

Technical Committee

TC/57/7

Fifty-Seventh Session
Geneva, October 25 and 26, 2021

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THE COMBINED OVER YEARS UNIFORMITY CRITERION (COYU)

Document prepared by the Office of the Union

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EXECUTIVE SUMMARY

1. The purpose of this document is to consider a proposal for a draft revision of document TGP/8 “Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability”, Section 9 “The Combined-Over-Years Uniformity Criterion (COYU)”.

2. The TC is invited to:

(a) note that software for COYU Splines is under evaluation and is planned to be implemented in the United Kingdom from 2022;

(b) note that evaluation versions of software for COYU Splines were made available in August 2021;

(c) note the invitation for members of the Union to participate in the test campaign of the COYU Splines software and report outcomes to the expert from the United Kingdom by December 31, 2021;

(d) request the TWC to prepare a report of the results of the test campaign of the software for COYU Splines for consideration by the TC, at its fifty-eight session, in conjunction with the revision of document TGP/8; and

(e) note that comments from the TWC will be presented as an addendum to this document.

3. The structure of this document is as follows:

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4. 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

5. The Combined-Over-Years Uniformity (COYU) criterion is a method used to assess uniformity on the basis of measured quantitative characteristics (see document TGP/8/3 “Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability”).

6. The TC, at its fifty-fourth session¹, noted that the statistical development of the new method of calculation of COYU had been completed, including the establishment of the probability levels required to most closely match decisions using the current method for calculation of COYU. The TC noted the invitation by the TWC for the expert from the United Kingdom to draft a replacement section for document TGP/8 on the method of calculation of COYU (see document TC/54/25 “Report”, paragraphs 221 to 224).

7. Further background to this matter is provided in document TC/56/6 “The Combined Over Years Uniformity Criterion (COYU)”.

8. The TC² agreed to request the TWC to prepare a report of the results of the test campaign of the COYU Splines software for consideration in conjunction with the revision of document TGP/8 by the TC at its fifty-seventh session (see document TC/56/23 “Report”, paragraph 29).

DEVELOPMENTS AT THE TECHNICAL WORKING PARTIES

9. At their sessions in 2021, the TWV³, TWO⁴, TWA⁵ and TWF⁶ considered document TWP/5/11 “The Combined-Over-Years Uniformity Criterion (COYU)” (see documents TWV/55/16 “Report”, paragraphs 25 to 31; TWO/53/10 “Report”, paragraphs 29 to 33; TWA/50/9 “Report”, paragraphs 25 to 30; and TWF/52/10 “Report”, paragraphs 37 to 40).

10. The TWV, TWO, TWA and TWF considered the proposed revision of document TGP/8, Section 9 “The Combined-Over-Years Uniformity Criterion (COYU);” on the basis of the draft presented in the Annexes to document TWP/5/11.

11. The TWO and TWA noted the report from the United Kingdom made at the TWV, at its fifty-third session, that DUS Centers in that country would evaluate the COYU Splines software on a range of crops in 2021 and that the COYU Splines method was likely to be implemented from 2022.

12. The TWV agreed to invite the United Kingdom to make a presentation at its fifty-sixth session to report on the evaluation of COYU Splines for any vegetable crops. The TWA agreed to invite the expert from the United Kingdom at the TWA to make a presentation and report developments at its fifty-first session.

13. The TWV, TWO, TWA and TWF noted that evaluation versions of software for COYU Splines in both “R” and “DUSTNT” software would be released in 2021. The TWV, TWO, TWA and TWF noted the expression of interest by experts from China, Finland, France and the United Kingdom to review the COYU Splines software. The TWV, TWO, TWA and TWF noted the invitation for members to participate in a test campaign of the COYU Splines software in 2021.

14. The TWV, TWO, TWA and TWF noted the request by the TC for the TWC to prepare a report of the results of the test campaign of the COYU Splines software for consideration by the TC, at its fifty-seventh session, in conjunction with the revision of document TGP/8.

15. The TWA noted the report from an expert from France that the COYU Splines software was under evaluation in that country. The TWA agreed to invite the expert from France to make a presentation and report developments at its fifty-first session.

16. The TWO recalled that COYU was not commonly used for ornamental plants.

¹ held in Geneva on October 29 and 30, 2018

² at its fifty-sixth session, held via electronic means, on October 26 and 27, 2020

³ at its fifty-fifth session, hosted by Turkey and held via electronic means, from May 3 to 7, 2021

⁴ at its fifty-third session, hosted by the Netherlands and held via electronic means, from June 7 to 11, 2021

⁵ at its fiftieth session, hosted by the United Republic of Tanzania and held via electronic means, from June 21 to 25, 2021

⁶ at its fifty-second session, hosted by China and held via electronic means, from July 12 to 16, 2021

17. Comments from the Technical Working Party on Automation and Computer Programs (TWC)⁷, to be held from September 20 to 22, 2021, will be presented as an addendum to this document.

RECENT DEVELOPMENTS

18. The Office of the Union has been informed by the United Kingdom that software for COYU Splines had been made available as a new module in the "DUSTNT" software and as a package in the statistical programming language "R".

19. On August 4, 2021, the Office of the Union issued Circular E-21/116 inviting experts to evaluate software for the improved method of calculation of the Combined Over Years Uniformity criterion (COYU Splines). Instructions for obtaining the software and the evaluation process were provided in the Annex to the Circular. Interested experts were instructed to contact Mr. Adrian Roberts (United Kingdom) for queries and reporting the outcomes of evaluation by December 31, 2021. A copy of the Circular is attached as an Annex to this document.

NEXT STEPS

20. The TC is invited to renew its request for the TWC to prepare a report of the results of the test campaign of the COYU Splines software for consideration by the TC, in conjunction with the revision of document TGP/8.

21. *The TC is invited to:*

(a) note that software for COYU Splines is under evaluation and is planned to be implemented in the United Kingdom from 2022;

(b) note that evaluation versions of software for COYU Splines were made available in August 2021;

(c) note the invitation for members of the Union to participate in the test campaign of the COYU Splines software and report outcomes to the expert from the United Kingdom by December 31, 2021;

(d) request the TWC to prepare a report of the results of the test campaign of the software for COYU Splines for consideration by the TC, at its fifty-eight session, in conjunction with the revision of document TGP/8; and

(e) note that comments from the TWC will be presented as an addendum to this document.

[Annex follows]

⁷ at its thirty-ninth session, hosted by the United States of America and organized by electronic means, from September 20 to 22, 2021.

TC/57/7

ANNEX

UPOV Circular E-21/116

August 4, 2021

To: TC and TWPs

Dear all,

The purpose of this Circular is to invite experts to evaluate software for the improved method of calculation of the Combined Over Years Uniformity criterion (COYU Splines).

Instructions for obtaining the software and the evaluation process are provided in the Annex to this Circular.

Interested experts should contact Mr. Adrian Roberts (United Kingdom) for queries and reporting the outcomes of evaluation by December 31, 2021.

Yours sincerely,

UPOV Secretariat



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[Appendix to Annex follows]

APPENDIX TO ANNEX

Annex to Circular E-21/116

Thank you for agreeing to evaluate the software for the improved version of the Combined Over Years Uniformity criterion (COYU Splines). Here is some information about the evaluation.

Background

The Combined Over Years Uniformity (COYU) criterion is a method used to assess uniformity on the basis of measured quantitative characteristics (see document TGP/8/3 “Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability”). Since 2012, experts from the Technical Working Party on Automation and Computer Programs (TWC) have been developing an improved version of COYU (COYU Splines). Software for COYU Splines is now available. In this exercise, we ask participants to evaluate the new software. There is also the opportunity to compare COYU Splines with the old version (COYU Moving Average) on your own data.

What we would like you to do

The primary goal of this exercise is to evaluate the software for COYU Splines (in DUSTNT or R according to your preference). There is also the opportunity to make comparison on your own data for your own purposes and perhaps to report to the TWC if you wish.

We would like you to first assess the installation process. Then please run the software on some examples, check that it works, review the output and carry out a basic comparison to the old version of COYU (Moving Average). If using DUSTNT, it would be valuable if you could check other modules that you use regularly to ensure that these are unaffected.

Please note that COYU Splines does not give exactly the same results as COYU Moving Average and the presentation of results is updated (especially in DUSTNT). In particular, COYU Splines indicates the degree of extrapolation for a new variety (i.e. does its level of expression fall outside the reference varieties). For more information on extrapolation, see document TWC/38/6 “The Combined Over-Years Criterion (COYU)” Annex II (available at: https://www.upov.int/edocs/mdocs/upov/en/twc_38/twc_38_6.pdf).

We would be grateful if you could notify Mr. Adrian Roberts (a.roberts@bioss.ac.uk) of your intention to participate. Please send a report on your evaluation to Mr. Roberts before the end of December 2021. If you have made progress before 17 September 2021, please send an update so that this can be reported in the TWC meeting. Queries should also be sent to Mr. Roberts.

Setting probability levels

COYU Splines and COYU Moving Average were compared on several data sets that were contributed in a practical exercise (see document TWC/35/21 “Report”, paragraphs 81 to 84). Based on that comparison, the following advice was adopted for setting the probability levels required for the COYU criterion:

- For a final decision, if a probability level of 0.001 is used for the old COYU (Moving Average) then use a probability level of 0.003 for the improved method (COYU Splines).
- For early decisions on acceptance after two years in a three-year test, if a probability level of 0.01 is used for the old COYU (Moving Average) then use a probability level of 0.02 for the improved method (COYU Splines).

Software overview and access

The new method has been implemented in two software packages: R (a statistical programming language) and DUSTNT (a specialist software package specifically for DUS, maintained by AFBI in the United Kingdom). Both will be made freely available.

In the case of DUSTNT, we have added a new module alongside the old method. The new module is called COYUS9 (and the old COYU9). The “S” refers to the spline method being used rather than moving average. The new module actually brings in R code (all other modules are based on Fortran). The installation process for DUSTNT has been improved to fit better with current Windows structures. Unlike earlier versions of DUSTNT, it is vital that the software is run from the Windows Start menu – see the installation instructions. The new evaluation version of DUSTNT with installation instructions can be obtained from:

<https://eservices.afbini.gov.uk/dustdownload/evaluation.aspx>

For R users, we have created an R package. This is suitable for those with R experience, particularly those who would like to integrate with their own DUS tools based in R. The code is available either as source code or as a directly installable package. The latter is a simpler process but even so requires knowledge on how to install packages from files. An alternative method is to install DUSTNT, which will give access to the package (guidance is available on demand for this approach). In the longer term, we plan to put the package on CRAN to facilitate access and ease of maintenance.

The directly installable package is available at:

<https://github.com/BiomathematicsAndStatisticsScotland/coyus/releases/tag/v1.8-1>

Instructions on basic usage can be found within the package vignette, which should be read.

The source code is available at

<https://github.com/BiomathematicsAndStatisticsScotland/coyus>

[End of Appendix to Annex and of document]