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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

ENLARGED EDITORIAL COMMITTEE

Geneva, January 8 and 9, 2014

REVISION OF DOCUMENT TGP/8: PART II: SELECTED TECHNIQUES USED IN DUS EXAMINATION, SECTION 3: METHOD OF CALCULATION OF COYU

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

1. The purpose of this document is to report on developments concerning the method of calculation of COYU.

2. The following abbreviations are used in this document:

TC:	Technical Committee
TC-EDC:	Enlarged Editorial Committee
TWA:	Technical Working Party for Agricultural Crops
TWC:	Technical Working Party on Automation and Computer Programs
TWF:	Technical Working Party for Fruit Crops
TWO:	Technical Working Party for Ornamental Plants and Forest Trees
TWPs:	Technical Working Parties
TWV:	Technical Working Party for Vegetables

BACKGROUND

3. The background to this matter is provided in documents TC/50/22 “Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, Section 3: Method of Calculation of COYU”.

DEVELOPMENTS IN 2014

Technical Committee

4. The TC considered document TC/50/22 and received a presentation by Mr. Adrian Roberts, United Kingdom, on “Proposed Improvements to COYU”. It noted that a copy of the presentation would be made available as an addendum to document TC/50/22 (see document TC/50/36 “Report on the Conclusions”, paragraph 48).

5. The TC noted the developments in the work concerning the proposals to address the bias in the present method of calculation of COYU, as set out in document TC/50/22, paragraphs 8 to 21 (see document TC/50/36 “Report on the Conclusions”, paragraph 49).

6. The TC agreed that the development of a demonstration module in DUST should be continued and demonstrated to the TWC at its session in 2014. The TC agreed that a practical exercise should be conducted using real data to compare decisions made using the current and the proposed improved method (see document TC/50/36 “Report on the Conclusions”, paragraph 50).

7. The TC requested the Office of the Union to issue a new circular inviting further information on the extent and modalities of use of the current COYU method, in advance of the thirty-second session of the TWC (see document TC/50/36 “Report on the Conclusions”, paragraph 51).

Technical Working Parties

8. At their sessions in 2014, the TWO, TWF, TWC, TWV and TWA considered documents TWO/47/16, TWF/45/16, TWC/32/16, TWC/32/16 Add., TWV/48/16 and TWA/43/16, respectively.

9. The TWO, TWF, TWV and TWA noted the developments concerning the method of calculation of COYU, including the development of a demonstration module in DUST and the practical exercise that would be conducted using real data to compare decisions made using the current and the proposed improved method (see documents TWO/47/28 “Report”, paragraph 42, TWF/45/32 “Report”, paragraph 33, TWV/48/43 “Report”, paragraph 38 and TWA/43/27 “Report”, paragraph 35).

10. The TWC received a presentation by an expert from the United Kingdom on the method for improving the calculation of COYU, including a demonstration version of a module for the DUST software (see document TWC/32/28 “Report”, paragraph 13). The Annex to document TWC/32/16 Add. “Addendum to Development of the Combined-Over-Year Uniformity Criterion” is reproduced as Annex to this document.

11. The TWC agreed to request the experts from China, Czech Republic, France, Finland, Germany, Kenya, Netherlands and Poland to test the new software on COYU (see document TWC/32/28 “Report”, paragraph 14).

12. The TWC agreed to invite other users of the COYU method to test the new software. The TWC agreed that an invitation should be developed by the Leading Expert and sent by the Office of the Union to the users of the DUST software package (see document TWC/32/28 “Report”, paragraph 15).

13. The TWC agreed that the software module for calculation of COYU developed using the “R” software should be sent to the interested experts that use other systems than DUST (e.g. SAS and GenStat) for testing the new method (see document TWC/32/28 “Report”, paragraph 16).

14. The TWC agreed that participants should seek to define probability levels to match decisions using the previous COYU method for continuity in decisions and that the test should be run for rejection probabilities of 1, 2 and 5% levels. The TWC agreed that participants should assess whether the results are consistent in all crops (see document TWC/32/28 “Report”, paragraph 17).

15. The TWC agreed with the timetable for the development of the new software package for the COYU method as follows (see document TWC/32/28 “Report”, paragraph 18):

- By the end of July 2014, the UPOV Office with assistance from the expert of the United Kingdom would invite participants for the practical exercise.
- By the end of September 2014, the expert of the United Kingdom would develop further the DUST module demonstrated at the thirty-second session of the TWC for evaluation by the participants and would prepare code for “R” software for participants that prefer this option to the DUST module.
- By early October 2014, the expert of the United Kingdom would send details of the practical exercise, including access to software, to the participants.
- By March 15, 2015, participants of the practical exercise should send a report on their experiences to the expert of the United Kingdom.
- The expert of the United Kingdom would compile a report on the practical exercise and the development of DUST module for the thirty-third session of the TWC.

16. On July 21, 2014, a circular E 14/193 “TWC/32: Participation in Practical Exercise (COYU)” was sent to the TC and the TWC members. On October 15, 2014, followed by October 21, 2014, for the new version with explanation, an expert of the United Kingdom announced the availability of software for participants.

17. The TC-EDC is invited to note the information in this document to be presented to the TC and propose any improvements to the document in that regard.

[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

TWC/32/16

COYU

Combined-Over-Year Uniformity Method

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

For quantitative characteristics

- Mainly for cross-pollinated crops

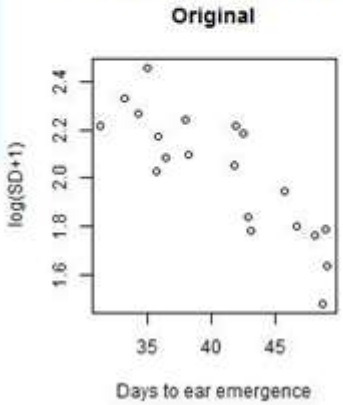
Uniformity of candidate compared with comparable varieties

- 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***



TWC/32/16

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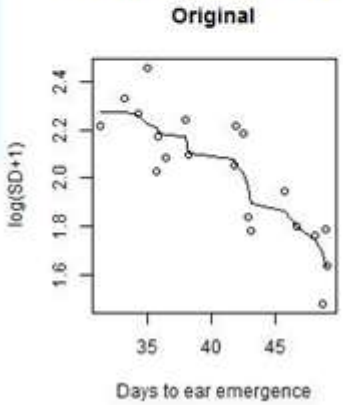

TWC/32/16

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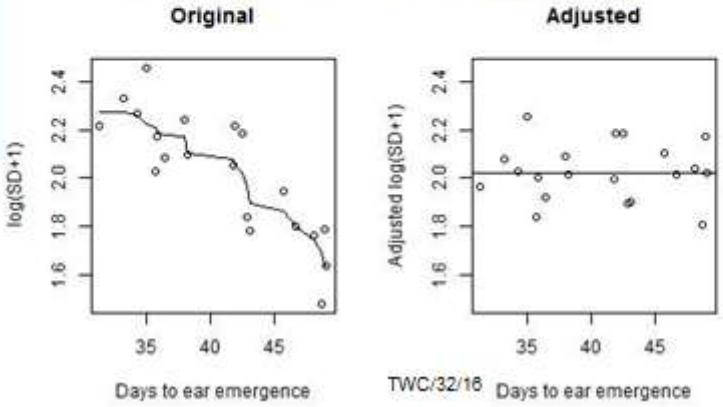

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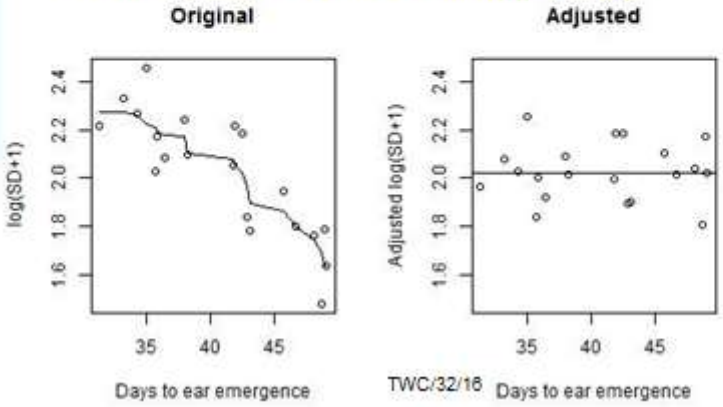


TWC work on improving COYU

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

TWC/32/16

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

TWC/32/16

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**
  - Graphs will be higher resolution and output to a PDF file
  - Need to work on improving output
  - Interface needs a little more work
  - Installation process needs facilitating

TWC/32/16

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

TWC/32/16

DEMONSTRATION

TWC/32/16

Evaluating the new method

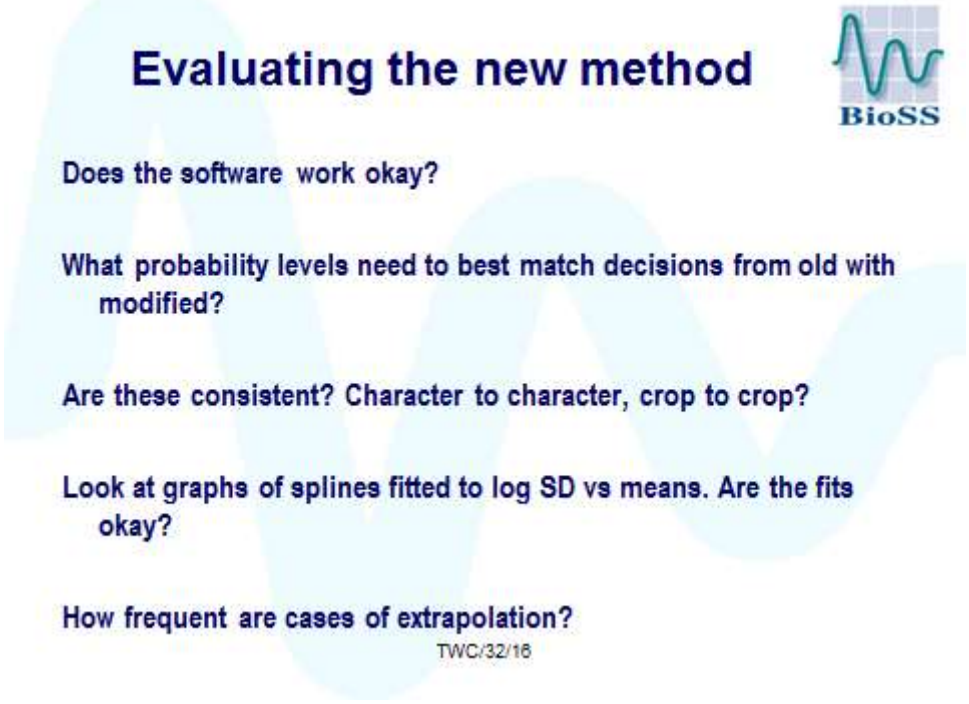
Pick a range of real data sets – the more the better

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

TWC/32/16



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