



ISTA
Seed Quality Assurance

ISTA Secretariat

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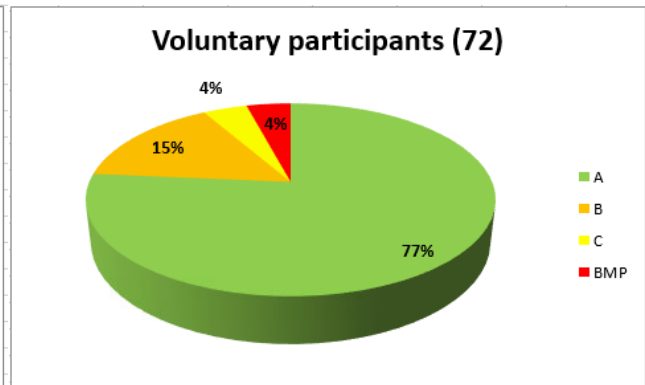
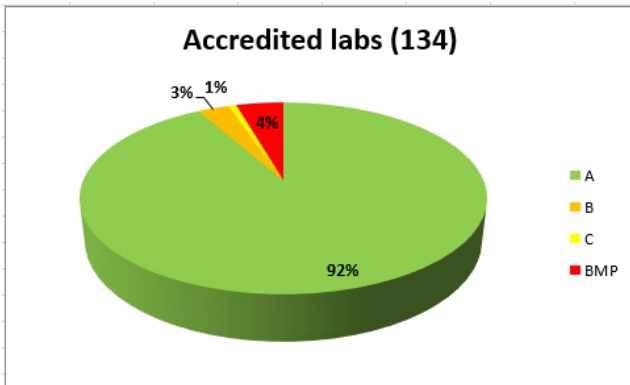
Summary report: PT 23-2 R.sat

Species: *Raphanus sativus*

Scope: PUR, OSD, GER, MOI, VIG (CT test), OIC issuance

PURITY Ratings

Total number of participants = 206



Means and Standard Deviation

of the obligatory accredited participants
calculated for the category of pure seed

Categories	Mean Values %			Standard Deviation		
	Lot 1	Lot 2	Lot3	Lot 1	Lot 2	Lot 3
Pure seed	99.5	99.7	99.7	0.15	0.12	0.10
Other seed	0.2	0.3	0.2	-	-	-
Inert matter	0.3	0.05	0.1	-	-	-

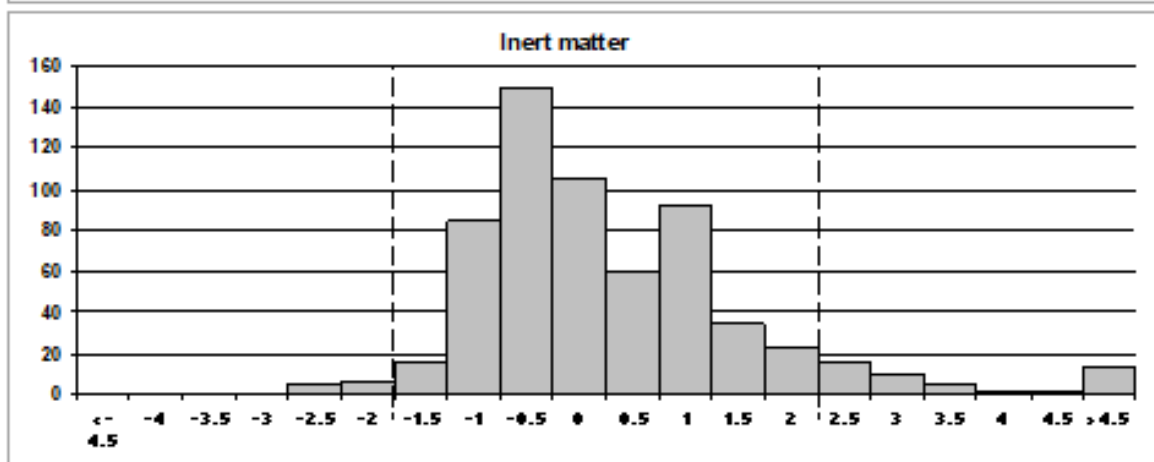
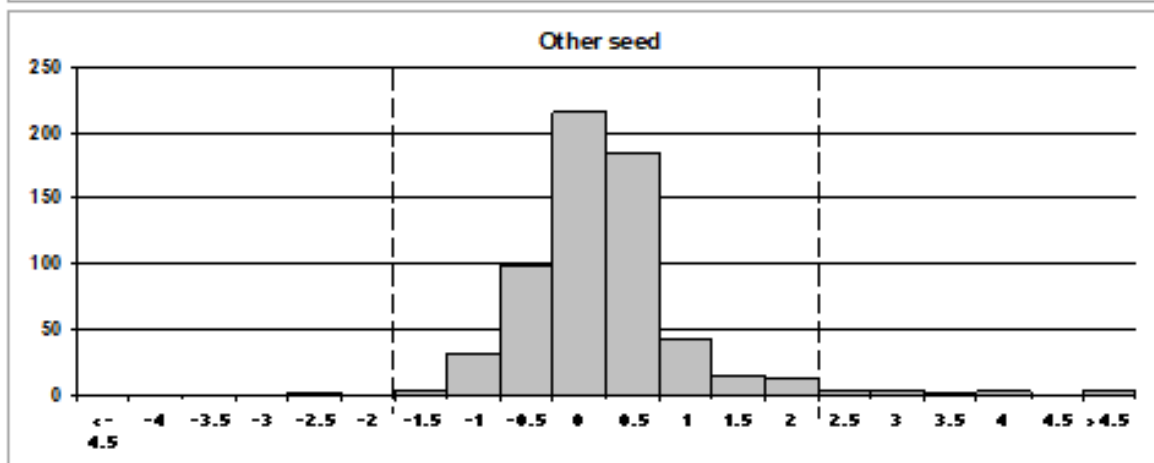
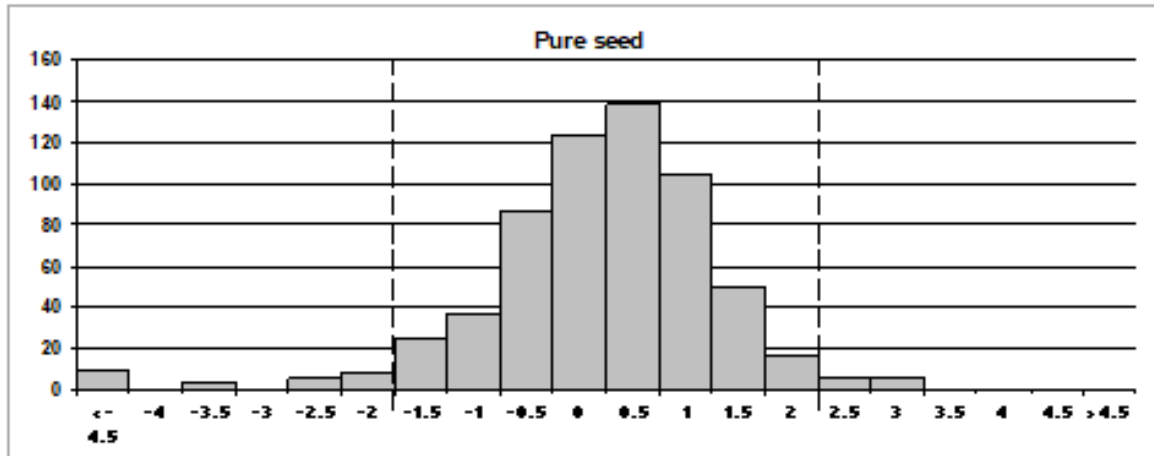
Z-score Distribution

Proficiency Test Report – Test Round 23-2 R.sat

Species : *Raphanus sativus*

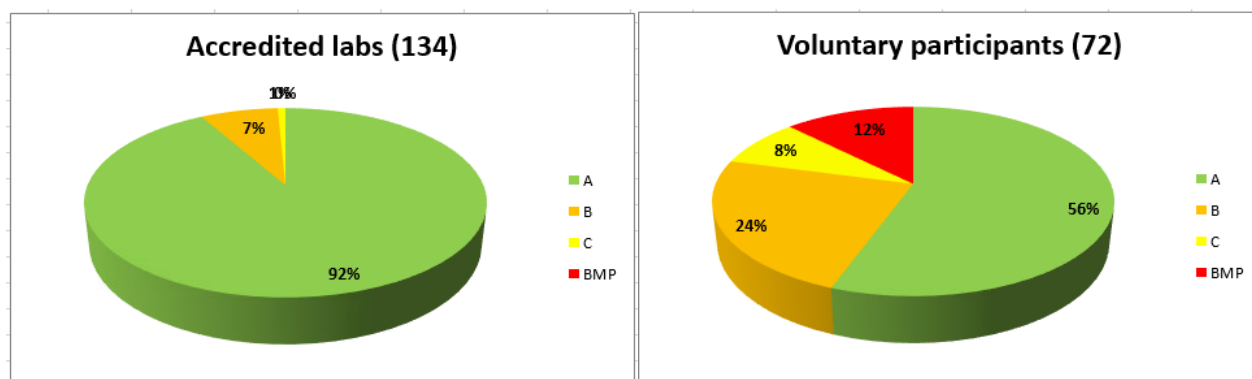
Scope: Purity

The following histograms show the frequency distributions of all participants Z-Scores for the relevant components, i.e. **Pure seed** and **Inert matter** and **Other seed**. The Z-Scores from all three samples are included in each histogram. For further explanations, please refer to the document 'The ISTA Proficiency Test Programme'



OSD Ratings

Total number of participants = 206



Retrieval rates

Proficiency Test Report - Test round 23-2 R.sat

Species: *Raphanus sativus*

Scope: Other Seed Determination

Average of seeds retrieved and identified correctly

The following table shows the retrieval rates of each species added by the test leader prior to sample dispatch. Every species that was added is assigned a value based on the actual retrieval rate of all seeds added. Thresholds are as follows:

- >=90 % -> 3
- >=85 % -> 2
- <85 % -> 1

This score is multiplied with the number of seeds your laboratory reported and identified correctly. The percentage of retrieved and identified seeds is then determined and does define the in-round rating. The thresholds are as follows:

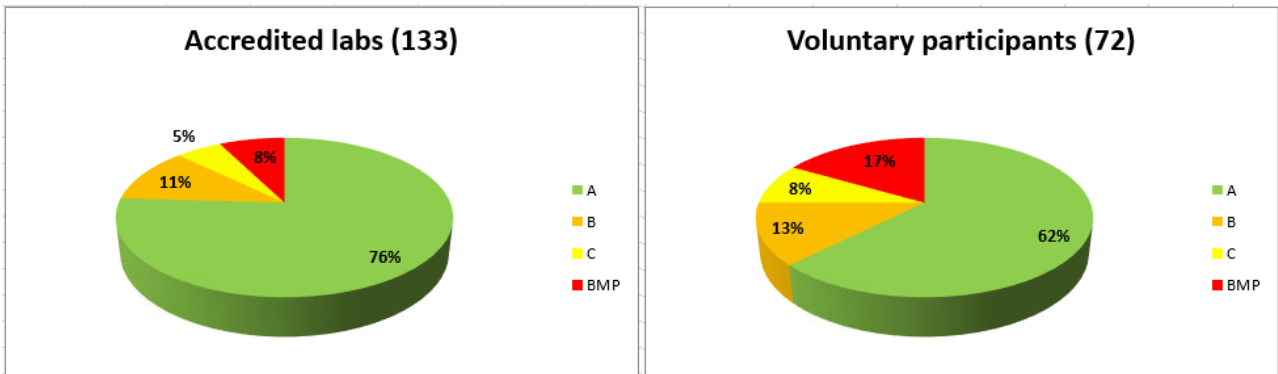
- >=90 % -> A
- >=80 % -> B
- >=70 % -> C
- <70 % -> BMP

For further details please refer to the document: "The ISTA Proficiency Test Programme".

Lot #	Species name	# of seeds added	Average # of seeds found	Retrieval rate [%]	Assigned factor
Lot 1	1 <i>Allium porum</i>	2	1.9	96.2	3
	2 <i>Apium graveolens</i>	3	2.7	88.5	2
	3 <i>Knautia arvensis</i>	2	1.8	90.1	3
	4 <i>Petroselinum crispum</i>	3	2.7	89.9	2
	5 <i>Phleum spp.</i>	2	1.9	93.0	3
	6 <i>Sinapis alba</i>	3	2.3	76.9	1
Lot 2	1 <i>Alopecurus myosuroides</i>	2	1.9	95.7	3
	2 <i>Borago officinalis</i>	3	2.9	96.3	3
	3 <i>Daucus carota</i>	3	2.9	95.8	3
	4 <i>Glebionis segetum</i>	2	1.5	75.2	1
	5 <i>Trifolium repens</i>	3	2.9	96.0	3
Lot 3	1 <i>Brassica spp.</i>	2	1.6	80.3	1
	2 <i>Centaurea scabiosa</i>	2	1.9	92.8	3
	3 <i>Lactuca sativa</i>	2	1.9	95.2	3
	4 <i>Trifolium pratense</i>	2	1.9	93.0	3

GERMINATION Ratings

Total number of participants = 205



Means and Standard Deviation

of the obligatory accredited participants
calculated for the category of normal seedlings

Categories	Mean Values %			Standard Deviation		
	Lot 1	Lot 2	Lot3	Lot 1	Lot 2	Lot 3
Normal seedlings	55	89	95	8.42	2.42	1.64
Abnormal seedlings	42	5	4	-	-	-
Non-germinated seed	3	6	1	-	-	-

Note: the germination of lot 1 was low and already germinated seeds was reported in sample from lot 1. Nevertheless, with high Standard Deviation for lot 1 rating of A or B is high for accredited and non-accredited laboratories.

Method used

overview for all participants
presented for the temperature, substrate and pretreatment

Temperature °C	# Users		# Users TOTAL
	Accredited labs	Voluntary participants	
20↔30	90	42	132
20	44	28	72
25*		1	1

* this temperature is not prescribed in the ISTA Rules

Substrate	# Users		# Users TOTAL
	Accredited labs	Voluntary participants	
BP	42	28	70
TP	40	25	65
PP	42	10	52
Sand	9	7	16
Soil		1	1
Not reported	1		1

Pretreatment	# Users		# Users TOTAL
	Accredited labs	Voluntary participants	
No Treatment	101	45	146
Prechill	26	24	50
Light / no light	7		7
H₂O		2	2

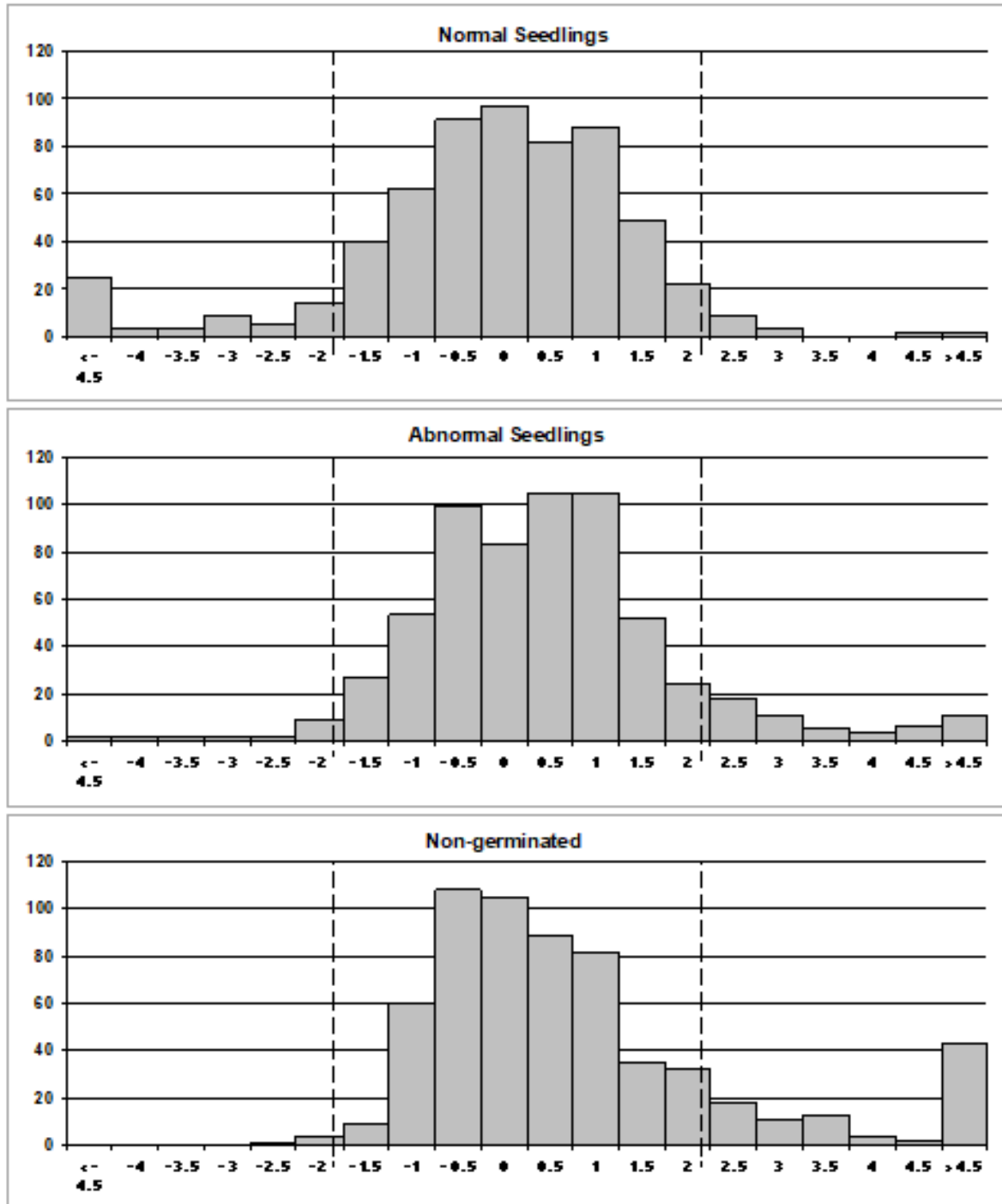
Z-score Distribution

Proficiency Test Report – Test Round 23-2 R.sat

Species : *Raphanus sativus*

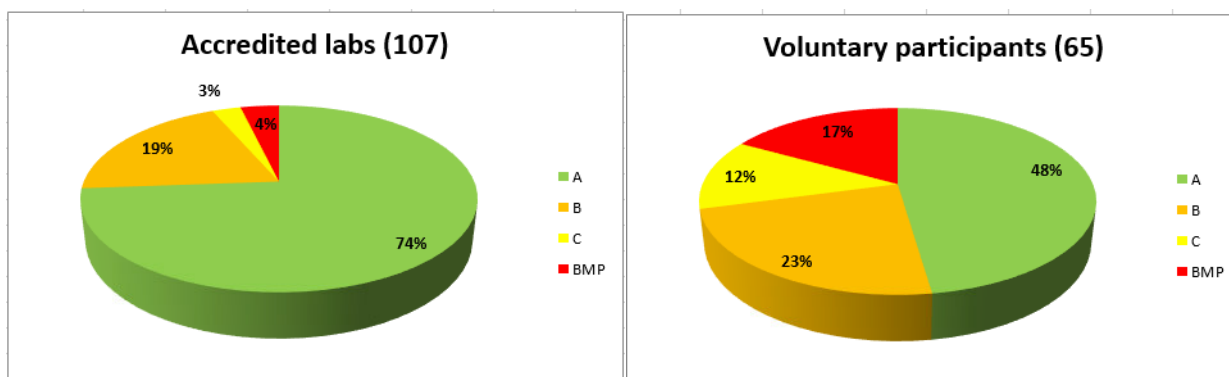
Scope: Germination

The following histograms show the frequency distributions of all participants Z-Scores for the relevant components, i.e. **Normal** and **Abnormal Seedlings** and **Non-germinated Seeds**. The Z-Scores from all three samples are included in each histogram. For further explanations, please refer to the document 'The ISTA Proficiency Test Programme'



MOISTURE TEST Ratings

Total number of participants = 172



Means and Standard Deviation

of the obligatory accredited participants

Categories	Mean Values %			Standard Deviation		
	Lot 1	Lot 2	Lot3	Lot 1	Lot 2	Lot 3
Moisture content	5.2	5.5	5.9	0.11	0.09	0.1

Method used

overview for all participants

Method	# Users		# Users TOTAL
	Accredited labs	Voluntary participants	
Oven, no grinding 101-105°C 17±1h	104	61	165
Oven, no grinding 101-105°C 1h or 2h *	2	2	4
moisture meter 125°C and 130°C duration not clearly described		2	2
Oven, coarse grinding* 101-105°C 17±1h	1		1

* Not prescribed ISTA method for this species

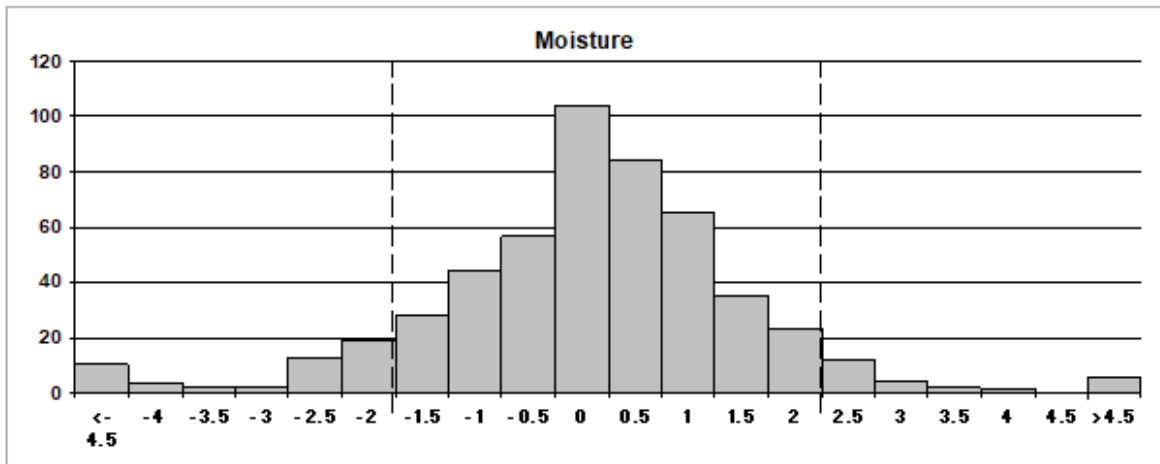
Z-score Distribution

Proficiency Test Report – Test Round 23-2 R.sat

Species : Raphanus sativus

Scope: Moisture

The following histogram shows the frequency distributions of all participants Z-Scores for the moisture test. The Z-Scores from all three samples are included in each histogram. For further explanations, please refer to the document 'The ISTA Proficiency Test Programme'.



VIGOUR TEST (CT test) Ratings

Total number of participants = 63

Out of 63 participants (21 accredited and 42 volunteers), only one laboratory would have received 'C' rating and only one laboratory the 'BMP' rating, for each of the categories. All other participants would have received 'A' and 'B' ratings.

However, the standard deviation in this PT round significantly exceeds the value of all previous PT rounds that involved the conductivity test. Therefore, the preliminary results for this test were not released to the participants as non-plausible results.

Means and Standard Deviation of the obligatory accredited participants

<u>Categories</u>	<u>Mean Values($\mu\text{S cm}^{-1} \text{g}^{-1}$)</u>			<u>Standard Deviation</u>		
	Lot 1	Lot 2	Lot3	Lot 1	Lot 2	Lot 3
Electroconductivity	140.97	138.68	81.7	54.86	43.23	32.53

Detailed investigation of the method used, and the statistical calculation applied in this test revealed that:

1. There is an assumption that the seed deteriorated from the time it was tested for possible heterogeneity until the samples were tested in different laboratories.
2. Some accredited laboratories did not use the ISTA prescribed method

Species	Containers to be used	Sample size	Seed moisture content	Water volume	Temperature	Soak time
15A.2						
<i>Raphanus sativus</i>	Tubes 7–8 cm high with a diameter of 4 cm	4 weighed replicates of 100 seeds	No adjustment	40 ml	20 °C	17 h

3. The ISTA rules indicate that 1.0 is suitable for the cell constant of the dip cell. However, 13 laboratories used probes with constants of 0.01 to 0.5. The Vigour Tests Committee Chair confirmed that the cell constant also affects the results.
4. Some laboratories including accredited laboratories did not check tolerance between replicates with the proper ISTA method (ISTA rule 15.8.1.7, "For species in Table 15A.2," "If the coefficient of variation does not exceed 9.0, the replicates are acceptable.")
5. The applied statistical criteria for excluding the outliers when determining the mean values and standard deviation was not suitable.
6. The Proficiency Test Committee Chair, the IT expert and the Statistical Committee agreed that different type of statistics may be required for the conductivity test.
7. For this purpose, some laboratories will be asked to participate in retesting of the same species using the samples that will be provided from the ISTA Secretariat.
8. Test reporting form will be improved with new fields for reporting all method details.
9. In this way we will have a better information on whether the seed really deteriorated, and this would provide a second set of results from this PT for the Statistic Committee to help developing a more appropriate statistical method.
10. Statistic Committee will use the test results to develop appropriate statistic in 2024 but the achieved results from the previous Conductivity tests must be kept, as there was no problem with the logic of the results.
11. **Outcome of the investigation is to cancel the results of this test.**

REPORTING ON THE ISTA ORANGE CERTIFICATES

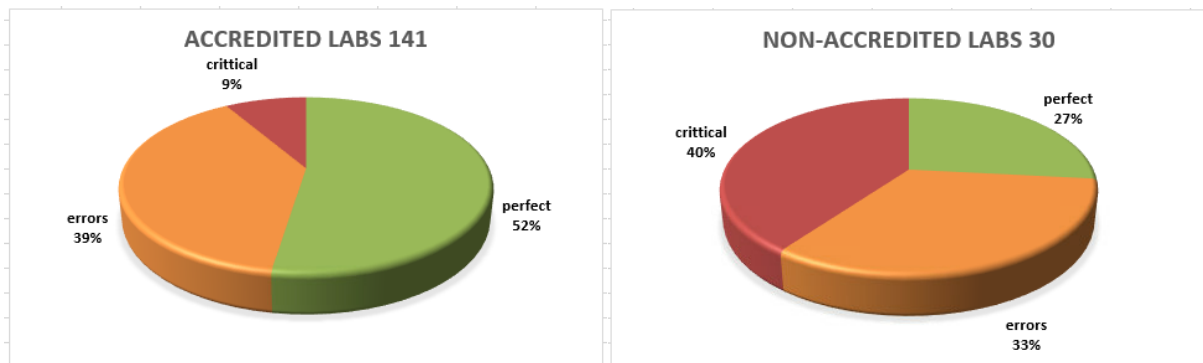
This exercise was voluntary for all participants.

The completion of the certificate has a training purpose only and it is not rated.

Out of 206 participants, the completed certificate was submitted for review by 171 participants (83%).
 Out of 171 submissions, 141 were from the accredited laboratories and 30 from non-accredited.

Quality of completing the certificates:

141 accredited laboratories		30 non-accredited laboratories	
NO error 74 labs	52%	No error 8 labs	27%
Minor and major errors 55 labs	39%	Minor and major errors 10 labs	33%
Critical errors 12 labs	9%	Critical errors 12 labs	40%
Critical error: certificate is invalid because of <ul style="list-style-type: none"> • Handwriting or • Stamp missing or • Signature missing or • Date of issue missing or • Signs of data alternation/erasures 			



Each participating laboratory receives the personalised report on how the Orange Certificate was completed.