltic States: Estonia, Latvia and Lithuania. It means just resuming relations that have been remitted through the historical changes in the region.

The second regional meeting of seed testing analysts was organised at Vilnius Laboratory in early spring of 2003. Having 11 staff members here at our laboratory (in that number 8 analysts), we welcomed 3 Latvian and 4 Estonian colleagues.

To be fair, we should emphasize that the Estonians were the first to establish our renewed relationship. It was in 2002, when Mari Jürman, The Head of Estonian Seed Testing Laboratory, invited us to Tallinn to take part at a nicely organised workshop. As staff fluctuation is never a true feature of the seed testing laboratories, many of the participants enjoyed knowing each other by name after a comparatively long parting.

It is natural that everybody has his own prioritised questions to be discussed at such an event, so the workshops tend to be multipurpose, but not chaotic. This is possible when a well-tuned programme exists, and working in joint or parallel sessions has been provided for with care.

But as a rule, an introductory excursion throughout the laboratory premises takes twice as long as it is planned for in the programme. Lots of questions have to be asked regarding the ideas of establishing the rooms, using or purchasing different pieces of equipment, keeping the samples, archiving the files, etc.

Then comes the time for specialised discussions in analysts' groups. Germination analysis and Tetrazolium testing seem to be the most stimulating topics. Joint testing of the prepared samples is followed by discussions on implementing the requirements of the ISTA Accreditation Standard. Viability testing in prepared Triticum aestivum, Hordeum vulgare and Secale cereale samples was a preferred question for viability analysts at the Vilnius workshop. Preferred methods to break dormancy in cereal and other seeds were discussed as well.

We were lucky to have Irene Jumburga, an ISTA Tetrazolium Committee member from the Latvian laboratory, at our Vilnius meeting. She agreed to be a leader at two joint sessions: What's new in Tetrazolium testing? Impressions brought from the ISTA Workshop in Germany as well as Fresh ideas brought from the QA Workshop at Ljubljana, Slovenia.

Our workshops, or meetings, are aimed also at highlighting the important role of every analyst in the successful results of the seed testing process. Meetings give them the possibility to share with their foreign colleagues not only in their experience and findings, but also in their concerns and fears, which is possible because of a cosy atmosphere naturally existing at the time of the event.
Finally, a practical remark: being relatively low in cost, regional workshops increase our staff motivation by much. ■

Supervision and Management of Seed Quality in China

By Jingshu Xin, National Seed Testing Center Ministry of Agriculture, P. R China

There are two aspects in supervision and management of seed quality at present in China. The first one is inner supervision and management system of seed quality in enterprise, in this system, the self-examinations will be carried out in seed enterprise. The second one is governmental supervision and management system of seed quality, which includes all levels of agricultural administration departments and interrelated offices.

1. Legal gist of supervision and management of seed quality

According to Chinese law and politics at present, Seed inspection and quality management must be carried through legally. The main legal gist is following three aspects.

1.1 Laws mainly Including People's Republic of China seed law, People's Republic of China Production Quality Law, People's Republic of China Measure Law, People's Republic of China Standardization Law,People's Republic of China Trademark Law,People's Republic of China Advertisement Law etc.

1.2 Department regulations mainly including Labels Managing Methods of Crop Seed, Field Identification Managing Methods of Crop Seed Quality, License Managing Methods of Crop Seed Production and Management, Processing and Packaging Regulations of Crop Commercial Seed, Variety Examining and Approving Methods of Crop Seed etc.

1.3 Standards mainly including Crop Seed Testing Rules, Breeding Rules of Main Crop Seed and productions quality rules of all kinds of crops etc.

2. Inner quality supervision and management system in seed enterprise.

Quality management, supervision and seed production, management is the all and the one. Quality testing is an indivisible section of seed production and management. Seed enterprise carry through seed quality supervision and control seed quality, following main measures need to be adopted.

2.1 Setting up special institution taking charge of seed quality supervision and management.

A testing lab with seed testing facilities and identifiers need to be in each seed enterprise, they represent seed enterprise to carry through seed quality testing and inner supervision.

2.2 Developing quality management system authentication, establishing quality guarantee system.

Chinese seed enterprise use the advance quality management experience of international seed enterprise for reference, developing quality management system authentication, up to now, there are more than 40 seed enterprises that have passed the ISO9000 management system authentication and obtained an authentication license.

2.3 Developing quality supervision and management system, controlling seed quality tightly.

2.3.1 Establishing and carrying out seed quality"three testing"system.

Through self-examination by practice operators of different departments in seed enterprise, examining each other by operators of different positions and special examining by seed quality testing institute, the seed producing quality should be insured.

2.3.2 Carrying out "signature"system

Each seed processing section must be signed by operators themselves. Including introducing breeding materials and parent materials, varieties breeding, original seed producing, commercial breeding, field testing, seed harvesting, processing, packaging, putting in or fetching out seed from seed bank, selling and service, quality tracking, information feeding back. All signatures files must be conserved so that responsibility should be distinct and reform measures can be developed pertinently.

2.3.3 Carrying out "retroactivity" system

During seed production and management processing, after each section is finished, the testing results and problems must be registered. Operator's names, time, locations and situations analyses must be recorded. So that responsibility should be distinct and work can be consummated.

3. Governmental seed quality supervision and management system

Carrying out governmental seed quality supervision and management is the important content for controlling seed quality, supplying gist for decision-making, protecting agricultural safe production, improving agricultural yield and increasing farmer's income. Following are the contents of governmental seed quality supervision and management.

3.1 Mainly through qualification examining of seed producing and managing, government supervise and manage seed enterprise so as to control the entrance of quality supervision and management.

According to regulations of license managing methods of crop seed production and management, seed enterprise, which apply for seed production and management from the ministry of agriculture, should own more than five seed identifiers who have passed the examinations given by province-level or higher level agricultural administration department. Seed testing facilities should accord with the standards of ministry-level seed testing center. Seed enterprise, which apply for license of crop hybridized seed production and management, should own more than two seed identifiers who have passed the examinations given by province-level or higher level agricultural administration department. Seed testing labs must be accord with requirements. Seed testing facilities should accord with the standards of common seed testing institution. Seed enterprise, which apply for license of crop non-hybridized seed production and management, should own more than one seed identifier who have passed the examinations given by province-level or higher level agricultural administration department. Seed testing labs and facilities must be accord with requirements. Through checking up testing conditions and identifiers, Seed enterprise should own corresponding testing conditions and identifiers, so as to establish basis conditions for seed quality supervision and management.

3.2 Through organizing and carrying out seed quality supervision and investigation, all level governmental relative departments supervise and manage seed quality of seed enterprise.

Seed, which need to be investigated, are following two aspects. One is the qualified seed

that was processed, packaged and self-examined in seed enterprise. This investigation can improve the seed quality produced by seed enterprise, so as to control unqualified seed entering into market effectively. The other is the seed in market. Through the seed investigation in market, the purpose of supervising and managing seed market is achieved; so as to reducing unqualified seed sell to farmers and reducing loss of agricultural production.

3.3 Through establishing and enacting laws, rules and standards, seed quality could be supervised and managed.
Establishing and enacting laws, rules and standards system, which is related with supervision and management of seed quality according with practice, this is the legal basis of governmental supervision and management. Through propagandizing and carrying out these laws, rules and standards related with supervision and management of seed quality, the supervision and management of seed quality would be brought into legal category. The actions of related persons could be prescribed effectively. The conditions of seed producing and managing could be created.

3.4 Through management of institutions and personal related with seed quality supervision and management, the guarantee of carrying through seed quality supervision and management fairly can be supplied
According to the regulations of seed law, all level agricultural administration departments take charge of the supervision and management of seed quality. The institutions of carrying out the supervision and management of seed quality must own related testing conditions and ability and it also need to pass the related examinations given by province-level or higher level agricultural administration departments. The personal related with the supervision and management of seed quality needs to have three qualifications.

- license of graduated from related specialty in middle or higher technology School.
- more than three years working experiences in seed testing field.
- passed the examinations given by the province-level or higher level agricultural administration departments.

3.5 Through setting up the feedback phones, the relationship between farmers and the government could be established. The function of supervision and management of seed quality could be carried out.
After the seed law was carried out, the feedback phones of seed cases were set up to receive farmers' appeal in all level agricultural administration departments. If farmers bought unqualified seed, which brought loss of agricultural production, through the feedback phone, they can appeal to all level agricultural administration department for governmental or legal help. This can avoid unqualified seed bring loss to agricultural production effectively. At the same time, the governmental administration department can deal with seed cases, which bring loss to agricultural production due to unqualified seed. The illegal seed enterprise or personal that produce or manage unqualified seed could be punished. An upstanding seed market would be established. The purpose of supervision and management of seed quality would be obtained. ■

Chinese Translation

中國的種子質量監督與管理

中國 農業部全國農作物種子質量監督檢驗測試中心　辛景樹

中國現階段種子質量管理與監督有兩個方面，一是以種子企業自檢爲主的企業內部種子質量管理與監督體系；二是以各級農業行政主管部門及相關部門爲主的政府種子質量管理與監督體系。

1、開展種子質量監督與管理的法律依據

根據中國現有法律和政策，種子檢驗與質量管理工作必須依法進行。主要的法律依據有以下二個方面。

1·1 法律主要包括：《中華人民共和國種子法》、《中華人民共和國産品質量法》、《中華人民共和國計量法》、《中華人民共和國標準化法》、《中華人民共和國商標法》和《中華人民共和國廣告法》等。

1·2 部門規章主要包括：《農作物種子標簽管理辦法》、《農作物種子質量田間鑒定管理辦法》、《農作物種子生産經營許可證管理辦法》、《農作物商品種子加工包裝規定》和《農作物品種審定辦法》等。

1·3 標準主要包括：《農作物種子檢驗規程》、《主要農作物良種繁育規程》以及各類作物種子的産品質量標準等。

2、種子企業內部質量管理與監督體系

質量管理與監督和企業種子的生產經營是一個有機整體，質量檢驗是種子生產經營中不可分割的環節。種子企業進行種子質量監督，把好種子質量關，主要採取以下措施。

2·1 設立專門機構，負責種子質量監督管理

每個種子企業都設有檢驗部門，配備了相應的檢驗人員和設備，代表企業進行種子質量把關檢驗，執行內部監督。

2·2 開展質量管理體系認證，建立健全質量保證體系

中國種子企業借鑒國際企業質量管理的先進經驗，積極開展質量管理體系認證工作，目前，中國已有 40 多家種子企業通過了 ISO9000 管理體系認證，獲得了認證證書。

2·3 健全質量監督與管理制度，嚴把種子質量關

2·3·1 制定並落實種子質量“三檢”制度。通過指企業不同部門的實際操作人員的自檢、不同崗位人員之間的互檢和質量檢驗部門的專門檢驗確保種子生產質量。

2·3·2 落實“留名”制度。通過從育種材料和親本的引進到品種選育、原種生產、商品制種、田間檢驗、種子田驗收、種子收穫、加工、包裝、入庫、出庫、銷售到售後服務、質量跟蹤、資訊反饋，每完成一道工序檢驗人員的簽字，將所有簽字文件留存，便於以後分清責任，有針對性地制定整改措施。

2·3·3 執行“追溯”制度。在種子生產經營過程中，每完成一道工序，都要記錄其檢驗的結果及其存在的問題，記錄責任者和檢驗者的姓名、時間、地點及情況分析，以便追究責任，完善工作。

3、政府種子質量管理與監督體系

實施政府種子質量管理與監督工作是監督控制種子質量，為進一步決策提供依據，保護農業生產安全，促進農業增產，農民增收工作的重要內容。政府實施種子質量監督與管理主要有以下內容。

3·1 政府對種子企業的管理與監督，主要通過對種子企業進行種子生產經營的資格的審查，把好質量管理與監督的入口關

根據《農業部農作物種子生產經營許可證管理辦法》規定：向農業部申請經營許可證的種子企業，應配備 5 名以上經過省級以上農業行政主管部門考核合格的種子檢驗人員，種子檢驗儀器設備符合部級種子檢測中心的標準；申請主要農作物雜交種子生產經營許可證的種子企業，應配備 2 名以上經過省級以上農業行政主管部

門考核合格的種子檢驗人員，有能夠滿足要求的檢驗室，儀器配備達到一般檢驗機構的標準；申請主要農作物雜交種子以外的種子企業，應配備1名以上經過省級以上農業行政主管部門考核合格的種子檢驗人員，有能夠滿足檢驗需求的檢驗室和必要的檢驗儀器。通過對檢驗條件和人員的審查，要求企業配備回應的檢驗條件和人員，爲企業進行質量管理與監督創造基礎條件。

3·2 通過各級政府的有關部門組織實施種子質量監督抽查，對企業經營的種子質量進行監督管理

抽查的種子涉及兩個方面：一個是通過對種子企業加工、包裝後，經過企業自檢合格的種子的監督抽查，加強對企業生產的種子質量的管理與監督，可以有效地控制企業的不合格種子流向市場；另一個則是通過對種子市場的監督抽查，達到對監督管理好種子市場的目的，減少不合格種子流向農民，給農業生產造成損失。

3·3 通過制定和頒佈有關種子質量管理與監督的法律、法規和標準對種子質量進行管理與監督

制定並頒佈內容完整、符合實際的有關種子質量管理與監督的法律、法規和標準體系，是政府進行種子質量管理與監督的法律基礎。通過對種子質量管理與監督的法律、法規和標準的貫徹與實施，可將種子質量管理與監督納入法制範疇，有效地規範種子行業從業人員的行爲，爲依法生產、經營子、管理、使用種子創造條件

3·4 通過對從事種子質量管理與監督的機構和人員的管理，爲公正進行種子質量管理與監督提供保障

根據《種子法》規定國家各級農業行政主管部門負責種子質量的管理與監督，從事種子質量管理與監督的機構必須具備相應的檢測條件和能力，需經過省級以上農業行政主管部門和政府有關部門考核。從事種子質量管理與監督的人員應具備以下二個條件：①具有相關專業中等專業技術學校畢業以上文化水平；②從事種子檢驗工作一年以上；③經過省級以上農業行政主管部門考核合格。

3·5 通過設立種子案件舉報電話，打通農民和政府直接溝通的渠道，實施種子質量監督管理的職能

種子法實施後，各級農業行政主管部門及其種子管理部門均設立了種子案件舉報電話，受理農民種子案件舉報。農民買到假劣不合格種子造成農業生產損失的可以通過舉報電話直接向各級農業主管部門舉報，求得政府和法律援助，有效地避免了因使用假劣不合格種子給農業生產造成的損失。同時，政府管理部門通過接受舉報，及時處理假劣不合格種子坑農害農事件，處罰生產、經營假劣不合格種子的不法企業和個人，營造良好的種子市場氛圍，達到了對種子質量監督管理的目的。

Report of two comparative tests on root system evaluation of *Tagetes*

By Lea Mazor, ISTA Flower Seed Committee Vice-chair, **Zita Ripka,** ISTA Flower Seed Committee Chair, and **Aleta Meyr,** AOSA/SCST & ISTA Flower Seed Committee Member,

Lea Mazor

Introduction

Two comparative tests of *Tagetes* were performed in 2001 to determine if the primary root is essential for the development of a normal seedling, i.e., if the current ISTA Rules are suitable.

Comparative tests I were organized by Zita Ripka (from ISTA) and comparative tests II by Aleta Meyr (from SCST).

The tested seeds underwent a mechanical cleaning process called "de-tailing" (removal of the pappus), which may cause damage to the primary root, and resulting in the development of several secondary roots during the germination test period.

Comparative tests I

Methods

Participants: Five ISTA laboratories and two AOSA/SCST laboratories.
Type of tests: Germination (see Table 1) and tetrazolium. Prof. Norbert Leist prepared the tetrazolium test worksheet.
No. of samples: Two samples: A & B.
For each sample, germination tests were performed on 400 seeds and the tetrazolium tests on 200 seeds.

Table 1. Germination methods generally used

	ISTA	AOSA	Comparative Tests
Substrate	TP; BP	TB	TP; BP
Water			50 - 70%
Light	L	L	L 8h
Temp.	20 - 30; 20	20 - 30; 20	20 - 30; 20
First count (days)	3 - 5	None	4 - 5
Final count (days)	14	7	5 - 14

Results

The germination methods used for *Tagetes* were those recommended by ISTA & AOSA (Table 1). The tests were conducted by the seven laboratories, and the results are presented in Table 2.

The results obtained at first count were only 5% lower than the final ones. Thus, the test duration may be reduced to 10 days (similar to AOSA), especially when using high quality seeds.

As assumed, the most frequent deficiency of seedlings was associated with various types of primary root defects, e.g., stunted, stubby, rotten at the tip, or missing. When the root system was evaluated according to the ISTA Rules, the results showed that germination (normal seedlings) of sample A was higher than of sample B. On the other hand, the range of germination between laboratories was wider for sample A (75-87%) than for sample B (66-72%), indicating variability between laboratories.

The viability of the seeds can be determined by the tetrazolium test, only if carried out by a skilled and expert analyst. The method was assessed by five laboratories and found appropriate to evaluate the viability of *Tagetes* (Table 3). A high correlation was found between viability and germination according to the current ISTA Rules (Figure 1).

Thus, the growth of the primary root is critical for the development of a normal seedling. In general, the types of abnormalities (roots, hypocotyl, cotyledons etc.) and their frequency correlate well with the worksheet of *Tagetes* prepared by the ISTA Flower Seed Committee members.

Conclusions of comparative tests I

- Germination methods within ISTA Rules are adequate and suitable.
- ISTA evaluation of seedlings is correct (A 2.1.1.1). Therefore, the root system consists of the primary root, which is essential for seedlings development.
In case the primary root is defective but well-developed secondary roots are present, the seedling is classified as abnormal.
- The tetrazolium method is appropriate.
- Possible changes: germination final count (10 days).

Table 2. Germination test results of Samples A & B

	Sample A	Sample B
Normal Seedlings (%) Ranges (%)	83 75-87	70 66-72
Abnormal Seedlings (%) Ranges (%) Incl. damaged primary root, with sufficient secondary roots (%)	83 6-16 (2)	20 16.5-21 (9.5)
Ungerminated Seeds (%)	7	10

Table 3. Tetrazolium (TZ) test results

	Sample A	Sample B
Viable Seeds (%) Ranges (%)	82 80-85	68 64-72
Non-viable Seeds (%) Ranges (%) Incl. dead/empty seeds (%)	18 15-20 (4)	32 28-36 (4)

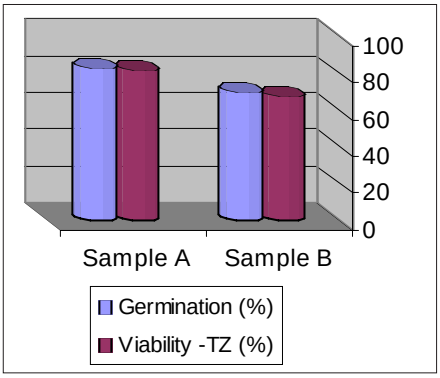

Figure 1. Germination and viability (TZ) of Samples A & B

Comparative tests II

Methods

Participants: Thirteen AOSA & SCST labs & 9 ISTA labs.
Type of tests: **Test 1.** Germination of samples C & D, 200 seeds each, on BP or TP, 20-300C, for 7 days.
Test 2. Photographic evaluation (1-16 photos).

Results

Test 1. Germination test of samples C & D

An initial control test was carried out by the company, which supplied the seeds. This control germination was performed in soil as a "plug grow-out" and the useable plug seedlings are reported as the first line in Tables 4 & 5. There was high correlation between these result and those of the participating laboratories. In brief, for sample C, useable plant germination was 82% and total germination (including seedlings with strong secondary roots) was 79%; for sample D, the corresponding values were: 92% and 89.5%, respectively. However, laboratories differed significantly in evaluating the root system. The organizer concluded that a seedling consisting of well-developed secondary roots performs well, produces a useable plant, and is considered normal.

Moreover, the question asked was: Do you think that *Tagetes* should be evaluated according to AOSA Seedling Evaluation for *Asteraceae* II, i.e., classified as a normal seedling, when the primary root is defective and strong secondary roots are present. The majority of the participants answered positively.

However, there was a discussion whether two well-developed secondary roots are sufficient, or three/four or more secondary roots are needed and the seedling should exhibit a balanced root-shoot development.

Test 2. Root system evaluation by photographs 1-16 (Figure 2)

This exercise was interesting and most labs have completed it. However, some of the photos were unclear.

In general, photographs may provide an important tool for seedling evaluation of various species.

Conclusions of comparative tests II

Ten AOSA/SCST and six ISTA laboratories out of 22 were in favour of the following seedling evaluation:

The root system usually consists of primary root. Seedlings with a defective primary root are classified as normal, if at least three well-developed secondary roots have developed.

Conclusions obtained from these two comparative tests

The comparative tests yielded contradictory results and the conclusions were ambiguous. One study concluded that the primary root is essential because it correlates well with the tetrazolium results. On the other hand, the other study deduced that when at least two-three well-developed secondary roots are present, such a seedling would produce a useable plant. Thus, such seedlings should be classified as normal.

It should be mentioned that the majority of the participants in the first comparative tests were ISTA members, while in the second one most were AOSA/SCST members. Several of the participants have agreed to revise the ISTA seedling evaluation while others disagreed or hesitated. In conclusion, the comparative tests yielded inconsistent results and further investigation is needed. ■

Aim - to determine if the primary root is essential for the development of a normal seedling.

Conclusion - the comparative tests yielded inconsistent results and further investigation is needed.

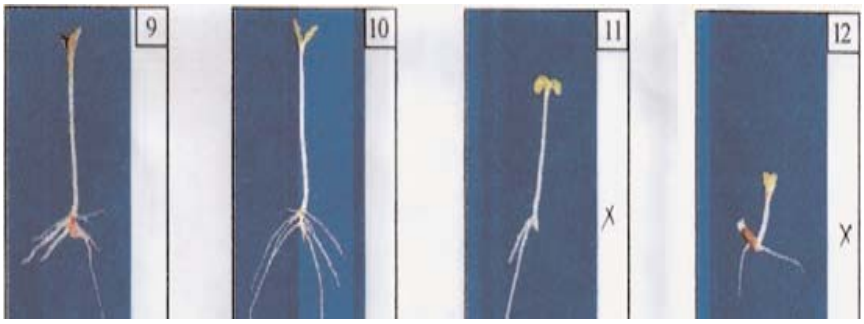

Figure 2. Defective primary root and sufficient/not-suficient secondary roots

Table 4. Test results of sample C - 200 seeds (performed by AOSA/SCST & ISTA)

	7-day % normal primary root intact	7-day % primary root damaged sufficient secondary roots	Total Roots %	Abnormal Seedlings %	Dead seeds %
Control test (soil) useable plug seedlings	N/A	N/A	82**	N/A	N/A
Average ISTA & AOSA/SCST 20 labs	67	12	79	16	5
Ranges	50-89	1-22	60-93	4-28	0-11

*** Initial control test by the seed supplier (in soil) is reported as % of useable plug seedlings.*

Table 5. Test results of sample D- 200 seeds (performed by AOSA/SCST & ISTA)

	7-day % normal primary root intact	7-day % primary root damaged sufficient secondary roots	Total Roots %	Abnormal Seedlings %	Dead seeds %
Control test (soil) useable plug seedlings	N/A	N/A	92*	N/A	N/A
Average ISTA & AOSA/SCST 20 labs	87.5	2	89.5	5.5	5
Ranges	74-92	1-6	80-95	3-9	2-11

** Initial control test by the seed supplier (in soil) is reported as % of useable plug seedlings.*

Healthy seeds, the basis for sustainable farming

Paper Series from the 4th ISTA PDC Symposium on Seed Health

Wageningen, Netherlands, April 29 - May 1, 2002

The ISTA PDC are starting a new series in the Seed Testing International. The two papers 'Detection and identification of the *Phomopsis/Diaporthe* on soya bean seeds samples from Brazilian crop regions' by Jaccoud-Filho, Universidade Estadual de Ponta Grossa, Brazil, and 'Occurrence of yam leaf, vine, and tuber infection by *Colletotrichum gloeosporioides* strains in four locations in Nigeria' by Ayodele, International Institute of Tropical Agricultural, Nigeria, are the first of a series of papers related to the field of seed health and show the technical and scientific work of our Association.

The papers are works which were presented at the 4th ISTA-PDC Seed Health Symposium 'Healthy seeds, the basis for sustainable farming' held in Wageningen, The Netherlands, April 29th to May 1st, 2002.

The ISTA-PDC Symposia are used as a platform to exchange ideas, new techniques, and information in the various topics of seed health. The high profile of seed health will be reflected in the future presentations in this series covering regional seed health issues, quality management, organic seeds, and innovations and new methods in seed health testing.

Detection and Identification of the *Diaporthe/Phomopsis* Complex on Soybean Seeds Samples from Brazilian Crop Regions

By D. S. Jaccoud Filho[1], C. P. Hiar[2], I. F. Zampier[2] and F. B. Passini[2]

State University of Ponta Grossa[1] - UEPG, Agronomy School, Campus de Uvaranas, Bloco F. CEP 84.030.000. Email: dj1002@uepg.br (This research project received from The Brazilian National Research Council - CNPq Undergraduate Research Scholarships[2])

Summary

Soya bean is grown in most of the Brazilian states from South to North and the estimated area is around 13,000,000 ha. The complex fungi *Phomopsis / Diaporthe* has been responsible for losses in yield and seed quality. The level of losses depends on several factors such as seed health quality, weather conditions during the ripening and harvesting periods, seed treatment and crop rotation system used. This research has the objective of assessing, detecting and identifying the *Phomopsis / Diaporthe* isolates in soya bean seed samples from Brazilian crop regions. Samples from the soya bean crop season of 2000-2001 (616) and 2001-2002 (770) were analysed and other samples are also being analysed. Most of the seed samples come from the South (Rio Grande do Sul, Paraná and Santa Catarina), Centre (Goias, Mato Grosso do Sul and Mato Grosso), South East (Minas Gerais), North East (Bahia) and North (Maranhão) regions. The health quality of the soya bean seeds were analysed concerning the mycelium, pycnidia and conidial characterisitics. During the crop season of 2000-2001 (616.samples presented *Phomopsis* [29,62%] with the avarage incidence of 2,76%. During the crop season 2001-2002 (770 samples presented *Phomopsis* [12,55%] with the avarage incidence of 0,30%. As a preliminary result, the identification of the majority of the *Phomopsis* isolates species were not conclusive, using the traditional blotter test methodology. The *Phomopsis sojae* was the second most observed species, followed by *Phomopsis meridionalis* and *Phomopsis longicolla*. Probably, the low incidence of *Phomopsis* detected at both crop seasons, can be associated with good weather conditions at the harvesting period and also due to the appropriate health management at the production regions.

Introduction

Soya bean is cultivated in the majority of the Brazilian states from North to South. The estimated planted area is around 14.000.000 ha, the total production 36.000.000 ton and the yield 2.640 Kg/ha. This crop is an important source of export income to Brazil and it is exported mainly as grain, ground meal and oil. This income is thought to be more than US$ 5,0 billion / year, representing roughly 12% of the total of the Brazilian export revenue (Embrapa, 2001).

The Soya bean crop in Brazil is affected by more than 40 economically important diseases and this number is increasing with the expansion of this crop to new agricultural areas. The *Phomopsis / Diaporthe* complex has been reported (Jaccoud Filho, 1996; Jaccoud Filho et al., 1999) for considerable losses (more than US$ 13 million) in yield and seed or grain quality every year (Yorinori, 1996). It is known that a great number of these diseases are spread by infected seeds to different producing regions (Neergard, 1977; Ferreira et al., 1979; Sinclair, 1982).

The *Phomopsis/Diaporthe* complex in Brazil

This complex includes the *Phomopsis sojae* (Stem and Pod Blight) [Ferreira et al., 1979], *Phomopsis phaseoli* f. sp. *meridionalis* (Stem Canker) [Yorinori, 1990] and *Phomopsis longicola* (Seed Decay) [Jaccoud Filho, 1996] as was previously discussed by Jaccoud Filho et al., (1999).

Soya Bean Seed Health Quality

Studies on seed health quality have been carried out using seed samples collected from the main soya bean producing regions around Brazil (Jaccoud Filho et al., 1999). Henning and Yuyuama (1999) reported the presence of *Phomopsis* spp. in almost 45% of the seed samples from the crop season 1992/1993 to 1996/1997.

By using the blotter test method, a total of 616 samples obtained from the Brazilian states of Mato Grosso do Sul (MS), Paraná

(PR), Rio Grande do Sul (RS), Santa Catarina (SC) and Maranhão (MA) at the crop season 2000/2001 were incubated for 7 to 10 days under 21-23ºC and 12h light / 12 dark (Hiar et al., 2001). After this period the presence of *Phomopsis* was observed in more than 29% of the examined samples (Table 1).

A total of 770 seed samples from the soya bean crop season 2001/2002 from the states of Paraná (PR), Goiás (GO), Rio Grande do Sul (RS), Santa Catarina (SC), Bahia (BA), Mato Grosso do Sul (MS), Minas Gerais (MG) e Maranhão (MA) were examined (Jaccoud Filho et al., 2002) and the level of *Phomopsis* incidence observed was around 12,55% (Table 2).

These results, obtained from the 1386 seed samples examined during the 2000 to 2002 crop seasons showed a significant *Phomopsis* incidence reduction, from 29,62% to 12,55%, when compared to the level of 44,7% of *Phomopsis* observed at the 1992 to 1997 crop seasons.

This remarkable decrease observed in the *Phomopsis* incidence level can be probably associated to several strategy managements that have been developed such as: New resistant cultivars launched by the governmental research institutions and private companies; The fact that 80% of the soya bean seed used in Brazil has been treated by fungicides (Henning, 1994; Goulart, 1998; Jaccoud Filho et al., 1999); The crop management strategy concerning crop rotation; The good weather conditions during the soya bean ripening and harvesting time and also due to the improvement in seed health testing and the demand from the farmers for seed quality.

As a preliminary conclusion from the observed results from the seed samples analysed, a significant reduction in the problems caused by *Phomopsis* could be detected around different soya bean production regions in Brazil.

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Acknowledgments

To the Brazilian National Research Council - CNPq, for the undergraduate scientific scholarship,

To the students for the Applied Plant Pathology Group at UEPG.

Table 1. Incidence Levels (%) of *Phomopsis* in Soybean Seeds from Different Brazilian Regions, Crop Season 2000 to 2001 from (Hiar et al., 2001)

	MS	PR	RS	SC	MA	(Average)
Samples	103,00	220,00	279,00	8,00	4,00	123,20
Frequency	23,29	9,45	15,40	25,00	75,00	29,62
Average Incidence	0,69	2,85	1,93	0,50	7,83	2,76
Maximum Incidence	3,50	7,00	8,00	0,75	8,25	5,50

Table 2. Incidence Levels (%) of *Phomopsis* in Soybean Seeds from Different Brazilian Regions, Crop Season 2001 to 2002 (Jaccoud Filho et al., 2002)

	PR	GO	RS	SC	BA	MS	MG	MA	(Average)
Samples	240,00	50,00	240,00	9,00	10,00	99,00	114,00	8,00	96,25
Frequency Incidence	3,32	10,00	15,40	0	0	19,10	2,64	50,00	12,55
Average	0,06	0,04	0,70	0	0	0,17	0,06	1,43	0,30
Maximum Incidence	2,00	0,75	20,00	0	0	2,00	0,25	8,25	4,15

Occurrence of Yam Leaf, Vine and Tuber Infection by *Colletotrichum gloeosporioides* Isolates in Four Locations in Nigeria

By M. A. Ayodele, J. d'A. Hughes and **R. Asiedu,** International Institute of Tropical Agriculture, Ibadan, Nigeria

Correspondence address: c/o L. W. Lambourn & Co. Ltd., Carolyn House, 26 Dingwall Road, Croydon CR9 3EE, U.K.

INTRODUCTION

Yams (*Dioscorea* spp.) are one of the most important carbohydrate staples grown in all ecologies of the 'yam belt' of West Africa. In addition to consumption on farm and at the village level, yams are sold in peri-urban areas and city markets, and have become an export commodity. There are many constraints to yam production including nutrient mining of the soils resulting in a reduction of available nutrients and subsequent reduced yields, pest and disease constraints, labour costs for staking and the cost of planting material. In some areas of West Africa, diseases have become the most serious constraint to yam production.

Anthracnose is one of the most serious leaf and vine epiphytotic diseases of yams, especially *D. rotundata*, in Nigeria. The causal agent of anthracnose is the fungus *Colletotrichum gloeosporioides* Penz. The *C. gloeosporioides* complex on yams was investigated during the planting season for three years (1999, 2000 and 2001) in Nigeria. The disease affects not only the leaves and vines, but also the tubers. Severe infection results in vine die back and defoliation.

In this paper, field symptoms, mycelial growth patterns and fungal conidia photographs are presented. The objective of the work was to associate or match field symptoms to specific identified *C. gloeosporioides* strains. These symptoms could perhaps be used for quick field identification of C. gloeosporioides strains and will help establish these diagnostic characteristics for use in routine germplasm health tests. This investigation will also facilitate the identification of *C. gloeosporioides* strains causing the different blights and spots on yams.

MATERIALS AND METHODS

Yam multiplication fields and experimental plots were regularly monitored in 1999, 2000 and 2001 throughout the growing seasons in four locations in Nigeria: Abuja, Ubiaja, Ikenne and Ibadan. The incidence of anthracnose was recorded. Samples of diseased leaves, vines and tubers were collected from 830 yam clones. The clones included landraces, improved clones and breeding lines. Similar leaf spots obtained from all the locations were classified together. The leaf samples were tested in the laboratory to determine the specie and strain of *Colletotrichum* causing the different leaf symptoms.

Yams (*Dioscorea* spp.) are one of the most important carbohydrate staples grown in all ecologies of the 'yam belt' of West Africa. In addition to consumption on farm and at the village level, yams are sold in peri-urban areas and city markets, and have become an export commodity.

Isolation of *C. gloeosporioides* and other microorganisms from the infected plant parts

Infected plant parts (leaves, vines and tubers) with different symptom types (spots, blight, die-back and sun scorch syndrome) were from the 830 yam genotypes were cut 1 cm long pieces using a sterile scalpel. The tissue pieces were surface sterilised by immersion in 10% w/v sodium hypochlorite for 3 minutes. The pieces were dried with sterile filter paper and 5 pieces per plate were plated on potato dextrose agar (PDA) containing 1ml/1litre lactic acid. The plates were incubated at 28°C for 4 days.

In order to identify the strain of *C. gloeosporioides* responsible for each of the growth patterns and mycelial colours on the plates, mycelial strands obtained from the initial cultures were taken from each growth pattern/colour and transferred onto new PDA plates. The plates were incubated at 28°C for 8 days and the mycelial growth examined on the 4th, 6th and 8th days.

In order to determine the growth rate of each *C. gloeosporioides* strain, the radial growth of the mycelia were recorded at two-day intervals until the 8th day when the conidia and setae were fully established.

RESULTS

C. gloeosporioides, the causal agent of yam anthracnose, produced different symptom types in the field in all the experimental and multiplication sites investigated. From observation of field symptoms on the leaves, the disease lesions were classified into either blights or spots. Seven types of spots and four types of blights were identified. The spot types were classified as follows:

Spot type **1** Regular spot with yellow halo;
Spot type **2** Large irregular brown spot with yellow halo;
Spot type **3** Large brown spot with concentric rings and having a grey centre;
Spot type **4** Light brown spot surrounded by a dark brown ring;
Spot type **5** Pin-point spots scattered on the lamina and surrounded by yellow haloes;
Spot type **6** Grey spots with a dark brown border merging to form lesions and causing deformation of the lamina edge;
Spot type **7** Brown spot with dark brown centre.

The four types of blight were classified as follows:

Blight type **1** Large brown lesion by the mid rib surrounded by a large yellow patch;
Blight type **2** Large brown lesion at lamina edge bordered by a yellow patch;
Blight type **3** Large grey lesion bordered by an olive green patch at leaf apex extending inwards;
Blight type **4** Large grey lesion bordered by an olive green patch starting from lamina edge extending inwards.

Other symptoms observed were large purple blotches on *D. alata* and the sun scorch syndrome (appearance of extensive burning of the leaves) on all the clones.

Macro- and microscopic studies showed that *C. gloeosporioides* isolates produced different growth patterns, mycelial colours and

other distinguishable morphological characters in culture. Growth was visible 48 hours after subculturing. In addition to *C. gloeosporioides*, *C. truncatum* (another anthracnose-causing pathogen) was frequently isolated from some of the symptom types. This pathogen was also found to produce different growth patterns and distinct morphological characters in culture.

A total of 19 growth patterns/mycelial colours were observed in culture: 12 from different spot types, four from blights and two from the sun scorch syndrome symptom types. The growth patterns ranged from concentric growth with distinct rings to growth with less pronounced rings. Mycelial colour types also varied between isolates namely, grey, white, dark brown, orange, sometimes fluffy while some produced scanty mycelia.

The fungus sporulated producing abundant and visible fruiting bodies with submerged acervuli, some isolates sporulated superficially with scattered acervuli while in some isolates, the sporulation was both superficial and submerged. The growth rate also differed. Some isolates were fast growing while others were slow growing. At the end of 8 days, the radial growth ranged from 2.2cm to 3.8cm with isolates from spots 6,4,2,1; blight 4 and sun scotch being the fastest while isolates from spots 2&3 and blight1 being the slowest. The conidial measurements ranged from 2.1-4.9um x 0.75 x 1.75um. Setae were present on isolates from spots 1, 5, 6 and the sun scotch type. The detailed results of the morphological characters of the various isolates isolated from each symptom types are presented on table 1.

DISCUSSION

C. gloeosporioides is easily identified in culture, but the production of different symptom types on yam in the field and the different growth patterns and various morphological characteristics obtained in culture give causes for concern in routine plant health testing schemes. Typification of isolates also present some difficulties. Some isolates with same conidial measurements, differ in some morphological characters, sporulation and growth patterns. This is the first attempt whereby symptoms have been classed and isolates associated to each symptom type. With this attempt, *C. gloeosporioides* isolates could be differentiated on the basis of growth pattern and other morphological characters produced in culture. Quick identification of *C. gloeosporioides* isolates in the field based on confirmed symptom types and morphological characters obtained after incubation, are vital in routine health testing schemes.

CONCLUSION

This study showed that *C. gloeosporioides* isolated from all symptom types and sometimes in association with *C. truncatum*, another causal agent of brown blotch (anthracnose), was the causal agent responsible for all the symptom types observed in the field. This fungus also produced different growth, sporulation patterns and mycelial colour in culture. With this diversity, it is obvious that there are several isolates of *C. gloeosporioides* either singly or in association involved in the yam anthracnose infections in the field. It was also observed during field inspections that the isolate causing the symptoms classed as blight types 3 and 4 was very virulent, causing severe die-back, defoliation and small or no tuber formation. Further investigations including pathogenicity tests will be required to determine the specific C. gloeosporioides isolate/isolates responsible for specific symptom type. Well established diagnostic characters could be used for practical routine plant health tests and symptoms used for field certification schemes and screening.

Acknowledgement

The authors wish to express their gratitude to Dr Bandypadhyay R Plant pathologist of the International Institute of Tropical Agriculture Ibadan , Nigeria for making valuable contribution to this paper by assisting in the description of the invitro characters of the fungus.

We wish to thank Mrs Afolabi and Mr Oguntade of the Germplasm Health unit for their useful contribution.

Morphological characteristics and growth patterns of *Colletotrichum gloeosporioides* isolates on *Dioscorea* spp.

Symptom	Mycelium growth pattern	Morphological characteristics		
		Radial Growth	Setae	Spore Dimensions
Spot 1	Greyish brown fluffy growth with concentric rings, submerged sporulation, black mass on the underside	3.7cm	present	2.9-3.5 x 0.75-1.05um
Spot 2	Dark/blackish mycelia, slow growth, distinct concentric rings, abundant sporulation, submerged and superficial production of distinct white/grey acervuli	2.25cm	absent	2.1-3.5 x 0.9-1.75 um
Spot 3	Dark grey mycelia, black growth underside	2.7cm	absent	2.1-3.5 x 1.05-1.75 um
Spot 4	Concentric growth, yellow and grey growth rings, pronounced growth rings on the underside of growth, pronounced superficial and submerged sporulation	3.3cm	absent	2.1-3.5 x 1.05-1.4 um
Spot 5a	Whitish cotton growth, less pronounced growth rings on the surface, light grey to brown pronounced growth rings on the underside		present	
Spot 5b	Dark grey to brown growth rings, less apparent concentric growth rings, scattered yellow acervuli			
Spot 5c	Grey growth, concentric rings sporulation not apparent on the surface	3.3cm	present	3.5-4.55 x 1.05-1.05 um
Spot 6a	Pronounced concentric growth with yellow rings, distinct sporulation on the surface, orange acervuli	3.8cm	absent	3.5-4.9 x 1.05 um
Spot 6b	Concentric growth with brown rings, sporulation not apparent, brown acervuli	3.6cm	absent	3.5-4.55 x 0.75-1.40 um
Spot 7a	Concentric growth with distinct white, brown and yellow rings, diffused sporulation, acervuli present in the yellow patches, diffused sporulation on the underside			
Spot 7b	Dark grey fluffy mycelial growth, less pronounced growth rings, black growth on the underside			
Spot 7c	Dark grey fluffy mycelial growth, less pronounced greyish black growth rings, pronounced dark grey growth rings on the underside	3.1cm	present	3.5-4.3 x 1.05-1.40 um
Blight 1	Whitish growth with distinct light to dark grey rings on the surface and dark grey to black growth rings on the under side	2.7cm	absent	3.5-4.2 x 1.05 um
Blight 2	Dark olive green fluffy mycelia, dark olive underside	3.5cm	absent	2.8-3.15 x 1.05-1.40 um
Blight 3	Dark grey mycelia, concentric growth with light/dark grey growth rings on the surface, black growth with distinct light yellow rings on the underside			
Blight 4a	Whitish fluffy mycelia, light grey rings towards the centre, slow growing black growth on the underside	3.7cm	absent	2.9-3.5 x 1.05 um
Blight 4b	Light grey to brown mycelia, no distinct growth pattern, sectored growth with dark brown patches on the underside			
Sunscorch a	White fluffy mycelia with light grey less apparent rings, less pronounced dark grey rings on the underside	3.4cm	present	2.8-3.5 x 1.05-1.40 um
Sunscorch b	Greyish yellow growth with an outer light brown growth ring. Black growth surrounded by a light yellow / grey ring on the under side			

ISTA Moisture Content Proficiency Test

By Ronald Don, ISTA Moisture Committee Vice-chair

In the last edition of Seed Testing International I gave an account of the work involved in preparing samples to be used in the first ISTA Moisture Content Proficiency Test. Now some might ask the question: Was all the work worth it? Well I'll let you be the judge of that.

One hundred and ten laboratories took part in the proficiency test and of these 77 were accredited laboratories and 33 volunteer laboratories. Here is a brief resume of the results which have been subject to statistical analysis at the ISTA Secretariat using the same computer program that is used to analyse purity and germination results.

Sample	Mean of all Laboratories (% Moisture Content)	Mean of Accredited Laboratories (% Moisture Content)
1	8.7	8.7
2	4.4	4.4
3	14.0	14.1

The mean results of the samples were:
When reporting the results to ISTA, 90 laboratories did this correctly. Fourteen laboratories reported results to two or more decimal places (the ISTA Rules state that: moisture content must be reported to the nearest 0.1%) and 6 laboratories reported replicate results that differed by more than 0.2% (In such cases they should have repeated the determination on another two replicates). An examination of the results show that they were distributed around the mean in a similar way to germination and purity proficiency test results:

Since the moisture content results were distributed in this manner, it was decided to analyse them using the standard ISTA program that is used to access the performance of laboratories in ISTA purity and germination proficiency tests. With this program laboratories having normalised or z-score out with the range -2 to +2 are considered to have reported a result that is considered questionable/deviant. In such cases the laboratories are asked to verify its results, examine their procedures and take action necessary to correct any deficiencies that may have contributed towards the deviant result(s). In addition, the test leader may recommend some formal follow-up corrective action. If a laboratory does not feel confident about the appropriateness of follow-up corrective action suggested by the test leader, it may contact the Secretariat for advice.

Because of the nature of seed and its variability, even with a homogenous referee sample, repeated tests in the same laboratory will produce a range of results and 2.5% of these will have z-scores that are less than (<) minus 2 and 2.5% will have z-scores greater than 2 (>). It is reassuring to see that less than 5% of ISTA Accredited Laboratories achieved an overall z-scores of <-2.0 and >+2.0, which is what would be expected by chance. It indicates that there is not any significant problem in moisture content testing in ISTA Accredited Laboratories for species where no grinding is required (Table 1).

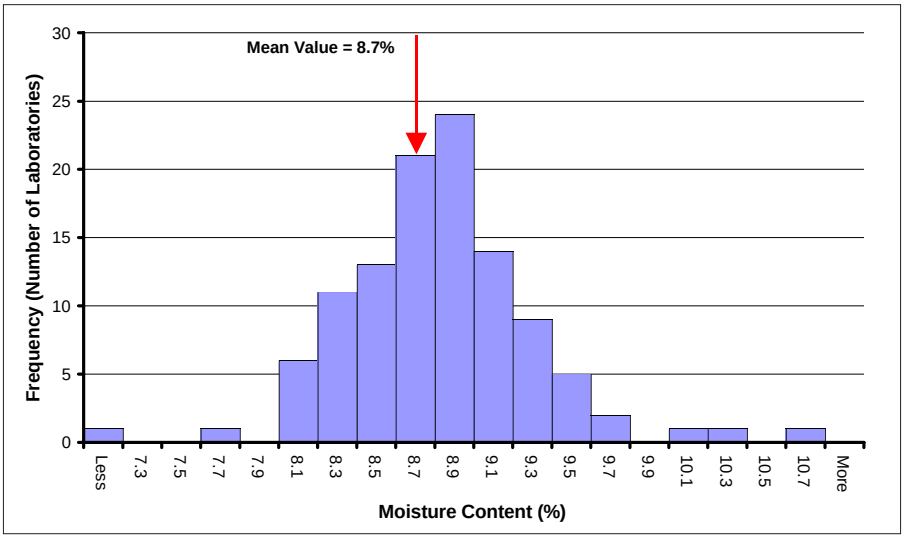


Figure 1. Frequency distribution of results reported on Sample 1 by laboratories participating in the first ISTA Moisture Content proficiency test

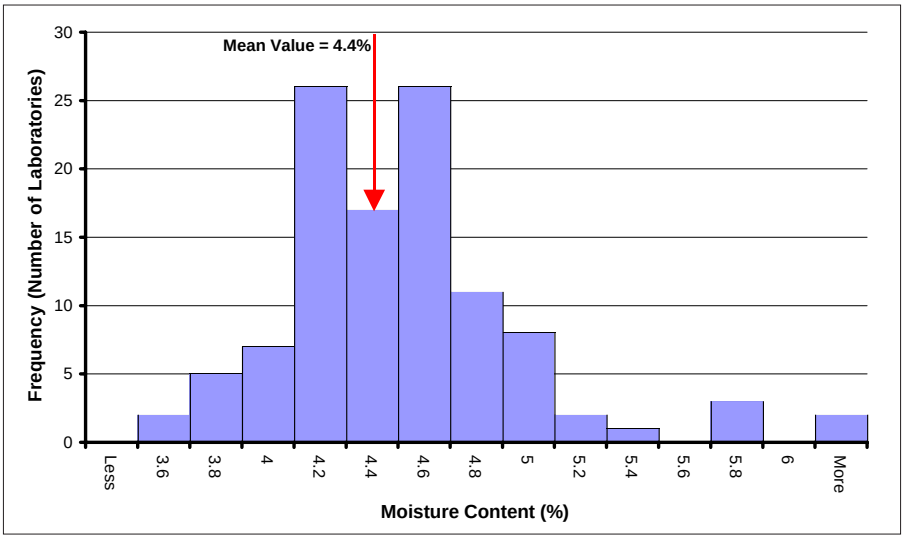


Figure 2. Frequency distribution of results reported on Sample 2 by laboratories participating in the first ISTA Moisture Content proficiency test

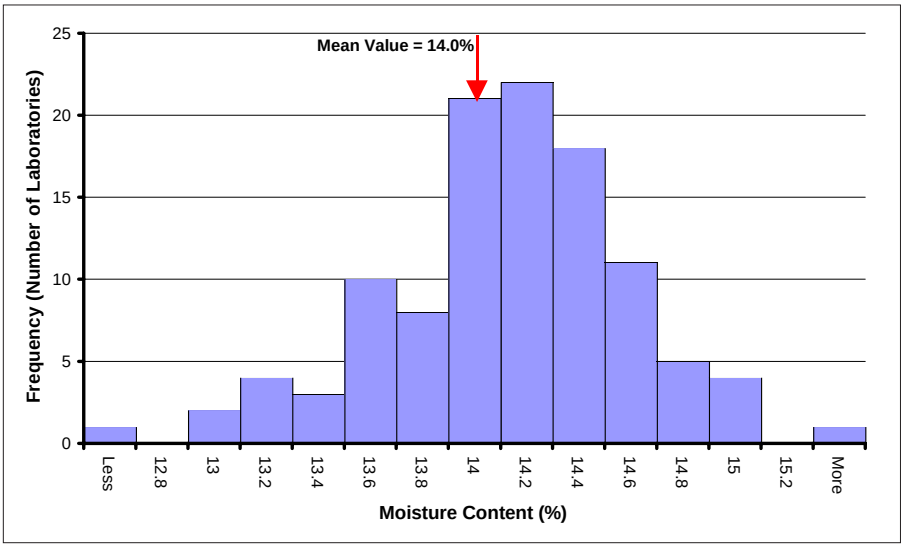


Figure 3. Frequency distribution of results reported on Sample 3 by laboratories participating in the first ISTA Moisture Content proficiency test

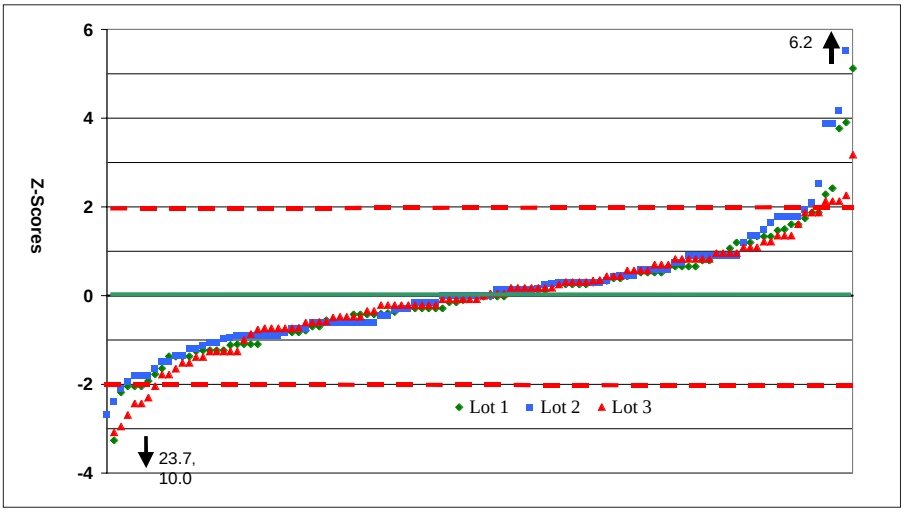


Figure 4 Distribution of z-scores for the three samples tested in the moisture proficiency test

Table 1 Details of Analysis of z-scores obtained in moisture content referee test

	Sample 1 (8.7% MC)	Sample 2 (4.4% MC)	Sample 3 (14.1% MC)	Average
Sample Results with z-scores <-2.0	3	3	7	4.33
Sample Results with z-scores >+2.0	5	7	5	5.67
Total of Sample Results with z-scores <-2.0 and >+2.0	**8**	**10**	**12**	**5.00**
Proportion of all Laboratories with z-scores <-2.0 and >+2.0	7%	9%	11%	9%
Proportion of Volunteer Laboratories with z-scores <-2.0 and >+2.0	21%	18%	21%	20%
Proportion of Accredited Laboratories with z-scores <-2.0 and >+2.0	1%	6%	7%	4.67%

The number of Volunteer Laboratories with scores <-2.0 and >+2.0 is however greater than would be expected by chance (20%). It is hoped that the test leader can offer Volunteer Laboratories recommendations and advice that will assist them in achieving moisture content results that are equivalent to those obtained by Accredited ISTA Laboratories.

Overall the distribution of z-scores for all 3 samples is similar to that obtained in purity and germination proficiency tests (figure 4). This is further evidence of the appropriateness of the standard ISTA proficiency test analysis program for moisture content proficiency tests.

To me the results of this proficiency test gives ISTA an assurance of the moisture content results reported on its International Certificates. However, this can not be a one off exercise. Moisture testing must be included routinely in the ISTA proficiency testing program. The next moisture proficiency test has already been scheduled to take place in February 2004. It will be more of a challenge as it will involve testing a species that requires grinding prior to oven drying. I send those preparing the test my best wishes - I know what's involved!

In the meantime I would like to thank all of the laboratories that took part in the referee test and thank Martina and Gerhard of the Secretariat Accreditation Department for their timely work in analysis all the results. ■

Plate I Calibrated electronic digital thermometer used to check oven temperature and oven temperature profile when conducting Moisture Content tests

Plate II Calibration Certificates for Digital Thermometer

The ISTA Flower Seed Testing Workshop

Budapest, Hungary, May 12 - 16, 2003

By Zita Ripka, ISTA Flower Seed Committee Chair

ISTA held its first workshop on flower seed testing in the previous 10 years this May with 14 participants from 7 countries and 3 continents. The main purpose of this workshop was to practice laboratory seed testing techniques of flower seeds and also to deepen lexical and theoretical knowledge of seed analysts.

The programme of purity testing covered seed knowledge of 9 large and 9 medium size seeded flower species and purity tests of *Tagetes patula* and *Dianthus caryophyllus* and a lecture was held on the importance of seed collections. In germination testing there were reports on the referee test results of *Petunia*, *Impatiens*, *Cyclamen* and *Tagetes* and afterwards germination tests practice were on these species except for *Cyclamen*. Sylvie Ducournau gave a short introduction about the new ISTA Handbook on Seedling Evaluation. On the third day the participants had the opportunity to evaluate TZ tests of *Helianthus*, *Viola*, *Lathyrus odoratus* and *Tagetes*, which they prepared the previous day and lectures helped to know better the theory of TZ testing. QA questions of the different laboratory seed testing areas -equipment, training, methods- were mentioned in short lectures. On the last day the participants got acquainted with the present work and programme of ISTA from Dr Prof Norbert Leist, President of ISTA. During the workshop we visited the Vácrátót Botanical Garden 20 km from Budapest, where we could find and know interesting plants.

The workshop was a good opportunity for the participants to start discussions about their problems in laboratory seed testing and correct and uniform interpretation of the ISTA Rules. The programme provided plenty of opportunities to practice their skills in seed testing techniques and every participant went home with some new knowledge that can be introduced and used home.

The written workshop process is available at the ISTA Secretariat. The organisation was a cooperate effort of ISTA FSC members - Sylvie Ducournau, Steffi Krämer, Rita Zecchinelli, Lea Mazor- and the laboratory staff of the Budapest laboratory of the National Institute for Agricultural Quality Control.

ISTA held its first workshop on flower seed testing in the previous 10 years this May with 14 participants from 7 countries and 3 continents.

Since there were 30 preliminary registrations after the first announcement it shows that flower seed testing is interesting for many analysts and laboratories. ISTA Flower Seed Committee intends to organize similar workshops in the future. ■

List of participants

Peñazola Aspe, Patricia	- Chile
Krzyzanowska, Joanna	- Poland
Skobrtal, Barbara	- Poland
Szust, Danuta	- Poland
Zecchinelli, Rita	- Italy
Ferrari, Fabio	- Italy
Mazor, Lea	- Israel
Ducournau, Sylvie	- France
Blouin, Valérie	- France
Leist, Norbert	- Germany
Rastetter, Karin	- Germany
Link, Ines	- Germany
Krämer, Stefanie	- Germany
Sproge, Lauma	- Latvia

12 May, Monday
Registration, Seed knowledge, Purity testing, Welcome reception

09.00-09.30 Registration
09.30-10.00 Greeting (Prof. Dr. Leist, ISTA President, Dr. Neszmélyi, director general)
10.00-10.30 Introduction (Zita Ripka)
10.30-11.00 Break
11.00-11.30 Seed collections -lecture (Zita Ripka)
11.30-12.00 Seed mixture -seed knowledge of some large flower seeds
12.00-12.30 Purity test (*Tagetes patula*) -practice
12.30-13.30 Lunch
13.30-14.30 Visit to the seed testing laboratories of the National Institute for Agricultural Quality Control, Seed Inspection Division, Budapest
14.30-15.00 Break
15.00-15.30 Seed mixture -seed knowledge of some medium size flower seeds
15.30-16.00 Purity test (*Dianthus caryophyllus*) -practice
16.00-16.30 Purity test (*Gypsophyla elegans*)- practice
16.30-17.00 QA questions of purity testing -lecture (Zita Ripka)
18.00 Welcome dinner

13 May, Tuesday
Germination testing

09.00-09.10 *Petunia* ring test -lecture (Sylvie Ducournau)
09.10-10.00 *Petunia* x *hybrida* germination test -practice
10.00-10.30 *Cyclamen* ring test -lecture (Rita Zecchinelli)
10.30-11.00 Break
11.00-11.30 *Tagetes* ring test -lecture (Lea Mazor)
11.30-12.00 *Tagetes patula* germination test -practice
12.00-12.30 New Seedling Evaluation Handbook -lecture (Sylvie Ducournau)
12.30-13.30 Lunch
13.30-13.40 *Impatiens* ring test -lecture (Sylvie Ducournau)
13.45-14.30 *Impatiens walleriana* germination test -practice
14.30-15.00 Break
15.00-15.30 TZ preparation of *Helianthus*
15.30-16.00 TZ preparation of *Viola*
16.00-16.30 TZ preparation of *Lathyrus odoratus*
16.30-17.00 TZ preparation of *Tagetes*

14 May, Wednesday
TZ testing

09.00-09.30 TZ testing: general introduction, procedure and safety precautions
09.30-10.00 Steps of preparation, seed morphology- place of embryo (Steffi Krämer)
10.00-10.30 Evaluation of *Viola* TZ -practice
10.30-11.00 Break
11.00-11.30 Evaluation of *Helianthus* TZ -practice
11.30-12.00 Evaluation of *Lathyrus* TZ -practice
12.00-12.30 Evaluation of *Tagetes* TZ -practice
12.30-13.30 Lunch
13.30-14.00 TZ testing as an indicator of seed vigour (Dr Leist)
14.00-14.30 Changes in ISTA Rules Chapter 6, introduction of ISTA Handbook on TZ Testing (Dr Norbert Leist)
14.30-15.00 Break
15.00-16.00 Seed vigour test for flower seeds -lecture (Gyöngyi Ivanovics)
16.00-16.30 QA in germination and TZ testing (Gyöngyi Ivanovics)
16.30-17.00 Consultation

15 May, Thursday
Visit to Gödöllo

08.30-09.30 Budapest - Vácrátót by bus
09.30-11.30 Visit of the Botanical Garden
11.30-12.00 Vácrátót - Gödöllo by bus
12.00-13.00 Lunch at the castle
13.00-14.30 Visit of the Grassalkovich castle
14.30-15.30 Gödöllo- Budapest by bus
15.30 Budapest sightseeing by bus and on foot

16 May, Friday

09.00-09.30 ISTA programme -lecture (Dr Norbert Leist)
09.30-10.00 Uniformity in seed testing -lecture (Dr Norbert Leist)
10.00-10.30 Work of ISTA FSC -lecture (Zita Ripka)
10.30-11.00 Break
11.00-12.00 Discussion of the ISTA FSC Handbook (Zita Ripka)
12.00-12.30 Closing session
12.30-13.30 Lunch
13.30 Consultation

1st ISTA Vigour Workshop

Parndorf, Austria, May 14 - 16, 2003

By Alison Powell, ISTA Vigour Committee Chair, and **Stan Matthews**

In the true spirit of ISTA, sunny Parndorf, Austria, was the setting for making friends from 16 different countries whilst working together in a workshop from 14 to 16 May 2003

In the true spirit of ISTA, sunny Parndorf, Austria, was the setting for making friends from 16 different countries whilst working together in a workshop from 14 to 16 May 2003. This was the first three-day workshop run by Alison Powell, Dennis TeKrony and Stan Matthews, held at the laboratories of Pioneer Hi-Bred International, courtesy of the company and with the active and positive collaboration of laboratory manager Lotte Leonhardt. A crucial welcoming touch was the arrangements put in place by Pioneer to meet participants at the airport and bus and train stations. In the feedback from participants this was frequently mentioned. It was especially appreciated by both the well and not so well traveled in view of a rare event in Austria, travel disruption in Vienna on the day of arrival. Special efforts were made by Pioneer to overcome this.

The mix of countries and different laboratory experiences were stimulating and helpful throughout the workshop. Practical work was undertaken on accelerated ageing (soyabeans), conductivity (garden peas) and controlled deterioration (small-seeded brassics). Seeds were sent from Aberdeen, Scotland (oilseed rape) and Kentucky, USA (soyabeans), set up in the Austrian laboratory and germination results analysed by participants from Eastern and Western Europe, South America, South Africa, the Far East and Australasia. All went smoothly, although the first consignment of soyabeans was delayed en route, but seeds made it to their germination room in time for the workshop! The laboratory at Parndorf had help from the official Austrian laboratory in Vienna and Vienna University in putting together the glassware and equipment for the 25 participants.

Supporting lectures, or should we say seminars, since the audience participated readily with questions and good-humoured interventions, were interspersed with the practicals. The theoretical background of ageing and imbibition damage were covered along with pictorial descriptions of the methods, including the video prepared at the University of Kentucky by Dennis and colleagues, Critical practical aspects of vigour testing were emphasised throughout. In response to questions, Dennis covered the cold test for maize, which, although not an ISTA validated test, was used by many at the workshop. Alison also explained the role of ISTA in test development. As experienced university teachers,

Alison, Dennis and Stan were delighted with the atmosphere of enjoyable learning that the group generated.

The domestic arrangements, daily transport from hotels, lunch at the laboratory and 'wunderbar' evening at a traditional Heurigen, where we ate and participated in tasting six Austrian wines (or was it eight?!), were well appreciated and enjoyed by all. Our thanks go to Pioneer for the wine tasting. The language of the workshop was English (UK and USA style), but some hesitant German was attempted (with tuition) in the many thank yous to our hosts.

The formal and informal feedback on the workshop was satisfying. The pre-prepared course papers and general organisation were well received. The course leaders were supported admirably to achieve this by Bettina Kahlert at the Secretariat and Lotte Leonhardt and her staff in Parndorf. The participants clearly expressed their improved know-how and a willingness to go back to their home laboratories and put vigour testing into practice. The emphasis given to the precision that is required for repeatable vigour testing was certainly taken on board. The Vigour Committee also increased its contacts to assist laboratories in following the vigour test rules as developed by ISTA. The emails have already been flowing back and forth between colleagues, which is easier to do when you know the people from an enjoyable experience together. ■

ISTA Purity Workshop

Seattle, United States, June 10 - 12, 2003

By Ken Allison, ISTA Purity Committee Chair

An ISTA Purity Workshop was held in Seattle, WA, USA. from June 10 to 12, 2003, immediately following the annual AOSA/SCST meetings. Pieter Oosterveld, 1st Vice-President of ISTA, brought greetings from the Association to the participants at the start of the workshop on the afternoon of June 10th. Thirty-seven people participated in the workshop. Most were from the United States, but there were also representatives from Denmark, Canada and Korea.

Topics covered included:

1. ISTA Purity Committee's work and changes to Chapter 3 of the ISTA Rules by Ken Allison, CFIA, Ottawa, Ontario, Canada.

2. Identification of Centaurea spp. by Michael Gerdes, Syngenta Seeds, Twin Falls, Idaho, United States.

3. Quality Control - calibration and monitoring of equipment and analysts in the seed purity laboratory by Ken Allison and Janine Maruschak, CFIA, Saskatoon, Saskatchewan, Canada.

4. Differences among PSD's in ISTA and AOSA Rules related to Grasses by Deborah Meyer, California Dept. of Food and Agriculture, Sacremento, California, United States.

5. Bromus spp. identification by Ken Allison.

6. Identification of Poa spp. by Sharon Davidson, Agri Seed Testing, Salem, Oregon, United States

I owe a debt of thanks to the various presentors who took the time to prepare presentations. They all did a great job and provided us with much useful information. I am sure we will all remember Michael Gerdes' presentation whenever we see a Centaurea seed from now on.

I would like to thank the local organizing committee, especially Nancy Hartshorn, who suggested having the workshop in Seattle and made all the logistical arrangements that madeit possible. The facilities were very satisfactory and the arrangements were excellent. Holding an ISTA workshop in connection with the AOSA/SCST meetings worked well and should be considered again in the future. Interest was expressed in an ISTA Tetrazolium workshop, for example. ■

2nd Announcement - ISTA Forest Tree and Shrub Seed Workshop

October 20 - 25, 2003
Prague, Czech Republic

Zdenka Procházková, ISTA Forest Tree & Shrub Seed Committee Chair

Objectives

The workshop will deal with practical problems related to tree seed testing of both conifer and broadleaf species. The general aim of the workshop is to create discussion and exchange of information in this area. Based on input from the preliminary registration, the workshop will cover all fields of seed testing such as Purity, Germination, Tetrazolium, Health, Excised embryo, Moisture content and X-ray tests; also, other fields of interest are Referee tests, Quality Management System, Precision of test results, Retesting frequencies of stored seeds and Practical work in the laboratory.

Tentative Programme

From Monday, October 20, to Wednesday, October 22 - presentations, lectures, practical "training"; and a visit to the Central Institute for Supervising and Testing in Agriculture in Prague (CZDL03). Registration for the workshop is scheduled for Sunday evening, October 19, and Monday morning, October 20.

There will be two alternative post-meeting trips (from Thursday, October 23, to Saturday, October 25):

1. Visit to the State Tree Seed Centre in Tyniste nad Orlici (1day bus trip of about 300 km).

2. Visit to the Seed Testing Laboratory for Forest Tree Seeds in Uherske Hradiste (CZDL02), southeastern Czech Republic, and then continue on to visit the Forest Seed Testing Laboratory (SKDL02) in Liptovsky Hradok, Republic of Slovakia (3 day bus trip of about 1 000 km).

Venue

The workshop will take place at the Congress Conference Centre Floret located in the peaceful village Pruhonice, a suburb of Prague, Czech. Pruhonice is situated in a quiet area on the main eastern highway leading to Brno and Vienna, only a few minutes by car from the Prague city centre and within the Prague municipal bus and metro (subway) systems. In Pruhonice there is a beautiful castle "Pruhonice Chateau" which presides over the Botanical Park, now protected by UNESCO. ■

For your registration, travel information and hotel reservation please visit the ISTA website:

www.seedtest.org

or contact:

Zdenka PROCHÁZKOVÁ
FGMRI RS Uherske Hradiste
686 04 Kunovice
Czech Republic
e-mail: Prochazkova@vulhmuh.cz
Fax +420 572 549 119

2nd Announcement 1st ISTA Moisture Workshop

Lyngby, Denmark
November 3 - 7, 2003

Harry Nijënstein, ISTA Moisture Committee Chair, and
Jette Nydam, ISTA Moisture Committe Member

General

The ISTA Moisture Committee and the Danish Plant Directorate have the pleasure of announcing 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:

Lectures and discussions
· 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 and excursions
· Moisture meters, Danish Grain Network
· Excursion to seed company and to manufacturer of moisture meters

Practical work
· Oven test (soft wheat test)
· Calibration of moisture meters

Registration

The number of participants is limited to 20. The provisional registration costs are EUR 250, which includes participation, handouts, refreshments during breaks, lunches, daily travel from hotel to laboratory.

Note: Unfortunately the Moisture Workshop is full, and no more participants can be accepted.

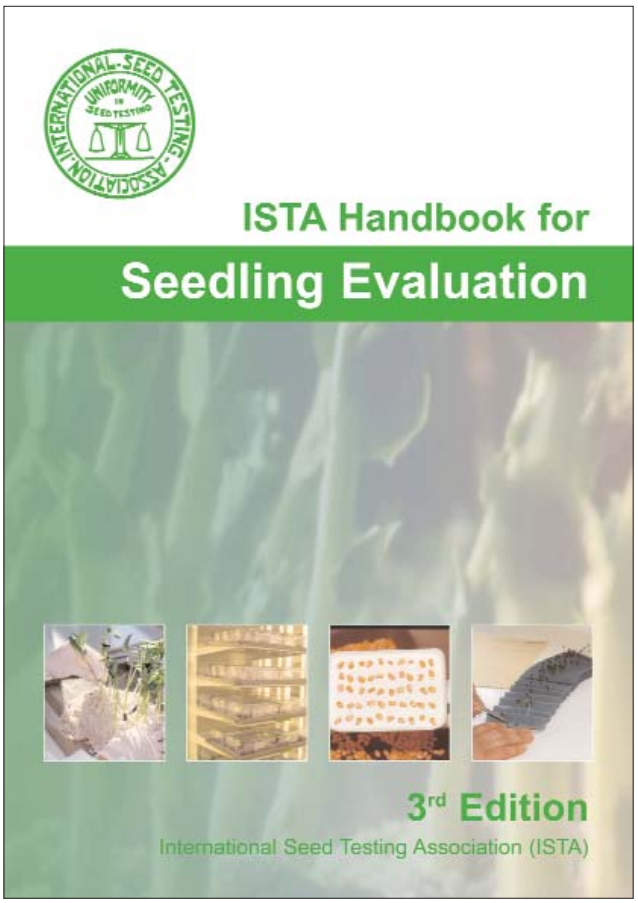
ISTA Handbook for Seedling Evaluation

3rd Edition, 2003

By Ronald Don

ISBN 3-906549-26-7

This handbook is a most valuable guide for seed analysts the world over. Although the 'International Rules for Seed Testing' define normal and abnormal seedlings in considerable detail, the additional help provided by this handbook, with its detailed instructions and many illustrations, is vital if the principles of seedling evaluation are to be applied uniformly. The 3rd edition also includes many tropical, subtropical, flower and tree species.



What is new about the 'ISTA Handbook for Seedling Evaluation'?

The first section of the new addition is aimed mainly at the trainee seed analyst and trainers and contains background information on the elements of seed biology, an understanding of which is considered essential for seed analysts. A large number of new diagrams as well as the classic Dutch diagrams from the 2nd edition give life to the text and help explain the finer details of physiology and seedling evaluation. For the first time, general evaluation rules such as the 50% rule for the evaluation of cotyledons are considered in depth and explained with the use of diagrams and colour prints of seedlings. The evaluation of different seedling types is fully illustrated by colour prints of normal and abnormal seedlings. Diagrams and plates are also used to explain in detail the intricacies of the evaluation of species, such as *Zea* and *Phaseolus*, and defects, such as physiological necrosis and negative geotropism.

It is planned to regularly update the new edition of the Handbook and to facilitate this in a binder format with individual sections adopting a QA numbering system. Amendments and additions to the handbook can be easily made without the expense of reprinting the entire publication.

ORDER FORM

Yes, I would like to order the newly released **ISTA Handbook for Seedling Evaluation,** 3rd Edition, 2003

Price: CHF 250.00*

Send to:
ISTA Secretariat
Zürichstrasse 50
P.O. Box 308
8303 Bassersdorf
CH - Switzerland

Sales & Accounts Department
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*Note: This publication will be delivered as a free service to all ISTA Members

ISTA Working Sheets on Tetrazolium Testing

Volume I - Agricultural, Vegetable and Horticultural Species

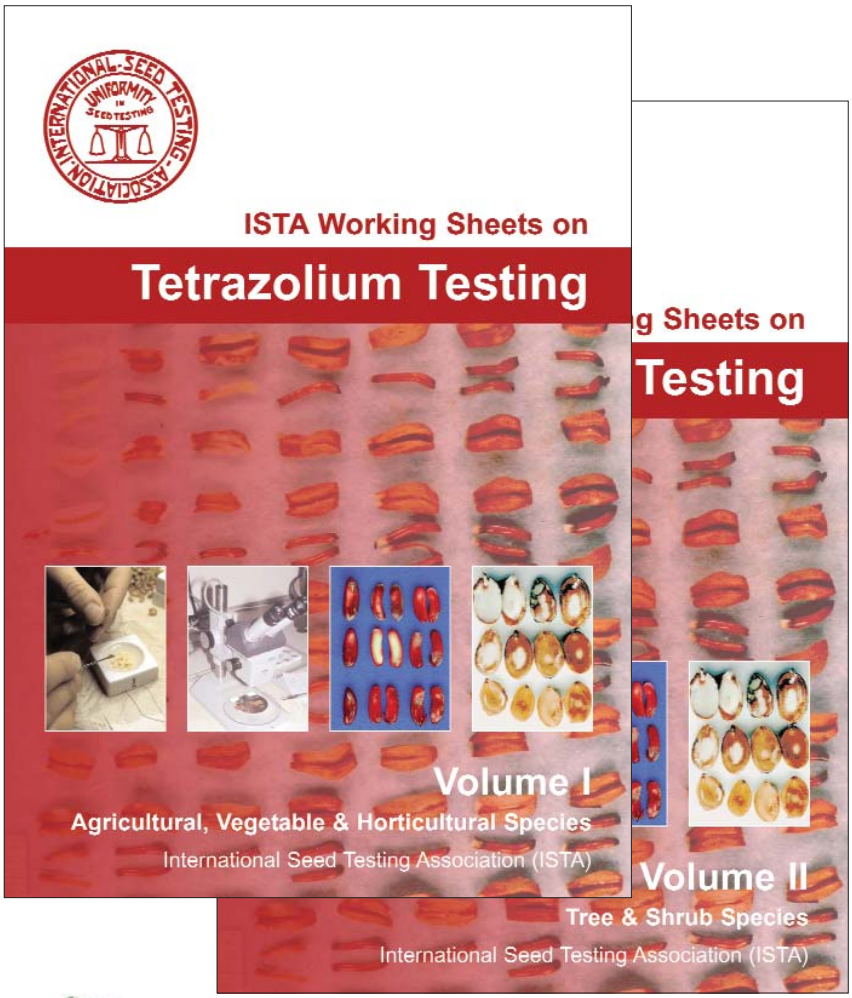
Volume II - Tree and Shrub Species

Edited by Norbert Leist and **Stephanie Krämer**

Illustrated by Jochen Pfäfflin

The Tetrazolium Working Sheets Part 1 and 2 include detailed and standardised description to conduct and evaluate Tetrazolium tests for the determination of viability from agricultural, horticultural and forest seed.

The working sheets present 120 agricultural and 122 forest species and genera, respectively, in as much as the testing of the species took place similar. The description is illustrated with pictures of the seed morphology, the cutting instructions and the different stages of non-viable seeds. The working sheets support the *International Rules for Seed Testing* by providing detailed working plans to the seed testing laboratories. This publication is a result of the experiences of the daily routine work of a seed testing laboratory and the optimisation of competent members of the ISTA Tetrazolium Committee from all over the world. The Tetrazolium Working Sheets contribute perfectly to one of the main aims of ISTA: Harmonization in international seed testing.



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Yes, I would like to order the newly released **ISTA Working Sheets on Tetrazolium Testing**

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	Vol. II	**CHF 250.00**
	Vol. I&II	**CHF 500.00**

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ISTA Secretariat
Zürichstrasse 50
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*Note: These publications will be delivered as a free service to all ISTA Members

Proficiency Test on Orange Certificates

By Martina Rösch, Head of ISTA Accreditation

A. INTRODUCTION

The test report, i.e. the ISTA Certificate laboratories issue, is the final product the customer receives from a laboratory performing seed analysis. Apart from the correct results, there are several items one has to bear in mind when completing an ISTA Certificate to make sure that the customer gets the required information. There is even a chapter in the ISTA International Rules for Seed Testing dealing with completion of ISTA Certificates. Therefore it is considered to be very important that they are correctly filled in.

A few years ago, accredited laboratories were required to report results on specimen Orange Certificates and send them to the Secretariat for evaluation. To assess the laboratories' capability to correctly fill in ISTA Certificates, the Proficiency Test Committee decided to again run a proficiency test round including the issuance of a specimen Orange Certificate. This shall be done on a regular basis and at least once a year. Accredited laboratories but also applicants shall be asked to complete them with the proficiency test's results. The submitted certificates shall then be assessed and feedback given to the participants.

With the first test round of 2003 (03-1, *Trifolium incarnatum*), the Proficiency Test Committee initiated such a proficiency test. This report aims at giving a brief overview on the problems that occurred on Orange Certificates that were issued by the participants.

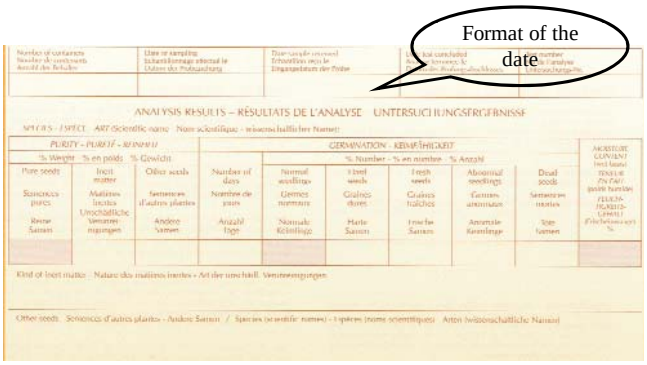
B. TOP OF THE CERTIFICATE

Some of the laboratories omitted the laboratory stamp on the top of the certificate. No major problems occurred with the entry fields for applicant and details of the sampling and testing laboratory except for the tick boxes indicating the laboratory's status, i.e. governmental, private and company. Quite a few laboratories either omitted this section or added the ticks manually as it seems to be difficult to adjust a typewriter or printer to the small size of the boxes.

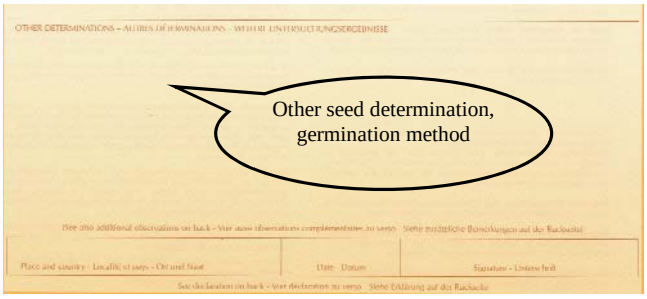
C. TEST RESULTS FOR PURITY, GERMINATION AND MOISTURE

A number of laboratories did not follow the format prescribed for entering the date. As described in Chapter 17 of the Rules, the format of the date shall follow the ISO Format (year in full-month-day with two figures for both month and day, i.e. YYYY-MM-DD) to make sure that month, day and year are not mixed up.

For the percentage of purity and germination components, no major problems occur. Only very few laboratories failed in rounding the percentages correctly.



D. OTHER DETERMINATIONS - BOTTOM OF THE CERTIFICATE



A few more errors occurred with data entry for other seed determination, e.g. wrong number of seeds or other seed determination was not reported at all. Some erroneous entries may have been caused by the fact that the sample size was not in accordance with the ISTA Rules for making a complete test and that the instruction enclosed may not have been clear enough for all participants.
Some laboratories also omitted details on the germination method like substrate, temperature regime or treatments to break dormancy.

E. GENERAL

Errors like handwriting (apart from the signature at the bottom) and erasures did not occur at all or very few times only as of course this shall not happen since these invalidate the Certificate. It has also been checked whether transfer of results was made correctly by comparing the proficiency test report form with the specimen certificate. Transcription errors only occurred twice among the sixty participants.

As a result of this proficiency test, a document has been compiled to give a summary following the ISTA Rules on how ISTA Certificates are to be completed ('Explanatory note on how to complete ISTA Orange, Green and Blue International Seed Analysis Certificates'). This document shall - next to the ISTA Rules - provide guidance especially to newly accredited laboratories who have not yet issued many certificates. It has been made available on the ISTA web site and upon request, and supersedes a similar document compiled in the early 90s. ■

For more information, please also check under: 'Newly released documents', page 48

Newly released Information Documents and Directives

By Martina Rösch, Head of ISTA Accreditation

Guidelines for developing quality documentation

INTRODUCTION

This document provides guidance for the development, preparation and control of quality manuals tailored to the specific needs of the user. The resultant quality manuals should reflect documented quality system procedures required by the ISTA Accreditation Standard. Examples are used to show one or several possibilities how requirements of the ISTA Accreditation Standard may be considered appropriately. All these examples originate from existing laboratory quality manuals; for confidentiality reasons references to the laboratories have been deleted. Another purpose of these examples is to show the great variety of possible solutions and to demonstrate that what may be appropriate for one laboratory does not necessarily represent the best solution for another one. This should encourage laboratories in finding suitable, customized solutions reflecting the laboratory's daily work. Although care has been taken to cover the subject comprehensively, no attempt was made to do this exhaustively.

Explanatory note on how to complete ISTA Orange, Green and Blue International Seed Analysis Certificates

INTRODUCTION

This note aims to cover all possible data entries on Orange and Green ISTA International Seed Lot Certificates (OIC and GIC), and Blue ISTA International Seed Sample Certificates (BIC). The numbering used in this note relates to the numbering on the example OIC attached and acts as a cross reference to the relevant sections of the ISTA Rules. GIC are completed in an identical way to the OIC but the difference is that the ISTA controlled sampling has been done in one country and the ISTA testing in another. For the BIC only the testing is under the control of the ISTA accredited laboratory, the sampling is not.

Conditions for making reference to accreditation and membership and the use of the ISTA Logo

1. SCOPE

The scope of this document is to outline conditions on how a laboratory may use the ISTA Logo and refer to its membership and/or accreditation status on cover letters or other documents, i.e. test reports, certificates or promotional material.

The 'Explanatory note on how to complete ISTA Orange, Green and Blue International Seed Analysis Certificates' and 'Conditions for making reference to accreditation and membership and the use of the ISTA Logo' have been made available on the ISTA web site at:

www.seedtest.org/Secretariat/UseofISTALogo.cfm

but are also obtainable from the ISTA Secretariat upon request as well as the 'Guidelines for developing quality documentation'.

The ISTA Logo has been made available for download as from September 1st, 2003 and may be used under the conditions mentioned in the document 'Conditions for making reference to accreditation and membership and the use of the ISTA Logo' as from October 1st, 2003.

Complete list of documents related to ISTA Accreditation

1. ISTA Seed Testing Laboratory Accreditation Standard, Version 3.1, November 2002
2. Guidelines for Monitoring ISTA Accredited Company Seed Samplers and Company Laboratories, Version 1.0, April 2002
3. Protocol on Termination, Suspension and Withdrawal of ISTA Accreditation, Version 1.0, July 2002
4. Guidelines for becoming an ISTA Accredited Member Laboratory, Version 1.4, May 2003 (also available in Spanish)
5. ISTA Accreditation Guidelines for Laboratories performing Seed Health Testing, Version 1.0, March 2003 (under review)
6. Conditions for making reference to accreditation and membership and the use of the ISTA Logo, Version 1.0, June 2003
7. Guidelines for developing quality documentation, Version 1.0, November 2002
8. Explanatory note on how to complete ISTA Orange, Green and Blue International Seed Analysis Certificates, Version 1.0, July 2003

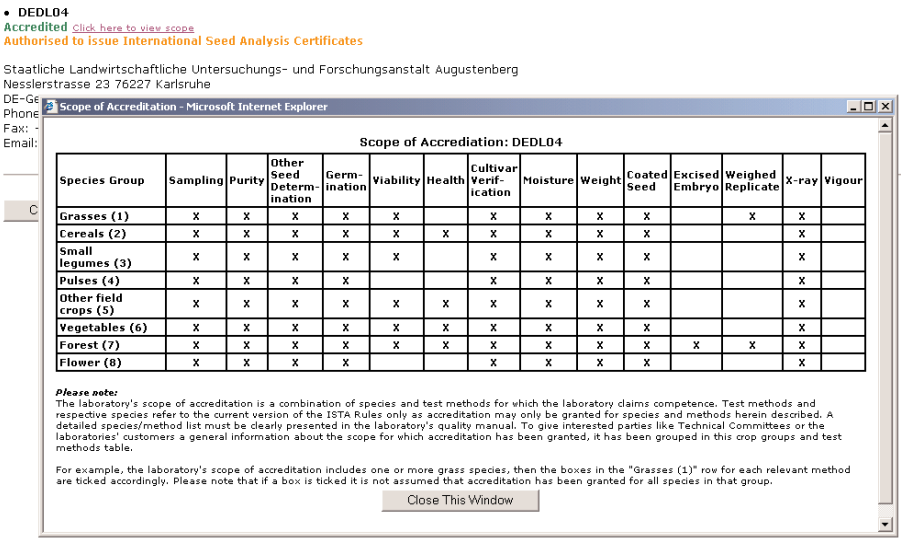
All documents are available free of charge from the ISTA Secretariat upon request.

Laboratory's Scope of Accreditation now online

The laboratory's scope of accreditation is now online. This gives ISTA members and their customers but also the Technical Committees the opportunity to see which laboratories are accredited and what they are accredited for. The scope of accreditation is presented in a matrix of crop groups and methods.

The laboratories' scope of accreditation is accessible via the membership list by clicking on respective laboratory. In addition, the information is given, whether a laboratory is authorised to issue ISTA Certificates.

Example:



Species Group	Sampling	Purity	Other Seed Determination	Germination	Viability	Health	Cultivar Verification	Moisture	Weight	Coated Seed	Excised Embryo	Weighed Replicate	X-ray	Vigour
Grasses (1)	x	x	x	x	x		x	x	x	x		x	x	
Cereals (2)	x	x	x	x	x	x	x	x	x	x			x	
Small legumes (3)	x	x	x	x	x		x	x	x	x			x	
Pulses (4)	x	x	x	x			x	x	x	x			x	
Other field crops (5)	x	x	x	x	x	x	x	x	x	x			x	
Vegetables (6)	x	x	x	x	x	x	x	x	x	x			x	
Forest (7)	x	x	x	x	x	x	x	x	x	x	x	x	x	
Flower (8)	x	x	x	x			x	x	x	x			x	

Please note:
The laboratory's scope of accreditation is a combination of species and test methods for which the laboratory claims competence. Test methods and respective species refer to the current version of the ISTA Rules only as accreditation may only be granted for species and methods herein described. A detailed species/method list must be clearly presented in the laboratory's quality manual. To give interested parties like Technical Committees or the laboratories' customers a general information about the scope for which accreditation has been granted, it has been grouped in this crop groups and test methods table.

For example, the laboratory's scope of accreditation includes one or more grass species, then the boxes in the "Grasses (1)" row for each relevant method are ticked accordingly. Please note that if a box is ticked it is not assumed that accreditation has been granted for all species in that group.

Re-accredited ISTA Member Laboratories

Status - August 31, 2003

AU - Australia

AUDL02

Queensland Seed Technology Lab
The University of Queensland
Gatton College
Lawes 4345, Queensland

Phone: +61 75460 1487
Fax: +61 75460 1486
E-mail: seedlab@aghort.uq.edu.au

AUDL09

AgriQuality
Seed Laboratory
GPO Box 1841
Melbourne, Victoria 3001

Phone : +61 3 8318 9000
Fax : +61 3 83189002
Email : saundersj@agriquality.com

AUDL10

Casco Agritech
Casco Australia Pty Limited
214 McDougall Street
P.O. Box 549
Toowoomba QLD. 4350

Phone : +61 7 46330599
Fax : +61 7 46330711
Email : castwb@casco.com.au

DE - Germany

DEDL03

LUFA Nord-West
Referat Saatgutprüfung
Postfach 100655
31756 Hameln

Phone: +49 51519 871920
Fax: +49 51519 871927
Email: goeritz@lawikhan.de

DEDL16

Landwirtschaft. Untersuchungs- und Forschungsanstalt (LUFA)
Mecklenburg - Vorpommern
Graf-Lippe-Str. 1
18059 Rostock

Phone: +49 381 2030760
Fax: +49 3812030790
Email: lufa-rostock@t-online.de

DEDL18

Thüringer Landesanstalt für Landwirtschaft TLL
Referat Saatgut
Postfach 100262
07702 Jena

Phone : +49 3641 454213
Fax : +49 3641426224
Email : g.mueller@jena.tll.de

LV - Latvia

LVDL01

National Seed Testing Laboratory
Lubanas str. 49
1073 Riga

Phone: +371 711 2716
Fax: +371 711 3085
Email : benita.derilo@vaad.gov.lv

US - United States

USML05

Agri Seed Testing, Inc.
1930 Davcor Court SE
Salem, Oregon 97302

Phone: +1 503 585 1440
Fax: +1 503 5880733
Email: sdagriseed@aol.com

Newly Accredited ISTA Member Laboratories

Status - August 31, 2003

DK - Denmark

DKML02

DLF-Trifolium A/S
Stensøvej 1
4900 Nakskov

Phone: +45 54 922511
Fax: +45 54 925222
Email: dlf@dlf.dk

IN - India

INML07

Indo-American Hybrid Seeds (India) Pvt. Ltd
Seed Laboratory, PO Box 7099
17th Cross,2nd A Main,K.R.Road
Banashankari II Bangalore 560070

Phone: +91 80 676 0111
Fax: +91 80 8602912
Email: iahs@indamseeds.com

JP - Japan

JPDL03

Nagano Station of National Livestock Breeding Centr, Ministry of Agriculture, Forestry & Fisheries
1889 Arakoda
Saku-shi, Nagano-ken 385-0007

Phone: +81 267 672501
Fax: +81 267 684743
Email: y0tsuji@nlbc.go.jp

NL - Netherlands

NLML05

Advanta Seeds B.V.
Dijkwelsestraat 70, P.O.Box 1
4420 AA Kapelle

Phone: +31 113 347911
Fax: +31 113 342778
Email: peter-van.immerseel@nl.advantaseeds.com

ISTA in the Electronic Age

Avoiding a Darwinian fate

By Jim Sheppard, ISTA Webmaster

The methods of publication and dissemination of scientific information have not significantly changed since the first volume of Philosophical Transactions of the Royal Society appeared in London in 1665. Scientific societies have plodded along for centuries confident that their members will remain loyal to the association that most closely represents their field of interest; that certain journals are more valued than others; that publication, by it nature, can take many months, and that the journal income will remain an important financial resource for the association. The technological changes of the 20th century have impacted on our everyday lifestyles and most importantly on our means of communication. Yet, while these advances have altered our society, the primary means of scientific communication remains unchanged.

Nevertheless, the paradigm has changed. Journals must compete for submissions not just on their reputations but also on their formats, their fees, and the speed they offer authors; libraries are consolidating their purchasing power and demanding pricing concessions. Like it or not, scientific associations are a business and subject to competitive pressures to innovate and modernise. The fact that the successes of scientific associations are not judged by their financial performance does not exempt them from failing. The era of electronic publication will result in an evolutionary milestone for scientific societies. If scientific associations such as ISTA are to avoid a Darwinian fate, we must be prepared to embrace new technologies and undergo a process of continual innovation and diversification.

It is essential that the leaders of ISTA recognise that open access to scientific research enabled by electronic publication is an asset to both researchers and the scientific societies that represent them. ISTA should do everything it can to encourage, rather than thwart open access in service to its members.

The fate of ISTA will depend on how well it manages this change. Four factors are crucial to success. First ISTA must wean itself from financial dependence on publications especially institutional income from publications. Second, we must be innovative technologically and editorially in order to deliver scientific content to our audience faster with more flexibility and at the same time protect the integrity of the association and its members. Third, technology must be used to reduce costs and add value. Finally, we must build loyalty and attract new members to the organisation through programmatic diversification.

How does an association break its dependence on institutional subscriptions? Through a combination of new programmes, production cost savings, attracting new institutional subscribers, instituting colour and page charges, raising reprint charges and maintaining institutional subscription fees the American Society for Cell Biology found it possible to move away from dependence on institution subscriptions. Journal related income derived from institutional sources was reduced by 50% over five years. At the same time total journal revenues rose by 237%, the number of institutional subscribers increased by 32% and society revenues grew by 57%.

The second key success factor is innovation. Technological innovation is critical to attracting new association members and journal readers, and to reducing costs. Electronic publication offers many advantages over current methods of publication.

· Development of platforms that allow real-time events to be presented and allow interactivity with the presented data
· A significant reduction in the time between submission of scientific communications and their presentation to the target audience
· Use of multimedia to enhance the presentation of the data.
· Significant reduction in the cost or publication
· Significant improvement in communication and use of searchable terms, text and key words
· Linkages to related information on the Internet.

The third key to success is reducing costs. The introduction of new technology is often believed to increase costs, as systems must be put into place to support the new services. While this may be true in the short term, it is almost universally true those investments in innovation when amortised over their productive lifespan, drive costs down. For example, the introduction of electronic submission and editing of papers has already resulted in a reduction in costs for Seed Science and Technology. We have the opportunity to make available ISTA publications electronically via the Internet or CD-ROM what is required is a business model for recouping some or all of the costs. There are several models currently in use by various organisations.

· Electronic version free to everyone
· Electronic version free to print subscribers
· Electronic version sold to everyone
· Electronic version sold to print subscribers for an extra charge
· Individual subscriptions
· Member subscriptions
· Single article sales
· Licensing options

The fourth and last key success factor is diversification. Without a variety of products and services, any business is doomed. ISTA is no exception. In the rapidly changing environment of the new millennium, we must embrace change. The benefits of the association are described in the goals of the constitution: promotion of uniform application of seed testing methods and access to research in all areas of seed science and technology. If ISTA is to survive its Darwinian fate, we must provide a broad range of activities and benefits that are valued by its members. This complex of goals and benefits combined with continual technological innovation in the area of electronic communication is the best assurance for the survival of ISTA in a rapidly changing technological environment.

The issue of electronic access to the publications of ISTA surfaced frequently during the 2003 Extraordinary Meeting held this June in Zürich, Switzerland. We would appreciate your comments and ideas on this important topic for the Association. Visit the ISTA WebBoard to share your thoughts and to read the comments of others. ■

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Conditions for making reference to a Laboratory's Membership and/or Accreditation and use of the ISTA Logo

1 SCOPE

The scope of this document is to outline conditions on how a laboratory may use the ISTA Logo and refer to its membership and/or accreditation status on cover letters or other documents, i.e. test reports, certificates or promotional material.

2 RELATED DOCUMENTS

2.1 ISTA Seed Testing Laboratory Accreditation Standard

2.2 Procedures for Termination, Suspension and Withdrawal of ISTA Accreditation

3 USE OF THE ISTA LOGO AND REFERENCE TO MEMBERSHIP AND ACCREDITATION

3.1 General Conditions

- The laboratory is responsible for the correct use of the ISTA Logo and reference to its membership or accreditation and misuse may lead to withdrawal of the membership or accreditation following the procedure mentioned under point 4.
- The laboratory must stop making reference to its membership or accreditation in case of suspension, withdrawal or termination.

3.2 ISTA Logo

The ISTA Logo has been officially registered and its use is restricted. An electronic copy which may be used for reproduction and printing purposes may be obtained from the ISTA Secretariat. The colour of the logo is black and the size of the logo must not exceed 1.5 cm in diameter. The logo must remain square in format.

3.2.1 Illustration of the ISTA Logo

3.3 Reference

3.3.1 ISTA Member laboratories and accredited member laboratories

ISTA member laboratories may refer to their membership or accreditation status by using the ISTA Logo and assigned code number following stated conditions.

The ISTA Logo must be placed either in the footer or the right or left hand side of the laboratory's cover letters accompanied by the ISTA Code number. The format of the ISTA Logo must be in compliance with conditions stated under 3.2. Further reference text is at the laboratory's discretion.

Example of reference to ISTA membership (and/or accreditation):

(Accredited) Member Laboratory XXYY01 [ISTA Code] of the International Seed Testing Association (ISTA).

3.4 Documents

The ISTA Logo may without further notice be quoted on:
- cover letters of the laboratory
- documentation for information, marketing and advertising purposes.

The ISTA Logo may not be quoted on:
- documents under the letterhead of any other organisation the member may be affiliated with if the impression is given that membership or accreditation refers to an entity other than the member laboratory.
- test reports and certificates.

3.5 Reference to the membership and accreditation status on test reports and certificates

The ISTA Logo must not be used on certificates and test reports. ISTA laboratories are allowed to make reference to their membership or accreditation on test reports and certificates at their own discretion.

3.6 Certificate of Accreditation

The 'Certificate of Accreditation' issued by the Secretariat to all ISTA Accredited Member Laboratories is the confirmation of a laboratory's competence to operate in accordance with the Association's regulations. The certificate or a copy thereof can be used by the laboratory to give evidence of its accreditation. The provisions of this document apply correspondingly. In addition, any copy of the certificate must be true to scale and be clearly identifiable as a reproduction.

4 MISUSE

In case a laboratory does not comply with the above mentioned requirements, following measures are taken depending on the severity of the irregularity:
- legal action
- suspension of membership and/or accreditation
- withdrawal of membership and/or accreditation

Apply for the use of the ISTA Logo online at **www.seedtest.org**

New ISTA Members and Membership Mutations

Status - 31 August 2003

New ISTA Members

AU- AUSTRALIA

AUDM
Mr. John M. Blackstock
Australian Seeds Authority Ltd,
P.O. Box 488, Carlton North,
Victoria 3054
Phone: +61 3 9381 2373 Fax: +61 3 93812373
E-mail: john@aseeds.org.au

DE-GERMANY

DEPM
Dr. Walter Haege
Paul-Hoesch-Str. 4, 81243 Muenchen
Phone: +49 89 82085522 Fax: +49 8982085522
E-mail: walter.haege@gmx.de

KG-KYRGYZSTAN (new member country)

KGML01 / KGPM01
Republican Seed Inspection,
RSI, Central Seed Laboratory,
4-A, Toktonaliev Street Bishkek, 720055
Phone: +996 312 542225 Fax: +996 312540423
Personal member : Ms. Helena Tkachenko

SE-SWEDEN

SEML08 / SEPM08
AnalyCen Nordic AB,
Seed Testing Unit, Box 905, 531 19 Lidköping
Phone: +46 510 88 700 Fax: +46 510 66 438
E-mail: malena.marklen@analycen.se
Personal member : Mrs. Malena Marklén

Mutations

BD-BANGLADESH

BDPM02
New personal member : Mr. M. A. Hakim
Bangladesh Agricultural Development
Corporation, Seed Testing Laboratory
Beej Bhaban, Gabtoli, Mirpur, Dhaka - 1218
Phone: +880 2 801347 Fax: +880 2 9552042
E-mail: stlbadc@dhaka.net
(formerly Mr. M. N. Farooq)

CN-CHINA

CNDM01
New personal member : Mr. Xi-Wu Zhang
Bureau of Animal Husbandry,
Ministry of Agriculture,
No. 11, Nongzhanguan NanliBeijing 100026
Phone: +86 10 64192886Fax: +86 1064192869
E-mail: xmjcych@agri.gov.cn
(formerly Mr. Gao-Ju Han)

CY-CYPRUS

CYDM01
New personal member : Mr. Petros Xystouris
Seed Testing Laboratory, Department of
Agriculture, Ministry of Agriculture,
Natural Resources and Environment,
1412 Nicosia
Phone: +357 22 466253 Fax: +357 22 343419
E-mail: doagrg@cytanet.com.cy
(formerly Mr. Efstathios Xenofontos)

DE-GERMANY

DEDM11
New personal member : Prof. Dr. Michael Kruse
Universität Hohenheim 350/d,
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u.Populationsgenetik
Fruwirthstr. 21, 70593 Stuttgart
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E-mail: kruse@pz.uni-hohenheim.de
(formerly Prof. Dr. Dr. h. c. A. M. Steiner)

DK-DENMARK

DKDM01
New personal member : Mrs. Jette Nydam
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Skovbrynet 20, 2800 Kgs. Lyngby
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E-mail: jnh@pdir.dk
(formerly Dr. Hans Arne Jensen)

DKPM06
New personal member : Mr. Christian Boehm
Hunsballe Seed Laboratory, Hunsballe Frø A/S,
Hunsballevej 6, Sørbymagle 4200 Slagelse
Phone: +45 58 57 1470 Fax: +45 58 57 1489
E-mail: cb@hunsballe.dk
(formerly Mr. Bent Fischer)

FR-FRANCE

FRPM
New personal member : Dr. Abdelkader Fatmi
AGROGENE S.A., 620 Rue Blaise Pascal, Z.I.,
77555 Moissy Cramayel Cedex
Phone: +33 1 641 33180 Fax: +33 1 64133181
E-mail: kader.fatmi@agrogene.com
(formerly Dr. Pierre Lacaze)

JP-JAPAN

JPDM04
New personal member : Dr. Kiyoshi Tanaka
Forestry & Forest Products Research Institute,
Independent Admin. Institution
Inashiki-gun, Matsunosato 1, Kukisaki-cho,
Ibaraki 305-8687
Phone: +81 298 733211 Fax: +81 298 733255
E-mail: bhutan@ffpri.affrc.go.jp
(formerly Mr. Tadakazu Hiroi)

LT-LITHUANIA

LTDM01
New personal member : Ms. Ramune Masiuniene
Quality Analysis Division, The State Seed &
Grain Service, under Ministry of Agriculture
Ausros Vartu 16/1, 2030 Vilnius
Phone: +370 5 2312954 Fax: +370 5 2616370
E-mail: lab.vsgt@takas.lt
(formerly Mrs. Danute Makeliene)

RO-ROMANIA

RODM02
New personal member: Mrs. Georgeta Mihai
Forest Research and Management Institute
(ICAS), Sos. Stefanesti 128,
sector 2 oficiul II, 72904 Bucuresti
Phone: +40 21 2406845 Fax: +40 21 2406845
E-mail: genetica@icas.ro
(formerly Mrs. Maria Moise)

RU-RUSSIAN FEDERATION

RUDM01
New personal member: Mr. Alexander M. Malko
The State Seed Inspection of the Ministry of
Agriculture of Russia,
Orlikov pereulok 1/11107139 Moscow
Phone: +7 095 2077064 Fax: +7 095 2070567
E-mail: Alexmalko@yandex.ru
(formerly Mr. Viktor Trusov)

US-UNITED STATES

USDM01
New personal member : Ms. Susan Maxon
Seed Regulatory and Testing Branch, AMS,
USDA, 801 Summit Crossing Place
Suite C, Gastonia, NC 28054
Phone: +1 704 810 8877 Fax: +1 704 8524189
E-mail: Susan.Maxon@usda.gov
(formerly Dr. Richard Payne)

YU-YUGOSLAVIA

YUDM03
New personal member : Dr. Dragica M. Ivanovic
Inst. za kukuruz Zemun Polje Maize Research
Institute, Seed Testing Laboratory
Slobodana Bajica 1, P.O.Box 89,
11080 Beograd-Zemun
Phone: +381 11 3754989 Fax: +381 113754994
E-mail: divanovic@mrizp.co.yu
(formerly Dr. Zivorad Videnovic)

Welcome!

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

All interested persons are invited to forward the attached request form to the ISTA Secretariat, PO Box 308, 8303 Bassersdorf, CH-Switzerland, phone +41 1 838 6000 or fax +41 1 838 6001, E-mail ista.office@ista.ch to receive a membership information package.

✓ Yes, please send me more information on how to become an ISTA Member.

Contact Person _____

Organisation _____

Address _____

_____

City _____

Postal Code _____

Country _____

Phone _____

Fax _____

Email _____

ISF Congress - A successful event for ISTA

Bangalore, India, June 9 - 11, 2003

The annual ISF congress took place in Bangalore, India from June 9-11, 2003. Due to the international environment and the SARS outbreak there were fewer participants than expected - 511 delegates and accompanying persons from 36 countries. If quantity-wise it was not a big congress, quality-wise it was one of the finest and best congresses that have taken place over the last fifteen years, reports the Secretary General of ISF, Bernard Le Buanec.

The trading floor was very busy and according to reports the commercial people were happy with the business they conducted.
The technical meetings were well attended. Amendments to the Trade and Arbitration rules were adopted and will enter info force on July 1, 2003. Several position papers, on the MTA in the framework of the Multilateral System of the FAO International Treaty on Genetic Resources, indication that a variety is genetically modified on the OECD List of Varieties, disclosure of the 'source' of biological material in intellectual property protection applications and GURTs, were adopted too.

A lively discussion took place on the document 'ISF View on Intellectual Property' and some amendments to the chapter titled Co-existence of Breeder's Right and Patents were adopted by very large majority. According to the new wording, a commercially available variety protected only by Breeder's Right and containing patented elements should remain freely available for further breeding.

In addition, if a new plant variety, not essentially derived, resulting from further breeding, is outside the scope of the patent's claims, it may be freely exploitable by its developer. But if the newly developed variety is essentially derived or is within the scope of the patent claims, consent from the owner of the initial variety or of the patent must be obtained.

The congress was followed by a two-day Seed Treatment Conference attended by 115 people. During the conference the marketing, technical and regulatory aspects of seed treatments were presented by specialists from all over the world. The presentations were marked by a keen response from the audience.

On the occasion of the congress ISF announced its support for an initiative to give anyone with an internet connection the ability to explore and use information about the world's largest collection of vegetable diversity. The grant - nearly US$ 50 000 - will fund a joint initiative by the System-wide Information Network for Genetic Resources (SINGER) of the Consultative Group on International Agricultural Research (CGIAR) and the Asian Vegetable Research and Development Center (AVRDC). ■

For more information, please contact the ISF Secretariat:
Chemin du Reposoir 7, 1260 Nyon, Switzerland
Tel: +41223654420, Fax: +41223654421
E-mail: isf@worldseed.org,
Web: www.woridseed.org

ISTA was represented at the Congress with an exhibition stand, where information documents were offered to the ISF Congress delegates, and various publications, such as the 'International Rules for Seed Testing' and the journal, 'Seed Science and Technology,' were on display.

Much interest was shown, and many questions were asked. The overall response from the local delegates and seed traders was most positive, and has led to many new contacts in the region for ISTA.

The Association of Official Seed Analysts (AOSA) and Society of Commercial Seed Technologists (SCST) are pleased to announce the upcoming publication of a special edition of Seed Technology, An International Journal Serving Seed Scientists and Technologists. Volume 25 No. 2 is titled Tree Seed Symposium. This special publication of Seed Technology is devoted to the publication of the Proceedings of the International Tree Seed Symposium of the Seed Physiology and Technology section of the International Union of Forestry Research Organization (IUFRO). This symposium is the annual meeting of IUFRO seed technologists and scientists.

This special issue includes 13 full manuscripts and 30 abstracts of papers and posters presented at the symposium by internationally recognized authors from the tree seed industry, seed testing laboratories and academia. The papers represent a wide range of basic and applied research topics related directly to forest tree seed physiology. Tree seed quality continues to increase in importance to forestry, nurseries and others in seedling establishment and tree seed production. Professionals in the tree seed industry, seed analysts, seed technologists and seed biology students wishing further insight into tree seed quality concerns will find this publication a valuable and essential reference.

An annual subscription to the Journal is $50 (US & Canada) and $60 (outside the US and Canada). Subscription includes two Volumes, Volume 25 No. 1 and Volume 25 No. 2 (Tree Seed Symposium). Volume 25 can be ordered individually for $40.

Seed Technology can be ordered from:
Jan Osburn

AOSA Management Office
PMB #411
1763 E. University Blvd., Suite A
Las Cruces, NM 88001
Phone/Fax (505) 522-1437
E-mail aosaoffice@earthlink.net
www.aosaseed.com

CALENDAR

2003

October

20-23 UPOV Council
(Geneva, Switzerland)

20-25 ISTA Forest Tree and Shrub Seed Workshop
(Prague, Czech Republic)

26-29 ESA Annual Meeting
(Brussels, Belgium)

November

02-04 EESNET Meeting
(Belgrad, Yugoslavia)

03-07 ISTA Moisture Workshop
(Lyngby, Denmark)

17-21 APSA Asian Seed Conference
(Bangkok, Thailand)

25-29 ISTA/FAO GMO Workshop
(Chiang Mai, Thailand)

December

01-05 ISTA/FAO/ICARDA/GTZ Quality Assurance Workshop
(Cairo, Egypt))

2004

March

24-26 AFSTA Annual Meeting
(Tunis, Tunisia)

May

13-24 ISTA 27th International Seed Testing Congress
(Budapest, Hungary)

24-26 ISF Congress
(Berlin, Germany)

International Seed Testing Association (ISTA)

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www.seedtest.org