International Seed Testing Association

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Document OGM19-06

Rules Proposals for the International Rules for Seed Testing 2020 Edition

This document was prepared by the Technical Committees (TCOMs) and the Rules Committee of the Association and has been endorsed by the ISTA Executive Committee (ECOM). The proposals are submitted to the ISTA Ordinary General Meeting 2019 for voting by the nominated ISTA Designated Members on behalf of their respective Governments.

It is submitted to all ISTA Designated Authorities, ISTA Members and ISTA Observer Organizations for information two months prior to the ISTA Ordinary General Meeting 2019.

It contains proposed amendments and changes for the ISTA *International Rules for Seed Testing* and will be discussed and voted on at the Ordinary General Meeting 2019 to be held on Tuesday, July 02, 2019 in Hyderabad, India under Agenda point 10*. Consideration and Adoption of the Proposed Rules Changes.*

Introduction to the ISTA Rules Proposals to become effective 1 January 2020

The current version of the ISTA International Rules for Seed Testing (ISTA Rules) is the 2019 edition.

The ISTA Rules are only available electronically as a printable pdf file and are available for free download by ISTA members from the Ingenta website: http://www.ingentaconnect.com/content/ista/rules

The electronic version also includes the French and German versions of the ISTA Rules. There is also now a separate official Spanish version for the main chapters of the ISTA Rules. If there are any questions on interpretation of the ISTA Rules the English version is the definitive version.

For further information on the ISTA Rules, see: http://www.seedtest.org/rules

The effective from dates are changed annually. The changes from the previous edition of the ISTA Rules can be displayed as yellow highlighted text as a 'layer' within the electronic copy with comments on what has changed. Previous Prefaces as a 'history of changes' are available on the ISTA website.

The ISTA Rules are the result of the work of the ISTA Technical Committees (TCOMs) with input from many different sources. Thanks go to all the Technical Committee members and the ISTA Secretariat for their help with the annual proposals.

The following Rules Proposals will be discussed at the ISTA Ordinary General Meeting in Hyderabad, India on July 02, 2019 and may be amended during the meeting. If the proposals are accepted by the membership, amendments will be issued, and they will become the 2020 edition of the ISTA Rules.

Please let us know about any problems with these proposals.

Many thanks.

Ernest Allen and Sue Alvarez

Chair and Vice-Chair of ISTA Rules Committee

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Key to text changes:

~~Deleted text~~

New text

New text in large blocks, not underlined for ease of reading

Any changes made after the proposals were published to the membership

Contents

PART A. INTRODUCTION OF EDITORIAL CHANGES

A.1. Editorial corrections

I-1 General Information
This editorial change was drafted in response to a Motion concerning "ISTA's position on integrating advanced technologies in classical seed testing methods" discussed at the 2018 OGM.

The change was approved by the ECOM and the Rules Committee.

CURRENT VERSION	PROPOSED VERSION
I-1 General Information … Seed quality testing therefore requires test methods and equipment that have been tested to ensure they are fit for purpose, i.e. validated. The ISTA Validation Programme (see Section I-2) provides the mechanism for the inclusion of the test methods in the ISTA rules. Seed is a living biological product,…	**I-1 General Information** … Seed quality testing therefore requires test methods and equipment that have been tested to ensure they are fit for purpose, i.e. validated. The ISTA Validation Programme (see Section I-2) provides the mechanism for the inclusion of the test methods in the ISTA rules. New methods and modifications to existing methods need to be validated through the ISTA Method Validation Programme. Equipment needs to be fit for the purpose described in each chapter, and not influence the accuracy or reliability of results. Rules proposals can include the use of technologies new to the ISTA Rules, whether these are the basis of new methods or new tools within existing methods, provided they meet these requirements. Seed is a living biological product, …

1.5.2.2. Purity
This editorial change is required to clarify placement of specified "species" or "inert matter" in the purity section on the OIC.

CURRENT VERSION	PROPOSED VERSION
1.5.2.2. Purity … Upon request, the following information can be reported to one decimal place in the spaces provided for the ~~% purity~~ results:	**1.5.2.2. Purity** … Upon request, the following information can be reported to one decimal place in the spaces provided for the "Kind of inert matter" and "Other seeds" results:

1.3. Conditions for issuance of ISTA Certificates

This editorial change is requested by the BSC to correct erroneous references.

The corrections were approved by the BSC by vote.

CURRENT VERSION	PROPOSED VERSION
1.3 Conditions for issuance of ISTA Certificates j) …….. The seed lot identification ('Marks of the lot'; see ~~2.2.10~~) may take the form of a sequential series of characters or a single reference character. Each container within the lot or sublot must be identified in such a way that the containers can be readily recognized by the information provided on the certificate issued. ……	**1.3 Conditions for issuance of ISTA Certificates** j) …….. The seed lot identification ('Marks of the lot'; see 2.2.11) may take the form of a sequential series of characters or a single reference character. Each container within the lot or sublot must be identified in such a way that the containers can be readily recognized by the information provided on the certificate issued. ……
2.5.4.4. Sampling from the seed lot …….. An Orange International Seed Lot Certificate issued on a seed lot (see 2.2.1) is still valid after re-packaging the seed lot in new containers provided that: a) The identity of the seed in the initial seed lot is preserved. b) The seed lot designation (see ~~2.2.10~~) is not changed. c) The moving of the seed into the new containers is done under the control of an ISTA seed sampler. d) ……..	**2.5.4.4. Sampling from the seed lot** …….. An Orange International Seed Lot Certificate issued on a seed lot (see 2.2.1) is still valid after re-packaging the seed lot in new containers provided that: a) The identity of the seed in the initial seed lot is preserved. b) The seed lot designation (see 2.2.11) is not changed. c) The moving of the seed into the new containers is done under the control of an ISTA seed sampler. d) ……..
11.1.1. Definitions …….. **Seed mats** Broad sheets of material, such as paper or other degradable material, with seeds placed in rows, groups or at random throughout the sheets. **Seed treatment** See ~~2.2.11~~. Seeds which have received seed treatment must still be tested according to the methods prescribed in other chapters. **Note:** the numbering in this Chapter refers to the appropriate paragraphs of the other Chapters in the Rules, e.g. 11.3.2.1 cross references Chapter 11 to Chapter 3.2.1.	**11.1.1. Definitions** …….. **Seed mats** Broad sheets of material, such as paper or other degradable material, with seeds placed in rows, groups or at random throughout the sheets. **Seed treatment** See 2.2.12. Seeds which have received seed treatment must still be tested according to the methods prescribed in other chapters. **Note:** the numbering in this Chapter refers to the appropriate paragraphs of the other Chapters in the Rules, e.g. 11.3.2.1 cross references Chapter 11 to Chapter 3.2.1.

2.5.1.1. Preparation of a seed lot and conditions for sampling

This revision specifies that seed may also be sampled from the seed stream, this would not necessarily be when it enters the containers but may be well before it enters the containers, such as for automatic sampling. It would also make it consistent with the wording in Rule 2.5.1.3 "Taking Primary Samples".

The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.1.1. Preparation of a seed lot and conditions for sampling …… Seed may be sampled in containers or when it enters containers. The containers must be fit for purpose, i.e. must not damage the seed, ~~and~~ must be clean to avoid cross contamination. The containers must be labelled or marked before or just after sampling is completed. The seed lot must be so arranged that each part of the seed lot is conveniently accessible.	**2.5.1.1. Preparation of a seed lot and conditions for sampling** …… Seed may be sampled in containers or from the seed stream, either before or when it enters containers. The containers in which seed is held must be fit for purpose, i.e. must not damage the seed, must be clean to avoid cross contamination, and must be sealable. The containers must be labelled or marked before or just after sampling is completed. The seed lot must be so arranged that each part of the seed lot is conveniently accessible.

3.2.3. Inert Matter

This editorial change is required due species in *Taxodiaceae* being absorbed into *Cupressaceae*.
The corrections were approved by the NOM Committee.

CURRENT VERSION	PROPOSED VERSION
3.2.3. Inert Matter 5) Seeds of *Berberidaceae, Brassicaceae, Cupressaceae, Fabaceae, Pinaceae, Taxaceae*, ~~and *Taxodiaceae*~~ with the seed coat entirely removed. In Fabaceae, separated…	**3.2.3. Inert Matter** 5) Seeds of Berberidaceae, Brassicaceae, Cupressaceae, Fabaceae, Pinaceae, and Taxaceae with the seed coat entirely removed. In Fabaceae, separated…

2.5.2.2.3. Spoon Method

This revision is requested by the BSC to make it more readable and to remove the part that the spoon method is the recommended method for seed health testing.

The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.2.2.3. Spoon method The spoon method ~~is recommended for sample reduction for seed health testing (7.4.1). For other tests it~~ is restricted to species with seeds smaller than *Triticum* spp., to the genera *Arachis*, *Glycine* and *Phaseolus*, and to tree genera *Abies*, *Cedrus* and *Pseudotsuga*. A tray, a spatula and a spoon with a straight edge are required. After preliminary mixing, pour the seed evenly over the tray; do not shake the tray thereafter. With the spoon in one hand, the spatula in the other, and using both, remove small portions of seed from not less than five random places. Sufficient portions of seed are taken to constitute a subsample of the required size.	**2.5.2.2.3. Spoon method** The spoon method is restricted to species with seeds smaller than *Triticum* spp., to the genera *Arachis*, *Glycine* and *Phaseolus*, and to tree genera *Abies*, *Cedrus* and *Pseudotsuga*. For all other species it can only be used to obtain working samples in the laboratory for seed health tests (7.4.1). A tray, a spatula and a spoon with a straight edge are required. After preliminary mixing, pour the seed evenly over the tray; do not shake the tray thereafter. With the spoon in one hand, the spatula in the other, and using both, remove small portions of seed from not less than five random places. Sufficient portions of seed are taken to constitute a subsample of the required size.

Table 5A Part 2 and 5A Part 3: Germination methods for *Malva sylvestris*

For *Malva sylvestris,* the germination method must be moved from Table 5A Part 2 to Table 5A Part 3, as this species is not a woody species.

CURRENT VERSION: Table 5A Part 2. Detailed methods for germination tests: Tree and Shrub Species

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
~~*Malva sylvestris*~~	~~TP~~	~~20<=>30; 20~~	~~7~~	~~21~~	-	-	-

PROPOSED VERSION: Table 5A Part 3. Detailed methods for germination tests: Flower, spice, herb, and medicinal species

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Malva sylvestris	TP	20<=>30; 20	7	21	-	-	-

Change to Table 2A Part 2 and 2A Part 3: Lot sizes and sample sizes for *Malva sylvestris*
For *Malva sylvestris,* lot sizes and sample sizes must be moved from Table 2A Part 2 to Table 2A Part 3, as this species is not a woody species.

CURRENT VERSION: Table 2A Part 3. Lot sizes and sample sizes: tree and shrub seeds

Species	Maximum weight of lot (kg) (except see 2.8 Note 2)	Minimum submitted sample (g)	Minimum working sample for purity analysis (3.5.1) (g)
1	2	3	4
~~*Malva sylvestris* L.~~	~~5000~~	~~30~~	~~15~~

PROPOSED VERSION: Table 2A Part 3. Lot sizes and sample sizes: flower, spice, herb and medicinal species

Species	Maximum weight of lot (kg) (except see 2.8 Note 2)	Minimum submitted sample (g)	Minimum working sample for purity analysis (3.5.1) (g)
1	2	3	4
Malva sylvestris L.	5000	30	15

7-019a Updated Background Information
As the method is rather long and complicated the industry has proposed the inclusion of a process flow diagram in the background section of 7-019a to reflect optional and mandatory steps in the method.

This proposal has been approved by a vote of the Seed Health TCOM and is supported by the committee.

Please see “OGM19-11 ISTA rules proposals method 7-019a” for complete text of the changes.

8.5. Procedures

This editorial change is required due an incorrect cross reference to performance approved methods. The corrections were approved by the Variety Committee.

CURRENT VERSION	PROPOSED VERSION
8.5.3. Examination of seeds …For the application of performance approved methods see ~~8.2.3~~.	**8.5.3. Examination of seeds** …For the application of performance approved methods see 8.3.3.
8.5.4. Examination of seedlings …For the application of performance approved methods see ~~8.2.3~~.	**8.5.4. Examination of seedlings** …For the application of performance approved methods see 8.3.3.
8.5.5. Examination of plants in glasshouse or growth chamber …For the application of performance approved methods see ~~8.2.3~~.	**8.5.5. Examination of plants in glasshouse or growth chamber** …For the application of performance approved methods see 8.3.3.
8.5.6. Examination of plants in field plots …For the application of performance approved methods see ~~8.2.3~~.	**8.5.6. Examination of plants in field plots** …For the application of performance approved methods see 8.3.3.

C.9.3. Correction of references and adding a cross reference

It seems that a few references in chapter 9, are incorrect and it is also proposed to optimize the references where needed; an additional reference is added, and it is stressed that the correct sample size shall be used and where to find it. The proposal has been approved by the Moisture Committee.

CURRENT VERSION	PROPOSED VERSION
9.1.5.1. **General directions and precautions** See Table 9A Parts 1 and 2 for directions for individual species. The submitted sample (see 2.5.1.5–2.5.1.~~7 and 2.5.4.4~~) may be accepted for moisture determination only if it is in an intact, moisture-proof container (or, if issuing a Blue International Seed Sample Certificate, apparently moisture-proof) from which as much air as possible has been excluded.	9.1.5.1. **General directions and precautions** See Table 9A Parts 1 and 2 for directions for individual species. The submitted sample (see 2.5.1.5–2.5.1.6) may be accepted for moisture determination only if it has the required sample size (2.5.4.5c and Table 9A), and it is in an intact, moisture-proof container (or, if issuing a Blue International Seed Sample Certificate, apparently moisture-proof) from which as much air as possible has been excluded.

C.18.8. Reporting results:

As a general principle, any statement of the applicant may be reported only in the space reserved for applicant statements/declarations. This space is reserved at the top of the ISTA certificate in the "Stated by Applicant" section. Therefore, the components of seed mixtures as reported by the applicant cannot be reported under the "Analysis Results" section of the certificate as this space is reserved for laboratory results obtained through by an ISTA laboratory through seed testing.

CURRENT VERSION	PROPOSED VERSION
18.8. Reporting Results … For the species tested, 'Seed mixture' ~~together with the mixture composition according to the declaration of the applicant,~~ must be entered.	**18.8. Reporting Results** … For the species tested, 'Seed mixture' must be entered. The composition of the mixture, determined during testing, is listed under 'Other Determinations.'

VOTE TO ACCEPT ITEM	RESULT

PART B. NEW SPECIES AND CHANGES TO SPECIES NAMES

B.1.1. Addition of *Salvia hispanica* to Table 2A Part 3

This inclusion of the new specie listed below to the ISTA Rules and the proposed sample and maximum seed lot size has been submitted to the BSC by the Purity Committee based on thousand seed weight determinations.

It was discussed by the members of the Bulking and Sampling Committee and approved by voting.

New entries: Table 2A Part 3

Species	Maximum weight of lot (kg) except see 2.8 Note 2	Minimum submitted sample (g)	Minimum working sample for purity analysis (3.5.1) (g)
1	2	3	4
Salvia hispanica L.	5000	20	3.5

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
B.1.1.			

B.1.2. Germination methods for *Salvia hispanica*

Germination methods for *Salvia hispanica* are proposed for inclusion into the Rules. The proposal is done following validation studies carried out within the Germination Committee.

PROPOSED: Table 5A Part 3. Detailed methods for germination tests

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Salvia hispanica	TP	20<=>30; 20	4-7	14			

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
B.1.2.			

B.1.3. Changes to the ISTA Stabilised List

Proposed Changes for the 7th Edition of the ISTA List of Stabilised Plant Names

The proposed changes involve: a) the addition of a few names that have been considered for inclusion in the Rules since ed. 6 was published, b) some spelling or authorship changes, c) some changes to family assignment for some names, and d) some changes to the names because of new taxonomic classification or nomenclature action. The most obvious changes among these proposals will be: 1) the acceptance of a number of trinomial names (subspecies or varieties) where formerly binomials were accepted in the *List* and in the Rules, and 2) the indication of alternate family classification for a name that was proposed to be included in a different family in our proposal balloting. Although family classification does not appear in Table IIA, it is intended to provide some continuity in family classification between the last and the next editions of the *Stabilized List* where these classifications may have changed.

This proposal has been approved by a vote of the Nomenclature Committee TCOM and is supported by the committee

Please see "OGM19-08 List of proposed changes for the ISTA List of Stabilised Plant Names" and "OGM19-09 Effects from 2019 Stabilised List Changes on 2020 Rules" for complete text of the changes.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
B.1.3.			

PART C. RULES CHANGES AND NEW METHODS REQUIRING A VOTE

Chapter 2: Sampling

C.2.1. Revision of 2.5.1.5 Obtaining the submitted sample

The BSC receives many queries regarding moisture sampling from ISTA Laboratories. The proposed changes to 2.5.1.5 are an attempt to clarify the procedures for obtaining submitted samples for moisture testing by moving the paragraph from **2.5.2.2 Sample reduction methods** to 2.5.1.5, grouping it together and reordering the paragraphs. As no method or procedure is changed, these could be regarded as editorial changes.
The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.1.5. Obtaining the submitted sample ~~The submitted sample must be obtained by reducing the composite sample to an appropriate size by one of the methods referred to in 2.5.2.2. In the case of very large composite samples, a method according to 2.5.1.3 may also be used.~~	**2.5.1.5. Obtaining the submitted sample** The composite sample can be submitted to the seed testing laboratory if it is of appropriate size for the tests to be conducted, or if it is difficult to mix and reduce the composite sample properly under warehouse conditions. **2.5.1.5.1. Obtaining the submitted sample for all tests** If the composite sample is too big, the submitted sample must be obtained by reducing the composite sample to an appropriate size by one of the methods referred to in 2.5.2.2. In the case of very large composite samples, a method according to 2.5.1.3 may also be used.
Obtaining ~~subsamples such as for~~ moisture testing must be carried out in such a way that changes in moisture content are minimal. The composite sample can be submitted to the seed testing laboratory if it is of appropriate size or if it is difficult to mix and reduce the composite sample properly under warehouse conditions.	**2.5.1.5.2. Obtaining the submitted sample for determination of moisture content** Obtaining submitted samples of the required size for moisture testing must be carried out in such a way that changes in moisture content are minimal. Samples must be taken in the following way from the composite sample: first, mix the composite sample by either stirring it or by passing it through a mechanical divider and combining ~~it at least~~ preferably once but not more than three times. Then, take a minimum of three subsamples from different positions and combine them to create the submitted sample for moisture testing.
Duplicate samples, which were requested not later than at the time of sampling, must be prepared in the same way as the submitted sample.	**2.5.1.5.3. Obtaining duplicate samples** Duplicate samples, which were requested not later than at the time of sampling, must be prepared in the same way as the submitted sample.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.2.1.			

C.2.2. Revision of 2.5.1.6 Dispatch of the submitted sample

The BSC proposes to add 'Packing' to the heading 2.5.1.6, as this Rule deals mainly with that aspect. Many seed companies have ISTA Accredited laboratories, where the warehouse in which the samples are taken and the testing laboratory are on the same premises, making it superfluous to seal the sample if the ISTA Sampler delivers it personally to the laboratory. The current wording is also not consistent with 2.5.4.3, which already makes provision for this.

The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.1.6. Dispatch of the submitted sample	**2.5.1.6. Packing and dispatch of the submitted sample**
The submitted sample must be marked with the same identification as the seed lot. For an Orange International Seed Lot Certificate, the sample must be sealed. The additional information required according to 1.4.2 as well as the name of any chemical treatment applied must be provided.	The submitted sample must be marked with the same identification as the seed lot. For an Orange International Seed Lot Certificate, the sample must be sealed, if it is not delivered personally by the sampler to the laboratory on the same premises (see 2.5.4.3). The additional information required according to 1.4.2 as well as the name of any chemical treatment applied must be provided.
Submitted samples must be packed so as to prevent damage during transit. Submitted samples should be packed in breathable containers.	Submitted samples must be packed so as to prevent damage during transit. Submitted samples should be packed in breathable containers.
~~Subsamples~~ for moisture testing, and samples from seed lots which have been dried to low moisture content, must be packed in moisture-proof containers which contain as little air as possible. Submitted samples for germination tests, viability tests and health tests may only be packed in moisture-proof containers if suitable storage conditions can be assured.	Submitted samples for moisture testing, and samples from seed lots which have been dried to low moisture content, must be packed in moisture-proof containers which contain as little air as possible. Submitted samples for germination tests, viability tests and health tests may only be packed in moisture-proof containers if suitable storage conditions can be assured.
Submitted samples must be dispatched to the seed testing laboratory without delay.	Submitted samples must be dispatched to the seed testing laboratory without delay.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.2.2.			

C.2.3. Revision of 2.5.2.2 Sample reduction methods

The BSC proposes to delete two paragraphs from **2.5.2.2 Sample reduction methods**, as the first of the two paragraphs has been moved to **2.5.1.5 Obtaining the submitted sample**, and as this paragraph is more applicable to obtaining a submitted sample (for moisture) than it is for sample reduction methods.

The deletion of the second of the two paragraphs is for consistency sake. Obtaining of working samples for specific tests is generally specified in the applicable Chapters. This paragraph is a duplication of what is already stated in **Chapter 9: Determination of moisture content**, Rule **9.1.5.2 Working sample.**

The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.2.2. Sample reduction methods ……. For seed tapes and mats take pieces of tape or mat at random, to provide sufficient seeds for the test. ~~To obtain the submitted sample for moisture content determination (2.5.4.5 c), subsamples must be taken in the following way: first, mix the composite sample. Then, take a minimum of three samples from different positions and combine them to create the subsample for moisture of the required size. The subsample for moisture must be taken as soon as possible to avoid changes in moisture content.~~ ~~To obtain the working sample for moisture content determination (9.1.5.2) subsamples must be taken in the following way: before taking the subsample, mix the sample by either stirring the sample in its container with a spoon or by placing the opening of the original container against the opening of a similar container and pour the seed back and forth between the two containers. Take a minimum of three subsamples with a spoon from different positions and combine them to create the subsample of the required size. The seed must not be exposed to the air during sample reduction for more than 30 s.~~	**2.5.2.2. Sample reduction methods** ……. For seed tapes and mats take pieces of tape or mat at random, to provide sufficient seeds for the test.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.2.3.			

C.2.4. Revision of 2.5.2.2 Sample reduction methods (mixing before dividing)

For the Variable and Rotary dividers it is not necessary to mix the composite sample before dividing, as mixing of the seed takes place during the dividing process – this is stated as such in the Sampling Handbook, but not so in the Rules. In the current Rules it is required that "the seed sample must first be thoroughly mixed" and the auditors apply this strictly, also for Variable and Rotary Dividers. It is therefore necessary it include the exclusion of the pre-mixing requirement of these two dividers in the Rules.
The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

CURRENT VERSION	PROPOSED VERSION
2.5.2.2. Sample reduction methods If the seed sample needs to be reduced to a size equal to or greater than the size prescribed, the seed sample must first be thoroughly mixed. The submitted/working sample must then be obtained either by repeated halving or by abstracting and subsequently combining small random portions. The apparatus and methods for sample reduction are described in 2.5.2.2.1 to 2.5.2.2.4. One, two or more of these methods may be used in one sample reduction procedure. When using one of the dividers described for seed pellets the distance of fall must not exceed 250 mm.	**2.5.2.2. Sample reduction methods** If the seed sample needs to be reduced to a size equal to or greater than the size prescribed, the seed sample must first be thoroughly mixed for all dividers and methods excluding the Variable sample divider and Rotary divider, where mixing takes place during the dividing process. The submitted/working sample must then be obtained either by repeated halving or by abstracting and subsequently combining small random portions. The apparatus and methods for sample reduction are described in 2.5.2.2.1 to 2.5.2.2.4. One, two or more of these methods may be used in one sample reduction procedure. When using one of the dividers described for seed pellets the distance of fall must not exceed 250 mm.
2.5.2.2.1. Mechanical divider method ……..	**2.5.2.2.1. Mechanical divider method** ……..
d) Rotary divider. The rotary divider comprises a rotating crown unit with 6 to 10 attached subsample containers, a vibration chute and a hopper. In using the divider the seed is poured into the hopper and the rotary divider is switched on so that the crown unit with the containers rotates with approx. 100 rpm and the vibration chute starts to feed the seed into the inlet cylinder of the rotating crown. The feeding rate and therefore the duration of the dividing operation can be adjusted by the distance between the funnel of the hopper and the chute and the vibration intensity of the chute. There are two principles: (i) The inlet cylinder feeds the seed centrally onto a distributor within the rotating crown distributing the seed to all containers simultaneously. (ii) The inlet cylinder	**d) Rotary divider.** The rotary divider comprises a rotating crown unit with 6 to 10 attached subsample containers, a vibration chute and a hopper. In using the divider the seed is poured into the hopper and the rotary divider is switched on so that the crown unit with the containers rotates with approx. 100 rpm and the vibration chute starts to feed the seed into the inlet cylinder of the rotating crown. The feeding rate and therefore the duration of the dividing operation can be adjusted by the distance between the funnel of the hopper and the chute and the vibration intensity of the chute. There are two principles: (i) The inlet cylinder feeds the seed centrally onto a distributor within the rotating crown distributing the seed to all containers simultaneously. (ii) The inlet cylinder

feeds the seed de-centrally into the inlets of the containers rotating underneath the inlet cylinder so that the seed stream is subdivided into a lot of subsamples.	feeds the seed de-centrally into the inlets of the containers rotating underneath the inlet cylinder so that the seed stream is subdivided into a lot of subsamples. For this type of divider, mixing and dividing takes place in one operation.
e) Variable sample divider. The variable sample divider consists of a pouring hopper and a tube underneath that rotates with about 40 rpm. The tube distributes the seed stream from the pouring hopper onto the inner surface of a further hopper, which is well fitted into a third hopper all being concentric. In the second and the third hopper there are slots that comprise 50 % of the perimeter of the hoppers. 50 % of the seed will pass through the two hoppers into a collecting pan. The other 50 % will stay within the hoppers and will then go into a second collecting pan. The two hoppers can be twisted against each other resulting in more narrow slots. The effect is that a smaller percentage will pass through the slots. Either the smaller sample outside the hoppers or the bigger sample inside the hoppers can be used as the required sample. The position of the two hoppers in relation to each other can be adjusted accurately, resulting in pre-determined subsample sizes.	**e) Variable sample divider.** The variable sample divider consists of a pouring hopper and a tube underneath that rotates with about 40 rpm. The tube distributes the seed stream from the pouring hopper onto the inner surface of a further hopper, which is well fitted into a third hopper all being concentric. In the second and the third hopper there are slots that comprise 50 % of the perimeter of the hoppers. 50 % of the seed will pass through the two hoppers into a collecting pan. The other 50 % will stay within the hoppers and will then go into a second collecting pan. The two hoppers can be twisted against each other resulting in more narrow slots. The effect is that a smaller percentage will pass through the slots. Either the smaller sample outside the hoppers or the bigger sample inside the hoppers can be used as the required sample. The position of the two hoppers in relation to each other can be adjusted accurately, resulting in pre-determined subsample sizes. For this type of divider, mixing and dividing takes place in one operation.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.2.4.			

C.2.5. Revision of the ISTA Protocol for the Approval of Automatic Samplers WITHDRAWN

Following questions received from ISTA Member Laboratories regarding the necessity to conduct check sampling on seed lots sampled by automatic seed samplers, by sampling the same lots twice, once by the automatic sampling device and then again manually by a sampler (person) and then to test both samples, a questionnaire was sent to member laboratories in this regard. Based on the answers received, the BSC then amended the Protocol to make provision for not having to conduct check sampling where only high-quality seed lots are being processed and sampled by automatic sampling devices. Since many changes were made, the entire document will presented for voting by the ISTA Membership.

The proposal was discussed by the Bulking and Sampling Committee and approved by vote.

Scope
When seed samples are taken by automatic seed samplers for the purpose of issuing an Orange International Seed Lot Certificate, the installation and operation of the automatic seed samplers used must be approved by an accredited ISTA Seed Testing Laboratory or an accredited ISTA Sampling Entity (ISTA Rules 2.5.4.4). **The scope of accreditation of the ISTA Seed Testing Laboratory must include Sampling.**

Related Documents
International Rules for Seed Testing (ISTA Rules current edition)
ISTA Accreditation Standard (current edition)
The ISTA Handbook on Seed Sampling (current edition)

Responsibility
The ISTA Seed Testing Laboratory/Sampling Entity is responsible for ensuring that the installation and operation of the automatic seed sampler corresponds to the ISTA Rules when the approval is first issued. The ISTA Seed Testing Laboratory/Sampling Entity or designated samplers are responsible for carrying out the necessary annual monitoring.

Abbreviations
BSC: ISTA Bulking and Sampling Committee
AWG: Accreditation Working Group of the ISTA Executive Committee
ECOM: ISTA Executive Committee
TSW: Thousand seed weight

Process description

1. Definition of automatic seed sampler
An automatic seed sampler consists of a sampling device, an outlet for the seed sample, a container for collecting the composite sample and a timing device. A sample divider may be connected between the sampling device and the container for collecting the composite sample.
The automatic seed sampler takes primary samples from the seed stream at constant time intervals.

2. The automatic seed sampler must fulfil the following conditions
- it must sample the entire cross section of the seed stream uniformly;
- it must not damage the seed;
- it must not select seed according to size, chaffiness or any other seed characteristic;
- seed must not bounce out of the seed sampler;
- all parts must be constructed in such a way that they can be cleaned effectively or that they are self-cleaning.

3. The installation of the automatic seed sampler must fulfil the following conditions
- the primary samples must be taken after the last step of processing;

- the falling distance between the sampling device and the container for the composite sample must be similar to the falling distance of the main seed stream;
- the connection between the sampling device and the container for the composite sample must be such that no seed or impurities will remain in the funnel or duct and must not allow seed to be added or withdrawn;
- the manufacturer's installation instructions must be followed.

4. The operation of the automatic seed sampler must fulfil the following conditions

- the sampling device must be properly adjusted and operated;
- there must be an unambiguous link between the composite sample and the seed lot;
- the opening of the sampling unit must be large enough for the seeds and all possible impurities to enter it easily;
- the time the sampling unit passes through the seed stream must be long enough for seeds and impurities to enter it;
- the timing device and any other settings must not be changed during the processing of the same seed lot;
- at least the minimum number of primary samples as given in the ISTA Rules must be taken;
- the composite sample must meet the following requirements:
  - it must be sufficiently uniform compared to the seed lot;
  - at least the minimum required sample size must be obtained;
  - the container for the composite sample must be filled to the minimum level (where applicable); and
  - there must be no cross-contamination between the composite samples;
- all parts must be clean when changing from one seed lot to the next one;
- the operation staff must follow the operation and cleaning instructions;
- the ISTA Seed Testing Laboratory/Sampling Entity must be informed about any substantial adjustments to the automatic seed sampler or procedures before any changes are introduced;
- records must be kept which should contain the following data as a minimum:
  - type and date of maintenance activities, e.g. ducting cleaned, timer operation checked;
  - lot data (sampling date, species, seed lot reference number, seed lot size); and
  - ~~number of primary samples or time settings; and~~
  - serial number of the sample container and level to which the sample container for the composite is filled (where applicable).

~~There is no need to keep the records above when the authorised ISTA Seed Sampler (person) is present all the time during sampling.~~

5. Responsibility of the authorized seed sampler (person)

The authorised ISTA Seed Sampler is responsible for:

- checking that the automatic seed sampler is operating properly and that the sampling fulfils the requirements described above when used for ISTA sampling purposes;
- refusing the sample when
  - any of the requirements above are not met;
  - the sample does not seems to be sufficiently uniform; or
  - the sample size differs from the expected sample size;
- Ensuring that the parts of the sampling ~~collection duct and automatic seed sampler that can be opened or manipulated are sealed. There is no need for sealing those parts when the authorised ISTA Seed Sampler is present when the sample is taken~~ system that can be easily reached and tampered with are sealed. The sampling container must be sealed if the sampler is not present at all times;
- checking that relevant records are made for each seed lot; and
- re-sampling manually when necessary.

6. Approval of the automatic seed sampler, its installation and operation

A seed company that intends to use an automatic seed sampler must send a request for approval to the relevant ISTA Seed Testing Laboratory/Sampling Entity.

If an automatic seed sampler is moved to a new location, ~~it must be~~ the authorizing laboratory will decide if it is necessary for it to be re-approved.

The application must include:

- the type, brand and unique number of the automatic seed sampler as well as a description of the way it operates;
- a description of the installation of the sampling unit and the container for the composite sample in the seed-processing stream;
- the intended procedures and instructions for operation, maintenance and cleaning;
- a responsible person for the automatic seed sampler who is to be the contact person for the ISTA Seed Testing Laboratory/Sampling Entity; and
- which of the four species groups will be sampled by the automatic seed sampler. It is up to the ISTA Seed Testing Laboratory/Sampling Entity to decide in which group a species belongs:

  A. Less sensitive bigger seeds (species with seeds equal to or bigger than *Triticum aestivum* L. subsp. *aestivum* seeds)
  B. Sensitive bigger seeds (e.g. Pulses)
  C. Small-seeded species (species with seeds smaller than *Triticum aestivum* L. subsp. *aestivum* seeds) that are non-chaffy species
  D. Small seeded chaffy species

The ISTA Seed Testing Laboratory/Sampling Entity will check the application for approval and decide if the type and installation of the automatic seed sampler meets the conditions under points 2 and 3 above.

- The ISTA Seed Testing Laboratory/Sampling Entity will determine if check sampling will be conducted. It may be omitted if the seed plant can prove that the seed lots processed in the plant are of such high quality that check sampling would not likely be able to show any differences between the two samples.
- Based on risk analysis, check sampling can be replaced by assessing the system by using a check list.

In cases where the ISTA Seed Testing Laboratory/Sampling Entity have decided that check sampling should be conducted, t~~T~~he ISTA Seed Testing Laboratory/Sampling Entity and the seed plant installing the automatic seed sampler should agree which tests should be performed on the samples. The ISTA Seed Testing Laboratory/Sampling Entity will determine the test plan on the basis of discussions with the seed plant.

The test plan should be based on the species involved. The tests that give the highest probability to highlight any difference between the two methods should be applied.

Ten seed lots must be sampled twice for comparative testing, i.e. once manually by an ISTA approved method and once by the automatic seed sampler. The testing must take place after the installation of automatic seed sampler.

The manual sampling must be performed by an authorised ISTA Seed Sampler. Sampling conducted by the automatic seed sampler must be performed under the supervision of an authorised ISTA Seed Sampler.

There must be no additional processing of the seed lot in between the two composite samples being taken.

The submitted samples must be obtained and sealed by the authorised ISTA Seed Sampler. In cases where the reduction of the composite sample is not necessary or cannot be performed e.g. because the composite sample is automatically sealed after the automatic sampling process, the composite sample can be regarded as the submitted sample.

The samples must be tested by an ISTA Seed Testing Laboratory.

The ISTA Seed Testing Laboratory/Sampling Entity responsible for the approval of the automatic seed sampler may set up additional requirements.

The automatic seed sampler can only be approved for the species groups that it has been assessed ~~tested~~for.

Testing plan
The testing plan is based on the species groups (mentioned above) that the automatic seed sampler is to be used for. 10 seed lots per species group must be sampled twice and tested. However, if 7 lots are accepted, then the ISTA Seed Testing Laboratory does not need test all 10 seed lots.

If seed lots from more than one group are to be tested,
Groups A and B: If tested for B, it is not necessary to test for group A.
Groups C and D: If tested for D, it is not necessary to test for group C.
Groups A and B don't affect testing on groups C and D and *vice versa*.

Each pair of samples must be examined for at least two quality attributes, which ~~can~~ could be any combination of~~be~~:

- other seeds by number;
- purity:
- germination, or
- thousand seed weight

The ISTA Seed Testing Laboratory is free to use other comparative tests instead of the above if it ~~is~~ would be more useful to detect differences, but at least one test should be of the above.

Guidance on which information to take into account and which test to apply is given below:

Purity, other seed count
If it is anticipated that the seed lot has a high purity level or that no other seeds are present, other quality attributes should be applied.

Germination
Germination is obligatory for species group B.

Thousand seed weight (TSW)
TSW can be used for species for which the seed size can vary within the same seed lot to check, if the automatic seed sampler selects on weight.

The submitted and working sample size must be in accordance with the sample sizes specified in Table 2A.

Where dividers are integrated in the processing system, the dividers must be tested before being installed by using a testing procedure that applies to dividers.

If possible, the two corresponding samples should be examined by the same analyst. If the analysis has been carried out by different analysts and the results are out of tolerance, the analysis will have to be conducted once more by the same analyst.
Purity, other seed count and germination: The results for the two corresponding composite samples are to be compared by means of appropriate ISTA tolerance tables.
For all tests, there must be no systematic difference in the results obtained from the analysis done on the samples from automatic seed samplers and those that were manually sampled.

The automatic seed sampler can be approved for a species group, if at least 70% of the tested seed lots (7 out of 10) show no significant differences between the two samples regarding two quality attributes. If the first seven samples are within tolerances and without any systematic differences for all tests carried out, the automatic seed sampler can be approved.

If substantial changes are made to the seed transfer system to which the automatic seed sampler is connected, the ISTA Seed Testing Laboratory/Sampling Entity may require a new set of check samples to be taken as described above.

The approval, as well as any conditions of the approval, shall be communicated in writing.

The approval must be kept as part of the company's records as long as the automatic seed sampler is in operation or suspended ~~due to a new set of check results~~.

There must be an unambiguous link between the approval document and the approved automatic sampler.

7. Expiration of the approval

This protocol does not specify a specific expiration period of the approval since automatic seed samplers, under good maintenance conditions, are known to work very consistently and reliably for a long time.

ISTA Seed Testing Laboratory/Sampling Entity may restrict the approval to a certain time period depending on the expected stability of working conditions and the quality of maintenance of the automatic seed sampler. If the ISTA Seed Testing Laboratory/Sampling Entity has restricted the time of the approval, a new full approval can be made after a successful completion of testing as in section 6.

8. Annual Monitoring Check

The automatic seed sampler and sampling operation must be checked at least once a year under the responsibility of the ISTA Seed Testing Laboratory/Sampling Entity. The annual check should include, but not necessarily be restricted to, timer adjustments, cleanliness, seals and sampling operation of the automatic seed sampler together with any possible weak points of a specific brand.
It is not necessary to take monitoring samples for testing annually unless there are observations from the annual check that would suggest the ISTA Seed Testing Laboratory/Sampling Entity should require this action.
A checklist can be used for this purpose, see the example below.

Annex
Checklist for Initial Accreditation and Periodic Assessment of Automatic Samplers

Distribution List
ISTA Membership

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.2.5. Withdrawn			

Chapter 5: The Germination Test

C.5.1.a Germination method for *Glycine max* using Organic Growing Media

Many requests of parallel testing on Sand and Organic growing media are received from applicants. They all result in better germination obtained using Organic growing media. It is therefore proposed to add this substrate as a primary media for the germination of *Glycine max*.

This proposal is supported by a validation study done within the Germination Committee.

PROPOSED: Table 5A Part 1. Detailed methods for germination tests

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Glycine max	BP; TPS; S; O	20<=>30; 25	5	8			

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.1.a			

C.5.1.b Germination method for *Phaseolus vulgaris* using Organic Growing Media

Many requests of parallel testing on Sand and Organic growing media are received from applicants. They all result in better germination obtained using Organic growing media. It is therefore proposed to add this substrate as a primary media for the germination of *Phaseolus vulgaris*.

This proposal is supported by a validation study done within the Germination Committee.

PROPOSED: Table 5A Part 1. Detailed methods for germination tests

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Phaseolus vulgaris	TP; BP; S; O	20<=>30; 25; 20	5	9			

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.1.b			

C.5.2. Germination method for *Zea mays* using TP (CCP)

The TP method using CCP has been an approved AOSA Rules method since 1980. This method produces very reliable and repeatable test results in a very efficient manner.

The Germination committee has conducted a validation study to compare the results obtained with this substrate to the results obtained with the other ISTA approved substrates.

This proposal is supported by a validation study done within the Germination Committee.

PROPOSED: Table 5A Part 1. Detailed methods for germination tests

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Zea mays	TP; BP; TPS; S	20<=>30; 25; 20	4	7			Use CCP for TP method

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.2.			

C.5.3. Addition of GA_3 for *Avena sativa* in Table 5A

GA_3 is indicated as a dormancy breaking treatment for *Avena sativa* in paragraph 5.6.3.1 "Procedures for breaking physiological dormancy", but it is not mentioned in Table 5A for this species. It is therefore proposed to add it in Table 5A to achieve greater concordance and understanding.

PROPOSED: Table 5A Part 1. Detailed methods for germination tests

	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Avena sativa	BP; S	20	5	10	GA_3; preheat at 30 to 35 °C; prechill		

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.3.			

C.5.4. Precision on light for germination tests WITHDRAWN FROM CONSIDERATION BY GER

The proposal is to make it clear in the Germination Chapter that LED can be used for Germination.

A harmonisation of the light requirements in lux, between ISTA and AOSA Rules is also proposed.

CURRENT VERSION	PROPOSED VERSION
5.6.2.4. Light …. In certain cases (e.g. some tropical and subtropical grasses), light may promote germination of dormant samples (5.6.3.1). In such cases, the light should be between 750 and ~~1250~~ lux from cool white lamps. There are….	**5.6.2.4. Light** …. In certain cases (e.g. some tropical and subtropical grasses), light may promote germination of dormant samples (5.6.3.1). In such cases, the light should be between 750 and 1350 lux from cool white lamps or LEDs (Light-Emitting Diode). There are….
5.6.3.1. Procedures for breaking physiological dormancy **Light:** … The quality and intensity of light may be important. The light intensity should be between 750 and ~~1250~~ lux from cool white lamps. Illumination is recommended especially for certain tropical and subtropical grasses…	**5.6.3.1. Procedures for breaking physiological dormancy** **Light:** … The quality and intensity of light may be important. The light intensity should be between 750 and 1350 lux from cool white lamps or LEDs (Light-Emitting Diode). Illumination is recommended especially for certain tropical and subtropical grasses…

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.4.Withdrawn			

C.5.5. Prewashing Beta seeds WITHDRAWN FROM CONSIDERATION BY GER

ISTA laboratories have indicated that washing Beta seeds in running water does not give better results than soaking and rinsing the seeds. In addition, soaking the seeds only would save water during the 2 or 4 hours of seeds washing.

CURRENT VERSION	PROPOSED VERSION
5.6.3.3. Procedures for removing inhibitory substances **Prewashing:** Naturally occurring substances in the pericarp or seed coat which act as inhibitors of germination may be removed by washing the seeds in running water at a temperature of 25 ±2 °C before the germination test is made. After washing, the seeds must be dried at a temperature of 20 to 25 °C (e.g. Beta vulgaris). Pelleted seed must not be prewashed.	**5.6.3.3. Procedures for removing inhibitory substances** **Prewashing:** Naturally occurring substances in the pericarp or seed coat which act as inhibitors of germination may be removed by washing the seeds in running water, or by soaking the seeds and rinsing them at the end of the soaking time, at a temperature of 25 ±2 °C before the germination test is made. After washing, the seeds must be dried at a temperature of 20 to 25 °C (e.g. *Beta vulgaris*). Pelleted seed must not be prewashed.

PROPOSED: Table 5A Part 1. Detailed methods for germination tests: Agricultural and vegetable seeds

Species	Substrate	Temperature* (°C)	First count (d)	Final count (d)	Recommendations for breaking dormancy	Additional directions	Additional advice
1	2	3	4	5	6	7	8
Beta vulgaris	TP, BP; S	20⇔30 15⇔25;20	4	14	Prewash (in running water or by soaking and rinsing the seeds; multigerm: 2h; genetic monogerm: 4h). Dry at 20-25°C		

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.5. Withdrawn			

C.5.6. Duration of the final count: adding precision related to the extension of the duration and, adapting the date of the final count when it ends on a non-working day.

There is no indication in the Rules on how to choose between the two options to prolong the germination with a) 7 days or b) up to half the prescribed period. It is therefore proposed to add what was already included in the Rules some years ago.

The current rules seem too strict regarding the obligation to end the test at the exact prescribed duration.

It does not allow starting the test as soon as possible, and depending on the test duration, there is a need of delaying the start of the test.

It is therefore proposed to add flexibility in the total duration of the germination test, allowing laboratories to end the test one day before or one day after the prescribed duration, when the end of the test is during a non-working day (week-end or holiday).

It appears also that the reason why the % of normal seedlings obtained at the end of the test period, when the test is extended, must be reported, is not obvious anymore. The proposal is to remove this prescription from the Rules.

CURRENT VERSION	PROPOSED VERSION
5.6.4. Duration of the test	**5.6.4. Duration of the test**
The duration of the test for individual species is indicated in Table 5A. The duration of the treatment required to break dormancy (5.6.3) before or during the test is not taken as part of the germination test period.	The duration of the test for individual species is indicated in Table 5A. The duration of the treatment required to break dormancy (5.6.3) before or during the test is not taken as part of the germination test period.
If it seems advisable, when for example some seeds have just started to germinate, the prescribed test period may be extended:	If the germination test period ends on a non-working day (weekend day or holiday), the final count can be done the day before or after this date.
a) by 7 days;	If it seems advisable, when for example some seeds have just started to germinate, the prescribed test period may be extended:
b) by up to half the prescribed period;	a) by up to 7 days; for species with a prescribed period for final count equal to or less than 14 days;
c) up to 21 days for Lolium spp.;	b) by up to half the prescribed period; for species with a prescribed period for final count greater than 14 days;
d) up to 32 days for Festuca spp. (except F. arundinacea and F. pratensis);	c) up to 21 days for *Lolium* spp.;
e) up to 42 days for Poa spp. (except P. bulbosa);	d) up to 32 days for *Festuca* spp. (except *F. arundinacea* and *F. pratensis*);
f) up to 54 days for Poa bulbosa.	e) up to 42 days for *Poa* spp. (except *P. bulbosa*);
If, on the other hand, the maximum germination of the sample has been obtained before the end of the prescribed test period, a test may be terminated. At the request of the applicant the germination test may be terminated when the sample reaches a predetermined germination percentage.	f) up to 54 days for *Poa bulbosa*.
	If, on the other hand, the maximum germination of the sample has been obtained before the end of the prescribed test period, a test may be terminated. …

5.9. Reporting results … The following additional information must be reported under 'Other determinations': – … ~~– the germination percentage obtained within the prescribed time, if the germination period was extended beyond the period indicated in Table 5A. The statement must be entered as follows: 'After the prescribed period of … days, there were … % normal seedlings.'~~… _ … Upon request, the following information may be reported as follows: _ …	**5.9. Reporting results** … The following additional information must be reported under 'Other determinations': – … _ … Upon request, the following information may be reported as follows: – the germination percentage obtained within the prescribed time, if the germination period was extended beyond the period indicated in Table 5A. The statement must be entered as follows: 'After the prescribed period of … days, there were … % normal seedlings.'… _ …

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.5.6.			

Chapter 7: Seed health testing

C.7.1. Updates to current method. Detection of *Aphelenchoides besseyi* in *Oryza sativa* (rice) seed

The proposed changes include improvements to the description of the method and detailed descriptions of nematode identification.

This proposal was approved by vote and is supported by the Seed Health Committee.

Please see "OGM19-10 ISTA rules proposals method 7-025" for complete text of the changes.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.7.1.			

Chapter 9: Determination of moisture content

C.9.1. Changes to wording for requirements to the oven

There are regular discussions on what is meant by ventilation and what is meant by capacity of the oven, and no clear definition has been found; it is therefore proposed to avoid using these words in the rules. The important thing is to check whether the oven is fit for purpose or not. In addition, the text was not so easy to read and understand. The text in 9.1.4.2 has therefore been revised. The requirements are still the same, though it has been stressed that the samples in the second drying should be placed in the same position as in the first drying. The proposal has been approved by the Moisture Committee.

CURRENT VERSION	PROPOSED VERSION
9.2.4.2. The oven must be electrically heated, and capable of being controlled in such a way that during normal operation the temperature of the air and of the shelves is 103 or 130 °C in the area where the samples are being dried. ~~The oven must have a heat capacity such that, when initially adjusted to a temperature of 103 or 130 °C, it can regain this temperature in less than 30 minutes~~ after insertion of the maximum number of test samples that can be dried simultaneously. ~~The drying capacity of the oven must be determined using a species that requires high temperature and a drying time less than or equal to 2 h.~~ ~~The ventilation must be such that after drying (2 h at 130 °C or 17 h at 103 °C), cooling and re-drying (1 h at 130 °C or 2 h at 103 °C) the maximum number of test portions, the results from the individual test portions do not differ by more than 0.15 % (for either temperature).~~	**9.2.4.2.** The oven must be electrically heated, and capable of being controlled in such a way that during normal operation the temperature of the air and of the shelves is 103 or 130 °C in the area where the samples are being dried. When initially adjusted to a temperature of 103 or 130 °C, the oven must be able to regain this temperature in less than 30 minutes after insertion of the maximum number of test samples that can be dried simultaneously. Whether the oven is fit for purpose must be checked by preparing the maximum number of samples that can be tested at the same time. Samples are dried (2 h at 130 °C or 17 h at 103 °C) then removed from the oven and allowed to cool in a desiccator before weighing and calculating moisture content; the same samples are then re-dried (1 h at 130 °C or 2 h at 103 °C) with the containers in the same position as for the first drying period, allowed to cool in a desiccator and moisture content is re-calculated. For individual samples, the difference in moisture content must not differ by more than 0.15 %. This check must be performed using a species that requires high temperature and a drying time less than or equal to 2 h. The same species can be used for 130 °C or 103 °C. Weighing should be performed in accordance with 9.1.5.3.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.9.1			

C.9.2. Changes to time limits for drawing working samples

The current version of the ISTA Rules causes a lot of confusion about the time limits to be followed when drawing the working sample for moisture determination. More precise descriptions are proposed, that are easier to read and also easier to fulfil.

The time limits are given for mixing, grinding, cutting and drawing the working sample separately, so all proposals shall be seen as one change. The proposal has been approved by the Moisture Committee.

CURRENT VERSION	PROPOSED VERSION
9.2.5.1. General directions and precautions **…..** During the determination, exposure of the sample to the atmosphere of the laboratory must be reduced to the absolute minimum, ~~and, in the case of species that do not require grinding, no more than two minutes may elapse between the time the sampling of the submitted moisture sample begins and the time the replicates for the moisture test are weighed.~~ …. **9.2.5.2. Working sample** .... Before the working sample is drawn, the submitted sample must be thoroughly mixed by one of the following methods: either stir the sample in its container with a spoon, or place the opening of the original container against the opening of a similar container and pour the seed back and forth between the two containers.	**9.2.5.1. General directions and precautions** ….. During the determination, exposure of the sample to the atmosphere of the laboratory must be reduced to the absolute minimum. …. **9.2.5.2. Working sample** …. Before the working sample is drawn, the submitted sample must be thoroughly mixed by one of the following methods: either stir the sample in its container with a spoon, or place the opening of the original container against the opening of a similar container and pour the seed back and forth between the two containers. The mixing process must not take more than one minute. Take at minimum three subsamples with a spoon from different positions and combine them to form the subsample of the required

	size.
Take at minimum three subsamples with a spoon from different positions and combine them to form the subsample of the required size. The seed may not be exposed to the air ~~during sample reduction for~~ more than 30 s.	The seed (whole seed, cut seed or ground material) must not be exposed to the air more than 30 s per replicate.
…	…
9.2.5.4. …. The ~~total~~ time of the grinding process must not exceed 2 min. …	9.2.5.4. …. The time of the grinding process must not exceed 2 min.
9.2.5.5. …..to arrive at approximately 10 g (two replicates of approximately 5 g each). The subsamples are quickly cut, recombined and mixed with a spoon prior to dividing into two replicates. The replicates are placed in weighed containers. ~~Exposure to the atmosphere should not exceed 4 min.~~	9.2.5.5. ….to arrive at approximately 10 g (two replicates of approximately 5 g each). Exposure to the atmosphere must not exceed 4 min. The subsamples are quickly cut, recombined and mixed with a spoon prior to dividing into two replicates. The replicates are placed in weighed containers.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.9.2.			

C.9.3. Adding additional possibilities to desiccator

Some desiccators are fitted with a perforated porcelain or even new forms of plastic plate and the MOI does not see any problems in using porcelain or other material instead of metal for this purpose. In addition, the MOI would also like to encourage use of non-toxic desiccant, it is therefore added to the rules. The proposal has been approved by the Moisture Committee.

CURRENT VERSION	PROPOSED VERSION
9.2.4.4. Desiccator The desiccator should be fitted with a perforated ~~metal~~ plate to promote rapid cooling of the containers and must contain an effective desiccant.	9.2.4.4. Desiccator The desiccator should be fitted with a perforated plate to promote rapid cooling of the containers and must contain an effective ~~and preferably non toxic~~ desiccant.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.9.3.			

C.9.4. Requirement to sample storage – using moisture meter

Requirement to storing the remaining of the submitted sample for moisture using moisture meters is missing. It is proposed to add the same requirement to storing time as for the submitted sample using the oven method. The proposal has been approved by the Moisture Committee.

CURRENT VERSION	PROPOSED VERSION
9.3.2.4.1. Precautions …. When the temperature of the sample is very different from the room temperature where the moisture meter is operated, there is a risk of condensation. Before testing, samples should therefore be equilibrated to the required room temperature.	**9.3.2.4.1. Precautions** …. When the temperature of the sample is very different from the room temperature where the moisture meter is operated, there is a risk of condensation. Before testing, samples should therefore be equilibrated to the required room temperature. The remaining submitted sample after determination of moisture must be stored under controlled conditions in a moisture-proof container for a period defined by the laboratory, but long enough to ensure the possibility for re-testing in case of errors.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.9.4.			

Chapter 15: Seed vigour Testing

C15.1. Removal of requirement for a control seed lot for the radicle emergence test

The radicle emergence (RE) test currently requires the use of a control sample when completing the test. Following their experience with the test, the Vigour Committee believes that when the test is completed following the prescribed ISTA Rules protocol, the use of a control seed lot is not necessary.

CURRENT VERSION	PROPOSED VERSION
15.8.4.4.1. Setting up the radicle emergence test The test must be set up using the media and conditions described in Table 15B, following the normal procedure in your laboratory for a germination test using the prescribed medium. ~~A control seed lot must be included with each test.~~	**15.8.4.4.1 Setting up the radicle emergence test** The test must be set up using the media and conditions described in Table 15B, following the normal procedure in your laboratory for a germination test using the prescribed medium.

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.15.1.			

C.15.2. Addition of a species to the Radicle Emergence test

The radicle emergence (RE) test is included in the ISTA Rules for *Zea mays, Brassica napus*, and *Raphanus sativus*. A method validation study has illustrated the test also identifies differences in vigour (field emergence) of seed lots of *Triticum aestivum* and that the test is repeatable and reproducible for this species. The Vigour Committee therefore proposes *T. aestivum* be added to the Rules as a species to which the RE test can be applied.

Table 15B. Specific conditions for the radicle emergence test procedure

CURRENT VERSION

Species	Germination medium	Replication	Germination temperature	Criterion of radicle emergence	Timing of radicle emergence count
Brassica napus	Pleated papers	2 replicates of 100 seeds	20 ± 1°C	Appearance of a radicle after breaking through the seed coat. Seeds in which the seed coat has split, but no radicle has emerged, must not be included.	30 h ± 15 min
Raphanus sativus	Top of paper	4 replicates of 50 seeds	20 ± 1°C	Production of 2 mm radicle	48 h ±15 min
Zea mays	Paper towels	8 replicates of 25 seeds	20 ± 1°C or 13 ± 1°C	Production of 2mm radicle	66 h ± 15 min at 20 ± 1°C 144 h ± 1 h at 13 ± 1°C

PROPOSED VERSION

Species	Germination medium	Replication	Germination temperature	Criterion of radicle emergence	Timing of radicle emergence count
Brassica napus	Pleated papers	2 replicates of 100 seeds	20 ± 1°C	Appearance of a radicle after breaking through the seed coat. Seeds in which the seed coat has split, but no radicle has emerged, must not be included.	30 h ± 15 min
Raphanus sativus	Top of paper	4 replicates of 50 seeds	20 ± 1°C	Production of 2 mm radicle	48 h ±15 min
Triticum aestivum L. subsp. *aestivum* (excluding dormant seed lots)	Between paper	4 replicates of 50 seeds	15 ± 1°C	Production of 2 mm radicle	48 h ±15 min
~~*Zea mays*~~	~~Paper towels~~	~~8 replicates of~~	~~20 ± 1°C~~	~~Production of 2mm~~	~~66 h ± 15 min at 20 ± 1°C~~

		25 seeds	or 13 ± 1°C	radicle	144 h ± 1 h at 13 ± 1°C

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.15.2.			

C.15.3. Change to validated tests listed in 15.3

Consequent change as a result of C15.2.

CURRENT VERSION	PROPOSED VERSION
The following ISTA vigour tests have completed validation: Conductivity test: *Cicer arietinum* (Kabuli type), *Glycine max*, *Phaseolus vulgaris*, *Pisum sativum* (garden peas only, excluding petit-pois varieties) Accelerated ageing test: *Glycine max* Controlled deterioration test: *Brassica* spp. Radicle emergence test: *Zea mays*, *Brassica napus* (oilseed rape, Argentine canola), *Raphanus sativus* Tetrazolium vigour test: *Glycine max*	The following ISTA vigour tests have completed validation: Conductivity test: *Cicer arietinum, Glycine max*, *Phaseolus vulgaris*, *Pisum sativum* (garden peas only, excluding petit-pois varieties) Accelerated ageing test: *Glycine max* Controlled deterioration test: *Brassica* spp. Radicle emergence test: *Zea mays*, *Brassica napus* (oilseed rape, Argentine canola), *Raphanus sativus*, *Triticum aestivum* L. subsp. *aestivum* Tetrazolium vigour test: *Glycine max*

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.15.3.			

Chapter 18: Seed mixture analysis

C.18.1. Purity and component analysis

Clarification on how to report purity content of seed mixtures (i.e. the percentage by weight of pure seed, inert matter, and other seeds).

CURRENT VERSION	PROPOSED VERSION
18.8.1. Purity and component analysis The results of the purity analysis are reported according to Chapter 3.	**18.8.1. Purity and component analysis** The results of the purity analysis are reported according to Chapter 3. ... "The percentage by weight of ~~all declared components of~~ pure seed ~~and~~, (if applicable, including declared inert material); inert matter and other seeds must be given to one decimal place and entered in the spaces for purity. The pure seed percentage is calculated using the total weight of the pure seed of all mixture components. "

VOTE TO ACCEPT ITEM	YES VOTES	NO VOTES	RESULT
C.18.1.			