

Preface to the 2024 edition of the ISTA Rules

Since 2014, the *International Rules for Seed Testing* (ISTA Rules) are primarily available in electronic format. The ISTA Rules can be downloaded as a complete PDF file or as individual chapters from:

www.ingentaconnect.com/content/ista/rules.

If required, users of the ISTA Rules can print their own copies. For further information on the ISTA Rules, see:

www.seedtest.org/rules.

The electronic version includes the English, French, German and Spanish versions of the ISTA Rules. If there are any questions on interpretation of the ISTA Rules, the English version is the definitive version.

Seed health testing methods

Previously, the seed health testing methods were published as a separate Annexe to Chapter 7 of the ISTA Rules. They are now available as separate method sheets from the ISTA website at:

www.seedtest.org/seedhealthmethods.

Details of changes

The 2024 changes are editorial corrections or Rules changes adopted at the Ordinary General Meeting held in Verona, Italy in June 2023. Edits were made in Adobe InDesign by Vanessa Sutcliffe of HeartWood Editorial (www.heartwoodeditorial.co.uk).

The changes in the text content from the previous edition of the ISTA Rules are listed below. They can be displayed with yellow highlight boxes as a 'layer' over the English version within the electronic copy, with comments on what has changed.

For the previous history of amendments to the ISTA Rules, see the Prefaces for 2003 to 2023 on the ISTA website.

Ernest Allen, ISTA Rules Committee Chair

Susan Alvarez, ISTA Rules Committee Vice-Chair

ISTA Secretariat

Changes to the ISTA Rules for 2024

Introduction

- I-1:** New address for ISTA Secretariat updated.
- I-2.2:** Standard method provided to determine working weight of purity and other seed determination (OSD) for adding a new taxon [taxa] to Table 2C, including data rounding rules. Statistical methods applied and experimental design recommended in the Calculator developed by Statistics TCOM. Proposal submitted by Bulking & Sampling and Purity TCOMs, and approved by majority vote.
- Form 1:** Revision of form to improve procedures and guidance for proposing a new taxon to Table 2C. Section 2 updated with newly developed 'Calculator for adding working weights to Table 2C'. Section 3 revised to clarify purpose of providing morphological features for PSD (not for identification). New section 4 added to provide validated working weight for a new taxon or group of taxa. Proposal approved by Purity TCOM through vote.

Chapter 1

- 1.3:** Revision of maximum subplot size allowance for *Solanum lycopersicum* L. Proposal supported by experimental data, a summary report and analysis supplied by Statistics TCOM. Recommendation that a maximum of 20 sublots should be set for homogenous seed lots of tomato, accounting for a low level of other seed content. This would assure buyers and sellers that test results represent what is traded, and provides a practical solution for companies producing tomato seed lots. Proposal approved by Statistics TCOM and unanimous vote of Bulking & Sampling TCOM and ECOM-VSI WG.
- 1.4.1:** Revision to allow weight of original seed lot and weight of subplot to be recorded in same place on ISTA Certificate. Proposal approved by Statistics TCOM and unanimous vote of Bulking & Sampling TCOM and ECOM-VSI WG.
- 1.4.2:** Revision to allow weight of original seed lot and weight of subplot to be recorded in same place on ISTA Certificate. Statement '1' deleted and subsequent statements relabelled sequentially. Proposal approved by Statistics TCOM and unanimous vote of Bulking & Sampling TCOM and ECOM-VSI WG.
- 1.5.2.2:** Inconsistency with requirements in 3.6.1.3 identified by an ISTA member laboratory. Proposal submitted by Purity TCOM and approved by vote.

- 1.5.2.3:** Consequential change due to update to sections of Chapter 11, reflecting advancements in available seed treatments. Clarifications added on how and what to report when testing coated seeds. Proposal approved by majority vote of Purity TCOM.
- 1.5.2.7:** Consequential change due to improvements made to germination information in Chapter 11, rewording general principles, evaluation and reporting results. Proposal originates from and is supported by Germination TCOM.
- 1.5.2.12:** Clarification on reporting moisture tests for pelleted seeds and for coated seeds (mats and tapes), to align with Chapter 11. Proposal originates from and is supported by Moisture TCOM.
- 1.5.2.15:** Consequential change due to improvements made to germination information in Chapter 13, rewording calculation and expression of results, and reporting results. Proposal originates from and is supported by Germination TCOM, following consultation with Forest Tree and Shrub Seed TCOM.
- 1.5.2.16:** Consequential change due to revision and updating of Chapter 14 to improve clarity. Previous information obsolete due to new generations of X-ray machines and applications of digital technology. Significant changes are focused on equipment and its operation, as well as clarification on reporting. Proposal developed and approved by Advanced Technologies, Forest Tree & Shrub Seed and Purity TCOMs.
- 1.5.2.21:** Section updated to reflect changes on how to report results of GMO testing in 19.7.
- 1.5.3:** Change necessary to achieve consistency with 19.7 in reporting uncertainty of measurement when testing genetically modified organisms. Proposal approved by vote within GMO TCOM.

Chapter 2

- 2.2.2:** Revision of maximum subplot size allowance for *Solanum lycopersicum* L. Proposal supported by experimental data, a summary report and analysis supplied by Statistics TCOM. Recommendation that a maximum of 20 sublots should be set for homogenous seed lots of tomato, accounting for a low level of other seed content. This would assure buyers and sellers that test results represent what is traded, and provides a practical solution for companies producing tomato seed lots. Proposal approved by Statistics TCOM and unanimous vote of Bulking & Sampling TCOM and ECOM-VSI WG.

2.5.2.1: Revision to provide standard method to determine working weight of purity and other seed determination (OSD) for adding new weights to Table 2C, including data rounding rules. Working weight determinations developed based on statistically recognised methods for estimating variables such as lots, variety and testing laboratories, and removing data outliers. Proposal provided by Bulking & Sampling and Purity TCOMs, and approved by majority vote. Statistical methods applied and experimental design recommended in the Calculator were developed by Statistics TCOM.

Table 2C Part 1: Revision following survey of ISF members producing tomato seed lots, concluding that 200 kg is a maximum lot size for international trade in tomato seed. Proposal discussed in depth within Bulking & Sampling TCOM, approved by Statistics TCOM, and approved by close majority vote of Bulking & Sampling TCOM and ECOM-VSI WG.

Chapter 3

3.5.2.4: Clarification regarding identification of indistinguishable species. Procedures only apply when seed is deemed by laboratories as ‘indistinguishable’, with discretion. Proposal supported by majority vote of Purity TCOM.

3.7: Correction of inconsistency with requirements in 3.6.1.3, as identified by an ISTA member laboratory. Proposal submitted by Purity TCOM and approved by vote.

Table 3B Part 2: Definition of PSD 15 made more inclusive for species where schizocarp could be broken and present in a sample. Schizocarp more than one-half original size is added. Proposal developed and approved by Purity TCOM.

Table 3B Part 2: Revision to correct discrepancy between PSD 33 (Fig. 3.1) and the *ISTA Handbook on Pure Seed Definitions* (Fig. 33.1), including multiple seed units with both fertile and sterile florets. Proposal developed and approved by Purity TCOM.

Chapter 4

4.5.3.2, 4.6, 4.7, 4.8, Table 4B [newly named], Table 4B [newly named]: Clarification on reporting sample weight of determination of other seeds to a fixed decimal place. Misleading use of ‘minimum’ deleted. Table given caption, subsequent tables renamed and cross references updated. Proposal developed and approved by Purity TCOM.

Chapter 5

5.6.3.1, 5.6.5.3, 5.7: Revision of rules on retesting when fresh seed present. Purpose of proposal is to address issue of considering test results of initial germination test ‘unsatisfactory’ and instruction to not report these test results and to require a retest when dormancy is suspected. Laboratories should have option to either report % germination and % fresh seeds determined by the initial test, or to not report results of initial test and to conduct additional testing using dormancy-breaking procedures listed in Table 5A. When fuller assessment is requested by customer or desired by laboratory, test results are not reported and a retest would be conducted. ISTA Rules should allow for same testing and reporting option for ‘fresh seeds’ as for ‘hard seeds’ (5.6.3.2). At end of test period, if ungerminated seeds are determined to be ‘fresh’, % fresh seeds is reported. Proposal originates from and is supported by Germination TCOM.

5.10: Editorial change clarifying column to be checked in Table 5A Part 2 for ‘double tests’.

Table 5A Part 1: Editorial change to correct alphabetical order of two *Centrosema* species.

Chapter 6

Table 6A Part 2: Addition of method to test *Ulmus* spp. seeds with tetrazolium salts. Proposal approved by Tetrazolium TCOM and supported by method validation study.

Chapter 7

All seed health methods: Sample size description revised for consistency across methods.

Methods 7-001a, 7001b, 7-002a, 7-002b, 7-003, 7-005, 7-007, 7-013a, 7-014, 7-016: Figure images updated and captions revised.

Method 7-013b: Figure and caption added.

Methods 7-019a, 7-019b, 7-020, 7-021, 7-023: Editorial changes to harmonise description of dilutions under Methods.

Methods 7-019a, 7-019b, 7-020, 7-021, 7-023, 7-029: Editorial changes to harmonise description of recording colony-forming units (cfu).

Method 7-019b: Editorial change to delete *X. c. pv. amoraciae* from classification of *Xanthomonas*.

Chapter 9

9.2.4.7, 9.2.5.1, 9.2.5.2, 9.2.5.3, 9.2.5.4, 9.2.5.5, 9.2.5.6, 9.2.5.7, 9.2.6.2: Updating of cross reference to Table 9A. Parts 1 and 2 of Table 9A merged due to changes in crop groups, to allow easier inclusions and modifications in future. Some species renamed according to Table 2C and additional information included for species new to taxonomy. Proposal originates from and is supported by Moisture TCOM.

9.2.5.7: Prescribed drying temperatures explicitly given, as in 9.1.2 and 9.1.3. Proposed tolerated range for high temperature method (127–133 °C) aligns with that prescribed by AOSA. Comparison conducted in two laboratories; Statistics TCOM analysed data and supports proposed change. Proposal originates from and is supported by Moisture TCOM.

9.2.6.2, Table 9B: Deletion of word ‘initial’ before ‘moisture content’. Proposal originates from and is supported by Moisture TCOM.

9.2.7: Clarification on reporting moisture tests for pelleted seeds and for coated seeds (mats and tapes), to align with Chapter 11. Proposal originates from and is supported by Moisture TCOM.

Table 9A: Parts 1 and 2 of Table 9A merged due to changes in crop groups (e.g. *Malva* transferred from tree & shrub to flower crop group), to allow easier inclusions and modifications in future. Some species renamed according to Table 2C and additional information included for species new to taxonomy. Proposal originates from and is supported by Moisture TCOM.

Chapter 11

11.1.2 [newly numbered], 11.3.2.2, 11.3.7, 11.10: Update to sections of Chapter 11 to reflect advancements in available seed treatments. Cross references to recent changes in Chapter 10 included. Clarifications added on how and what to report when testing coated seeds. Proposal approved by majority vote of Purity TCOM.

11.4.6: Cross reference to Table 4A updated due to re-belling of tables in Chapter 4.

11.5.3, 11.5.6.5, 11.5.8: Improvements made to germination information in Chapter 11 by rewording general principles, evaluation and reporting results. Proposal originates from and is supported by Germination TCOM.

Chapter 13

13.7: Improvements made to germination information in Chapter 13 by rewording calculation and expression of results, and reporting results. Proposal originates from and is supported by Germination TCOM, following consultation with Forest Tree and Shrub Seed TCOM.

Chapter 14

Revision and updating of chapter to improve clarity. Previous information obsolete due to new generations of X-ray machines and applications of digital technology. Significant changes are focused on equipment and its operation, as well as clarification on reporting. Proposal developed and approved by Advanced Technologies, Forest Tree & Shrub Seed and Purity TCOMs.

Chapter 18

18.8: Addition of section regarding reporting moisture content of seed mixtures. Subsequent sections in chapter renumbered and cross references updated. Proposal originates from and is supported by Moisture TCOM.