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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Thirty-Second Session
Helsinki, Finland, from June 3 to 6, 2014

ADDENDUM

DEVELOPMENT OF THE COMBINED-OVER-YEAR UNIFORMITY CRITERION

Document prepared by Denmark and the United Kingdom

Disclaimer: this document does not represent UPOV policies or guidance

The Annex to this document contains a copy of a presentation on development of the combined-over-year uniformity (COYU) criterion that will be made at the Technical Working Party on Automation and Computer Programs (TWC), at its thirty-second session.

[Annex follows]

Development of the Combined-Over-Year Uniformity Criterion

Adrian Roberts

Work with Kristian Kristensen (DK), David Nutter (UK), Sally Watson & AFBI colleagues (UK)

Funded by UK and Danish National Authorities and CPVO

COYU

Combined-Over-Year Uniformity Method

- Ref: TG/1/3, TGP/8, TGP/10

For quantitative characteristics

- Mainly for cross-pollinated crops

Uniformity of candidate compared with comparable varieties

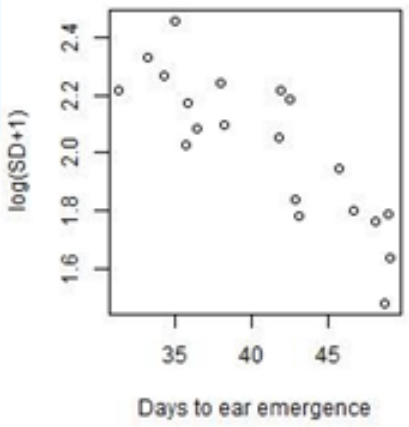
- Based on standard deviations calculated from individual plant observations
- Takes into account variation between years
- Uses analysis of variance with a moving average adjustment

Adjustment

Variability of measurements often depends on level of expression

- So an adjustment is used to compensate
- Currently the method used is ***Moving Average***

Original



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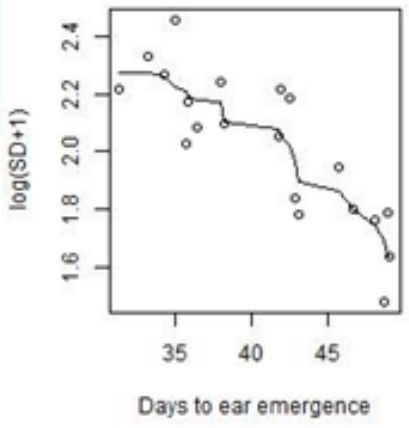

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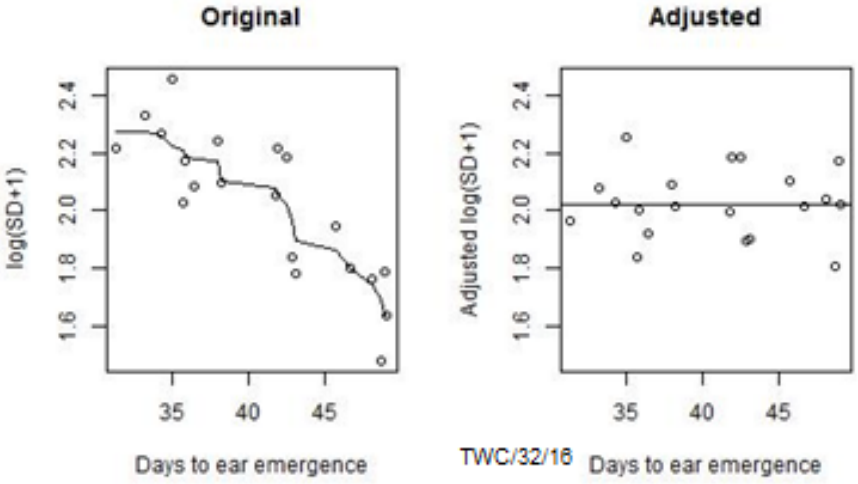

Concern with current COYU method

Shown that the current method rejects more varieties than it should

- In examples in TWC/27/15, rejection rate was more than 2 times expected

This is due to the method of adjustment (moving average)

In practice, this seems to be partially compensated for by use of smaller probability levels than usual

- Typical probability level for COYD is 1%
- Typical probability level for COYU is 0.1%

TWC work on improving COYU

Considered various alternative methods of adjustment

- Needs to fit relationships between variation and level of expression well
- No bias problem

Method called "cubic smoothing spline" was found to be suitable

- Flexibility constrained to 4 effective degrees of freedom

This was demonstrated at TWC last year

- *R* software

Issues arising

Key issues to deal with:

- **Choice of probability levels**
  - Optimise to match decisions with current approach?
- **When a new variety has a level of expression outside that seen in comparable varieties**
  - Also an issue for the current COYU
- **Minimum number of varieties required for COYU**
  - Easier than with moving average

Current work

Developing a demonstration module in DUST

- Plan to demonstrate at TWC in June 2014

Ask TWC members to try on their own data

- Compare with current method
- Probability levels

Survey of use of COYU and software

- See Annex I
- 7 members from 11 responding use COYU
- Software: DUST, SAS and GenStat
- Useful information for future guidance

DUSTNT module development

- **DUSTNT is a Windows-based program for the analysis of data from DUS trials. It includes modules for COYD and COYU**
  - Windows interface links to modules for different tasks
  - Modules largely Fortran 90
- **New COYUs module mainly written in R**
  - R is free but powerful statistical software
  - Less time to write
  - Potential for use outside DUST
  - Requires R to be installed

DUSTNT module development

- **Progress**
  - Statistics largely in place
    - **Need to allow for missing values**
  - Need to work on improving output
  - Graphs will be higher resolution and output to a PDF file
  - Interface needs a little more work
  - Installation process needs facilitating

Suggested next steps 2014-5

Software development

June : Demo version

October: Evaluation version

June: Improved version

Evaluation

June: Call for participants

October: Alternative version of DUST available

March: participants send reports to Adrian Roberts

June: Summary report

DEMONSTRATION

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Evaluating the new method

Pick a range of real data sets – the more the better

Run current COYU and the proposed modified COYU

Use current set up (with probability levels) for COYU (2 or 3 years) and experiment with different probability levels for the modified COYU

Report to Adrian Roberts by 15 March 2015

Evaluating the new method

Does the software work okay?

What probability levels need to best match decisions from old with modified?

Are these consistent? Character to character, crop to crop?

Look at graphs of splines fitted to log SD vs means. Are the fits okay?

[End of Annexes and of document]