Report of the Moisture committee

Axel Goeritz (MOI chair)

3.7.2024

Members Moisture committee

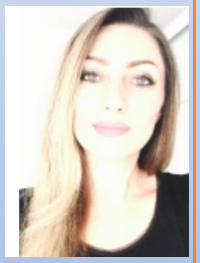
Denmark

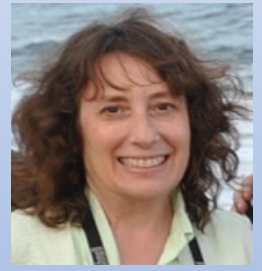
Germany
Chair

Serbia
Vicechair

India

Turkey





USA

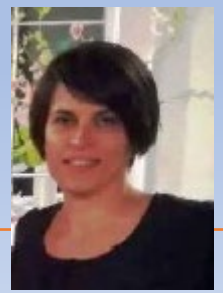
Netherlands

MOI

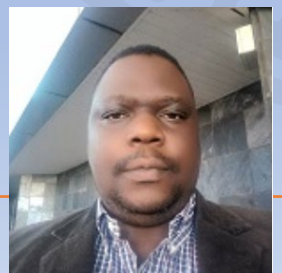
Ireland

Italy

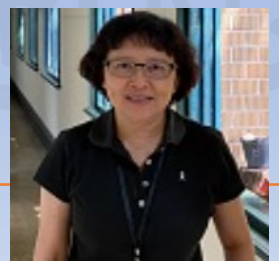
Liason
officer



Zambia



TW



France

USA

Members Moisture committee

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

100 years Moisture Testing in ISTA

1924ISTA´s Birthday in Cambridge

1931 "Determination of the moisture content“ in the first ISTA Rules

"Seed Moisture and Storage committee"

chairs: Toole, Oren Justice, van Wyk

Separation in two TCOMs: MOI and STO

Don Grabe (US) 1. chair of the MOI, thereafter Grete Tharp, Harry Nijënstein, Craig McGill, Jette Nydam, Laura Bowden, Axel Goeritz

Moisture boom time

2000 - Harry Nijënstein chair of the MOI
2001 - Addition of moisture meters to chapter 9
2003 - first MOI PT (Ronald Don)
- first MOI Workshop (Lyngby, DK)

TECHNICAL COMMITTEES

ISTA Moisture Content Proficiency Test

ISTA Moisture Content Proficiency Test

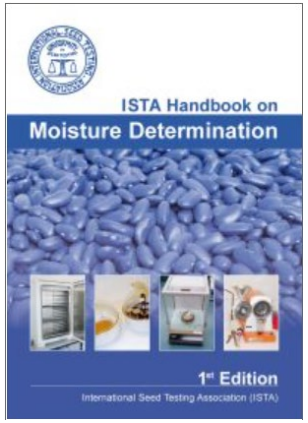
By **Ronald Don**, ISTA Moisture Committee Vice-chair

In the last edition of Seed Testing International I gave an account of the work involved in preparing samples to be used in the first ISTA Moisture Content Proficiency Test. Now some might ask the question: Was all the work worth it? Well I'll let you be the

low-up corrective action. If a laboratory does not feel confident about the appropriateness of follow-up corrective action suggested by the test leader, it may contact the Secretariat for advice.

than 2 (>). It is reassuring to see that less than 5% of ISTA Accredited Laboratories achie-

2005 **goals: 1. Revision of MOI chapter 2. MOI handbook 3. MOI Workshops**
2006-8 many MOI workshops
2007 1. MOI handbook



1st ISTA Moisture Testing Workshop

The Danish Plant Directorate
Lyngby, Denmark, November 3 -7, 2003

By **Harry Nijënstein**, ISTA Moisture Committee Chair

Participants

The first ISTA Moisture testing workshop ever was held in Denmark in November 2003. The 19 participants originated from 14 countries on three continents (Europe, Northern America, Australia/New Zealand). Governmental, private and company labs were all well represented.

Organisation and purpose

The workshop was very well organised by Jette Nydam and her staff. All went very smoothly: the welcome at the hotel, the daily train trip between the hotel and the Plant Directorate, the breaks and the lunches. Alterations in the program were accepted with great flexibility.

The main purpose of the program was to promote uniformity in seed moisture testing

Project Groups

Equilibrium Relative Humidity (Fiona Hay)

Calibration of Moisture Meters (Ainara Fernandez)

Moisture „Tool“ (Axel Goeritz)

Seeds equilibrate with their environment

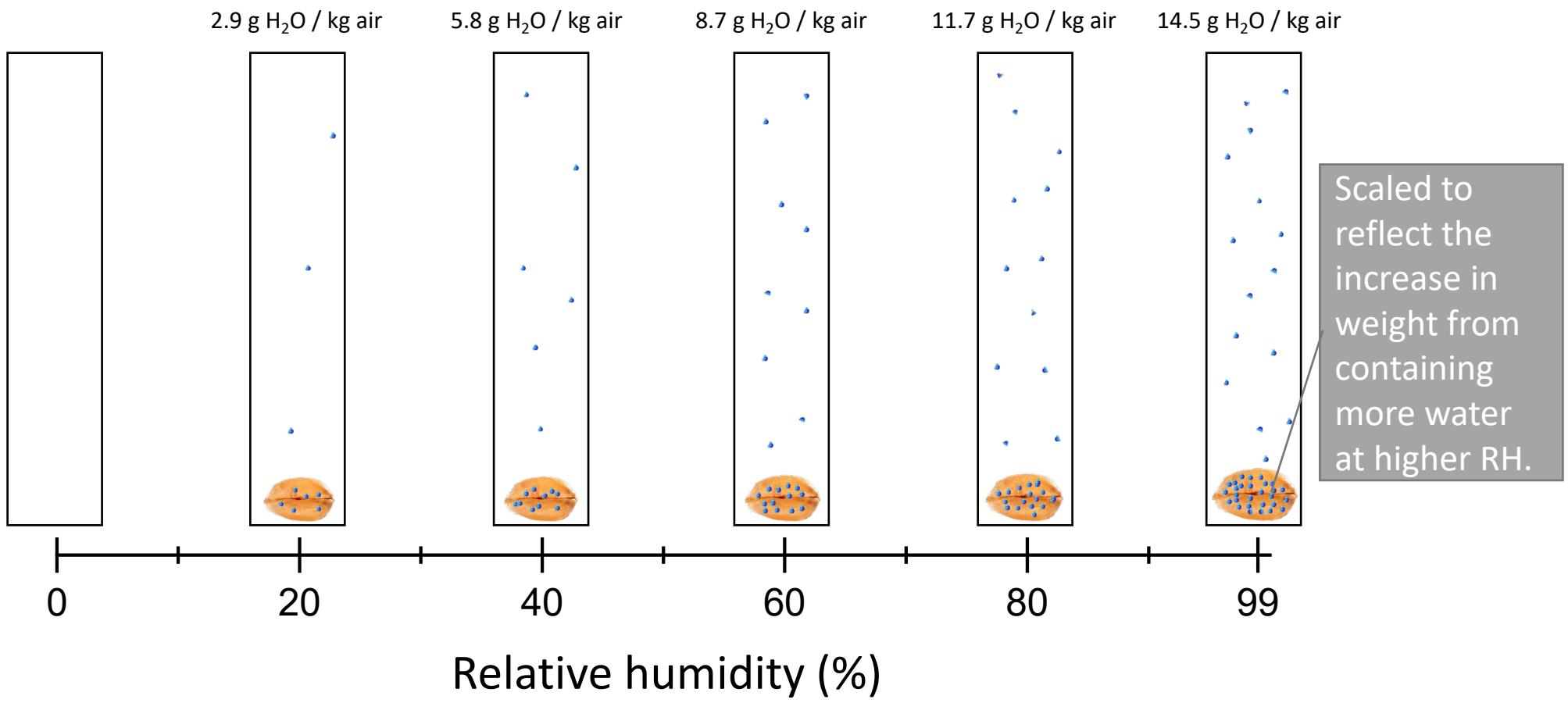
= 100 g dry weight wheat seeds

= 1 g water

= 1 kg air

@20°C

Some water molecules are able to move out of the seeds, but equilibrium with the surroundings is maintained.



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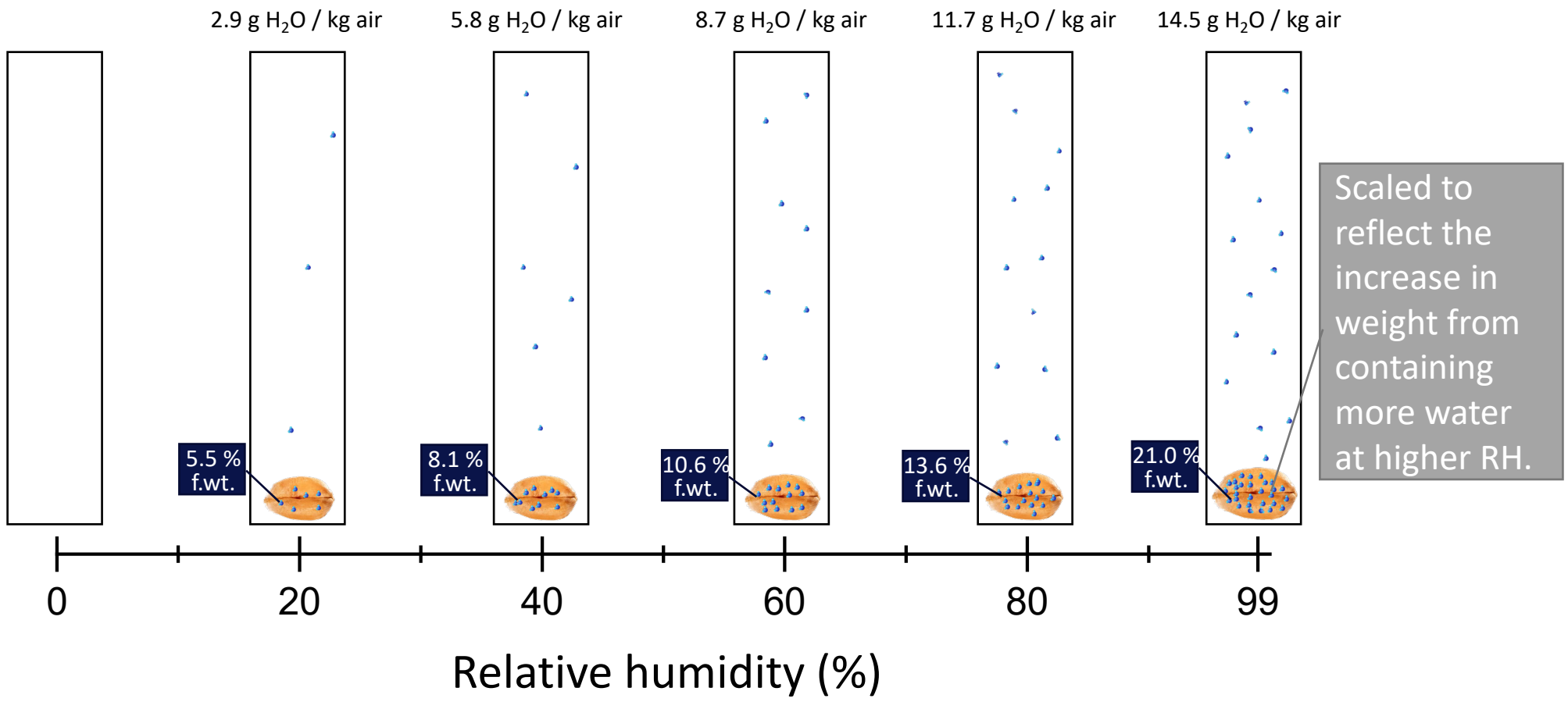


Scaled to reflect the increase in weight from containing more water at higher RH.

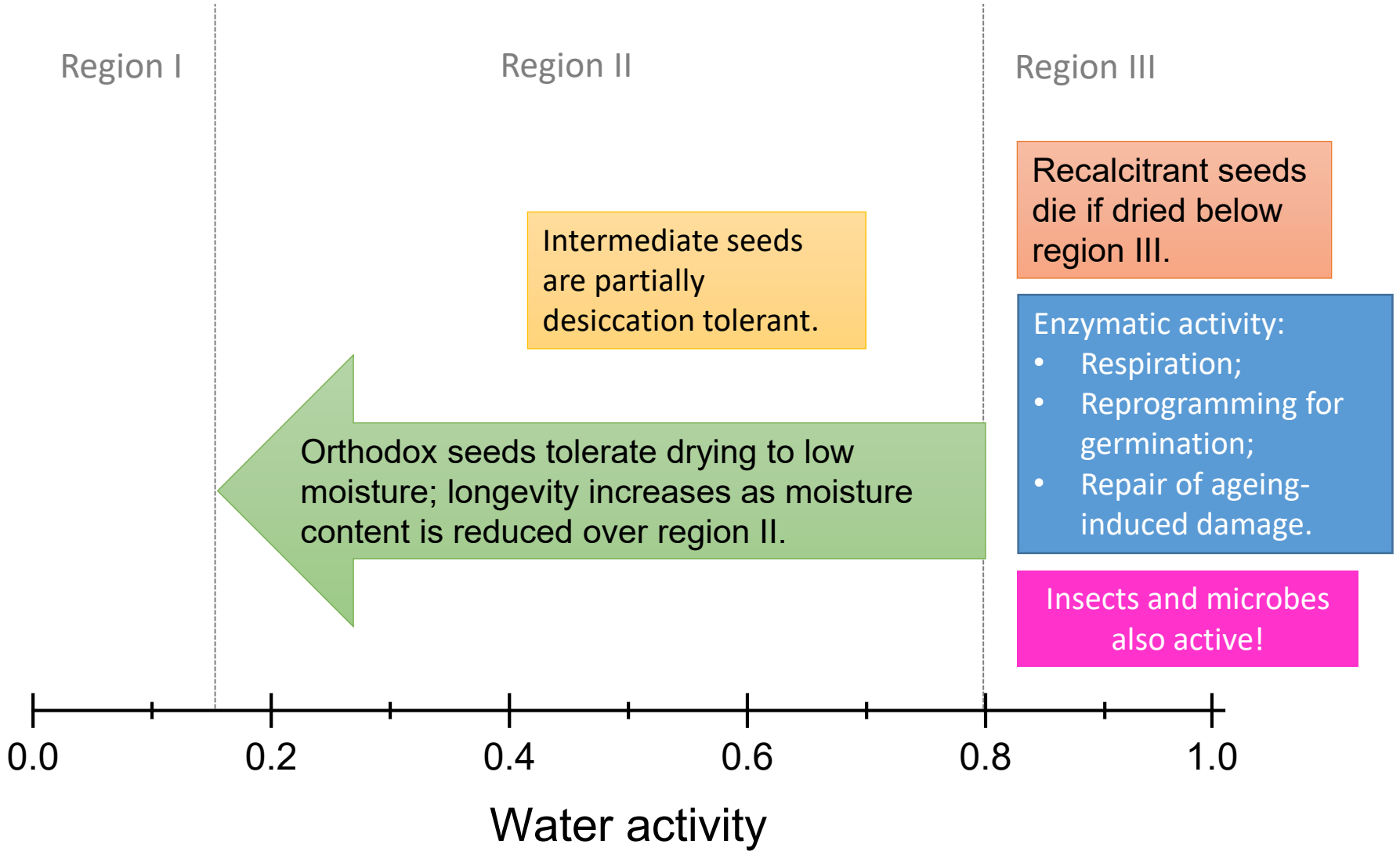
Water activity meters

- Measured using a water activity meter
- Measures the relative humidity of the air around the sample when the system is in equilibrium
- Referred to as water activity (Aw) or equilibrium relative humidity (eRH), where $eRH \equiv Aw \times 100$
- Non-destructive measure of the water in the seeds

Rotronic

Novasina

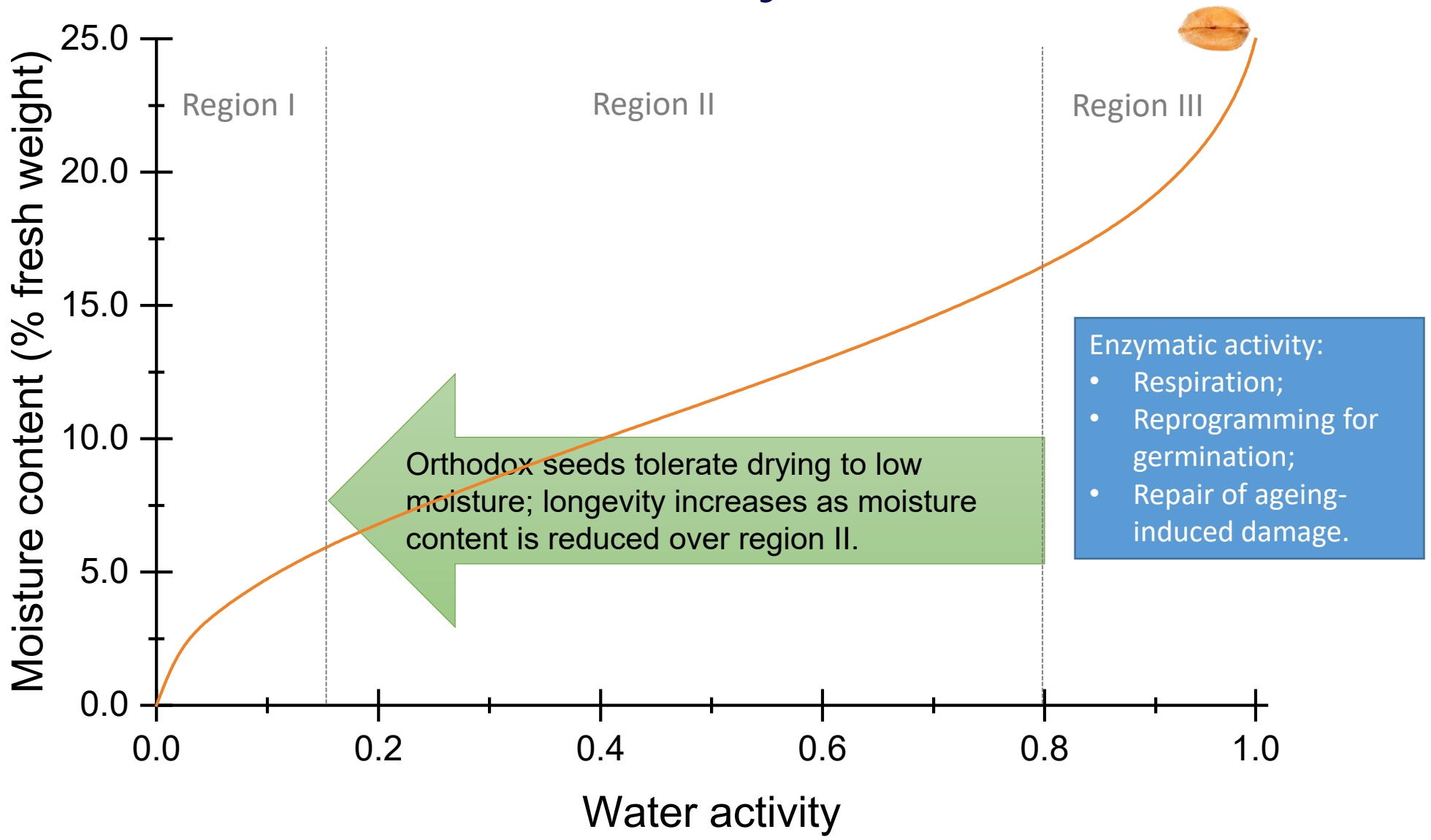
Seed water activity



Seed water activity

@20°C

Wheat seeds
(2.2% oil)



Seed water activity

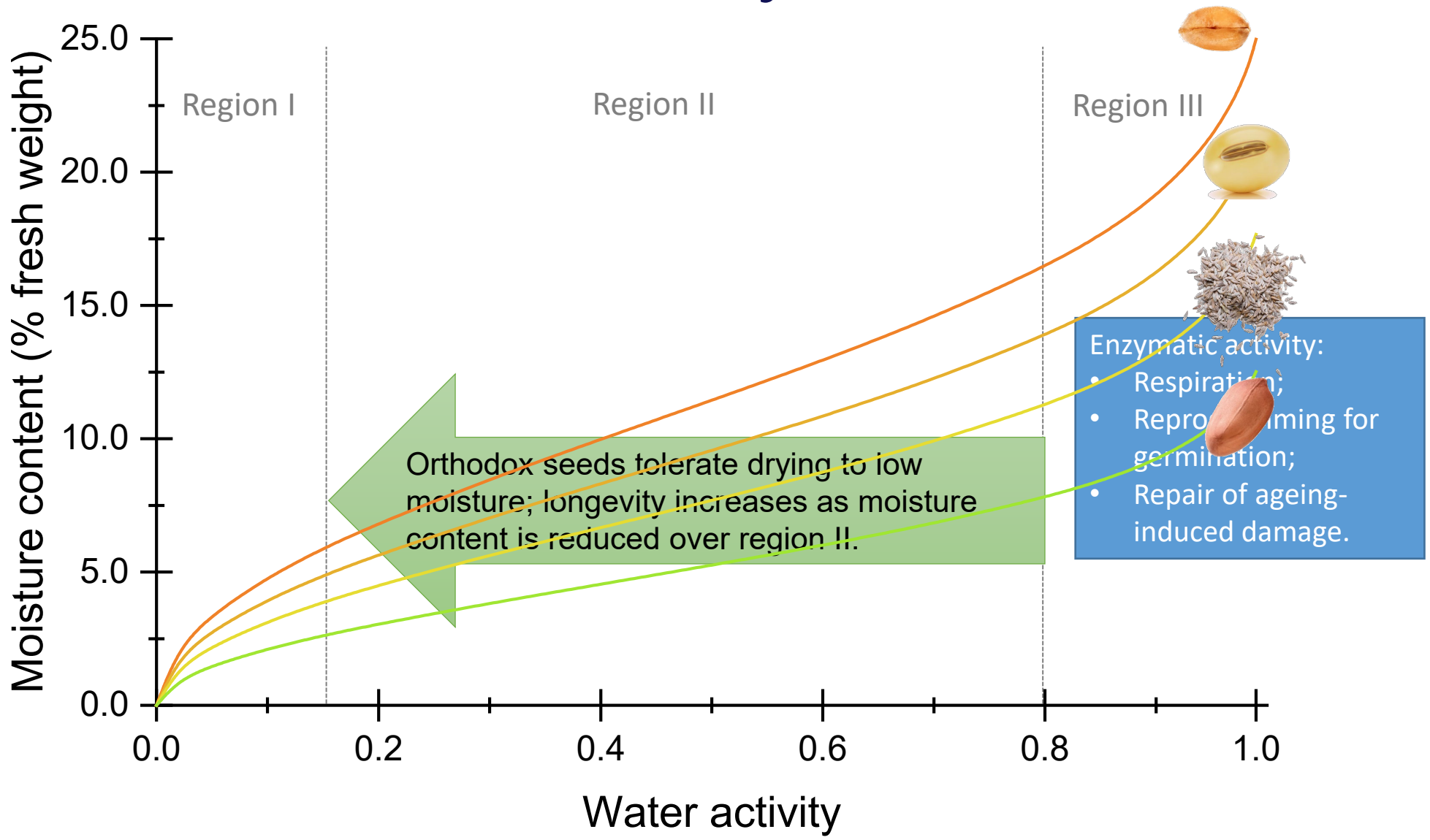
@20°C

Wheat seeds (2.2% oil)

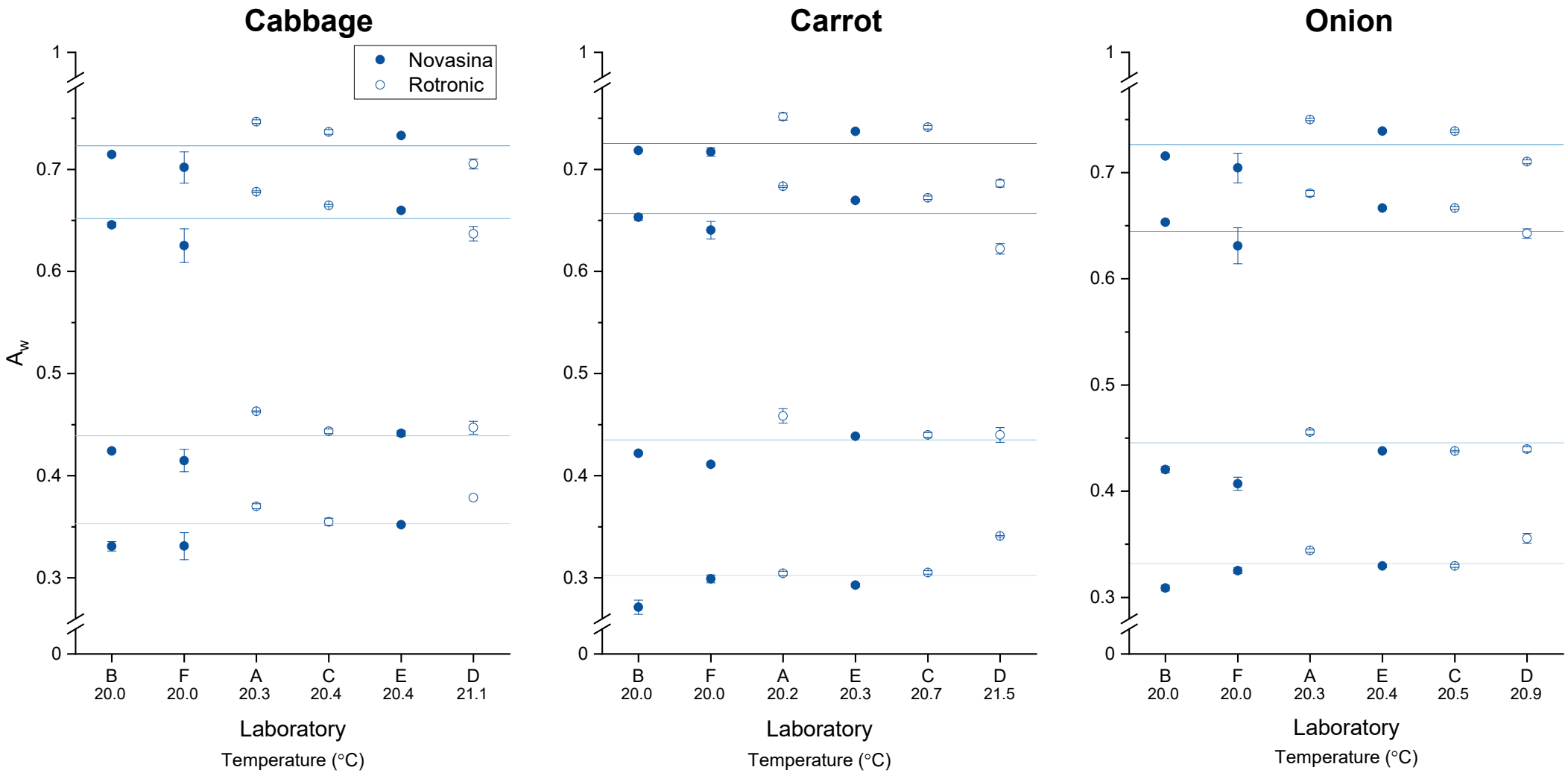
Soybean seeds (20% oil)

Lettuce seeds (37% oil)

Groundnut seeds (58% oil)



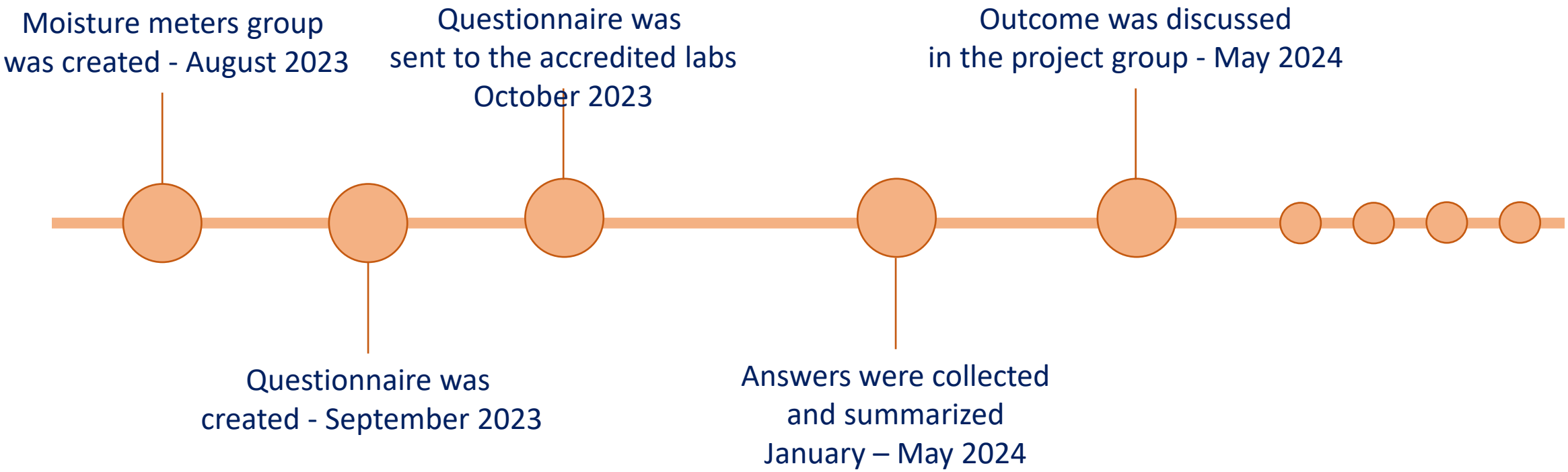
Special project: multi-laboratory test



Moisture Meter Project

Ainara Fernández

Timeline


Moisture meters group was created - August 2023
Questionnaire was created - September 2023
Questionnaire was sent to the accredited labs October 2023
Answers were collected and summarized January – May 2024
Outcome was discussed in the project group - May 2024

Moisture meters group was created

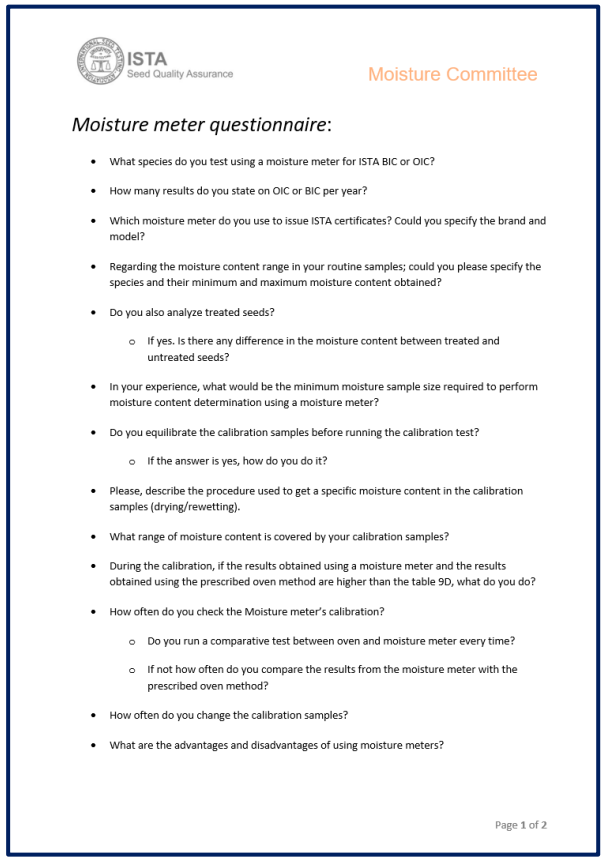
6 TCOM members became part of the Moisture Meters project group:

- Ainara Fernández
- Axel Goeritz
- Chandrashekara Bhat
- Celine Herbert
- Tanja Petrovic
- Sergio Pasquini

Questionnaire was created

13 questions were agreed by the Moisture TCOM to gather information about:

- Moisture meters used
- Type of samples analysed
- Calibration samples and calibration procedures
- Advantages and disadvantages



ISTA Seed Quality Assurance

Moisture Committee

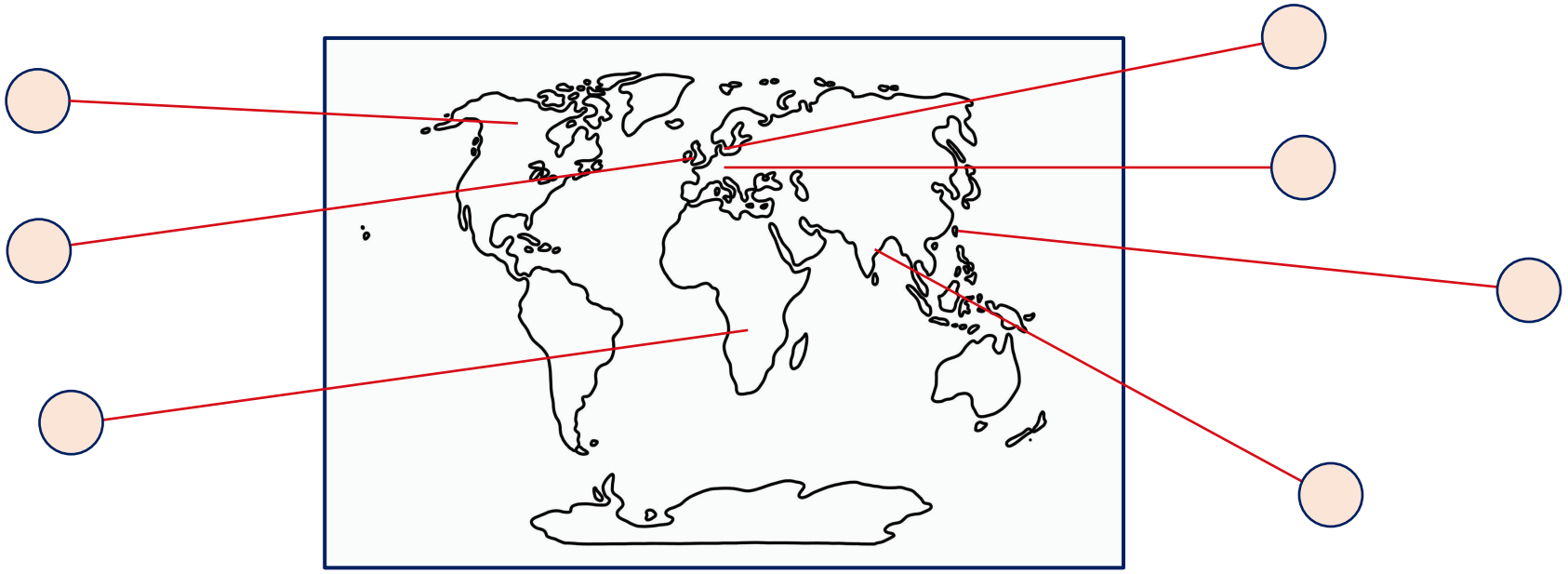
Moisture meter questionnaire:

- What species do you test using a moisture meter for ISTA BIC or OIC?
- How many results do you state on OIC or BIC per year?
- Which moisture meter do you use to issue ISTA certificates? Could you specify the brand and model?
- Regarding the moisture content range in your routine samples; could you please specify the species and their minimum and maximum moisture content obtained?
- Do you also analyze treated seeds?
  - If yes. Is there any difference in the moisture content between treated and untreated seeds?
- In your experience, what would be the minimum moisture sample size required to perform moisture content determination using a moisture meter?
- Do you equilibrate the calibration samples before running the calibration test?
  - If the answer is yes, how do you do it?
- Please, describe the procedure used to get a specific moisture content in the calibration samples (drying/rewetting).
- What range of moisture content is covered by your calibration samples?
- During the calibration, if the results obtained using a moisture meter and the results obtained using the prescribed oven method are higher than the table 9D, what do you do?
- How often do you check the Moisture meter's calibration?
  - Do you run a comparative test between oven and moisture meter every time?
  - If not how often do you compare the results from the moisture meter with the prescribed oven method?
- How often do you change the calibration samples?
- What are the advantages and disadvantages of using moisture meters?

Page 1 of 2

Questionnaire was
sent to the accredited labs

Questionnaire was sent to the 7 accredited lab to issue ISTA certificates using Moisture Meters



Answers were collected and summarized

Species covered
Brassica napus
Triticum turgidum subsp. Durum
Triticum aestivum
Hordeum vulgare
Avena sativa
Secale cereale
Pisum sativum
Glycine max
Linum usitatissimum
Panicum sp.
x Triticosecale sp.
Cannabis sp.,
Fagopyrum sp.
Helianthus sp.
Papaver sp.
Lupinus sp
Vicia sp.
Carum sp
Zea mays

Calibration
Annual basis Every month Once every three months

Minimum and maximum moisture content
Brassica napus 5.1 - 8.3
Triticum turgidum subsp. durum 10.2 - 13.3
Triticum aestivum 8.9 – 16.1
Hordeum vulgare 11.7 – 16.9
Avena sativa 11.4 - 14.3
Pisum sativum 14.3 - 15.3
Linum usitatissimum 8.9 - 9.7
Zea mays 7.7 - 15
Solanum lycopersicum 6.2 – 8.7
Glycine max 7.2 -12.4

Sample size	
Minimum	50g
Maximum	500g
Average	~500g
It will depend on the moisture meter container	

Advantages	Disadvantages
Less time and energy consuming Does not require experienced personnel.	Calibration is very time consuming. Requires a larger sample size. Not as accurate as the moisture oven method.

OIC or BIC per year in total
Around 200 samples

Outcome was discussed in the project group

Project group in collaboration with other MOI and interested ISTA members, will determine the next steps, which could include:

- Continuing discussions with accredited laboratories to gather more information on calibration and calibration samples.
- Engaging with non-accredited laboratories for additional insights.
- Conducting a validation study for treated seeds.
- Drafting a new calibration method to be included in the ISTA rules.

Thank you

Validation studies

planned Validation study *Moringa oleifera* (Axel)

- started 2020 “first steps”
- silenced till this year, now Steve took action and material will be delivered
- Calibration of moisture samples is currently supported by Michael Kruse

planned Validation study *Abelmoschus esculentus* (???)

- The demand seems to be given
- the MOI agreed to conduct a validation study
- the lead has to be appointed

Workshop ?

Workshop - Friendship – ISTA-family

Rules Changes

The *Lupinus* genus was added to the ISTA Rules, in 2023, under agricultural species as *Lupinus* spp. (Table 9A Part 2). In the 2024 edition of the ISTA Rules, this listing is now valid for flower and other *Lupinus* species which may have smaller seeds than those intended for the current coarse grinding method for *Lupinus* spp. As a result, the MOI in consultation with the BSC, proposes to name each individual *Lupinus* species appropriate for coarse grinding to avoid confusion and testing error.

Table 9A Details of methods for moisture determination

The oven method must be used as specified for the species in this Table.

Species	Grinding/cutting (9.2.5.4, 9.2.5.5)	Drying Temp. High: 130°C Low: 103°C	Drying time (h)	Tolerances of replicates (9.2.6.2)	Predrying requirement (9.2.5.6) / remarks
1	2	3	4	5	6
~~Lupinus spp.~~	~~Coarse~~	~~High~~	~~1~~	~~0,2 %~~	~~To 17% moisture content or less~~
Lupinus albus L.	coarse	High	1	0.2 %	To 17 % Moisture content or less
Lupinus angustifolius L.	coarse	High	1	0.2 %	To 17 % Moisture content or less
Lupinus luteus L.	coarse	High	1	0.2 %	To 17 % Moisture content or less

Rules Changes: Latest Correction

We missed to include *Carica papaya* into the fused Table 9A in the Rules 2024, it has been in Table 9A part 2 in the Rules 2023.

Table 9A Details of methods for moisture determination

Species	Grinding/cutting (9.2.5.4, 9.2.5.5)	Drying Temp. High: 130°C Low: 103°C	Drying time (h)	Tolerances of replicates (9.2.6.2)	Predrying require-ment (9.2.5.6) / Remarks
1	2	3	4	5	6
…	…	…	…	…	…
Caragana arborescens	Coarse	Low	17	Table 9B	–
Carica papaya	No	Low	17	Table 9B	– / High oil content
Carpinus betulus	Coarse	Low	17	Table 9B	–
…	…	…	…	…	…

ISTA ANNUAL MEETING 2024
01-04 JULY
CAMBRIDGE, UNITED KINGDOM

Thank you