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Dear colleagues, seed testing analysts, and readers,

The Annual Meeting in June in Edinburgh marked the closing of my first year in the role of Secretary General. Thus, I would like to share some of this year's experiences and observations.

This first year was mostly marked by a steep learning curve, much steeper than I anticipated, and the learning is not yet complete. Part of the challenges, for example technical issues, administration, Swiss law and modes of operation, were expected, and were easier to meet. Others will require refinement over a longer time. These challenges stem mostly from the vast diversity of our Association: people from different parts and cultures of the world, from government, academia and industry, from well-funded and underfunded institutions, from laboratories with heritage and traditions versus newly founded laboratories. All this variation manifests itself in differences in emphasis and sensitivities. Being able to identify the nuances and to craft the appropriate communication is and will be for a while "work in progress". At the same time, these same differences that are reflected in our membership are also one of the more fascinating and enlightening parts of this job. I feel lucky to be at this juncture where I can experience them – I just hope that nobody's feelings will get hurt while I am learning.

On the operational level, the following may be the most crucial observation:

ISTA's main sources of income are membership, accreditation and Certificate sales, which means that ISTA's income depends on the number of laboratories that join the Association and the proportion of these that become accredited. Both depend on ISTA's recognition as a leading international seed testing entity. This, in turn, is to a large extent a function of ISTA's marketing effort.

Historically, the need for such a marketing effort was not as critical; there was plenty of room for growth in the domain where ISTA began and evolved in: Western government laboratories. However, in the last two decades the seed world has expanded significantly. This growth happened around the world and in various dimensions. If we want ISTA to experience corresponding growth it will necessitate a bigger marketing effort.

This vision is shared and backed by our Executive Committee. As a first step, the Secretariat is recruiting a marketing specialist. With the help of this professional we hope to develop a concrete, structured effort to tap into the big potential growth out there, to break geographical barriers, and to extend into industry and academia to become the association of the whole seed world.

As this new effort is getting under way, some older ones are being wrapped up. In this issue of STI you will find the complete report of the Accreditation Review Working Group, which is the summary of the surveys conducted by the Working Group over the past two years. Also in this issue, we have reports of the various events at and around the 2014 Annual Meeting. We sadly part with Karen Hill, who prematurely passed away this September. Our feature article introduces us to the work and contributions of Ferdinand Julius Cohn, a pioneering biologist and one of the founders of modern microbiology. And finally, we bid farewell to Joost van der Burg, who has decided to retire.

Joyous reading,

Beni



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President's Report

Joël Léchappé



The autumn report of the President traditionally presents the main achievements of the Annual Meeting held in June. The ISTA Annual Meeting this year took place in the beautiful and historic city of Edinburgh, the capital of Scotland. Scotland was a very appropriate place to be holding this meeting because of its long and extensive experience in seed production and the related fields of seed science and quality evaluation. It was also very appropriate that the timing of this meeting coincided with the 100th anniversary of the Official Seed Testing Station for Scotland. It was a great pleasure for all of us who attended the ISTA 2014 Annual Meeting to be able to celebrate this occasion with the colleagues and friends of SASA (Science and Advice for Scottish Agriculture), hosts and organizers of the meeting.

The authorities and our SASA colleagues here in Scotland have been supporting our Association for more than 40 years now. SASA became a member of ISTA in 1973, when it was represented by John R. Thomson. Bill Rennie then took over for a year. It was under Simon Cooper's presidency from 1995 to 1998 that ISTA started the Accreditation Programme which remains a success to this day. Ronald Don, an Honorary Life Member of ISTA, has also been a Designated Member, a member of the Executive Committee and a member or a

Chair of several Technical Committees. He is still very active for ISTA, as both a technical and a systems auditor. Valerie Cockerell, who is Director of the seed testing laboratory, and who was also Chair of the Organising Committee of the 2014 Annual Meeting, has been a Designated Member since 2008 and is a past Chair of the Seed Health Committee. ISTA also benefits from the very positive contributions of Gerry Hall, who is a member of the Bulking and Sampling Committee; Gillian McLaren, Vice-Chair of the Germination Committee and a member of the Proficiency Test and Vigour Committees; Laura Bowden, a member of the Editorial Board of Seed Science and Technology, the Moisture Committee, and since 2013 convenor of the Symposium held during the triennial ISTA Congress. Alison Powell, Chair of the Vigour Committee, has been a leader in seed science development in ISTA, both as a member of the Executive Committee and as chief editor of Seed Science and Technology. This contribution was recognized in 2013 when Alison was made an Honorary Life Member of ISTA, the second person with Scottish connections to be so honoured. All colleagues and staff from SASA contribute regularly to the work of ISTA by supporting their colleagues in the preparation of proficiency tests or by participating in ISTA experiments, and this year organizing the ISTA Annual Meeting, seminars and workshops.

During the Annual Meeting, Edinburgh hosted a complete programme of ISTA events. It began with the 7th Seminar on Seed Health, followed by the Annual Meeting, which included the ISTA Sampling Seminar, the presentation of the Technical Committees' work, and finally the Ordinary General Meeting. A workshop on sampling closed the series of events.

ISTA is very grateful to SASA and to the Scottish authorities for their support and their contribution to the Association. In a period when all organizations are reducing their contributions because of economic

constraints, the contribution of SASA is exceptional and very much appreciated.

The successful ISTA Seed Health Symposium, organized by Valerie Cockerell and Valérie Grimault (Chair of the Seed Health Committee), provided an opportunity for the 100 seminar participants to build collaborations and strengthen the network of seed pathologists from state laboratories, universities and industry laboratories.

The official programme of the Annual Meeting was opened with a presentation from Mr. David Barnes, Deputy Director of Agriculture, Food and Rural Communities: Head of Agriculture and Rural Development. On Monday, the seminar on sampling, organized by Gerry Hall, Leena Pietila and the Bulking and Sampling Committee, gave the opportunity for presentations on major topics such as quality assurance, training and qualification of samplers, and statistics with practical exercises, and facilitated a debate on monitoring of sampling and samplers. A panel of experts from ISTA seed laboratories opened the debate, followed by the very active participation of the audience. The objective of gaining the collective opinions of the membership on the best practices to monitor the samplers was successful.

On Tuesday and Wednesday the presentations of the Technical Committees summarized the significant progress that these Committees have made in less than one year since the 2013 Congress. The work of the Technical Committees is the heart of ISTA. The members of the Committees represent all regions of the world; they come from the regulatory sector, from official laboratories, from seed companies and from the private sector. This diversity of backgrounds guarantees that the work that we do here in ISTA is in line with the needs of the seed sector worldwide.

The 225 Technical Committee members, who all have great expertise and scientific knowledge, give many hours of their time to the work of ISTA. This is the strength of our Association. It does, however, mean

that the work of ISTA depends upon the continued willingness of employers to allow their staff to spend time on ISTA work.

On behalf of the Executive Committee, I would like to thank all of the organizations and employers for their continued investment in ISTA and for the quality of their contribution, which is essential.

The reports of the work of the Committees are published on the ISTA web site. Again this year, the work of the Committees resulted in Rules Proposals that were voted on during the meeting. I would like to thank the Rules Committee, whose members are the Chairs of the Technical Committees, and Steve Jones, Chair of the Rules Committee, for the excellent work done preparing the Rules, the core production of our Association. The electronic version made available this year gives a higher value to the Rules which are referred to in many laws and regulations all over the world.

On Thursday, the Ordinary General Meeting was preceded with presentations by Dr. Kevin O'Donnell, Deputy Director of Agriculture, Food and Rural Communities: Head of Science and Advice for Scottish Agriculture (SASA), on behalf of Scottish Government. It was followed by a presentation on behalf of the Agricultural Industries Confederation of Scotland,

Seed Sector, by Mr. Lorne Watson from Alexander Harley Seeds, and a presentation by Mr. Iain Eadie, President of the Scottish Seed Trade Association.

At the Ordinary General Meeting, the Executive Committee decision on the demand to introduce in-house methods into the Germination chapter of the Rules was presented for further discussion and opinion of the membership.

From the intense discussions on in-house methods that took place over the last few years, and based on the work of the working group led by Joost van der Burg and Masatoshi Sato, the Executive Committee decided to retain the standard methods approach, which guarantees the uniformity of results based on harmonized methods.

However, these discussions have also highlighted the need for alternative methods which better serve the requirements of certain categories of seed producers, such as the vegetable seed sector.

In acknowledgement of this, ISTA wants to offer more opportunities for the industry to express its needs. The vote during the Ordinary General Meeting on amending the corporate membership category, including renaming it industry membership, is a contribution to achieve this goal, and modifies the Article 4 of the Articles of the Association accordingly. The strength

of this new category is that it combines the opportunity for industry to express its needs for the future with a financial contribution towards the work that would be necessary to respond to these needs.

Good progress has been made on the accreditation review, led by Rita Zecchinelli, with the contribution of the Designated Authorities of New Zealand and Australia, the ISF, the ISTA Executive Committee, and the Accreditation and Technical Department of the ISTA Secretariat. The questionnaires sent to all members and Designated Authorities provided an opportunity for them to give their views on the future. It is an excellent source of information. The next steps proposed by the Working Group and supported by the membership will be to publish in Seed Testing International a summary of the results of the questionnaires (see p. 37), and to work on the structure of the accreditation fees.

The Secretary General, Beni Kaufman, presented the work on finances in detail. As main conclusions, the financial tool presented in 2012 and 2013 has made progress and has proven to be very powerful. Further developments are being considered, such as allocating time at the process or activity level, and to revise the allocation of income to expenses from one business area

Joost van der Burg retires

Joost van der Burg, currently a scientist at Plant Research International in Wageningen, has been very active in ISTA since 1978, when he organized purity and seed identification sessions in a "Wageningen Workshop". Joost proved to be an excellent botanist, passionate about tropical grasses, flowers, trees and shrubs, as well as species from the flora of primary forests.

Since he joined ISTA, Joost has served as Vice-Chair of the Purity Committee, as a member of the Forest Tree and Shrub Seed Committee, and as leader of working groups such as those on Pure Seed

Definitions (PSDs) and Seed Blowing. Joost has actively contributed to Rules proposals both at the committee stage and in the discussions at the Congresses and Annual Meetings. As examples he developed many of the current PSDs for tropical grasses (the Multiple Seed Unit drawing), and most PSDs of the flower seeds and the tree and shrub seeds. These remain pillars of the rules for purity and other-seed determination.

Joost is a scientist interested in new technologies and a member of the Advanced Technology Committee. He was formerly the ISTA coordinator for the Netherlands, and Designated

Voting Member at Ordinary General Meetings, until 1 November 2014. Joost's contributions to discussions at the Ordinary General Meetings were very much appreciated.

Joost has announced his retirement from Plant Research International, but we are very pleased that he will continue to contribute to ISTA's activity as technical auditor. On behalf of ISTA, I would like to thank Joost for his strong contribution to our Association and to the seed world.

Joël Léchappé

to another based on the experience of two years' use of the financial tool.

Our Association has healthy finances, confirmed by the audit of the external financial auditors of BDO. As a result, the membership fees are maintained at the current level, which means that there has been no increase in fees in the past two years.

During the Annual Meeting, we were very pleased to welcome Dr. Michael Keller, the new Secretary General of the ISF, who concluded his presentation with the following words that I would like to quote: "The aim we have together is to reach our long-term goal: a unified system to provide the user with good-quality seed in respect of variety, varietal identity, germination capacity, specific purity, field performance, seed health and management of co-existence." ISTA and ISF have been working together since they were created in 1924, and there is mutual willingness to strengthen this collaboration in many fields, such as seed health methods with the ISHI working groups, the World Seed Project (FAO, UPOV, ISF, ISTA, OECD), or in working groups (ISTA WG on Accreditation, in-house methods), to contribute to the aim of facilitating seed trade.

The topic of late payment of ISTA membership fees has been of concern to a number of ISTA members over the past few years. There was a need to introduce a penalty fee for late payments, because ISTA relies on its membership fees, and at this time there were issues of members not paying in time. With ISTA having built up its cash reserves, it is now in a better position to deal with the late payment of ISTA membership fees. The Ordinary General meeting agreed that the best way to proceed is to have a transitional period, suspending the penalty fees from 1 January 2015 until the Executive Committee comes back with a proposal.

Following feedback from the Annual Meeting, the Executive Committee decided to develop actions in several areas:

- To strengthen international relations, the Executive Committee will be looking for more opportunities to have discussions with invited organizations during the Annual Meeting, to identify the needs and the possibilities for further collaboration. Another action is to widen the participation of ISTA in meetings and working groups of other organizations. The Executive Committee decided that a network for ISTA representation would be built with the Executive Committee and the Secretariat, mainly for representation on political issues, whereas for meetings where technical issues are to be discussed, the ISTA representative will come from the relevant Technical Committee.
- To attract more people to contribute to ISTA's work, the Technical Committees will organize at least one open meeting during the Annual Meeting and Congresses.
- The Executive Committee Publications Working Group will continue to work on the publication of Rules and handbooks in other languages. The Executive Committee Articles Working Group will look at the issue of whether delegates should be able to see who is casting 'yes' and 'no' votes during electronic voting at the Ordinary General Meeting.

These actions fit in the main goals for the coming period as presented during the Ordinary General Meeting, specifically developing a pricing and translation policy for the ISTA Rules, upgrading the ISTA web site, including a redesign, exploring the use of electronic certificates, clarifying membership fees in regard to the question of late payment, continuing to support the work of the TCOMs, encouraging development of seed science and new technologies in ISTA laboratories, promoting ISTA, and recruit a marketing specialist.

Many workshops are scheduled for the coming months; some are already fully

booked. I invite you to participate, or show your interest when already full, and more workshops can be organized.

I am very honoured and pleased to announce that the ISTA Executive Committee has been invited by the Japanese designated authorities to held the February 2015 ECOM meeting in Japan.

Together with Cecilia Jones, member of the Executive Committee and representing the Uruguayan Organizing Committee, we invite you to attend the 2015 ISTA Annual Meeting in Montevideo, Uruguay.

I would like to warmly thank the ISTA Secretariat and the Executive Committee, and you ISTA members and colleagues for your contribution to the Association. We can be proud altogether to have provided since 1924 harmonized methods and since 1931 the International Orange Certificates, contributions to seed science and to facilitating the seed trade worldwide – all are important components of food and feed security.

On 25 August, our friend and colleague Karen Hill passed away. Karen was a specialist in seed testing covering many fields of science such as botany, vigour and germination of Australasian species. Karen was very much appreciated for her knowledge in running a seed testing laboratory, and as a result of her competency, she recently joined the team of ISTA technical auditors. Together with her husband Murray, she attended many ISTA events and contributed to Technical Committees and to organizing workshops supporting the Association in every aspect. Karen's human and professional qualities will be remembered with respect and honour by all of us, ISTA colleagues and friends.

Your President

Joël Léchappé

(prepared with the assistance of Craig McGill)

Ferdinand Julius Cohn: dissertation, research work and seed testing

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History is the essence of innumerable biographies.”

(Thomas Carlyle, 1795–1881, Scottish essayist and historian)

Introduction

Who was Ferdinand Julius Cohn, and what has he to do with seed testing?

Thanks to Oskar von Kirchner (see below), the Division of Seed Science and Technology of the University of Hohenheim is fortunate to have a copy of Cohn's original dissertation. This led the first author to give a lecture on the occasion of the 150th anniversary of Cohn's doctorate (Steiner, 1997), and to publish a short biography (Steiner, 1998).

Following on from his dissertation, over the following decades Cohn contributed substantially to the advancement of seed science and seed testing. At the change in the scientific approach in the middle of the 19th century, Cohn represented the example of the new type of scientist.

In Germany, in the first half of the 19th century, romantic natural philosophy still prevailed, dominated by the philosophers Friedrich Schelling (1775–1854), Friedrich Hegel (1770–1831) and Lorenz Oken (1779–1851). For this reason, for example, the ingenious findings of Christian Konrad Sprengel (1750–1816) on the co-evolution of insects and flowers were not noticed, and in spite of the clear data of Jacob Camerarius (1665–1721) and Joseph Gottlieb Koelreuter (1733–1806), sexuality in plants was still under debate.

It was Matthias Schleiden (1804–1881) who brought about the change in the scientific approach in botany, by publishing

in 1842 his famous book *Grundzüge der wissenschaftlichen Botanik* [Fundamentals of scientific botany]. From then on, metaphysical interpretations, preconceived beliefs and speculative deductive methods to establish knowledge were replaced by empirical methods and inductive reasoning. Observation and experiment took the place of theological and metaphysical perceptions; for example, belief in the constancy of species was superseded by the theory of evolution.

Cohn still followed romantic natural philosophy when he aimed at showing the similarity of animal and plant eggs, the correspondence of animal and plant protoplasm, and the relation of movements in animals and plants, because when doing so, he was still inspired by the romantic idea of an all-embracing nature. However, his research was based entirely on the new theory of cognition. Thus, all in all, Cohn deserves to be remembered.

Cohn's boyhood and education

Ferdinand Julius Cohn (Fig. 1) was born on 24 January 1828 in Breslau, Silesia (now Wrocław, Poland) as the eldest of three brothers, with four sisters. His father Isaak Cohn was a merchant and producer of oils and lubricants; his mother Amalie came from the merchant family of Nissen.

His father had made his way from modest circumstances to economic prosperity and public reputation. He held honorary posts, and was appointed Prussian Privy Councillor and Austro-Hungarian Consul. His mother was an educated, prudent and warm-hearted woman. She was responsible for Ferdinand maturing at an early age. At the age of two he started reading, at the age of three he dealt with the basics of natural sciences reading Georg Christian Raff's famous *Naturgeschichte für Kinder* [Natural History for Children], and at the age of four he started primary school.

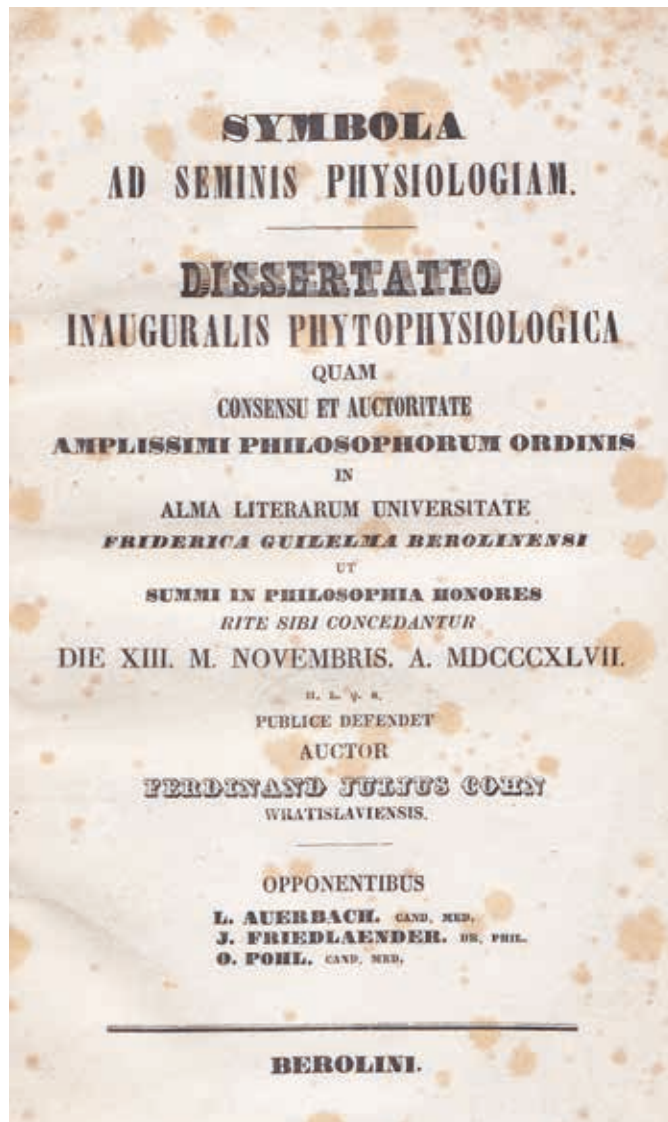
Already at the age of seven, he moved to a highly esteemed grammar school, where he received an excellent classical education.



Figure 1. Portrait and signature of Ferdinand Julius Cohn around 1890; by courtesy of Margot Klemm (see Klemm, 2002).

After graduating at the age of 16, in 1844, he enrolled at the University of Breslau, starting a broad study of natural sciences with a focus on botany. At the same time, he went to lectures on logic, philosophy, history, poetry, aesthetics, psychology and other subjects of good education. His main teachers were Heinrich R. Göppert (1800–1884), one of the leading botanists of his time, a co-founder of palaeobotany and later his colleague at Breslau for many years, and Christian G. Nees van Esenbeck (1776–1858), still a follower of idealistic natural philosophy, a friend of the famous poet Johann W. Goethe, and active in politics, striving for a democratic government.

Two years later, Cohn moved on to the University of Berlin, since at that time Breslau University denied Jews admission to study for a doctorate. In Berlin, Cohn's teachers were the well-known chemist Eilhard Mitscherlich, the botanist Karl S. Kunth, the zoophysiological Johannes P. Müller and in particular the protozoologist Christian G. Ehrenberg, who



Markers for the physiology of seeds
 Dissertation
 Inaugural in plant physiology
 which
 with the consent and authority
 of the most laudable Philosophical Faculty
 at the
 alma scientific University
 Frederick William of Berlin
 so that
 the highest honours in philosophy
 truly on him will be bestowed
 on the day [of] 13th [of the month] November [in the year]
 1847
 [at the well announced time
 and location]
 publicly defends
 the author
 Ferdinand Julius Cohn
 from Breslau.
 Against the opponents
 L. Auerbach, Candidate of Medicine
 J. Friedländer, Doctor of Philosophy
 O. Pohl, Candidate of Medicine
 at Berlin

Figure 2. The title page of the dissertation of Ferdinand Julius Cohn, with translation.

introduced him to the new, then rising art of microscopy.

Two events were crucial to Cohn's further path in life: Firstly, at the age of 18, he received as a gift from his parents a microscope worth an unbelievable 312 German guilders, far more than the annual earnings of a master artisan. Secondly, he was witness to the 1848 March Revolution with street battles in Berlin, and experienced the political conflicts of the educated middle class with sympathy for the democratic movement, but scientifically reserved.

At the age of only 19 he was promoted to Doctor of Philosophy, and in 1849, returned to Breslau.

Cohn's dissertation

Cohn's dissertation carried the title *Symbola ad seminis physiologiam* [Markers for the physiology of seeds]. As customary in his time, he wrote it in Latin, which was the language of science for centuries. It is a simple Latin, easily understood. This is particularly true for botanists, since many botanical technical terms are of Latin origin, and all the more for seed scientists, being acquainted with reported facts, findings and inferences. In addition, at that time quotations were presented as footnotes in full length. It hence gives the classically educated great pleasure to read the dissertation with original citations in ancient Greek, Latin, French, English and German.

Figure 2 shows the title page of the dissertation in Latin and the translation, line for line.

The dissertation was published in book form (Cohn, 1847). It comprises a title page, two pages each with a dedication to Mitscherlich and Göppert, a three-page preface by the author, 73 pages of text, one page *Theses*, and two pages *Vita*. The text is subdivided into paragraphs. On 14 pages, §§ 1–11 present an extensive literature review on the physiology of seed development reaching back to ancient times. §§ 12–38 describe on 44 pages material and methods together with the experimental observations and results, which were directly interpreted in relation to relevant literature. In §§ 39–44 on 12 pages, the outcome is discussed synoptically. In § 45 on

three pages, the summary lists 18 important points.

Briefly, the subject of the dissertation was the description and critical definition of the three phases of seed development: seed formation, seed ripening, and seed ripeness. Regarding seed formation (*formatio*), Cohn described the seed as sink growing and differentiating. Seed ripening (*maturatio*) he considered primarily as a desiccation process, taking place on the mother plant, or independently after drying of the funiculus. Seed ripeness (*maturitas*) he defined technologically as the condition of the seed when ready for use, i.e. marketability.

Cohn studied the development of the seeds of 22 species, including weeds, agricultural and vegetable crops, herbs, and ornamental and woody plants. As markers, he determined with a trained eye or by measurement changes in size, shape, lustre, transparency, colour, moisture content, strength, drying behaviour, specific gravity and germination. He did the same, case by case, also separately for the embryo, the nutritive tissue and the seed coat. In addition, he studied and described the effect on germination behaviour of seed position, not only of the position on the mother plant, but also of the position in multiple fruits.

Three items deserve mention.

Firstly, Cohn determined experimentally that after complete formation of the embryo and nutritive tissue, both entirely filling the seed cavity, the seeds of the 22 species were already germinable. "*Apud omnes has, – nec ne nimium dicam, vereor – apud plurimas planta non coincident in idem tempus maturitas et vis germinandi; altera alteram plus minus praecedit.*" [In all these and – I hesitate not to say something too daring – in most plants ripeness and germinability do not fall on the same date; the latter more or less precedes the other.] (from §39, page 60). In this context, Cohn quotes Theophrastus of Eresos (ca. 371–287 BC), a student of Aristotle and Aristotle's successor, who as the first delivered to posterity: "It seems incomprehensible, however, it is at the same time a real miracle that some of premature seeds are germinable – premature for showing no signs of ripeness – and when this is now indeed the case we must discriminate the properties for us [note: ripeness for consumption or sowing] and competence to germinate." (Fig. 3). In addition, Cohn refers to similar

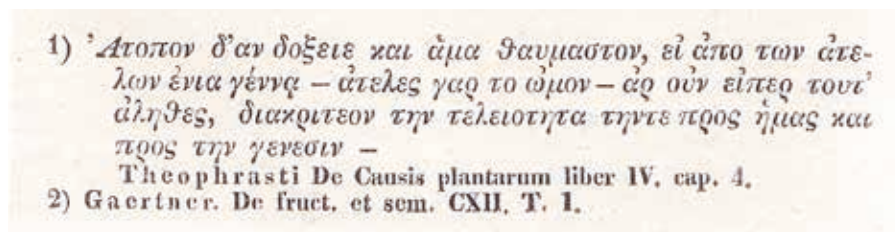


Figure 3. Quotation of Theophrastus in a footnote of § 26, page 39, of the dissertation. For translation see text.

observations of a few contemporary authors. However, eventually, Cohn did not content himself with this observation as the other scientists did, but drew practical conclusions from this. He recommended starting studies in germinating premature seeds in such species in which seed development may be too long to be completed in our vegetation period in the temperate zone, namely in tropical and subtropical species. Furthermore, he recommended using premature seeds in general as a means to speed up the production of plants by evading the ripening period. He understood the practical relevance of these findings. Today, we practice embryo culture.

Secondly, considering premature germinable seeds he addressed clearly, what we now call recalcitrant seeds. He compared the physiological condition of premature germinable seeds with the situation of seeds as *Zizania*, *Cacao* and others, which by nature do not tolerate desiccation. However, quite the opposite, adequately dried premature seeds retain germinability. This was a remarkable discovery for his time.

And thirdly, what truly needed courage in the middle of the 19th century, he compared plant embryo development and premature germinated seeds to animal embryo development and premature born animals, emphasizing on the fact that both develop from the same origin common to plants and animals, the fertilized egg.

Cohn's five theses

In connection with his dissertation, Cohn submitted five theses for defending:

1. *Systema naturale non est finis botanices* [The natural system is not the endpoint of botany].
2. *Natura universa progreditur* [All nature is in continuing progression].
3. *Doctrinae physicae ne sint metaphysicae* [Scientific findings are not metaphysical].

4. *Infusoriorum perscrutatione physiologia generalis maxime promovetur* [General physiology is highly promoted by the study of infusoria].

5. *Laboratoria phytobiologica in hortis botanicis instituenda censeo*. [I am of the opinion that laboratories for plant physiology must be built in botanical gardens].

The first three theses show explicitly the change in the science-oriented philosophical thinking in biology of the mid-19th century. The static concept of living nature as an unalterable creation turned into the perception of nature as an evolutionary process of ongoing development and diversification. Nature was now subject to causal analysis and experimentation rather than mere description and systemizing. Cohn already experienced this change in thinking by observing his academic teachers. Nes van Esenbeck was still more idealistically oriented, Göppert was already experimentally oriented.

The fourth thesis argues, deducing from the results, that the new attitude and the new technologies facilitate success in knowledge acquisition. The fifth thesis simply expresses Cohn's main aim.

Cohn's academic career

As early as 1850, Cohn gained his habilitation with a treatise on the cuticle (*De Cuticula*), earning the title of private lecturer. In 1857, he was awarded the title of professor, and in 1859 he was appointed associate professor. In 1866, he founded an Institute of Plant Physiology in the rebuilt Jesuit St. Joseph's Boarding School opposite the University. In 1872, he was appointed full professor. Finally, in 1888, in the Botanical Garden, he inaugurated his new Institute of Plant Physiology with testing grounds and a botanical museum. It was the first such institute in Prussia, and the second in Germany. Cohn's dream had come true.

During his life, Cohn was active in many and most diverse fields. Already in 1850, he claimed a close analogy, if not a far reaching identity, between plant protoplasm and animal protoplasm, and began to study the contractile elements of plants, the phototropism of microorganisms, and insectivorous plants. At the same time, he undertook broad studies on the development and reproduction of bacteria, fungi and algae. He observed and described many species of bacteria, and invented solid media for the cultivation of axenic cultures. In 1852, on the occasion of a cholera epidemic, he founded the biological analysis of water, and in 1854 he began studies on the parasitism of fungi on insects. In 1866, he installed seawater aquariums, and classified algae according to their phylogeny following Darwin's theory of evolution.

From 1870, Cohn published his studies on bacteria. By doing so, he founded the science of bacteriology, and thus the basis of hygiene in medicine. In teaching bacteriology for students of medicine, he was assisted by Eduard Eidam. In 1871, he established a natural system of classification of the cryptogams; among others, he coined the term *pteridophyta*. In 1872, after assigning the bacteria to the plant kingdom, he established a natural system for bacteria which is still valid. In 1876, assisted by Oskar Kirchner, he published a cryptogamic flora of Silesia.

In the same year, he discovered the heat-resistant endospores of *Bacterium subtilis*. Thus, together with, but independent of, the physicist John Tyndall and the chemist Louis Pasteur, he ultimately disproved the then still valid antique doctrine of abiogenesis.

Not to forget, Cohn decisively advanced the careers of Julius Kühn (1825–1910), the founder of scientific agriculture, and in particular Robert Koch (1843–1910), the winner of the Nobel Prize in 1905.

Cohn's public relations activities

Along with his scientific work, the popularization of the findings of natural sciences was close to Cohn's heart. Cohn was a highly gifted speaker, articulate and straightforward in presenting facts, and at the same time entertaining and witty; he often used a romantic touch to inspire the imagination of the audience. Hence, Cohn gave a great number of lectures at Breslau,

Berlin and other places, always fascinating his audience. For example, at Breslau he held a public lecture every Sunday afternoon. This attracted particularly women, who at that time were still excluded from university education and the world of science. In addition, in 1882, he published a two-volume book with the title *The Plant*, which was reprinted in 1896 due to its great success. These volumes contained lectures combining botany, history, and poetry in a narrative form. There were chapters such as *What forests tell*, *The world in a water drop*, *Insectivorous plants*, *The invisible enemies in the air*, *From sea level to eternal snow*, *Goethe as botanist*, *Vine and wine*, or simply *Issues of life*. Cohn also covered poisonous plants in myth and historical murders, as also the use of flowers in poetry and the fine arts; and he just loved gardens (cf. Steiner, 1998). The public reception of *The Plant* was notable, in ladies' gatherings revolutionary. Thus, Cohn deserves the merit to have established botany as part of a good educational background.

Cohn's contributions to seed testing

In August 1869, Nobbe published his *Statute concerning the testing of agricultural seeds* (Steiner and Kruse, 2007). Cohn, also active in the field of botanical-agricultural research and supported by the Ministry of Agriculture, realized the implications and, after consultation with the Agricultural Central Council of Silesia, in 1870 immediately founded a "Provisional Seed Testing Station" as a division at his institute. In 1875, this provisional station became permanent as the "Seed Testing Station of the Breslau Agricultural Association". Eventually, in 1887, on Cohn's instigation this division became an independent institution under the name "Agricultural and Botanical Experiment Station". It was the first experiment station of its kind in Prussia.

Since 1873, seed testing was under the direction of Eidam. Eduard Eidam (1845–1901) was a pharmacist, having taken his state examination at Munich. In Berlin he studied botany, specializing in mycology. He received a doctor's degree in 1871 at the University of Rostock. In 1875, the third edition of his dissertation, entitled *The present status of mycology*, was extended to become a textbook. In 1873,

Eidam became Cohn's assistant and right-hand man. Thus, in 1887, he was appointed Professor and Director of the new Experimental Station, expanding seed testing and adding plant protection as a further assignment (Limpricht, 1902).

Cohn's lasting interest in seed physiology gave rise to three dissertations of candidates who later became pioneers in seed testing. In 1870, Leopold Just (1841–1891) finished a dissertation on *Germination and development of Secale cereale under the influence of light*. In the very same year, Just was appointed lecturer at Karlsruhe, and after habilitation in 1874 became associate professor and in 1877 full professor of botany. Already in 1872, after consultation with the Central Office of the Agricultural Association in Baden, he founded a Seed Testing Station, which was the origin of today's Agricultural Technology Center Augustenberg (LTZ), a Member Laboratory of ISTA (Cohn, 1892; Schmidt, 1997). In 1874, Oskar Kirchner (1851–1925), having simultaneously studied classical philology and natural sciences, finished a dissertation on *De Theophrasti Eresii libris phytologicis* [The botanical publications of Theophrastus of Eresos]. After teaching at the Prussian Agricultural Academy at Proskau, in 1878 Kirchner became head of the Hohenheim Seed Testing Station, founded by Franz von Fleischer in that year. Only three years later he succeeded von Fleischer as professor for botany (Steiner, 2004a). As his assistant in seed testing, Kirchner appointed Jacob Michalowski (1846–1933), who in 1881 under Cohn's guidance completed a dissertation on *A contribution on the anatomy and development of Papaver somniferum L.* (Steiner, 2004b).

Eidam, Just, and Kirchner took part at the 1st Meeting of the Directors of Seed Testing Stations in Graz in 1875, with Eidam taking the minutes (Steiner, Kruse and Leist, 2011). All three became greatly renowned protagonists of seed testing, with the younger Michalowski contributing to the implementation. In view of the achievements of Cohn and his four pupils, Lindenbein (1967) coined the term "Silesian School of Seed Analysts."

Cohn as scientist of his time

Cohn ranked among the most prominent scientists of his time as a botanist, a microbiologist and the founder of bacteriology.

He met many of his colleagues at annual meetings and corresponded with many colleagues abroad while visiting them whenever possible. For example, in 1876, while presenting his famous models of plant organs at a scientific exhibition in London, Cohn was invited by Charles Darwin to visit him at Down House. Cohn and his wife travelled by train, and were picked up by an open chaise to reach Darwin's house. However, they did not discuss evolution, as may be assumed, but insectivorous plants, which had been a life-long interest of both and a topic of previous correspondence; notabene, while dining on dainty game and sipping delicate Bordeaux.

Cohn was truly showered with honours from Germany and in fact from around the world. The three most precious honours were in 1877 the honorary doctorate of the medical faculty of the University of Tübingen, which was awarded to Cohn at the University's 400 years' anniversary for his contributions to medical hygiene, in 1885 the Leeuwenhoek Medal, which is awarded only every ten years, for his achievements in microbiology (incidentally, in competition for this medal with Louis Pasteur and Robert Koch), and in 1897 the Honorary Citizenship of his hometown Breslau.

Cohn and Pauline Reichenbach married in 1867, but remained childless. All his life, Pauline was a faithful partner. In November 1897, the University of Breslau celebrated the 50th anniversary of Cohn's doctorate as a great official event. In January

1898, Cohn celebrated his 70th birthday in the company of friends and colleagues. On 25 June 1898, unexpectedly and in the middle of his work, he died of heart failure.

As the time of writing, Cohn's grave is well preserved in the Jewish Cemetery of Wrocław. Seed science and technology owe much to him.

Dedication

This paper is dedicated to Prof. Dr. Peter Ruckebauer, professor emeritus for plant breeding and a firm supporter of seed science and technology, at the University of Natural Resources and Life Sciences, Vienna (BOKU Wien), on the occasion of his 75th birthday.

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Note: For biographical details, a list of Cohn's publications, a list of his university lectures and numerous references, see Klemm (2002). Concerning the dissertation, see Steiner (1997). For the digitalized reproduction of the dissertation, see Google Books in the internet. ■

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7th ISTA Seed Health Symposium

Edinburgh, United Kingdom, 12–14 June 2014

Laura Bowden¹ and Valerie Cockerell

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The seventh ISTA Seed Health Symposium was held in Edinburgh from the 12th to the 14th of June 2014. The meeting attracted 94 participants from 27 countries, and was held in the National Museum of Scotland, in the heart of the city. The symposium was a valuable, unique meeting, bringing together industry, government and international organisations to discuss all aspects of seed transmitted diseases.

The three-day symposium was split into five sessions. A total of 29 oral presentations were given by presenters from 12 different countries. Françoise Petter, from the European and Mediterranean Plant Protection Organization (EPPO), was invited to give the opening presentation of the symposium. Françoise discussed the main aims of EPPO, and focused on their work

identifying seed-borne pests that present risks for different regions. The afternoon session, Seed-borne Diseases Transmission and Epidemiology, included talks on *Ramularia*, *Tilletia*, *Microdochium*, *Fusarium* and coriander bacterial blight.

Day two opened with a second invited speaker, Ruud Scheffer from the International Seed Federation. Ruud talked about the work of the International Seed Health Initiative for Vegetable Crops (ISHI-Veg) and the many challenges faced when developing reliable tests for seed-borne pathogens. The morning session, Test Method Standardisation and Laboratory Evaluation, included talks on new methods for the detection of pospiviroids, *Sclerotinia* and *Xanthomonas*. Valerie Grimault, SHC Chair, discussed the developments within ISTA for seed health proficiency testing (PT), particularly how ISTA proposes to evaluate laboratories participating in the seed health PT rounds. Jane Chard, Chair of the International Plant Protection Convention (IPPC) Standards Committee,

presented a talk on the development of IPPC standards including recent seed standards.

Before and during the lunch break delegates had the chance to view the 23 posters from presenters from 12 different countries. Posters covered a diverse range of topics, notably development and validation of new methods, particularly molecular methods, and novel seed treatments. In the afternoon, the session Seed Treatments for Conventional and Organic Seed Production included talks on assessing the effect of treatments for *Spacelotheca* on maize, rhizobial isolates as a method of bio-control for *Rhizoctonia*, *Sydowia* infection in conifers, treating *Alternaria* on sunflowers and treatments for *Xanthomonas* on rice. The final session of the day, Emerging Diseases and Climate Change, included presentations on newly discovered pathogens of leafy vegetables in Italy, two talks on *Fusarium* pathogens on cereals in Europe and talks on *Sclerotinia* in Brazil and *Phomopsis* in Austria.



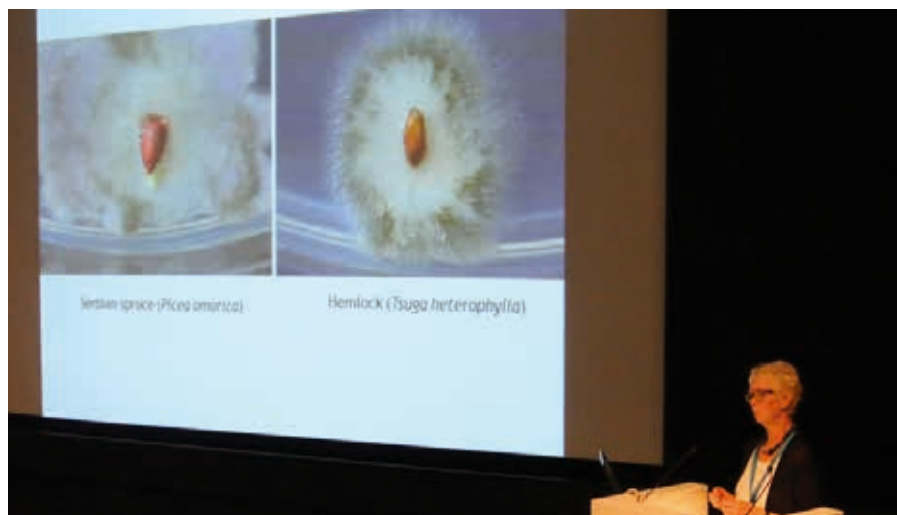
The participants of the Seed Health Symposium in the central hall of the National Museum of Scotland.

After a full day's programme, participants had a chance to relax and were taken on a guided coach tour of Edinburgh before arriving at the Royal Botanic Gardens for an evening barbecue and drinks. Typical Scottish weather threatened to make an appearance, but the rain held off and everyone was able to make the most of the beautiful setting at the Caledonian Hall in the gardens.

The final session of the Symposium was Traditional and Modern Approaches for Seed Health Evaluation. Presenters described novel methods for detecting pathogens on alfalfa, tomato and cucurbits, and on using next-generation sequencing for pathogen screening. A talk was given on sampling methods to detect pathogens that occur at very low frequencies in seed lots, and the session also included both a talk and a demonstration on the use of multi-spectral imaging for seed health testing.

Feedback from the symposium has been very positive, with comments such as "It was really a pleasure to participate in the symposium," and "This was a fabulous opportunity to meet with all sectors of the seed health community." Not forgetting tributes to the host city: "I really enjoyed the meeting and visiting Scotland and its capital Edinburgh – what a lovely and special city!"

Special thanks must go to our major sponsors Bayer Crop Science and the British Society of Plant Pathology, as well as the staff at the National Museum of Scotland. Thanks also to the organising committee from SASA and SRUC, to the ISTA Secretariat for their help with the organisation of the online registration, to the session chairs, some of who also made up the scientific programme committee. Not forgetting and especially to the staff at SASA, for all the work that they put in both preparing for and during the Symposium. The opportunity to be involved in an ISTA event and seeing everything come together and result in a successful Symposium was an experience that will not be forgotten in the Official Seed Testing Station for Scotland laboratory for quite some time! ■



Guro Brodal gives a talk on *Sydowia* on conifer seedlings.



Views over the city of Edinburgh from Holyrood Park with Ilaria Alberti and Masatoshi Sato.



Delegates enjoyed drinks and a barbecue at the Caledonian Hall at the Royal Botanic Gardens Edinburgh.

Report from the ISTA Annual Meeting 2014

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The ISTA Annual Meeting 2014 was held in Edinburgh, Scotland, United Kingdom, from 16 to 19 June and was hosted by the Science and Advice for Scottish Agriculture (SASA), a Division of the Scottish Government.

The meeting took place in the beautiful modernized Assembly Rooms, in the centre of Edinburgh's World Heritage site. The Assembly Rooms opened in 1787. Throughout its history the venue has catered for balls, music festivals, banquets and Royal Occasions, as well as conferences. The venue provided the perfect space for the ISTA Annual Meeting 2014, with state of the art lighting and sound systems throughout and in-house audiovisual and wireless internet.

The meeting was attended by 176 delegates from governments, academia and the seed industry, representing 48 countries.

Some of the meeting's highlights were the Welcome Reception on 15 June that was opened by John Kerr, Head of Seeds, Varieties & Pesticides Branches, and Joël Léchappé, the President of ISTA, who welcomed all the participants to Edinburgh. The attendees enjoyed the evening with delicious Scottish food and drinks in the stunning Ballroom of the Assembly









Rooms. The evening was accompanied by two violinists in kilts playing traditional Scottish music.

On Monday 16 June, the Seminar on Bulking and Sampling, organized by the ISTA Bulking and Sampling Committee, was held (see report on p. 22).

Over the next two days, the ISTA Technical Committees (TCOMs) presented their work. They also took the opportunity to hold their own side meetings. Some of them were open to all delegates, providing the opportunity for interested people to get more details about future plans of the TCOMs and the organization within the TCOMs.

The Official Dinner took place on Wednesday evening in the spectacular circular stables ballroom of Prestonfield House. The evening started with an aperitif on the beautiful front lawn and was followed by a delicious meal. The highlight







of this evening was the band, teaching the participants traditional Scottish dances. This was a lot of fun and outstanding experience for everybody.

On Thursday Dr. Kevin O'Donnell, Deputy Director of Agriculture, Food and Rural Communities: Head of Science and Advice for Scottish Agriculture (SASA) welcomed all delegates on behalf of the Scottish Government to the Ordinary General Meeting. This was followed by a presentation on behalf of Agricultural Industries Confederation Scotland, Seed Sector, by Mr. Lorne Watson of Alexander Harley Seeds, and a presentation by Mr. Iain Eadie, President of the Scottish Seed Trade Association.

Afterwards the changes and the future of the Association were discussed and voted on. The minutes and all other approved documents of the Ordinary General







Meeting can be found on the ISTA web site (www.seedtest.org/AM14).

We would like to thank all speakers and participants for the successful meeting in Edinburgh, but foremost the National Organising Committee, the staff of SASA, for organizing a very successful ISTA Annual Meeting and their great hospitality. The ISTA Annual Meeting 2014 was a great success due to the active participation of the delegates and lively discussions, and certainly also because of the help of the very competent and friendly organizers.

The presentations and further information of this event are available on the ISTA website at www.seedtest.org/AM14. ■





Change to the Articles of ISTA

As reported in STI 147, a change to the Articles of ISTA was proposed for voting at the 2014 Ordinary General Meeting. The change was accepted by the Voting Delegates.

The name of the membership category “Corporate Member” was changed to “Industry Member”, and with regard to the membership fee, a principle was introduced that links the size of the fee to the size of the company or entity, as defined by the number of employees.

Before the vote, there was a lively discussion on the subject of this proposal and of the role of the seed industry in ISTA in general. This discussion can be found in the Draft Minutes of the OGM 2014, at:

www.seedtest.org/minutes

Former	Accepted
Article 4 Governments, Authorities and Members	Article 4 Governments, Authorities and Members
a) ... g) Corporate Member 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. (h) ...	a) ... g) Industry Member An Industry Member is any entity which supports the Association and its objectives, pays an appropriate annual fee to the Association, and is admitted by the Association. <u>The industry membership fee depends on the number of employees.</u> (h) ...



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Where next?

ISTA is seeking Member Countries to host the Annual Meetings in 2017 and 2018, and the 32nd ISTA Congress in 2019.

Applications are welcome from any ISTA Designated Authority of a Member Country.

Applications must be submitted by 1 February 2015 for consideration by the Executive Committee.

For more information about requirements, application procedure etc., please see the guidelines available on the ISTA web site at:

www.seedtest.org/hosting

or contact the Secretariat at ista.office@ista.ch

ISTA Sampling Seminar 2014

Eddie Goldschagg

Chair, ISTA Bulking and Sampling Committee

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The ISTA Bulking and Sampling Committee presented a Seminar on Sampling on 16 June 2014, at Edinburgh in Scotland, United Kingdom as a prelude to the 2014 ISTA Annual Meeting, which was held at the same venue over the following three days. The Organising Committee, consisting of Leena Pietilä (Convener), Steve Jones, Dot Vittrup Pedersen and Jean-Claude Stephan managed to put together an interesting programme with excellent speakers. The Seminar was very

well attended, as most of the persons who attended the Annual Meeting also showed up at the Seminar. In addition, 17 participants made the trip to Edinburgh specifically to attend the Seminar. From the survey results, 74 % of those who attended thought the Seminar was very good or excellent, and 24 % thought it was good or satisfactory.

After the ISTA President, Joël Léchappé, opened the proceedings and welcomed all present to the ISTA Annual Meeting and Seminar, the Chair of the Seminar and Bulking and Sampling Committee, Eddie Goldschagg introduced the purpose of the Seminar and the programme to the audience. The Seminar was divided into four sessions which covered the following issues:

– Session 1: Relevance of seed sampling for seed testing statistics

- Session 2: New methods/developments in seed sampling
- Session 3: Quality assurance in seed sampling
- Session 4: Panel Debate: Monitoring of seed samplers and seed sampling equipment

The first Session was chaired by Michael Kruse, which he started off by conducting a very interesting and well-received sampling exercise, the so-called Smiley experiment, which involved almost all of the participants. This entailed the sampling of smileys, which represented seed, from envelopes, which represented seed bags. Grey smileys represented impurities, while the yellow ones were the “pure seed”. Participants then had to indicate their perception of the homogeneity of the seed lot, based on the results obtained by all the

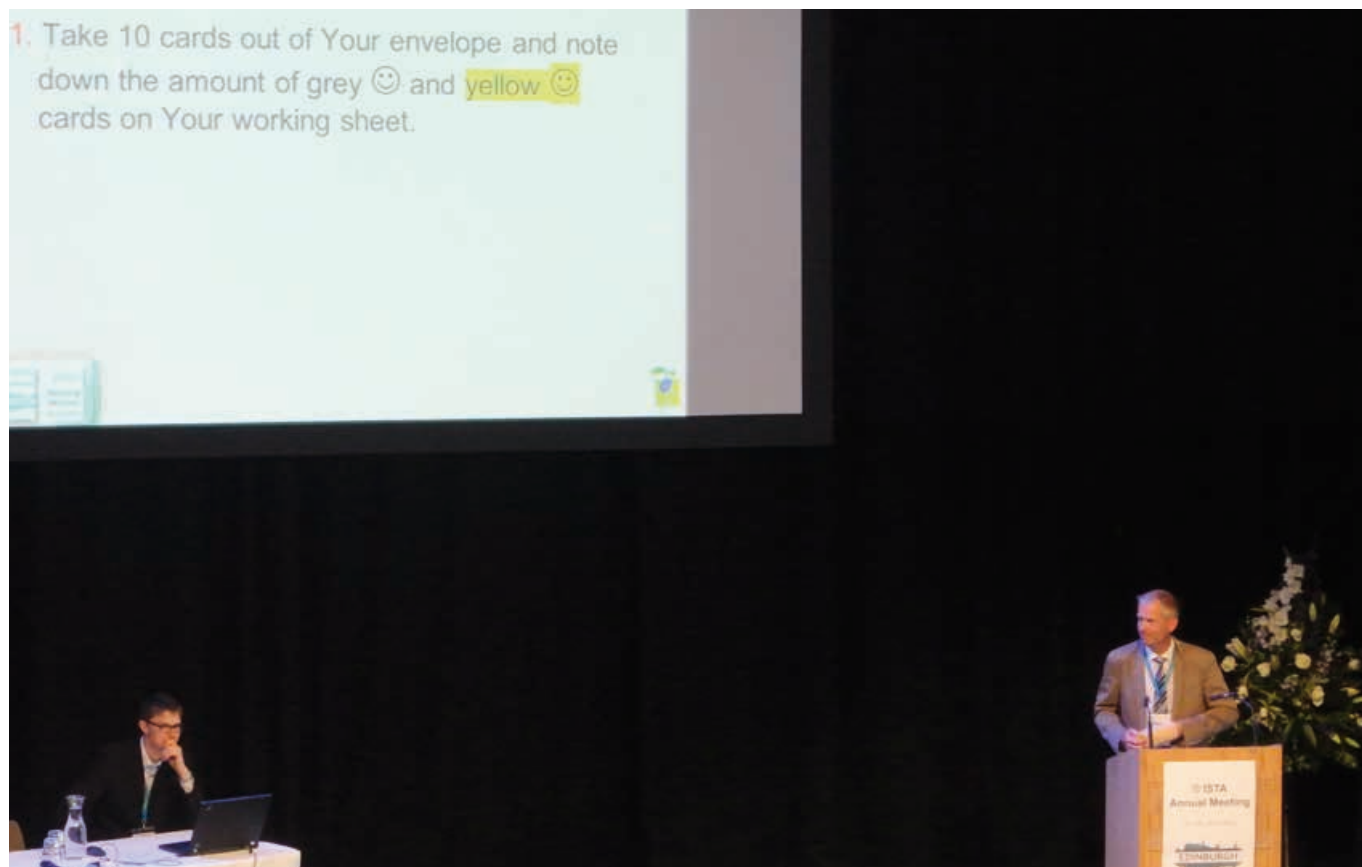


Figure 1. Michael Kruse explaining to the audience how to sample their smileys.

participants. This demonstration showed the importance of representative sampling.

The exercise was followed by his excellent presentation on “Sampling as a source of variation in ISTA tolerances”, and the session was concluded by a presentation by Peter Deplewski on “Practical examples for monitoring the performance of sampling and sampling tools”.

Session 2, which covered new methods and developments in seed sampling, was chaired by Steve Jones. His presentation on “Validation of new methods and equipment for sampling purposes” was followed by a presentation by Roy MacArthur on “Optimizing sampling plans for seed transmitted pathogens” and a presentation by Lotta Claesson on “Automatic seed sampling”.

The 3rd session, chaired by Rasha El-Khadem concentrated on the main theme of the Seminar, namely quality assurance in seed sampling. The first presentation of this session was by Eddie Goldschagg on why quality assurance is essential in seed sampling. Rasha El-Khadem then informed the participants on “How to respond to non-conformities”, followed by Jette Nydam’s presentation on “Evaluation of suppliers and of supplied equipment”. Dot Vittrup Pedersen explained how to “Train, examine and authorize seed samplers” before the session was concluded by

Leena Pietilä’s presentation on “Monitoring of seed samplers”.

The highlight of the Seminar was during the last Session, which consisted of a Panel Debate on monitoring of seed samplers and seed sampling equipment. The aim of the debate was to get inputs from ISTA Member Laboratories on how the ISTA Rules, the ISTA Accreditation Standard and the ISTA Handbook on Seed Sampling should be amended to better meet the needs of the Laboratories. The debate was capably chaired by Joël Léchappé.

The panel members were drawn from different parts of the world and with different prevailing conditions and country sizes that influence quality assurance in seed sampling. The panel members were: Cecilia Jones (Uruguay), Steve Jones (Canada), Zita Ripka (Hungary), Pamela Strauss (South Africa), Grethe Tarp (Denmark) and Dot Vittrup Pedersen (Denmark).

Each of the panel members gave their views on the following questions:

- 1: Is there any value in using check sampling to monitor ISTA samplers?
- 2: Can training and examination replace on-site assessment for internal monitoring?
- 3: For on-site assessment of ISTA samplers: how do you solve the problem of distances, number of samplers and number of samples taken per year per sampler?

4: Is there anything in the Accreditation Standard that you would change but still maintain the quality of seed sampling in ISTA?

Three panel members with opposing views were selected to present their answers by means of a PowerPoint presentation on two of the questions, which was followed by questions and comments from the floor and from other panel members. These discussions culminated in very useful information and suggestions that the BSC will take into account with the revision of the Sampling Handbook and for future Rules changes.

The session was concluded with an aggregation of the discussions and viewpoints by Beni Kaufman, the Secretary General of ISTA, followed by the closing of the Seminar by Eddie Goldschagg, during which he thanked all the participants, panel members, presenters, organising committee, other BSC members and SASA for their inputs and contributions.

All the Seminar presentations can be downloaded from the Seminar Programme on the ISTA web site by clicking on the links in the Programme at this address: https://www.seedtest.org/en/sampling-seminar-_content---1--1417.html. ■



Figure 2. Panel members listening to comments from the floor during the debate.

Auditors' Meeting 2014

Rasha El-Khadem

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The ISTA auditors met on 16 June 2014, in conjunction with the Annual Meeting 2014 in Edinburgh.

Karen Hill from Australia, who joined the ISTA auditors group in 2013, was welcomed.

For 2015, the Accreditation and Technical Department is expecting to have 48 re-accreditation audits plus new laboratories that ask for their first ISTA audit. Thus it is one of the busy years in the three-year cycle of accreditation.

Audit duration 2014

Key figures of the 2014 audit duration were provided. The median is around 10 hours with a minimum of 8 hours and a maximum of 11.7 hours. The feedback provided by laboratories after the accreditation was presented. 7% stated that they partially agree that the time management related to the audit was adequate. The auditors discussed during the meeting whether the time management could be improved. Some of the auditors stated that they believed that the key figures shown are acceptable, and that there is no need to reduce the audit time. The 10 hours' duration is the range that is announced in the audit timetable sent to the laboratory. Suggestions provided by the auditors were:

- During the opening meeting, announce clearly that the audit time is approximate and that the audit may take longer.
- Announce that the audit will take longer if translation is needed.
- Give more instructions before the audit to not 'waste' time during the audit with having to search for documents (e.g. ask the laboratory to have all calibration records available in the laboratory, all job descriptions with the Quality Manager, all sampling records with the sampler).

- The technical auditor may want to skip some of the test steps or some of the non-critical tests. In this case this must be recorded in the report. This will ensure that the next audit team can focus on steps or tests that were not audited during the previous assessment.

The auditors were asked whether they believe that 10 hours is too long for an audit. They stated that 10 hours is a suitable duration for an ISTA audit, considering the audit frequency and the fact that the auditors try to cover all activities of the laboratory.

The auditors were asked whether we should continue record the non-conformities using the laptop, as this also takes a significant amount of time. The auditors believed that we should continue with the current system, and that the laboratory appreciates getting the printed non-conformities.

Reporting time 2014

Key figures of the 2014 reporting duration were provided. The median is around 8 days from audit to the submission of the audit report with a maximum of 13 days. The box plot shows that there were two outliers. The results (apart from the outliers) are satisfactory.

Technical discussions

Moisture Committee

The moisture committee was approached with the following question due to non-conformity:

2.5.1.3 f) states that sampling by hand can be done (only for primary samples) for seed with a low moisture content. So what is exactly a low moisture content? And why would the Rules not require you to use gloves to not affect the moisture content?

2.5.2.2 Sample reduction methods states that the submitted sample for moisture is taken by mixing the composite sample and than taking a minimum of three samples

from different positions. This does not require the laboratory to use a spoon, so they could take the samples by hand, if they have good arguments stating that this did not change the moisture content.

The Moisture Committee responded and will discuss this.

Bulking and Sampling Committee:

The Bulking and Sampling Committee was approached with the following question due to a non-conformity:

The ISTA Handbook on Seed Sampling states that the collecting pans must be of sufficient size to hold at least half of the sample. Is this a requirement?

The reply of the BSC was: It would be unreasonable to require that the collecting pans be big enough to hold half. Fill the hopper, open the valve, empty the two collecting pans in two separate "holding" containers if you do not have several collecting pans, place the two empty pans beneath the outlets and repeat the process, each time emptying the two collecting pans in the two separate "holding" containers, until all of the composite sample has been divided. The hopper may be filled two or more times. You now take one of the "holding" containers and divide it down until the required weight is obtained, while discarding the other. We will describe it more clearly in the revised Handbook.

Open discussion and open questions arising from experience

Auditing laboratories without sampling in their scope of accreditation

Some ISTA laboratories have testing in their scope of accreditation but not sampling. Nevertheless, they issue ISTA Orange Seed Lot Certificates after testing samples that they received from an ISTA laboratory accredited for sampling. What would be the requirements that the laboratory must fulfil and that the auditors will check during the audit?

The auditors discussed this question during the meeting, and came to the conclusion that the following list provides the requirements that the auditors would be expected to encounter:

- Mixing and dividing of the submitted sample (might be the composite sample) must be audited.
- The Laboratory shall have a procedure how to identify which samples to accept, and how to get in contact with the sampling laboratory (e.g. exchange a list of samples, or inform the sampling laboratory upon receipt of a sample and get confirmation – a formal contract is not required, just an agreement).
- Procedure how to stay updated with the information on authorised samplers or changes in the procedure.
- The laboratory would be requested to include the sample receipt process in their yearly internal audits.
- If the laboratory receives their samples mainly from one laboratory: make sure that the sampler himself/herself is authorised.

Issuing of subplot Certificates

It was noted that the Rules do not clearly explain how subplot Certificates should be issued. This was brought to the attention of the ISTA Bulking and Sampling Committee. The Committee is working on this. Once we receive more comments we will distribute the outcome to the auditors.

Recording of the number of primary samples

It was discussed whether an auditor may request the sampler to record the number of primary samples taken.

The auditors felt that there is no need to contact the Bulking and Sampling Committee and to ask for guidance, and that the recording of the numbers of primary samples is not a requirement. However, if during an audit the auditors witnessed that the sampler came to a wrong conclusion regarding the number of primary samples, than the auditor might request that the number is recorded for a specific period of time.

Keeping issued copies from the final Certificate

During past auditors' meetings it was discussed several times whether the auditors can accept that laboratories do not keep copies of the issued ISTA Certificates (a copy or scan including signature and stamp on the orange paper). The outcome of previous discussions was also published in Seed Testing International:

“Copies of the ISTA Certificates

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

(Seed Testing International 140, October 2010, p. 20)

“Review of ISTA Certificates issued

“There has been some discussion as to what is acceptable as a record for audit purposes regarding ISTA Certificates issued by a laboratory.

“For example:

- Accreditation Standard Clause 9.2 does not insist that the record be a photocopy of the exact ISTA Certificate that was issued.
- Are electronic versions of the ISTA Certificates with all required details clearly visible (e.g. signature, stamp) acceptable as records?

“At the outcome, the auditors agreed that the laboratories will be asked to have readily available a selection of paper copies of certificates, issued over the past three years.”

(Seed Testing International 142, October 2011, p. 16)

During audits some laboratories argue that there is no need to keep copies as all information is available in a database. The Accreditation and Technical Department would like to investigate whether there are circumstances that would allow the auditor to accept data being archived electronically. The auditors suggested establishing a working group that would look into this. ■

ISTA Annual Meeting 2015 Montevideo, Uruguay, 15–18 June
Online registration now open: www.seedtest.org/AM15

Address by the Secretary General of the International Seed Federation

Michael Keller

Secretary General, International Seed Federation

ISF Secretariat
Chemin du Reposoir 7
1260 Nyon, Switzerland
isf@worldseed.org

It was a pleasure for me to be in Edinburgh at the 2014 Ordinary General Meeting of the International Seed Testing Association (ISTA). While there I had the opportunity to meet the Association's leading team, the staff that underpin its functioning, and its members who actively participate and generate lively and useful debate on all topics of interest to ISTA.

ISF members coming from 78 countries cover over 96 % of international seed trade. Our role in ISF is to facilitate the international trade in seeds. There are many related objectives to that, such as representation of the seed industry at the global level, collection of statistics, communication on the contributions of the seed industry and many more. But in short the core business of the ISF is to ensure that seeds can travel around the world. Having access to high quality seed is the first requirement for farmers to produce more food, combat hunger and face other challenges that our planet faces.

ISF and ISTA were founded in the same period, even in the same year! 1924. Since then they have been working intensely to develop seed testing rules and standards aimed at facilitating international trade.

The goals of our two organizations have not changed much since 1924, even if the tools for achieving our goals have been modernized; improved technology has brought with it new ways of working; and innovation has been a constant driving factor in our activities. These goals are: to facilitate international trade, develop science-based solutions, and explore alternatives to improve the use of resources and speed up or accelerate reaching objectives.

Seed movement is more and more global. Thanks to harmonized rules, international agreements, and science-based measures, the international movement of seed has

increased steadily. The annual survey conducted by the ISF estimated the global seed market at USD 45 billion and international trade at USD 11 billion in 2013. This growth of trade has, however, been faced with an increasing number of regulations.

The production of seed involves many steps: increase of parental lines, hand pollination and hybridization, harvesting, cleaning and grading, vigorization, seed treatment, coating, and packaging. Favorable growing environments, the availability of skilled manual workers, the presence of modern facilities, and freedom from pests and diseases push seed companies to choose different countries as sites for the different stages of seed production. Consequently, before reaching the end user, seed can cross many borders, and at each border there may be different regulations for import and export, different methods of assessing quality, and different environmental regulations.

Harmonization of all of these measures is essential for efficient and profitable seed trade. Internationally recognized testing methods to determine seed quality are fundamental for seed business. ISTA has been a leader in developing standardized methods for seed testing recognized worldwide. The ISTA Orange International Seed Lot Certificate – established in the early 1930s at the request of ISF – is currently the most recognized document and used worldwide in the global trade of seed.

Internationally recognized sampling and testing methods are also required for genetically engineered (GE) seed, to avoid situations in which the movement of seed is hindered, so that opportunities and resources are not wasted.

As producers and suppliers of seed the seed companies want to be compliant, their customers want to be sure of what they are buying and sowing, and national authorities need to assure an agreed-upon level of quality. All this can be done by internationally recognized and harmonized rules and methods.



There are many other issues that ISF and ISTA can explore and jointly resolve: in the domain of seed health, in the field of enhancement technologies, in the promotion of science-based regulations, in capacity building to help emerging markets create infrastructure and reach the level of performance that is found in other regions of the world. I believe that strong cooperation between public and private sectors can provide solutions in all these areas.

ISTA and ISF should pursue stronger cooperation. The creation of an 'industry membership' and the proposed Industry Advisory Committee are a good move towards integrated work; it will be a great opportunity for seed companies to provide ISTA with useful support, to play the role of advisors on items of relevant interest to seed trade. Breeders and seed producers could actively participate in ISTA technical activities, providing recommendations for addressing specific issues, experience in seed processing, familiarity with problems generated by the improper handling of seed, and reference material for seed testing.

Seed companies might be able to share innovative testing methodologies, which have proven to be as effective as the standard ISTA ones, but may be more efficient, or meet other specific needs. They could also indicate how best resources might be allocated, or where to concentrate efforts.

In the GMO domain, seed companies regularly face hurdles created by non-harmonized sampling and testing procedures. The cooperation between our organizations could lead to the promotion of a

worldwide testing protocol, recognized by most governments, that would greatly improve international trade to the benefit of the world's food and feed supply.

Technologies are evolving very fast. Every year brings new equipment, new processes, new tools improve our work and our lives. Innovation is most important in our sectors and is the best way to keep

pace with and face the challenge of today's world. Our undeclared responsibility is to support farmers to always be more efficient and environmentally friendly when growing crops for production of food and feed, of fuel and fiber, of flowers and pharmaceuticals, for a world's population that is always demanding more.

I am convinced that our work will also be very fruitful in the future. We must strive to reach our long-term goal: a unified system to provide the user with good-quality seed with respect to varietal identity, germination capacity, specific purity, field performance, seed health and management of the coexistence of crops developed using different technologies. ■

Changes to the *International Rules for Seed Testing* 2015 Edition

Jonathan Taylor
ISTA Publications Unit

ISTA Secretariat
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At this year's Annual Meeting, the discussion of the Rules Proposals was rather more lively than usual, and a number of proposals were withdrawn or even rejected.

Changes to the Stabilized List

There was a proposal to limit the Stabilized List to the species in Table 2A, and to use the online database of the Germplasm Resources Information Network (GRIN) and the Universal List for the names of any other species.

There was, however, a preference among the Member Laboratories for fixed standard lists of species, which would have required extensive amendments to the proposal. It was therefore decided to reject and ask the Nomenclature Committee for a new proposal.

Chapter 5: The germination test

- Counting errors during the germination test (5.6.1)

This proposal was withdrawn.

Chapter 9: Moisture determination

- Cutting seeds (9.1.5.2, 9.1.5.5)
- Cutting large tree seeds (9.1.5.5)

These proposals were withdrawn.

Chapter 10: Weight determination

- Coefficient of 6.0 should apply to all chaffy seed (10.5.3)
- Correct number of decimal places specified when weighing (10.6)

These proposals were withdrawn.

Thus the changes to the ISTA Rules for 2015 are:

Chapter 2: Sampling

- Removal of text on evidence of heterogeneity (2.5.1.1)
- Containers must be static free (2.4) (amended proposal)

Chapter 3: The purity analysis

- Rounding of fractions clarified (3.6.1.3)
- Clarification regarding retention and storage of components until sample disposal (3.5.2, §4)

Chapter 4: Determination of other seeds by number

- How to report when seed cannot be identified to species level (4.7, following 3.7)
- Clarification regarding retention and storage of seeds until sample disposal (4.5.2)

Chapter 5: The germination test

- More categories to describe seminal root defects (5.2.8.1)
- Allowing combinations of suitable growing media (5.4.1) (amended)
- Clarifying procedures for acceptance testing of media (5.4.3.2, 5.4.3.3)

Chapter 6: Topographical tetrazolium test

- Additional information for the preparation and storage of tetrazolium solutions (6.4.1, 6.4.2)

Chapter 7: Seed health testing

- Modifications to seed health methods 7-009 and 7-019a
- New seed health method 7-030: Detection of *Acidovorax valerianellae* on *Valerianella locusta* (Corn salad)
- Revision of Table 7A

Chapter 9: Moisture determination

- Clarification of the method to be used for new species (9.0, 9.0.1)
- Review of requirements for moisture calibration samples (filling containers; 9.2.1.5.2)

Chapter 11: Testing coated seeds

- Clarifying suitable media (11.5.4) (amended proposal)

Chapter 15: Seed vigour testing

- Conductivity test for *Cicer arietinum* (15.8.1.2)
- Radicle emergence test for *Brassica napus* (15.8.4)
- Revision of 'General directions' text (15.5.2)

Chapter 19: Testing for seeds of genetically modified organisms

- Text change to better reflect the aims of the Chapter (19.4.1)
-

Joost van der Burg retires

Marcel Toonen¹ and Ruud van den Bulk²

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In the past four decades, many ISTA members have collaborated with Joost van der Burg in the field of seed science. Joost was trained as a tropical botanist at Wageningen University in the 1970s. At the start of his career, he was appointed as head of the Department of Purity, Cytology, Identification and Seed Cleaning at the Government Seed Testing Station (RPvZ) in Wageningen in 1977. From that time onwards, he filled various positions in the area of seed technology at the successors of this station. On 1 November this year, he will retire from his position as Researcher Applied Ecology at Plant Research International in Wageningen.

During his career, Joost pursued his two passions: seed technology and tropical botany. In many instances he was able to combine these two passions. He was, and still is, an active member of ISTA, where he participated in many scientific committees, acted as a technical auditor for ISTA and was, for over 20 years, the Dutch ISTA representative. In 2012, Joost chaired the Dutch Organization Committee of the Annual Meeting held in Venlo, the Netherlands. As Dutch representative Joost was very committed to this task. He never missed the Ordinary Meeting and was able to ask critical questions on behalf of the Dutch Designated Authority. In various cases this led to lively discussions with the Executive Committee.

Already early in his career, Joost developed and optimized standardized seed testing technologies. One of his first ISTA activities was the organization of the purity and seed identification sessions at the 'Wageningen Workshop' in 1978. In the 1980s, Joost developed many of the current pure seed definitions for tropical grasses (the



multiple seed unit drawing in Chapter 3), and most pure seed definitions of the flower seeds and the tree and shrub seeds. Today these definitions still have a central position in the Rules. Joost was also actively involved in the establishment of a number of ISTA handbooks, such as seed sampling and purity analysis.

Joost served for many years as member of the Forest Tree and Shrub Seed Committee and as Vice-Chair of the Purity Committee. He also acted as the leader of the Pure Seed Definition and Blowing Working Groups. With his dedication to improve seed testing came his interest in new technologies; he has been an active member of the Advanced Technologies Committee since its establishment.

Joost was involved in many projects that aimed to strengthen seed technology and seed production, in particular in tropical countries. The 'Project Seed Laboratory 2000–5000' is an example where Joost and his co-workers described how a seed testing station, testing between 2000–5000 samples annually, could be established in tropical and subtropical areas. Directives and general considerations concerning staffing, organization of the work, layout of the

building and the equipment needed were given. One of the projects benefiting from this was the establishment of an ISTA station in Depok, Jawa Barat, Indonesia. The second edition of this handbook can still be ordered on the ISTA web site.

As ISTA is an organization built by volunteers, the contribution of Joost to ISTA was important. ISTA, as well as seed testing laboratories, both governmental and private ones, benefited from the work carried out by Joost in the past four decades. Joost actively contributed to the improved quality of seed testing. A contribution with impact, as seed testing acts as a basis to establish secure and reliable seed supply for developed and developing countries all around the world. We would like to thank Joost most sincerely for his contribution to ISTA and to the improvements accomplished in the fields of seed testing and seed technology. Joost will step back as Dutch ISTA representative, but will continue to support ISTA as a technical auditor and Technical Committee member in the coming years.

Joost, 'dank je wel' – Thank you ! ■



Punta del Este

ISTA Annual Meeting 2015

Montevideo, Uruguay

15–18 June 2015

Overview

Tuesday–Friday 9–12 June	ISTA Quality Assurance Workshop
Tuesday–Friday 9–12 June	ISTA Workshop in Tetrazolium Testing and Vigour by Tetrazolium in <i>Glycine max</i>
Monday 15 June	Opening ceremony
Monday–Tuesday 15–16 June	ISTA Seminar: Molecular tools for seed quality and seed health
Tuesday 16 June	City tour of Montevideo
Tuesday–Wednesday 16–17 June	Presentation of ISTA's technical work
Wednesday 17 June	Official Dinner
Thursday 18 June	ISTA Ordinary General Meeting
Friday 19 June	Post-meeting tours



Uruguayan tango



Invitation by Ing. Agr. Tabaré Aguerre Minister for Livestock, Agriculture and Fisheries of the República Oriental del Uruguay

It is an honor to invite you to the International Seed Testing Association's 2015 Annual Meeting to be held in Montevideo, Uruguay.

Located at the heart of the southern cone of America, Uruguay is located in the middle of one of the most fertile regions of the world. Agriculture, forestry and cattle raising promote the economic growth of the country. Innovation and sustainable intensification of agriculture are supported

by public policies for soil use and environmental preservation.

The National Seeds Institute (INASE) is the host of the 2015 ISTA Annual Meeting. The Institute was founded in 1997 to facilitate the trade of best quality seed in Uruguay. The INASE oversees more than 40 seed laboratories in Uruguay. The National Agricultural Research Institute (INIA) will host the workshops that complement the Annual Meeting, providing

opportunities for practical experience of ISTA methods.

Seed scientists, specialists and officials from all over the world are invited to come to the 2015 ISTA Annual Meeting in Montevideo, Uruguay. It will be an excellent opportunity for exchange of knowledge and information related to the progress of seed science.

Hope to see you there.

Ing. Agr. Tabaré Aguerre

Invitation by the Organizing Committee of the ISTA Annual Meeting 2015

The International Seed Testing Association (ISTA) invites you to its Annual Meeting to be held in Montevideo, Uruguay from 15–18 June 2015.

The National Seed Institute (INASE) is delighted to be hosting the next ISTA Annual Meeting and would like to cordially invite you to Montevideo.

The ISTA Annual Meeting provides an excellent opportunity to meet other seed experts and to exchange experiences. The aim of the meeting is to discuss and decide

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

The Annual Meeting also provides a chance for in-depth discussions about topics of interest to the ISTA community. For the 2015 meeting, a one-and-a-half day

Seminar will be held on “Molecular tools applied to seed quality and seed health”. This seminar will be a opportunity to receive the latest research and development.

Moreover, we are delighted to announce that two ISTA workshops will take place in Colonia: a Workshop on Seed Sampling and Quality Assurance in Seed Sampling and a ISTA Workshop in Tetrazolium Testing and Vigour by Tetrazolium in Glycine max. ■

ISTA Annual Meeting 2015
Montevideo, Uruguay, 15–18 June 2015
Online registration now open: www.seedtest.org/AM15

Preliminary programme

Venue: Radisson Montevideo Victoria Plaza,
Plaza Independencia, Montevideo

Sunday, 14 June 2015

12:00–18:00 Registration of participants at conference venue

19:00 Welcome reception

Monday, 15 June 2015

08:00–18:00 Registration of participants at conference venue

08:30–18:00 ISTA Seminar: Molecular tools for seed quality and seed health

Tuesday, 16 June 2015

08:00–18:00 Registration of participants at conference venue

08:30–12:30 ISTA Seminar: Molecular tools for seed quality and seed health

08:30–18:30 Presentations of ISTA's technical work and meetings of ISTA Technical Committees

08:30 Opening by the ISTA President, Joël Léchappé (France)

08:30–10:00 Purity Committee (Chair: Jane Taylor)
Germination Committee (Chair: Sylvie Ducourneau)
Moisture Committee (Chair: Jette Nydam)

10:00–10:30 Coffee break

10:30–12:30 Tetrazolium Committee (Chair: Stefanie Krämer)
Seed Vigour Committee (Chair: Alison Powell)
Seed Health Committee (Chair: Valérie Grimault)
Variety Committee (Chair: Ana Laura Vicario)

12:30–13:30 Lunch break

13:30–14:00 GMO Committee (Chair: Cheryl Dollard)

14:00–15:00 Flower Seed Committee (Chair: Rita Zecchinelli)
Forest Tree & Shrub Seed Committee (Chair: Fabio Gorian)

15:00–15:30 SST Editorial Board (Chair: Fiona Hay)

15:30–16:00 Coffee break and official photo session

16:00–18:30 Individual ISTA Technical Committee meetings

Wednesday, 17 June 2015

08:00–17:00 Presentations of ISTA's technical work (cont.)

08:30 Opening by the ISTA President, Joël Léchappé

08:30–10:00 Bulking and Sampling Committee (Chair: Eddie Goldschagg)
Statistics Committee (Chair: Jean-Louis Laffont)
Nomenclature Committee (Chair: John Wiersema)

10:00–10:30 Coffee break

10:30–11:30 Seed Storage Committee Chair: (Hugh Pritchard)
Advanced Technologies Committee (Chair: Bert van Duijn)

11:30–12:30 Proficiency Test Committee (Chair: Günter Müller)
Laboratory Accreditation and Quality Assurance Programme (Chair: Rasha El-Khadem)

12:40–13:30 Lunch break

13:30–15:30 Rules Committee (Chair: Steve Jones)

15:30–16:00 Coffee break

16:00–18:00 Rules Committee (cont.)(Chair: Steve Jones)

19:00 Official Dinner

Thursday, 18 June 2015

09:00–17:30 ISTA Ordinary General Meeting

**09:00–10:00 Welcome by the ISTA President, Joël Léchappé
Presentation on the development of the seed industry in Uruguay**

10:00–10:30 Coffee break

Agenda

- 10:30–12:30
1. Call to order
 2. President's address
 3. Roll call of Designated Members entitled to vote
 4. Comments about the minutes of the previous General Meeting
 5. Report of the Executive Committee
 6. Report of the Secretary General

12:30–13:30 Lunch break

13:30–15:00

7. Fixation of annual subscriptions
8. Changes to the Articles
9. Consideration and adoption of the proposed Rules changes 2015

15:00–15:30 Coffee break

15:30–17:30

10. Consideration and adoption of reports
11. Announcement of the places and dates of the next Ordinary General Meetings
12. Any other business raised by a Member, of which notice in writing has been received by the Secretary General at least two months prior to the date of the General Meeting
13. Any other business raised by consent of the Executive Committee
14. President's closing address
15. Adjournment

General information

Venue

On central Independence Square, the Radisson Montevideo Victoria Plaza offers stunning views of Harbor Bay.

The pleasant rooms at the hotel include air conditioning, Wi-Fi, a bathtub and coffee maker. Every spacious suite features a separate lounge area and stunning views of the Rio de la Plata.

Guests at the Radisson Victoria can benefit from a variety of dining options, including a restaurant serving Uruguayan specialties, and Bar del Puente with its selection of cocktails. Additional facilities include gym, casino, pool and spa.

The hotel offers over 2500 m² of space for meetings and receptions with capacity for 2500 guests, equipped with advanced technology (audio, video, lighting, IT). Sixteen meeting rooms are available, with capacity for up to 1100 persons and spacious foyers for services like coffee breaks and cocktails, as well as exhibitions and displays set up concurrently with conferences.

About Montevideo

Montevideo, the capital of Uruguay, harmoniously combines modernity and tradition. Ancient architectural treasures standing alongside Art Nouveau and Art Deco give the city a unique identity.

The capital's Rambla (waterfront promenade) provides access to over 30 kilometers of coastline. It is one of the main attractions of Montevideo and an unforgettable stroll for its inhabitants who frequently visit it.

Montevideo also has an extensive cultural scene. Its theatrical productions are remarkably extensive and varied, and include classic, modern and alternative shows.

Climate

The climate in Uruguay is temperate and humid, with warm summers, moderate temperature in winter (10–15 °C) and fairly uniform rainfall throughout the year.

Registration fees (online registration at www.seedtest.org/AM15)

Periods	Events	EARLY registration (up to 28 February 2015)	LATE registration (1 March–15 May 2015)
ISTA Members			
15–18 June	Annual Meeting incl. Seminar	USD 1120	USD 1290
15–16 June	Seminar only	USD 380	USD 380
Non-members			
15–18 June	Annual Meeting incl. Seminar	USD 1680	USD 1930
15–16 June	Seminar only	USD 570	USD 570
Students			
15–16 June	Seminar only	USD 100	USD 100
Accompanying persons*			
15–18 June	Social events, lunches etc. only	USD 450	USD 450

*This category is applicable only for the spouse, companion and/or children of a delegate or for one additional person at the exhibition booth. Registration as an Accompanying Person does NOT include participation in any of the meetings or sessions, but only to social events, lunches and coffee breaks, cocktails and Official Dinner.

Accommodation

Hotels		Single	Double	Distance to venue
Victoria Plaza (venue)	5*	USD 170	USD 190	
Sheraton Montevideo	5*	USD 185	USD 195	15 min
Four Point by Sheraton	4*	USD 115	USD 125	10 min
Regency Golf	4*	USD 115		15 min
NH Columbia	4*	USD 100	USD 100	10 min
Tryp Montevideo	3*	USD 108	USD 108	15 min

Visit <http://www.ista2015.org/en/Accommodation.aspx> for links to all hotel web sites

Flight information

Flights arrive at Montevideo through connections from South and Central America, the USA and Europe. The new Carrasco International Airport was opened in 2009 and is considered one of the most modern and attractive in the world. The taxi fare from the airport to Montevideo city centre will cost approximately USD 30.

Local time

Local time in Montevideo is UTC (GMT) –3 hours.

Visas

Certain foreign visitors need to follow some special immigration procedures. Citizens of bordering countries can enter with their national ID document. Nevertheless, in all cases it is recommended to consult diplomatic representatives.

For more information visit the National Immigration Department web site:
<http://www.dnm.minterior.gub.uy/visas.php>.

If an official invitation letter is required, please contact: Vanesa Sosa at vsosa@inase.org.uy

VAT & service charges

Value-added tax (VAT) is 22%. VAT is usually included in quoted prices. Certain shops are authorized to refund the tax.

Credit cards

International credit cards are widely used in Uruguay. Major credit cards (Visa, MasterCard, American Express etc.) are accepted in most establishments. Most ATMs accept international credit/bank cards.

Currency and exchange

The currency in Uruguay is the Uruguayan peso (UY\$) and the exchange rate is approximately € 1 to UY\$ 30, or USD 1 to UY\$ 22.5.

Exhibitors

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

The exhibitor registration fee includes one exhibitor for the duration of the Annual Meeting (15–18 June, 2015) as well as welcome reception, coffees, lunches and official dinner.

Sponsors

There are also possibilities to sponsor the ISTA Annual Meeting 2015 with a variety of sponsoring packages to choose from.

For detailed information about sponsorship, please contact Andrea Puppi:
ista2015@personas.com.uy

Social programme

City tour of Montevideo

A unique historical-cultural tour for accompanying persons, round the old part of Montevideo, visiting its emblematic buildings. You will be able to visit the Independencia and Zabala squares, the elegant neighbourhoods of Pocitos and Carrasco and the Rambla, the waterfront promenade that provides access to over 30 km of coastline. It is one of the main attractions



Colonia del Sacramento

of Uruguay's capital, and an unforgettable stroll for its inhabitants who frequently visit it.

Date: June 16
 Duration: 3 hours (8:30–11:30, 14:00–17:00)
 Languages: English, Spanish and Portuguese
 Lunch: not included
 Cost: USD 35
 Minimum: 25 people

Post-meeting tour: Colonia del Sacramento

Declared a World Heritage Site by UNESCO in 1995, Colonia del Sacramento invites you to travel back in time and arrive at a Lusitanian town. Founded by the Portuguese and disputed for years by the crowns of both Spain and Portugal, its magical history remains intact. It has charming cobbled streets lit by its traditional and characteristic yellow lanterns, on which there are countless historical and cultural attractions to discover and enjoy.

The Calle de los Suspiros (Street of Sighs), the Casa del Virrey, the Iglesia Matriz, the Plaza de Toros, the Puerta de la Ciudadela (City Gate) are just some of the beautiful examples of architecture in this spectacular city. Just 2 hours from Montevideo or 6 km from the Laguna de los Patos International Airport, Colonia is ideally located, whatever the place of departure.

Date: June 19
 Duration: 10 hours (8:30–18:30)
 Languages: English, Spanish and Portuguese
 Lunch: not included
 Cost: USD 82
 Minimum: 25 people

Post-meeting tour: Punta del Este

Punta del Este is internationally recognized as one of the top resorts in the Americas and the most exclusive in the region. It is located in the department of Maldonado, just an hour and a half from Montevideo.

With over 20 kilometers of coastline and high hills overlooking the sea, the resort also offers charming places and landscapes for those who come in search of absolute peace and tranquility.

The meeting point of its two most famous beaches, Playa Mansa and Playa Brava, marks the end of the Río de la Plata and the start of the Atlantic Ocean. The resort has grown westward forming Punta Ballena and eastward creating La Barra and José Ignacio.

Date: June 19
 Duration: 10 hours (8:30–18:30)
 Languages: English, Spanish and Portuguese
 Lunch: not included
 Cost: USD 54
 Minimum: 25 people

Digital object identifiers for *Seed Science and Technology* papers: update

Fiona Hay¹ and Jonathan Taylor²

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As reported in the last issue of *Seed Testing International*, all papers published in ISTA's scientific journal, *Seed*

and *Technology* (SST) are now given their own unique **digital object identifier** or **DOI name**. The DOI is a permanent reference for a digital object (e.g. a paper published in SST); if the web address for the object is changed, the database of DOIs will be updated to reflect the new web address.

As well as newly published papers being given DOIs, all SST papers published since 2003 and which are also available online (www.ingentaconnect.com/content/ista/sst)

have now also been given their own DOIs. By the time that you are reading this issue of *Seed Testing International*, these DOIs should also be published online on the SST abstract pages. This will allow authors of future articles who cite SST papers to include the DOIs in the references.

So, readers of SST will always be able to find a paper that has been published online, using the DOI. ■

ISTA membership changes

Status 1 September 2014

New Member Laboratories

Bosnia and Herzegovina BAML0300/BAML0301

Laboratory representative: Kristina Zlomislic
Federal Agromediterranean Institute of Mostar,
Testing Laboratory for quality control
Department of Plant Production Technology
Biskupa Cule 10, Mostar, 88000
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ISTA Annual Meeting 2015 Montevideo, Uruguay, 15–18 June
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Seed Health Committee Official Method Review 2013

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Table 1. The one ISTA Official Seed Health Testing Method to be reviewed in 2013

Method No.	Pathogen	Host	Actions taken since last review
7-025	<i>Aphelenchoides besseyi</i>	<i>Oryza sativa</i>	Not applicable, first review

Table 2. Number of respondent laboratories using the method and whether they consider it fit for purpose

Method No.	Pathogen/host	Method used		Fit for purpose?	
		Yes	No	Yes	No
7-025	<i>Aphelenchoides besseyi</i> / <i>Oryza sativa</i>	6	11	15	2

The Seed Health Method Validation Programme requires that methods approved as Official Methods should be reviewed every 5 years to ensure their continuing effectiveness and suitability. Official Seed Health Testing Methods are found in the International Rules for Seed Testing 2013, Annexe to Chapter 7, Seed Health Testing Methods. There is one ISTA Official Seed Health Testing Method reviewed in 2013 (Table 1). This is the first review for Method 7-025. As part of the review process a questionnaire (appendix 1) was sent to all ISTA Member Laboratories and a copy was posted on the ISTA web-site for other interested bodies to respond.

Report on the 2013 Review Questionnaire

In 2013, one Seed Health Method was reviewed (Table 1).

Replies to the 2013 Method Review Questionnaire

Seventeen laboratories from 17 countries answered the 2013 review questionnaire (Table 2).

7-025 *Aphelenchoides besseyi*/*Oryza sativa*

Of the 6 laboratories that used the method all agreed that the method was fit for purpose. Two laboratories that did not use the method found the method not fit for purpose as they did not use it and could not judge.

To the question: ‘do you think further improvement is necessary?’, eleven responded ‘No’ and one laboratory (using the method) ‘Yes’. The following comment was made by this laboratory:

- 1.2 20 ml
- Safety precautions: Delete: “especially during preparation of media, autoclaving and weighing out of ingredients.”
- CCP: “Clean the mill thoroughly between each sample ...”

To the question: ‘is there a need to respond to a technological change in the method? If yes explain in a few words’, three responded ‘No’ and one laboratory made the following comment: ‘Maybe it would be worth checking and comparing the efficacy of the centrifuge method with the current one.’

To the question: ‘most methods are not validated for use on treated seed. Do you have a need to test treated seeds for this pathogen? If yes please give brief explanation’, two laboratories responded ‘No’. Comment from one other laboratory: ‘It would be very useful to check and compare treated and untreated seeds. For example ISPM 15 (Heating treatment of package wood material on presence

of *Bursaphelenchus xylophilus*) has been checked many times and revealed not 100% efficacy.’

Seed Health Committee proposals

As a result of the review and in particular comments received via the Questionnaires, the SHC makes the following proposals for the Method.

7-025 *Aphelenchoides besseyi* / *Oryza sativa*

Accept Method with new review date (2018).

General editing

The method will be subject to editing of errors, correction of taxonomy and updated formatting where necessary.

In conclusion, no formal requests for changes or withdrawal of the method under review were submitted to the ISTA Secretariat or the ISTA-SHC since its adoption in 2008. It appears that the method is thus considered fit for purpose.

The Seed Health Committee wishes to thank all the laboratories for taking the time to complete the questionnaires. Their inputs are greatly appreciated. ■

ISTA Annual Meeting 2015 Montevideo, Uruguay, 15–18 June
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Review of the ISTA audit process: results of the questionnaires

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At the Ordinary General Meeting 2014 in Edinburgh, the ISTA Accreditation Working Group, chaired by Rita Zecchinelli provided a presentation on the review of the ISTA accreditation system. This presentation could only provide information on selected topics, and the participants were informed that the complete evaluation would be available after the meeting. In the following pages the results of the analysis, comments provided on the questionnaires, conclusions and resulting questions are given.

Background

At the Ordinary Meeting 2012 in Venlo (Netherlands), the ISTA Membership approved a motion jointly proposed by the ISTA Executive Committee and the Designated Authorities from Australia and New Zealand. The motion proposed a review of the audit process, in order to improve its cost effectiveness, considering the overall cost to laboratories, without reducing standards.

In order to fulfil the request of the motion, a working group was established, including representatives from ISTA, the seed industry and the Designated Authorities who had taken the initiative of the motion. The working group members are:

- Rita Zecchinelli (Chair of the working group and ISTA Executive Committee Member)
- Joël Léchappé (ISTA President)
- Ronnie Don (ISTA Honorary Life Member)
- Masatoshi Sato (ISTA Executive Committee Member)

- Craig McGill (ISTA Executive Committee Member)
- Beni Kaufman (ISTA Secretary General)
- Rasha El-Khadem (ISTA Accreditation and Technical Department)
- Graeme Smith (Representative of the Australian Designated Authority)
- John Randall (Representative of the New Zealand Designated Authority)
- Piero Sismondo (International Seed Federation)

In order to identify and collect the opinions of as many stakeholders as possible, the working group decided to distribute two questionnaires, the first designed for the laboratories, the second for the ISTA Designated Authorities and other stakeholders.

The aims of the questionnaires were not only to identify the needs related to the ISTA accreditation system, but also to collect information on other accreditation systems relevant for the seed testing laboratories. This information will help to develop proposals for a review of the ISTA accreditation system.

At the Ordinary General Meeting 2013 in Antalya (Turkey), the questionnaires were presented and then distributed. The responses were received before the end of 2013 and then analysed. The results were presented at the Ordinary General Meeting 2014 in Edinburgh (UK).

The questionnaire for the laboratories

The questionnaire was a success, as answers were received from more than half of the ISTA laboratories (106 of 202), 70 % of the ISTA-accredited laboratories (81 out of 120) and from more than 80 % of the countries or distinct economies represented in ISTA (58 of 71). All types of laboratory were represented (public, company and private independent laboratories). It is interesting that 43 out of the 81 ISTA-accredited laboratories are also accredited based on other standards (ISO

17025 or others). Almost all the ISTA-accredited laboratories have traditional tests in their scope of accreditation, and more than 90 % hold accreditation for sampling. Table 1 gives a picture of the laboratories participating in the questionnaire.

The needs

When asked to give an answer concerning their needs connected to ISTA accreditation:

- 32 of 81 (~40 %) of the ISTA-accredited laboratories stated that they must be accredited because this is requested by the national authority or the administration they belong to. This is particularly true in Australasia, Asia and Africa, while South and North American laboratories are less represented in this group. The request by the national authority or the administration is more binding for the governmental laboratories (49 %) than for the company laboratories (21 %) or those with private-independent status (27 %);
- 14 of 25 non-ISTA-accredited laboratories state that ISTA accreditation is requested by the national authority or the administration they belong to (will they seek accreditation in the future?);
- 75 of 81 (~93 %) of the ISTA-accredited laboratories need to be accredited because they issue ISTA Certificates. In this group were 19 of 19 company laboratories, 9 of 11 private independent laboratories, and 47 of 51 governmental laboratories;
- the overall evaluation of ISTA accreditation is good (it is very prestigious for 90 % of the participants, it is the most important recognition for 88 % of the ISTA-accredited laboratories and 60 % of non-ISTA-accredited laboratories);
- 43 of 81 ISTA-accredited laboratories are accredited also by another accreditation body, but more than 50 % would be happier to be accredited by one body only.

ACCREDITATION

Review of the ISTA audit process: results of the questionnaires

Table 1. A picture of the laboratories participating in the survey

Status	ISTA accredited	Not ISTA accredited
Governmental laboratories	52	17
Company laboratories	19	6
Private independent laboratories	10	2
Total	81	25

Status	Participant laboratories	
Accredited only by ISTA	38	35,8 %
Accredited by ISTA + other bodies	43	40,6 %
Accredited only by other bodies	10	9,4 %
Not accredited	15	14,2 %
Total	106	100,0 %

Area	Number of laboratories	%
Africa	9	8 %
Asia	26	24 %
Australasia	6	6 %
North America	8	8 %
South America	4	4 %
Europe	50	47 %
No response	3	3 %
Total	106	100 %

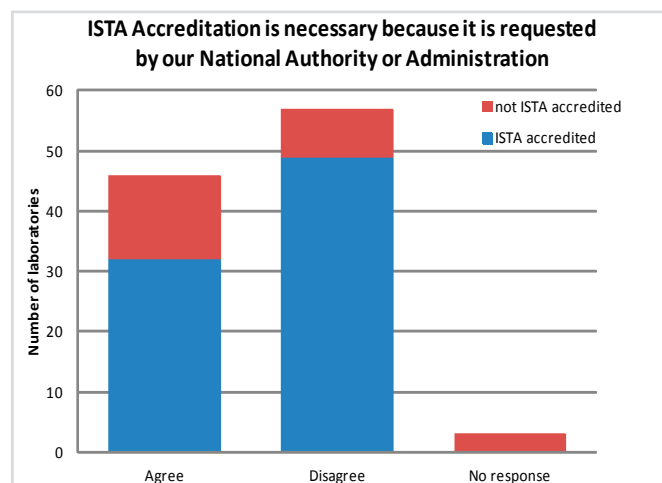
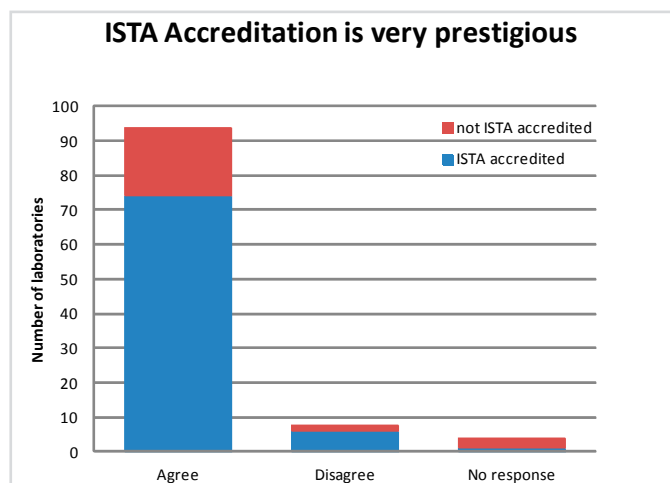
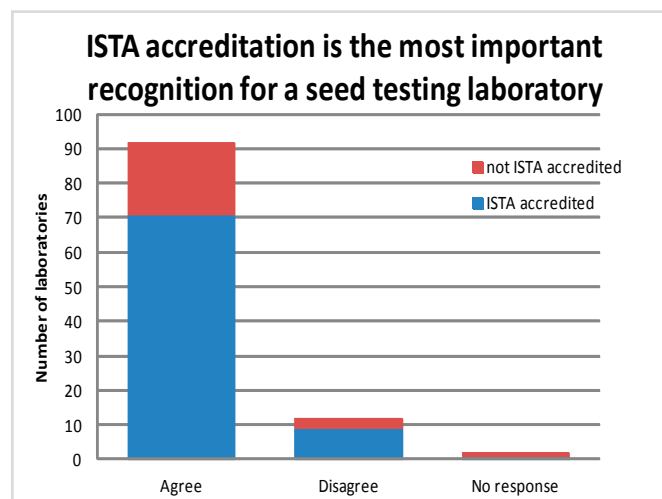
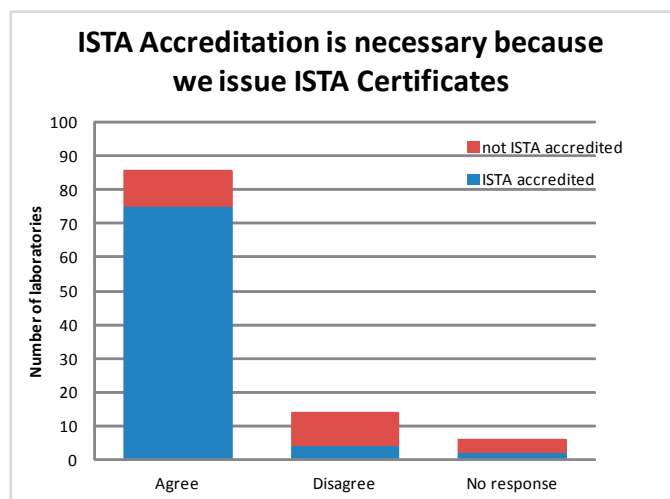


Figure 1. Why are laboratories ISTA accredited?

Figure 1 shows some details thereof.

When asked to state what they appreciate in the ISTA accreditation system:

- the Proficiency Test Programme is appreciated by almost 100 % of the participants;

- the competence of the ISTA auditors is appreciated by 84 % of the participants;
- the possibility to be accredited for performance-based methods is appreciated by 74 % of the participants;

- intangible benefits seem to be also important, such as the focus on seed testing, being part of a community of seed testing laboratories, receiving support from the Association.

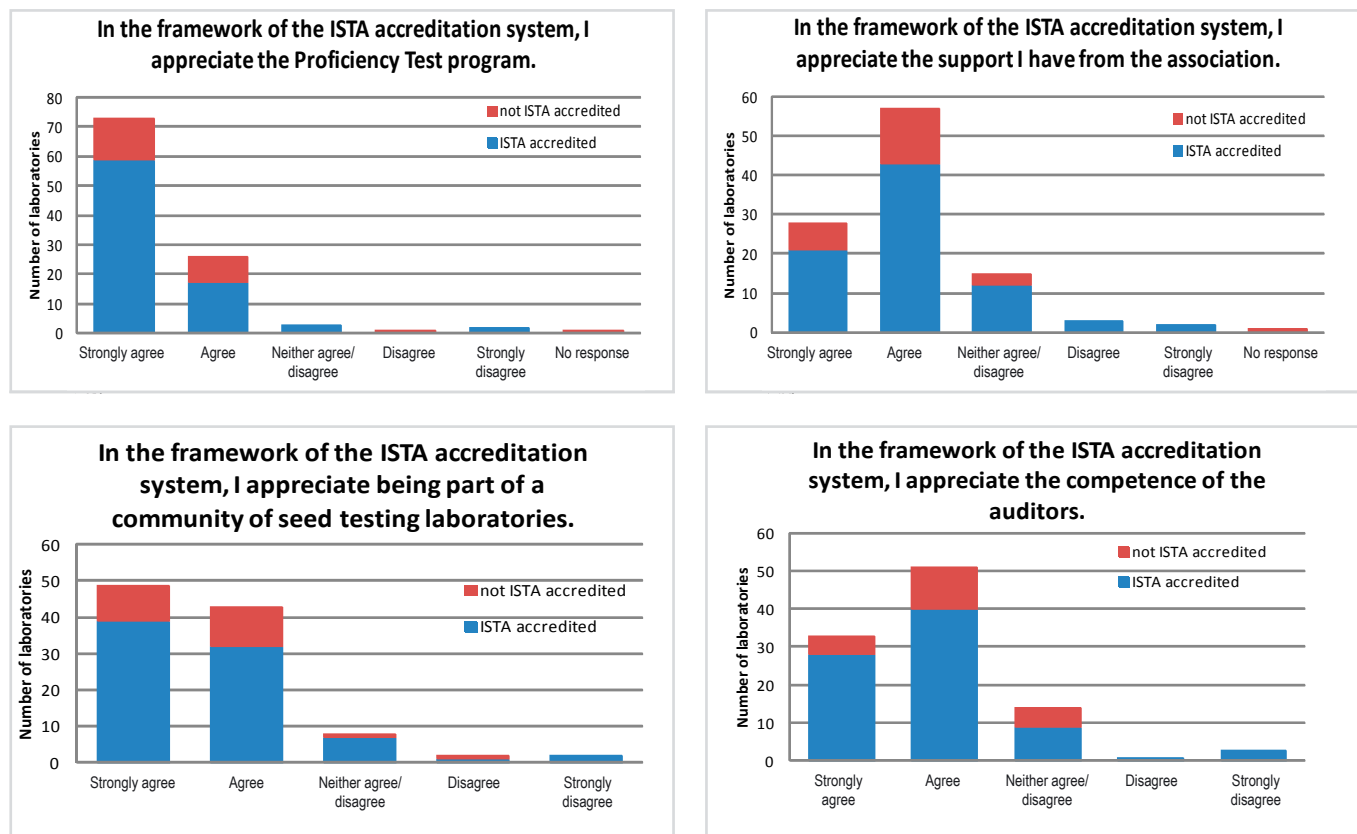


Figure 2. What the laboratories appreciate in the ISTA accreditation system.

Table 2. Details of the laboratories that have expressed concerns about the costs of ISTA accreditation (they agree or strongly agree that costs are a concern)

All laboratories			Governmental laboratories			Company and private independent laboratories		
Area	Agree or strongly agree		Area	Agree or strongly agree		Area	Agree or strongly agree	
	Number	%		Number	%		Number	%
Africa (9)	6	67	Africa (8)	5	63	Africa (1)	1	100
North America (8)	6	75	North America (4)	4	100	North America (4)	3	75
South America (4)	2	50	South America (3)	1	33	South America (1)	1	100
Asia (26)	10	38	Asia (15)	6	40	Asia (11)	4	36
Europe (50)	23	46	Europe (33)	16	48	Europe (17)	7	41
Australasia (6)	3	50	Australasia (3)	2	67	Australasia (3)	1	33
No responses (3)	1	33	No responses (2)	0	0	No responses (1)	1	100
Total (106)	51	48	Total (68)	34	50	Total (38)	18	47

Figure 2 shows some details in the graphs.

About the reasons why some laboratories do not appreciate the ISTA accreditation system:

- costs are a concern for about 50 % of the laboratories, while 34 % do not express an opinion (there are no big differences between different kinds of laboratories; see Table 2); as far as the costs are concerned, it is interesting that later on in the questionnaire many laboratories state that ISTA accreditation is expensive and at the same time gives good

value for the costs; only a few laboratories provided information on the costs of other accreditation systems;

- 12 laboratories do not appreciate the way the audits are conducted: they are from Africa (1) North America (3), Asia (1), Europe (6), Australasia(1);
- 28 laboratories do not appreciate the frequency of the audits: they are from Africa (2) North America (3), South America (1), Asia (5), Europe (15), Australasia (2).

A total of 55 laboratories (52 %) do not have reasons to criticize the ISTA accreditation system (see Fig. 3 for the details).

The questionnaire was also a good opportunity to assess the degree of recognition of the ISTA accreditation system, as it is perceived by the member laboratories (Fig. 4):

- 90 % of the participants state that the ISTA accreditation system is highly recognized;
- 18 % of the laboratories think that the ISTA accreditation system is not

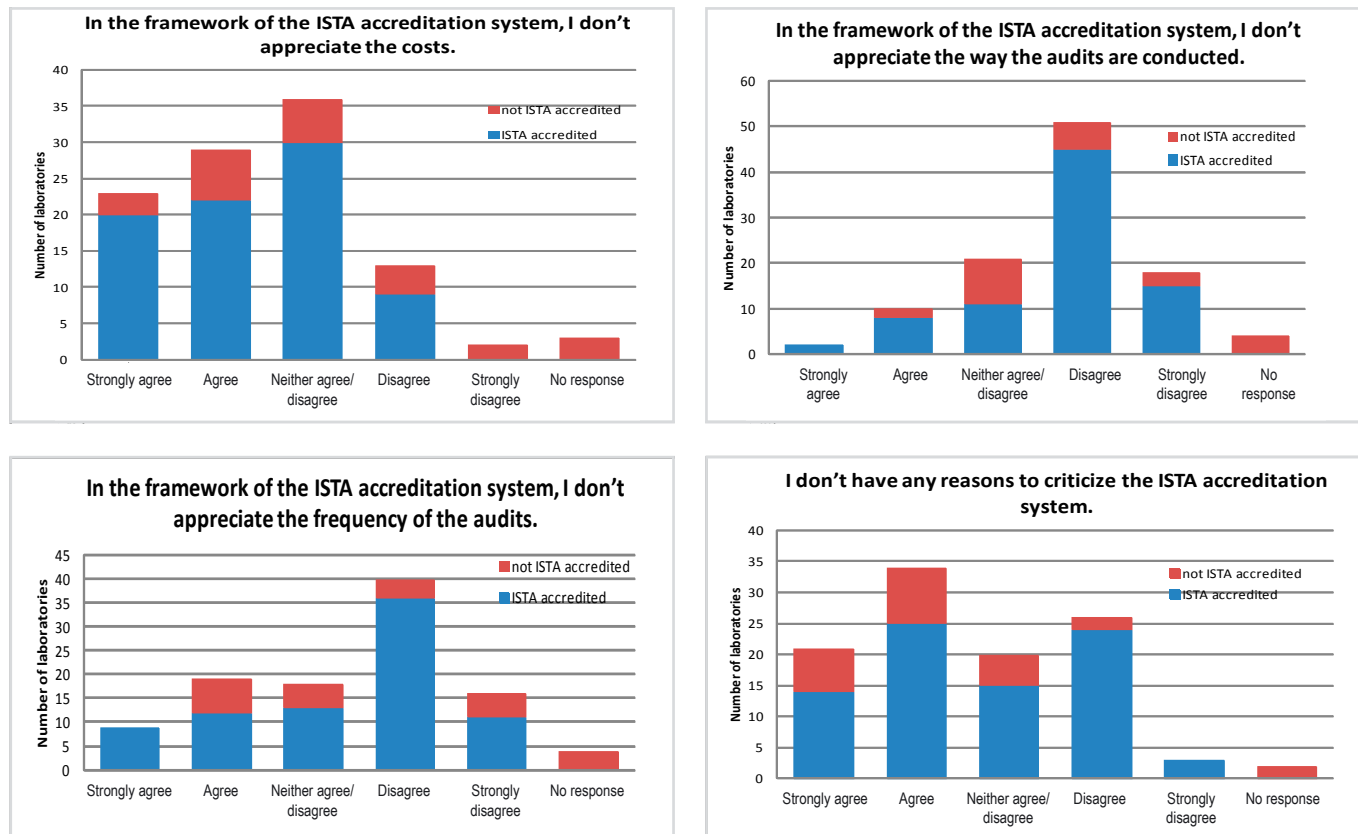


Figure 3. What the laboratories do not appreciate in the ISTA accreditation system.

recognized as equivalent to other accreditation system/s: they are from North America (5), South America (1), Asia (7), Europe (6).

- When requested, 9 do not provide further information, 5 state that ISO accreditation is more recognized (4 laboratories from Europe, 1 laboratory from North America), 5 state that a regional or national system is more recognized (3 laboratories from North America, 2 laboratories from Asia).
- 47 % of the laboratories state that ISTA accreditation is recognized only for traditional tests, while a percentage of 59 % state that ISTA accreditation is recognized for all kinds of tests.

ISTA audits: the laboratory's experience

The ISTA-accredited laboratories were also asked to provide their feedback based on their experience of ISTA audits. As shown in Figure 5, 75 % of them think that ISTA audits always provided a true picture of the laboratory, and 80 % state that ISTA audits were always an

opportunity to improve (one accredited laboratory disagreed).

Several questions were designed to understand the role that should be assigned to the Proficiency Tests (PT), according to the ISTA laboratories. As shown in Figure 6, it is not easy to evaluate the answers:

- 80 laboratories (75 %) think that the PT results should be taken into greater consideration;
- 64 laboratories (60 %) agree and 35 (30 %) disagree that laboratories with low PT ratings should be audited more frequently.

But at the same time:

- Only 27 participants (25 %) expect that, during the audits, laboratories with high PT ratings will show a small number of non-conformities, and only 37 participants (35 %) expect that laboratories with low PT ratings will show a high number of non-conformities.

As a further piece of information, after receiving the replies to the questionnaire, the ISTA Accreditation and Technical

Department evaluated the relationship between the laboratory performance as shown by the PT rating and that shown by the audit non-conformities. For various reasons (e.g. not all the laboratories already have an overall rating for all tests, not all the non-conformities have the same importance), the exercise is very difficult and for the time being no correlation could be found.

As far as the frequency of the ISTA audits is concerned (one audit in three years), 75 laboratories (71 %) think that it is an appropriate frequency; this is the opinion of most of the laboratories from all geographical areas of the world (Fig. 7, Table 3). With regard to other audit systems, 20 laboratories state that ISTA audits are less frequent, 15 laboratories state that the frequency is the same, and 10 laboratories state that ISTA audits are more frequent.

Concrete suggestions aimed at improving the system

Laboratories were asked to add any comments concerning the ISTA accreditation

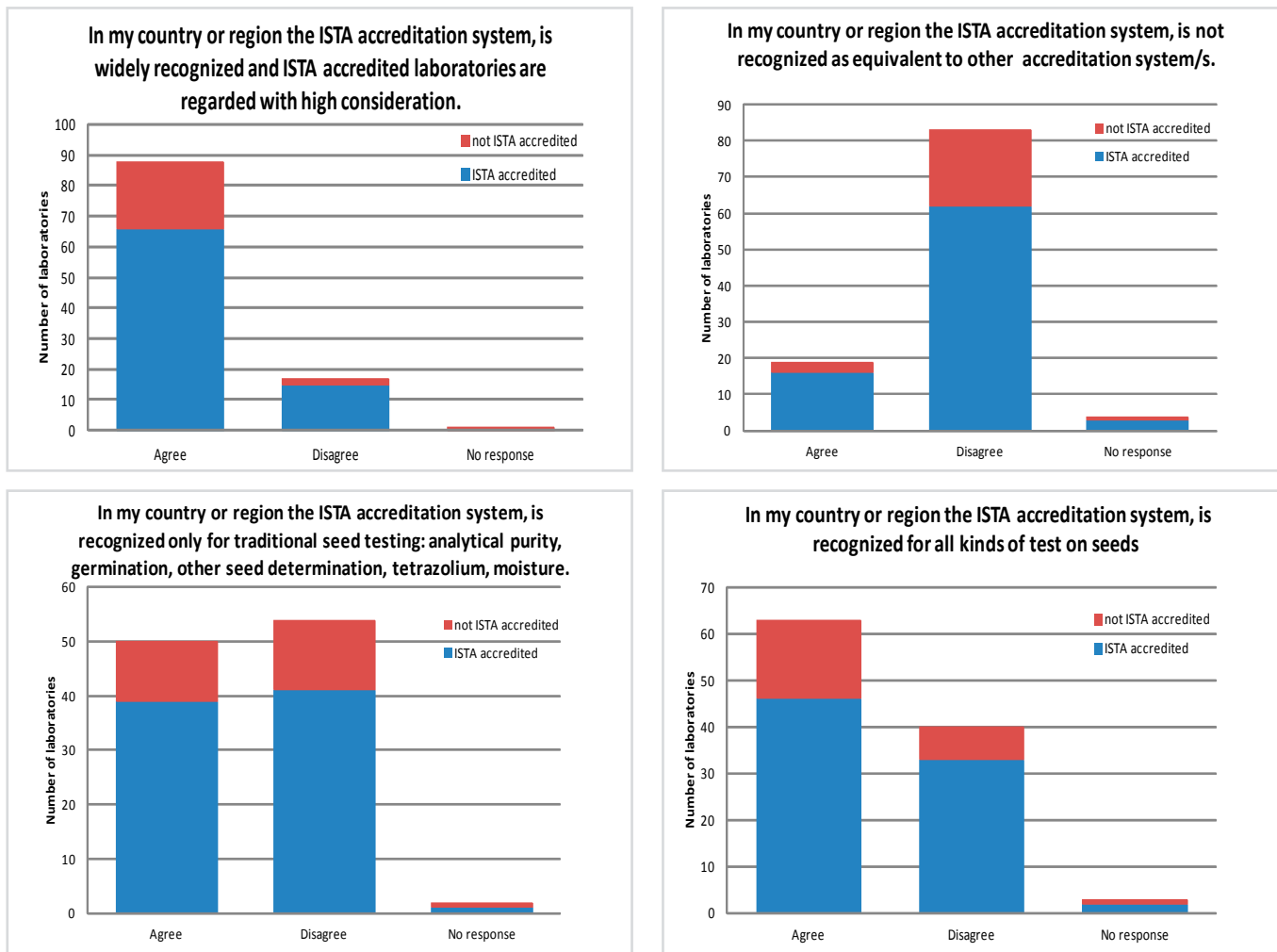


Figure 4. Recognition of the ISTA accreditation system

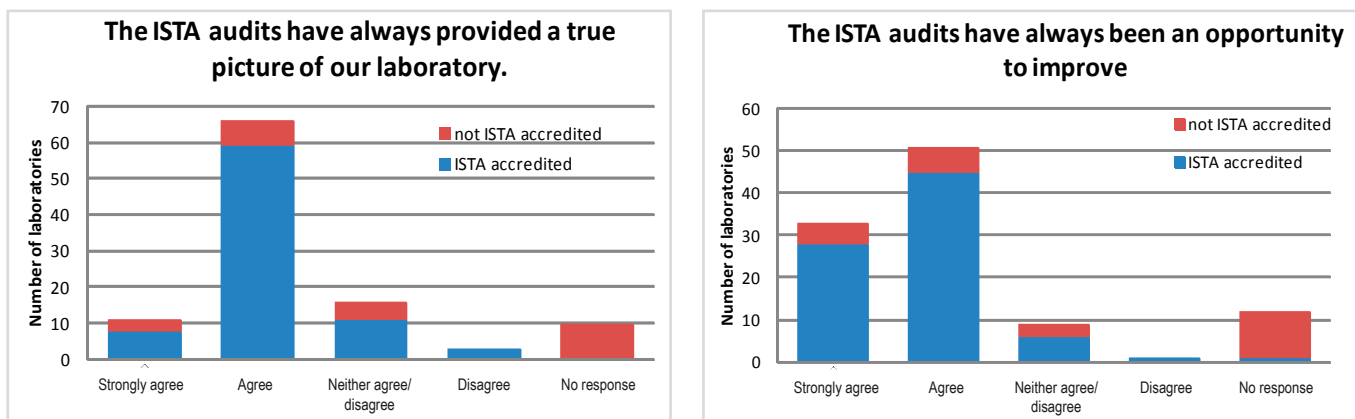


Figure 5. ISTA audit: the experience of the laboratories (general feedback)

system or suggestions how to improve it. The suggestions received can be grouped into categories.

a) Differentiating the fees

- The fees should be tailored to the species (less expensive for forest species), the country (based on the economy), the scope of accreditation (less expensive for small scopes), the size of the laboratory

- (less expensive for small laboratories), the number of Certificates issued by the laboratories (less expensive for laboratories issuing a few Certificates);
- lower fees for laboratories of the same organization, based in different countries

ACCREDITATION

Review of the ISTA audit process: results of the questionnaires

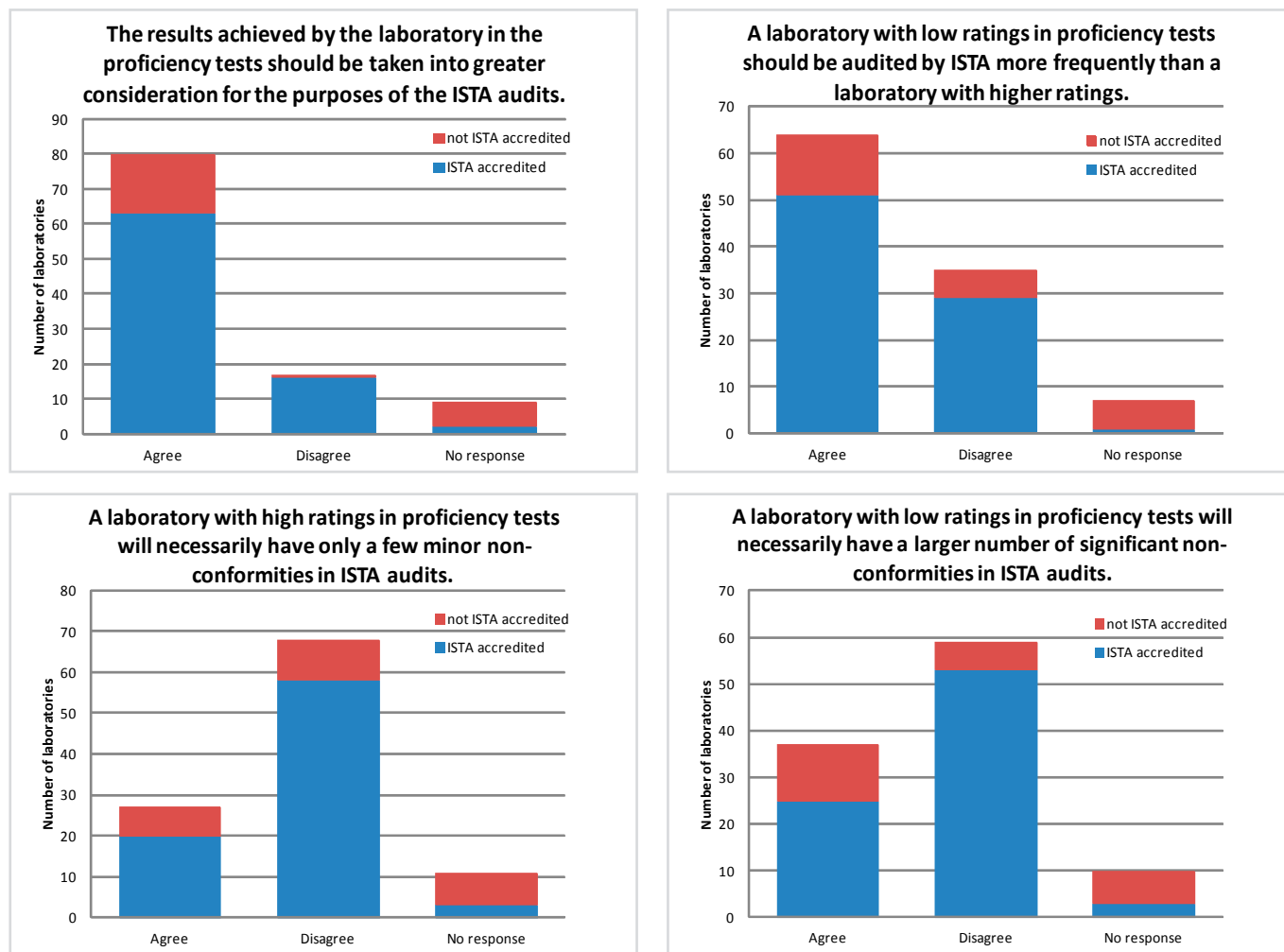


Figure 6. The role of the Proficiency Test in the mind of the participants

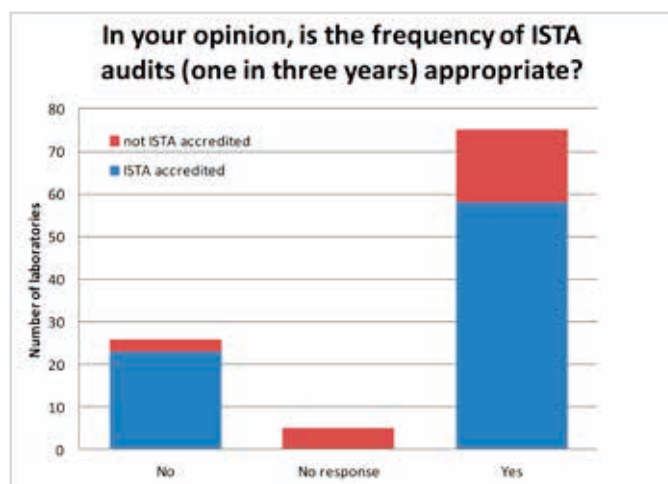


Figure 7. About 75 % of the laboratories think that the frequency of the ISTA audits is appropriate

Table 3. In all the areas, half or more than half of the laboratories think that the frequency of the ISTA audits is appropriate

Area	Yes		No		No response
	Number	%	Number	%	
Africa (9)	5	56	3	33	1
North America (8)	4	50	4	50	
South America (4)	4	100			
Asia (26)	20	77	5	19	1
Europe (50)	35	70	12	24	3
Australasia (6)	4	67	2	33	
No responses (3)	3	100			
Total (106)	75	71	26	25	5

and having the same quality assurance system;

- lower fees for laboratories audited by other bodies (ISTA should use the results of those audits);
- lower fees for laboratories preparing Proficiency Test rounds;
- ISTA should recognise national ISO-17025 audits to avoid the need for a laboratory to be audited by both bodies (in this case, ISTA could use the Proficiency Test system to assess the competence plus use desk audits);
- charge the audit basic costs and separately reimbursement of expenditures (travelling and accommodation);
- increase the annual fee and reduce the audit fee (to avoid the large audit fee every three years).

b) Review of the audit system

- Group the audits in the same region;
- in the case of “good” laboratories (which showed good results both in the Proficiency Tests and in the previous audits), decrease the audit frequency (e.g. an audit every 4 years);
- decrease the audit frequency for all laboratories (an audit every 5 years; in between, the performance is checked through the Proficiency Tests);
- reduce the expenses (e.g. ISTA pays for the air ticket and the laboratory pays for the accommodation);
- the audit could be carried out by a local independent body;
- increase the Proficiency Test Programme and reduce the audit cost for the laboratory;
- take into consideration the Proficiency Test rating and the duration of accreditation (risk-based approach);
- if cheaper, organize one audit day with two auditors or two audit days with one auditor;
- possibility to organize a desk system or video audits.

c) Add benefits, in order to make the audit fee more acceptable

- Include a certain number of free ISTA Certificates in the membership fee;
- organize audits with a more consulting role;
- allocate time to receive questions from the staff.

The questionnaire for the Designated Authorities

The second questionnaire, for the Designated Authorities, was not as successful as the first, but at least for some areas it can be considered as representative. Replies were received from 16 Designated Authorities (DA) (22,5 % of the 71 countries/distinct economies):

- 2 from North America (of 2)
- 2 from South America (of 7)
- 6 from Europe (of 35)
- 3 from Africa (of 10)
- 1 from Asia (of 15)
- 2 from Australasia (of 2)

Based on the general information provided by the participants, it is interesting to note that:

- in all 16 countries there is at least one ISTA-accredited laboratory;
- in 9 of 16 countries there is at least one ISO 17025 accredited seed testing laboratory;
- in 5 of 16 countries there is at least one laboratory with accreditation based on other standards; these standards are national standards of the various countries (5);
- ISTA accreditation is recognized by the law in 9 countries (1 in South America, 5 in Europe, 2 in Africa, 1 in Australasia), ISO 17025 in 4 countries (1 in South America, 2 in Europe, 1 in Africa); more often all accreditation systems (ISTA, ISO as well the other standards) are recognized by popular practice.

As in the case of laboratories, the Designated Authorities (DAs) were also questioned about the needs they believe to be associated with the ISTA accreditation system. The replies showed that out of 16 DAs:

- 13 state that ISTA accreditation is necessary in order to issue ISTA Certificates;
- 6 state that ISTA accreditation is necessary because required by law (4 in Europe, 2 in Africa);
- 14 believe ISTA accreditation to be the most important recognition for a seed-testing laboratory;
- 13 think that ISTA accreditation is very prestigious;

- 2 state that for seed testing laboratories it is necessary to be accredited by ISTA and by another body as well;
- 4 think that ISTA accreditation is not necessary at all.

The questions are listed in Table 4, where the answers are reported area by area.

The DAs were also asked to provide feedback on their appreciation of the ISTA accreditation system (Table 5). The Proficiency Test Programme is again very popular and 14 out of 16 participants stated to appreciate it. The focus on seed testing as well as the support provided to the laboratories by the Association are also highly appreciated.

Which concerns are expressed by the DAs? 6 of them have no reasons to criticise the ISTA accreditation system, while 4 have such reasons. Costs are a concern for 8 DAs of 16; at the same time, 4 think that ISTA accreditation is expensive and gives good value for the costs. 3 DAs do not appreciate while 8 do appreciate how ISTA audits are conducted; 5 DAs do not appreciate while 8 do appreciate the frequency of the ISTA audits.

As far as the Proficiency Test Programme is concerned, again – as for the laboratories – it is not easy to have a clear picture. Most of the DAs (14 of 16) state that the Proficiency Test (PT) results should be taken into greater consideration for the purposes of ISTA audits. 11 of them also think that laboratories with low PT ratings should be audited more frequently than laboratories with higher PT ratings; at the same time, not all of them expect that laboratories with low PT ratings will have a larger number of significant non-conformities (9) or expect that laboratories with high PT ratings will have a smaller number of significant non-conformities (6).

Concrete suggestions aimed at improving the system

Like the laboratories, the DAs also provided suggestions and comments. Some are the same as those already listed above, others are new, such as the advice to decrease the audit frequency if there are no disputes or complaints received with regards to the Certificates issued by the laboratory.

Table 4. Questionnaire to the Designated Authorities: the needs related to the ISTA accreditation system

Question: ISTA accreditation is necessary because ISTA Certificates are requested. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	1	1	–
South America (2)	1	1	–
Europe (6)	5	1	–
Africa (3)	3	–	–
Asia-Pacific (3)	3	–	–
Total (16)	13	3	–

Question: ISTA accreditation is necessary because it is requested by the law. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	–	1	1
South America (2)	–	2	–
Europe (6)	4	2	–
Africa (3)	2	1	–
Asia-Pacific (3)	–	2	1
Total (16)	6	8	2

Question: ISTA accreditation is the most important recognition for a seed testing laboratory. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	–	2	–
South America (2)	2	–	–
Europe (6)	6	–	–
Africa (3)	3	–	–
Asia-Pacific (3)	3	–	–
Total (16)	14	2	–

Question: the seed testing laboratories need to be accredited both by ISTA and by another Body. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	–	2	–
South America (2)	–	2	–
Europe (6)	1	5	–
Africa (3)	1	2	–
Asia-Pacific (3)	–	3	–
Total (16)	2	14	–

Question: ISTA accreditation is very prestigious. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	–	1	1
South America (2)	2	–	–
Europe (6)	5	1	–
Africa (3)	3	–	–
Asia-Pacific (3)	3	–	–
Total (16)	13	2	1

Question: for the seed testing laboratories ISTA accreditation is not necessary at all. Do you agree?

Area	Agree	Disagree	No answer
North America (2)	1	–	1
South America (2)	2	–	–
Europe (6)	–	6	–
Africa (3)	1	2	–
Asia-Pacific (3)	–	3	–
Total (16)	4	12	–

One DA suggested the use of the financial tool developed by ISTA and presented to the membership to increase the transparency of the fees (the tool allows the allocation of the costs to the incomes).

Again, other inputs go in the direction of adding benefits instead of, or even in addition to, decreasing costs. New proposals presented by the DAs concern language (audit conducted in the local language) and the accreditation of non-laboratory institutions interested in seed sampling.

Conclusions

The participation of the ISTA laboratories in the survey was very successful, that of the ISTA Designated Authorities less so. The general feedback was good: the ISTA accreditation system seems to be highly appreciated both by the laboratories and the Designated Authorities.

The questionnaires showed some issues that are not always easy to evaluate.

Most of the participants state that the frequency of the ISTA audits is appropriate. This raises the question: **should we continue to discuss this issue?**

At the same time, most of the participants state that the PT results should be taken into greater consideration, but only a smaller number (25 % of the laboratories, 38 % of the DAs) think that laboratories with good PT ratings will have only few number of minor audit non-conformities. **This appears to be contradictory.**

For 50 % of the laboratories and DAs, costs are a concern. When asked to evaluate the costs of the ISTA accreditation system, more than 50 % of the participants do not express an opinion; the others have different opinions, but many of them think that ISTA accreditation is expensive and at the same time gives good value for the costs. Some laboratories and DAs suggested adding benefits to make the fees more valuable.

How should these needs be addressed?

The comparison with other systems cannot be analysed soundly (only a few answers have been received and these are not always easy to understand). **Should we insist in the attempt to compare the systems? Are the laboratories accredited to ISTA and other bodies ready to provide more information?**

Starting from the discussion about these issues, the work of the ISTA Accreditation Review Working Group will continue in the aim to present proposals useful to improve the system, its recognition, its cost effectiveness.

A first option was presented to the membership at the OGM 2014. It regards the transformation of the large audit visit fee, currently paid every three years, into an annual payment. Based on the discussion held in June, most of the ISTA members seem to appreciate this change. ■

Table 5. Questionnaire to the Designated Authorities: what it is appreciated/not appreciated in the framework of the ISTA accreditation system

Question: in the framework of ISTA accreditation, we appreciate the Proficiency Test Programme. Do you agree?				Question: in the framework of ISTA accreditation, we don't appreciate the costs. Do you agree?			
Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree	Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree
North America (2)	–	–	2	North America (2)	–	–	2
South America (2)	2	–	–	South America (2)	1	1	–
Europe (6)	6	–	–	Europe (6)	3	1	2
Africa (3)	3	–	–	Africa (3)	2	–	1
Asia-Pacific (3)	3	–	–	Asia-Pacific (3)	2	–	1
Total (16)	14	–	2	Total (16)	8	2	6

Question: in the framework of ISTA accreditation, we appreciate the support provided by the Association. Do you agree?				Question: in the framework of ISTA accreditation, we don't appreciate the way the audits are conducted. Do you agree?			
Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree	Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree
North America (2)	–	1	1	North America (2)	–	–	2
South America (2)	2	–	–	South America (2)	–	2	–
Europe (6)	5	–	1	Europe (6)	–	4	2
Africa (3)	3	–	–	Africa (3)	1	2	–
Asia-Pacific (3)	3	–	–	Asia-Pacific (3)	2	–	1
Total (16)	13	1	2	Total (16)	3	8	5

Question: in the framework of ISTA accreditation, we appreciate the focus on seed testing. Do you agree?				Question: in the framework of ISTA accreditation, we don't appreciate the frequency of the audits. Do you agree?			
Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree	Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree
North America (2)	1	–	1	North America (2)	1	1	–
South America (2)	2	–	–	South America (2)	–	2	–
Europe (6)	6	–	–	Europe (6)	–	4	2
Africa (3)	3	–	–	Africa (3)	2	1	–
Asia-Pacific (3)	3	–	–	Asia-Pacific (3)	2	–	1
Total (16)	15	–	1	Total (16)	5	8	4

Question: in the framework of ISTA accreditation, we appreciate the possibility to be accredited for PBA methods. Do you agree?				Question: we don't have any reasons to criticize the ISTA accreditation system. Do you agree?			
Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree	Area	Strongly agree/ agree	Strongly disagree/ disagree	Neither agree/ disagree
North America (2)	–	–	2	North America (2)	–	–	2
South America (2)	2	–	–	South America (2)	1	–	1
Europe (6)	5	–	1	Europe (6)	4	1	1
Africa (3)	1	1	1	Africa (3)	1	1	1
Asia-Pacific (3)	3	–	–	Asia-Pacific (3)	–	2	1
Total (16)	11	1	4	Total (16)	6	4	6

Only government laboratory in India with ISTA accreditation – the Coimbatore Seed Testing Laboratory IN16

M. V. Mohanasundaram

Assistant Director and Seed Testing Officer

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The Seed Testing Laboratory of Coimbatore in the state of Tamil Nadu in India is one of the oldest seed testing laboratories in India, established in 1964. Coimbatore, located on the banks of the river Noyyal and surrounded by the Western Ghats, is often referred to as the Manchester of South India, due to the numerous cotton mills in the district and hosiery units fed by the surrounding cotton fields in the suburbs. It is the second largest city in the state of Tamil Nadu, and the 17th top global outsourcing city of India.

This laboratory is now in its 50th year. It is part of the Department of Seed and Organic Certification, whose function is to test seeds received from the certification and inspection wings of the department as well as from the seed producers, dealers and farmers.

The accreditation now awarded by ISTA is due to seven years of continuous strenuous efforts, beginning with the laboratory becoming a member of ISTA in 2007, under the designation IN16.

The efforts put in by the agricultural officers R. Jawahar, E. Nirmala, C. N. Akila, A. Vanathi and P. S. Arulvadi, under the guidance of Seed Testing Officer M. V. Mohanasundaram, include firstly, the successful participation in five consecutive Proficiency Tests from January 2012 to February 2013. This thanks to the above-mentioned technical personnel who continuously studied the ISTA Rules and Handbooks for various areas of seed testing, and held discussions among themselves to improve their competency to the ISTA level.



The analyst team of IN16. From left to right: E. Nirmala, A. Vanathi, P. S. Arulvadi, C. N. Akila, R. Jawahar and Seed Testing Officer M. V. Mohanasundaram.

Secondly, IN16 implemented a quality system for its daily work, based on the ISTA Accreditation Standard. The laboratory procured and uses the precision instruments as stipulated in the ISTA Accreditation Standard with proper calibrations.

This finally led to the application for ISTA accreditation by IN16 in August 2013, and an on-site assessment by the ISTA auditors was scheduled for 27 January 2014. The two auditors from ISTA thoroughly audited both the functioning of the quality system and the technical competence of the IN16 agricultural officers.

A few non-conformities were found, which were addressed by IN16 within the appropriate time schedule approved by the auditors.

Finally, IN16 was granted accreditation by the ISTA Executive Committee on 3 June 2014.

This accreditation is a recognition of the high level of competence of the IN16 agricultural officers to the ISTA standards, and also of the high level of the laboratory's quality system, making it stand out among the other government seed laboratories in India. This will pave the way for the improvement in standards of seed testing by training of staff of other government laboratories by the agricultural officers to raise them to the level of ISTA standards. Such a rise in seed testing standards will evidently augment the quality of the seed reaching the markets, both national and international. So to conclude: if the quality in seed testing is higher, the seed reaching the farmer will certainly be of very high quality. ■

Accreditation of DuPont Pioneer Seed Testing Laboratory in Italy

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In March 2014, the DuPont Pioneer Seed Testing Laboratory located in Sissa Trecasali, Italy, obtained international accreditation with the International Seed Testing Association.

The laboratory was built in 1985 to support our production site. Over the last 30 years, the laboratory has increased the number and types of tests performed, moving from a simple local laboratory to an international one. In fact, from April 2012, the Sissa laboratory was integrated into the Pioneer Central Seed Quality Testing System in Europe. This expansion provides additional capacity to meet Pioneer business requirements of testing in all EU countries.

With the increase of skills and experience, the laboratory staff obtained (from 2009) the Accreditation of the Italian Official Certification for Corn, Sunflower, Soybean, Wheat and Barley. This accreditation includes sampling, germination and purity tests, and other-seed determinations.

In 2011, the laboratory became a Member of ISTA, and started the ISTA Accreditation programme.



This process included:

- ISTA Proficiency Test Program, taking about two years to achieve good results. During this period we improved our experience and started to build a seed reference collection;
- implementation of a Quality Management System to conform to ISTA Laboratory Accreditation Standards;
- attending ISTA workshops;
- training laboratory staff to achieve the required level of qualifications.

The ISTA Audit was scheduled for 16 October 2013.

The scope of accreditation for the Sissa laboratory includes seed sampling, purity testing, germination testing and other-seed determinations for cereals and other agricultural crops.

The ISTA Accreditation of the Sissa laboratory is the result of real teamwork. The team demonstrated strong professionalism in the preparation phases, during the audit and for the implementation of the corrective actions addressing the audit findings.

We are very proud of this accomplishment, and very proud to be a Member Laboratory in ISTA! ■



Laboratory accreditation changes

Status 1 September 2014

Re-accreditations

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International Society for Seed Science Workshop on Seed Longevity: 'Seeds For Future Generations – Determinants of Longevity'

IPK Gatersleben, Germany, 5–8 July, 2015

Plant genetic resources play a major role for global food security. Worldwide, 7.4 million accessions are stored in about 1750 ex situ gene banks. Since the majority of gene bank holdings globally are stored as seed, seed longevity is of exceptional importance for germplasm conservation. Great differences between plant species were recognised. In addition a huge variation within a species is present. However, there is a deficit in understanding the biology behind long and short seed life. The seed longevity workshop will focus on all aspects of seed ageing/conservation. It will concentrate on molecular mechanisms of biochemistry, physiology, biophysics and

genetics of seed survival. Hence, it will bring together scientists involved in seed science and seed banking.

With a total inventory of 150 000 accessions of 3212 plant species and 776 genera, the gene bank at IPK in Gatersleben, Germany, holds one of the most comprehensive collections worldwide. Therefore, it will be a predestined host for the workshop. Early July will be an appropriate time for the workshop. It will allow the participants to visit the gene bank facilities, including the extensive seed regeneration activities (~ 8000 accessions) in the fields and glass-houses of IPK.

The following topics will be discussed:

- Seed banking – state of the art
- Role of pre- and post-harvest environmental factors on seed longevity
- Genetics of inter- and intra-specific variation of seed survival
- Physiology and biochemistry behind seed ageing - deleterious effects vs. repair mechanisms

Detailed information about registration, abstract submission, accommodation and travel details you will find under:

http://meetings.ipk-gatersleben.de/ISSS_Longevity_2015/

ISTA Workshop on Quality Assurance in Seed Testing Depok, Indonesia, 12–16 May 2014

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The ISTA-accredited seed testing station Balai Besar PPMB-TPH, Jalan Raya Tapos, Depok, Indonesia hosted a quality assurance workshop in their laboratory premises.

18 participants from 7 different countries (Indonesia, India, Iraq, Malaysia, Philippines, Thailand and Zambia) attended the workshop. The participants were from governmental seed testing stations and the seed industry.

The workshop presented and discussed basic principles of quality management, and focused on the needs of seed testing laboratories wishing to comply with the ISTA Accreditation Standard and planning to prepare for attaining and maintaining ISTA accreditation. Rasha El-Khadem, head of the ISTA Accreditation



and Technical Department, and Joanne Hinke, ISTA technical auditor, delivered the lectures.

At the beginning the participants announced their expectations with regards to the workshop. For the majority of the

participants this event was the first ISTA workshop they attended.

One of the technical focuses was on seed sampling. After lectures about sampling in general and quality aspects in seed sampling, the participants could test sampling



equipment on a rice seed lot that the seed testing station had organised for the practical exercise.

For the system part, the workshop covered the following topics:

- How the ISTA Accreditation System is set up
- What is documentation control
- Training and how to maintain the competence of analysts
- General management
- Corrective actions and non-conforming work
- Internal quality control, monitoring of laboratory staff
- How to complete ISTA Certificates

The discussion we had regarding how to set up a document control system showed that

participants were very eager to understand in detail the advantages and disadvantages of applied systems.

In the technical part of the workshop, the participants obtained detailed information and practical experience with:

- how to verify the suitability of soil dividers
- how to use the ice point calibration method
- how to check whether a container is moisture proof
- how to perform substrate checks on different paper batches (pH, conductivity, phytotoxicity)

The group visited the calibration institute ABICAL in Bogor and had an informative tour through their calibration laboratories.

A lecture about “Calibration for measurement traceability” was provided by ABICAL.

The visit of the Bogor Palace, one of the presidential palaces in Indonesia, was an impressive experience. The tour through the huge Bogor Botanical Garden with its different tree selections must be highlighted.

The feedback provided by the workshop participants showed that their expectations were met and that they found the lectures and the group work very helpful.

We would like to thank the staff of the seed testing station in Depok for their hospitality and their efforts to organise this event making it a very pleasant experience. ■



ISTA Workshop on Seed Sampling & Quality Assurance in Seed Sampling

Edinburgh, Scotland, 23–26 June 2014

Max Soepboer

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The ISTA Bulking and Sampling Committee (BSC) held a workshop on seed sampling and quality assurance in connection with the ISTA Annual Meeting in Edinburgh. The workshop was organised by Gerry Hall, Head of Seed Certification at SASA (Science and Advice for Scottish Agriculture). SASA is a Scottish Government organisation that carries out various statutory and scientific activities, and it is where the Official Seed Testing Station for Scotland is based.

The workshop focused on two topics: seed sampling and quality assurance. Both were dealt with theoretically and in practice. Twenty-two participants from thirteen countries took part, from Belgium, China, Denmark, France, Germany, Latvia, the Netherlands, Poland, South Korea, Sweden, Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu, the United Kingdom and the USA. The participants came from ministries of agriculture, seed testing laboratories (both official



and private), research centres and certification agencies.

The lecturers for the workshop were Valerie Cockerell and Gerry Hall (both SASA, United Kingdom), Lotta Claesson (Swedish Board of Agriculture, Sweden) and Max Soepboer (former vice-chair of the BSC, the Netherlands). Both Lotta and Gerry are long-standing members of the BSC and have lectured at previous sampling workshops.

The theoretical lessons were held in the meeting room of SASA. The practicals

took place in the sampling warehouse of the SASA farm. At this warehouse, seed lots in various types of container (hessian bags, big bags, bulk and small packages) are stored for training and examination purposes of SASA sampling staff.

With regard to seed sampling, the following aspects were covered:

- General principles of seed sampling
- Introduction to sampling methods
- Seed sampling: sealing and labelling of seed lots
- General principles and types of automatic seed samplers
- ISTA protocol for approval of automatic samplers
- Testing and approval of automatic seed samplers
- Methods for reduction of the composite sample
- Training, examination and authorisation of seed samplers

Concerning quality assurance, the following items were dealt with:

- Check of sample dividers
- ISTA Accreditation Standard
- Quality assurance in seed sampling
- Internal quality control in seed sampling
- Monitoring of seed samplers (Internal audits and assessments)
- Non-conformities and corrective actions



Workshop reports

Each item was covered by means of a presentation for which the participants received hand-outs. Participants were invited not only to ask questions, but also to present their working methods and share experiences with each other. This resulted in lively discussions and enriching each others knowledge.

During the practicals on seed sampling, participants practised various ways of sampling such as sampling of bags with the Nobbe trier, sampling of boxes with the sampling stick, sampling of big bags with the extended Nobbe trier and sampling of small containers. Besides that participants carried out various sample homogenisation and reduction methods. A new element in the practicals was the so-called 'mock or practice examination'. For this purpose the participants worked in pairs consisting of a candidate sampler and an examiner. The candidate was to carry out a number of different samplings (Nobbe trier, stick sampler) as well as a mixing and dividing operation. On the basis of a checklist the examiner was to check the work of the candidate and give points for each step in the sampling and sample handing process and provide feedback to the candidate. After a certain time the examiner of each pair became the candidate and vice versa. The mock examination was regarded as highly

instructive by the participants and therefore deserves to be incorporated in future seed sampling workshops.

The practicals on QA in seed sampling consisted of:

- drafting a programme for the calibration of various sample reduction methods (soil divider, centrifugal divider, hand-halving method),
- defining the root cause for a non-conformity and drafting a plan to prevent the same non-conformity in the future,
- drafting a checklist for the assessment of seed samplers with the aim to detect possible trends

For these assignments the group was divided into small subgroups that each had to work out the assignment. The results of the work of the subgroups were subsequently discussed in the plenary group.

SASA had organised a very interesting social programme. On the Tuesday afternoon there was a bus tour through the beautiful east coast region of rolling land south of Edinburgh. Our guide, dressed in typical Scottish attire (kilt, sporran etc), not only told us interesting things about the region with its beautiful old coastal towns and villages, but also had a great sense of humour. The final destination were the impressive ruins of Tantallon Castle, a

semi-ruined fortress, built in the mid-1300s by the dynastic house of Douglas. The castle, which sits high on a cliff edge, served as a fortification for more than three centuries and endured three sieges, the last in 1651, which resulted in its final destruction. Standing on top of the old walls one had a splendid view of the countryside, the sea, and the mouth of the Firth of Forth and Bass Rock.

On Wednesday evening at SASA, there was a delicious and refined workshop dinner, prepared and cooked at the SASA kitchen. The dinner was followed by a whisky tasting organised by two field inspectors of SASA whose hobby it is to organise whisky tasting evenings. Five different types of whisky could be tasted. We were told how to taste them, together with information on the history of making whisky and various objects and utensils used in whisky making were shown. All in all it was a very interesting and tasty evening.

At the end of the workshop participants were asked to give their opinion about the programme and give suggestions for improvements. The general feeling of the participants was that the workshop was valuable, informative and supportive for their daily work at home. ■



ISTA Seed Health Testing Workshop 2014

Poznań, Poland, 4–7 September 2014

Dorota Szopińska¹ and Theresa Aveling²

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Lecturers and organizers. Front row (from left): Ilona Witczak, Hanna Dorna, Karin Sperlingsson, Krystyna Tylkowska, Dorota Szopińska, Theresa Aveling, Isabelle Serandat. Back row: Magdalena Jarosz, Reyes Blanco-Prieto, Agnieszka Rosińska.

The Seed Health Workshop was hosted by the Poznań University of Life Sciences and the Polish Phytopathological Society and took place in the laboratories of the Department of Plant Physiology. The workshop preceded the 11th Conference of the European Foundation for Plant Pathology and the 5th International Seed Health Conference in Krakow, Poland, 9–13 September 2014.

The title of the workshop was “Seed-borne pathogens of carrot, brassicas, pea, flax, soybean, wheat and barley”. There were 29 participants from 14 countries [Brazil (1), Chile (1), Czech Republic (1), Estonia (1), Finland (2), Germany (2), Ireland (1), Iraq (1), Latvia (2), Netherlands (4), Norway (1), Poland (6), Serbia (4), Sweden (2)]. Prof. Małgorzata Mańka, Chairman of the Polish Phytopathological

Society, opened the workshop and welcomed the delegates. The instructors came from 5 different countries.

Prof. Theresa Aveling (ISTA Seed Health Committee Vice-chair) from South Africa presented the opening lecture on “The International Seed Testing Association Seed Health Method Validation and Testing”. Prof. Reyes Blanco-Prieto (Seed Health Committee member) from the University of Almeria, Spain, presented on *Fusarium* spp. and their detection on Poaceae, and

Prof. Krystyna Tylkowska (former Seed Health Committee member) and Dr. Dorota Szopińska (Seed Health Committee member) from the Poznań University of Life Sciences, Poland, presented the detection of *Alternaria* spp. on carrots and brassicas, respectively. Mrs Isabelle Serandat (ISHI-Veg member) from GEVES-SNES, France, presented on the detection of several pathogens of pea, flax and soybean. Mrs Karin Sperlingsson (Seed Health Committee member), Swedish Board of



In the laboratory



Agriculture Seed Division, Sweden, informed the delegates on a range of different pathogens on barley and the different methods to detect them.

The workshop brought together seed health matter specialists and provided opportunities for international researchers, analysts and students to learn the international seed health testing methods validated by ISTA. The workshop provided a forum for both theoretical and practical exposure to seed health testing, and promoted exchange of ideas and collaboration between the participants and presenters of the workshop.

The workshop included theory and hands-on practical work within a laboratory. Lectures were supported by practical demonstrations, and focused on the

use of standardized ISTA seed health assay procedures. Our appreciation goes to all the lecturers who did an excellent job and provided detailed explanations and information for the workshop manual. The manual was well received by the participants, and every participant was exposed to new information that will be very useful in their home countries. The participants made full use of the international lecturers to discuss a wide range of seed health topics and problems and also evaluated the ISTA seed health testing protocols used in the workshop, making suggestions for improvements where possible. Dr. Szopińska handed over the ISTA certificates of attendance during the workshop dinner.

The social events included the workshop dinner on Saturday night at a restaurant in

the Poznań Old City called “U mnie czy u ciebie” which translated to English means “In your place or mine”! The workshop tour took place on Sunday afternoon, including an hour tram excursion through Poznań and a two-hour sightseeing tour of the Old City. Both events were enjoyed by all delegates.

Special thanks go to Dr. Hanna Dorona, Ms Magdalena Jarosz, Ms Agnieszka Rosińska and Mrs Ilona Witzczak who tirelessly helped with all the practical preparation before and during the workshop and with cleaning and clearing of the laboratory. Prof. Jolanta Floryszak-Wieczorek and the Department of Plant Physiology are acknowledged for the use of their facilities. ■



International Workshop on Seed Identification

Roelofarendsveen, the Netherlands, 24–26 March 2014

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This spring, a new initiative was launched: a Seed Identification Workshop for international participants. The aim of the workshop was to improve the identification of seeds found as impurities in seed samples. The participants learned how to identify the seeds and fruits from the 14 most important wild plant families occurring in the European arable landscape, and responsible for frequent impurities.

The ISTA Purity Committee aims to incorporate this workshop into its training programme for the coming year 2015. Here we would like to present a short introduction to the past workshop, and draw your attention to the later official presentation of the 2015 programme and the possibilities for registration.

Introduction

In March 2014, a three-day workshop was organized and hosted by Naktuinbouw in Roelofarendsveen, the Netherlands, as a result of a set of yearly courses that were previously organized for Dutch-speaking participants only. The professional content of the workshop was devised by two experts in the field of seed identification, Renée Bekker and René Cappers of the University of Groningen (for more details see www.plantatlas.eu). Dr. Bekker and Prof. Cappers were also the trainers at the workshop. There were 20 participants from 10 countries.



Above: Participants at work during the workshop

The workshop was specifically developed for seed analysts and those in industry who are involved in seed purity analysis or seed identification. No particular knowledge of seed identification was required to attend the workshop.

Content of the workshop

Over the three days, participants were given lectures, excursions and plenty of practical assignments in which they had to identify seeds under the microscope themselves.

A first major step in seed identification is the recognition of the plant family to which a particular seed or fruit belongs, making it possible to consult reference collections and seed atlases efficiently for a final identification. In this workshop, a selection of families was introduced that represent the majority of the seeds from the

ISTA Universal List of Species. The plant families *Apiaceae*, *Brassicaceae*, *Fabaceae*, *Asteraceae*, *Poaceae*, *Cyperaceae*, *Malvaceae*, *Boraginaceae* and *Polygonaceae* were discussed in great detail:

The *Manual for the Identification of Plant Seeds and Fruits* by Cappers and Bekker was used as a hard-copy reference and handed out to all participants. The book consists of chapters dedicated each to a single plant family, describing the diagnostic features for identification: orientation of seeds or fruits (infructescences), the specific morphological features of seeds and fruits, the morphology of the dispersal unit (diaspore) and the occurrence of variability of seed/fruit morphology within a species (seed dimorphism/heterocarpy).

In addition, participants were familiarized with the use of tools easily accessible through the Internet, such as the *Digital Seed Atlas of the Netherlands* (book and

web site; www.plantatlas.eu) as useful references for identification.

During the lectures participants were trained to understand and correctly apply the terminology that is often used in seed identification literature. The practical assignments focused on the specific features that distinguish seeds and fruits of closely related species from each other, and participants were challenged to identify vast amounts of seed material to the species level.

Interesting excursions and networking

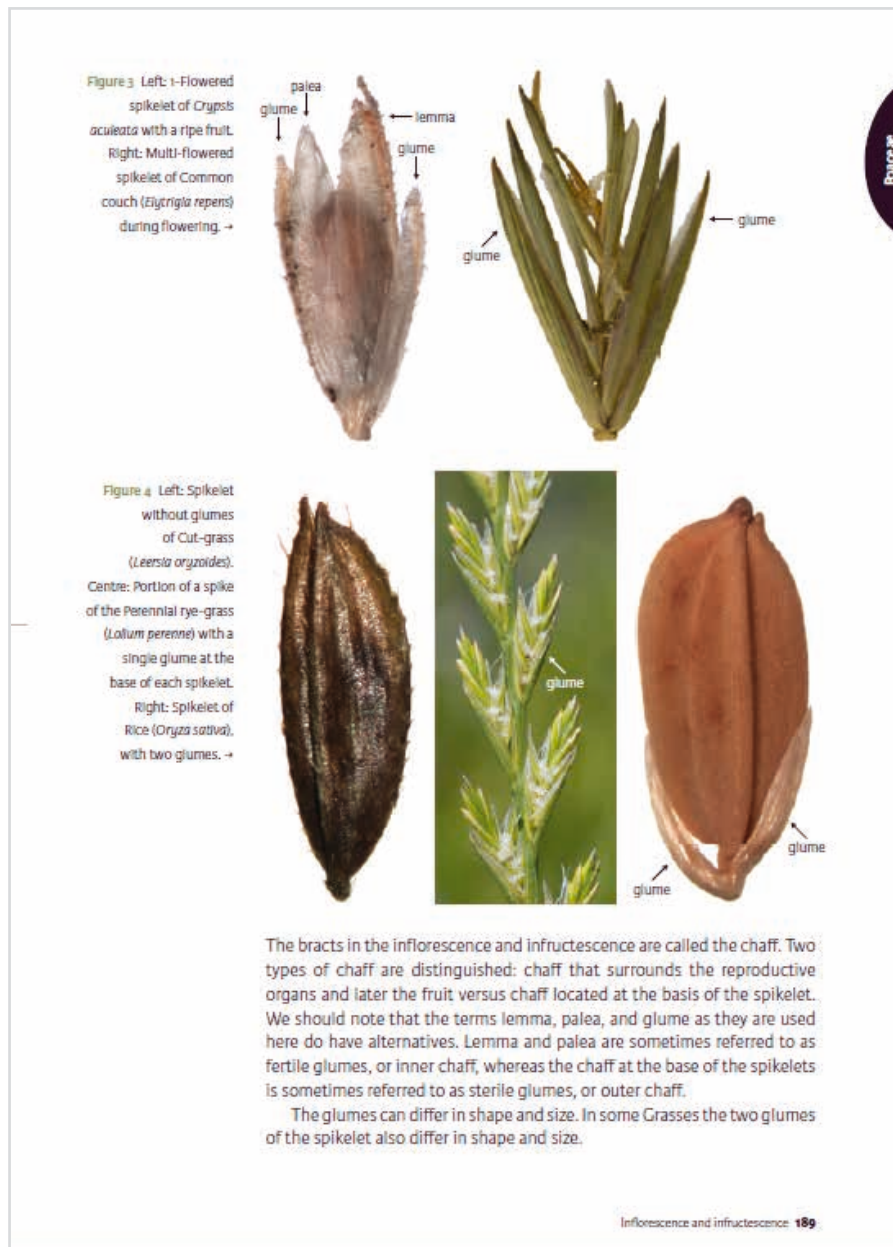
In addition to the lectures and practical work, the programme of the workshop contained a few exiting outings and social events. The workshop took place at the Netherlands Inspection Service for Horticulture (Naktuinbouw) in Roelofarendsveen, the Netherlands. Participants were given a guided tour of the Variety Center and the routine laboratories on the grounds of the venue. A bus ride combined a local tour through the surrounding Dutch landscape below sea level with a visit to the worldwide known Aalsmeer Flower Auction and the Botanical Garden in Leiden. Also included was a sightseeing boat tour of the city of Leiden and an excellent dinner in the city centre.

The participants formed an interesting network of peers, coming as they did from Benelux, Portugal, Eastern Europe and Scandinavia. They all had a laboratory background. Their experience in identification varied, but this was not a hindrance during the workshop.

ISTA Workshop

Following the excellent reviews of the workshop we are happy to announce that this workshop will be organized again in its existing format in the Netherlands in 2015. It will then be available for the worldwide international community of ISTA. Date and place will be announced in autumn on the ISTA web site, together with a detailed programme with full information.

Participants will not necessarily need experience with the identification of seeds. A good understanding of English is, however, a prerequisite.



An example of a page from the manual on the identification of grass seeds (Poaceae).

Further reading:

Cappers, R. T. J., Bekker, R. M. & Jans, J. E. A. (2012). *Digital Seed Atlas of the Netherlands*. Second edition, 524 pp. Barkhuis Publishing.

Cappers, R. T. J. & Bekker, R. M. (2013). *A Manual for the Identification of Plant Seeds and Fruits*. 275 pp. Barkhuis Publishing.

Cappers, R. T. J., Neef, R. & Bekker R. M. (2009). *Digital Atlas of Economic Plants*. Three volumes, >2000 pp. Barkhuis Publishing.

Web sites: www.naktuinbouw.nl, www.nak.nl, www.plantatlas.eu

2014	10–13 November	APSA Asian Seed Congress 2014	Macau, China	www.asianseedcongress.com/2014/
	10–13 November	ISTA Workshop on Seed Vigour	Bengaluru, India	www.seedtest.org/vigws1114
	10–14 November	ISTA Workshop on Seed Health Testing	Depok, Indonesia	www.seedtest.org/shws1114
	17–20 November	ISTA Workshop on Seed Sampling and Quality Assurance in Seed Sampling	Bengaluru, India	www.seedtest.org/bscws1114
2015	3–5 March	AFSTA Congress 2015	Victoria Falls, Zimbabwe	http://afsta.org/
	25–27 May	ISF World Seed Congress 2015	Kraków, Poland	www.worldseedcongress2015.com/
	30 May–5 June	AOSA/SCST 2015 Annual Meeting	Tampa, Florida, USA	www.aosaseed.com/annual_meeting_2015_tampa
	15–18 June	ISTA Annual Meeting	Montevideo, Uruguay	www.seedtest.org/am15
	5–8 July	ISSS Workshop on Seed Longevity	Gatersleben, Germany	http://meetings.ipk-gatersleben.de/ISSS_Longevity_2015/index.php
2016	June	31st ISTA Congress	Tallinn, Estonia	

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