

International Seed Testing Association



# ISTA

Publications  
and products  
2012-2013

rules

science

handbooks

minutes

information

QA

# New releases...

## ISTA Working Sheets on Tetrazolium Testing

### New supplements with full colour illustrations

**Volume I: 43 new sheets on agricultural, vegetable and horticultural species**

**Volume II: 15 new sheets on tree and shrub species**

**See page 14 for more information**

## Contents

### International Rules for Seed Testing

1.1	International Rules for Seed Testing	1
1.2	Amendments	2
1.3	Replacement binders	2
1.4	ISTA Method Validation Reports	2

### Seed Science and Technology

2.1	Journal subscription	3
2.2	Back issues	3

### Handbooks and proceedings

3.1	Flower seed	4
3.2	Germination	5
3.3	Moisture	6
3.4	Nomenclature	7
3.5	Purity	7
3.6	Laboratory equipment	8
3.7	Sampling	9
3.8	Seed health	10
3.9	Statistics	13
3.10	Tetrazolium	14
3.11	Tree and shrub seed	15
3.12	Variety	15
3.13	Vigour	17
3.14	Replacement binders	17

### Minutes and reports

4.1	Minutes of membership meetings	17
4.2	ISTA Committee reports	17

### Information publications

5.1	ISTA position papers	18
5.2	Seed Testing International (ISTA News Bulletin)	18

### Quality assurance

6.1	ISTA accreditation	19
6.2	ISTA Proficiency Test Programme	19

	<b>Order and payment information</b>	<b>20</b>
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# International Rules for Seed Testing

## 1.1 International Rules for Seed Testing

### 1.1.1 Rules Edition 2012

ISBN 978-3-906549-68-2

ISBN 978-3-906549-69-9 (Annexe to Chapter 7)

#### Rules Edition 2013

ISBN 978-3-906549-72-9

ISBN 978-3-906549-73-6 (Annexe to Chapter 7)

Available in November 2012

Complete set in two parts (Rules & Annexe to Chapter 7)

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

The *International Rules for Seed Testing* are approved by and amended at ISTA Ordinary Meetings on the basis of advice tendered by the ISTA Technical Committees.

The Edition 2012 (**effective 1 January 2012**) includes the latest changes which were passed at the ISTA Ordinary Meeting 2011, held at Zurich, Switzerland, on 16 June. The Edition 2013 (**effective 1 January 2013**) will include the changes which will be passed at the ISTA Ordinary Meeting 2012, to be held at Venlo, the Netherlands, on 14 June.

The *International Rules for Seed Testing* in English consists of two binders, since the Annexe to Chapter 7: Seed Health Testing Methods (see item 3.8.6) is published in a separate binder.

Updates, in the form of additions or replacements of existing pages, are published as Amendments to the *International Rules for Seed Testing* (see item 1.2), and can be inserted separately into the binder.

### 1.1.3 Règles Internationales pour les Essais de Semences

ISBN 978-3-906549-70-5 (Edition 2012)

ISBN 978-3-906549-74-3 (Edition 2013; available November 2012)

French translation of the International Rules for Seed Testing. Includes Annexe to Chapter 7.

### 1.1.4 Internationale Vorschriften für die Prüfung von Saatgut

ISBN 978-3-906549-71-2 (Ausgabe 2012)

ISBN 978-3-906549-75-0 (Ausgabe 2013; available in November 2012)

German translation of the International Rules for Seed Testing. Includes Annexe to Chapter 7.

For translations into other languages please contact the ISTA Secretariat.



## 1.2 Amendments to the International Rules for Seed Testing

### 1.2.1 Amendments 2012 and 2013

Keep your International Rules for Seed Testing up to date!

The Rules Amendments 2012 are Rules changes and editorial corrections which were passed at the ISTA Ordinary Meeting 2011, held at Zurich, Switzerland, on 16 June. These included, among many others:

Chapter 1: Reporting the methods for evaluating fresh seeds

Chapter 2: Addition of *Prunus persica*; new rules on sampling sticks, hand sampling, spoon method for *Arachis*, *Glycine* and *Phaseolus* and *Abies*, *Cedrus* and *Pseudotsuga*; hand halving method extended to further species

Chapter 4: Inclusion of a test for *Orobanche* spp.; reporting of actual sample weight

Chapter 5: new germination method for *Solanum nigrum*

Chapter 6: Clarification of various procedures

Annex to Chapter 7: Revised method for *Botrytis cinerea* on *Helianthus annuus*; new methods for *Ustilago nuda* on *Hordeum vulgare* and *Pyrenophora teres* and *P. graminea* on *Hordeum vulgare*

Chapter 11: Merging of Chapter 11 with its Annex

Chapter 15: New radicle emergence test for *Zea mays*

New Rules Chapter 18: Testing Seed Mixtures

The Rules Amendments 2013 are Rules changes and editorial corrections which will be passed at the ISTA Ordinary Meeting 2012, to be held at Venlo, the Netherlands, on 14 June.

A table in the preface details the pages that are to be replaced in the *International Rules for Seed Testing*.

### 1.2.3 Amendements 2012 and 2013 (French translation)

### 1.2.4 Änderungen 2013 (German translation)

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## 1.3 Binders for the International Rules for Seed Testing

### 1.3.1 Replacement binder for the Rules

### 1.3.2 Replacement binder for the Annexe to Chapter 7

\* N.B. No membership discount can be offered on replacement binders.

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## 1.4 ISTA Method Validation Reports

The ISTA Method Validation Reports cover studies supporting proposals for new or modified methods to be included in the *International Rules for Seed Testing*. The Method Validation Reports are published together with the Rules Proposals to be voted on by the ISTA Membership at the Ordinary Meeting.

### 1.4.1 Volumes 2004–2011

Free internet download at [www.seedtest.org/mv-reports](http://www.seedtest.org/mv-reports)

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# Seed Science and Technology

## 2.1 Seed Science and Technology Subscription 2012/2013 Vol. 40/41, Issues 1–3

**Editors: Fiona Hay (Chief Editor), C. Bailly, M. A. Bennett, C. C. Block, A. Dell'Aquila, I. Demir, R. Don, B. Hamman, J. Marcos-Filho, A. Marshall, S. Matthews, D. Mycock, A. A. Powell, Z. Procházková, M. Sacandé, N. W. Schaad, M. Sussman and C. Wood**

Print ISSN 0251-0952, Online ISSN 1819-5717

*Seed Science and Technology* (SST) is one of the leading international journals featuring original papers and review articles in all areas of seed production, sampling, testing, storing, processing and distribution. This widely recognised journal is designed to meet the needs of researchers, advisers and all those involved in the improvement and technical control of seed quality.

SST is published by the International Seed Testing Association in three issues per volume and year with approximately 800 pages. The journal was launched in 1973, to succeed the *Proceedings of the International Seed Testing Association*, which were first issued in 1921.

SST is available as a print and an online subscription.

Please visit [www.seedtest.org/sst](http://www.seedtest.org/sst) or contact the **ISTA Secretariat** for further details.

The online subscription includes all online back issues.



## 2.2 Printed back issues of Seed Science and Technology (SST)

### 2.2.1 Volume 34–39 No. 1, 2, 3

\* Please note that no membership discount can be offered for the subscription to *Seed Science and Technology*. An online subscription is included in the ISTA membership fee.

For online ordering  
and free downloads visit  
[www.seedtest.org](http://www.seedtest.org)

# Handbooks

## 3.1 Flower seed

### 3.1.1 ISTA Handbook on Flower Seed Testing, 1st Edition, 2008 (including Supplement 2010)

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

ISBN 978-3-906549-45-3

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

The handbook now contains 33 method sheets, covering 17 families, in an A4 size ring binder with a series of procedures and detailed descriptions, full-colour pictures, and instructions and conditions of the most important laboratory seed tests on flower species or genera.

For easy reference the genera are in alphabetical order. A glossary explains the expressions used in seed analysis.

The 33 method sheets are: **Acanthaceae**: *Thunbergia alata*; **Amaranthaceae**: *Celosia argentea*; **Asteraceae**: *Ageratum houstonianum*, *Aster* spp., *Bellis perennis*, *Callistephus chinensis*, *Calendula officinalis*, *Coreopsis* spp., *Cosmos* spp., *Dahlia pinnata*, *Gaillardia* spp., *Gazania rigens*, *Helichrysum bracteatum*, *Rudbeckia* spp., *Tagetes* spp., *Zinnia* spp.; **Balsaminaceae**: *Impatiens* spp.; **Begoniaceae**: *Begonia* spp.; **Brassicaceae**: *Matthiola* spp.; **Caryophyllaceae**: *Dianthus* spp.; *Gypsophila* spp.; **Geraniaceae**: *Pelargonium* Zonale Group; **Lamiaceae**: *Salvia* spp.; **Papaveraceae**: *Eschscholzia* spp.; **Primulaceae**: *Cyclamen persicum*; **Portulacaceae**: *Portulaca* spp.; **Scrophulariaceae**: *Antirrhinum majus*; **Solanaceae**: *Petunia* × *hybrida*; **Tropaeolaceae**: *Tropaeolum* spp.; **Verbenaceae**: *Verbena* spp.; **Violaceae**: *Viola* spp.



### 3.1.2 Supplement 2010 to ISTA Handbook on Flower Seed Testing

Seven new method sheets: **Asteraceae**: *Aster* spp., *Rudbeckia* spp.; **Caryophyllaceae**: *Gypsophila* spp.; **Papaveraceae**: *Eschscholzia* spp.; **Portulacaceae**: *Portulaca* spp.; **Tropaeolaceae**: *Tropaeolum* spp.; **Verbenaceae**: *Verbena* spp.

ISTA Membership entitles you to a **50% discount**

## 3.2 Germination

### 3.2.1 ISTA Handbook on Seedling Evaluation, 3rd Edition, 2009

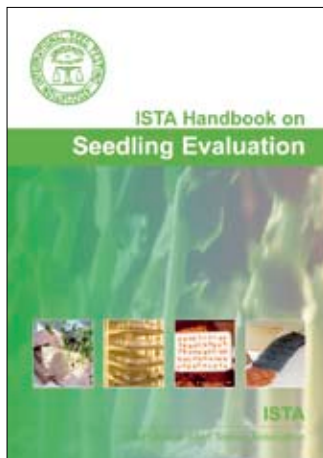
By the ISTA Germination Committee; editor R. Don

ISBN 978-3-906549-39-2

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

The first section is aimed mainly at the trainee seed analyst and trainers and contains background information on the elements of seed biology, an understanding of which is considered essential for seed analysts. For the first time, general evaluation rules such as the 50% rule for the evaluation of cotyledons are considered in depth and explained with the use of diagrams and colour prints of seedlings. The evaluation of various seedling types is fully illustrated by colour prints of normal and abnormal seedlings. Diagrams and plates are also used to explain in detail the intricacies of the evaluation of species, such as *Zea* and *Phaseolus*, and defects, such as physiological necrosis and negative geotropism.

The 3rd Edition 2009 includes all Amendments.



## Amendments to ISTA Handbook on Seedling Evaluation, 3rd Edition, 2003

### 3.2.2 Amendments 2006

The amendments consist of:

- Introduction of guidance on the evaluation of primary roots of grasses into Section 12: Seedling Type D, Seedling Group AA-1-2-3-1 (*Lolium*);
- Revision of Section 4: Laboratory conditions for seedling evaluation, to add the new substrate definitions, i.e. growing media and organic growing media, and the germination parameters;
- Addition of an Appendix 5 including illustrative standard operating procedures to reflect quality assurance requirements, i.e. growing-media specification checks on water retention, conductivity, pH, innocuity, temperature measurement and control of temperature.

### 3.2.3 Amendments 2009

- New Section 4.6.4: flow chart on the assessment of ungerminated seeds after a germination test.
- Appendix 5 now includes a flow chart on the calculation of the water-holding capacity of growing media.
- The new Appendix 6 gives guidance on the evaluation of seedlings with damaged, necrotic, decayed and discoloured tissue. Guidance on when actual cotyledon size or estimated cotyledon size should be used when applying the 50% rule is provided, as well as diagrammatic and photographic examples of the application of the 50% rule. This Appendix should be of particular use to those evaluating seedlings with physiological necrosis.

### 3.2.4 Slides of normal and abnormal seedlings

Please download special ordering list from [www.seedtest.org](http://www.seedtest.org) or contact the ISTA Secretariat.

267 slides showing normal and abnormal seedlings of about 35 agricultural and horticultural species were made at the seed testing laboratory at Zurich-Reckenholz. Some of these were used as prints in the new edition of the *Handbook for Seedling Evaluation*. Seed testing laboratories interested in obtaining copies of these slides, for training or other purposes, may request an order list from the Secretariat which contains all species and abnormalities represented.



## 3.3 Moisture

### 3.3.1 ISTA Handbook on Moisture Determination, Edition 2007

By the ISTA Moisture Committee; editors H. Nijënstein, J. Nydam and R. Don

ISBN 978-3-906549-49-1

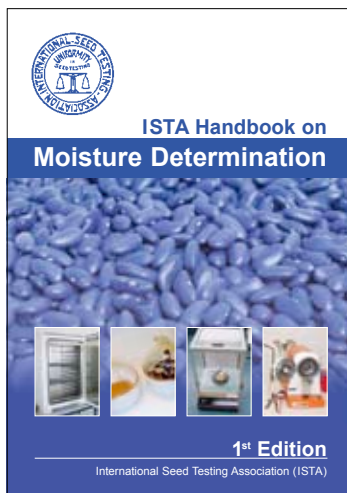
This first version of the *ISTA Handbook on Moisture Determination* provides additional help to the *International Rules for Seed Testing*, Chapter 9: Moisture. Its detailed instructions, interpretations of Rules sections, and examples of how to calculate results in detail should prove to be of value to those concerned with seed moisture testing.

The main chapters are:

- Moisture in seed (seed physiology, moisture testing during several stages in a seed's life, non-orthodox seeds);
- Methods of moisture testing (Karl Fischer, phosphorus pentoxide, ovens, capacitance and conductance type meters, NIR, NIT, NMR, RH);
- Sampling and sample preparation (examples, quality assurance);
- Reference method (including detailed procedure and examples of how to do the calculations);
- Constant temperature oven method (around 50% of the Handbook; contains detailed instructions, photographs, flow charts, examples of SOPs etc.);
- Moisture meters (detailed information, including monitoring and calibration);
- Reporting of results (calculations, tolerances, validation of new methods);
- References.

In addition, the Handbook contains a list of abbreviations and a glossary.

The chapters 'Moisture in seed' and 'Methods of moisture testing' are aimed mainly at trainee seed analysts, trainers and students, and contain background information on moisture in seed.



## 3.4 Nomenclature

### 3.4.1 List of Stabilized Plant Names, 5th Edition, 2007

By the ISTA Nomenclature Committee; compiled by J.H. Wiersema

ISBN 978-3-906549-44-6

The new edition includes a total of 2915 entries, with 63 new species names and 264 that have changed from the previous edition, including 62 changes to family names, and many other changes of spelling, author names, synonym names and other nomenclatural or taxonomic changes, bringing the List up to date with current taxonomy.

These changes were adopted at the 28th ISTA Congress at Iguazu Falls, Brazil, in May, 2007, and will be consistent with the International Rules for Seed Testing for the next six years.

Free internet download at [www.seedtest.org/stablist](http://www.seedtest.org/stablist)

### 3.4.2 A Multilingual Glossary of Common Plant Names, 2nd Edition, 1982

By the ISTA Nomenclature Committee; compiled by H. Koster and F. Schneider

ISBN 978-3-906549-15-6 235 pages, with explanatory notes in English, French and German

The glossary aims to assist seed traders, seed analysts and agricultural scientists in finding the correct corresponding scientific plant name of a seed sample, if only the common name is known or mentioned on labels and certificates or in correspondence and literature. It is arranged in three sections: In the first section, the scientific names, according to the ISTA Rules, are given in alphabetical order with the equivalent common names for each species, if available, in 61 countries. The second section is an alphabetical index of the common names with cross-references to the equivalent scientific names. A third section gives an alphabetical index of scientific synonyms.

## 3.5 Purity

### 3.5.1 Handbook on Pure Seed Definitions, 3rd Edition, 2010

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

ISBN 978-3-906549-46-0

This upcoming handbook will assist the seed analyst by expanding on and illustrating the pure seed definitions (PSDs) of the *International Rules for Seed Testing*, Chapter 3: The Purity Analysis. This will help in the training of analysts in purity testing according to international principles.

An illustration of the most relevant genera within a PSD will be given to provide practical guidance on the application of each definition. Each PSD is illustrated with scaled colour photographs or line drawings of seed covered by the PSD to help in understanding the descriptions. A comprehensive glossary of scientific terms applying to seed purity is also included.



## Cleaning of Agricultural and Horticultural Seed on Small-scale Machines

By E. Madsen and N.E. Langkilde

ISBN 978-3-906549-01-9

The purpose of this handbook is to assist seed processors as well as seed testers in handling seed after harvest. Seed cleaning is a mechanical process. The aim is to separate undesirable seeds and other components from the harvested lot with the smallest possible loss of pure seed. This handbook makes available the expert knowledge and experience of specialists. This certainly is an important step towards uniform seed testing worldwide for the benefit of seed traders and farmers.

The Handbook is divided into a theoretical Part 1 and a practical Part 2.

### 3.5.2 Part 1, 1st Edition, 1987

126 pages, 45 photographs and illustrations, and 14 tables.

### 3.5.3 Part 2, 1st Edition, 1988

117 working sheets with flow charts.

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### 3.5.4 Proceedings of the ISTA Purity Workshop

Compiled by H.A. Jensen; edited by the ISTA Secretariat

ISBN 978-3-906549-32-3

Proceedings of the ISTA Purity Workshop held in Budapest, Hungary, 1–4 April 1997

140 pages

The proceedings contain flow charts for procedures described in the ISTA Rules in relation to purity, proficiency tests, working samples for purity, and treatment of working samples prior to purity and number count tests. The proceedings also explain purity tests, mechanical aids, identification of seeds, calculation and reporting of results, accreditation and quality assurance.

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## 3.6 Laboratory equipment

### Calibration samples

Calibration samples for general seed blowers are available for the following grass species:

#### 3.6.1 *Dactylis glomerata* 3.0 g

#### 3.6.2 *Poa pratensis* 1.0 g

\* N.B. No membership discount can be offered on the calibration samples.

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### 3.6.3 Handbook for Home-made Equipment, 1st Edition

By E. Madsen

177 pages, 70 photographs and 74 sketches.

Descriptions, sketches and photographs of various seed testing equipment designed and manufactured at laboratories, but not marketed by commercial companies. The descriptions are sufficiently detailed for use in local production of the equipment presented.

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### 3.6.4 Project Seed Laboratory 2000–5000, 2nd Edition, 1983

Edited by W.J. van der Burg, assisted by J. Bekendam, A. van Geffen and M. Heuver

70 pages and 46 pictures.

A description of how seed testing laboratories, testing between 2000 and 5000 samples annually, in tropical and subtropical areas, can be established. Directives and general considerations are provided concerning staffing, organization of the work, layout of buildings and the equipment needed.

## 3.7 Sampling

### 3.7.1 ISTA Handbook on Seed Sampling, 2nd Edition, 2004

By the ISTA Bulking and Sampling Committee; editor M. Kruse

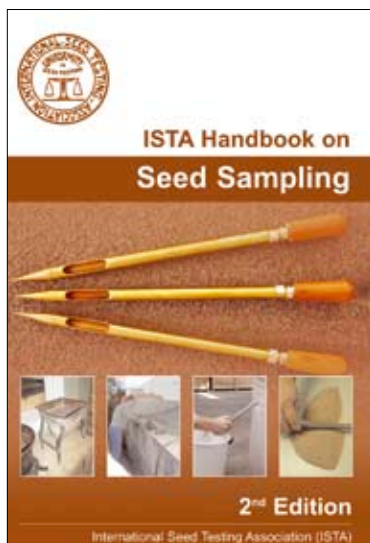
ISBN 978-3-906549-42-2

This handbook is made up of 148 pages in an A4 loose-leaf ring binder, with full-colour pictures.

The handbook should prove to be valuable to those concerned with sampling seed at all stages of production and testing. It is basically a practical guide but contains also elements of sampling theory to emphasize the important part that sampling plays in determining seed quality.

The main chapters of the handbook are:

- Chapter 1: discussion of general conditions and responsibilities;
- Chapter 5: description of sampling seed lots such as sampling intensity, sampling seed lots in containers and sampling from the seed stream; description of the tools and a step-by-step application of the method;
- Chapter 6: description of methods for sample reduction;
- Chapter 7: labelling and sealing methods for seed lots and seed samples;
- Chapter 8: procedures for submission of samples to the laboratory;
- Chapter 9: quality assurance.



For online ordering  
and free downloads visit  
[www.seedtest.org](http://www.seedtest.org)

### 3.8 Seed health

#### 3.8.1 Common Laboratory Seed Health Testing Methods for Detecting Fungi, 1st Edition, 2003

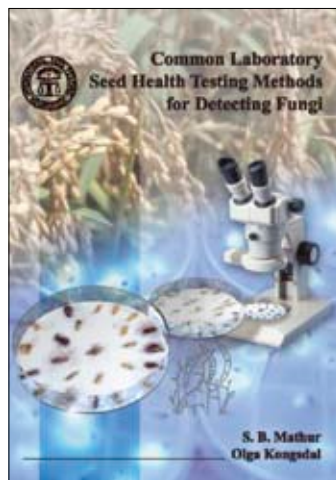
By S. B. Mathur and O. Kongsdal

ISBN 978-3-906549-35-4

This book is made up of 425 pages and 440 illustrations.

The book describes in detail the conventional testing methods that are used in detecting fungi associated with seeds. The basic facilities and equipment required to perform these methods are presented with photographs. There are eight chapters covering sampling, examination of dry seeds, the washing test, the blotter method and its modifications, the agar plate method, the embryo count method, and the seedling symptom test, supported by a glossary and literature references. Each method is supplemented with examples.

The book is written for scientists and technicians working at seed testing and plant quarantine laboratories where the health of seeds is monitored for planting value and where presence of fungi of quarantine importance is checked in seed consignments of big and small sizes, including germplasm. Methods described in the book, along with identifying characters of fungi, are useful to plant pathologists and seed technologists in their daily work. At the same time the book will act as a reference source to plant pathologists and mycologists in research and training programmes. The descriptions of 239 fungi are well illustrated with photographs (both black and white and colour) and line drawings of fruiting structures that will ease their identification.



#### 3.8.2 Seed-borne Fungi: A Contribution to Routine Seed Health Analysis, 1st Edition, 2002

By J. C. Machado, D. S. Jaccoud Filho and C. J. Langarak

ISBN 978-3-906549-37-8

This book came about through the collaboration of several colleagues working in seed pathology in different countries. The book covers updated topics approached during the training course held in Lavras/MG, Brazil, 1994, with support by the ISTA Seed Health Committee. Part of the book is dedicated to colour illustrations of seed health testing for some selected fungi.



### 3.8.3 An Annotated List of Seed-borne Diseases, 4th Edition, 1990

By M. J. Richardson

ISBN 978-3-906549-18-7 345 pages

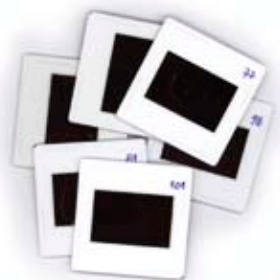
The Annotated List includes information about all kinds of pathogens (fungi, bacteria, viruses and nematodes), as well as some physiological disorders which affect seed or seed assessment. This information is cross-referenced in 3 indices (host common names; host scientific names with families; pathogens and other disease agents with nomenclature authorities, synonyms, references to descriptions and distribution maps). The list contains short synopses of relevant literature references.

This publication is very useful for research and testing laboratories, as well as for seed and plant pathologists, since important information can be obtained quickly together with relevant literature citations.

### 3.8.4 Slides of seed pathogens

Please download special ordering list from [www.seedtest.org](http://www.seedtest.org) or contact the ISTA Secretariat.

80 slides show 15 different pathogens (fungi, nematodes, bacteria) on 10 different hosts (*Apium graveolens*, *Beta vulgaris*, *Brassica* spp., *Helianthus annuus*, *Hordeum* spp., *Linum usitatissimum*, *Pisum sativum*, *Phaseolus* spp., *Triticum* spp. and *Vicia faba*). C. Anselme, then chair of the formerly named Plant Disease Committee, started this series which has been enlarged with slides from various research laboratories. Some of these were used as prints on the working sheets of the *Handbook on Seed Health Testing*.



### 3.8.5 Annexe to Chapter 7, Edition 2012/13 Seed Health Testing Methods

ISBN 978-3-906549-69-9

ISBN 978-3-906549-73-6

The *Annexe to Chapter 7* of the *International Rules for Seed Testing* comprises 30 validated seed health testing methods.

Each method description is a fully illustrated, self-contained unit that includes full details of the test, including media preparation, quality assurance information, pathogen identification and test evaluation.

Method descriptions are available either as part of the *International Rules for Seed Testing* or as a separate volume (see also page 1).



## 3.8.6 ISTA Handbook on Seed Health Testing

### Section 2: Working Sheets

Edited by various authors

33 working sheets in an A5 loose-leaf ring binder, with photographs and illustrations. Each working sheet is also available separately from the ISTA Secretariat.

The working sheets give detailed descriptions of methods for determining the presence of specific pathogens in seed samples. Each working sheet deals with one pathogen on one host.

Description of a method in these working sheets does not imply formal recognition by ISTA.

Although many of the methods described have been evaluated in comparative tests, they cannot be considered to be validated. Methods which have been validated will be included in the Annex to Chapter 7 of the *International Rules for Seed Testing*, and will be removed from this handbook.

#### Working sheets listed by pathogen

Pathogen	Host	Authors	Edition	No.
<i>Acremonium coenophialum</i>	Gramineae	R. E. Welty, W. J. Rennie	1st	55
<i>Alternaria longissima</i>	<i>Sesamum indicum</i>	S. H. Yu, R. K. S. Chauhan, S. B. Mathur	1st	59
<i>Alternaria sesami</i> (Kawamura)	<i>Sesamum indicum</i>	S. H. Yu, R. K. S. Chauhan, S. B. Mathur	1st	60
<i>Alternaria sesamicola</i>	<i>Sesamum indicum</i>	S. H. Yu, R. K. S. Chauhan, S. B. Mathur	1st	61
<i>Alternaria zinniae</i>	<i>Zinnia</i> spp.	P. Gambogi	2nd	32
<i>Anguina agrostis</i>	<i>Agrostis</i> spp.	I. Rohloff	1st	52
<i>Anguina tritici</i>	<i>Triticum</i> spp.	J. F. Southey	1st	54
<i>Ascochyta rabiei</i>	<i>Cicer arietinum</i>	S. B. Mathur	1st	38
<i>Cercospora kikuchii</i>	<i>Glycine max</i>	M. M. Kulik	1st	34
<i>Clavibacter michiganensis</i> subs. <i>michiganensis</i>	Solanaceae	H. A. Bolkan, C. M. Waters, M. Fatmi	1st	67
<i>Ditylenchus dipsaci</i>	<i>Vicia faba</i>	G. Caubel	1st	57
<i>Drechslera maydis</i>	<i>Zea mays</i>	S. B. Mathur	1st	39
<i>Drechslera nodulosa</i>	<i>Eleusine coracana</i>	S. B. Mathur	1st	36
<i>Fusarium oxysporum</i>	<i>Lycopersicon esculentum</i>	P. Gambogi	1st	58
<i>Gerlachia oryzae</i>	<i>Oryza sativa</i>	M. A. T. Mia, R. K. S. Chauhan, S. B. Mathur	1st	62
<i>Gloeotinia temulenta</i>	<i>Lolium</i> spp.	B. D. Matthews	1st	35
Lettuce mosaic virus	<i>Lactuca sativa</i>	I. Rohloff, J. Marrou	2nd	9
<i>Macrophomina phaseolina</i>	<i>Sesamum indicum</i>	A. Meiri	2nd	26
<i>Peronospora manshurica</i>	<i>Glycine max</i>	H. J. Hansen, S. B. Mathur	1st	64
<i>Peronospora valerianellae</i>	<i>Valerianella locusta</i>	R. Champion	1st	51
<i>Phoma betae</i>	<i>Beta vulgaris</i>	A. Mangan	1st	49
<i>Phoma exigua</i>	<i>Linum usitatissimum</i>	J. P. Malone	1st	47
<i>Protomyces macrosporus</i>	<i>Coriandrum sativum</i>	S. B. Mathur	1st	41
<i>Pyrenophora avenae</i>	<i>Avena sativa</i>	W. J. Rennie, M. M. Tomlin	2nd	3
<i>Pyrenophora graminea</i>	<i>Hordeum vulgare</i>	W. J. Rennie, M. M. Tomlin	2nd	6
<i>Pyricularia grisea</i>	<i>Eleusine coracana</i>	S. B. Mathur	1st	37

Pathogen	Host	Authors	Edition	No.
<i>Sclerospora graminicola</i>	<i>Pennisetum typhoides</i>	H. S. Shetty, S. B. Mathur	1st	40
<i>Tilletia contraversa</i> , <i>T. caries</i>	<i>Triticum aestivum</i>	M. Kietreiber	1st	53
<i>Ustilago nuda</i>	<i>Triticum aestivum</i>	W. J. Rennie	1st	48
<i>Xanthomonas campestris</i> pv. <i>translucens</i>	<i>Poaceae</i>	R. L. Forster, N. W. Schaad	1st	68
<i>Xanthomonas malvacearum</i>	<i>Gossypium</i> spp.	A. Meiri, Z. Volcani	1st	43

## 3.9 Statistics

### 3.9.1 Handbook of Tolerances and Measures of Precision for Seed Testing, Vol. 28, 1963, No. 3, reprint 2007

By S. R. Miles

ISBN 978-3-906549-47-7 168 pages

The handbook presents the total sum of all achievements that were made by ISTA and AOSA under the lead of Samuel Raymond Miles. It presents in the first part a multitude of tolerance tables for testing results for significance of purity, foreign seed, germination, pure-live seed and trueness to cultivar determinations. A glossary forms the introduction to this part. The various test situations are explained. The tolerance tables contained in the ISTA Rules are taken directly from this collection of tables.

In the second part, the calculation of the tolerances is demonstrated in a very clear way, providing a deeper insight into understanding the application of statistics to the evaluation of seed testing results.

### 3.9.2 Handbook on Statistics in Seed Testing

Revised edition 2002

By J. Bányai and J. Barabás

84 pages

The role of this Handbook is to supply the users with basic knowledge enabling them to apply properly the most important statistical procedures. Assuming accordance with the sampling and testing prescriptions of the ISTA Rules, this guide presents tools for the adequate inference from the measurements on seed lot properties. In order to obtain practical primary, composite and submitted samples, as well as working samples good enough to represent the lot, recommendations in the Handbook on Seed Sampling should be followed.

The content of this handbook is based on the principles of probability and statistics, and serves to explain the most important probability distributions, sampling procedures and statistical tests. To show the development of the application of statistical methods in seed testing, a short historical survey is included.

Tolerances for various purposes, heterogeneity and compatibility tests, fixed size and sequential sampling plans, and various statistical methods and tables are presented along with examples for the use of one-sided and two-sided test procedures. The role of the user's choice with respect to the strictness of the significance levels to be applied is also explained. A glossary is provided.

Free internet download at [www.seedtest.org](http://www.seedtest.org)

### 3.10 Tetrazolium

#### ISTA Working Sheets on Tetrazolium Testing, 1st Edition, 2003

By the ISTA Tetrazolium Committee; editors N. Leist, S. Krämer and A. Jonitz, illustrator J. Pfäfflin

The Tetrazolium Working Sheets Volumes I and II include detailed and standardized descriptions to conduct and evaluate tetrazolium tests for the determination of viability in agricultural, vegetable, horticultural and forest seed.

The working sheets cover 120 agricultural and 122 forest species and genera. The descriptions are illustrated with full colour pictures of seed morphology, cutting instructions and the various forms of non-viable seeds. The working sheets support the *International Rules for Seed Testing* by providing the seed testing laboratories with detailed working plans. They are a result of the daily routine work experience of a seed testing laboratory and optimization by the members of the ISTA Tetrazolium Committee from all over the world.

##### 3.10.1 Vol. I: Agricultural, Vegetable and Horticultural Species (incl. Supplement 2011)

ISBN 978-3-906549-40-8 219 sheets, A4 loose leaf ring binder

##### 3.10.2 Vol. II: Tree and Shrub Species (incl. Supplement 2011)

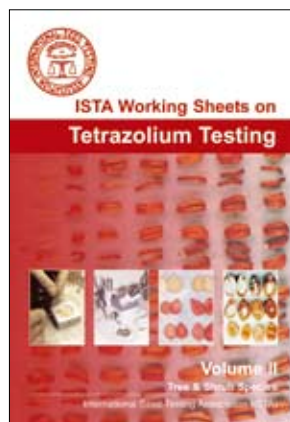
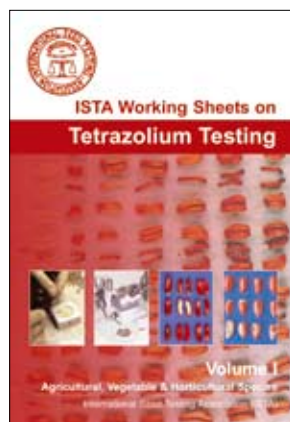
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##### 3.10.5 Supplement 2011 to Volume I: Agricultural, Vegetable and Horticultural Species

43 new sheets, A4 loose leaves

##### 3.10.6 Supplement 2011 to Volume II: Tree and Shrub Species

15 new sheets, A4 loose leaves



##### 3.10.4 Proceedings of the ISTA Tetrazolium Workshop

Compiled and edited by N. Leist, R. Don and A.M. Steiner

ISBN 978-3-906549-33-0 Held in Edinburgh, United Kingdom, June 1997

110 pages

This publication covers the subjects presented and discussed at the workshop in brief descriptions, illustrations and tables. These cover the history of the development of biochemical viability determination in seeds; the theory of biochemical viability determination in seeds by the tetrazolium test; the seed vigour determination by means of the tetrazolium test; and the strategy for establishing tolerances for tetrazolium test results. Also included are articles on the chemistry of tetrazolium salts and biochemistry of tetrazolium reduction; the quality assurance procedures with special reference to the tetrazolium test; and the use of tetrazolium for evaluation of fresh ungerminated seeds.

## 3.11 Tree and shrub seed

### 3.11.1 Handbook of Tree and Shrub Seed Testing, 1st Edition, 1991

By A. G. Gordon, P. Gosling and B. S. P. Wang

ISBN 978-3-906549-20-0 190 pages, 28 photographs, 30 illustrations, 14 tables

The handbook is designed as a comprehensive reference book for anyone interested in testing tree and shrub seeds. Although covering mostly seeds in international trade, it provides a starting point for persons with little or no experience in testing tree and shrub seeds. For the serious analyst, it must be stressed that this handbook does not replace the ISTA Rules, but is meant to be used in conjunction with these and the *Handbook on Seedling Evaluation*. In order to make this handbook as comprehensive as possible, chapters on X-radiography and the Indigo Carmine Method were included.

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### 3.11.2 Tropical and Sub-tropical Tree and Shrub Seed Handbook 1st Edition, 1998

Edited by K. Poulsen, M. Parratt and P. Gosling

ISBN 978-3-906549-31-6 204 pages, over 50 illustrations

The handbook contains an introductory chapter on seed testing, with consideration of the special difficulties of tropical and sub-tropical tree seeds, followed by sections on approximately 40 species. There is a line diagram of each species' seed or fruit and sometimes foliage, plus sections on flowering, fruit ripening, collection and processing, then seed testing information on purity and thousand-pure-seed weight statistics, plus methods of dormancy breakage, germination and storage.

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### 3.11.3 Micro-organisms Associated with Tree Seeds: World Checklist 1990

By R. K. Mittal, R. L. Anderson and S. B. Mathur

ISBN 0-662-57306-4/ISSN 0714-3351 57 pages, in both English and French

The Tree Seed Pathology Working Group of the ISTA Forest Tree and Shrub Seed Committee had the task of identifying seed-borne tree pathogens that could cause serious problems if transported to other geographic areas. Their work led to compilation of the first checklist in 1985. The need for an update was soon recognized, and this 1990 edition is the result.

Literature on the micro-organisms associated with tree seeds is available from various sources, which are sometimes inaccessible to researchers. The information is listed alphabetically by host (Latin nomenclature, followed by a list of associated micro-organisms with their bibliographic references and the countries of origin). 339 works are cited; a pathogen index is included.

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## 3.12 Variety

### 3.12.1 Electrophoresis Testing, 1st Edition, 1992

By R. J. Cooke

ISBN 978-3-906549-21-7 36 pages, 6 illustrations, 11 tables

The handbook on variety testing gives general specifications of electrophoresis and its use. It describes in detail three types of electrophoretic methods for wheat, barley, peas, ryegrass and maize.

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### 3.12.2 Growth Chamber – Greenhouse Testing Procedures, 1st Edition, 1993

By R. C. Payne

ISBN 978-3-906549-28-6

23 pages, 7 illustrations, 2 plant seedling care/evaluation tables

Growth chamber and greenhouse testing involves growing and evaluating seedlings and plants in a controlled, uniform environment. This approach ensures that all seedlings and plants are grown under the same conditions. Therefore, the differences in seedling and plant characteristics recorded for the varieties tested will be valid and have a genetic basis.

### 3.12.3 Laboratory Tests for Variety Determination with Fungus Pathogens, 1st Edition, 1993

By J. F. Schoen

ISBN 978-3-906549-29-3 15 pages

One of the most important agronomic factors associated with crop cultivars is yield potential, but characterization of this attribute is practically impossible without data from field trials. In contrast, the closely related characteristic of disease resistance can often be observed in the laboratory, growth chamber or greenhouse. Most often a combination of subtle physiological and chemical processes confer resistance on a cultivar. The most successful means of distinguishing susceptible varieties from those with some degree of resistance is the observation of plants during a period of development after inoculation with a pathogen.

### 3.12.4 Rapid Chemical Identification Techniques, 1st Edition, 1993

By R. C. Payne

ISBN 978-3-906549-24-8 22 pages, 4 illustrations, 1 test reference table

Rapid chemical identification techniques may be defined as testing procedures that utilize specific treatments, such as ultraviolet light or chemicals, to reveal chemical differences between seeds or seedlings of different varieties. These tests require virtually no technical expertise or training and can be completed in a relatively short time. They are inexpensive to conduct and require no sophisticated or expensive equipment. The results of these tests are usually distinct and easily interpreted. These kinds of variety tests can be conducted easily in every laboratory.

## Special offer

### 3.12.5 All four Variety handbooks together

Electrophoresis Testing

Growth Chamber – Greenhouse Testing Procedures

Laboratory Tests for Variety Determination with Fungus Pathogens

Rapid Chemical Identification Techniques

## 3.13 Vigour

### 3.13.1 Handbook of Vigour Test Methods, 3rd Edition, 1995

By J. G. Hampton, D. M. TeKrony, and the ISTA Vigour Committee

ISBN 978-3-906549-10-1 117 pages, 1 illustration, 9 tables

Client requests for vigour testing continue to increase, and vigour tests for an increasing number of species are required by seed testing laboratories. This handbook has been completely revised and reformatted to reflect the advances made in our understanding of seed vigour and the refinements in test methods designed to improve uniformity and international applicability.

Adherence to the procedures described for each test will enhance the goals of achieving international standardization among seed testing laboratories, and uniformity in seed vigour testing.

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### 3.13.2 Understanding Seed Vigour

4-page pamphlet in both English and Spanish.

Available as **free internet download** at [www.seedtest.org](http://www.seedtest.org)

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## 3.14 Binders

### 3.14.1 Replacement binder for the ISTA handbooks

Replacement binders are available in A4 format and fit all new ISTA handbooks:

Flower Seed Testing, Seedling Evaluation, Moisture Determination, Pure Seed Definitions, Seed Sampling, Seed Health, and ISTA Working Sheets on Tetrazolium Testing, Volumes I and II.

\* Note: No membership discount can be offered on replacement binders.

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## 4.1 Minutes of membership meetings

Available as **free internet downloads** at [www.seedtest.org/minutes](http://www.seedtest.org/minutes)

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## 4.2 ISTA Committee reports

Available as **free internet downloads** at [www.seedtest.org/reports](http://www.seedtest.org/reports)

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## 4.3 ISTA working programmes of the ISTA Technical Committees

Available as **free internet downloads** at [www.seedtest.org/wp](http://www.seedtest.org/wp)

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## Information publications

### 5.1 ISTA position papers

#### 5.1.1 ISTA Strategy

Approved by the ISTA Ordinary Meeting, 11 May 2007

#### 5.1.2 Quantifying and Reporting Uncertainty of Measurement in Seed Testing

Approved by the ISTA Ordinary Meeting, 11 May 2007

#### 5.1.3 Position Paper concerning the Increase or Repeal of ISTA Maximum Seed Lot Size

Approved by the ISTA Ordinary Meeting, 21 June 2001

#### 5.1.4 Position Paper on ISTA's Strategy Regarding Methods for the Detection, Identification and Quantification of Genetically Modified Seeds in Conventional Seed Lots

Approved by the ISTA Extraordinary Meeting, Bolivia, 2002. Version 1, 14 November 2001

#### 5.1.5 Position Paper on ISTA's view regarding the units for the reporting of quantitative results on presence of seeds with specified traits in conventional seed lots

Approved by the ISTA Ordinary Meeting, Glattbrugg, Switzerland, 18 June 2009

All position papers are available as **free internet downloads at [www.seedtest.org](http://www.seedtest.org)**.

### 5.2 Seed Testing International (ISTA News Bulletin)

*Seed Testing International* is distributed to 1500 subscribers worldwide, including all ISTA personal and laboratory members in more than 70 countries. The magazine contains the President's report, articles on Association news, updates on development of the Rules, method validation and accreditation, and scientific papers of applied seed science. It also updates you on training and education programmes, e.g. upcoming and past training courses, workshops and seminars, and new publications. It provides an insight into seed testing issues on regional and international levels.

*Seed Testing International* is published twice a year, in April and October.

Subscription is **free of charge**. To be included in the mailing list, simply contact the Secretariat with your postal details.

**Also available as a free internet download at [www.seedtest.org/sti](http://www.seedtest.org/sti)**

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## Quality assurance

### 6.1 ISTA accreditation

- 6.1.1 ISTA seed-testing laboratory accreditation standard
- 6.1.2 Guidelines for becoming an ISTA accredited member laboratory (also available in Spanish)
- 6.1.3 Conditions for making reference to accreditation and membership and the use of the ISTA logo
- 6.1.4 Guidelines for developing quality documentation (also available in Spanish)
- 6.1.5 Explanatory note on how to complete ISTA Certificates
- 6.1.6 Procedures for termination, suspension and withdrawal of ISTA accreditation
- 6.1.7 Appeals and complaints procedure
- 6.1.8 How to respond to audit findings
- 6.1.9 Accreditation of laboratories with facilities on multiple sites
- 6.1.10 Principles and conditions for laboratory accreditation under the performance-based approach
- 6.1.11 Performance data evaluation for the presence of seeds with specified traits in seed lots
- 6.1.12 Performance data evaluation for specified trait purity
- 6.1.13 Scope of accreditation policy

Available as free internet downloads at [www.seedtest.org/accred-docs](http://www.seedtest.org/accred-docs)

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### 6.2 ISTA Proficiency Test Programme

#### 6.2.1 The ISTA Proficiency Test Programme

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