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

Vigour Committee

Alison A Powell (Chair)

ISTA 100 YEARS
A CENTURY OF PROGRESS IN SEED QUALITY ASSURANCE

Membership

CHAIR: Alison Powell	United Kingdom
VICE-CHAIR: Hulya Ilbi	Turkey
I-Chen Cheng	Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu
Ibrahim Demir	Turkey
Carina Gallo	Argentina
Simon Goertz	Germany
G.V. Jagadish	India
Mohammad Khajeh Hosseini	Iran
Jaana Kaurila	Finland
Tim Loeffler	United States
Stan Matthews	United Kingdom
Carey Matthiessen	Canada
Gillian Musgrove	United Kingdom
Takashi Shinohara	Japan
Marie-Hélène Wagner	France
Sylvie Ducournau	ECOM Liaison

Outline

Rules proposals

Addition of *Glycine max* to the radicle emergence (RE) test

Clarification of effect of temperature in RE test for *Zea mays*

Progress in test development

RE test

Cold test

Workshop

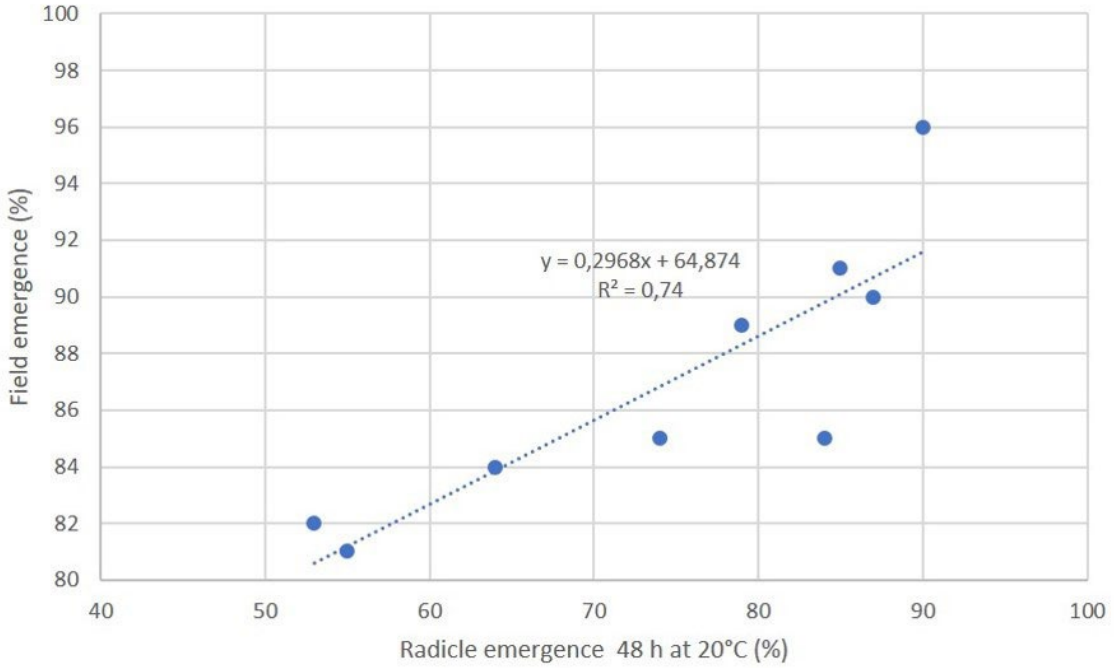
Webinars

2024-2025?

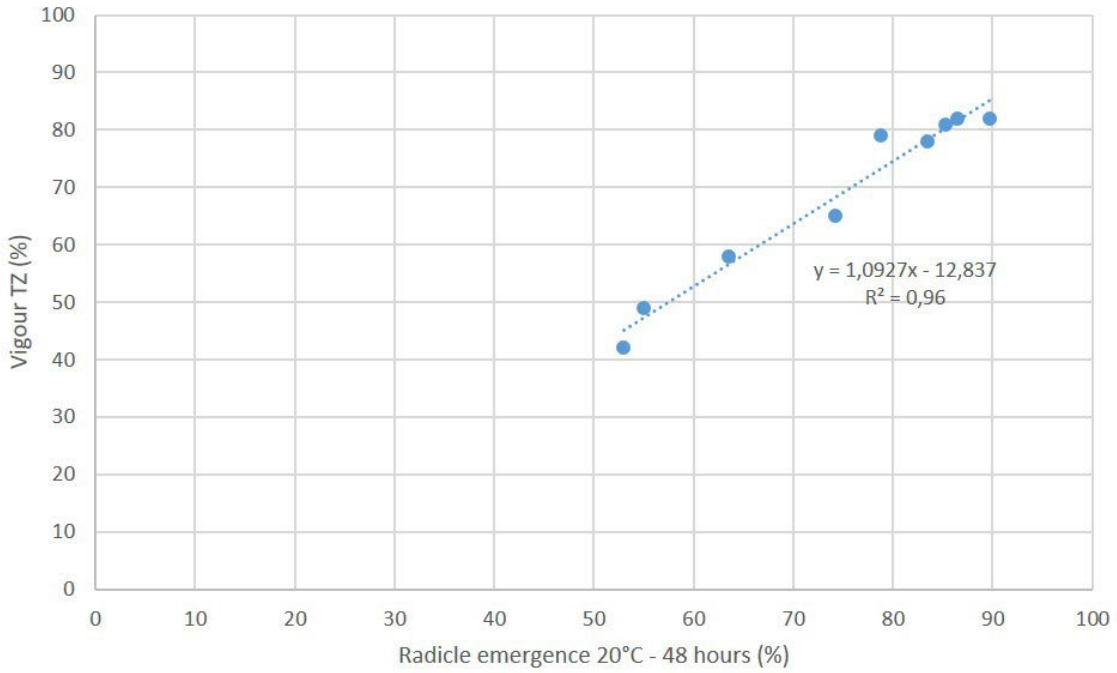
Rules Proposals: addition of *Glycine max* to RE test

Comparative test organised and validation report prepared by Carina Gallo (Argentina)
Approved – Rules Proposal

RE relates to field emergence



RE identifies same vigour differences as TZ vigour test



Clarification of temperature conditions in RE test for *Zea mays*

RE test for maize can be conducted at either 20°C or 13°C

Vigour is a relative concept

- There is no specific numerical result to the test, unlike, for example germination
- Alternative conditions do not give the same percentage data

However, relative differences in vigour are the same at different temperatures

In Table 15b

CURRENT VERSION	PROPOSED VERSION
15.8.4.4.2 Temperature for the test The radicle emergence test must be conducted at the temperature prescribed for the species in Table 15B. Temperature is the most important variable in the test, and each seed lot must be transferred to the test temperature within 15 minutes after being set to germinate. Monitoring of temperature is desirable and rotation of seed lots and replicates is advised at time intervals of 24 h	**15.8.4.4.2 Temperature for the test** The radicle emergence test must be conducted at the temperature prescribed for the species in Table 15B. Temperature is the most important variable in the test, and each seed lot must be transferred to the test temperature within 15 minutes after being set to germinate. Monitoring of temperature is desirable and rotation of seed lots and replicates is advised at time intervals of 24 h When two temperatures have been validated for a species, be aware that results will depend on temperature: vigour ranking will be the same, but the final percentage radicle emergence will be different.

Progress in test development : RE test

Onion

Brassica spp.

Barley

Onion

Comparative test completed:

Organisers: Hulya Ilbi (Turkey), G K Jagadish (India)

Laboratories in Europe and India

Statistical analysis completed (Jean-Louis Laffont)

Validation report in preparation

Rules proposal 2025

Brassica spp

Outcome of ISTA Special project

Comparative test completed:

cauliflower (*B. oleracea var botrytis*),

cabbage (*B. oleracea* var *capitata)*

mustard (*B. juncea*).

Validation report sent to reviewers

Organiser: Marie-Helene Wagner

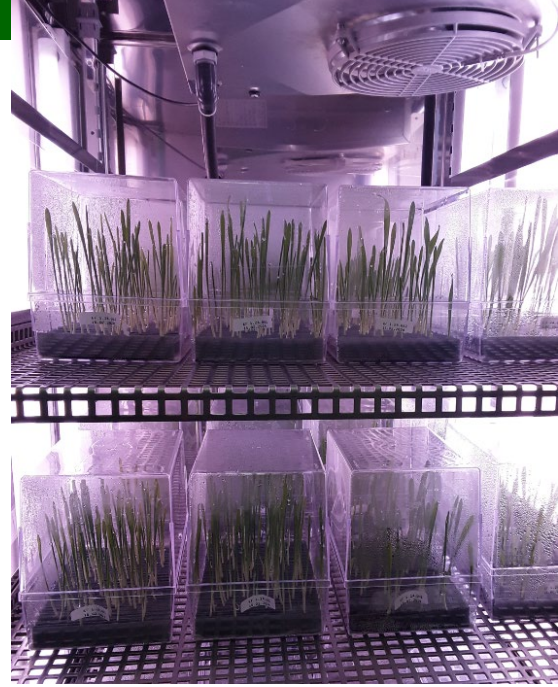
Progress in test development : RE test

Onion

Brassica spp

Barley: Simon Goertz

Barley RE - ISTA Evaluation 2024



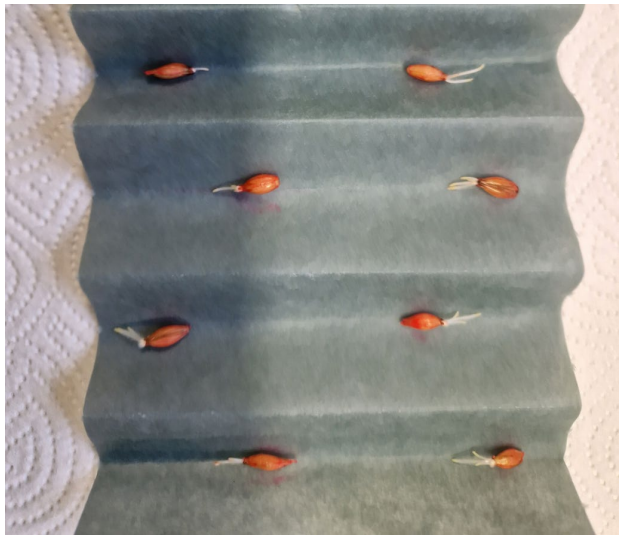
Trial set-up

12 samples, 6 winter barley varieties

Untreated, seed applied fungicide (each variety)

Lab tests performed, March 2024

- Germination 7d PP 20°C 16hrs light
- RE 48h PP 15°C 24hrs dark
  - radicle >2mm count
  - *sensu stricto* count
- Sand vigour 20°C 16hrs light



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Barley RE lab results

Variety	Seed treatment	TSW	Germination 7d	RE 48h	RE 48h	Sand vigour 7d
		g	%	% >2mm rule	% sensu stricto	%
			12.04.2024	15.04.2024	15.04.2024	15.04.2024
Variety A	Untreated	53,5	99	84	94	95
Variety A	Seed applied fungicide	53,7	97	71	83	94
Variety B	Untreated	56,8	99	88	99	86
Variety B	Seed applied fungicide	57,4	94	80	97	93
Variety C	Untreated	48,5	92	88	94	91
Variety C	Seed applied fungicide	48,5	92	71	86	89
Variety D	Untreated	56,6	97	94	98	96
Variety D	Seed applied fungicide	56,8	92	84	94	91
Variety E	Untreated	45,3	99	89	100	100
Variety E	Seed applied fungicide	45,2	99	88	98	98
Variety F	Untreated	48,1	98	77	99	98
Variety F	Seed applied fungicide	47,7	98	71	94	97

- Visible impact of seed applied fungicide on radicle emergence
- Seed lot differences in germination (92-99%) and vigour (71-94%)
- Lesser impact of seed applied fungicide in sand vigour test (89-98%)

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Barley RE field trials

All 12 samples, sown in 4-replicated field trial March 2024

- 2 locations, North-East (Malchow) & West (Hovedissen)
- Sowing density 200 seed/m2

Field trial	EC	Malchow	Hovedissen
Seed treatment application	00	February 14th	
Sowing date (200K/m2)	00	March 28th	March 19th
1st count field emergence	10-12	April 10th 12DAP	April 5th 17DAP
2nd count field emergence	12-14	April 17th 19DAP	April 15th 27DAP
Biomass development score ED2	12-14	April 17th 19DAP	April 15th 27DAP

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Malchow 1st count (12DAP)
sandy loam, dry conditions

Hovedissen 1st count (17DAP)
loamy soil, cool & wet conditions

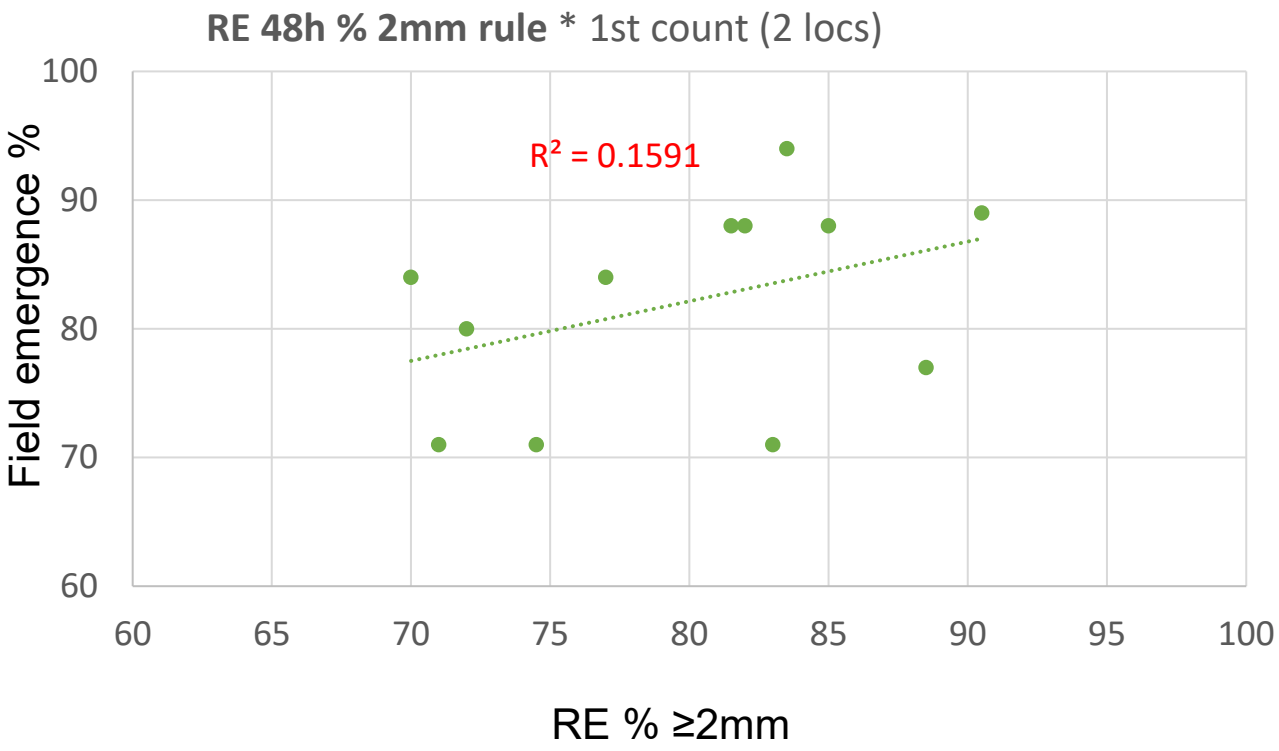
Barley RE field trial results -

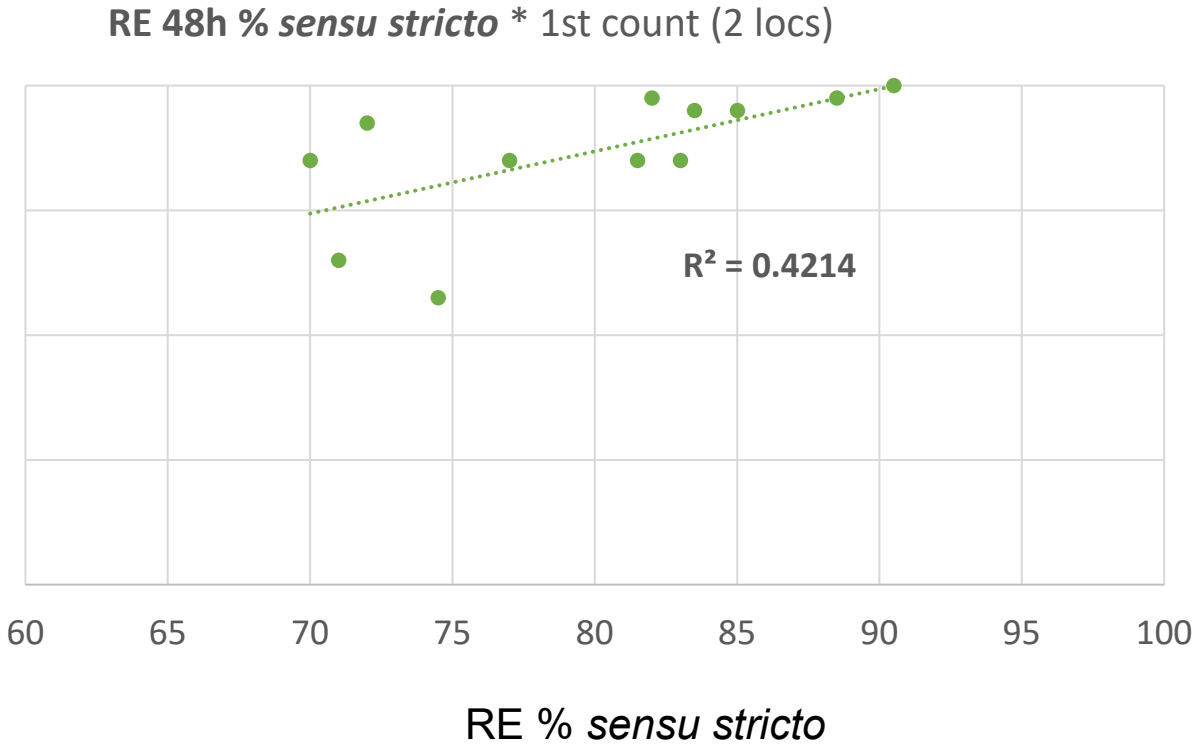
Variety	Seed treatment	1st count MAL %	1st count HOV %	1st count Both locations %	2nd count MAL %	2nd count HOV %	2nd count Both locations %
		10.04.2024	05.04.2024		17.04.2024	15.04.2024	
Variety A	Untreated	84	56	70	84	69	76,5
Variety A	Seed applied fungicide	87	62	74,5	83	72	77,5
Variety B	Untreated	92	72	82	85	77	81
Variety B	Seed applied fungicide	80	64	72	83	76	79,5
Variety C	Untreated	86	77	81,5	84	81	82,5
Variety C	Seed applied fungicide	79	63	71	76	69	72,5
Variety D	Untreated	89	78	83,5	83	77	80
Variety D	Seed applied fungicide	86	68	77	82	72	77
Variety E	Untreated	99	82	90,5	92	90	91
Variety E	Seed applied fungicide	94	76	85	88	81	84,5
Variety F	Untreated	95	82	88,5	91	82	86,5
Variety F	Seed applied fungicide	89	77	83	87	78	82,5

Barley RE field trial results - correlations

Correl. coeff.	Germination 7d	RE48 >2mm	RE48 *sensu stricto*
1st count MAL	0.69*	0.39	0.59*
1st count HOV	0.25	0.37	0.63*
1st count both locations	0.46	0.39	0.65*
2nd count MAL	0.69*	0.58	0.66*
2nd count HOV	0.36	0.42	0.67*
2nd count both locations	0.52	0.37	0.69*

Barley RE field trial results - correlations (1st count)





13.11.2024

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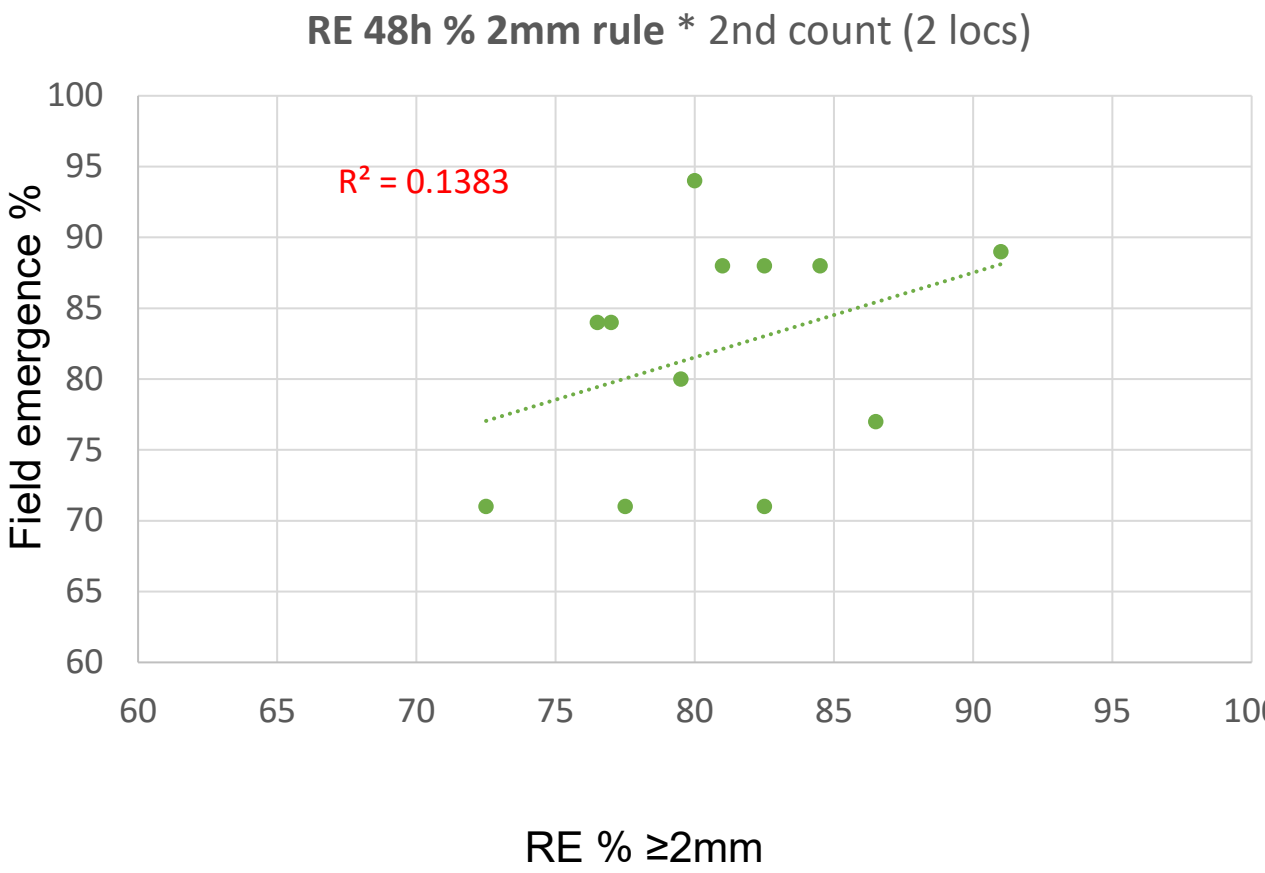
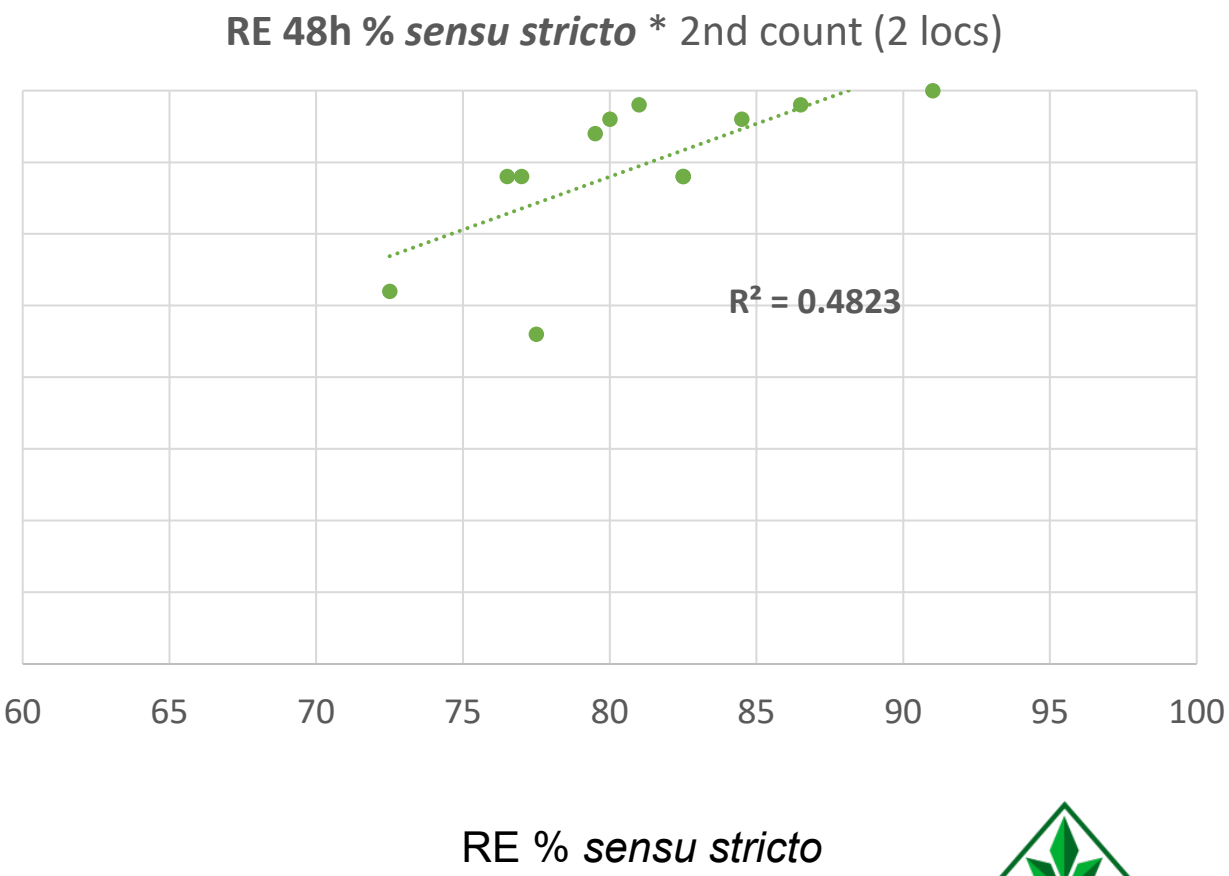
Barley RE field trial results - correlations (2nd count)





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Barley RE field trial results

Main observations:

- Impact of seed applied fungicide on field emergence
- Seed lot differences in vigour tests confirmed in field trials
- Best correlation of sand vigour test and Malchow dry conditions (r=0,56 – 0,71)
- Best correlation with RE 48h *sensu stricto* confirmed in field trials (r=0,59 – 0,67)

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Progress in test development : Cold test for *Zea mays*

Marie-Hélène Wagner

Cold test widely used: in-house methods

Differences in results from different laboratories

Request for standard/ reference method: this would allow comparison of results from different sources.

Background work completed

Three French laboratories: test completed using

- 6 samples,
- two substrates
- combinations of cold duration, moistening substrate, and growth temperature after cold treatment.

Seven French laboratories compared their in-house method to a single combination of cold period and growth temperature using sand or paper

- Consistent ranking of seed lots
- But good field conditions: no field emergence differences

Comparative test

Six laboratories:

GEVES (France): Sylvie Ducournau
FNPSMS (France) Pilar Cambet
LARAS (Italy) Enrico Noli
NAKTUINBOUW (Netherlands) Erik van Egmond
20/20 Seed Lab (Canada) Carey Matthiessen
Cerience (France) Nelly Boinot
Arterris (France) Stephanie Pierre

6 seed lots of *Zea mays*

- Germination test
- Vigour test,
  - Two test conditions: high level of moisture
    - BP moistened at 292% of blotter weight (94% of WHC)
    - Sand moistened at 14% of its weight
  - Germination temperature: 10°C for 7 days and 25°C for 5 days

Comparative test completed: data analysis in progress

Field trials

- In four contrasted locations for soil and climatic conditions
- Sown early March 2024 in experimental plots using 4 blocks of 100 seeds
- First count of emergence 8-10 days after sowing; then every 2-3 days until end April
- Final count in May
- Emergence compared to cold test results

IF

- Cold test results are repeatable and reproducible, and
- Cold test results relate to emergence
- Production of a validation report, possibly leading to Rules Proposal 2025

Workshop: in collaboration with APSA

Bangkok, 26-28 September 2023

ISTA contributors;

Alison Powell
Hulya Ilbi
Stan Matthews
Marie-Helene Wagner

51 participants: Hong Kong, China; India; Indonesia; Malaysia; Myanmar; Philippines; Thailand and Vietnam

Topics:

- Validated vigour tests;
- In-house development of validated tests for new species
  - (melon, cucumber, tomato, sweet corn, sweet pepper)
- Automation of radicle emergence assessment (RGB imaging and multispectral imaging)

Practical work

4 vigour tests plus 5 new species: what test conditions to use?

Preliminary work by Hulya, Marie-Hélène and Thai laboratories
Guided by data from Ibrahim Demir

Grateful to:

Thai Department of Agriculture (Dr Pappasorn Watanakulpakin)

Chia Thai (Wilasinee Ramnut)

East-West Seeds (Saruttaya Lapuk)

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Webinars

APSA webinar series 2023: Seed Quality / Seed Vigour (October, 2023)

Alison Powell: Towards seed vigour tests for the ISTA Rules: Principles and standardisation

Tim Loeffler: Using vigour test results for management of seed inventory

ISTA Centennial webinar series: Rules and Vigour testing (April, 2024)

Steve Jones: ISTA Rules development

Alison Powell: Seed vigour in ISTA from 2001 to 2024 and beyond

I-Cheng Chen: Starting a career in vigour testing and what to expect in the next 100years

2024-2025?

Priorities:

Complete work on:

- RE: onion, Brassica spp., barley
- Cold test
- Rules proposals?

Revised Handbook:

- Only one chapter left to complete
- Photos collected ready for decisions on use
- Flow charts prepared

Workshop: RE?

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Thank you