UPOV

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TECHNICAL WORKING PARTY FOR FRUIT CROPS

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REVISION OF DOCUMENT TGP/8: PART II: SELECTED TECHNIQUES USED IN DUS EXAMINATION, SECTION 9: THE COMBINED-OVER-YEARS UNIFORMITY CRITERION (COYU)

Document prepared by the Office of the Union

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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.   At its twenty-sixth session held in Jeju, Republic of Korea, from September 2 to 5, 2008, the TWC considered document TWC/26/17 "Some consequences of reducing the number of plants observed in the assessment of quantitative characteristics of reference varieties[1]" and a presentation by Mr. Kristian Kristensen (Denmark), a copy of which is reproduced as document TWC/26/17 Add.

4.   Document TWC/26/17 states the following with regard to the current method of calculation of the Combined-Over-Years Uniformity Criterion (COYU):

"Conclusions

"18.   From the above it can be concluded that the variances calculated in the present system do not reflect the expected value of the true variance as they are too small, partly because the expected value of RMS [residual mean square] from the ANOVA is less than the expected value of $Var(Y_v)$ and partly because only the number of varieties used in the local adjustment influence[s] this variance (and not the total number of reference varieties). However, the present method probably adjusts for this bias by using a

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[1]   The term "reference varieties" here refers to established varieties which have been included in the growing trial and which have comparable expression of the characteristics under investigation.

large t-value (by using a small α-value). Also it can be concluded that the residual mean square (RMS) may depend significantly on the number of observations recorded as the component of RMS that depends on the number of observations (degrees of freedom) was not a negligible part."

5.   The TWC noted the following possible actions to address the bias in the present method of calculation of COYU, as identified and commented on by Mr. Kristensen:

(i)   Ignore the biases
        (comment: the test will most probably be too liberal);

(ii)   Correct only for the bias introduced by the smaller sample sizes
        (comment: the test will be too liberal, but will be comparable to those in the past);

(iii)   Correct only for the present bias
        (comment: the test will be conservative, but not comparable to the past);

(iv)   Correct for all biases
        (comment: there will be no biases, but the tests will not be comparable to the past).

6.   The developments between 2009 and 2012 are reported in document TWO/46/15 "Method of calculation of COYU".

7.   The TC, at its forty-ninth session, held in Geneva, from March 18 to 20, 2013, agreed to request the TWC to continue its work with the aim of developing recommendations to the TC concerning the proposals to address the bias in the present method of calculation of COYU and noted that a document on possible proposals for improvements to COYU would be prepared for the TWC session in 2013 (see document TC/49/41 "Report on the Conclusions, paragraph 113).

8.   At their sessions in 2013, the TWO, TWF, TWV and TWA considered documents TWO/46/15, TWF/44/15, TWV/47/15 and TWA/42/15, respectively.

9.   At its thirty-first session, held in Seoul, from June 4 to 7, 2013, the TWC considered document TWC/31/15 Corr. "Method of Calculation of COYU" including the proposals for improvements to COYU prepared by experts from the United Kingdom and Denmark and received a presentation from an expert from the United Kingdom (see document TWC/31/15 Corr. paragraph 16 to 61 and TWC/31/15 Add.).

10.   The TWC noted that the present method of calculation of COYU was overly strict due to the method of smoothing used and that very low probability levels were used in compensation (e.g. p=0.1%). The TWC agreed that the bias in the present method of calculation of COYU could be addressed by a change of smoothing method from "moving average" to "cubic smoothing splines" (see document TWC/31/32 "Report", paragraph 91).

11.   The TWC welcomed the offer by the experts from the United Kingdom to write software for the proposed COYU method in FORTRAN for integration into the DUST software and to present a demonstration version of the DUST software using the proposed COYU method at the thirty-second session of the TWC (see document TWC/31/32 "Report", paragraph 92).

12.   The TWC agreed that the probability levels to be used in the proposed COYU method should be discussed on the basis of the experience of UPOV members in using the proposed method (see document TWC/31/32 "Report", paragraph 93).

13.   The TWC agreed that a circular should be prepared by an expert from the United Kingdom and issued by the Office to the TC representatives, in order to investigate which members of the Union used the current COYU method and in which software it was used (see document TWC/31/32 "Report", paragraph 94).

14.   The TWC agreed that the document containing the proposal for an improvement to COYU should be summarized by an expert from the United Kingdom and presented to the TC at its fiftieth session and the TWP sessions to be held in 2014. The document should explain the bias of the present method that justified the proposed changes (see document TWC/31/32 "Report", paragraph 95).

15.   The TWC agreed that guidance should be developed on the minimum number of varieties that would be suitable for using the COYU method (see document TWC/31/32 "Report", paragraph 96).

16.   The TWA supported the continuation of work of the TWC to improve the COYU method and noted that the TWC would provide information on the proposed changes to the COYU method and eventual consequences in DUS examination (see document TWA/42/31 "Report", paragraph 38).

SURVEY ON USE OF COYU

17.   On November 4, 2013, the Office of the Union issued Circular E_13/268 to the designated persons of the members of the Union in the TC, inviting them to provide information on the use of the current COYU method and in which software it was used.

18.   The Annex to this document contains the results of the survey.

IMPROVEMENTS TO COYU

19.   The TC, at its fiftieth session, held in Geneva, April 7 to 9, 2014, considered document TC/50/22 "Revision of document TGP/8: Part II: Selected Techniques Used in DUS Examination, Section 3: Method of Calculation of COYU" and received a presentation by Mr. Adrian Roberts, United Kingdom, on "Proposed Improvements to COYU" (see document TC/50/22 Annex IV and TC/50/22 Add.). (http://www.upov.int/meetings/en/doc_details.jsp?meeting_id=31703&doc_id=266557, http://www.upov.int/meetings/en/doc_details.jsp?meeting_id=31703&doc_id=273227)

20.   The TC agreed that the development of a demonstration module in DUST should be continued and demonstrated to the TWC at its thirty-second session, to be held in Helsinki, June 3 to 6, 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, paragraph 50).

21.   The TWF is invited to note the developments concerning the method of calculation of COYU

[Annex follows]

ANNEX

SUMMARY OF THE REPLIES TO THE QUSTIONNAIRE
CONCERNING THE COMBINED-OVER-YEARS UNIFORMITY CRITERION (COYU) METHOD

This following table summarizes the results of the survey:

Member of the Union	Use of COYU (Question 1)	Software (Question 2)	Crops COYU is used for (Question 3)
Czech Republic	Yes	DUSTNT	Fodder crops; Oilseed rape
Estonia	Yes	DUSTNT	Grasses; Legumes
Finland	Yes	DUSTNT	Meadow fescue and Tall fescue; Red clover and White clover; Reed canary grass; Rye; Timothy; Turnip rape (oilseed type)
France	Yes	SAS	Broad bean; Forage crops; Oilseed rape
Germany	Yes	SAS	Cat's tail; Festulolium; Fodder beet; Fodder radish; Hybrid ryegrass, Italian ryegrass, Perennial ryegrass and Westerwolds ryegrass; Meadow fescue, Red fescue and Sheep's fescue; Rape; Red clover; White mustard; Winter rye
Japan	No	n/a	n/a
Netherlands	Yes	GenStat	Cross-pollinated crops in general; Grasses in particular
New Zealand	No	n/a	n/a
Portugal	No	n/a	n/a
Russian Federation	No	n/a	n/a
United Kingdom	Yes	DUSTNT	Festulolium; Oilseed rape (winter type); Pea; Ryegrass; White clover

In addition to the above, the following comments were received (Question 4):

- France: for forage crops, COYU is in routine use for uniformity; for oilseed rape, COYU is used for some of the characteristics and for other characteristics, off types methods are used; for broad bean (field crop group), COYU has been used for quantitative characteristics until now, but will be abandoned to use GAIA to get a distance mixing qualitative and quantitative characteristics.

- Netherlands: Naktuinbouw is working with a full set of procedures in GenStat developed by Biometris (Wageningen University) for trial design (alpha or block design), trial analysis, COYD, COYU and 'Differ' (filter for distinctness).

- New Zealand: DUST is used for ryegrass and other forage species. New Zealand has not had sufficient variety numbers to apply COYD or COYU until this year. It is planned to undertake COYD and COYU on ryegrass and other forages measurements in January 2014. Until this time, the LSD 1% method has been used.

[End of Annex and of document]