Technical Working Party on Testing Methods and Techniques

TWM/1/8 Add.

First Session
Virtual meeting, September 19 to 23, 2022

Original: English
Date: September 15, 2022

ADDENDUM TO
DEVELOPMENTS ON THE IMPROVED COYU METHOD (SPLINES)

Document prepared an expert from the United Kingdom

Disclaimer: this document does not represent UPOV policies or guidance

The Annexes to this document contains a copy of a presentation prepared by experts from the United Kingdom, to be made at the first session of the TWM:

- ANNEX I: "An update on COYU development 2022"

- ANNEX II: "COYU splines Path to implementation in the United Kingdom"

[Annex I follows]

An update on COYU development 2022

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Overview

- A recap on COYU and the proposed change

- Software: evaluation and further development

- United Kingdom developments

- Extrapolation

- Guidance for TGP/8

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A recap on COYU

Combined Over-Year Uniformity criterion (COYU)

A method for determining uniformity of candidate variety
- Mostly used for agricultural crops, but also some vegetables
- Characteristic-by-characteristic
- Quantitative characteristics, measured on single plants
- Works over two or more cycles
- More information in TGP/8

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COYU key concepts

Compares uniformity with similar varieties

TG/1/3 General Introduction
6.4.2.2.1 For measured characteristics, the acceptable level of variation for the variety should not significantly exceed the level of variation found in comparable varieties already known. UPOV has proposed several statistical methods for dealing with uniformity in measured quantitative characteristics. One method, which takes into account variations between years, is the Combined Over Years Uniformity (COYU) method.

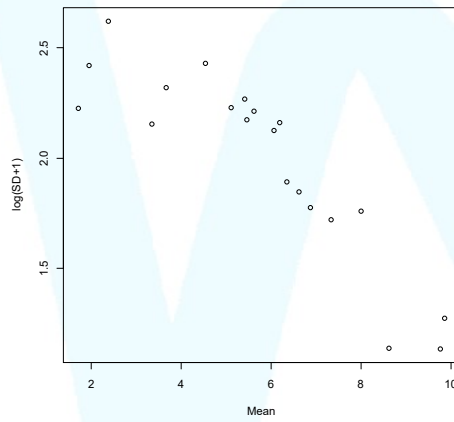Measures uniformity through standard deviation (SD) of measurements within plots
- Log (SD+1)

Adjusts for any relationship between variability (SD) and level of expression (mean)
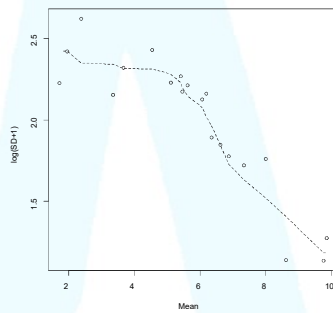- This is main element that is changed
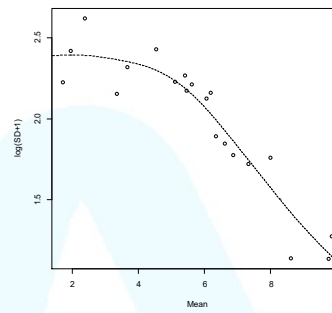 Moving-average ➔ Spline

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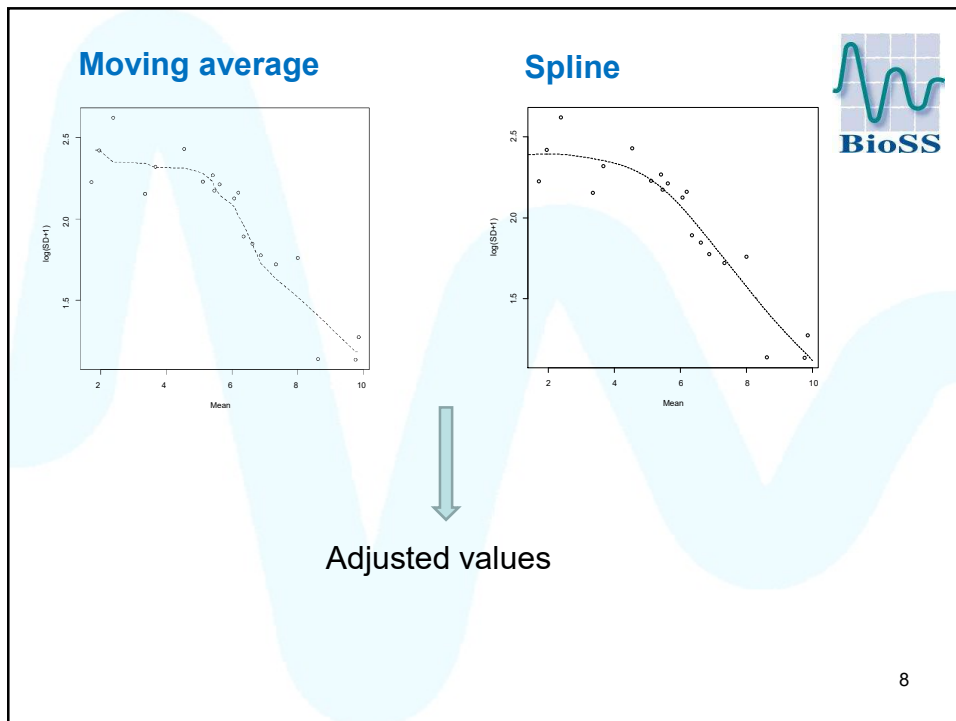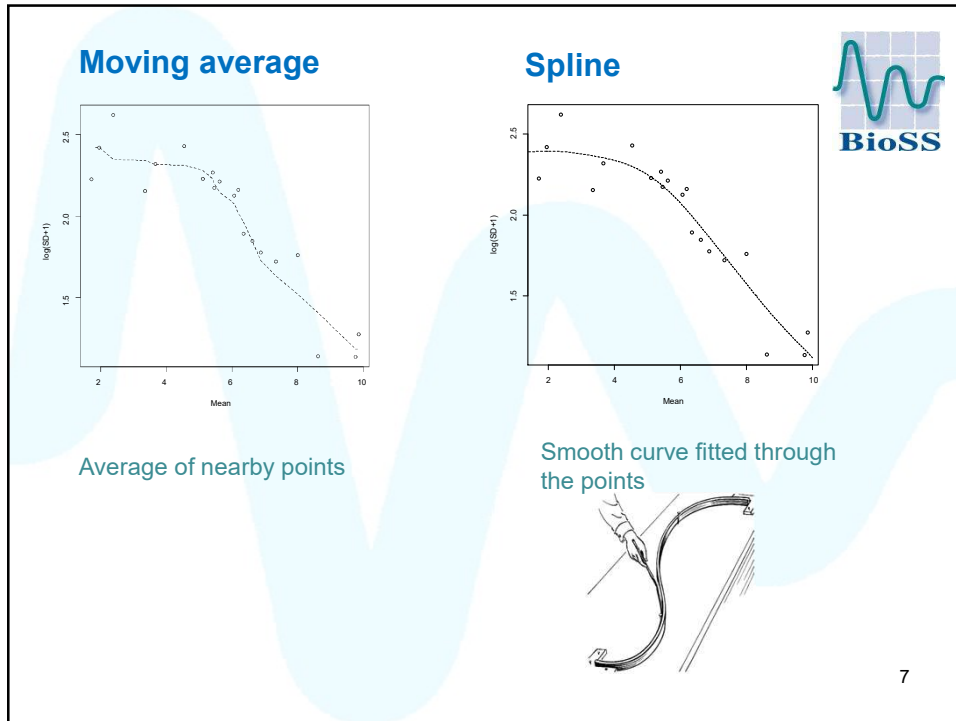Relationship between uniformity & mean

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Moving average
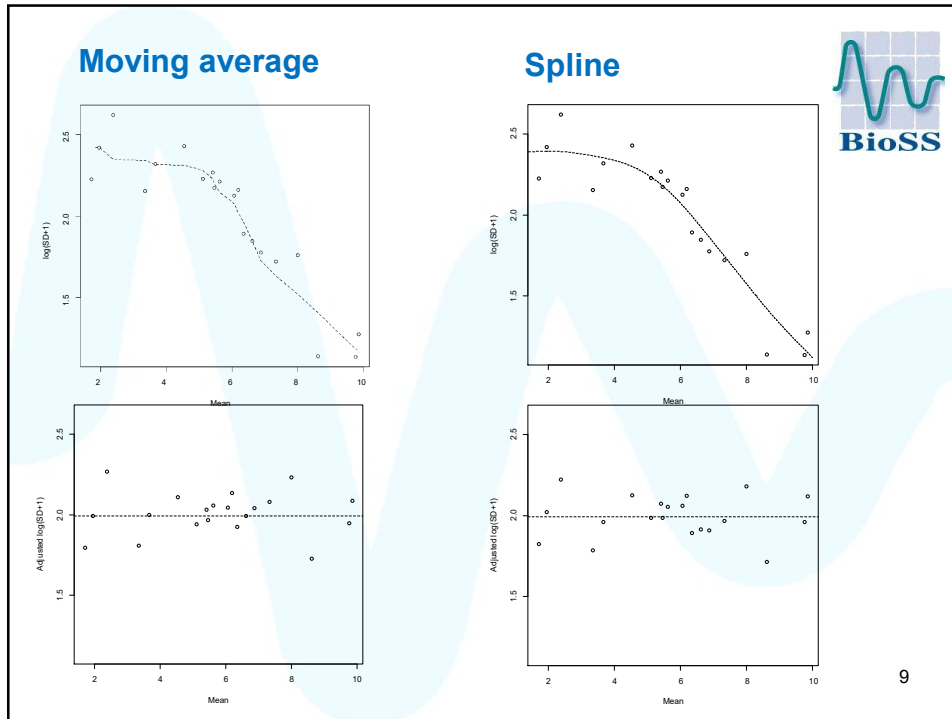
Spline

Adjusted values

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Moving average

Spline

Average of nearby points

Smooth curve fitted through the points

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Moving average

Spline

Adjusted values

8

Slide 9

Moving average

Spline

9

Slide 10

Why make a change?

Original reason dates back to 2008!

- Expert from Denmark notes an issue with COYU
- Technical but to do with incorrect error estimate
- UK works with DK to propose way forward using splines
- Sequence of papers by UK to develop and evaluate idea

Additional reason:

- Splines produce more sensible curves

  In other words – it's an improvement!

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Software to support COYU with Splines

DUST9NT

- New module in the DUST9NT software package
- Evaluation version at the moment
- Full version likely to be released within a year

R package

- Suitable for those wanting to integrate into their own systems
- The COYU package is freely available, including source code.

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Test Campaign

UPOV Circular on 4 August 2021 invited members to evaluate the new software

- Many downloaded the evaluation version of DUST9NT
- Feedback from:
  - Czech Republic, Finland, Slovakia, United Kingdom
    - **Many thanks!!!!**
- Feedback was generally positive
- Improvements identified

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Software improvements

Test Campaign identified following improvements:

- Improvements to the reports, including formatting and extra information;
- Criteria for flagging data sets that are too small;
- Extra tables in csv format;
- Improved graphics;
- Modification of flagging of cases with extrapolation;
- Managing diacritics in file and directory names.

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Software plan

Most identified improvements have been implemented
Still to deal with:

- Modification of flagging of cases with extrapolation
  - Pending feedback from TWM and UK working group
  - See TWM/1/7
- Managing diacritics in file and directory names
  - Full solution not yet found. Partly due to mix of new and old software

Plan to launch new version of DUST9NT once the extrapolation issue is resolved

- Likely within a year

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Implementation in the UK

BioSS

Process started

Comparisons between old and new methods using historical data

- Perennial ryegrass, pea, onion, swede, oilseed rape
- Few differences in decisions, and in marginal cases
- Highlighted the importance of the extrapolation issue

Working party on extrapolation

Then to consider way forward

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Extrapolation

BioSS

Key issue – see TWM/1/7 presentation!

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Guidance

Draft text for TGP/8 already drafted – see TWP/5/11

- Change from moving average to splines
- Will only be adopted once a member is using
- Likely to remove old method from TGP/8

Text needs further improvement

- Criteria for sufficient data set size
- More guidance on extrapolation

Aim to update text for next session of TWM

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Thank you for your attention!

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COYU splines
Path to implementation
in UK

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Historical Testing

These summary tables by crop should provide the reassurance that we seek, and the breeders too, on the impact on decisions of using COYUs (and its recommended probability levels) in place of COYU for uniformity testing

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Summary table to compare COYU and COYUs in the 2-year tests of winter oilseed rape hybrids conducted in each of 2016, 2017 and 2018

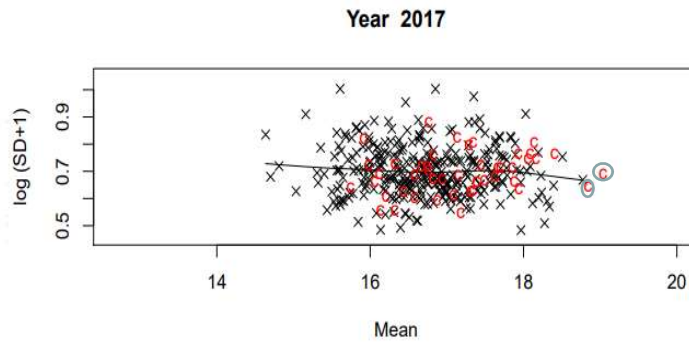|	Uniform COYU	Not uniform COYU
Uniform COYUs	122	2
COYUs extrapolated	15	0
Not uniform COYUs	3	3

3

Comparison of COYU and COYUs on 2 year test of winter oilseed rape hybrids CB 2017-2018

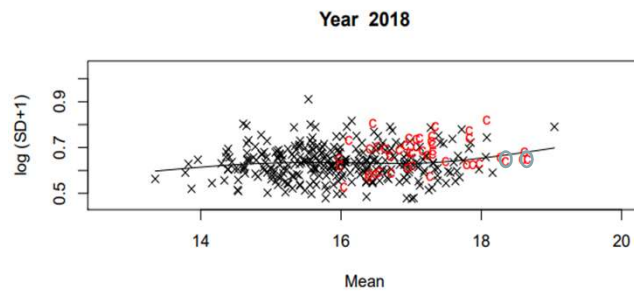| WOSR hybrids CB 2017-2018	Uniform COYU	Not uniform COYU
Uniform COYUs	45	1
COYUs extrapolated	6	0
Not uniform COYUs	1	1

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Character 14, Petal length

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Character 14, Petal length

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Currently

- **Outputs being scrutinised**
- **Results being summarised**

- **2022**
- **Informal parallel running**

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Acknowledgements

Adrian Roberts
David Nutter

Sally Watson

Haidee Philpott

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[End of Annex II and of document]