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METHOD OF CALCULATION OF COYU

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

Background

2.   At its twenty-sixth session held in Jeju, Republic of Korea, from September 2 to 5, 2008, the Technical Working Party on Automation and Computer Programs (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.

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

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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.

"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 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."

4.   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).

5.   The TWC agreed that Denmark and the United Kingdom should prepare a new document, including a simulation using the smoothing spline method. It was noted that that would also allow experts further time to reflect on the situation and possible ways forward.

6.   The Technical Committee, at its forty-fifth session, held in Geneva from March 30 to April 1, 2009, noted the discussions concerning the current method of calculation of COYU, as set out above, and agreed that the Technical Working Parties (TWPs) should be informed about those discussions at their sessions in 2009. The TC requested the TWC to make its recommendations to the TC concerning the proposals set out in paragraph 3 of this document.

Developments in 2009

7.   At its twenty-seventh session, held in Alexandria, Virginia, United States of America, from June 16 to 19, 2009, the TWC considered document TWC/27/15 "Potential approaches to improving COYU" prepared by experts from Denmark and the United Kingdom on the basis of a presentation by Mr. Adrian Roberts (United Kingdom). The TWC agreed that it would be important to evaluate the range of circumstances that needed to be accommodated and that a new document should be prepared for its twenty-eighth session by experts from Denmark and the United Kingdom.

Developments in 2010

8.   The Technical Committee (TC) at its forty-sixth session held in Geneva from March 22 to 24, 2010 considered document TC/46/11 "Method of Calculation of COYU". It noted the

developments concerning the method of calculation of COYU as set out in document TC/46/11, paragraphs 7 to 11, and requested the TWC to make proposals to address the bias in the present method of calculation of COYU. The TC noted the observation at the twenty-seventh session of the TWC, that the way COYU made the calculations at the moment was acceptable, but that it was nevertheless desirable to find a solution.

9.   The TWC, at its twenty-eighth session held in Angers, France, from June 29 to July 2, 2010, considered document TWC/28/27 "Alternative Methods to COYU for the Assessment of Uniformity", presented by Mr. Kristian Kristensen (Denmark). Mr. Kristensen proposed to carry out a survey to obtain data on the relationship between uniformity and expression of characteristics for different crops in order to determine if linear or quadratic adjustments would be suitable to correct the biases. He would then consider the implementation of the improved method. The TWC noted that experts from Germany, Netherlands, Poland and United Kingdom would send information of averages and standard deviations to Mr. Kristensen for analysis and encouraged other experts to send such information to Mr. Kristensen (see document TWC/28/3 "Report" paragraphs 49 and 50).

10.   The TC, at its forty-seventh session held in Geneva from April 4 to 7, 2011, noted the developments concerning the method of calculation of COYU as set out in this document, paragraphs 8 and 9, and requested the TWC to continue its work with the aim of developing recommendations to the TC (see document TC/47/26 "Report on the Conclusions", paragraph 88).

Comments of the Technical Working Parties at their sessions in 2011

11.   The Technical Working Party for Agricultural Crops (TWA), at its fortieth session, held in Brasilia, Brazil, from May 16 to 20, 2011, noted the information provided in document TWA/40/10 (see document TWA/40/23, paragraph 41).

12.   The Technical Working Party on Automation and Computer Programs (TWC) took note of the information contained in document TWC/29/10.

   (a)   COYU possible proposals for improvements to COYU (document TWC/29/22)

13.   The TWC received a presentation by Mr. Kristian Kristensen (Denmark) "Analysis of the Relation Between Log SD and Mean of Varieties", prepared by experts from Denmark and the United Kingdom. The TWC agreed that a new document based on the cubic spline model should be prepared for the next session of the TWC.

   (b)   A comparison of COYU and a method based on Bennett's Test for coefficients of variation (document TWC/29/23)

14.   The TWC took note of the information in document TWC/29/23, presented by Mr. Wieslaw Pilarczyk (Poland). Some experts wondered whether better results could be obtained if the Bennett's Test were compared with COYU at other significance levels and with COYU improved with the cubic spline model.

   (c)   A rationale for excluding varieties of common knowledge from the second growing cycle when COYD is used (document TWC/29/26)

15.   The TWC received a presentation by Mrs. Sally Watson (United Kingdom) on "Cyclic Planting of Established Varieties to Reduce Trial Size". The TWC agreed that the text should be included in TGP/8 Part I in a new section on the reduction of the size of the trials.

(d)   Use of COYD when varieties are grouped (document TWC/29/25)

16.   The TWC received the presentation by Mr. Adrian Roberts (United Kingdom) on "An Adjustment to the COYD Method When Varieties are Grouped Within the DUS Trial". The TWC agreed that the text should be included in TGP/8 Part II Section 3 (see document TWC/29/31, paragraphs 59 to 63).

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