

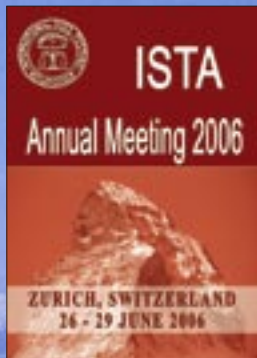
Seed Testing

INTERNATIONAL

ISTA News Bulletin No. 131 April 2006



ISTA Annual Meeting in Zurich, Switzerland Page 3
June 26 - 29, 2006



IN THIS ISSUE

COVER ARTICLE

ISTA Annual Meeting 2006
3 - 11

ASSOCIATION NEWS

The 5th Annual EESNET Meeting
12

Seeds in Agricultural Development
- an Update from Vietnam
14

RULES DEVELOPMENT

ISTA Seed Moisture Committee
Progress Report
20

ACCREDITATION

5th ISTA Proficiency Test on GMO Testing
22

ISTA Proficiency Test Programme
26

SEED SCIENCE

ISTA Seed Symposium 2007
31

TRAINING & EDUCATION

3rd ISTA Workshop on Statistical Aspects
of GMO Detection
40

Seed Testing INTERNATIONAL



EDITORIAL OFFICE

EDITOR-IN-CHIEF
Dr. Michael Muschick

CO-EDITORS
Mrs. Michelle Jenni Nietlispach
Ms. Patricia Raubo

ADMINISTRATION
Dr. Bettina Kahlert
(Technical Committees)
Ms. Martina Rösch
(Accreditation)

International Seed Testing Association (ISTA)

ISTA Secretariat
Zürichstrasse 50
P.O. Box 308
8303 Bassersdorf
CH - Switzerland
Phone: +41 44 838 6000
Fax: +41 44 838 6001
E-mail: ista.office@ista.ch
Internet: www.seedtest.org

Next Issue

Deadline for article submission:
August 15, 2006
Publication date of *Seed Testing
International* No. 131:
April 2006
No of copies: 2500

Other ISTA Publications

For information and orders of other
ISTA Publications, please contact
the ISTA Secretariat at the above
address, or visit our website at

www.seedtest.org

Editorial

By Michael Muschick,
ISTA Secretary General



Dear Reader,

you have the newest issue of *Seed Testing International* in your hands. This number is different compared to the previous issues, not only because of the contents itself, but because of the new structuring of the contents.

All articles in the journal are now arranged in the four business areas of ISTA: **Rules Development**, **Accreditation** of laboratories, **Seed Science** and **Training & Education** activities. Furthermore, you will always have a big section about the latest news from and around ISTA including the latest membership updates in the section of the **Association News**.

In all coming issues of *Seed Testing International* you will now find a cover article, focussing on a topic of actual major importance. This issue is focussing on the upcoming ISTA Annual Meeting 2006, which undoubtedly will be the biggest gathering of seed analysts from all over the world. Find in this issue the final programme, an overview of all relevant documents you need in order to be superbly prepared for that meeting, as well as the text of the most important documents to be discussed at this meeting. Like for instance the strategy document - the article explains the process on how the new strategy should be developed. I invite you to study the contents of the strategy and to actively participate in the discussion or to send your comments on the strategy to the ISTA Secretariat already now.

I am truly excited about this meeting and the discussions which will be taking place – likewise I look forward to personally welcoming you at this important meeting.

Next to all the other interesting articles in this issue of *Seed Testing International*, like a fascinating report from Vietnam and many technical and scientific contributions besides all the Annual Meeting information, I would like to particularly draw your attention to the

President's report. Pieter provides you with an excellent summary of the discussions of this year's business meeting of the Executive Committee, who's members work very hard for you to enhance the Association and to let ISTA cope with the challenges of the time.

Please enjoy the reading of this issue of *Seed Testing International* and I indeed look much forward to welcoming you in Zurich this June at the ISTA Annual Meeting 2006.

Yours sincerely,
Michael Muschick

CONTENTS

PRESIDENT'S REPORT 2

COVER ARTICLE

The ISTA Annual Meeting 2006	3
Proposed Changes to the ISTA Constitution	5
Proposed Fixation of Annual Subscriptions	7
Draft ISTA Strategy	8
Final Programme ISTA Annual Meeting 2006	10

ASSOCIATION NEWS

EESNET Meeting Report	12
GCC Workshop Bahrain	13
Seed in Agricultural Development - Vietnam	14
Obituary Kees Langerak	16
Obituary Claude Anselme	17
Membership Update	18

RULES DEVELOPMENT

ISTA Seed Moisture Committee Progress Report	20
--	----

ACCREDITATION

5 th ISTA Proficiency Test on GMO	22
ISTA Proficiency Test Programme	26
Accreditation of Laboratories under the Performance Based Approach	28
Member Lab Update	29

SEED SCIENCE

Experience Diversity in Brazil	30
ISTA Seed Symposium 2007	31
Electrical Conductivity Vigour Test	32

TRAINING & EDUCATION

ISTA Handbook on Seedling Evaluation	36
Workshop Reports	40
Workshop Announcements	42
Industry Needs Trained Seed Analysts	48
Calendar	49



ISTA Annual Meeting 2006

Find all relevant documents and the final programme for the ISTA Annual Meeting 2006 in Zurich, Switzerland

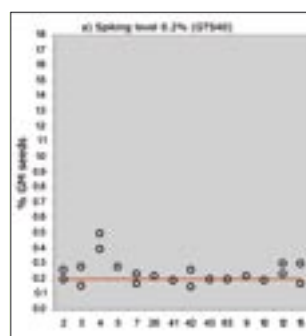
Page 3



Seed in Agricultural Development - an Update from Vietnam

Read about the developments of the Seed Industry in Vietnam

Page 14



5th ISTA Proficiency Test on GMO

The results of the 5th ISTA Proficiency Test on GMO are published

Page 22



Experience Diversity in Brazil

Find out more about Brazil, the host country of the next ISTA Congress in 2007

Page 30



Workshop Reports

Read the report of the 3rd ISTA Workshop on Statistical Aspects of GMO Detection in Buenos Aires, Argentina

Page 40

President's Report

By Pieter Oosterveld, ISTA President



Over the past years ISTA and FAO have been working closely together in the organisation of workshops in various countries. This year a joint workshop will be held in Ghana. ISTA believes that the collaboration with FAO is very important with regard to the expressed wish of the Association to support seed testing on tropical species and the development of laboratories in areas where seed testing is still developing. FAO and ISTA agreed that a Memorandum of Understanding between the two partners would be of benefit to strengthen their relation. During a ceremony on May 24, 2006, the assistant director of FAO, Ms Louise Fresco and myself, will sign the agreed Memorandum of Understanding. The Executive Committee and the ISTA staff are very happy with the Memorandum of Understanding with FAO, it underlines once more the acknowledgement of the work for our Association.

In February, the Executive Committee met at the premises of the Secretariat in Bassersdorf, Switzerland. All members of the Executive Committee participated in the meeting. It was my great pleasure to welcome also our Honorary President, Professor Attilio Lovato. The meeting was well prepared and hosted by the ISTA staff. The Executive Committee expressed its appreciation to the staff members for all the work they do for the Association. We all are aware of the fact, that the support of the staff is essential for all of us.

The Executive Committee evaluated the developments of the Association over the past ten years and concluded that many goals that were set, have been achieved. Worldwide uniformity in seed testing is the vision of ISTA. The increase of membership, from 64 countries and 136 laboratories in 1995 up to 76 countries and 171 in 2005, indicates clearly that governments and the seed industry acknowledge ISTA's importance for the facilitation of the national and international seed trade. Also interesting is the increasing number of ISTA certificates that are issued by laboratories in regions where seed testing is developing.

The positive signals from the 'market' were clearly highlighted when the Executive Committee discussed a draft document on strategic planning. As announced in Bangkok, the Executive Committee will come up with a draft strategic document for discussion at the Ordinary Meeting 2006. The document has been circulated to the members and is also available for download on the ISTA Website.

The Executive Committee also discussed testing for specified trait(s) and made reference to the outcome of the Ordinary Meeting in Bangkok. The Executive Committee agreed that the scope of the decisions made concerning 'testing on specified trait(s)' includes GMO testing as well. Therefore, the Executive Committee decided that from now on ISTA will use in all documents relating to methodology the terminology 'testing on specified trait(s)'.

The Executive Committee decided positively on proposals on a revision of the Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots. The revised version is already available on the ISTA Website.

The Executive Committee agreed on a number of proposals in order to bring some articles of the Constitution in line with the current fee structure. These proposals do not affect the policy of the Association nor the voting right. Furthermore, the proposals include the installation of associate members, corporate members and honorary life members. The proposals for changes in the constitution have already been distributed to the membership and are published on page 5 of this issue.

Several working groups are working on various numbers of items. Some examples: The working group on tropical seeds is looking for possibilities for a training programme for regions where seed testing is at an early stage of development. ISTA seeks partners to make such a programme possible. The method validation working group is finalising the ISTA generic method validation programme.

The draft is going to be discussed with the chairpersons of the technical committees. The working group on certificates is going to present some proposals with regard to the use of ISTA certificates. Part of an ongoing discussion is a request for permission of printing the ISTA logo on seed bags.

The Executive Committee finalised the discussion on the programme of the Annual Meeting 2006 and the Congress 2007. The working group presented a number of proposals. The Executive Committee concluded that the introduction of annual meetings worked out positively in the work of the technical committees and the decision making process in general. The Executive Committee concluded that annual meetings should be continued to be organised. Also the 4-days programme can remain unchanged in principle. The Executive Committee is also in favour of continuing a triennial cycle for the congress, starting with the seed symposium, followed by open technical committee meetings and the ordinary meeting. The overall programme will take 7 days. The already published programme for the congress in Brasil will remain unchanged, since this programme has already been published. The Executive Committee decided also that in the future two fees are to be set for the congress: one for the overall congress and one for the seed symposium only.

The Secretary General presented the audit report on ISTA's finances. The year 2005 ended up with a small profit. The Executive Committee congratulated the Secretary General for the data presented. Especially

continued from page 2

the reduction of debtors of membership subscription, certificates and publications went down from CHF 210.000 to only CHF 50.000. The Executive Committee is aware of the fact, that this reduction is a result of intense attention by the ISTA staff.

On invitation of the 'Dipartimento di Scienze e Technologie Agroambientali' of the University of Bologna the Executive Committee decided that the Annual Meeting 2008 will take place in Bologna, Italia. The Executive Committee appreciates the invitation of the Italian colleagues very much. In 2008, the university of Bologna is celebrating its 100 years anniversary. Our Honorary President, Professor Attilio Lovato, showed his appreciation for ISTA's choice for Bologna. He was professor at the University of Bologna and managed for many years the seed testing laboratory of this university. Also from this place he served our Association. We all are looking forward to meeting in Bologna in the year 2008.

In this address I have highlighted some items that have been discussed during our meeting in February. You should have received the agenda and documents for our Annual Meeting 2006 already by now. The Executive Committee is ready and looking forward to discussing with you.

Welcome to our Annual Meeting in Glattbrugg, Switzerland.

Your President,
Pieter Oosterveld



The Executive Committee at the Meeting in Bassersdorf, Switzerland in February 2006

The ISTA Annual Meeting 2006

By Michael Muschick, Secretary General

In a few months only, from June 26 to June 29, 2006 to be exact, the largest international meeting of seed analysts will take place – the ISTA Annual Meeting 2006.

This year it will be held in Glattbrugg, Switzerland at the Novotel Hotel Zurich Airport.

Seed analysts, seed scientists and government representatives from around 76 countries are expected to participate in this conference. It will allow a profound exchange of opinions regarding all aspects of seed science and technology, provide a unique possibility to make new contacts to other people involved in the seed business and will give the possibility to talk about the own experiences in the area of seed science and technology and to listen to others about their experiences.

Besides this unique opportunity to discuss with experts in the field of seed science and technology, ISTA has elaborated a very interesting programme for the Annual Meeting 2006, which is published in this issue of *Seed Testing International*.

FOCAL POINTS

The focal points of the programme this year are very important for the future development of the Association. They are:

- **Discussion regarding the future strategy of ISTA**
- **Testing of specified traits in the session of the GMO Task Force**
- **Discussion on the ISTA Rules Proposals.**

Discussion on ISTA Strategy

The discussion on the strategy of an association is indeed the most important task of its membership. At the Annual Meeting 2006 the ISTA membership will start the first discussion round regarding the ISTA strategy for the upcoming years.

In a faster and faster getting world with more and more technical know how, the developments in the single countries expand with dif-

ferent speed, also in the area of seed science and technology.

For an association with the vision of 'Uniformity in Seed Testing' all over the world, the task to achieve this vision will also become more and more complex. Therefore a clever strategy needs to be developed, how we can work towards our vision, what is necessary on the different continents and how can we support countries, which obviously have problems to follow these rapid developments.

The ISTA Executive Committee has developed a strategy, which should intensively be discussed among the ISTA membership.

Specified Trait Testing in the Session of the GMO Task Force

Specified trait testing is one of the topics being discussed most controversially and most intensively over the past time. The ISTA GMO Task Force has not only enthusiastically participated in the discussions, but has actively elaborated a system to achieve true and reproducible results in the specified trait testing in ISTA accredited laboratories all over the world.

The GMO Task Force rules chapter working group has established ISTA Rules for the testing of specified traits, which have formally been approved by the ISTA membership at the Annual Meeting 2005 in Bangkok, Thailand and are in force since February 1, 2006. The proficiency test working group, which has already executed 6 rounds of the ISTA international proficiency test in regard to specified trait testing with nearly 100 participating laboratories from all over the world, has elaborated an evaluation system for its proficiency test and has used this system to evaluate the performance of the participating laboratories. The ISTA accreditation working group and the statistics working group of the GMO Task Force have established an accreditation system for laboratories testing for the adventitious presence of specified

The ISTA Annual Meeting 2006

traits in seed lots, as well as for trait purity of specified trait seed lots.

At the ISTA Annual Meeting 2006, information and presentations will be given on the current work of the ISTA GMO Task Force, the evaluation system of the ISTA GMO proficiency test and the ISTA accreditation programme for the testing of adventitious presence of specified traits in seed lots as well as trait purity of specified trait seed lots.

The ISTA Rules Proposals

Also this year a number of rules proposals will be brought to the attention of the government representatives, who will finally make an official vote to approve or reject the proposed rules changes submitted by the 16 ISTA Technical Committees.

Proposals regarding the bulking and sampling, the inclusion of new species into the ISTA Rules, the introduction of new seed health testing methods and variety testing methods will be up for voting, just to mention some of the proposed ISTA Rules changes.

PRESENTATION OF THE ISTA TECHNICAL COMMITTEES

The Technical Committees are the heart of the Association. They are developing and validating the seed testing methods to be included in the ISTA International Rules for Seed Testing, they organise workshops for training and information exchange and they produce the ISTA handbooks in their working fields.

On Monday, June 26, 2006 all ISTA Technical Committees will give a presentation on the status of their current work. It will be a comprehensive overview of all the various activities in the different committees and will be a unique summary of the latest international developments in regard to seed science and technology.

ORDINARY MEETING

The Ordinary Meeting is the business meeting of the Association where the decisions regarding the future development of the Association take place. A set of different documents which will be up for decision at our Ordinary Meeting will be distributed to all ISTA members.

This year the following documents will be

distributed to all ISTA members and interested persons, to achieve an optimal preparation of our Ordinary Meeting:

- **Minutes of the ISTA Ordinary Meeting 2005 (published)**
- **Activity Report 2005 of the International Seed Testing Association (published)**
- **Draft ISTA Strategy (published)**
- **Proposed changes to the ISTA Constitution (published)**
- **Proposed Fixation of the annual subscriptions (published)**
- **Proposed Rules changes 2006**
- **Method validation reports**

All these documents can also be downloaded free of charge by anybody interested from the ISTA Website <http://www.seedtest.org/en/content---1--1204.html>.

On the following pages of this issue of *Seed Testing International* you can already find the final programme of this meeting, the proposed changes to the ISTA Constitution, the proposed fixation of the annual subscriptions and the draft ISTA strategy.

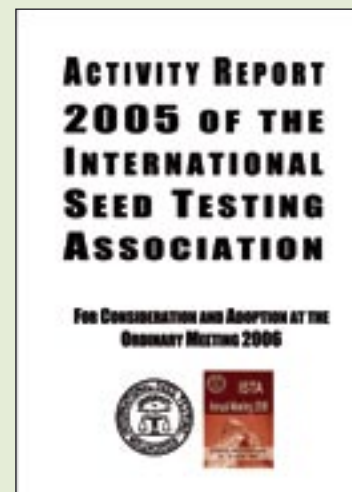
As said above, the ISTA Annual Meeting 2006 will not only be a unique chance to meet with seed scientists and seed technologists from all over the world to converse, have fundamental discussions and exchange on challenges, opinions and problems, but furthermore the ISTA Annual Meeting 2006 will have a very interesting programme to discuss about the future strategy to work towards 'Uniformity in seed testing'.

It will indeed be my pleasure to welcome you personally at this interesting ISTA Annual Meeting 2006.

Michael Muschick
Secretary General

Activity Report 2005

Cited and Published
by the ISTA Secretariat



This document contains the Reports 2005 of the Executive Committee, the Secretary General, Proficiency Test Committee, Rules Committee and Editorial Board and the Working Programmes 2004-2007 of the Technical Committees as approved by the Executive Committee of ISTA.

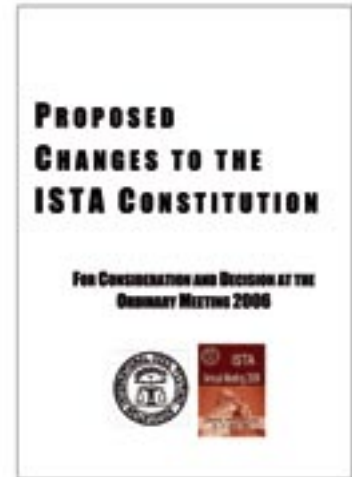
These Reports have been circulated to all members of the Association for consideration and adoption at the upcoming Meeting of the Association, which is the **ISTA Ordinary Meeting 2006 in Glattbrugg/Zurich, Switzerland, June 28 and 29.**

Available as of March 15, 2006, from the ISTA Secretariat or download it for free at

www.seedtest.org

Proposed Changes to the ISTA Constitution

For consideration and decision at the Ordinary Meeting in Zurich, Switzerland
June 26 - 29, 2006



INTRODUCTION

The Executive Committee of ISTA is suggesting to amend the ISTA Constitution and is therefore seeking approval by the Designated Members of proposed changes in the following areas:

1. Align the ISTA Membership Categories with the present Subscription Categories
2. Introduce a New Membership Category 'Corporate Member'
3. Introduce a New Membership Category 'Associate Member'
4. Introduce a New Membership Category 'Honorary Life Member'

At the upcoming Ordinary Meeting 2006 in Glattbrugg/Zurich, Switzerland, the Designated Members designated by their respective Designated Authority to vote on behalf of the Government in their country, will be asked to vote area by area.

In this document you will find the current text of the Constitution Article of concern on the left side and the proposed new version of the same Constitution Article on the right side. In order to make the necessary changes in the Constitution in one area, it is possible that more than one Article of the Constitution needs to be changed. However, please keep in mind that voting will not be made Article by Article but as a package area by area.

Please take into consideration that according to ISTA Constitution Articles XII (a) and (b), modifications of the text presented in the Constitution Change Proposals can not be made during the Ordinary Meeting.

The Executive Committee of ISTA recom-

mends all of the presented Constitution Change Proposals for adoption by the Designated Members entitled to vote.

According to ISTA Constitution Articles IX (b) and XII (c), the motion to alter the Constitution requires for adoption at least a two-thirds majority of those Designated Members voting, provided a quorum is present.

PROPOSAL 1 – ALIGN THE ISTA MEMBERSHIP CATEGORIES WITH THE PRESENT SUBSCRIPTION CATEGORIES

1.1 Background

1.1.1 The present Constitution allows four types of membership

viz	Designated Member (person)	} IV(b)
	Designated Member (laboratory)	
	Member (person)	} IV(c)
	Member (laboratory)	

IV(d) then goes on to say that “the duly designated Designated Members shall be entitled to vote”, but does not specify whether this refers to a person or laboratory as the Designated Member.

1.1.2 Normally, a member of an association or society pays a membership fee (or subscription). ISTA’s membership categories as per the Constitution are not in agreement with the categories of subscription that ISTA currently sets i.e. per laboratory and per person.

1.1.3 The present subscription categories are:

- Member Laboratory
- Personal Member

This would require deleting the present IV(b) from the Constitution, writing a new IV(c) (to define a Member Laboratory) and changing IV(d) to define a Personal Member.

Note that the term ‘Designated Member’ would be defined in a new IV(b) under the heading ‘Designated Member’, and would no longer be included under ‘Membership’. The definition would make it clear that a Designated Member is a person (who must be a Personal Member) and not a laboratory.

1.2 Proposal

That the present Article IV of the ISTA Constitution be changed to:

Current version:

ARTICLE IV
<i>Designated Authority</i>
(a) A Designated Authority is an authority designated by a government of a country or Distinct Economy as recognised by international fora to act on its behalf in designating Designated Members and in liaison with the Association.
<i>Membership</i>
(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.

Accredited Laboratory

(e) An Accredited Laboratory is a member laboratory accredited by the Executive Committee according to the Accreditation Standards approved under Article VII(c)(15) of the Constitution.

Proposed version:

ARTICLE IV

Designated Authority

(a) A Designated Authority is an authority designated by a government of a country or Distinct Economy as recognised by international fora to act on its behalf in designating Designated Members and in liaison with the Association.

Designated Member

(b) A Designated Member is a Personal Member designated by their Designated Authority and, subject to the provisions of Article IX, entitled to vote in meetings of the Association.

Membership

(c) A Member Laboratory is a laboratory engaged in the testing of seed which supports the Association and its objects and is admitted by the Association.

(d) A Personal Member is a person engaged in the science or practice of seed testing or in the technical control of such activities who supports the Association and its objectives and is admitted by the Association. A Personal Member may be nominated by a Member Laboratory to represent the Member Laboratory in the affairs of the Association.

Accredited Laboratory

(e) An Accredited Laboratory is a member laboratory accredited by the Executive Committee according to the Accreditation Standards approved under Article VII(c)(15) of the Constitution.

PROPOSAL 2 – INTRODUCTION OF A NEW MEMBERSHIP CATEGORY ‘CORPORATE MEMBERSHIP’

2.1 Background

Internationally there are many organisations (international, national, private, company, etc) which value ISTA’s work and would be prepared to pay an appropriate annual fee to support the Association. It is proposed that a new membership category ‘Corporate Member’ be introduced.

A Corporate Member:

- would receive two copies of all ISTA’s publications including *Seed Science and Technology*
- would nominate one representative to act on behalf of the Corporate Member. That representative would be entitled to pay the ISTA Member registration fees for all ISTA meetings, but could not be designated as a Designated Member and therefore could not vote or hold office in the Association.
- would have their name published annually in the Activity Report under the heading ‘Corporate Members’ and their name would also appear prominently under the same heading at ISTA Ordinary Meetings and Congresses.

2.2 Proposal

That an addition be made to Article IV of the ISTA Constitution:

Current version:

ARTICLE IV
Membership
...
Accredited Laboratory
(e) An Accredited Laboratory...

Proposed version:

ARTICLE IV
Membership
...
(e) A Corporate Member is any organisation which supports the Association and its objectives, pays an appropriate annual fee to the Association, and is admitted by the Association.
Accredited Laboratory
(f) An Accredited Laboratory...

Note: if this proposal is accepted, the present clause ‘(e)’ in Proposal 1 would become ‘(f)’.

PROPOSAL 3 – INTRODUCE A NEW MEMBERSHIP CATEGORY ‘ASSOCIATE MEMBERSHIP’

3.1 Background

For many individuals, meeting the costs of an ISTA Personal Membership is difficult.

ISTA’s Technical Committees include people who are not ISTA Members, yet who are obviously interested in ISTA and its goals. To allow an opportunity for more individuals to become ISTA Members, a new membership category ‘Association Member’ is proposed, on the clear understanding that while the subscription for this membership category would be lower than that for a Personal Member, the Associate Members will not be entitled to the same level of ISTA services.

i.e. an Associate Member

- would receive priority for membership of an ISTA Technical Committee over individuals who were not ISTA Members
- would be entitled to pay the ISTA Member registration fees for all ISTA meetings.
- would be entitled to purchase ISTA publications at the Member’s price
- would receive *Seed Testing International* but not the ISTA Rules, ISTA Handbooks, or *Seed Science and Technology*
- Could not be designated as a Designated Member and therefore could not vote or hold office in the Association.

3.2 Proposal

That an addition be made to Article IV of the ISTA Constitution:

Current version:

ARTICLE IV
Membership
...

Proposed version:

ARTICLE IV
Membership
...
(e) An Associate Member is a person who is not a Personal Member, but who supports the Association and its objectives, and is admitted by the Association.

Note: if this proposal is accepted, then clauses ‘(e)’ and ‘(f)’ from Proposal 2 would become ‘(f)’ and ‘(g)’.

PROPOSAL 4 – INTRODUCTION OF A NEW MEMBERSHIP CATEGORY ‘HONORARY LIFE MEMBER’

4.1 Background

Many organisations have membership categories (e.g. Fellow, Life Member) that recognise the significant contribution made by an individual to that organisation. ISTA has had such individuals over the years and will continue to do so. Some form of ‘recognition’ membership is appropriate. It is proposed that a new membership category ‘Honorary Life Member’ be introduced.

A Honorary Life Member

- would be a person, who in the opinion of the Association, has made an outstanding contribution to the Association
- would be elected by the Executive Committee after the Executive Committee

had received a nomination proposed and seconded by ISTA Members accompanied by details of the nominee’s contributions to ISTA

- would not pay a membership fee
- would receive *Seed Testing International* but no other ISTA publications
- would be entitled to pay the ISTA Member registration fees for all ISTA meetings
- would not be designated as a Designated Member and therefore could not vote or hold office in the Association
- would have his/her name published annually in the Activity Report under the heading ‘Honorary Life Members’.

4.2 Proposal

That an addition be made to Article IV of the ISTA Constitution:

Current version:

ARTICLE IV
Membership
...

Proposed version:

ARTICLE IV
Membership
...
(g) An Honorary Life Member is a person who in the opinion of the Association has made an outstanding contribution to the Association, and has been honoured by election to the status.

Note: if this proposal is accepted, the clause ‘(g)’ in Proposal 3 would become ‘(h)’. ■

Proposed Fixation of Annual Subscriptions

For consideration and decision at the Ordinary Meeting in Zurich, Switzerland, June 26 - 29, 2006

INTRODUCTION

If the ISTA membership agrees to accept the new membership categories as suggested under proposal 2. and 3. of the ‘Proposed Changes to the ISTA Constitution’ for consideration and decision at the Ordinary Meeting 2006, then new fee categories will need to be introduced for Associate and Corporate Membership.

Provided one or both of the above mentioned new membership categories have been accepted by the ISTA membership, the Executive Committee of ISTA will be seeking approval by the Designated Members of proposed fixations of the annual subscription fees for Associate and Corporate Members as proposed herein.

1. Associate Member fee
2. Corporate Member fee

At the upcoming Ordinary Meeting 2006 in Glattdbrugg/Zurich, Switzerland, the Designated Members designated by their respective Designated Authority to vote on behalf of the Government in their country, will be asked to vote point by point.

The Executive Committee of ISTA recommends all of the presented annual subscriptions for adoption by the Designated Members entitled to vote.

According to ISTA Constitution Articles IX (b) and XII (c), the motion to fix the annual subscriptions requires for adoption at least a simple majority of those Designated Members voting, provided a quorum is present.

PROPOSAL FOR MEMBERSHIP FEES FOR ASSOCIATE AND CORPORATE MEMBERS

If the ISTA membership agrees to accept new membership categories, then new fee categories will need to be introduced for Associate and Corporate Membership.

1. ASSOCIATE MEMBER FEE

The Associate Member fee should be set at a level which will be attractive to those working for ISTA but currently not members, yet must also cover any costs for the services ISTA provides as a condition of this membership. For this reason, a fee of Swiss Francs CHF 200.- per year is proposed. This covers the annual costs of ISTA publications.

2. CORPORATE MEMBER FEE

A Corporate Member fee is paid by the member to signify their support for the goals and objectives of the organisation. It is not meant to simply reflect the costs of the services received. For this reason, a fee of Swiss Francs CHF 10'000.- per year is proposed. ■

Draft ISTA Strategy

For consideration and decision at the Ordinary Meeting in Zurich, Switzerland, June 26 - 29, 2006

INTRODUCTION

Dear ISTA Member,

The draft strategy presented in this document was elaborated and approved by the ISTA Executive Committee and is herewith circulated to the ISTA Members for consideration.

To bring the ISTA strategy into force the Executive Committee has foreseen a three step process over one year:

1. Step – First Discussion – Annual Meeting 2006

In the first step the draft strategy as outlined in this document will be orally presented by the ISTA President to the participants of the ISTA Ordinary Meeting on Wednesday, June 28, 2006.

During that meeting, the draft strategy should be intensively discussed among the ISTA membership and the ISTA stakeholders.

The ISTA Executive Committee will take note of the comments, concerns or proposals for modifications coming from the ISTA membership and ISTA stakeholders and will - by considering and following these comments - revise the current version of the draft strategy.

2. Step – Final discussion – 28th ISTA Congress 2007

The revised strategy will be circulated to the ISTA membership as 'Final Draft Strategy' for consideration and discussion one year later during the 28th ISTA Congress in Iguacu Falls, Brazil on Wednesday May 9, 2007.

During this meeting final adjustments on the strategy could be made.

3. Step – Voting process – Ordinary Meeting, 28th ISTA Congress 2007

During the ISTA Ordinary Meeting 2007 at the 28th ISTA Congress in Iguacu Falls, Brazil on May 11, 2007 a vote of the ISTA voting

delegates will take place to officially approve the ISTA strategy.

If you already have comments, concerns or proposals for modifications after reading this document, you are welcome to send these in a written form to the ISTA Secretariat already before the ISTA Annual Meeting 2006.

With kind regards

Pieter Oosterveld Michael Muschick
ISTA President ISTA Secretary General

Draft ISTA Strategy [Version 2007 – 2010]

ISTA IS THE INDEPENDENT INTERNATIONAL ASSOCIATION FOR SEED TESTING

Vision: Uniformity in Seed Testing world wide

Mission: ISTA achieves its vision by producing internationally agreed rules for seed sampling and testing, accrediting laboratories, and providing international seed analysis certificates, training and dissemination of seed science and technology knowledge.

SOME HEADLINES IN THE DEVELOPMENT OF ISTA OVER THE PAST TEN YEARS

- ISTA continued its role as the international association for seed science and technology and seed testing;
- ISTA membership increased from 64 countries (April 1994) to 76 countries and from 136 laboratories to 171 laboratories;

- ISTA opened its membership for seed company and private seed testing laboratories;
- ISTA has added method validation as an important part of method development;
- ISTA reviewed the referee tests system and transformed it into a proficiency test system, including clear and transparent standards for the required performance;
- ISTA introduced an accreditation standard for seed testing laboratories that meets the standards of internationally accepted accreditation, including an audit procedure that guarantees a worldwide uniform application of the standard;
- ISTA decided to open the accreditation system for seed company laboratories, including the issuance of the ISTA international certificates;
- ISTA has enhanced the decision-making process by introducing annual meetings;
- ISTA professionalised its internal organisation, including the introduction of modern office tools and techniques for communication;
- ISTA strengthened the relation and collaboration with international operating organisations and associations;
- ISTA and FAO concluded upon a Memorandum of Understanding for future co-operation.

CONSIDERATIONS

The increasing interest in ISTA and its activities indicates the importance of ISTA as a service provider for governments, international organisations, and the national and international seed trade. In a time of globalisation, seed industry in many countries entered into the international market. Governments want to support the industry and seek for co-operation with internationally operating associations such as ISTA. The ISTA rules,

including the accreditation standard, is of increasing value for the goal of uniformity in seed testing. More and more, companies are doing business on the basis of bilateral agreements, including reference to the ISTA rules and methods.

IN CONCLUSION

The work of ISTA is very much appreciated and valuable for governments, international organisations and the seed industry. ISTA should continue its work and the development of the association.

STRATEGY

1. Method development

Method development is an important activity for ISTA. The respective technical committees play a leading role in these activities. ISTA will make a study of the process of method development in order to examine whether the current structure needs changes. Important issues for the study are: the adjustment of the work to market demands, the availability of experts, financial aspects, etc. The association will continue to organise annual meetings in order to facilitate contacts between the experts. Contacts between experts, either as members of committees or as individuals, are important for the exchange of information and ideas.

The association will continue to give support to the activities of the committees by supplying assistance from the secretariat.

2. Method validation

Method validation is an important element of method development and recognition. ISTA

is developing a generic method validation programme for implementation. Methods developed by any person or laboratory can be submitted to ISTA for validation. A business plan will be elaborated.

3. Seed science

ISTA seed symposia have to compete with more specialised congresses and symposia. Nevertheless, part of the core business of ISTA is seed science. Therefore, the association will redefine the aim and structure of its symposia. The executive committee will seek cooperation with other associations that are active in the field of seed science. Furthermore the executive committee is considering other avenues for expanding seed science.

4. Training

ISTA will continue to organise workshops. ISTA wants to extend the collaboration with other organisations, especially for workshops in areas where seed testing is still in an early stage of development. ISTA realises that a professional approach to training programmes and workshops is needed.

In response to the expressed wish for ISTA training, the association is developing a seed analyst training programme.

The association will explore the possibilities of distance learning programmes.

5. Certificates

The ISTA certificate is a valuable document, providing a lot of information about quality of the seed involved. The association will examine how to increase the usefulness of ISTA certificates. Advantages and disadvantages of changing the wording from 'ISTA Certificates' to 'ISTA Seed Testing Reports' will be explored.

6. Accreditation

The accreditation programme of ISTA is very well accepted. Worldwide around 100 laboratories have been accredited. The performance of the laboratories has improved. The ISTA audits are very well received by most of the laboratories. The association sees the accreditation standard as an important part of the ISTA work. The basic principles of the audit procedures will remain untouched. However as before, comments and advice of auditees will be continuously subject to discussion and consideration in order to remain as effective and efficient as possible. The audits on the recently agreed performance based approach for testing on specified traits will continuously be reviewed, in order to find the best way to assure the quality of the laboratory.

7. International recognition

ISTA is a well-known international association. However, the association feels that not all governments, institutes, organisations and seed companies are aware of the benefits and possibilities ISTA can offer them. ISTA wants to show its value to all those who are working in the seed science and seed testing area. ISTA will start a campaign to enhance international recognition.

8. Products

ISTA's products are of great value to members and are also sold to non-members. The association is investigating ways to increase sales and reduce costs. Electronic publishing and distribution will be investigated.

9. Membership

While ISTA's membership has increased over the past 10 years, there is still potential for membership growth. The association will actively seek new members. ■

Exhibition at the ISTA Annual Meeting 2006

limited availability only - prime location !!

If you are interested in renting a booth at the ISTA Annual Meeting 2006 in Zurich, Switzerland, please contact the meeting organisers at meetings@ista.ch.

Costs per booth: EURO 1,000.00
(includes registration fee for one person)

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

Dear Colleagues,

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

The meeting is aimed at discussing and deciding on proposals for changes to the ISTA International Rules for Seed Testing and business items of the Association, with the international participation of ISTA delegates and representatives from both the seed industry and governments, including experts in seed technology, scientific research and laboratory accreditation.

The main subjects of the meeting will be:

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

Final Programme

SUNDAY	June 25, 2006 16:00 - 18:00 18:30 - 20:00	REGISTRATION <i>Registration of Participants at Novotel Zürich Airport</i> Welcome Cocktail (sponsored by the Swiss Federal Office for Agriculture)
MONDAY	JUNE 26, 2006 07:30 - 18:00 08:45 - 09:00 09:00 - 09:30 09:30 - 10:00 10:00 - 10:30 10:30 - 11:00 11:00 - 11:30 11:30 - 12:00 12:00 - 12:30 12:30 - 13:30 13:30 - 13:45 13:45 - 14:15 14:15 - 14:45 14:45 - 15:15 15:15 - 15:45 15:45 - 16:15 16:15 - 16:45 16:45 - 17:15 17:15 - 17:30 17:30 - 18:00	SESSIONS - Presentation of Working Programmes, activities and special projects <i>Registration of Participants at Novotel Zürich Airport</i> Welcome by ISTA Bulking and Sampling Committee Session Purity Committee Session Germination Committee Session <i>Coffee break</i> Tetrazolium Committee Session Vigour Committee Session Moisture Committee Session <i>Lunch</i> Editorial Board Session (Seed Science & Technology) Statistics Committee Session Seed Health Committee Session Proficiency Test Committee Session <i>Coffee break</i> Variety Committee Session Flower Seed Committee Session Forest Tree and Shrub Seed Committee Session Nomenclature Committee Session Seed Storage Committee Session

**TUESDAY JUNE 27, 2006**

08:30 - 09:30

09:30 - 10:00

10:00 - 11:00

11:00 - 13:30

12:30 - 13:30

13:30 - 14:30

14:30 - 15:30

15:30 - 16:00

16:00 - 17:30

SESSIONS - Discussion on current important issues

GMO Task Force Session

Coffee break

GMO Task Force Session [cont.]

Time allocated for Technical Committee Meetings

Lunch

Accreditation Session

Rules Committee Session

Coffee break

Rules Committee Session [cont.]

WEDNESDAY JUNE 28, 2006

09:00 - 10:00

10:00 - 10:30

10:30 - 12:00

12:00 - 13:30

13:30 - 15:00

15:00 - 15:30

15:30 - 17:00

18:00**19:30****ORDINARY MEETING (DAY 1)**

Welcome

Presentation on the Development of the Seed Industry in Europe and the Role of ISTA

Coffee break

Ordinary Meeting (Block 1)

1. Call to order

2. President's address

3. Roll call of Designated Members entitled to vote

4. Reading and acceptance of Minutes

5. Report of the Executive Committee

6. Report of the Secretary General

7. Presentation of ISTA Draft Strategy

Lunch

Ordinary Meeting (Block 2)

8. Discussion of the ISTA Draft Strategy with the ISTA Membership

Coffee break

Ordinary Meeting (Block 3)

9. Constitution changes

10. Fixation of annual subscriptions

Depart from hotel for Official Dinner by bus**Official Dinner****THURSDAY JUNE 29, 2006**

09:00 - 10:30

10:30 - 11:00

11:00 - 12:00

12:00 - 13:00

13:00 - 14:30

ORDINARY MEETING (DAY 2)

Ordinary Meeting (Block 4)

11. Consideration and Adoption of the proposed Rules Changes 2006

Coffee break

Ordinary Meeting (Block 5)

11. Consideration and Adoption of the proposed Rules Changes 2006 [cont.]

12. Consideration and Adoption of reports

Lunch

Ordinary Meeting (Block 6)

13. Announcement of the place and date for the next Ordinary Meeting
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

16. President's closing address

17. Adjournment

The 5th Annual EESNET Meeting

November 13 - 15 2005, Sofia, Bulgaria

By **Katalin Ertsey**, ISTA 1st Vice-President
National Institute for Agricultural Quality Control, Budapest, Hungary, ertseyk@ommi.hu



Katalin Ertsey, ISTA 1st Vice President

The Eastern European Seed Network or EESNET is a regional integration of national seed associations or other such grouping in central and eastern Europe. The Network entails participation but without any membership fees

DECLARATION

Countries of central and eastern Europe being represented by their national seed associations and/or seed enterprises have decided that

- *in the absence of a regional seed sector integration*
- *due to a general lack of information on the regional seed sector*
- *in need of developing wide seed sector contacts and*
- *in the face of a need to develop a common position with respect to topical matters in the seed industry*

to create a new type of regional integration in central and eastern Europe. Countries in this region will integrate in a structure without strict membership rules and duties under the name "Eastern European Seed Network" or EESNET.

MISSION

The basic mission of the network is an information exchange at the regional and world wide level.

The most important meeting of the Eastern European seed sector was held in this year in the Bulgarian capital in Sofia. More than 250 registered participants from about 15 countries interested for the object:

Challenges for Seed Market in an Enlarged Europe.

The presentations and experiences came from different parts of Europe from the old and new member states and from third countries. Bulgarian organizers made a good job. But the main responsibility of the Meeting took over Prof. Dr. Atanas ATANASOV, member of the Bulgarian Academy of Sciences and president of the Association for Seed and Planting Material with his assistant Dr. Ivelin RIZOV.

The Meeting was accepted and welcomed on the highest official level by the Deputy Minister of Agriculture and Forestry Dr. Svetlan BATCHAROVA.

The frame of the technical content was given by the first introductory of Mirjana MILOŠ-

EVIC Secretary General of EESNET (Serbia –Montenegro) with her excellent overview: **EESNET Present, Past and Future.**

The EESNET have to work in close-cooperation with the European Seed Association they are active on the same market this was the message of Secretary General Garlich v. ESSEN.

On the Meeting Katalin ERTSEY 1st Vice-President of ISTA and Jean Marie DEBOIS from OECD presented the structure and activity of their organisations.

The ISTA presentation focused on importance of accreditation and the progress made by ISTA in the last period. After that, was evaluated the role of Eastern European labs inside the Association and activity of experts.

Bulgarian, Hungarian, Polish, Romanian and

Table 1. The present situation compared the Western and the Eastern regions of the EU

Kind of laboratory	Eastern Europe (number of labs)	Western Europe (number of labs)
ISTA Member Laboratory		
Official labs	25	33
Company	3	15
Total	28	48
ISTA Accredited Laboratory		
Official labs	17	27
Company		9
Total	17	36
Countries without accredited laboratory	5	0
Countries without any ISTA laboratory	1	0

Monitored countries in Eastern European Region: Albania, Belarus, Bosnia, Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Ukraine
Monitored countries in Western European Region: old EU member states, Switzerland and Norway

Serbian experts together with German and French speakers exchanged their information and experiences concerning the influence of the enlarged Europe to the seed market and conducted the market and the development of the seed business in the last year.

The second day gave the opportunity for bilateral discussions and for business meetings.

ISTA was very high respected on the Meeting during TV and Radio interview as well. The interest came first of all from non accredited

ISTA member laboratories.

The Congress venue and accommodation were excellent.

The 6th EESNET Meeting will be in Opatia, Croatia in November 2006. ■

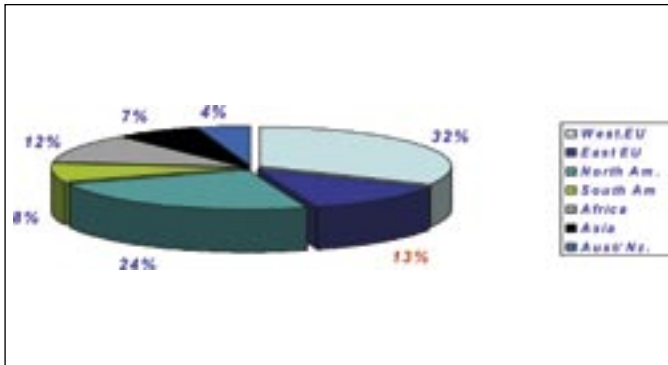


Figure 1. Participation of experts in the ISTA Technical Committees from the different Regions



Atanas Atanasov

Mirjana Milosevic

Agriculture Genetically Modified Products Workshop of the Gulf Cooperation Council of the Arab States (GCC) Bahrain, December 6 - 7, 2005

By **Bettina Kahlert**, Head of ISTA Technical Committee Administration
ISTA Secretariat, Switzerland, bettina.kahlert@ista.ch

The Agriculture Genetically Modified Products Workshop of the Gulf Cooperation Council of the Arab States (GCC) was held in Manama, Bahrain, from December 6 to 7, 2005. The aim of the meeting was to develop key points for future concerted actions in regard to establishment of regulations related to GM agriculture products for the whole GCC region.

Around 50 delegates, scientists and governmental authorities, from GCC states Bahrain, Kuwait, Oman, Dubai, and Saudi Arabia, as well as from other countries such as Egypt, Sudan and United States attended the workshop. Further, international and regional organisations were invited to present information to regulatory issues in other regions as well as to the technical background of biotechnology development, i.e. technol-

ogy of GM products.

The workshop was structured into four sessions. Twelve presentations in English or Arabic were given and each followed by a question period with intensive discussions in the sessions:

1. National, regional and international activities and regulations related to genetically modified foods;
2. Risks and benefits of genetically modified foods and their health effects on human, animal and the environment; and
3. Methods and techniques on disclosing modified foods and capacity building.

These sessions were used to provide all delegates the same background knowledge.

In the final session the GCC delegates developed conclusions, i.e. the key points for further joint activities related to GM agricultural products regulations.

Bettina Kahlert from the ISTA Secretariat represented ISTA and FAO (Food and Agriculture Organisation). The participation of ISTA in this workshop was sponsored by FAO. A contribution to the workshop was made by presenting a paper with the title 'Detection of GM Seed in Imported Seeds'. The presentation gave an overview on the complexity of specified trait(s) testing; ISTA's approach to ensure reliability and accuracy of results all over the world, when testing seeds for specific trait(s); and ISTA's and FAO's joint activities to provide technical help and to support capacity building in the different regions of the world.

An ISTA/FAO Workshop on Electrophoretic Methods and PCR-Techniques for Variety Verification and GMO Detection in the GCC region is planned for the future. ■

Seeds in Agricultural Development - an Update from Vietnam

By Michael Turner

Danida-ASPS - Seed Component, MARD, 2 Ngoc Ha St, Hanoi, Vietnam, seed-turner@fpt.vn

Seeds have been a key element in international agricultural development for over 30 years. Following the experience of the Green Revolution in the 1960s, many development agencies began to focus attention on 'improved seeds' and in 1973 FAO launched its Seed Improvement and Development Programme (SIDP). The result was an upsurge of donor-funded projects implemented through government ministries or agencies. These put in place the key components of seed supply including specialized facilities such as processing plants and quality control services, in countries where none had existed before.

The approach in those early years was essentially technical, and strongly influenced by experience from countries with a highly developed agricultural industry. Put simply, the belief was that if good quality seed could be made available, farmers would come to buy it and, on realising the benefits, would become regular customers of the 'formal' seed sector. The importance of seed quality was recognised but marketing was generally neglected, or simply evaded by providing subsidies to reduce the seed price.

Some of these activities gave seed projects a rather bad start in many countries and the high expectations that seeds would be an 'engine of development' were not fulfilled. Donors became disillusioned and looked for explanations - but of course we should recognise that the provision of high quality seeds is a management intensive activity, and even more demanding in tropical regions where storage life is often limited and weak infrastructure makes distribution difficult. It was hardly surprising that bureaucratic government agencies often failed to 'deliver the goods' to small-scale farmers out in the rural areas.

From the late 1980s privatisation became fashionable and state-owned seed enterprises were seen as prime candidates, both to bring much needed efficiency gains in their management, and to dispose of loss-making 'as-

sets'. In addition, multinational companies entered the market in many countries introducing new varieties and creating competition with strong marketing experience. But of course, their crop portfolio was highly selective for the hybrids (especially maize) and small-seeded vegetables. Besides promoting the private sector, donors have subsequently embraced a host of new priorities such as sustainability, gender, poverty alleviation, human rights, environmental impact and HIV/AIDS. All are important, but they make considerable demands on the design and successful implementation of development projects.

Yet another change in the past 15 years has been the entry into the 'development arena' of countries which were aligned with the former Soviet Union and had centrally-planned economies. With the decline of that system, these countries are now in a process of economic transition. This has special implications for seed supply which was an integral part of the central planning process, and highly structured as a result. Seed production was part of the overall agricultural plan but it had no basis in a competitive market where farmers could make their own decisions. The transition to a free-market has therefore been a difficult process, except where profitable hybrid crops like maize and sunflower predominate, as in some East European countries. The same pain has been felt by many plant breeding institutions which often enjoyed a key position and generous funding under the socialist system.

At the same time, many changes have taken place in the mature seed indus-

tries of industrialised countries. For example the withdrawal of government funding for services and the requirement for cost recovery, or even complete privatisation of the services in some cases. ISTA responded to this changing climate with its opening up to private licensed laboratories in 1995 accompanied by the introduction of a laboratory accreditation scheme. WTO obligations, plant variety protection, access to plant genetic resources, and the advent of biotechnology/GMOs are further 'big issues' which now brighten the global seed landscape - or cloud it, some would say.

It is clear that the context for seeds in development has become much more complicated over the years. We have come a long way since projects had just to build seed labs and processing plants and train their staff. Yet it is still a basic fact that improved varieties and high quality seeds are a vital input to improving agricultural production, which remains a priority in the countries with many rural poor. Genetic gains in yield potential or quality from plant breeding remain a cost effective way to help farmers and seeds provide the means to transfer those gains from research into agriculture.



Women planting rice - a classic scene from the Vietnamese countryside. In the north of the country, the crop is entirely transplanted, and there is a significant proportion of hybrid varieties. In the south, especially in the Mekong Delta, direct sowing is normal, but this increases seed cost, and no hybrids are used yet.

Poverty alleviation is the guiding principle for most aid donors nowadays and it is enshrined in the UN Millennium Development Goals set for 2015. However, there are many ways to reduce poverty, for example by targeting the poorest people or by promoting general economic development. Seeds illustrate this dilemma very clearly; should we concentrate on strengthening 'formal' seed systems which mostly serve the more commercial farmers or try to improve community-based seed initiatives which are embedded in the local farming system and closer to the poor? There are strong advocates for each approach but in practice both have their place.

So where does Vietnam fit into this story? Because of a series of conflicts, the country was one of the last to receive official development assistance from the major donors. The turning point in Vietnam's recent economic development came in 1986 when the renovation policy of 'Doi Moi' (new way) was introduced, leading to wide-ranging reforms in all sectors of the economy, including agriculture. Since the early 1990's, there has been a dramatic increase in the production of rice for domestic and export markets, and several cash crops such as coffee, pepper and cashew nut. In recent years, an annual growth rate of 7 – 8% has been maintained in the economy, with a rapid expansion of the industrial sector and a steady reduction in rural poverty.

Danish International Development Assistance (Danida) has been the main donor to 'Vietnam Seeds' through its Agriculture Sector Programme based in the Ministry of Agriculture and Rural Development (MARD). This programme has a number of components among which 'Seed' is the largest in terms of funding. The Seed Component works within MARD directly, with a number of specialized technical agencies and with the local administration in seven provinces. Through a wide

range of activities, it assists almost all parts of the national seed system from policies and the legal framework, through regulatory procedures and services to commercial seed production and farmer-based training (see Table 1). Training and institutional capacity building remain a key element, reflecting the importance of human resources in all seed activities.

As in the past, seed quality assurance is a prime candidate for support through training and investment. Accreditation of staff and seed testing labs is now high on the agenda as MARD intends to devolve much of the responsibility for seed quality to those who produce and market it. This approach is now favoured by most developed countries but they have reached that stage after a long period of 'commercial evolution'. In Vietnam, and many other developing countries, the framework for quality assurance is still fragile, both in terms of trained staff and facilities. Danida has supported a comprehensive consultancy in accreditation procedures (by former ISTA Executive Officer Heinz Schmid) and accreditation of the national laboratory in Hanoi is in progress now. The same laboratory hosted a regional ISTA/APSA training course in 2004.

The variety release system is also being strengthened through staff training and other investments to establish a testing system for distinctness, uniformity and stability. This has assumed special significance recently as Vietnam is actively pursuing WTO membership and is therefore obliged to offer plant variety protection for at least 15 crops in order to satisfy the requirements for UPOV membership. The Seed Ordinance was introduced in 2004 and the new Intellectual Property Law passed by the National Assembly in December 2005 contains a chapter on plant variety protection. The subsidiary decrees and regulations required to implement these new laws are now being prepared.

One key factor in the transition to a free market is to have clear policies to guide that process. This applies in the transition economies like Vietnam, but in fact the same is true in many developing countries where the government previously



Planting rice in February in the North of Vietnam; inside the tropics but a cold north-east wind is blowing!

Early planting is needed to grow two crops per year – but field conditions are often unfavourable.

In many other crops this would give rise to a seed vigour concern, but when transplanted, the germination % is not so critical for rice – and the nursery beds are covered with plastic for extra protection.

played a leading role in seed supply and is now withdrawing to a more regulatory function. In these circumstances, it is the task of government to create a policy framework which assigns roles to the various stakeholders in the seed supply system and provides an environment in which they can all work effectively. Recognising this need, Danida has supported the establishment of a National Seed Advisory Council as a forum to represent the key players and advise on the overall development of the seed sector.

The transition to a market economy is still in progress in Vietnam as state-owned enterprises, including the many provincial seed companies, are 'equitised'. Danida is assisting this process through staff training and a soft-loan scheme for equipment. However the demand for loans has been slow, perhaps reflecting the limited profitability when rice is the main product and real economics apply. This contrasts with the golden days of seed projects, when large and often complex investments were made with little prospect of financial viability.

Table 1
Sub-components of Danida support to the seed sector in Vietnam

SC	Objective
1.	Strengthen the regulatory framework for seeds and varieties
2.	Establish a National Seed Advisory Council
3.	Improve variety testing and release procedures
4.	Improve seed quality assurance and accreditation
5.	Strengthen seed-related activities of plant breeding institutes
6.	Improve seed health
7.	Support to seed production units (training and investment)
8.	Improve local seed production through farmer training



A familiar scene at harvest time with a mobile thresher working at the road side. The two contrasting landscapes of Vietnam are shown clearly, flat irrigated lowland and steep hilly upland.

The 'crop portfolio' can have a profound effect on seed sector development. In many countries, hybrid maize provided the backbone for commercial companies, around which they could build other products. However, rice is the staple cereal of Vietnam, with two or three crops per year being grown throughout the country. Rice is always a problem crop for the formal seed sector because of the limited profitability of selling open-pollinated varieties to small farmers. This situation calls for local seed production initiatives which incur low overhead and distribution costs and thus keep the price of seed attractive to farmers. For this reason, Danida is supporting a pilot programme of farmer-training in seed production which can be assimilated into the extension activities of the host provinces. Likewise, farmer seed groups/clubs are also being designed, an approach already developed by Danida in Bangladesh.

There is no doubt that rice production has been a success story in Vietnam, with annual production over 30 million tons ensuring national self sufficiency and an exportable surplus of around 4 million tons annually, making Vietnam the second largest rice exporter. However, even this strong position raises some interesting challenges for seed supply, particularly in the Mekong River Delta which is the main export producer. For example, the export market is very sensitive to quality and there is a natural concern to compete in the premium markets for fragrant and other speciality rice. This has implications for seed production and the management of the whole supply chain. The identity and quality of varieties must be preserved from sowing,

through crop production, post-harvest processing and finally to marketing the grain in order to obtain maximum benefit from a premium product.

Despite the attractions of private sector participation already discussed, there are still social dimensions to seed supply which need to be considered. One example is the provision of emergency seed following natural disasters. In Africa, this is normally a response to drought but in Asia,

flooding is the main problem, and in Vietnam that occurs in some parts of the country nearly every year. Thus the government may still have to assume responsibility for seed security – this is not an easy task for the private sector to fulfill.

It is clear that seeds are still an essential element in rural development but they come with a number of complexities. There are some general technical and economic principles for the development of a national seed industry but there are also many factors that are country specific such as the crops, climate, topography, political system and ultimately the overall social context of agriculture. Different policies and criteria may be needed to support the commercial farming sector as compared with subsistence farmers who live in the difficult areas isolated from the market. It remains a challenge for many developing countries to reconcile these different needs of their farmers, and to make the best possible use of their investment in seeds and varieties.



The Mekong Delta is an area of very intensive rice production which provides nearly all the export crop. Large scale mechanization is difficult but many small machines like this are used for land preparation, sowing and harvesting

Obituary

Kees Langerak

1947 - 2006

By Ruud van den Bulk and Joost van der Burg

Plant Research International, Wageningen, The Netherlands



It is with great sadness that we have to inform you that our former colleague Dr. C.J. (Kees) Langerak passed away on February 9, 2006. Kees had worked at Plant Research International for many years and had made use of the option for early retirement about one year ago. A few months after that, it became clear that Kees had oesophageal cancer and that it was incurable.

Throughout his career, Kees has had a large network within ISTA, especially through his chairmanship of the former Plant Disease Committee (PDC) which he took up in 1992 and ended in 2001. At that time, seed health testing was becoming an issue of increasing importance, and Kees was asked during the Argentina congress to organise the PDC to meet the future needs of governments and seed companies. He did this with great enthusiasm and followed a sound approach. The structure established proved to be effective, and with the help of many of the ISTA colleagues, from governmental organisations and inspection services as well as private seed industry, modern seed health testing became top priority under his guidance. Kees resigned as member of the PDC in 2004.

Kees began his career in 1972 as scientific staff member in the Department of Phytopathology of the Wageningen Agricultural University, the Netherlands, where he carried out his PhD work. He joined the former Government Seed Testing Station

(RPvZ) in Wageningen in 1978 as head of the Department of Seed Health. In the following years he hired some excellent new scientific staff and ensured that the testing at the station gained a stronger scientific basis. Many new methods for fungi, bacteria and viruses were developed. During these years he developed strong international interests and he joined ISTA shortly after his appointment at RPvZ. He was an active member of the PDC for many years. In 1987 he organised the International Seminar on Seed Health in Wageningen. He has always been very faithful to seed technology and in particular the study of seed-borne fungi. He actively took part in several institute reorganisations, which culminated in the present-day Plant Research International. In 1998 he represented The Netherlands at the congress in Pretoria. For the last few years he devoted all his energy to developing methods for managing seed-borne pathogens specifically in organic seed production.

Kees will be remembered as a researcher 'pur sang', who was always willing to share his vast knowledge and expertise in the area of seed-borne fungi. He presented and discussed his results and views with an enthusiasm which we all appreciated so highly. He was also a good teacher and gave lectures at the University and organised both national and international courses. He supervised several PhD students like a helpful father and performed a number of consultancies in countries such as Brazil, Kenya, Poland, the Philippines, Syria, and the USA. A memorable achievement was his establishing a link with the Brazilian seed scientists from the University of Lavras and elsewhere within the country. This resulted in quite a number of PhD students from Brazil in Wageningen, and in joint research projects and workshops. And, who knows, perhaps this early link also stimulated the Brazilians to opt for the organisation of our next congress.

With Kees we have lost a colleague who has played an important role in the international field of seed pathology. With him, we also lost a friend who always showed great interest in the people around him and who was, together with his wife Lenny, a good and enjoyable host to many of us. ■

Obituary Claude Anselme

1925 - 2005

By **Attilio Lovato**, ISTA Honorary President

Università di Bologna, Bologna, Italy, alovato@agrsci.unibo.it

It is with great sadness that we heard about the passing away of Dr. Claude Anselme, former Director of SNES (the state seed testing station in France) and a former Secretary Treasurer of the ISTA, on August 12, 2005.

After completing the agricultural studies with a PhD in Plant Pathology at the Grignon's High Agricultural School, Claude Anselme joined INRA (Institut Nationale de Recherche Agronomique), France in 1948 and the SNES (Station Nationale d'Essais de Semences), Paris where, as a plant pathologist he created the Seed Health Testing Laboratory in 1958. In 1969 he became Director of the SNES, La Minière, Versailles, and a designated member of ISTA. For a long time Claude was also a member of the ISTA Plant Disease Committee of which he was the chairperson from 1974 to 1986. In 1977 in Madrid he was elected member-at-large of the ISTA Executive Committee and from 1980 to 1989 he served as Secretary Treasurer of the ISTA. He retired after 42 years of activity on 1st April 1990.

During his long activity as a seed specialist Claude Anselme always gave the best of himself and his scientific and technical expertise to the progress of seed science and technology. Everybody who has had the chance to work with him has always appreciated the dynamism with which he worked on both the Plant Disease Committee and the Executive Committee, not to mention his invaluable work over nine years as Secretary Treasurer of ISTA. He also cooperated with FAO as a consultant in a number of seed projects for developing countries, mainly in South-East Asia, teaching and training local analysts and technologists with workshops and courses in seed testing and technology.

Whatever decision had to be taken, he always demonstrated his fairness, wisdom, exemplary technical and scientific competence, and his extra-ordinary humanity towards his colleagues and his collaborators. He gave

also enthusiastic contribution to the success of evening entertainments: who does not remember Claude while singing the famous scout's hymn "Alouette"!

After his retirement he continued to take interest in seed problems, but the need of taking care of his own health condition and that of his wife represented his main commitment, despite that he happily attended the ISTA Congress 2001 in Angers, France.

In the sad time of this great loss, ISTA's deepest sympathies go to his wife, Elisabeth, who often was seen at her husband's side at ISTA meetings, to his four children with their consorts and the 10 grandchildren of whom Claude was particularly proud.

For friends and colleagues,
Attilio Lovato



Foto: Taken during ISTA Post Congress Tour at the Hamilton Botanical Gardens.

A. Lovato, A. Wold, C. Anselme, Ottawa, Canada 1983 ■

AU – Australia

AUML12/AUPM12
South Pacific Seeds Pty Ltd
48-50 Willandra Ave.
P O Box 934
Griffith N.S.W 2680
Phone: +612 69627 333
Fax: +612 69641 311
E-mail: seedlab@spseed.com.au
Personal member: Ms. Anne Bolch

AUPM
Mr. Esakki Konar Nambi
Terranova Seeds
P.O.Box 118
Wetherill Park
2164 Sydney NSW
Phone: +61 2 9725 1989
Fax: +61 2 9725 1066
E-mail: nambi.konar@tnseeds.com

DK – Denmark

DKPM
Dr. Jan Torp
Danish Seed Health Centre
Thorvaldsensvej 40, 1
1871 Fredriksberg C, Copenhagen
Phone: +45 35 283737
Fax: +45 35 283701
E-mail: shc@kvl.dk

HR – Croatia

HRML04/HRPM04
Laboratory for Testing Seed Quality
Forest Research Institute
Department of Tree Improvement & Forest Seed
Cvjetno naselje 41
10450 Jastrebarsko
Phone: +385 1 6273 000
Fax: +385 1 6273 035
E-mail: marijag@sumins.hr
Personal member: Mrs. Maja Gradecki-Postenjak

ID – Indonesia

IDML01/IDPM01
BPMBTPH
Development Agencies Seed Quality of Food Crop
and Horticulture
JL. Raya Tapos Kotak Pos 20
Cimanggis Jawa Barat
16956 Depok
Phone: +62 21 8755046
Fax: +62 21 8754225
E-mail: bpmbtph@yahoo.com
Personal member: Akhmad Riyadi Wastra

IN-India

INML13/INPM13
Nunhems India Pvt Ltd
10-1-127/1, Masab Tank
Hyderabad 500 028
Andhra Pradesh
Phone: +91 40 23324242 /23324040
Fax: +91 40 2332 3737
E-mail: a.reddy@nunhems.com
Personal member: Mr. A.S.N. Reddy

IT - Italy

ITML07/ITPM07
Laboratorio Analisi Sementi
C/O Cooperativa Agricola Cesenate
Via Calcinaro 1450
47020 Martorano di Cesena (FC)
Phone: +39 0547 643511
Fax: +39 0547383417
E-mail: commerciale@caseeds.it
Personal member: Dr. Cinzia Asioli

ZA – South Africa

ZAML02 / ZAPM02
Sakata-Mayford Seed Testing Laboratory
Mayford Seeds (Pty) Ltd
Teesdale Farm, Renosterspruit
P.O. Box 160
1748 Lanseria
Phone: +27 11 548 2800
Fax: +27 11 548 2820
E-mail: Anel.Labuschagne@Sakata-eu.com
Personal members: Anel Labuschagne and Jane K. Skhosana

ZM – Zambia

ZMDM01
Mrs. Mable M. Simwanza
Seed Control and Certification Institute
Official Seed Testing Station
Mount Makulu, P.O. Box 350199
13201 Chilanga
14501 Lusaka
Phone: +260 1 278236
Fax: +260 1 278170
E-mail: scci@zamnet.zm

CA – Canada

CAPM10
Personal Member: Mr. Lori Bowman
(formerly Mrs. Brenda Winnicki)
20/20 Seed Labs Inc.
#201 509-11 Avenue
Nisku, Alberta T9E 7N5
Phone: +1 780 9553435
Fax: +1 780 9553428
E-mail: lori@2020seedlabs.ca

CADM04
Personal Member: Mr. Frank Lewis
(Formerly Mr. Ken Allison)
Canadian Food Inspection
Ottawa Laboratory Agency
(Carling) - Seeds
Building No. 22, C.E.F.
960 Carling Ave.
Ottawa, Ontario K1A 0C6
Phone: +1 613 759 1292
Fax: +1 613 7597316
E-mail: flewis@inspection.gc.ca

LK – Sri Lanka

LKDM01
Mrs. Chandrani Dissanayake
(formerly Mrs. Sheela Kariyawasm)
Department of Agriculture - Sri Lanka
Seed Testing Laboratory
Gannoruwa, Peradeniya
Phone: +94 81 2388157
Fax: +94 81 2388333
E-mail: dgagri@sri.lanka.net

NZ – New Zealand

NZDM01
Personal Member: Mrs. Diane H. Dahlkamp
(formerly Mr. Alan Johnson)
AgriQuality Limited
National Seed Laboratory
Batchelar Agriculture Centre
Tennent Drive
P.O.Box 609
Palmerston North
Phone: +64 6 351 7946
Fax: +64 6 351 7907
E-mail: dahlkampd@agriquality.com

PH – Philippines

PHDM01
Personal Member: Mrs. Lealyn A. Ramos
(formerly Dr. Blo Umpar Adiong)
Bureau of Plant Industry
692 San Andres St., Malate
Manila
Phone: + 63 2 525 7909
Fax: +63 2 521 7650
E-mail: cu.bpi@da.gov.ph

PHDM01
Personal Member: Mr. Henry T. Carpiso
(formerly Dr. Aurora G. Legaspi)
Bureau of Plant Industry
National Seed Quality Control
Services
Visayas Avenue
Diliman Quezon City
Phone: +632 920 0968
Fax: + 63 2 920 09 68
E-mail: nsqcs_qc@yahoo.com

UY - Uruguay

UYDM01
Personal Member: Mr. Carlos Rossi
(formerly Ing. Agr. Eduardo de la Rosa)
INIA - Instituto Nacional de
Investigaciones Agropecuaria
Laboratorio de Semillas
La Estanzuela, Ruta 50 Kmt. 12
C.P. 39173
Colonia 70000
Phone: +598 574 8000
Fax: +598 574 8012
E-mail: crossi@inia.org.uy

UYDM02
Personal Member: Ing. Agr. Enzo Benech
(formerly Ing. Agr. Martin Garicoits)
Instituto Nacional de Semillas (INASE)
Cam. Bertolotti s/n y
Ruta 8, Km 28.8
P.O. Box 7731
Pando-Canelones
Phone: +598 2 2887099
Fax: +598 2 2887077
E-mail: inasebenech@adinet.com.uy

CO – Colombia**CODM01**

Mr. Hernando Montenegro Torres
Laboratorio Nacional Semillas
en Mosquera
Calle 37 8-43 Edificio de
Colas, Piso 4
Oficina 410 Bogotá
Phone: +57 1 2328643
Fax: +57 1 2324697

DE – Germany**DEDM**

Dr. Petra Schwarz
Institut für Angewandte Botanik
Abteilung Saatgutprüfung
Ohnhorststrasse 18
22609 Hamburg
Phone: +49 40 42816583
Fax: +49 4042816550
E-mail: petra.schwarz@iangbot.uni-hamburg.de

DEPM

Dr. Lutz Grohmann
Bundesamt für Verbraucherschutz & Lebens-
mittelsicherheit (BVL), Referat 405
Rückverfolgbarkeit und Nachweisverfahren
Taubenstrasse 42-43
10117 Berlin
Phone: +49 1888 413 3071
Fax: +49 1888 413 3060
E-mail: lutz.grohmann@bvl.bund.de

DK – Denmark**DKPM**

Mr. Torben Borggaard
Frederiksborgvej 55 D
4000 Roskilde
Phone: +45 4632 1298
E-mail: torben.borggaard@privat.dk

DKPM

Mrs. Alice Klausen
DLF-Trifolium A/S
Ny Ostergade 9
P.O. Box 59
4000 Roskilde
Phone: +45 46 330300
Fax: +45 46 320830
E-mail: ak@dlf.dk

IT – Italy**ITDL02/ITDM02**

Università Pisa
Dipartimento di Agronomia
Lab. Ricerca e Analisi Sementi
Via del Borghetto, 80
56100 Pisa
Phone: +39 050 599111
Fax: +39 050 540633
E-mail: macchia@agr.unipi.it
Personal member: Prof. Mario Macchia

LK – Sri Lanka**LKDM01**

Dr. Sarath L. Weerasena
Division of Seed Certification & Plant Protection
Old Galaha Road
P.O. Box 49, Peradeniya
Phone: +94 81 2388157
Fax: +94 81 2388333
E-mail: dgagri@sri.lanka.net

SE – Sweden**SEDL05/SEDM05**

Swedish University of Agricultural Sciences -
Dept. of Silviculture Seed Lab
901 83 Umea
Phone: +46 90 7868354
E-mail: urban.bergsten@ssko.slu.se
Personal member: Dr. Urban Bergsten

SY – Syria**SYDM01**

Dr. Abbas Abbas
General Organization for Seed Multiplication,
G.O.S.M. Seed Testing Laboratory
Boustan AlBasha Str.
P.O.Box 5857
Aleppo
Phone: +963 21 4469041
Fax: +963 214644901

New TCOM Members**Editorial Board**

Dr. Michael Sussman
USDA
801 Summit Crossing Place
28054 Gastonia, North Carolina
US-United States
Phone: +1 704 8673873
Fax: +1 704 8532800
E-mail: michael.sussman@usda.gov

Variety Committee

Mr. Ulf Kjellström
Statens Jordbruksverk
Utsädesenheten
Box 83
268 22 Svalöv
SE-Sweden
Phone: +46 418 667420
Fax: +46 418 667408
E-mail: ulf.kjellstrom@su-kontroll.se

Variety Committee

Ir. Job Schipper
Naktuinbouw
Sataweg 22
Postbus 40
2370 AA Roelofarensveen
NL-Netherlands
Phone: +31 71 332 62 52
Fax: +31 71 332 63 69
E-mail: j.schipper@naktuinbouw.nl

TCOM Member Terminations**Editorial Board**

Prof. Norberto Lisker
The Volcani Center
Dept. of Seed Research
Institute of Field Crops
P.O.Box 6
Bet-Dagan 50250
IL-Israel
Phone: +972 3 968 3638
Fax: +972 3 966 9642
E-mail: norlisk@agri.gov.il

Editorial Board

Prof. Dr. Mark A. Bennett
The Ohio State University
Department of Horticulture
and Crop Science
312A Kottman Hall
2021 Coffey Road
Columbus, Ohio 43210
US-United States
Phone: +1 614 292 3864
Fax: +1 614 2927162
E-mail: bennett.18@osu.edu

Germination/Storage Committee

Dr. Loren Wiesner
National Seed Storage Laboratory
USDA ARS
1111 South Mason Street
Fort Collins, CO 80523-4500
US-United States
Phone: +1 970 4953223
Fax: +1 970 2211427
E-mail: lwiesner@lamar.colostate.edu

Statistics Committee

Prof. Dr. Lawrence O. Copeland
Michigan State University
Department of Crop and Soil
278 Plant & Soil Sciences Bldg
East Lansing, MI 48824-1325
US-United States
Phone: +1 517 353 9545
Fax: +1 517 3535174
E-mail: copeland@msu.edu

Variety Committee

Dr. Robert John Cooke
NIAB National Institute of Agricultural Botany
Chemistry Department
Huntingdon Road
Cambridge CB3 0LE
GB-United Kingdom
Phone: +44 1223 342331
Fax: +44 1223277602
E-mail: robert.cooke@niab.com

ISTA Seed Moisture Committee Progress Report

Working Group for assessment of water content in recalcitrant and other non-orthodox seed material

By Deon Erdey¹ and Craig McGill², ISTA Moisture Committee Members

¹University of KwaZulu-Natal, South Africa, erdeyd@nu.ac.za

²Massey University, New Zealand, C.R.McGill@massey.ac.nz

OBJECTIVES

The ISTA Seed Moisture Committee seeks to establish rules about drying of recalcitrant seed material which could be no better than guidelines, because of the inherent variability of these and other non-orthodox seeds. Nevertheless, both to establish the possibility of sound guidelines and to emphasise the unpredictability of recalcitrant and other non-orthodox seeds, we have undertaken to monitor water contents of a spectrum of species of recalcitrant/non-orthodox seeds, dehydrated under prescribed conditions in relation to the loss of vigour and viability. To this aim, the present report summarises the results obtained for the period 2004 – 2005.

RESULTS

Initial characteristics

The initial characteristics of the seven species tested are summarized in Tables 1 and 2. The seeds of *C. africana*, *E. natalensis* and *E. gratus* are very large and, as a result, whole seed water contents could not be obtained

(Table 1). However, as the embryonic axes comprise only a relatively small proportion of the entire seed in these species, whole seed water contents would most likely correspond with that of the storage tissues (as seen for *S. spinosa* and *S. madagascariensis*, Table 1). With the exception of *S. spinosa*, these seeds were characterised by axis water contents considerably higher than that of the corresponding storage tissues (Table 1).

The initial characteristics of *B. gymnorrhiza* propagules are presented separately due to the unusual structure of these large seeds (Table 2). At maturity, seeds of this species consist of a large elongated hypocotyl and small plumule (Figure 1). Consequently, the water contents of the plumule, and middle and distal portions of the hypocotyls were each determined separately. The water contents of the hypocotyl segments were higher than that of the plumule. In addition, the water content of the distal portion of the hypocotyls was higher than that of the middle portion (Table 2).



Figure 1. Mature *Bruguiera gymnorrhiza* seed.

Table 1. Seed mass and initial whole seed and seed component water contents, expressed as grams water per gram dry mass.

Species	Seed mass (g)	Whole seed	Water content (g.g-1)	
			Storage tissue	Axis
<i>Cordyla africana</i>	± 10*		1.04 (±0.11)	1.72 (±0.14)
<i>Encephalartos natalensis</i>	6.98 (±0.41)		0.58 (± 0.05)	1.01 (± 0.07)
<i>Encephalartos gratus</i>	6.40 (±0.42)		0.51 (± 0.01)	1.49 (± 0.09)
<i>Dysoxylum spectabile</i>	2.21 (±0.19)	1.06 (± 0.04)	0.76 (± 0.04)	2.23 (± 1.21)
<i>Strychnos spinosa</i>	1.29 (±0.14)	0.63 (±0.01)	0.63 (±0.01)	0.33 (±0.20)
<i>Strychnos madagascariensis</i>	1.14 (±0.15)	0.78 (± 0.14)	0.78 (± 0.14)	1.63 (± 0.40)

* Information obtained from Msanga, H.P. 1998. Seed Germination of Indigenous Trees in Tanzania. Northern Forestry Centre, Canadian Forest Service

Table 2. *Bruguiera gymnorrhiza* seed mass and initial seed component water contents, expressed as grams water per gram dry mass.

Species	Seed mass (g)	Plumule	Water content (g.g-1)	
			Hypocotyl (middle 1 cm ³)	Hypocotyl (distal 1 cm ³)
<i>Bruguiera gymnorrhiza</i>	12.58 - 20.88 (±3.29)	1.57 (±0.18)	1.77 (±0.10)	1.97 (±0.08)

Desiccation

The results are represented as percentage germination (root emergence) versus seed component water content (Figure 2).

The degree of desiccation tolerated in these experiments varied among the species tested. While the viability of *C. africana*, *E. natalensis* and *E. gratus* seeds declined considerably following only limited removal of water from the seed tissues, *S. spinosa* seeds retained viability to much lower water contents. While root emergence by *B. gymnorrhiza* propagules was enhanced following slight desiccation, the plumules of these seeds were extremely desiccation sensitive, exhibiting severe necrosis in all the drying treatments (results not shown).

In most cases, viability declined at a higher axis water content, than indicated when the water content was determined on a whole seed basis only (in the case of *S. madagascariensis* seeds) or when determined for that of the storage tissues, which comprised the bulk of dry weight of these seeds.

Summary

As found previously for other non-orthodox species:

- Water content values differs greatly between the various seed components
- Determining water content on a whole seed basis only for desiccation sensitive seeds underestimates the desiccation sensitivity of the germinative axis tissues.

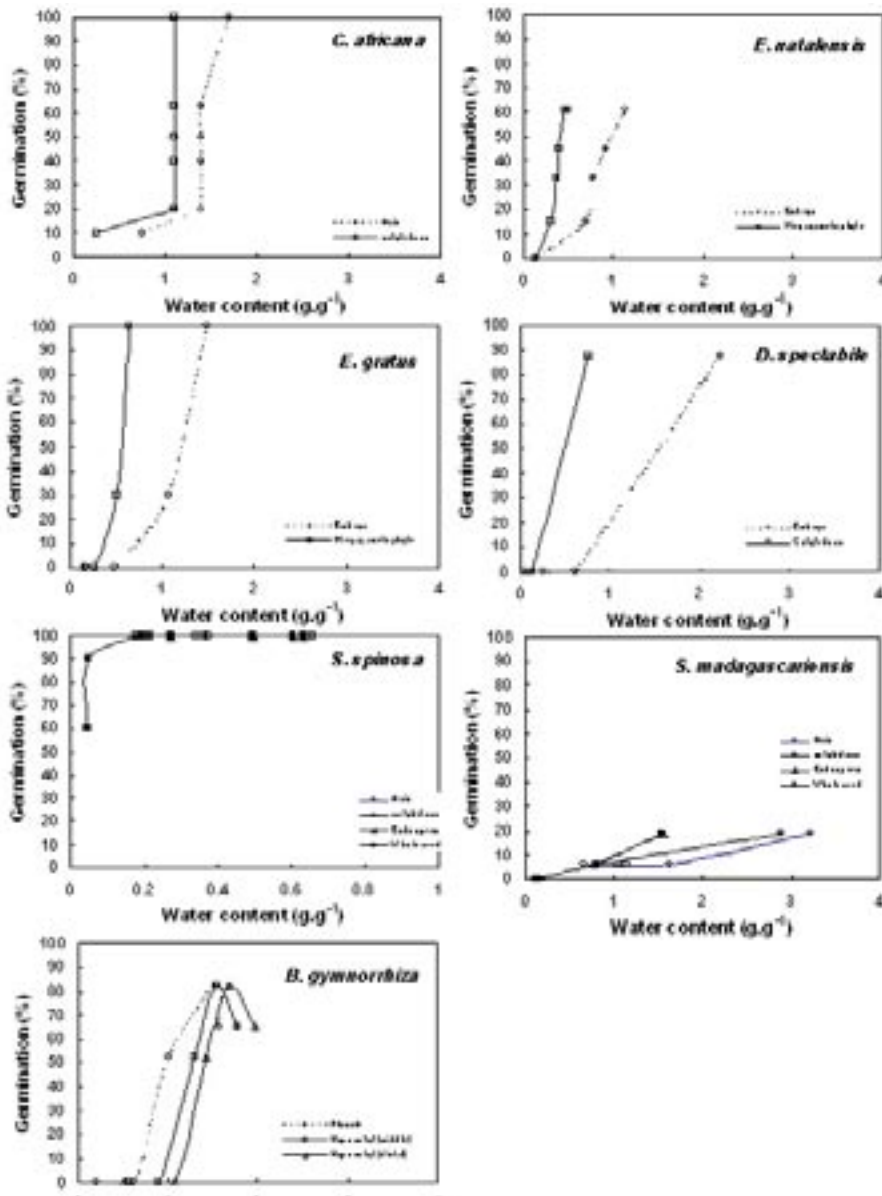


Figure 2. Viability curves (n = 25)

elmor

Equipment for Seed Testing Laboratories



PC Controlled Precision Counter



Multichannel Counter for High Throughput

... and much more

SWISS MADE

elmor, Dr. Rudolf Moll
 info@elmor.com
 www.elmor.com

elmor

5th ISTA Proficiency Test on GMO Testing on *Glycine max* (L.) Merr.

By **Bettina Kahlert**, ISTA GMO Task Force Proficiency Test Working Group Leader
ISTA Secretariat, Switzerland, bettina.kahlert@ista.ch

1. AIM

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

2. EXPERIMENTAL DESIGN

Samples were either negative, i.e. did not contain any transgenic events, or positive, i.e. contained the transgenic event GTS 40-3-2 (GTS40) or A2704-12 (A2704). When preparing the positive samples different quantities of GTS40 or A2704 seeds were mixed with non-GM seeds. The genetic purity was tested prior to the sample preparation.

The GTS40 seeds in the samples have the 35S promotor, the NOS terminator and the CP4 EPSPS gene. The CP4 EPSPS gene encoding the EPSPS protein (5-enolpyruvylshikimate-3-phosphate synthase) confers tolerance to the glyphosate herbicide (the active ingredient in Roundup Ready®). This transgenic event was already used in the 4th ISTA Proficiency Test on GMO Testing. The

A2704 seeds in the samples have two copies of the 35S promotor and a single copy of the PAT gene. The PAT gene encoding the PAT enzyme (phosphinothricin acetyltransferase) confers tolerance to glufosinate ammonium (also known as phosphinothricin herbicide tolerance).

Each participating laboratory received a set of 12 soybean samples each containing about 3000 seeds. The positive samples were made positive by adding a defined number of seeds from the GTS40 or A2704 seed lot to the negative seeds. For each sample, the non-GM seeds were weighed and the GM seeds were counted and the weight determined. For laboratories performing sub-sampling quantification, also the non-GM seeds were counted.

Three samples were negative and nine samples were positive. Five out of the nine positive samples were the same for all laboratories: two samples contained 0.2% GTS40 seeds and three samples contained 1.0% A2704 seeds. Four samples differed in their GMO content between the laboratories. One-

third of the labs received either samples with a GTS40 content of 0.5%, 1.0% or 1.5%. Table 1 and 2 give detailed information about the arrangement of the samples and the spiking levels.

The choice of the method used for testing was at the laboratory's discretion.

3. RESULTS

Sixty-four laboratories received samples. Fifty-eight submitted their results. Three (5%) submitted only qualitative results. Thirteen (20%) performed the quantification using the sub-sampling strategy. Forty-one (64%) reported quantitative results performing a quantitative test. One (2%) submitted results for both tests, sub-sampling quantification and quantitative test and six (9%) did not report data.

3.1 Descriptive Statistics of the Qualitative Results

Each laboratory reported for the individual sample whether this is a negative sample or

Table 1: Detailed information about disposition of the samples.

Label	A-C	D-E	F-I	K-M
# of samples	3	2	4	3
events	-	GTS 40-3-2	GTS 40-3-2	A2704-12
GM spiking level by # of seeds	0%	0.2%	0.5% or 1.0% or 1.5%	1.0%

Table 2: Detailed information about the spiking levels of the test samples: spiking levels by number and by mass of seeds, the number and average weight of GM and non-GM seeds per sample.

GM spiking level by # of seed	0%	0.2%	0.5%	1%	1.5%
Average GM spiking level by mass of seed of GTS 40-3-2	-	0.20% ± 0.01%	0.50% ± 0.02%	0.98% ± 0.03%	1.47% ± 0.04%
Average GM spiking level by mass of seed of A 2704-12	-	-	-	1.01% ± 0.04%	-
# of non GM seeds ¹	3000	2994	2985	2970	2955
# of GM seeds ¹	0	6	15	30	45
Weight of non-GM seeds ²	~412 g	~411 g	~410 g	~407 g	~406 g
Weight of GM seeds (GTS 40-3-2) ²	0 g	~0.81 g	~2.06 g	~4.13 g	~6.06 g

¹samples for laboratories performing sub-sampling quantification.

²samples for laboratories performing a quantitative test, e.g. RT-PCR.

a positive sample. Hence, for a given sample, the result reported by the laboratory can be either correct or false (Figure 1 and Table 3).

Out of the 58 laboratories:

- Thirty-two laboratories classified all 12 tested samples correctly. These are 55.2% of the laboratories.
- 89.1% of the 696 samples were reported correctly by the 58 laboratories.
- In total, 26 laboratories reported results falsely, one laboratory reported both, false positives and false negatives and 25 laboratories only false negatives. No laboratory reported only false positives.
- One laboratory reported false positives (one out of the three negative samples (1/3)) with a total number of one out of 174 negative samples tested. These are 1.7% of the laboratories and 0.6% of the negative samples.
- Twenty-six laboratories reported false negatives (between 1/9 and 3/9) with a total number of 75 out of 522 positive samples tested. These are 44.8% of the laboratories and 14.4% of the positive samples. All 26 laboratories reported false negatives for the A2704 samples with a spiking level of 1.0%. Between 1/3 and 3/3 samples were classified falsely as negative with a total number of 75 samples out of 174. These are 44.8% of the laboratories and 43.1% of the A2704 samples.
- Zero laboratories reported false negatives for the GTS40 samples with a spiking level of 0.2%, 0.5%, 1.0% or 1.5%.

3.2 The Quantitative Results

Fourteen laboratories used the sub-sampling strategy for a quantification. All laboratories reported the number of sub-samples, the size of these sub-samples and the number of positive sub-samples tested. Most laboratories used a testing plan with a high number of sub-samples. All laboratories used all 3000 seeds to create the sub-samples. Figure 2 shows the estimate of the percentage of GM seeds in a sample reported by the laboratories.

Forty-one laboratories performed the quantitative test, e.g. using RT-PCR, and reported for the individual test sample the estimated value of the GM content as the percentage seed in number of seeds or mass of seeds or other units, e.g. percentage of DNA. (Figure 3).

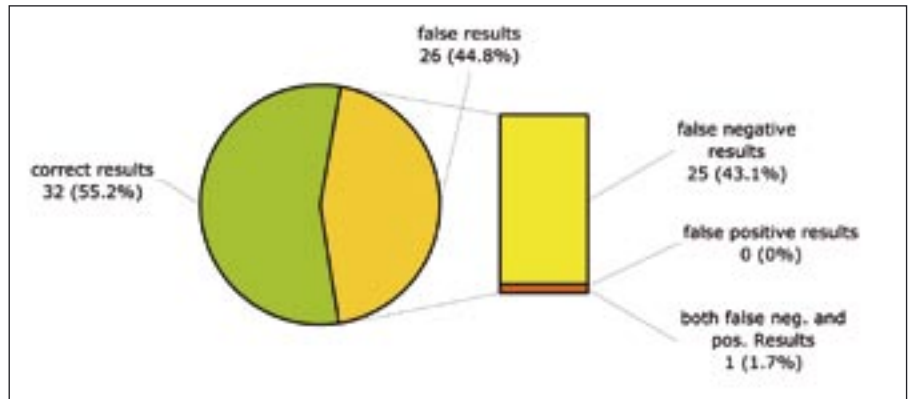


Figure 1: Percentage of laboratories reporting correct and false results.

Table 3: Number and percentage for which false results were reported.

	# of samples tested	# of false results	% of false results
All samples	696	76	10.9%
Negative samples	174	1	0.6%
Positive samples	all	75	14.4%
0.2% GTS40 content	116	0	0.0%
0.5% GTS40 content	76	0	0.0%
1.0% GTS40 content	76	0	0.0%
1.5% GTS40 content	80	0	0.0%
1.0% A2704 content	174	75	43.1%

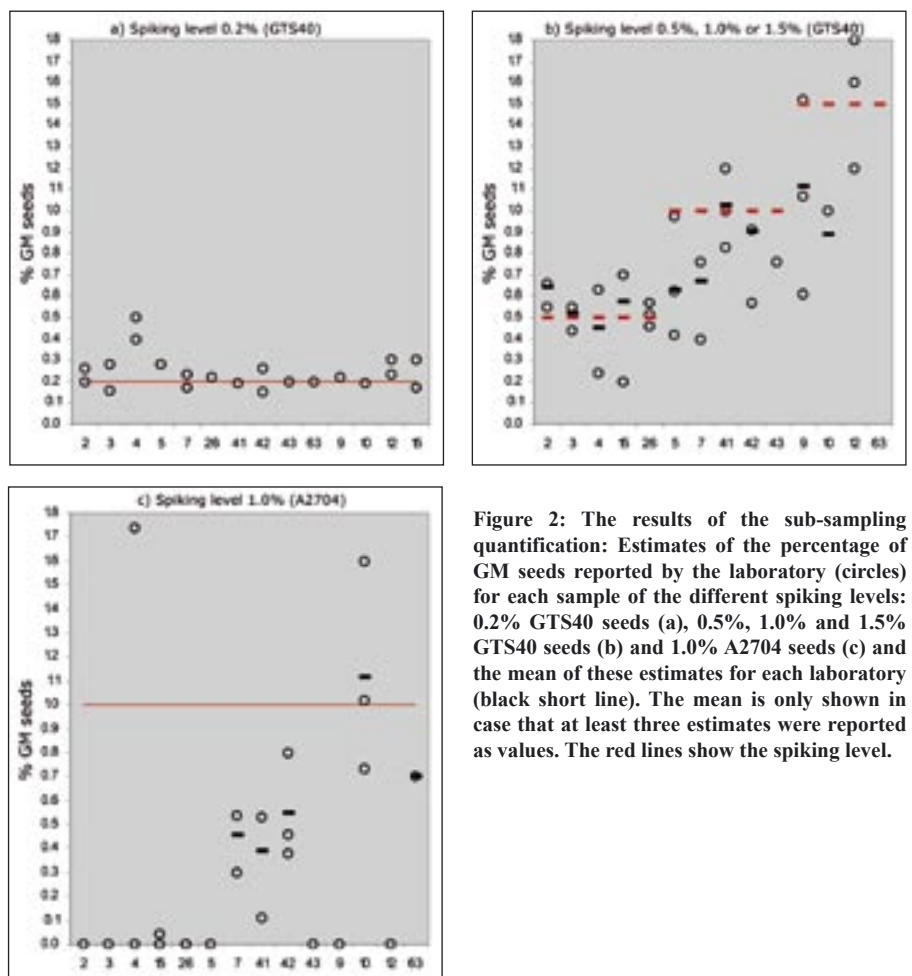


Figure 2: The results of the sub-sampling quantification: Estimates of the percentage of GM seeds reported by the laboratory (circles) for each sample of the different spiking levels: 0.2% GTS40 seeds (a), 0.5%, 1.0% and 1.5% GTS40 seeds (b) and 1.0% A2704 seeds (c) and the mean of these estimates for each laboratory (black short line). The mean is only shown in case that at least three estimates were reported as values. The red lines show the spiking level.

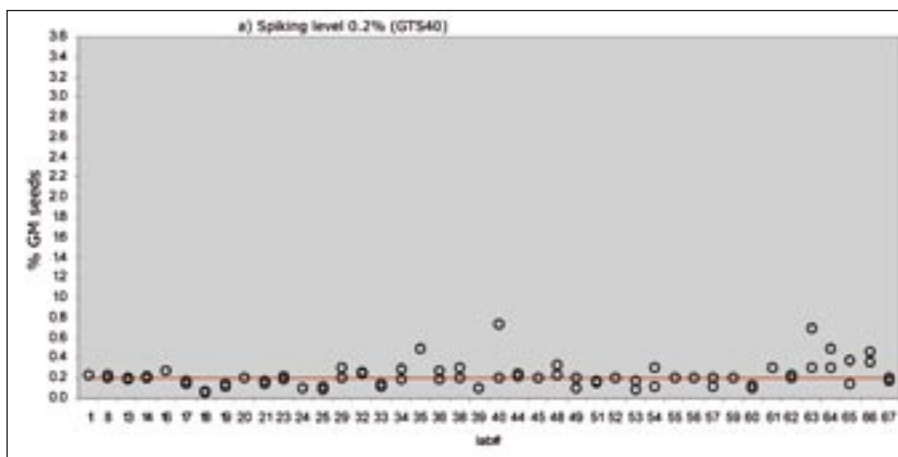


Figure 3: The results of the quantification: Estimates of the percentage of GM seeds reported by the laboratory (circles) for each sample of the different spiking levels: 0.2% GTS seeds (a), 0.5% GTS40 seeds (b), 1.0% GTS seeds (c), 1.5% GTS40 seeds (d), 1.0% A2704 seeds (e) and the mean of these estimates for each laboratory (short line). The mean is only shown in case that at least three estimates were reported as values.

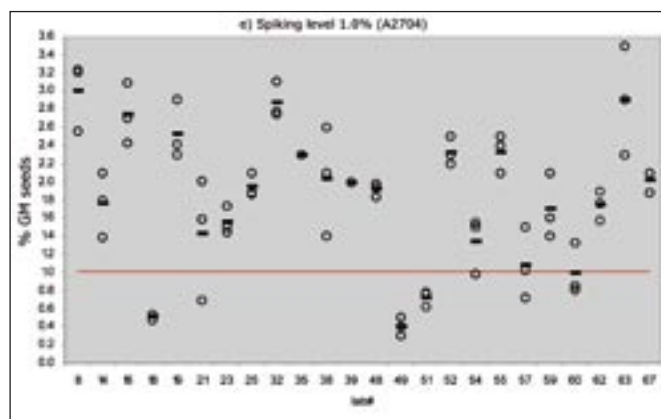
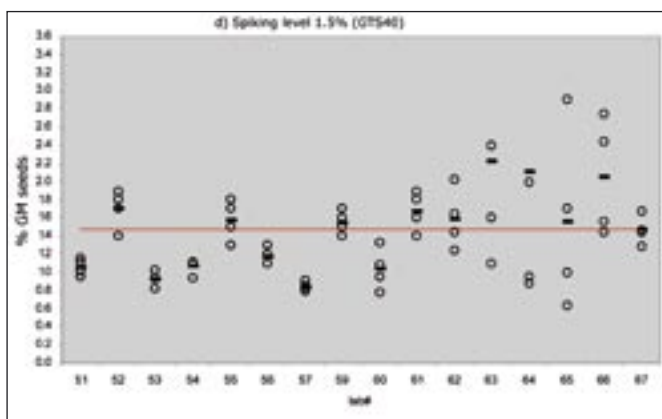
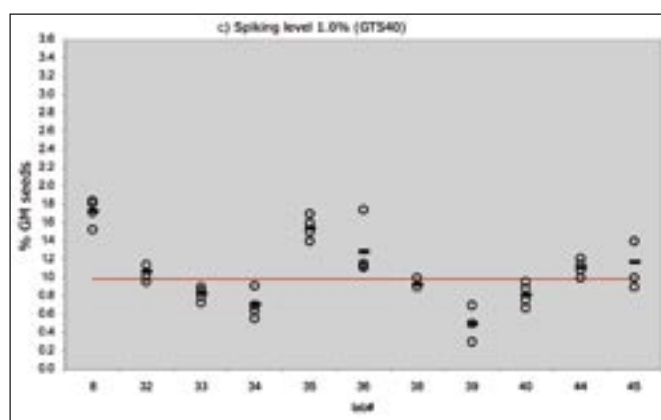
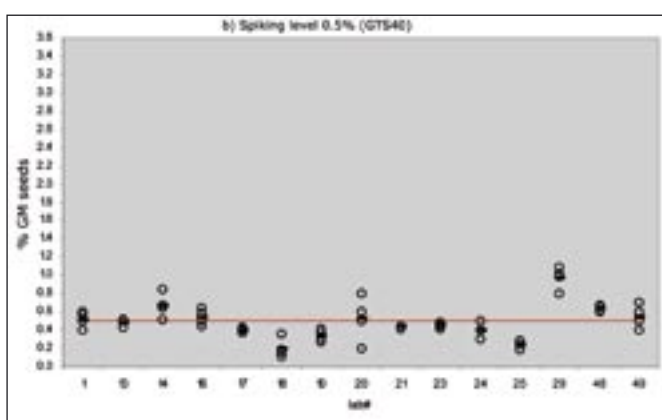


Table 4: Quantitative test - The (overall) mean of the quantitative test results for each spiking level, the standard deviation, the variation coefficient and the relative error among the samples within each spiking level. The standard deviation, the variation coefficient and the relative error in this table are related to the single results per sample and not to the laboratories' means.)

Spiking level and transgenic event	Replicates	Mean ± SD (%)	Variation coefficient (%)	relative error (%)
0.2% GTS40	116	0.23 ± 0.12	51.4	16.4
0.5% GTS40	76	0.48 ± 0.16	33.2	10.9
1.0% GTS40	69	0.99 ± 0.34	34.7	40.5
1.5% GTS40	79	1.47 ± 0.67	45.6	16.4
1.0% A2704	88	1.63 ± 0.85	52.1	82.0

Table 4 shows the overall performance of the laboratory regarding the different sample groups, i.e. spiking level and event: The (overall) mean of the quantitative and sub-sampling test results for each spiking level, the standard deviation, the variation coefficient and the relative error among the samples within each spiking level. The variation coefficient (% variation coefficient =

standard deviation/mean*100) shows the inter-sample variability. The lowest variation coefficient was calculated for the 0.5% and 1.0% spiking level of GTS40 samples with 33.2% and 34.7%. The highest were calculated for the 0.2% GTS40 and the 1.0% A2704 samples with 51.4% and 52.1%, respectively. These variation coefficients are similar to the ones of previous test rounds. The relative er-

ror (% relative error = [reported value – true value]/true value*100) shows the closeness of agreement between the reported value (test result) and the true value. The samples with the lowest relative error are the 0.5% GTS40 samples (10.9%) and with the highest relative error are the 1.0% A2704 samples (82.0%).



Call for Registration

7th and 8th ISTA Proficiency Test on GMO Testing

Since GMO testing has been included in the ISTA Accreditation Programme, the participation in the ISTA Proficiency Tests on GMO Testing is compulsory for those laboratories which have GMO testing methods in their scope of accreditation.

The ISTA GMO Proficiency Test on GMO Testing is also open to all laboratories involved in GM seed testing.

Your laboratory can select the method appropriate to detect the presence or absence of GM seeds, to quantify and to identify their presence in samples of conventional seeds.

7th ISTA Proficiency Test on GMO Testing on *Zea mays* L.

Your laboratory will receive 12 maize test samples each of 2000 seeds, either containing GM seeds or not.

Registration deadline: May 31, 2006

8th ISTA Proficiency Test on GMO Testing on *Glycine max* (L.) Merr.

Your laboratory will receive soybean test samples, either containing GM seeds or not.

Registration deadline: November 30, 2006

Registration forms and further details on proficiency tests can be found on the ISTA Website at www.seedtest.org

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

New as of June 2006!



SST Online Subscription

As of June 2006, the journal *Seed Science and Technology* is also available as an Online Subscription.

Online Subscription:	CHF 353.00	(approx. US\$ 265.00/EUR 230.00)
Online & Print Subscription:	CHF 447.00	(approx. US\$ 335.00/EUR 291.00)

CHF = Swiss Francs

Single Paper Download (Pay-per-View)

As of June 2006 all papers may be downloaded individually for a fee of US\$ 35.- per paper.

Back issues from volume 31 - 33 are also available for download as well as all future issues of *Seed Science and Technology*.

Visit www.seedtest.org for further details

ISTA Proficiency Test Programme

Update on Lab Performance

By **Martina Rösch**¹, ISTA Accreditation Department and **Ronald Don**², ISTA Proficiency Test Leader

¹ ISTA Secretariat, Switzerland, martina.roesch@ista.ch,

² Official Seed Testing Station, Scottish Agric. Science Agency Headquarters, 1 Roddinglaw Road, Edinburgh EH12 9FJ, United Kingdom, ronald.don@sasa.gsi.gov.uk

The ISTA Proficiency Test (PT) rating system was implemented in 2002 and since then nine test rounds have been completed. Having now data for a number of germination, other seed determination and moisture content PT rounds, it is possible to provide some answers to the following questions regarding the performance of participants:

How have the laboratories performed?

and

Is there a difference between the performance of accredited laboratories and non-accredited laboratories?

Proficiency Test on Germination – Overall Performance

Overall ratings for 95 laboratories are available. This is approximately 80% of the average number of participants in germination PTs. Seventy-seven of the 95 laboratories are ISTA accredited and the other 18 laboratories participated as volunteers. As shown in figure 1, more than 50% of the accredited laboratories scored an overall A rating, which indicates excellent overall performance over six test rounds.

Compared to the overall performance of the accredited laboratories, one can see that the percentage of A laboratories is lower for the volunteers; however, there are still more than one third of all non-accredited laboratories scoring an overall A. The greatest difference

in performance ratings is in the C range. One third of the volunteers scored an overall C whereas only 3% of the accredited laboratories were rated an overall C. It is encouraging to see that there is no laboratory, be it accredited or volunteer that scored an overall BMP. An overall BMP would have indicated serious problems in the laboratory's testing procedures.

Proficiency Test on Germination – In-round Performance

The following charts present the in-round PT performance in germination over the past ten test rounds for accredited laboratories (Figure 2) and non-accredited laboratories (Figure 3). Most accredited laboratories performed well in germination as an average of more than 75% of the accredited laboratories scored an in-round A and only an average of four percent of the laboratories scored an in-round BMP. The distribution of scores is quite homogenous in contrast to the scores of the volunteers. In some test rounds, the number

of non-accredited laboratories scoring an A is quite high but in some test rounds a considerable number of non-accredited laboratories scored an in-round BMP, e.g. in test round 04-3, *Phleum pratense*, more than 30% of the volunteers scored an in-round BMP.

Proficiency Tests on Other Seed Determination – In-round Performance

The in-round rating system for other seed determination follows the system presented at the Ordinary Meeting in Bangkok, Thailand in 2005 and is described in the last issue of *Seed Testing International*. This system has been approved by the Proficiency Test Committee and is being submitted to the Executive Committee for adoption. Only five of the proficiency test rounds since 2002 have included other seed determination and the ratings and final test reports for these will be sent to participants as soon as the in-round rating system is approved by the Executive Committee.

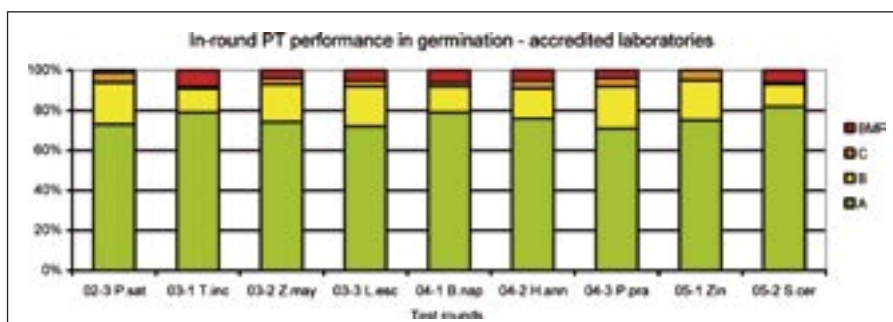


Figure 2: Proficiency test performance in germination per test round – accredited laboratories

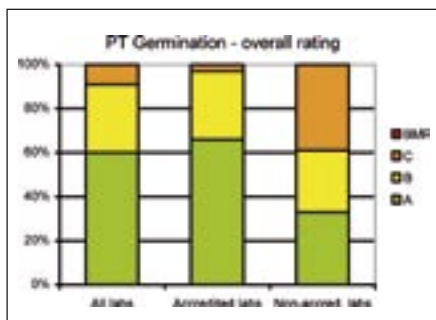


Figure 1: Comparison of overall proficiency test performance in germination

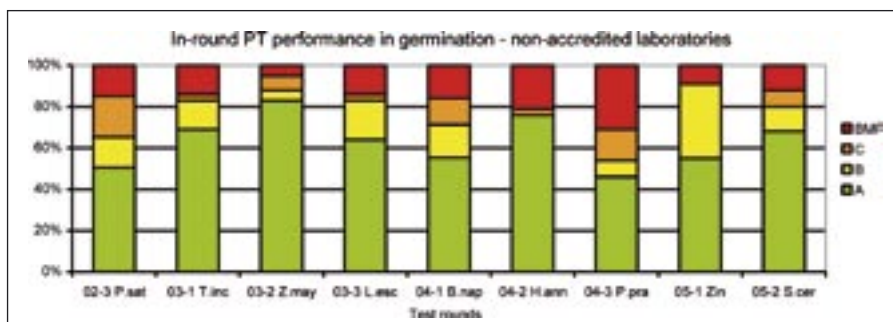


Figure 3: Proficiency test performance in germination per test round – non-accredited laboratories

Compared to in-round performance in germination testing, the difference between accredited and non-accredited laboratories is even more pronounced in the determination of other seed (see Figures 4 and 5). An average of 85% of the accredited laboratories scored an in-round A compared to an average of only 50% of the non-accredited laboratories. The amount of laboratories scoring an in-round BMP is considerably higher among the non-accredited laboratories, with an average of more than 20%. An average of only 2% of the accredited laboratories scored an in-round BMP in other seed determination.

Proficiency Test on Moisture Content Testing – In-round Performance

Each year moisture content tests are included in one of the PT rounds so the results of only three test rounds are available for analysis. The in-round rating system follows the same system as that used for germination tests and participants have received final test reports. Those scoring C or BMP have been given advice from the test leader for remedial action and offered further samples for testing.

The following charts present the in-round PT performance in moisture content testing over the past three years for accredited laboratories

(Figure 6) and non-accredited laboratories (Figure 7). Most accredited laboratories performed well in moisture content tests with an average of 80% of the accredited laboratories scoring an in-round A and only an average of 5% of the laboratories scoring an in-round BMP. This is similar to the performance of accredited laboratories in germination PTs.

The performance of non-accredited laboratories was similar to that obtained in germination PTs with an average of 61% of non-accredited laboratories scoring an in-round A and an average of 21% scoring an in-round BMP. There is also an indication that the performance of non-accredited laboratories was poorer in test rounds 04-1 and 05-2 where seeds had to be ground as part of the moisture content methodology.

General

The results are not surprising, as one would expect the accredited laboratories to perform better on average than non-accredited laboratories. Accredited laboratories have given evidence of their technical performance through passing the extensive audit procedure and are required to maintain a quality management system that allows for evaluation and the continuous improvement of test

performance. They are required to routinely check the proper functioning of equipment, offer adequate training to personnel and verify implementation and effectiveness of their systems through internal audits, quality control procedures and management reviews.

The results of germination, other seed determination and moisture content PTs are encouraging and reassuring. They indicate that test results on ISTA Certificates are reliable and accurate. The accreditation and PT procedures are effective in terms of assessing the performance of laboratories and ensuring the continued accuracy and reliability of results reported on ISTA Certificates. The PT programme encourages the maintenance of high levels of performance in accredited laboratories. Nonetheless, it is also good to see that a substantial number of non-accredited laboratories demonstrate high levels of competence in these PTs which is an important prerequisite should they intend to become accredited at some stage. Laboratories not performing so well in particular tests are encouraged to make use of the results in order to identify weak areas in their performance and then improve it. They are also offered support from PT leaders and additional samples as part of the continuous improvement process. ■

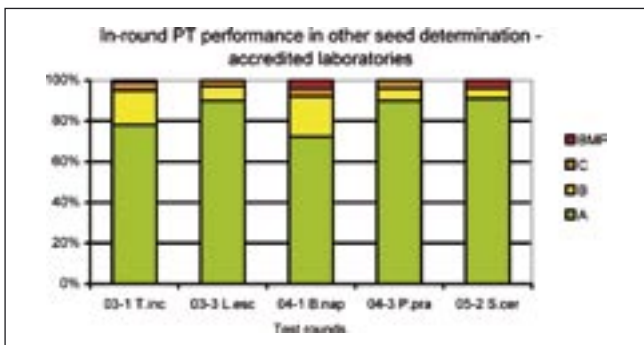


Figure 4: Proficiency test performance in other seed determination per test round – accredited laboratories

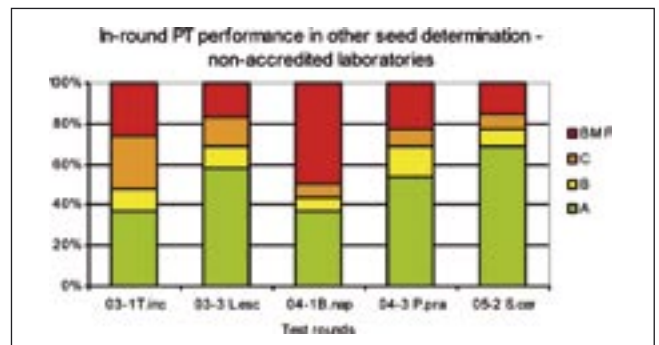


Figure 5: Proficiency test performance in other seed determination per test round – non-accredited laboratories

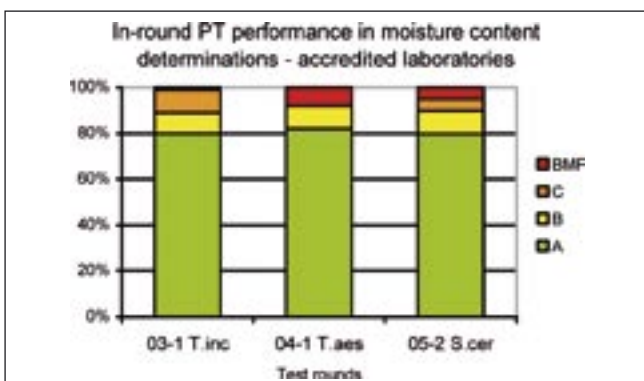


Figure 6: Proficiency test performance in moisture content determinations per test round – accredited laboratories

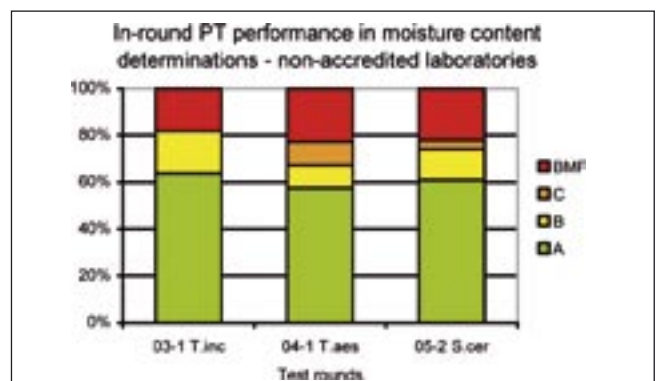


Figure 7: Proficiency test performance in moisture content determinations per test round – non-accredited laboratories

Accreditation of Laboratories using Methods approved under the Performance Based Approach

By **Gerhard Schuon**, ISTA Accreditation Department

ISTA Secretariat, Switzerland, gerhard.schuon@ista.ch

Detection, identification and quantification of seeds with specified traits has for some time been under discussion within the laboratory community. The current edition of the ISTA Rules with the new Chapter 8 provides the framework for an area in seed testing that is internationally unquestionably a hot topic. At the same time the ISTA Rules exhibit a departure from the traditional approach of having standard methods applicable in all situations and worldwide under the uniformity motto.

It is exactly this novelty that required some adjustments in terms and requirements of the accreditation process. With the formal conditions defined in the ISTA Rules 2006, the ISTA Seed Testing Laboratory Standard 4.0 and the directives ACC-D-04 (Principles and Conditions for Laboratory Accreditation under the Performance Based Approach) and ACC-D-05 (Performance Data Evaluation for the presence of seed with specified trait(s) in seed lots), as of beginning of February 2006 ISTA laboratory accreditation may include testing seed for specified traits.

Three pillars

The new features in Chapter 8 revolve around the Performance Based Approach (PBA), emphasising performance aspects of a given method used by a specific laboratory. As in the past, laboratories have to participate in the related proficiency test rounds and undergo regular on-site assessments to attain and maintain the status of an accredited laboratory. These two pillars of the accreditation programme for test protocols covered by standard methods published in the ISTA Rules have been taken over for assessing laboratories testing according to the PBA. As a third pillar, unique to methods that are not standardised and published in the ISTA Rules, a system for evaluating a laboratory's competence has been established.

Performance data evaluation

It is considered to be common practice to introduce new methods into routine testing

after making sure that each method is fit for the purpose and competently applied by staff. While technical validation procedures may be followed to a varying degree in different laboratories and depending on the method used, it is assumed that a series of test runs under defined conditions is always part of this process.

For accreditation under the PBA, ISTA defines minimum requirements as to the extent of performing test runs, including criteria for evaluating accuracy and repeatability for a given analysis.

Accreditation always refers to the ability to solve a specified analytical problem, in seed analysis commonly defined by a species, a technical protocol (i.e. the method) and a trait. The trait is the qualitative attribute of a quantity of seed that a customer may want to have confirmed, possibly also quantified. Each separate element in a laboratory's scope of accreditation under the PBA needs thus to be looked into during the accreditation process and a meaningful set of performance data must be presented to the auditors for each combination of species*method*trait intended to be included in the laboratory's scope of ISTA accreditation.

Practical experience

With the formal requirements being publicly debated and published for some time now, feedback from a variety of stakeholders has been received. A number of laboratories with appropriate proficiency test performance have initiated the process of accreditation for testing under the PBA. For some laboratories the first phase of document evaluation has already reached a final stage and on-site assessments have taken place at several occasions. The ISTA Executive Committee's decision on the first laboratory accreditation including testing for specified traits is expected for the next future. ■

ISTA Accreditation – Document update

The Accreditation Department of the ISTA Secretariat has published a new document, which the ISTA Executive Committee approved at its February meeting in Zurich, Switzerland. The document "Accreditation of laboratories with facilities on multiple sites" explains ISTA's policy in terms of possibilities to combine accreditations into one. A distinction between single site and multi site facilities is made. Laboratories that operate at different locations might combine their accreditation if certain criteria, described in this document are met. If locations where accredited work is performed cannot be reached and assessed within a reasonable period of time, membership with ISTA and thus, accreditation for each of the facilities is to be sought.

The Executive Committee also approved some minor amendments to the document "Termination, Suspension and Withdrawal of Accreditation" which aimed at enhancing clarity with regard to proficiency test participation and the payment of fees.

Both documents are available from the ISTA Secretariat upon request and may also be downloaded from ISTA online under:

<http://www.seedtest.org/en/content---1--1115.html>



IT – Italy

ITML06

Centro Nazionale per lo studio e la
Conservazione della Biodiversita Forestale
Via del Ponte 256
37020 Peri, Verona
Phone: +39 45 628 4071
Fax: +39 45 628 4089
Email: f.gorian@corpoforestale.it

JP – Japan

JPML06

Takii & Co. Ltd.
Quality Assurance Department
180 Umekoji, Inokuma
Shimogyo-KU
C.P.O. Box 7
Kyoto 600-8686
Phone: +81 75 365 0123
Fax: +81 75 3650110
Email: mkomaba@takii.co.jp

KG – Kyrgyzstan

KGML01

Republican Seed Inspection
RSI, Central Seed Laboratory
4-A, Toktonaliev Street
Bishkek, 720055
Phone: +996 312 542225
Fax: +996 312540423
Email: kgml01@mail.ru

SI – Slovenia

SIML04

Semenarna Ljubljana d.d.
Seed Testing Laboratory
Dolenjska C. 242
1000 Ljubljana
Phone: +386 1 4759 246
Fax: +386 1 4273538
Email: darja.vouk@semenarna.si

AU - Australia

AUDL01

SA Seed Laboratory
Primary Industry & Resources SA
Plant Research Centre
Waite Campus, Urrbrae
GPO Box 1671
Adelaide 5001
Phone: +61 8 83039549
Fax: +61 8 83039508
Email: lawrie.heather@saugov.sa.gov.au

AUDL02

Queensland Seed Technology Laboratory
The University of Queensland
Gatton Campus
4345, Queensland
Phone: +61 75460 1487
Fax: +61 75460 1486
Email: seedlab@mailbox.uq.edu.au

AUDL06

Tasmanian Seed Laboratory
Department of Primary Industry Water &
Environment
165 Westbury Rd, Prospect 7250
P.O.Box 46
Kings Meadows 7249, Tasmania
Phone: +61 3 63365248
Fax: +61 3 63444961
Email: mary.dearing@dpiwe.tas.gov.au

AUDL07

AGWEST Plant Laboratories
Department of Agriculture
Seed Testing Station
Locked Bag 4
Bentley Delivery Centre
Bentley 6983, Western Australia
Phone: +61 8 9368 3844
Fax: +61 8 94742658
Email: agwestplantlabs@agric.wa.gov.au

AUDL09

AgriQuality
Seed Laboratory
3 - 5 Lillie Cres
Tullamarine, Victoria 3043
Phone: +61 3 8318 9000
Fax: +61 3 83189002
Email: MillsR@agriquality.com

DE - Germany

DEDL16

Landwirtschaftlicher Untersuchungs- und
Forschungsanstalt (LUF) der LMS
Landwirtschaftsberatung Mecklenburg -
Vorpommern
Fachgebiet Saatgut
Graf-Lippe-Str. 1
18059 Rostock
Phone: +49 381 2030760
Fax: +49 3812030790
Email: Lufa-rostock@lms-beratung.de

GR – Greece

GRDL01

Seed Testing Station of Athens
Ministry of Rural Development and Food
Antheon 2, Marousi
151 23 Athens
Phone: +30 210 683 0471
Fax: +30 210 6830917
Email: an2u001@minagric.gr

HR - Croatia

HRDL03

Seed Testing Laboratory
The State Institute for Seed and Seedlings
(SISS)
Vinkovacka 63
31000 Osijek
Phone: +385 31 275 705
Fax: +385 31 275 701
Email: s.spoljaric@zsr.hr

IN - India

INML07

Indo-American Hybrid Seeds
(India) Pvt. Ltd
Seed Laboratory
Banashankari II, 17th Cross, 2nd A Main, K.
R.Road
PO Box 7099
Bangalore 560070
Phone: +91 80 676 0111
Fax: +91 80 8602912
Email: iahs@indamseeds.com

JP - Japan

JPDL03

National Livestock Breeding Center
Nagano Station
Ministry of Agriculture, Forestry & Fisheries
1889 Arakoda
Saku, Nagano 385-0007
Phone: +81 267 672501
Fax: +81 267 684743
Email: a0chabat@nlbc.go.jp

JPML05

Sakata Seed Corporation
Seed Testing Department
1660, Hazawa-Cho, Kanagawa-ku
Yokohama, 221-0863
Phone: +81 45 383 1621
Fax: +81 45 3719366
Email: aki.suzuki@sakata-seed.co.jp

NZ - New Zealand

NZDL01

AgriQuality Limited
National Seed Laboratory
Batchelar Agriculture Centre
Tennent Drive
P.O.Box 609
Palmerston North
Phone: +64 635 17940
Fax: +64 635 17907
Email: dahlkampd@agriquality.com

Experience Diversity in Brazil

By Alison A Powell, ISTA Seed Symposium Convenor 2007

School of Biological Sciences, University of Aberdeen, Aberdeen, Scotland, a.a.powell@abdn.ac.uk

Diversity is the theme of the 28th ISTA Seed Symposium as indicated by the title, **Diversity in Seed Technology**, and programme content (page 31). The choice of theme was prompted by the country of venue for the 2007 ISTA Congress, Brazil, which is the fifth largest country in the world with a land mass of 8.5 million km² stretching from 5° north of the equator to 33° south. Size and location has conferred on Brazil the gift and responsibility of the greatest biodiversity in flora and fauna on earth, providing us with a clear and unifying idea for the Seed Symposium.



The tropical rainforest of the Amazon basin is the most celebrated ecosystem in the world, and rightly so. Half of the known animals and plants, including an estimated 80,000 species of trees and flowering plants, are to be found there. Four other ecosystems are also to be found within Brazil's borders: the Atlantic rain forest, inland from the east coast; the semi-arid caatinga of the North East; the savanna grasslands of the central high plains; and the wetlands of the Pantanal in the centre of not just Brazil, but of South America. Each of these areas has its own plant diversity.

Economically important crops have already been derived from the diverse flora, rubber and cocoa from the tropics and cassava from the savanna, but much more potential still exists. More than 1000 of the plants of the Amazon forest have a recognised medicinal value and provide opportunities for development.

The conservation of the species that represent the biodiversity, some of which have an as yet unrealised potential, can be achieved in situ. However, the safeguard of preservation in seed banks is a priority which will be considered in the Seed Symposium Session on Seed Storage and Genetic Conservation, led by the keynote speaker Dr. Hugh Pritchard.

The seed technology problems associated with developing the potential of undomesticated species is covered in the session on the Domestication and Use of Non-Crop Species, chaired by Dr. Mirian Eira, who will present an overview of the rich plant diversity. A particular problem in domestication which still exists, sometimes usefully, in some crop species, is dormancy. This is included in Seed Development, Dormancy and Germination, chaired by Dr. Roberto Benech Arnold, who will review our current understanding of the science behind the control of dormancy.

Disease and insect problems always occur when plants are grown in a simplified crop ecosystem, away from their original diverse habitat. The effects of diseases and pests can be ameliorated by seed treatments. In the past chemical seed treatments have predominated, while more recently treatments involving organisms that are antagonistic to contaminating organisms have been investigated. Dr. Gary Harman, our chairman and keynote speaker in the session Diversity in Contaminating Organisms, will illustrate that some biological seed treatments can also be used to enhance productivity.

Two further sessions are concerned with improving efficiency in crop production. First, Dr. Michael Kruse, in the session on Diversity Within and Among Seed Lots and Species, will set the scene for the discussion of methods aimed at coping with sam-



pling and quality testing in the presence of diversity, including the assessment of GMO presence. Second, Dr. Kent Bradford, in the chair for the Vigour and Invigoration session, will highlight the science behind methods of evaluation and improvement of seed quality for the crop production systems of today.

A symposium with a positive and forward looking view of crop production and the role of seeds has a no more appropriate setting than Brazil. The diversity of climatic regions has enabled an expansion of crops that have their origin in both the Old and New World. The area and production of *Phaseolus* beans in Brazil leads the world by a substantial margin. Brazil is second only to the USA in the production of soyabeans and maize. Rice production is the greatest outside Asia and cotton production features in the top ten, second only to the USA outside Asia. Add on the rest of South and Central America and the array of field crops, vegetables, fruits, pasture grasses and ornamentals reaches a scale and diversity that is immense and of worldwide significance.

The level of interest in seed technology matches the scale of crop production. All the participants in the Seed Symposium in May 2007 are sure to be impressed when they see and experience for themselves the energy and commitment to seed technology in Brazil. ■





28th ISTA Congress

XV Congresso Brasileiro de Sementes

Theme: Diversity in Seed Technology

Programme

SESSION 1 - DIVERSITY WITHIN AND AMONG SEED LOTS AND SPECIES

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

Chair and lead speaker: Michael Kruse

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

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

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

Chair and lead speaker: Mirian Eira

Embrapa, Brasilia, Distrito Federal, Brazil

SESSION 3 - DIVERSITY IN CONTAMINATING ORGANISMS

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

Chair and lead speaker: Gary Harman

Cornell University, Geneva, New York 14456, United States

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

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

Chair and lead speaker: Roberto L. Benech-Arnold

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

SESSION 5 - VIGOUR AND INVIGORATION

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

Chair and lead speaker: Kent J. Bradford

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

SESSION 6 - SEED STORAGE AND GENETIC CONSERVATION

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

Chair and lead speaker: Hugh W. Pritchard

Seed Conservation Department, Royal Botanic Gardens Kew, Wakehurst Place, United Kingdom

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

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

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

28th ISTA Seed Symposium Scientific Programme Advisory Committee

**Alison A Powell (GB) Seed Symposium
Convenor**

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

Submit your Papers online at

www.seedtest.org/seed-symposium

Electrical Conductivity Vigour Test: Physiological Basis and Use

By Stan Matthews and Alison Powell, ISTA Seed Vigour Committee Chair
School of Biological Sciences, University of Aberdeen, Aberdeen, Scotland, a.a.powell@abdn.ac.uk

Introduction

The electrical conductivity (EC) test for garden peas (*Pisum sativum*) is one of only two vigour tests included in the ISTA Rules for Seed Testing (ISTA, 2006). Bulk samples of 50 seeds are soaked in deionised water and the EC of the soak water is measured after 24 hours. The test is both quantitative and repeatable. In many reports on peas, the EC readings for lots have been found to relate significantly to field emergence (Matthews and Powell, 1981). High levels of leakage are a characteristic of low vigour lots with acceptably high levels of laboratory germination (e.g. above 80%) but low field emergence, particularly in cold, wet soils.

The earliest example of EC as a vigour test was for castor bean (Thomas, 1960) when performance in a soil test was related to the EC of seed soak water. This observation gave the lead to later work on garden or vining peas, when the frozen food industry in the UK came up against a problem. The programme to spread the harvesting of peas ready for freezing included early season sowings, which exposed weak, so-called low vigour seed lots, that were satisfactory in laboratory germination tests, but failed in the field. The relationship between field emergence and EC turned out to be not only interesting, but useful in practical seed technology (Matthews and Bradnock, 1967). An understanding as to the physiological basis of this relationship came later as we describe in this brief review. We have focussed on the two main explanations for high leakage from low vigour seeds for which there is substantial evidence, namely seed ageing and imbibition damage.

Seed ageing

When seed scientists discuss the causes of the leakage from low vigour seeds, they almost always start with a reference to the

deterioration of membranes, resulting from either artificial or natural ageing. Biochemical analyses and hypotheses about seed deterioration suggest impaired membrane activity is a factor leading to leakage (McDonald, 1999). This can have a role in the early stages of seed ageing (Powell and Matthews, 1977). However, the greatest increases in leakage seen in commercially available seed lots are often associated with an increase in dead tissue on the cotyledons which does not result in the failure to germinate in the laboratory (Matthews and Rogerson, 1976). Similar seeds can be produced by artificial ageing (Powell and Matthews, 1977). In terms of the seed survival curve (Figure 1) these seeds would be placed on the slow initial decline in germination.

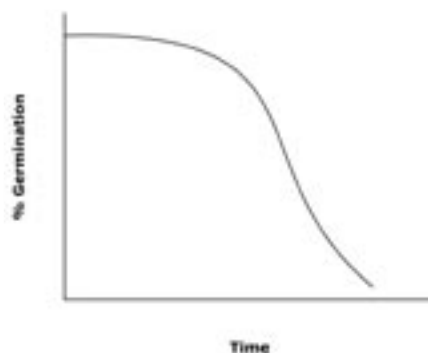


Figure 1: Seed survival curve. Seed germination initially declines slowly, followed by a steep fall in germination.

The effect of ageing on cotyledon tissues of peas is illustrated in Figure 2, which depicts staining with tetrazolium chloride (TZ) of cotyledons after ageing and slow imbibition in moist tissues. This vital stain, TZ, is well known to seed technologists, being extensively used in viability testing. The red formazan which is formed by the reduction of TZ by dehydrogenases indicates respiratory activity in living cells (ISTA, 2003).

As ageing progresses from the top row of em-



bryos in Figure 2, the areas of the cotyledons that remain unstained increase, even though the staining of the embryonic axes indicates that the seeds will germinate. It is these dead areas that contribute much of the electrolyte leakage into seed soak water (Matthews and Rogerson, 1976). Legumes with large, normally living, cotyledons are good candidates for the EC vigour test to indicate field emergence, because they still germinate in the laboratory even with considerable areas of dead tissue on their cotyledons, provided that critical areas of the embryo remain living (ISTA, 2003).

Analyses of seed soak water have shown that potassium is a major constituent of the electrolytes leaked out in peas (Matthews and Rogerson, 1976) and in soyabeans (Dias *et al.*, 1996). The conductivity of pea seed soak water was found to be closely correlated with both the sugar and amino acid content, indicating general solute loss from seeds (Mat-



Figure 2: Tetrazolium staining of pea cotyledons reveals an increase in the incidence of dead tissue as the extent of seed ageing increases.

thews and Carver, 1971). This is also a feature of leachates from other species (Schroth and Cook, 1964; Duke and Kakefuda, 1981). The levels of leakage were not associated with the extractable solute content of the embryos (Matthews and Rogerson, 1976).

A further reason why the conductivity test works as a vigour test can be illustrated by looking again at the seed survival curve, and particularly at the slow decline in germination. The further to the right that a seed lot is placed on the initial decline, the lower the germination. A germination of 80% is often taken as an acceptable minimum for the use of a seed lot, based on the laboratory germination of a sample of 400 seeds. If a sample of 50 seeds from the same seed lot is soaked in water, then on average 10 of the 50 seeds would be non-germinable. Work on many species has shown that high levels of leakage are characteristic of seeds incapable of germinating (Steere *et al.*). Thus, as we go down the slow initial decline, the conductivity will increase as the laboratory germination falls, in addition to the reduced ability of germinable seeds to retain cell contents.

Imbibition damage

Imbibition damage is a phenomenon that has been clearly shown to influence vigour in a range of temperate and tropical grain legumes (Powell *et al.*, 1984), although it may also occur in small-seeded dicotyledonous crops (Thornton and Powell, 1992; Draper and Keefe, 1990). Imbibition damage results from the rapid entry of water into the cotyledons during imbibition, leading to cell death and high solute leakage from the seeds (Powell and Matthews, 1978a). When seeds are soaked in water, the almost instantaneous occurrence of damage within 2 minutes of the beginning of imbibition suggests that it results from physical damage, possibly through the disruption and disorganization of cell membranes. Certainly, the extensive loss of cellular material and enzymes from the seeds (Powell and Matthews 1981a; Duke and Kakefuda, 1981) indicates extensive membrane disruption.

Imbibition damage is prevented by slowing down the rate of water uptake and is greater at low temperatures in peas (Powell and Matthews, 1978a), soyabean (Leopold and Musgrave, 1979) and lima bean (Pollock, 1969), possibly because the membrane components are held more rigidly and are therefore more

sensitive to physical damage from the considerable forces generated by the imbibition process. These forces result from the difference in water potential between pure water (0 mega Pascals [MPa]) and that of seed tissues. The water potential of seeds is generated by the slightly hydrated starch and protein molecules and can be lower than -3.0 MPa. This is extremely low, with the result that an air dry seed can initially pull in water against a pressure equivalent to 30 atmospheres and more (Hadas and Russo, 1974).

As the seed hydrates, its water potential increases to reduce the differential between the seed and the outside. Conversely, the drier the seed tissues, the lower the water potential and the greater the differential between the seed and the outside substrate, be it soak water, laboratory germination media or soil. The relevance of imbibition damage to field emergence has been clearly shown for peas, when seeds imbibed in wet field soil were removed and stained with TZ (Powell and Matthews, 1980).

The observation of imbibition damage is most apparent when seed coats have been removed from dry seeds before imbibition. This has highlighted the role of the testa in protecting the cotyledons from the damaging effect of water uptake (Powell and Matthews, 1978a; Tully *et al.*, 1981). In addition, these observations on imbibition damage have brought into question the evidence used by Simon and Raja Harun (1972) to support their hypothesis of changes in membrane conformation during early imbibition of dry embryos. They proposed that the high leakage of solutes in the first few minutes of imbibition that they observed from pea embryos (seed minus testa) resulted from the membranes of the dry seed being in a porous hexagonal state. The subsequent decline in leakage as the embryos imbibed was explained by the formation of the normal bilamellar membrane following hydration, which restricted leakage. However, Powell and Matthews (1978a) suggested that the initial high leakage during imbibition resulted from the death of the outer cells of the cotyledons due to imbibition damage and that the decline in leakage represented a slower loss of solutes from undamaged tissue within the seed. This was in part suggested on the basis of the TZ staining of cotyledons after imbibition damage, where only the outer layers of cotyledon cells failed to stain (Powell and Matthews, 1978a). This

was later confirmed in soyabean by Tully *et al.* (1981). Indeed subsequently, we went on to demonstrate that the pattern of leakage observed by Simon and Raja Harun (1972) occurs from completely dead embryos and from any spherical structure containing ions (Powell and Matthews, 1981a).

In some species, such as peas and soyabean, the presence of an intact testa limits the incidence of imbibition damage (Powell and Matthews, 1979; Oliveira *et al.*, 1984). In these species, the incidence of damage to the testa influences the extent of imbibition damage and the vigour of the seeds. Thus seed lots showing extensive testa damage imbibe rapidly and exhibit a high incidence of imbibition damage (Powell and Matthews, 1979, 1981b). These lots emerge poorly in the field (Powell and Matthews, 1980; Oliveira *et al.*, 1984) and therefore have low vigour. In contrast, seed lots with little testa damage imbibe slowly, show little imbibition damage and have high emergence. This emphasizes the importance of the integrity of the testa in determining the vigour of some grain legume species and hence the need to minimize damage to the testa during harvest and processing.

In other grain legume species however, there is also a genotypic component to the susceptibility of seeds to imbibition damage. Thus cultivars of *Phaseolus vulgaris* (Powell *et al.*, 1986a, 1986b), soyabean (Tully *et al.*, 1981), chickpea (*Cicer ciceris*; Legesse, 1991), long bean (*Vigna sesquipedalis*; Abdullah *et al.*, 1991) and cowpea (*Vigna unguicularis*; Legesse and Powell, 1992), in which the testa is partially or completely unpigmented, imbibe more rapidly and show greater levels of imbibition damage compared with cultivars having pigmented testae. As a result, the vigour of unpigmented cultivars is reduced, leading to poorer field emergence than is found in pigmented cultivars (Powell *et al.*, 1984). The close association between pigmentation and slower rates of imbibition has been demonstrated in studies on seed development (Legesse and Powell, 1996) and on isogenic lines of peas, differing only in the A gene for testa pigmentation (Powell, 1989). In some species, for example *Phaseolus vulgaris* (Powell *et al.*, 1986b) and chickpea (Legesse and Powell, 1996), the close adherence of the pigmented testa to the cotyledons appears to limit the rate of water movement within the seed. In cowpea, however, testa permeability

also has a role (Legesse and Powell, 1996). Identification of the factor associated with pigmentation that leads to reduced rates of water uptake, could lead to the introduction of this characteristic to unpigmented cultivars through breeding programmes, thereby increasing the seed vigour of these cultivars.

Interaction of imbibition damage and ageing

The two major causes of reduced vigour in grain legumes, ageing and imbibition damage also interact, with aged seeds being more susceptible to imbibition damage seen in reduced TZ staining and increased leakage into soak water. When the testae of seeds of peas (Powell, 1985) and cowpeas (Asiedu and Powell, 1998) were scarified before imbibition, leading to more rapid water uptake, the extent of living tissue declined much more markedly in aged than in unaged seeds. The increased susceptibility of aged seeds to imbibition damage could be the result of the weakening of cell membranes by physiological deterioration, with the result that the membranes are more sensitive to physical damage during imbibition (Powell, 1985; Asiedu and Powell, 1998).

Leachates and emergence in soil

The nutrient status of seed leachates has been suggested as a stimulatory factor for fungi close to the germinating seed in, for example, *Phaseolus* beans (Schroth and Cook, 1964) and peas (Perry, 1973). There is also experimental evidence (Matthews, 1971) to suggest an additional explanation, that dead areas on cotyledons, which result from ageing and/or imbibition damage, act as a focal point and a food base for infection by the weakly parasitic soil-borne fungus *Pythium ultimum*

Extending the use of the conductivity test

Conductivity tests have also been applied to detect vigour differences in many other grain legumes and indeed some other species (ISTA, 1995). The methods remain to be developed and standardised for these species which include many grain legumes such as soyabean (Oliveira *et al.*, 1984; Yaklich *et al.*, 1979), longbean (Abdullah *et al.*, 1991) and *Phaseolus* (Abdullah, 1988; Powell *et al.*, 1986a). However, the correlations between conductivity readings and field emergence are encouraging (Table 1).

Prediction of viability by EC

The assessment of the conductivity of single

Table 1 Correlation coefficients (r) of EC of seed soak water and field emergence for 18 seed lots¹ of soyabean (*Glycine max*), 80 lots² of soyabean, 30 lots of *Phaseolus vulgaris*³ and 11 lots of long bean⁴ (*Vigna sesquipedalis*)

Soyabeans			<i>Phaseolus vulgaris</i> ³		Longbean ⁴
Sowing 1 ¹	Sowing 2 ¹	Range for 12 sowings ²	Sowing 1	Sowing 2	
-0.89***	-0.92***	-0.67*** to -0.79***	-0.82***	-0.87***	-0.86***

¹Oliveira *et al.* (1984); ²Yaklich *et al.* (1979); ³Powell *et al.* (1986a); ⁴Abdullah *et al.* (1991); ***p ≤ 0.001

seeds was proposed as an assessment of seed viability (Steere *et al.*, 1981), following the development of an instrument to measure the conductivity of the leachate of 100 single seeds simultaneously. Studies with pea, soyabean, cotton, *Phaseolus* bean, maize and small-seeded crops provided evidence that analysis of the single seed leachate conductivity, could indicate both standard germination and seed vigour. The instrument does not however adjust readings to take account of seed weight. It is therefore recommended that each of the 100 seeds be weighed prior to testing so that the average reading can be recorded per gram individual seed weight (Hepburn *et al.*, 1984) i.e. as $\mu\text{amps cm}^{-1} \text{g}^{-1}$ or $\mu\text{S cm}^{-1} \text{g}^{-1}$, depending on the instrument used.

As a routine measure of germination, the original proposed use of the instrument, the determination of single seed conductivity, has not proved successful because of the lack of a clear and consistent conductivity for each species that separates viable from non-viable seed (Hepburn *et al.*, 1984). Work on cotton (Perl and Feder, 1983) confirmed the difficulty of predicting laboratory germination, but showed that the percentage of seeds below a relatively low conductivity after 18 hours soaking was closely related to both the rate of emergence and final emergence when the same seeds were sown in the field.

Much earlier work on the use of electrical conductivity of seed soak water to predict viability used bulks of seed, not single seeds. Hibbard and Millar (1928) found that in bulk samples of wheat, peas and timothy grass that showed wide ranges of germination, the conductivity of the soak water increased (or in their measurement, the resistance to electricity decreased) as germination decreased. In cotton, Presley (1958) generated different levels of viability by artificial ageing and showed that the conductivity of soak water increased as germination decreased. More recently Mirdad *et al.* (2006) generated samples of cauliflower and cabbage contain-

ing different proportions of germinable seeds by ageing seeds at raised seed moisture content and high temperature and found that the conductivity of soak water using bulks of 50 seeds related well to germination. This applied to a wide range of germination levels, similar to those in early work, with r^2 values of from 0.79*** to 0.96*** (cauliflower and cabbage) and also to germination levels from 90 to 98% (r^2 0.98*** for cauliflower). There is clearly potential for a 24 hour test of germination based on the electrical conductivity of the soak water of bulk samples of seeds.

Future developments

The challenges for the future include extension of the validated routine EC method to other crops beyond peas, starting with *Phaseolus* and soyabeans. Work on these crops is underway within ISTA, and will move on to other grain legumes. This requires a systematic approach on appropriate seed material, taking account of some of the scientific understanding that we already have. An example would be the effect of a low initial seed moisture content. This has been shown to slow down imbibition in peas (Powell and Matthews, 1977) leading to a misleadingly low reading. In contrast low seed moisture content in soyabean can lead to inappropriately high readings (Loeffler *et al.* 1988). This may result from the increased sensitivity to imbibition damage in both soyabeans (Obendorf and Hobbs, 1970) and lima beans (Pollock, 1969) observed in very dry seeds having extremely low water potentials. Hence in routine EC testing the moisture content of peas and soyabeans must be adjusted to within the range 10 – 14% before EC testing.

The measurement of EC as an assessment of viability goes back as far as Hibbard and Millar (1928). We believe their bulk method has a potential that has not yet been realised. To achieve a repeatable measure of viability in 24 hours or less would be valuable in seed production and commercial seed testing. The challenge is by no means insurmountable, needing a methodical scientific approach

and would not require technically elaborate equipment.

The measurement of EC could also have a role alongside ageing-based vigour tests, like the accelerated ageing and controlled deterioration tests, by giving a measure of viability following ageing in 24 hours in place of a germination test of 7 days or longer (Thornton *et al.*, 1990). In our own work EC after rapid ageing predicted the longevity of pea seeds in commercial storage (Powell and Matthews, 1978b).

The main intention in writing this brief review was to explain the basis of the EC test. We also hope that others will be encouraged to take up the challenges of extending the use of conductivity in seed technology.

References

- Abdullah, W.D. (1988). Factors affecting seed quality in long bean (*Vigna sesquipedalis* L Fruhw) and French bean (*Phaseolus vulgaris* L). Unpublished MSc thesis University of Aberdeen.
- Abdullah, W.D., Powell, A.A. and Matthews, S. (1991). Association of differences in seed vigour in long bean (*Vigna sesquipedalis* L Fruhw) with testa colour and imbibition damage. *Journal of Agricultural Science, Cambridge*, **116**, 259-264.
- Asiedu, E.A. and Powell, A.A. (1998). Comparisons of cultivars of cowpea (*Vigna unguiculata*) differing in seed coat pigmentation. *Seed Science and Technology*, **26**, 211-222.
- Dias, D.C.F.S., Marcos-Filho, J. and Carmello, Q.A. (1996). Potassium leakage test for the evaluation of vigour in soybean seeds. *Seed Science and Technology*, **25**, 7-18.
- Draper, S. and Keefe, P.D. (1990). Seed vigour in species of field vegetables: prediction by means of machine vision. *Project News Supplement*, **Spring 1990**, 2-3. Horticultural Development Council.
- Duke, S.H. and Kakefuda, G. (1981). Role of the testa in preventing cellular rupture during imbibition of legume seeds. *Plant Physiology*, **67**, 449-456.
- Hadas, A. and Russo, D. (1974). Water uptake by seeds as affected by water stress, capillary conductivity and seed-soil water contact I Experimental study. *Agronomy Journal*, **66**, 643-647.
- Hepburn, H.A., Powell, A.A. and Matthews, S. 1984. Problems associated with the routine application of electrical conductivity measurements of individual seeds in the germination testing of peas and soyabeans. *Seed Science and Technology*, **12**, 403-413.
- Hibbard, R.P. and Miller, E.V. (1928). Biochemical studies on seed viability I Measurements of conductance and reduction. *Plant Physiology*, **3**, 335-352.
- ISTA (1995). *Handbook of vigour test methods* (eds. J.G. Hampton and D.M. TeKrony), 3rd edition, International Seed Testing Association, Zurich.
- ISTA (2003). *ISTA Working sheets on tetrazolium testing*. (eds. N. Leist, S. Kramer and A. Jonitz), Volumes 1 and 2, International Seed Testing Association, Bassersdorf, Switzerland.
- ISTA (2006) *International Rules for Seed Testing*. Edition 2006. International Seed Testing Association, Switzerland.
- Legesse, N. (1991). Genotypic comparisons of imbibition in chickpea (*Cicer arietinum*) and cowpea (*Vigna unguiculata*). Unpublished PhD thesis, University of Aberdeen, UK.
- Legesse, N. and Powell, A.A. (1992). Comparisons of water uptake and imbibition damage in eleven cowpea cultivars. *Seed Science and Technology*, **20**, 173-180.
- Legesse, N. and Powell, A.A. (1996). The association between the development of seed coat pigmentation during maturation of grain legumes and reduced rates of imbibition. *Seed Science and Technology*, **24**, 23-32.
- Leopold, A.C. and Musgrave, M.E. (1979). Respiratory changes with chilling injury of soybeans. *Plant Physiology*, **64**, 702-706.
- Loeffler, T.M., TeKrony, D.M. and Egli, D.B. (1988). The bulk conductivity test as an indicator of soybean seed quality. *Journal of Seed Technology*, **12**, 37-53.
- McDonald, M.B. (1999). Seed deterioration: physiology, repair and assessment. *Seed Science and Technology*, **27**, 177-237.
- Matthews, S. (1971). A study of seed lots of peas (*Pisum sativum* L.) differing in predisposition to pre-emergence mortality in soil. *Annals of Applied Biology*, **68**, 177-183.
- Matthews, S. and Bradnock, W.T. (1967). The detection of seed samples of wrinkle-seeded peas (*Pisum sativum* L) of low planting value. *Proceedings of the International Seed Testing Association*, **32**, 553-563.
- Matthews, S. and Carver, M.F.F. (1971). Further studies on rapid seed exudate tests indicative of potential field emergence. *Proceedings of the International Seed Testing Association*, **36**, 307-12.
- Matthews, S. and Powell, A.A. (1981). Electrical conductivity test. In *Vigour Test Handbook*. (ed. D. A. Perry), pp 37-41, International Seed Testing Association, Zurich.
- Matthews, S. and Rogerson, N.E. (1976). The influence of embryo condition on the leaching of solutes from pea seeds. *Journal of Experimental Botany*, **27**, 119-125.
- Mirdad, Z., Powell, A.A. and Matthews, S. (2006). Prediction of germination in artificially aged seeds of Brassica spp using the bulk conductivity test. *Seed Science and Technology*, (in press).
- Obendorf, R.L. and Hobbs, P.R. (1970). Effect of seed moisture on temperature sensitivity during imbibition of soybean. *Crop Science*, **10**, 563-566.
- Oliveira, M. de A., Matthews, S. and Powell, A.A. (1984). The role of split seed coats in determining seed vigour in commercial seed lots of soyabean, as measured by the electrical conductivity test. *Seed Science and Technology*, **12**, 659-668.
- Perl, M. and Feder, Z. (1983). Cotton seed quality prediction with the Automatic Seed Analyser. *Seed Science and Technology*, **11**, 273-280.
- Perry, D.A. (1973). Infection of seeds of *Pisum sativum* by *Pythium ultimum*. *Transactions of the British Mycological Society*, **61**, 135-144.
- Pollock, B.M. (1969). Imbibition temperature sensitivity of lima beans controlled by initial seed moisture. *Plant Physiology*, **44**, 907-911.
- Powell, A.A. (1985). Impaired membrane integrity – a fundamental cause of seed quality differences in peas. In *The Pea Crop* (eds. P.D. Hebblethwaite, M.C. Heath and T.C.K. Dawkins), pp. 383-395, Butterworths, London..
- Powell, A.A. (1989). The importance of genetically determined seed coat characteristics to seed quality in grain legumes. *Annals of Botany*, **63**, 169-175.
- Powell AA, Matthews S. 1977. Deteriorative changes in pea seeds (*Pisum sativum* L) stored in humid or dry conditions. *Journal of Experimental Botany*, **28**, 225-234.
- Powell, A.A. and Matthews, S. (1978a). The damaging effect of water on dry pea embryos during imbibition. *Journal of Experimental Botany*, **29**, 1215-1229.
- Powell, A.A. and Matthews, S. (1978b). Rapid evaluation of the storage potential of seed peas. *Acta Horticulturae*, **83**, 113-140.
- Powell, A.A. and Matthews, S. (1979). The influence of testa condition on the imbibition and vigour of pea seeds. *Journal of Experimental Botany*, **30**, 193-197.
- Powell, A.A. and Matthews, S. (1980). The significance of damage during imbibition to the field emergence of pea (*Pisum sativum* L) seeds. *Journal of Agricultural Science, Cambridge*, **95**: 35-38.
- Powell, A.A. and Matthews, S. (1981a). A physical explanation for solute leakage during imbibition of dry pea embryos. *Journal of Experimental Botany*, **32**, 1045-1050.
- Powell, A.A. and Matthews, S. (1981b). The significance of seed coat damage in the production of high quality legume seeds. *Acta Horticulturae*, **111**, 227-233.
- Powell, A.A., Matthews, S. and Oliveira, M. de A. (1984). Seed quality in grain legumes. *Advances in Applied Biology*, **10**, 217-285.
- Powell, A.A., Oliveira, M. de A. and Matthews, S. (1986a). Seed vigour in cultivars of dwarf French bean (*Phaseolus vulgaris*) in relation to the colour of the testa. *Journal of Agricultural Science, Cambridge*, **109**, 419-425.
- Powell, A.A., Oliveira, M. de A. and Matthews, S. (1986b). The role of imbibition damage in determining the vigour of white and coloured seed lots of dwarf French bean (*Phaseolus vulgaris*). *Journal of Experimental Botany*, **57**, 716-722.
- Presley, J.T. (1958). Relations of protoplast permeability to cotton seed viability and predisposition to seedling disease. *Plant Disease Reporter*, **42**, 852.
- Schroth, M.N. and Cook, R.J (1964). Seed exudation and its influence on pre-emergence damping –off of bean. *Phytopathology*, **53**, 809-812.
- Simon, E.W. and Raja Harun, R.M. (1972). Leakage during seed imbibition. *Journal of Experimental Botany*, **23**, 1076-1085.
- Steere, W.C., Levensgood, W.C. and Bondie, J.M. (1981). An electrical analyser for evaluating seed germination and vigour. *Seed Science and Technology*, **9**, 567-576.
- Thomas, C.A. (1960). Permeability measurements of castor bean seed indicative of cold-test performance. *Science, N.Y.*, **131**, 1045-1046.
- Thornton, J.M. and Powell, A.A. (1992). Short term aerated hydration for the improvement of seed quality in *Brassica oleracea* L. *Seed Science Research*, **2**, 41-49.
- Thornton, J.M., Powell, A.A. and Matthews, S. (1990). Investigation of the relationship between seed leachate conductivity and the germination of Brassica seed. *Annals of Applied Biology*: **117**, 129-135.
- Tully, R.E., Musgrave, M.E. and Leopold, A.C. (1981). The seed coat as a control of imbibitional chilling injury. *Crop Science*, **21**, 312-317.
- Yaklich, R.W., Kulik, M.M. and Anderson, J.D. (1979). Evaluation of vigor tests in soybean seeds: relationship of ATP, conductivity, and radioactive tracer multiple criteria tests to field performance. *Crop Science*, **19**, 806-810. ■

Amendments to ISTA Handbook on Seedling Evaluation

By Ronald Don, ISTA Germination Committee Chair

Official Seed Testing Station, Scottish Agric. Science Agency Headquarters, 1 Roddinglaw Road, Edinburgh EH12 9FJ, United Kingdom, ronald.don@sasa.gsi.gov.uk

Since the ISTA Congress 2004 held in Budapest, Hungary the Germination Committee has been working on revisions to the ISTA Handbook on Seedling Evaluation, 3rd Edition. The revisions consists of three different parts:

1. The introduction of guidance on the evaluation of primary roots of grasses into Section 12: Seedling Type D – Seedling Group A-1-2-3-1 (*Lolium*).

A comparative test using photographs of grass seedlings has shown that ISTA Member Laboratories do not appear to evaluate defects of primary roots in the same manner (especially when the primary root is short). Guidance is included therefore into the handbook on the evaluation of primary roots of grasses and the extent to which secondary roots can be taken into account (see for more details regarding the comparative test see: ‘Summary of *Lolium* Seedling Evaluation based on images from different ISTA Member Laboratories’ by Sylvie Ducournau, pp. 37-39).

2. The revision of Section 4 of the Handbook: “Laboratory Conditions for Seedling Evaluation” to add the new substrate

definitions, i.e. growing media and organic growing media, and the germination media parameters.

‘Growing media’ as a generic term for all substrates, i.e. paper, sand and other germination media, was introduced into the ISTA International Rules for Seed Testing, Edition 2006. The handbook is now updated accordingly.

3. The addition of an Appendix 5: Illustrative Standard Operating Procedures (SOP) to reflect quality assurance requirements.

To assist laboratories in ensuring that the germination media they use in germination tests meet the specifications given in the ISTA Rules, the following four illustrative SOPs are included in the handbook:

- Germination Procedures – Growing Media Specification Checks – Water Retention;
- Germination Procedures – Growing Media Specification Checks – Conductivity; and
- Germination Procedures – Growing Media Specification Checks – pH

- Germination Procedures – Growing Media Specification Checks – Innocuity

Temperature control and measurement is an important factor in the germination laboratory and other areas of seed testing. To assist laboratories to meet the specifications for temperature control and measurement given in the ISTA Rules an illustrative SOP is included in the handbook:

- Germination Procedures - Temperature Measurement and Control of Temperature in the Germination Laboratory;

The illustrative SOPs included in the handbook are for guidance purposes only. They illustrate procedures that the germination committee consider will meet the requirements of the ISTA Rules and the ISTA Accreditation Standard. Accredited laboratories are expected to comply with the requirements and document the procedures adopted in their laboratory.

A sample of the revised handbook will be available at the ISTA Annual Meeting 2006 in Zurich, Switzerland.



Example of the SOP 'Germination Procedures – Growing Media Specification Checks – pH'

Summary of *Lolium* Seedling Evaluation based on images from different ISTA laboratories

By Sylvie Ducournau, ISTA Germination Committee Vice-chair
 GEVES-SNES, Rue Georges-Morel, 49071 Beaucozé Cedex, France, sylvie.ducournau@geves.fr

Objective

The objective of this work was to compare the evaluation of *Lolium* root system from different ISTA laboratories in order to determine a length limit for the primary root to be considered as normal.

In the ISTA Handbook on Seedling Evaluation (2003), it is stated for *Lolium* : “The root system consists of a primary root, usually covered with root hairs. Secondary roots may occasionally develop during the test period, but they are not taken into account in seedling evaluation”.

Material and methods

A lot of images of *Lolium* seedlings have been taken with a digital camera. From all these images, 18 have been selected in order to obtain different size of primary root (see Annexe).

Lolium seedlings have been obtained from seeds germinated on top of paper, at 20-30°C with 8 hours of light per day.

A file containing these 18 seedling images has been sent to ISTA stations:

- SASA – Scotland
- NAK - Netherlands
- NIAB - England
- Plant Directorate - Denmark
- LUFA – Germany
- GEVES-SNES - France

From the 6 laboratories, 5 answers have been received.

Together with the evaluation of the seedlings, the length of the primary root has been measured. We also measured the length of the primary root + secondary roots. The length of the root (s) has been reported against the length of the shoot part in order to appreciate the balance of the seedling.

Results

Results are summarised in the following table. It contains the evaluation of the seedlings and the measurements of the root system (length of the primary root and length of primary + secondary roots).

Seedling number	Length of primary root	Length of primary + secondary roots	Seedling evaluation N : Normal, A : Abnormal				
			Lab 1	Lab 2	Lab 3	Lab 4	Lab 5
1	46	96	N	N	N	N	N*
2	54	144	N	N	N	N	A*
3	82	132	N	N	N	N	N
4	51	81	N	N	N	N	N
5	36	106	N	N	N	N	A*
6	50	80	N	N	N	N	N*
7	40	90	N	N	N	N	A*
8	66	123	N	N	N	N	A*
9	30	30	A	A	A	N	A
10	48	58	N	N	N	N	N*
11	60	65	N	N	N	N	N
12	66	123	N	N	N	N	A*
13	28	28	A	A	A	A	A
14	70	95	N	N	N	N	N
15	46	96	N	N	N	N	N*
16	39	59	A	N	A	N	N*
17	39	59	A	N	A	N	N*
18	56	56	N	N	N	N	N

- Percentages of root length are expressed against the length of the shoot
- Seedling number with the same colour are identical. 1=15 ; 8=12 ; 16=17
- *Seedling identified with this mark are evaluated differently by the analysts of the same laboratory

Considering these results, following comments can be proposed :

- When the primary root is very short ($\leq 30\%$ of the shoot size), seedling is quite always considered as abnormal. This is the case for seedlings 9 and 13.
- Laboratories 1 and 3 present the same evaluation of the seedlings. It is specially the case for seedlings 16 and 17 that are considered as abnormal by these 2 laboratories. If these seedlings are considered as abnormal when seedling 5 is considered as normal, maybe these laboratories have taken secondary roots into account because the length of the

- primary root is strictly the same in size.
- Laboratories 2 and 4 evaluate less abnormal seedlings than the other laboratories. Perhaps the limit of the root length is shorter for these laboratories (around 30% of the shoot size) or maybe these laboratories are taken secondary roots into account for the evaluation of the seedlings.
- Laboratory 5 evaluates more abnormal seedlings than the other laboratories, especially when the root length is less than half the size of the shoot part (seedlings 2, 5 and 7). Differences have been also identified between analysts because the primary root was not very easy to identify on images for these seedlings. Seedlings 8 and 12 have been considered as abnormal for this laboratory. Perhaps it was due to the fact that primary root was evaluated as decayed. Primary roots looked often brown due to the time to take the pictures.

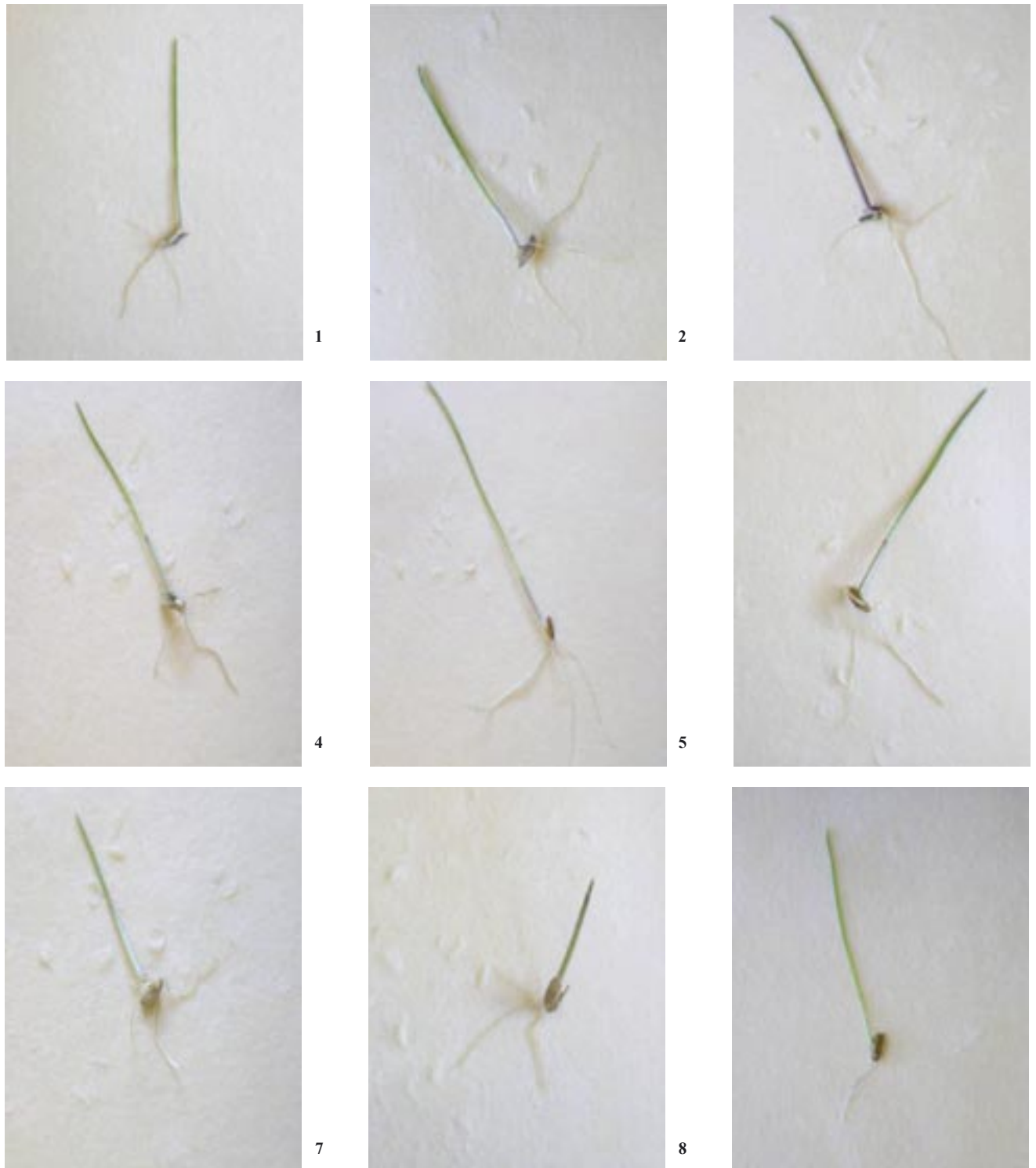
Conclusion

- There is a good accordance in seedling evaluation when the primary root is very short (size of the primary root less than 30% of the shoot size)
- Discrepancies are higher when the size of the primary root increases between 30% to 50% of the shoot size
- More precision should be given in the ISTA Handbook on Seedling Evaluation

to increase uniformity in the evaluation of *Lolium* root system

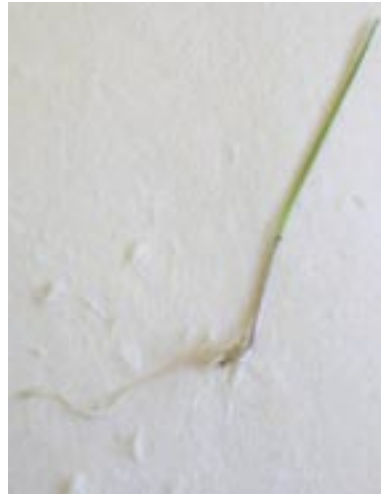
- Precision of a limit of size of the primary root could be a first proposition: More than 30% of the shoot size to be considered as normal
- Secondary roots are frequently observed during the test period. Taking secondary roots into account in seedling evaluation could be a second proposition to facilitate the evaluation of seed-

lings when the primary root is very short (around 30% of the shoot size). We have performed some trials in glasshouse with seedlings presenting different size of primary root and come to the conclusion that to grow normally, *Lolium* seedlings need to have primary + secondary roots of at least 60% of the shoot size with a minimum length for the primary root of 30% of the shoot.

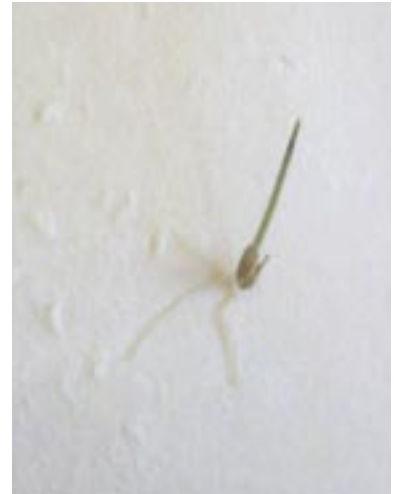




10



11



12



13



14



15



16



17



18



Order the ISTA Handbook for Seedling Evaluation Online at
www.seedtest.org

The Amendment to the ISTA Handbook for Seedling Evaluation will be available as of August 2006.

Pre-Order Now!

3rd ISTA Workshop on Statistical Aspects of GMO Detection

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

By Ana Laura Vicario, ISTA GMO Task Force Member

Instituto Nacional de Semillas, Buenos Aires, Argentina, avicar@mecon.gov.ar

On Monday, October 31, people from four cities around Argentina and six countries gathered in Buenos Aires City to participate in the 3rd ISTA Workshop on Statistical Aspects of GMO Detection. This 3rd workshop of four days and a half included presentations on statistical aspects and PCR based methods for GMO detection. Among the statistical aspects Sylvain Grégoire, Jean-Louis Laffont and Kirk Remund made presentations on the following topics: ISTA Proficiency Tests on GMO, Statistical Tests, Uncertainty, Distributions, Testing Plan Design, Robustness, DG SANCO, Data Checking, Repeatability, Check of Purity, GM Estimate and use of Qualstat and Seedcalc. Opening the Workshop, Enrico Noli made presentations on general aspects of DNA, PCR, a complete overview on GMO detection methods and good laboratory practice for GMO labs.



As Argentina is the second highest GMO producing country, a detailed presentation on GMO regulatory aspects for Argentina and the Latin American region was also made. On Tuesday, we visited the Molecular Markers Lab at the Quality Department of INASE and on Thursday evening we enjoyed a dinner and a Tango show at Esquina Homero Manzi. All the presentations were included on a CD, together with the free software presented during the meeting and some photos taken during the lectures. In general, the thirteen attendants from government and private companies learned, discussed and enjoyed the pleasant atmosphere during this ISTA Workshop.



The local organizers would like to thank the lecturers and the Membership Department of the ISTA Secretariat for all the work done making this workshop successful. ■

7th ISTA Seminar on Statistics

University of Hohenheim, Germany
August 29 - September 2, 2005

By Kirk Remund, ISTA Statistics Committee Vice-Chair
Monsanto, St. Louis, United States, kirk.m.remund@monsanto.com

The 7th ISTA Seminar on Statistics in Seed Testing was kindly hosted by Professor Michael Kruse and his colleagues at the Institute of Plant Breeding, Seed Research and Population Genetics in the University of Hohenheim on August 29 to September 2, 2005. There were a total of 32 individuals that participated in the seminar.

The seminar started with an interesting history presentation by Professor Adolf Steiner on the pioneers of statistics in seed testing and chairpersons of the statistics committee. Numerous other presentations were given during the course of the seminar on topics including tolerances, GM testing statistics, proficiency tests, seed lot homogeneity testing, and germination testing. The participants had many questions and comments that combined for a very healthy and productive discussion for all.

The seminar content was enhanced by some wonderful tours, excursion and excellent hospitality of the local hosting group led by Susanne Meyer. Professor Steiner took the participants on a very interesting tour through Hohenheim Gardens. Many participants also took tours to Deutsches Landwirtschafts-Museum, downtown Stuttgart and Esslingen city. A highlight of the seminar was the excursion/party to the Swabian Alb. The participants enjoyed a beautiful evening at the Institute's research site on the Swabian Alb and a wonderful dinner and refreshments were served. The presentations, discussions, tours/excursion and excellent hospitality combined for a very successful seminar! ■



New ISTA Publications

ISTA Handbook on Flower Seed Testing

1st Edition 2006
By Zita Ripka



Price: Swiss Francs CHF 260.00
(US\$ 195.00/EUR 169.00)

plus shipping costs (50% off for ISTA Members)

Publication Catalogue 2006



Available directly from the ISTA Secretariat or online at

www.seedtest.org

ISTA Biotech Trait Detection Workshop

Iowa State University, Ames, United States

May 8 - 10, 2006



Testing for Adventitious Presence (AP) of biotechnology traits in seed and grain became an integral part of crop development, production, stewardship and regulation. Presently, government regulators, seed companies, grain suppliers, interest groups, contract laboratories, and academia are all involved in AP testing. Various Polymerase Chain Reaction (PCR) applications, most importantly quantitative real-time PCR (qPCR), emerged as the leading methodology used for AP testing. In this workshop we will present and discuss the technical and scientific challenges in AP testing and provide hands-on training in the current process and PCR methodologies utilized for biotech trait detection:

Topics that will be covered include:

- The statistical aspects of sampling and testing design
- Management of the samples and data flow
- Theory and hands-on experience in:
 - Upfront sample processing (DNA isolation, quantification, normalization) in low and high throughput environments
 - Qualitative and quantitative PCR technologies
 - Data analysis

We will have a round table discussion on quality control issues, and hear presentation from leading analysts that will focus on character-

ization of qPCR as a testing tool, challenges in interpreting AP testing results, Validation, and ISTA's position, experience and activities in the field of biotech trait detection.

Registration Fees:

ISTA Members: US\$ 350 (US\$ 390 after April 28)
 Non-ISTA Members: US\$ 400 (US\$ 440 after April 28)

For more information or questions about programme content, contact:

Seed Science Center
 Iowa State University
 Ames, IA 50010
 Phone: +1 (515) 294.6821
 Fax: +1 (515) 294.2014

For questions about registration, contact:

University Conference Services
 Iowa State University
 Ames, IA 50010
 Phone: +1 (515) 294.6222
 Fax: +1 (515) 294.6223
 E-mail: ucs-info@iastate.edu

Website update

The following new tools are available for download at the ISTA Website.

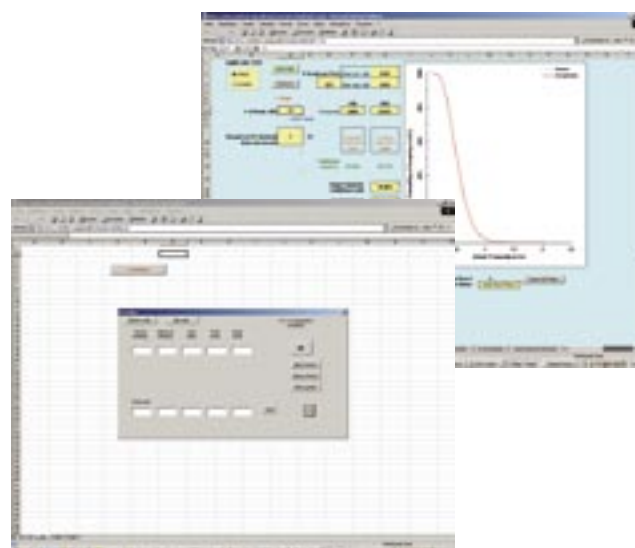
- Seedcalc 7
- Germination Rounding programme

Download the programmes for FREE at

www.seedtest.org

Also visit the new

Information Platform for GM Seed



ISTA Vigour Testing

Workshop

Beaucouzé, France

May 10 - 12, 2006

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

Workshop content

Lectures

- Background to seed vigour
- Importance of seed vigour in crop production
- Two ISTA validated vigour tests: Accelerated ageing test for *Glycine max* and Conductivity test for *Pisum sativum*
- Controlled deterioration test for small seeded vegetables
- Cold test for maize
- Rate of germination as a vigour assessment
- Precision in vigour testing
- Tolerances

Practical work

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

Question and answer sessions

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

Presenters of the workshop

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

Location

The workshop will take place at SNES, Beaucouzé, France, situated 1h 30min from Paris by TGV. Accommodation will be in the



city of Angers. Transport will be provided to SNES.

Registration

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

Accommodation

Accommodation has been reserved at the IBIS Hotel, Angers. The price of a room for one night is 71 € without breakfast (6.50 € for breakfast).

To register please visit

www.seedtest.org

Master Class Seed Technology

Wageningen, the Netherlands, June 6 – 9, 2006

The aim of the master class is to offer professional seed technologists the possibility for a further deepening and actualisation of their knowledge and expertise. Through an intensive in-depth seminar programme and informal discussions, along with several demonstrations of recent technological developments, participants will be challenged with the latest developments in seed technology. The course will enhance participants to make strategic choices in seed technology research and development.

Invited speakers and WSC staff will give seminars on topics including embryogenesis, seed expressed genes, dormancy and seed quality, seed stress tolerance, longevity and germination equations, germination markers, seed enhancement maturation sorting, cDNA microarrays, seed proteomics, seed health, seeds for organic farming, priming, molecular identification of seeds and variety protection, seed management and business, seed quality control and statistics, international seed supply systems and property rights.

For more information visit the website from Wageningen Seed Centre: www.seedcentre.nl

ISTA Quality Management Training Course

Zurich, Switzerland

June 30 - July 3, 2006



Organiser

Dr. Silvia Zanetti, Head of the Seed Testing Laboratory of Agroscope FAL Reckenholz

Lecturers

Gerhard Schuon, Martina Rösch (ISTA System Auditors)

Aim of the workshop

This workshop aims at presenting and discussing basic principles of quality management and it focuses on the needs of seed testing laboratories that wish to comply with the ISTA Accreditation Standard

Workshop content

Quality documentation, management review, contract review, handling and control of non-conformities, corrective action, internal audits

Workshop Description

Participants of this workshop will be actively involved through group work, discussions, presentations and performance of a mock on-site audit at the ISTA accredited seed testing laboratory in Switzerland. The theoretical background will be given through lectures. The normative documents are the ISTA Accreditation Standard, the ISO 9000 series ("Quality Management Systems") and the ISO 19011 Standard ("Guidelines for Quality and Environmental Management Systems Auditing").

Preliminary Programme

Friday and Saturday: Lectures, group work, discussions (Workshop dinner on Saturday)

Sunday: Optional tour: We will be visiting the Lake Lucerne in the heart of Switzerland. The tour will be featuring the stunning world's steepest cogwheel railway journey up to the Mount Pilatus (2137 m altitude). On the way back we will stop for a ride down the summer toboggan run at Fräkmüntegg (coffee and a piece of cake might be an alternative for those who like it less racy).

Monday: Practical work (mock internal audit)

Participation Fee

300 Swiss Francs (~195 EURO) for ISTA members + 140 Swiss Francs (~90 EURO) for the Sunday Tour

400 Swiss Francs (~260 EURO) for non-ISTA members + 140 Swiss Francs (~90 EURO) for the Sunday Tour

Number of Participants 25

Target Group

Quality managers, laboratory managers, internal auditors; participants with or without experience in quality management may register.

Contact person for the Workshop registration

Silvia Zanetti

Seed Testing Laboratory, Agroscope FAL-Reckenholz

Reckenholzstrasse 191, 8046 Zürich, Switzerland

E-mail: silvia.zanetti@fal.admin.ch

Phone: +41 44 377 72 84 Fax: +41 44 377 72 01



ISTA Purity Workshop

Nakuru, Kenya

July 13 - 14, 2006

Location:

Plant Health Inspectorate Service (KEPHIS), Nakuru, Kenya

Local Organiser:

Dr. Joseph Oloo Ahenda, KEPHIS (kephissq@africaonline.co.ke)

Lecturers:

Maria Rosaria Mannino, ISTA Purity Committee Chair, GEVES – SNES, France (maria-rosaria.mannino@geves.fr)

Tove Due, Danish Plant Directorate (tod@pdir.dk)

Dr Siro Masinde, Botanist in charge, East African Herbarium, National Museums of Kenya (plants@africaonline.co.ke)

Dr Reuben Muasya, Moi University, Crop Science & Seed Technology Dept (rmuasya@africaonline.co.ke)

The **ISTA Purity Committee** and the **Plant Health Inspectorate Service in Nakuru (KEPHIS)**, have a great pleasure to announce the ISTA Purity Workshop in Kenya. This workshop has been organised with the objective of covering topics related to tropical and sub-tropical species, including:

- Presentation of the Purity Committee, its work and Purity Rules Changes
- Practical exercises on evaluation of pure seed in the genera *Brachiaria*, *Digitaria*, *Panicum*, *Setaria*, *Urochloa*, *Cenchrus* and *Chloris*
- Aspects of the purity analysis of other species such as *Tanacetum cinerariifolium* and vegetable species of the genus *Brassica*
- Analysis of mixtures
- Future increased coverage of tropical and sub-tropical species in Rules: introduction of new species, needs for ring tests and proficiency tests, presence in the Universal List of Weeds and Crops
- Visit to the hosting laboratory.

The workshop is planned for up to **30 participants**. Language of the Workshop is English.



Registration:

Registration fee is 270 USD for ISTA members and 330 USD for Non-ISTA members. Registration fee includes the costs of the official programme of the workshop, lunches and coffee breaks.

Contact person for the Workshop registration Hotel reservation and the post-workshop tour booking:

Dr. Joseph Oloo Ahenda

KEPHIS, Nakuru Regional Office

P.O. Box 1679

Nakuru, Kenya

Phone: +254 51 850106

Fax: +254 51851268

E-mail: kephissq@africaonline.co.ke

Registration deadline: 15th of May 2006

Payment deadline: 15th of June 2006

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

Accommodation (in USD):

Hotel name	Merica	Midland	Kunste	Waterbuck	Stem
Single room	60	35	30	20	30
Double room	100	50	50		
Junior suite	125				
Executive suite	135				

Post-workshop tour:

One day post-workshop tour of Lake Nakuru /Masai Mara/ Bogoria National Parks can be arranged but at an extra cost of 90 USD. Applicants interested in the post-workshop tour should indicate it in the Application form. Final post-workshop tour booking and payment will be done upon arrival to Kenya.



11th ISTA Training Course on Tetrazolium Testing Vegetable- and Agricultural Seeds

Emmeloord, The Netherlands

July 24 - 28, 2006

Location:

NAK
Dutch General Inspection Service for Agricultural Seed and Seed Potatoes
Randweg 14
P.O. Box 1115
8300 BC Emmeloord
The Netherlands

Preliminary Programme:

Lectures on:

- History and development of Tetrazolium Testing
- FTS in ISTA, Viability – germination- General and special aspects of Tetrazolium Testing.
- Tetrazolium test in vegetable and agricultural seeds.
- Physiological aspects.

Practical Work:

With the ISTA Rules and Tetrazolium Working Sheets on *Agrostis*, *Lolium*, *Triticum*, *Brassica*, *Trifolium*, *Helianthus*, *Lycopersicon*, *Cichorium*, *Lactuca*, *Phaseolus*, *Daucus* and *Allium*

Further species of interest asked for by participants. Half day excursion to world inheritance property Schokland and a visit to Giethoorn, “Venice of Holland”.

Registration fee:

ISTA members: 400 Euro
Non-ISTA members: 600 Euro
Hotel available for 56 Euro/night
Participants: 16-18 at maximum



ISTA Workshop on Varietal- and Hybrid Determination by IEF

LUFA Augustenberg, Karlsruhe, Germany

August 28 - 31, 2006

Organiser

Rainer Knoblauch, ISTA Variety Committee Chair

Location

State Agricultural Testing and Research Institute
Department Seed Testing and Applied Botany
Nesslerstr. 23
D-76227 Karlsruhe
Germany

Participants

8 at maximum

Participation Fee

ISTA members: 250 Euro
Non-ISTA members: 350 Euro

Preliminary Programme

Lectures on principles and details of Isoelectric Focusing and aspects of quality assurance. Intensive practical work on *Zea mays*, *Helianthus annuus* (self pollination, foreign pollination), *Triticum aestivum*, *Oryza sativa*.



Special tasks from participants are welcome.

Half day excursion to a company supplying essential chemicals for electrophoresis in Heidelberg.

Are you interested in participation?

Please contact Mr. Rainer Knoblauch for further information.
e-mail: rainer.knoblauch@lufa.bwl.d

ISTA Forest Tree and Shrub Seed Seminar

Verona, Italy

September 12 - 15, 2006



Objectives

The seminar will deal with practical problems related to seed testing of forest tree and shrub species. The aim of the meeting is to intensify an exchange of information in this area. The meeting will cover **Purity**, **Germination** and **Tetrazolium test**.

Preliminary Programme

Monday 11: Trip to the National Centre of Forest Biodiversity in Bosco della Fontana Reserve (MN), about 30 km from Verona, by bus of Corpo Forestale dello Stato. In the afternoon visit to the town of Mantua.

Tuesday 12: Registration, welcome, presentation of the programme. Germination tests (presentations, practical part – evaluation of normal, abnormal, fresh seeds, discussion – exchange of experiences among participants).

Wednesday 13: Tetrazolium (presentations, practical part – discussion – exchange of experiences among participants). Official dinner.

Thursday 14: Travel day-trip to Peri (45 min from Verona, with bus of Corpo Forestale dello Stato) and visit to a public nursery and seed production and to the ISTA laboratory in the Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale. In the afternoon visit to a vineyard and wine shop.

Friday 15: Purity (PSD – presentation – practical part, discussion – exchange of experiences among participants). Farewell ceremony. Closing of the meeting.

Pre seminar tours

Saturday 09: Arrival of participants, in the afternoon facultative trip in Verona and visit of the town (a guide will be available). Mini-

mum 10 participants.

Sunday 10: Arrival of participants, facultative visit to Venice (less than 1,30 h from Verona by train-a guide will be available). Minimum 10 participants.

Seminar language: English.

Venue

The workshop will take place at the “Circolo Ufficiali di Presidio” located in the “Castelvecchio” (Old Castle), via Castelvecchio, 4-Verona (www.comune.verona.it/turismo/Passaggiando/ItinerarioC/pontedicastelvecchio.htm) in English, French and German version, only a few minutes on foot from the accommodation in the city centre or with the Verona municipal bus systems.

Registration

The Registration Fee is EUR 300 for ISTA members and EUR 400 for Non-ISTA members. It covers the cost of the workshop documentation and other material, coffee breaks and lunches, official dinner and transportation to the National Centre of Forestry Biodiversity of Boscofontana (MN) and to the National Centre of Forestry Biodiversity and ISTA Laboratory in Peri VR (a day trip).

Accompanying person: 120 €. Cost covers: trip to Mantua, trip to Peri, official dinner.

Registration deadline: July 31, 2006

Accommodation

Hotel Italia

Category ***

Address: via Mameli, 58/66-Verona

Phone: +39 045 91 8088

Fax: +39 045 834 8028

e-mail: info@hotelitaliaverona.it

www.hotelitaliaverona.it

double room single use/night 74 €

double room/night 90 € (2pax)

only 10 rooms available

breakfast included

Hotel Borghetti

Category ***

Address: via Valpolicella 47-Parona VR

Phone: +39 045 94 10 45

Fax: +39 045 94 23 67

e-mail: hb@hotelborghetti.com

www.hotelborghetti.com

single room/night 50 €

double room/night 75 € (2 pax)

breakfast included

For the seminar registration, hotel and pre-seminar tours reservation please refer to the ISTA website or contact the organiser:

Fabio Gorian

Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale

Via del Ponte 256,

37020 PERI VR, ITALY

f.gorian@corpoforestale.it

Tel +39 045 628 40 71

Fax +39 045 628 40 89



Industry Needs Trained Seed Analysts

Information from the Colorado State University, United States

Recently the Association of Official Seed Analysts and the Society of Commercial Seed Analysts and Seedquest.com website ran a survey of their memberships to determine the need for seed analyst training programs at the collegiate level. Based on this survey, approximately ten analysts per year will be needed to meet the needs of State, Federal, private and seed company laboratories. Eighty-three percent of the respondents agreed that there is a shortage of seed analysts. These are very interesting figures when you realize that many of the University seed programs are being terminated. Recent figures compiled by Dr. Dennis TeKrony, University of Kentucky, indicated that only thirteen Universities still have active seed programs. Other Universities such as Cornell, Mississippi State, Washington State, Montana State and Michigan State have terminated their seed programs or greatly reduced their effort in seed related education.

The respondents to this survey were from seed analysts, private laboratory owners/managers and seed company owners/man-

agers. The responses were equally divided among these three groups giving greater validity to the results. The area of greatest need for seed analysts training includes grasses, vegetable, flower and herb seed. Comments received from respondents suggest several reasons why there is a shortage of seed analysts: lack of training opportunity, degree of training necessary to become a certified or registered seed analyst, low salaries that do not reflect the degree to training necessary to become a professional seed analyst and lack of emphasis by high school councilors for agricultural careers.

This survey indicated that there is a shortage of seed analysts and that we need to develop a training program for analysts. Today most of the analysts are trained on-the-job requiring that trained analysts do the training and reduces the time they have to do seed analysis work. Ninety-three percent of the respondents recommended some type of formal training at the collegiate level that includes classroom training, distance education courses and apprenticeships. Workshops were also

suggested as another way to broaden the education opportunities.

Respondents were asked about the specific subjects for training and suggested that students have basic science courses such as biology, genetics and seed physiology. In addition to the basic science courses some specific topic were suggested; seed identification, and tetrazolium, germination and purity testing.

Colorado State University is now developing a certificate program in seed technology. This would be a two year program with subject matter courses being taught in the first year of enrollment and internship work experience in an approved seed laboratory the second year of the program. This program would greatly help prepare prospective seed analysts for taking the certification or registration tests of the Association of Official Seed Analysts and the Society of Commercial Seed Analysts. ■

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



CALENDAR 2006

May

- 08-10 ISTA Biotech Trait Detection Workshop
(Ames, Iowa, United States)
- 10-12 **ISTA Vigour Testing Workshop**
(Beaucouzé, France)
- 29-31 ISF Congress
(Copenhagen, Denmark)

June

- 03-08 AOSA/SCST/AOSCA Annual Meeting
(Indianapolis, USA)
- 06-09 Masterclass on Seed Technology
(Wageningen, Netherlands)
- 22-23 **ISTA Purity Workshop**
(Zurich, Switzerland)
- 26-29 **ISTA Annual Meeting 2006**
(Zurich, Switzerland)
- 30-03 **ISTA Quality Management Training Course**
(Zurich, Switzerland)

July

- 13-14 **ISTA Purity Workshop**
(Nakuru, Kenya)
- 23-28 **11th ISTA Training Course on Tetrazolium Testing, Vegetable- and Agricultural Seeds**
(Emmeloord, Netherlands)

August

- 07-11 OECD Seed Schemes Annual Meeting
(Salvador de Bahia, Brazil)
- 14-18 FELAS XX Seminario Panamericano de Semillas
(Salvador de Bahia, Brazil)
- 28-31 **ISTA Workshop on Varietal- and Hybrid Determination by IEF**
(Karlsruhe, Germany)

September

- 06-08 3rd International Seed Health Conference
(Bydgoszcz, Poland)

October

- 15-18 ESA Annual Meeting
(Brussels, Belgium)
- 22-24 EESNET Meeting
(Opatija, Croatia)

November

- 13-16 Asian Seed Congress
(Kuala Lumpur, Malaysia)



International Seed Testing Association (ISTA)

ISTA Secretariat, Zürichstrasse 50, PO Box 308, 8303 Bassersdorf, CH - Switzerland
Phone: +41 44 838 6000, Fax: +41 44 838 6001, E-mail: ista.office@ista.ch

www.seedtest.org