

Report of the Moisture committee

Dr. Axel Goeritz and Daniela Villa

23.06.2026



Agenda

- Membership
- Rules changes
- Workshop 2025 in Türkiye (Daniela)
- Validation study *Abelmoschus esculentus* (Chandrashekara)
- Validation study *Moringa*

Members MOI

1	Chair: Axel Goeritz	Germany
2	Vice-Chair: Tanja Petrovic	Serbia
3	Vice-Chair: Daniela Villa	Italy
4	Sergio Pasquini	Italy
5	Gerarda de Boer-Raatgever	Netherlands
5	Susan Alvarez	United States
6	Baymolo Goma	Zambia
7	Wen-Ju Yang	Sep. Customs Territory of Taiwan
8	Celine Herbert	France
9	Selma Kurt	Turkey
10	Ramesh D M	India
10	Fiona Hay	Denmark
12	Brady Carter	United States
11	Chandreshekara Bhat	India
12	Ainara Fernandez	Ireland

Members Moisture committee

Applicant members



Italy
Vicechair



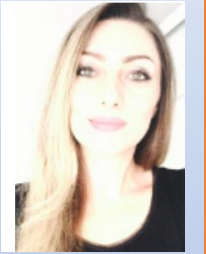
Germany
Chair



Serbia
Vicechair



India



Turkey



Ireland

MOI

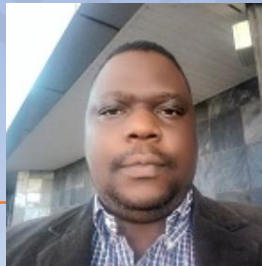
Italy



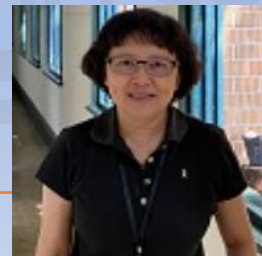
Denmark



Zambia



TW



France



Netherlands



Liason officers

Craig and Keshavulu

Membership

- Goals
 - To represent every Continent
 - is not optimal, more resp. applications wished
- to get active members
 - Applicant Members of MOI
 - Same rights as every member
 - but
 - No voting rights
 - After one year voting about membership in the MOI, if application still given

Proposed Rules changes

Form 1: Inclusion of new species in the ISTA Rules

Form 1 in the Introduction to the ISTA Rules is missing a place to record the minimum submitted sample for **moisture** testing for Table 2C. It is also missing a place to record the seedling evaluation group for Table 5A.

There is no corresponding AOSA Rule.

This editorial change proposal was submitted by the ISTA Rules Committee Chair and Vice-Chair.

RUL Committee Votes	Yes: 11	No: 0	Abstain/Absent: 8
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CURRENT VERSION

Form 1: Proposal for inclusion of new species in the ISTA Rules

2. Lot and sample weights

(Information as it should appear in Table 2C)

Species	Maximum weight of lot (kg)	Minimum submitted sample (g)	Minimum working samples (g) Use 'Calculator for adding working weights to Table 2C'	
			Purity analysis (3.5.1)	Count of other species (4.5.1)

PROPOSED VERSION

Form 1: Proposal for inclusion of new species in the ISTA Rules

2. Lot and sample weights

(Information as it should appear in Table 2C)

Species	Maximum weight of lot (kg)	Minimum submitted sample (g)	Minimum working samples (g) Use 'Calculator for adding working weights to Table 2C'		Minimum submitted sample for moisture testing (g)
			Purity analysis (3.5.1)	Count of other species (4.5.1)	

Minimum submitted sample for moisture testing (g)

Proposed Rules changes

CURRENT VERSION	PROPOSED VERSION
<p>9.2.7 Reporting of results</p> <p>The result of a moisture content test must be reported in the space provided to the nearest 0.1 %. The method must be reported (duration and temperature).</p> <p>The following additional information must also be reported under 'Other determinations':</p> <p>....</p>	<p>9.2.7 Reporting of results</p> <p>The result of a moisture content test must be reported in the space provided to the nearest 0.1 %. The method must be reported (oven method: duration and temperature).</p> <p>The following additional information must also be reported under 'Other determinations':</p> <p>....</p>
<p>CONSEQUENTIAL CHANGE TO CHAPTER 1</p>	
<p>1.5.2.12 Moisture content</p> <p>....</p> <p>The following additional information must also be reported under 'Other determinations':</p> <ul style="list-style-type: none"> • For the oven method (9.2.7), the method (i.e. duration and temperature) must be reported. <p>....</p>	<p>1.5.2.12 Moisture content</p> <p>....</p> <p>The following additional information must also be reported under 'Other determinations':</p> <ul style="list-style-type: none"> • For the oven method (9.2.7), the method (oven method: duration and temperature) must be reported. <p>....</p>

Proposed Rules changes

Moisture test checking tolerances

The proposed wording makes it much clearer how to proceed, so the results are in agreement with the Moisture handbook (2007) and the moisture calculator.

This proposal harmonises with the AOSA Rules.

This proposal was submitted by the Moisture Committee.

MOI Committee Votes	Yes: 13	No: 0	Abstain/Absent: 0
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CURRENT VERSION	PROPOSED VERSION
<p>9.2.6.2 Tolerances</p> <p>The difference must be calculated to three decimal places and then rounded off to one decimal place. The maximum difference between the two replicates must not exceed 0.2 % after rounding from three to one decimal place.</p> <p>....</p>	<p>9.2.6.2 Tolerances</p> <p>The difference <u>between two replicates</u> must be calculated to three decimal places and then rounded off to one decimal place. The maximum difference between the two replicates must not exceed 0.2 %.</p> <p>....</p>

Proposed Rules changes

Definition of moisture content reported

The wording for reporting moisture content for pelleted seed for the oven method was changed some years ago. This proposal will harmonise the wording for the moisture meter method.

The AOSA Rules do not reference moisture testing of coated seed.

This proposal was submitted by the Moisture Committee.

MOI Committee Votes	Yes: 13	No: 0	Abstain/Absent: 0
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CURRENT VERSION

9.3.2.7 Reporting of moisture meter results

....

In the case of pelleted seeds (see Chapter 11), the following statement must be entered: 'The seeds of the submitted moisture sample were pelleted, and the moisture content reported is ~~the average of~~ seed and pelleting materials'.

....

PROPOSED VERSION

9.3.2.7 Reporting of moisture meter results

....

In the case of pelleted seeds (see Chapter 11), the following statement must be entered: 'The seeds of the submitted moisture sample were pelleted, and the moisture content reported is that of the combined unit comprising seed and pelleting materials'.

....

Proposed Rules changes

While testing for moisture content of pelleted seeds is described in Chapter 9 (Moisture testing), it will also be helpful to find this reference in Chapter 11 (Testing coated seeds).

The AOSA Rules do not reference moisture testing of coated seed.

PROPOSED VERSION

11.6.7 Reporting results

... percentage of viable seed`.

11.9 Determination of moisture content

- Pelleted seeds have to be tested the same way as unpelleted seeds and the following statement must be entered: `The seeds of the submitted sample were pelleted, and the moisture content reported is that of the combined unit comprising seed and pelleting material.`

- The moisture content of seed tapes and seed mats cannot be reported on an Orange International Seed Lot Certificate or a Blue International Seed Sample Certificate, since there is no ISTA method for this kind of sample.

ISTA Workshop on Purity, Other Seed Determination and Moisture Analysis – Antalya Türkiye, 10-14 November 2025



The ISTA MOI committee successfully conducted in 2025 a Workshop on Purity, Other Seed Determination, and Moisture Analysis in Antalya, Türkiye. Hosted by the Yüksel Seed Laboratory, the five-days programme focused on the practical application of ISTA Rules to enhance global seed quality.

Under the leadership of **Selma Kurt** and **Daniela Villa**, the participants were engaged in sessions designed to improve expertise in sampling, testing, and quality assurance.

This workshop was specifically tailored to foster information exchange and introduce equipment and methodologies to the seed testing laboratories.

By the end of the week, the initiative had successfully bridged the gap between theoretical rules and practical laboratory experience.

A diverse cohort representing ten nations worldwide



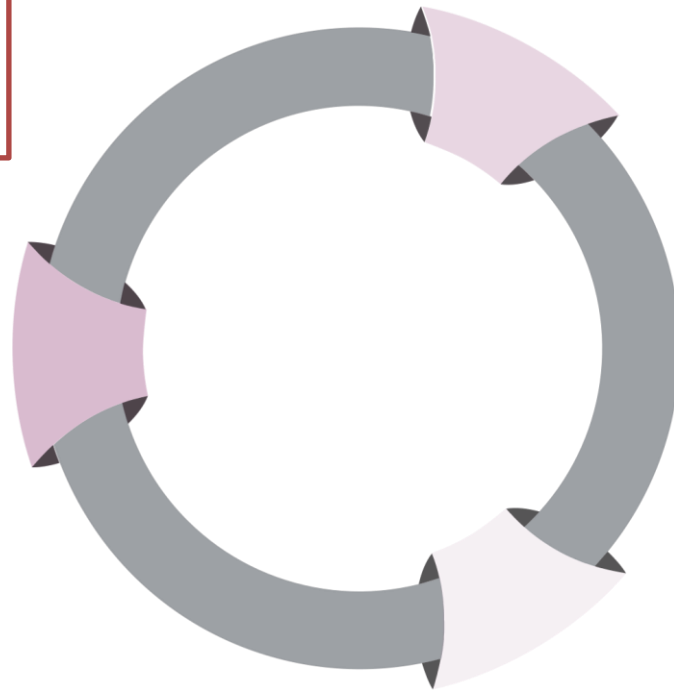
The workshop attracted 25 participants from Europe, the Middle East, and Asia to learn best practices in ISTA Moisture test

Mastering Moisture test

The first three days focused on sampling and purity/OSD in complex mixtures The final two days were dedicated to moisture testing, covering both grind and no-grind methods

1. Full Cycle

Participants practiced the full testing cycle, including sample preparation and oven drying.



2. Sample preparation

Testing methods for three species including no-grind, coarse grind, and fine grind.

3. Hands-on Practice - Calculation

Calculation of moisture content in respect of ISTA rules

Upholding ISTA accreditation standard and quality control checks for MOI tests

Quality assurance was a central pillar of the curriculum. The quality control check were illustrated emphasizing that accurate testing begins with control checks procedures, which must be together with accurate application of the ISTA Rules.

These sessions provided a framework for implementing robust internal controls.

By integrating ISTA quality standards into the training, the workshop ensured that participants could return to their home labs with improved quality management systems.

At the end of the practical exercise, a question-and-answer session was proposed to solve specific issues followed by a valued and open-minded discussions, not only with the lecturers, but also among the participants, with the aim of sharing knowledge and experiences

Moisture Validation study – Abelmoschus sp.

<u>Author</u>	Chandrashekara Bhat (IN07 lab) Indo American Hybrid seeds(India) Pvt.Ltd., Bengaluru
<u>Reviewer Name</u>	Erik van Egmond
<u>Reviewer Name</u>	Enrico Noli
<u>Moisture Committee Chair</u>	Axel Goeritz
<u>Statistician</u>	Kirk Remund & Nicholas Syring
<u>ISTA Secretariat co-ordination</u>	Nadine Ettel

- Abelmoschus esculentus is one of the key vegetable crops cultivated across the world in tropical, sub tropical and warm temperate regions for its edible green seed pods. Since, seed moisture determination is one of the key quality parameter, the existing ISTA standard method of Low constant temperature oven method ($103\pm 2^{\circ}\text{C}$ for $17\text{ hrs}\pm 1\text{ hr}$) needs to be validated or method modification with High constant temperature method ($130\pm 3^{\circ}\text{C}$ for $1\text{ hr}\pm 3\text{ min.}$, $2\text{ hr}\pm 6\text{ min.}$, $3\text{ hr}\pm 9\text{ min.}$, $4\text{ hr}\pm 12\text{ min.}$) needs to be arrived along with other parameters such as grinding requirement and duration of drying etc.
- Abelmoschus esculentus (Okra) is also a new species in Table 9A of ISTA Rules and that the species is already listed in Table 2C.

Moisture Validation study – *Abelmoschus* sp.

DOE for preliminary study:

of lots (moisture level): 3

of test methods (Temperature): 5 (103±2°C for 17 hrs±1 hr; 130±3°C for 1hr±3 min., 2 hr ±6 min., 3 hr ±9 min., 4 hr ±12 min.,)

of Grinding methods: 3 (whole seed, coarse, fine)

Total treatments: 3x5x3= 45

of Replication: 2

of Labs: 2 (IN07 & IN47)

Total observations: 45x2=90x2 = 180

Observations:

- Repeatability and reproducibility results point to the standard method as being more reliable.
- Grinding significantly impacts moisture measurement and substantially reduces variance leading to better repeatability and reproducibility. Therefore, including (only one of either coarse or fine) grinding is recommended in further validation study along with the high temperature methods.
- A full validation study is recommended to compare the standard 103/17 method to the high temp methods.
- The subject-matter experts must decide if the significant differences between the standard 103/17 method and the 130/3-4 methods are sufficiently *practically* significant to warrant dropping the latter from consideration. In that case, the 1 to 2 hour methods could be retained for further comparison.

Moisture Validation study – *Abelmoschus* sp.

DOE for the main study:

of Variety: 2

of Lots (moisture level): 2

of test methods (Temperature): 3 (103±2°C for 17 hrs±1 hr; 130±3°C for 1hr±3 min., 2 hr ±6 min.)

of Grinding methods: 2 (whole seed, coarse)

Total treatments: 2x2x3x2= 24

Replication: 2

of Labs: 8 (India- 2 (INML07, INML47) , Republic of Serbia-1 (RSDL03), Germany-1 (DEDL03 **all samples for EU**), Italy-1 (ITDL03), Netherland-1 (NLDL03), France-1 (FRDL02), Ireland-1 (IEDL01)

Total Observation: 24x2= 48x8= 384

Observations:

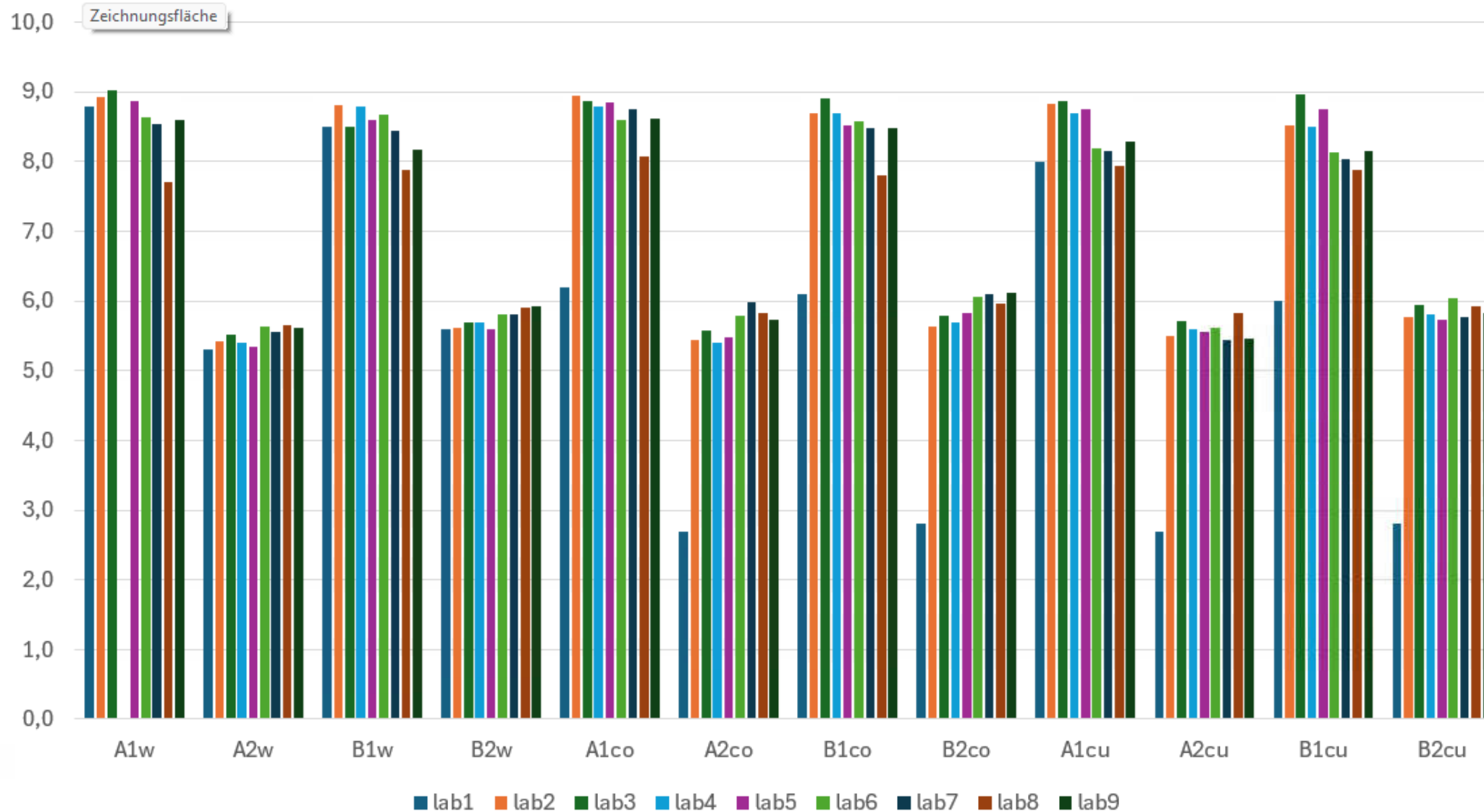
- There is high consistency of data across labs. Overall, the hypotheses seem correct: Coarse grinding is associated with higher moisture readings and the H2 and L methods give similar readings within grinding levels.
- Coarse grinding appears to increase variability which leads to slightly lower repeatability and reproducibility compared to no grinding. The H1 method is less repeatable and reproducible than the L and H2 methods.
- All coarse grinding methods produce higher moisture measurements than no grinding methods. Between H1 and H2, the H2 oven method is more consistent with the current L method.

Moisture Validation study – *Moringa oleifera*

- Design
 - 9 labs
 - 2 varieties
 - 2 different Moisture levels (dried and remoistured)
 - 3 kinds of preparation (Whole Seed, Coarse grinding, Cutting)
 - 1 Ovenmethod (103°C, 17h)
- Statistical evaluation follows
- No great differences between the preparation methods
 - whole seeds, 103°C, 17h would be the favorite

Moisture Validation study – Moringa oleifera

Moringa Validation Study



Further Project groups

Equilibrium Water Activity/eRH (Fiona Hay)



Calibration of Moisture Meters

Moisture „Tool“

Thank you

