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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Twenty-First Session
Tjele, Denmark, June 10 to 13, 2003

REPORT ON THE CONCLUSIONS

adopted by the Technical Working Party on Automation and Computer Programs

Opening of the Session

1. The Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the TWC") held its twenty-first session in Tjele, Denmark, from June 10 to 13, 2003. The list of participants is reproduced in Annex I to this report.

2. The TWC was welcomed by Mr. Ole Olsen, Director of the Danish Institute of Agricultural Science. Mr. Olsen gave a report on the activities of the Institute.

3. The session was opened by Mr. Uwe Meyer (Germany), Chairman of the TWC, who welcomed the participants and, in particular, new participants to the TWC.

Adoption of the Agenda

4. The TWC adopted the agenda as reproduced in document TWC/21/1 Rev., after having agreed to follow the work plan proposed by the Chairman.

Short Reports on Developments in Plant Variety Protection

(a) Reports from members and observers

5. The TWC received oral reports from the participants on developments in plant variety protection in their respective countries.

(b) Reports on developments within UPOV

6. The TWC received an oral report from the Office of the Union on the latest developments in the UPOV Council, Administrative and Legal Committee (CAJ), Technical Committee (TC) and Technical Working Parties.

Molecular Techniques

(a) Report on developments

7. The TWC received an oral report from the Office of the Union on the latest developments at the Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular (BMT), the *Ad Hoc* Crop Subgroups on Molecular Techniques and the BMT Review Group.

(b) Statistical method for data produced by biochemical and molecular methods

8. Mr. Sylvain Grégoire (France) introduced document TWC/21/3. He explained, in particular, the differences between PREDIP and GAÏA.

9. The TWC discussed the possible use of PREDIP for Option 1 (b) or Option 2 concerning the use of molecular markers in DUS testing (see document TC/38/14). It noted that the output from PREDIP was dependent on the crop and the characteristics and molecular markers used in the analysis. The TWC agreed that the methods used in PREDIP were to be viewed as methods under development.

Project to Consider the Publication of Variety Descriptions (documents TWC/21/5 and TWA/29/19)

10. The TWC considered document TWC/21/5, introduced by the Office of the Union, and document TWA/29/19, introduced by Mr. Gerhard Deneken (Denmark).

11. In response to the request in document TWC/21/5 to comment on the proposed program for the development of the model study the TWC made the following recommendations:

(a) where practically possible, the study should be conducted on all characteristics included in the UPOV Test Guidelines;

(b) contributors of variety descriptions should be requested to provide their “official” descriptions of the varieties concerned i.e. the description resulting from the DUS examination of the variety. In making this recommendation it noted that the description may have been re-

calibrated in the meantime, but considered that if such changes could not be accommodated in the comparison of variety descriptions the aims of the project could not be met;

(c) in the case of authorities wishing to contribute variety descriptions for which they did not have "official" descriptions, e.g. for varieties which had been acquired for their reference collections, the description to be provided should be that produced at the end of the first complete cycle of testing in which the variety was included;

(d) contributors should be requested to specify the reference of the UPOV Test Guidelines on which the description had been developed; and

(e) contributors should be requested to provide the variety denomination, breeder's reference, breeder and applicant for each variety to verify, as far as possible, whether varieties were the same or different.

12. With regard to advice on the management of data, it was agreed that the Chairman of the TWC should, after consultation with the members of the TWC, develop guidance on how to present the variation in the states of expression between different descriptions of the same variety.

UPOV Databases

13. Documents TC/39/13 and TC/39/14–CAJ/47/5 were introduced by the Office of the Union.

14. With regard to the UPOV code proposed in document TC/39/13, the TWC agreed with the structure of the code and the proposed program for its introduction. The TWC agreed that if members had any comments after further consideration of the codes, these would be sent to the Office of the Union by the end of September 2003. It recommended that the database should indicate which Technical Working Party would be responsible for checking the validity of each code. It also agreed that, where appropriate, the database should indicate the relevant Test Guidelines for each code and, furthermore, that the third element of the code should be used to generate different codes for different types of varieties of the same species or sub-species, which were covered by different Test Guidelines. The TWC agreed that new codes created by the Office of the Union could be used immediately but such new codes should be reviewed by the relevant TWP at their annual sessions.

15. The TWC agreed that the code should, in general, not be changed as a result of a change in the Latin name of a species. However, it recognized that a change in the structure and content of a genus may require a change in the UPOV code to ensure that the first element of the code could be used to sort species into the correct genus.

16. The TWC received a presentation from the Office of the Union, based on document TC/39/14–CAJ/47/5, on the review of the UPOV-ROM plant variety database. It agreed that consideration should be given to the creation of a field to indicate whether the variety denomination is in the form of a "code", rather than a "fancy name."

TGP Documents

(a) TGP documents the Technical Committee invited all Technical Working Parties to consider at their sessions in 2003

(i) TGP/7 Development of Test Guidelines (document TGP/7 draft 3)

17. The TWC considered document TGP/7 Draft 3 and recommended the following changes:

Annex I: TG Template

Cover page (page 27):

In the first sentence of the highlighted section on the cover page, "document TG/1/3" should be inserted after "the General Introduction."

Section 3.1 (page 30):

The title of this section should be changed to "Number of independent growing cycles." With regard to the first sentence, the TWC questioned whether this should be retained (see comments on section 4.1.2 Consistent Differences) but, if retained, agreed that it should read as "The consistency of differences between varieties is supported by observations made in different independent growing cycles."

Section 3.2 (page 31):

The highlighted section should be replaced by the following sentence: "Where considered appropriate, the variety may be tested at an additional location."

Section 4.1.2 (page 31):

The TWC considered that this section should be retained, as the need to ensure that any differences in a characteristic are sufficiently consistent was the basis for determining the minimum duration of the tests.

Annex II: Additional Standard Wording (ASW)

ASW 7 (page 45):

First sentence to read "Where the COYD method is used for examining distinctness and it is applied to a characteristic, a difference between varieties should be considered to be clear and consistent if it is greater than the COY LSD for distinctness at the level of {e.g. 1%} after two or three growing cycles. The Chairman of the TWC will consult with the members of the TWC to verify if the words ", or equal to," should be added after "greater than" and notify the Office accordingly."

ASW 8(e) (page 46):

The Chairman of the TWC, in consultation with the members of the TWC, to develop new wording for this section and supply to the Office for incorporation into document TGP/7

draft 4. It was agreed that the "Note" forming the second paragraph should be developed into a Guidance Note (GN) and included in Annex 3 of TGP/7.

(ii) Explanation of the "Schematic overview of TGP/3 (Varieties of Common Knowledge), TGP/4 (Management of Variety Collections) and TGP/9 (Examining Distinctness)"

18. Document TC/39/6 was introduced by the Office of the Union.

19. The TWC recommended the following changes concerning the structure of TGP/9 presented in TC/39/6:

TGP/9.4

Title to be changed, since the whole of TGP/9 concerned methods for examining distinctness.

TGP/9.4.3

The TWC agreed that the word "Recommended" should be deleted from the title. It also agreed that, in addition to COYD, the long-term LSD method should be added to the statistical methods and noted that other suitable methods could be added even after the initial adoption of TGP/9.

TGP/9.5

TGP/9.5 to be placed before TGP/9.4 and the sections to be renumbered accordingly.

20. With regard to the proposed program for the development of TGP documents presented in Annex II of document TC/39/6, the TWC agreed the following:

TGP/10.1

The first draft of TGP/10.1 "Considering the application of statistical methods" to be produced for the first complete draft of TGP/10, scheduled to be prepared for the TC in 2005.

TGP/10.3

It was agreed that the word "Recommended" should be deleted from the title.

TGP/10.3.3

The Chairman of the TWC to discuss the development of a first draft of document TGP/10.3.3 "Recommended statistical methods: Segregation ratios" with Mr. John Law (United Kingdom).

TGP/10.3.4

TGP/10.3.4 "Relative tolerances in the number of off-types" to be deleted and the section to be incorporated into TGP/10.3.2 "Off-types."

TGP/14.3

It was agreed that, subject to the agreement of Mr. Tanvir Hossain (Australia) being obtained by the Office of the Union, a second draft of document TGP/14.3 "Statistical terms" would be developed by Mr. Adrian Roberts (United Kingdom) for discussion at the twenty-third session of the TWC.

(b) TGP documents to be prepared by TWC experts:

TGP/8.2 Validation of Data and Assumptions

21. Mr. Kristian Kristensen (Denmark) introduced document TGP/8.2 draft 2. He explained that this document was a revision of TGP/8.2 draft 1, presented to the TWC at its previous session, within which the comments made by the TWC at that session had been incorporated.

22. The TWC agreed that a new document should be prepared by experts from Denmark and the Netherlands. In accordance with the proposal from an expert from France, the TWC agreed to keep the document as simple as possible in order to make it more useful for crop experts. It agreed to modify paragraph 12, because it considered that it was not the observed raw data which should be normally distributed. It also agreed that the third sentence of paragraph 13 of the document should read as follows:

"For a formal description of the model see TGP 8.5 Two-way ~~anova~~ ANOVA ~~alinea~~ paragraph 7."

TGP/8.4 Types of Characteristics and Their Scale Levels

23. Mr. Uwe Meyer (Germany) introduced document TGP/8.4 draft 2. He noted that this draft incorporated the comments made by the TWC during its previous session.

24. The TWC agreed that a new document would be prepared for the following TWC session. That new document would include a more comprehensive explanation of the different process levels presented in section 8.4.2 and clarify the meaning of "absolute measurement" and "absolute zero point". For these purposes, the TWC considered it useful to include examples to help crop experts to understand the document.

TGP/8.5 Statistical Methods for DUS Examination

25. Mrs. Sally Watson (United Kingdom) introduced document TGP/8.5 draft 2. She noted that document TGP/8.5 draft 2 was an updated version of the document considered by the TWC during its session in 2003.

26. The TWC proposed that, once agreed, the decision rule for comparisons of means should be included at the end of paragraph 31. It was agreed that the expert from the United Kingdom would check the criteria in the COY procedure and amend paragraph 14 of Appendix A2 accordingly.

27. The TWC noted that the numbering of the columns in the tables of paragraphs 2 and 3 of Appendix A3 should be amended.

28. In relation to the content of TGP/8 as a whole, the TWC agreed to restructure the content of the document as follows:

TGP/8.1	Introduction (former TGP/8.1)
TGP/8.2	Experimental Design Practices (former TGP/8.3)
TGP/8.3	Types of Characteristics and Their Scale Levels (former TGP/8.4)
TGP/8.4	Validation of Data and Assumptions (former TGP/8.2)
TGP/8.5	Statistical Methods for DUS Examination (former TGP/8.5)
TGP/8.6	Examining DUS in Bulk Samples (former TGP/8.6)

TGP 9.4.1 Examining distinctness in different types of varieties: General

29. Mrs. Beate Rücker (Germany) introduced document TGP/9.4.1 draft 2. She pointed out the remark in paragraph 3 noting that, according to the document TG/1/3 (General Introduction), guidance for the handling of quantitative characteristics should be provided in document TGP/9. She wondered in what section of document TGP/9 it should be included.

30. The TWC made no particular proposals for amendments to this document.

TGP/9.7 Recommended Statistical Methods

31. Mrs. Sally Watson (United Kingdom) introduced document TGP/9.7 draft 2. She noted that document TGP/9.7 Draft 2 was an updated version of the document considered by the TWC during its session in 2003. She pointed out that this draft 2 included reference to long-term LSD in the main part of the document (see paragraphs 17 and 18) instead of having them in the Annex, which had been the case for draft 1 of document TGP/9.7.

32. The TWC agreed the following amendments:

(a) In paragraph 12 of the document, the order of the criteria for recommending the use of COYD should be:

- the characteristic is quantitative;
- there are some differences between plants (or plots) of a variety;
- observations are made on a plant (or plot) basis over two or more years.

(b) A separate section on long-term LSD to be introduced.

33. The TWC agreed that paragraph 20 should only mention Mrs. Sally Watson as the contact person for obtaining the DUST package for statistical analysis of DUS data and that, in the last paragraph of figure 1, “or equal” has to be checked by the Chairman of the TWC after consultation with other members of the TWC.

TGP/10.2 Assessing Uniformity According to the Features of Propagation

34. Mrs. Beate Rücker (Germany) introduced document TGP/10.2 draft 2.

35. The TWC agreed the following amendments:

paragraph 1: first sentence to read: "The variation in the expression of characteristics within varieties is the critical consideration in the ~~judgment~~ assessment of uniformity."

paragraph 4: to take the wording of paragraph 6.4.1.1 from the General Introduction to define off-type;

paragraph 5(b): to amend the text for consistency with the text of the General Introduction and to elaborate on the notion of "comparable varieties" and the reference to TGP/13 should be clarified;

TGP/10.3.1 Recommended Statistical Methods: COYU

36. Mr. Adrian Roberts (United Kingdom) introduced document TGP/10.3.1 draft 2. He noted that the document incorporated the comments made by the TWC during its session in 2003.

37. In response to comments received from Mr. H.P. Piepho (University of Hohenheim, Germany), the TWC agreed to invite Mr. Piepho to prepare a document for the TWC to describe alternative approaches within the COYU method.

38. The TWC agreed that a paper should be prepared by experts from Germany to reconsider if the 9-point moving average was still appropriate in all cases. It also agreed that a paper on the determination of the minimum number of plants to be used when measuring characteristics should be prepared by experts from Denmark and Germany for its following session. The TWC noted that, in formula SD_j in paragraph 15, the divisor "n" should, theoretically, read "n_j", but for practical purposes the divisor should continue to read "n". With regard to paragraph 35 of the document, it agreed that this should read:

"The program will operate with a complete set of data or will accept some missing values, e.g. when a variety is not present in a year."

39. The TWC pointed out that, in paragraph 33, the notation of TGP/7, page 46, should be used (probabilities as examples).

40. As a result of discussions on document TWC/21/7, the TWC agreed that the next draft of TGP/10.3.1 should include an explanation concerning the possible acceptance of varieties after two years of tests in a three-year testing system.

TGP/10.3.2 Recommended Statistical Methods: Off-Types

41. Mr. Adrian Roberts (United Kingdom) introduced document TGP/10.3.2 draft 2. He noted that the document incorporated the comments made by the TWC during its session in 2003.

42. The TWC agreed that the subject of relative tolerances in the number of off-types, which was intended to be presented in TGP/10.3.4, should be incorporated into a section within TGP/10.3.2. It also agreed that the next draft of TGP/10.3.2 should address the determination of off-types by measurements, as referred to section 6.4.1.2 of the General Introduction.

TGP/10.3.3 Recommended Statistical Methods: Segregation Ratios

43. The TWC agreed that the Chairman of the TWC would contact the drafter of TGP/10.3.3 to clarify whether a version of that document would be provided for the next session of the TWC.

Incomplete Block Design

44. Mr. Kristian Kristensen (Denmark) introduced document TWC/21/6. Discussions focused on the efficiency and limitations of α-designs, especially for grouping purposes, which is a requirement from crop experts.

45. The TWC agreed to delete the word "almost" in paragraph 6 of the document and to change the wording of paragraph 17 from "(but never negative)" into "(only in a few cases slightly negative)".

Efficiency of Incomplete Block Designs in DUS Herbage Trials

46. Mrs. Sally Watson (United Kingdom) introduced document TWC/21/8.

47. The TWC concluded that resolvable incomplete block designs could be used for DUS testing. It agreed that further studies were necessary to make a more detailed recommendation and that experts from Denmark, Poland and the United Kingdom would prepare a paper on recommendation for the use of α-designs in DUS testing for the following TWC session.

Chi Square distribution

48. Mr. Vincent Gensollen (France) introduced document TWC/21/2.

49. The TWC agreed that for the following session a revised version of document TWC/21/2 would be prepared taking into account the fact that uniformity could not be assessed. The revision should include a comparison of Chi square and exact tests. It also agreed that the expert from Kenya would prepare a document on the use of generalized linear models in cases described in document TWC/21/2.

Uniformity Standards for COYU

50. The Office of the Union introduced document TWC/21/7.

51. The TWC agreed that a new document on probability levels for COY should be prepared for the following session. The Office of the Union was requested to collect the information and to prepare the document. The TWC agreed that an explanation on the way decisions are taken when using the COY approach should be included in the request and that the replies should be organized by type of decision. Annex II to this report contains the agreed explanation to be included in the request. With regard to the recommendation for probability levels, the TWC agreed that the first step would be to make recommendations for those crops where there was

already a harmonized level. For other crops, the different levels could be presented and the possibility to develop a recommended level discussed by the TWC.

52. The TWC considered that, once agreed, this information would be included in the relevant sections of TGP/9 and TGP/10.

Calculation of Phenotypic Distances

53. Mr. Sylvain Grégoire and Mr. Christophe Chevalier (France) presented document TWC/21/4 and made a presentation on the GAÏA software.

54. The TWC noted that the use of this software required careful consideration by crop experts and, in particular, attention was needed in the weighting attributed to differences in each characteristic and the combination of data from different years and locations. The TWC agreed that the Office of the Union should issue a questionnaire to all recipients of the GAÏA software, requesting information on the crops to which the software was being applied, with the outcome to be reported to the TWC at its next session.

55. It was agreed that the user guide for the GAÏA system and contact details for obtaining the GAÏA CD-ROM should be posted on the first restricted area of the UPOV Website. It noted that a Website hotline might be established by the experts from France if the uptake of the software justified such a feature.

56. The TWC agreed that methods used in GAÏA were to be viewed as methods under development and that this should be clarified in the UPOV website.

List of Statistical Documents

57. The TWC agreed to update the list of statistical documents and to post this on the TWC section of the UPOV Website.

Future Program, Date and Place of the Next Session

58. At the invitation of the expert from country, the TWC agreed to hold its twenty-second session in Japan, from June 14 to 17, 2004. During the twenty-second session, the TWC planned to discuss or re-discuss the following items:

1. Opening of the session

2. Adoption of the agenda

3. Short reports on developments in plant variety protection

   (a) Reports from members and observers (oral reports by the participants)

   (b) Reports on developments within UPOV (oral report by the Office of the Union)

4. Molecular Techniques

   (a) Report on developments (oral report by the Office of the Union)

   (b) Statistical methods for data produced by biochemical and molecular methods

5. Project to consider the Publication of Variety Descriptions (document to be prepared by the Office of the Union)

6. UPOV Databases (document to be prepared by the Office of the Union)

7. TGP document

   TGP/8 Use of Statistical Procedures in DUS Testing

   TGP/8.1 Introduction (document to be produced by the experts from France and the Netherlands)

   TGP/8.2 Validation of Data and Assumptions (document to be produced by the experts from Denmark and the Netherlands)

   TGP/8.3 Experimental design Practices (document to be produced by the experts from Germany and the Netherlands)

   TGP/8.4 Types of Characteristics and Their Scale Levels (document to be produced by the expert from Germany)

   TGP/8.5 Statistical Methods for DUS Examination (document to be produced by the experts from the United Kingdom)

   TGP/8.6 Examining DUS in Bulk Samples (document to be prepared by the experts from Denmark)

   TGP/9 Examining Distinctness

   (document to be compiled by the Office of the Union in conjunction with the relevant drafters of the individual sections of TGP/9)

   TGP/10 Examining Uniformity

   TGP/10.2 Assessing Uniformity According to the Features of Propagation (document to be produced by the expert from Germany)

   TGP/10.3.1 Recommended Statistical Methods: COYU (document to be produced by the experts from the United Kingdom)

   TGP/10.3.2 Recommended Statistical Methods: Off-Types (document to be produced by experts from Germany and the United Kingdom)

   TGP/10.3.3 Recommended Statistical Methods: Segregation Ratios

8. Assessment of distinctness for segregating characteristics (document to be produced by experts from France and the United Kingdom)

9. Incomplete block design (document to be produced by the experts from Denmark, Poland and the United Kingdom)

10. Efficiency of incomplete block designs in DUS herbage trials (document to be produced by the expert from United Kingdom)

11. Generalized linear models (logistic regression approach) (document to be produced by the expert from Kenya)

12. Standard probability levels for COY (document to be produced by the Office of the Union)

13. COY: the selection of the optimum number of plants (document to be prepared by experts from Denmark and Germany)

14. COYU Methodology (document to be prepared by Mr. Piepho from Germany)

15. COYU: moving average (document to be prepared by the expert from Germany)

16. Calculation of phenotypic distances (document to be produced by the Office of the Union)

17. Image analysis in peas (document to be prepared by the expert from the United Kingdom)

18. Date and place of the next session

19. Future program

20. Report on the conclusions of the session (if time permits)

[Annex I follows]

ANNEX I

LIST OF PARTICIPANTS

I. MEMBER STATES

CZECH REPUBLIC

Lydie ČECHOVÁ (Mrs.), Central Institute for Supervising and Testing in Agriculture, Ustredni kontrolni a zkusebni ustav zemdlský, 56901 Hradec Nad Svitavou (tel.: +420 461 535 003, fax: +420 461 22 748, e-mail: lydie.cechova@ukzuz.cz)

DENMARK

Jens Henrik BADSBERG, Biometry Research Unit, Department of Animal Breeding and Genetics, Danish Institute of Agricultural Sciences, Post Box 50, 8830 Tjele (tel.: +45 89 99 16 60, fax: +45 89 99 13 00, e-mail: jenshenrik.Badsberg@agrsci.dk)

Gerhard DENEKEN, Head, Department of Variety Testing, Danish Institute of Agricultural Sciences, Ministry of Food, Agriculture and Fisheries, Postbox 7, Teglvaerksvej 10, Tystofte, 4230 Skaelskoer (tel.: +45 58 160601, fax: +45 58 160606, e-mail: gerhard.deneken@agrsci.dk)

Kristian KRISTENSEN, Biometry Research Unit, Department of Animal Breeding and Genetics, Danish Institute of Agricultural Sciences, Post Box 50, 8830 Tjele (tel.: +45 89 99 12 09, fax: +45 89 99 13 00, e-mail: kristian.kristensen@agrsci.dk)

Erik LAWAETZ, Department of Variety Testing, Postbox 7, Teglvaerksvej 10, 4230 Skaelskoer (tel.: +45 5816 06 03, fax: +45 5816 06 06, e-mail: erik.lawaetz@agrsci.dk)

ESTONIA

Anna VARES, Viljandi Variety Testing Centre, P.O. 71024, Viljandi (tel.: +372 433 4054, fax: +372 433 4406, e-mail: sordi@tmkk.ee)

FINLAND

Sami MARKKANEN, KTTK Seed Testing, P.O. Box 111, 32201 Loimaa (tel.: +358 2 76056251, fax: +358 2 76056222, e-mail: sami.markkanen@kttk.fi)

FRANCE

Christophe CHEVALIER, SNES, rue G. Morel, 49071 Beaucouze Cedex (tel.: +33 02 41 22 58 19, e-mail: christophe.chevalier@geves.fr)

Vincent GENSOLLEN, Groupe d'étude et de contrôle des variétés et des semences (GEVES), 711 rue J.F. Breton, 34090 Montpellier (tel.: +33 4 67 04 35 85, fax: +33 4 67 63 37 58, e-mail: vincent.gensollen@geves.fr)

Sylvain GRÉGOIRE, Groupe d'étude et de contrôle des variétés et des semences (GEVES), Ministère de l'agriculture (INRA), 78995 Guyancourt Cedex (tel.: +33 1 30 83 3600, fax: +33 1 30 57 0147, e-mail: sylvain.gregoire@geves.fr)

GERMANY

Uwe MEYER, Referatsleiter Informationstechnologie, Referat 111, Bundessortenamt, Postfach 61 04 40, 30604 Hanover (tel.: +49 511 9566 689, fax: +49 511 563 362, e-mail: uwe.meyer@bundessortenamt.de)

Beate RÜCKER (Frau), Referatsleiterin DUS-Prüfung, Bundessortenamt, Osterfelddamm 80, 30627 Hannover (tel.: +49 511 956 6639, fax: +49 511 5633 62, e-mail: beate.ruecker@bundessortenamt.de)

HUNGARY

Zoltán VERESS, National Institute for Agricultural Quality Control (OMMI), Keleti K. u. 24, 1024 Budapest II (tel.: +36 1 212 3127, fax: +36 1 212 5800, e-mail: veressz@ommi.hu)

JAPAN

Koichiro TANAKA, 828-402, 3-2-1 Azuma, Tsukuba City, Ibaragi 3050031 (tel.: +81 298 51 7665, fax: + 81 298 51 7665, e-mail: kouichi@ncss.go.jp)

KENYA

John M. NGENY, Biometrician, Plant Variety Protection Office, Kenya Plant Health Inspectorate Service (KEPHIS), P.O. Box 49592, Waiyaki Way, Nairobi (tel.: +254 02 444 0087, fax: +254 02 444 8940, e-mail: kephis@nbnet.co.ke)

MEXICO

Porfirio RAMÍREZ Vallejo, Breeder and Professor-Investigator, Colegio de Postgraduados (CP), Km. 36.5 Carretera México-Texcoco, 56230 Montecillo (tel.: +01 595 9520200 ext. 1590, fax: +52 55 5804 5962, e-mail: ramirez@colpos.mx)

NETHERLANDS

Jac THISSEN, Biometris, Plant Research International, Veldheimweg 40, 6871 CD Renkum (tel.: +31 317 476 936, fax: +31 317 418 094, e-mail: Jac.Thissen@wur.nl)

Kees VAN ETTEKOVEN, Responsible for PBR and Registration of Vegetable Varieties, Naktuinbouw, Sotaweg 22, Postbus 40, 2370 AA Roelofarendsveen (tel.: +31 71 332 6128, fax: +31 71 332 6363, e-mail: c.v.ettekoven@naktuinbouw.nl)

POLAND

Wieslaw PILARCZYK, Expert Statistician, Centralny Osrodek Badania Odmian Roslin Uprawnych (COBORU) Research Center for Cultivar Testing, 63-022 Slupia Wielka (tel.: +48 61 285 2341, Ext. 224, fax: +48 61 285 35 58, e-mail: wpilar@owl.au.poznan.pl)

ROMANIA

Eugenia NICOLAE (Mrs.), IT Specialist, State Office for Inventions and Trademarks, 5, Ion Ghica Sector. 3, Bucharest (tel.: +40 21 314 2102, fax: +40 21 1 312 3819, e-mail: jeni.nicolae@osim.ro)

Adriana PARASCHIV (Mrs.), Head, State Office for Inventions and Trademarks (OSIM), 5, Jon Ghica, Sector 3, 70018 Bucharest (tel.: +40 21 3155698, fax: +40 21 3123819, e-mail: adriana.paraschiv@osim.ro)

RUSSIAN FEDERATION

Sergej GERASSIMOV, State Commission of the Russian Federation for Selection Achievements Test and Protection, Orlicov per. 1/11, 107139 Moscow (tel.: +70 95 204 49 26, fax: +70 95 207 86 26, e-mail: desel@agro.aris.ru)

SLOVAKIA

Lubomir HORVATH, Central Institute for Control & Testing in Agriculture, Matúskova 21, 83316 Bratislava (tel.: +421 2 6446 2089, fax: + 421 2 6446 2089, e-mail: horvath@uksup.sk)

UNITED KINGDOM

Adrian M.I. ROBERTS, The University of Edinburgh, Biomathematics & Statistics Scotland (BioSS), James Clerk Maxwell Building, The King's Buildings, Edinburgh EH9 3EP (tel.: +44 131 650 4893, fax: +44 131 650 4901, e-mail: adrian@bioss.ac.uk)

Sally WATSON (Ms.), Biometrics Division, DARD, The Queen's University of Belfast, Newforge Lane, Belfast BT9 5PX (tel.: +44 2890 255 292, fax: +44 2890 255 008, e-mail: sally.watson@dardni.gov.uk)

URUGUAY

Mariela Ibarra Dutra (Mrs.), Instituto Nacional de Semillas (INASE), C. Bertolotti S/No y Ruta 8, km. 29, CC 7731, Pando-Canelones (tel.: +598 2 288 70 99, fax: +598 2 288 70 77, e-mail: inasemid@adinet.com.uy)

II. OBSERVER

INTERNATIONAL SEED FEDERATION (ISF)

Kurt HJORTSHOLM, Danish Association of Plant Breeders, Noerremarksvej 67, Sejet, 8700 Horsens (tel.: +45 75 68 21 77, fax: +45 75 68 21 04, e-mail: KHJ@sejet.dk)

III. OFFICER

Uwe MEYER, Chairman

IV. OFFICE OF UPOV

Peter BUTTON, Technical Director, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland (tel. +41-22-338 8672, fax +41-22-733 03 36, e-mail: peter.button@upov.int, Website: http://www.upov.int)

Raimundo LAVIGNOLLE, Senior Counsellor, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland (tel. +41-22-338 9565, fax +41-22-733 0336, e-mail: raimundo.lavignolle@upov.int

[Annex II follows]

ANNEX II

STANDARD PROBABILITY LEVELS USED FOR COYD AND COYU

The following four cases are those which, in general, represent the different situations which may arise where COYD and COYU are used in DUS testing

Case A. Test is conducted over 2 independent growing cycles and decisions made after 2 growing cycles (A growing cycle could be a year and is further on denoted by cycle)

Case B. Test is conducted over 3 independent growing cycles and decisions made after 3 cycles

Case C. Test is conducted over 3 independent growing cycles and decisions made after 3 cycles, but a variety may also be accepted after 2 cycles

Case D. Test is conducted over 3 independent growing cycles and decisions made after 3 cycles, but a variety may also be accepted or rejected after 2 cycles

The stages at which the decisions are made in Cases A to D are illustrated in figures 1 to 4 respectively. These also illustrate the various standard probability levels (p_{d2}, p_{nd2}, p_{d3}, p_{u2}, p_{nu2} and p_{u3}) which are needed to calculate the COYD and COYU criteria depending on the case. These are defined as follows:

Probability Level	**Used to decide whether a variety is :-**
p_{d2}	distinct in a characteristic after 2 cycles
p_{nd2}	non-distinct in a characteristic after 2 cycles
p_{d3}	distinct in a characteristic after 3 cycles
p_{u2}	uniform in a characteristic after 2 cycles
p_{nu2}	non-uniform in a characteristic after 2 cycles
p_{u3}	uniform in a characteristic after 3 cycles

In figures 1 to 4 the COYD criterion calculated using say the probability level p_{d2} is denoted by $LSDp_{d2}$ etc., and the COYU criterion calculated using say the probability level p_{u2} is denoted by UCp_{u2} etc. The term "diff" represents the difference between the means of a candidate variety and another variety for a characteristic, while "U" represents the mean adjusted log(SD+1) of a variety for a characteristic.

Table 1 summarises the various standard probability levels needed to calculate the COYD and COYU criteria in each of Cases A to D. For example, in Case B only two probability levels are needed (p_{d3} and p_{u3}), whereas Case C requires four (p_{d2}, p_{d3}, p_{u2} and p_{u3}).

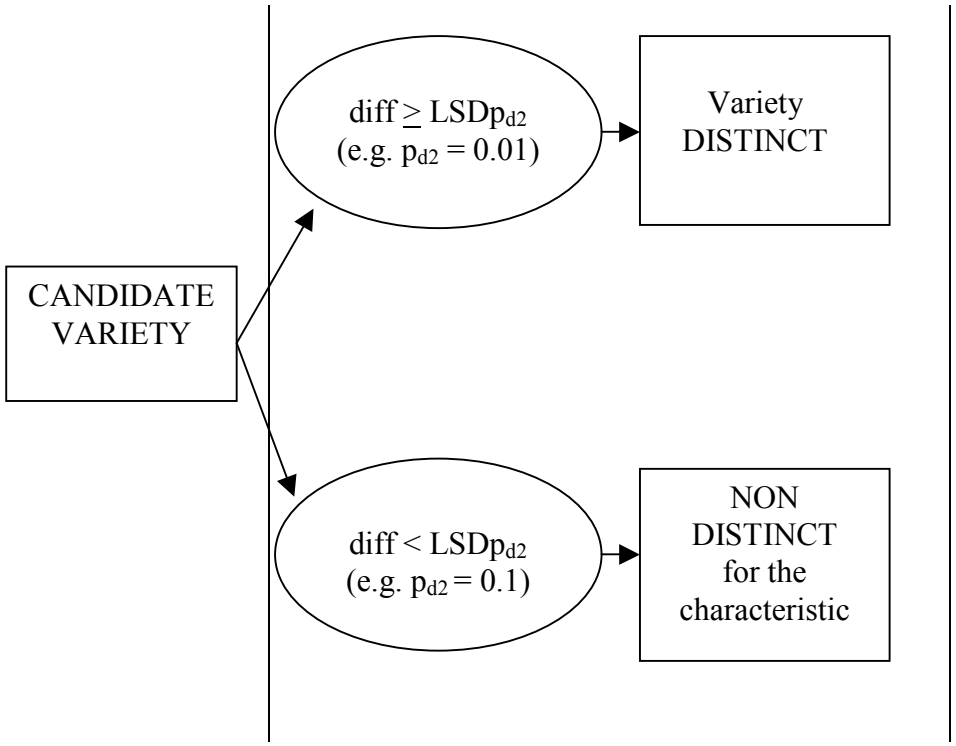
Table 1.	COYD			COYU		
CASE	p_{d2}	p_{nd2}	p_{d3}	p_{u2}	p_{nu2}	p_{u3}
A						
B						
C						
D						

Please complete Table 2 to list each of the species tested using COYD and COYU by your authority. For each species please indicate the type of test (Case A, B, C or D), and, depending on the type of test, the standard probability levels you use. The example of Herbage in United Kingdom is given. This is tested as per Case C.

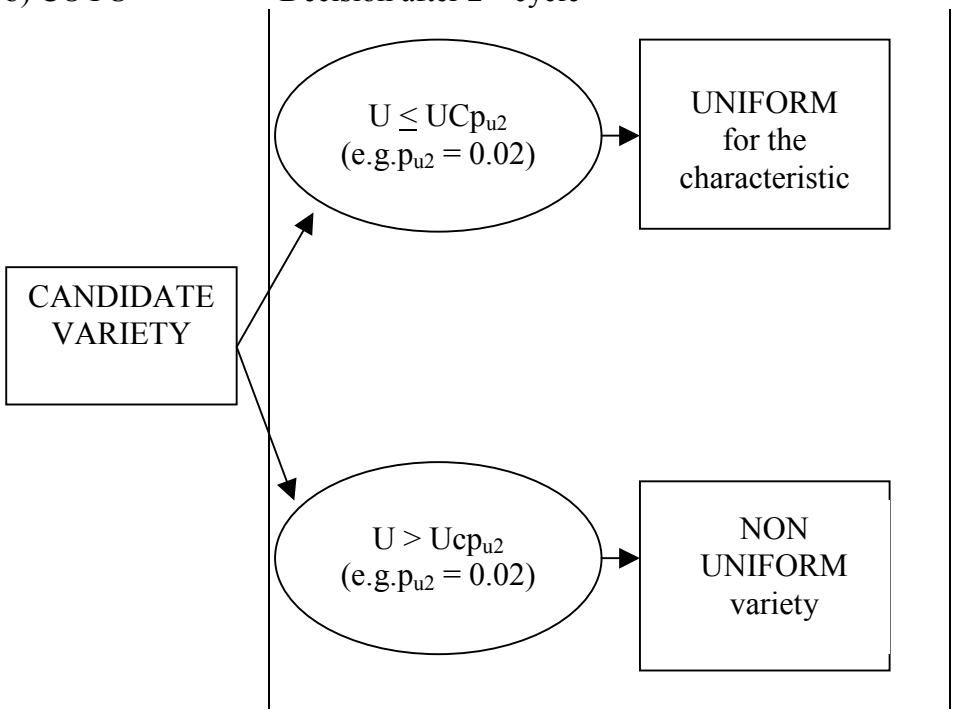
Table 2.		COYD probability levels			COYU probability levels		
Species	CASE	p_{d2}	p_{nd2}	p_{d3}	p_{u2}	p_{nu2}	p_{u3}
Herbage	*C*	*0.001*		*0.001*	*0.01*		*0.001*

Figure 1. COYD and COYU decisions and standard probability levels (p_i) in Case A

a) COYD Decision after 2nd cycle

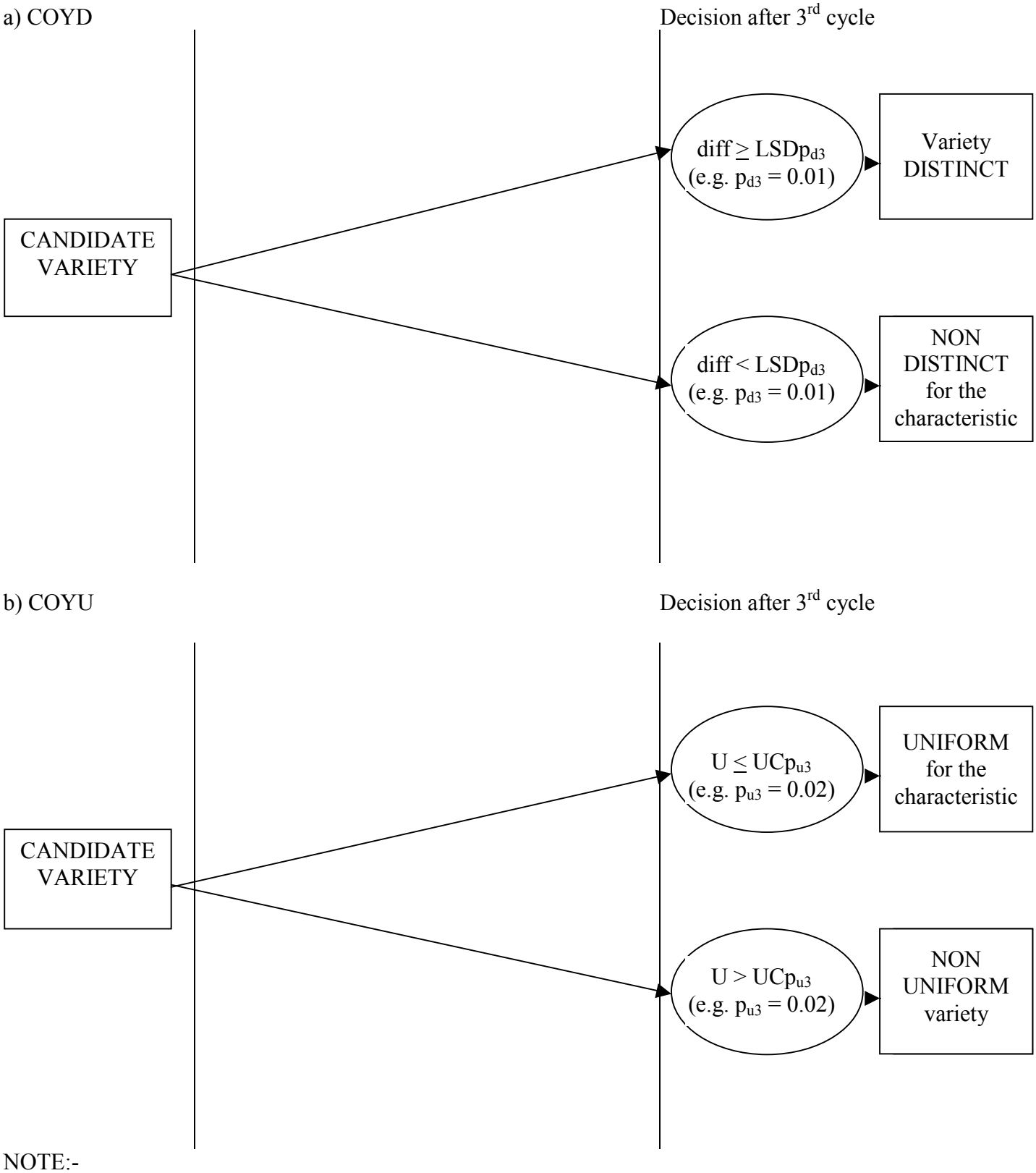


b) COYU Decision after 2nd cycle



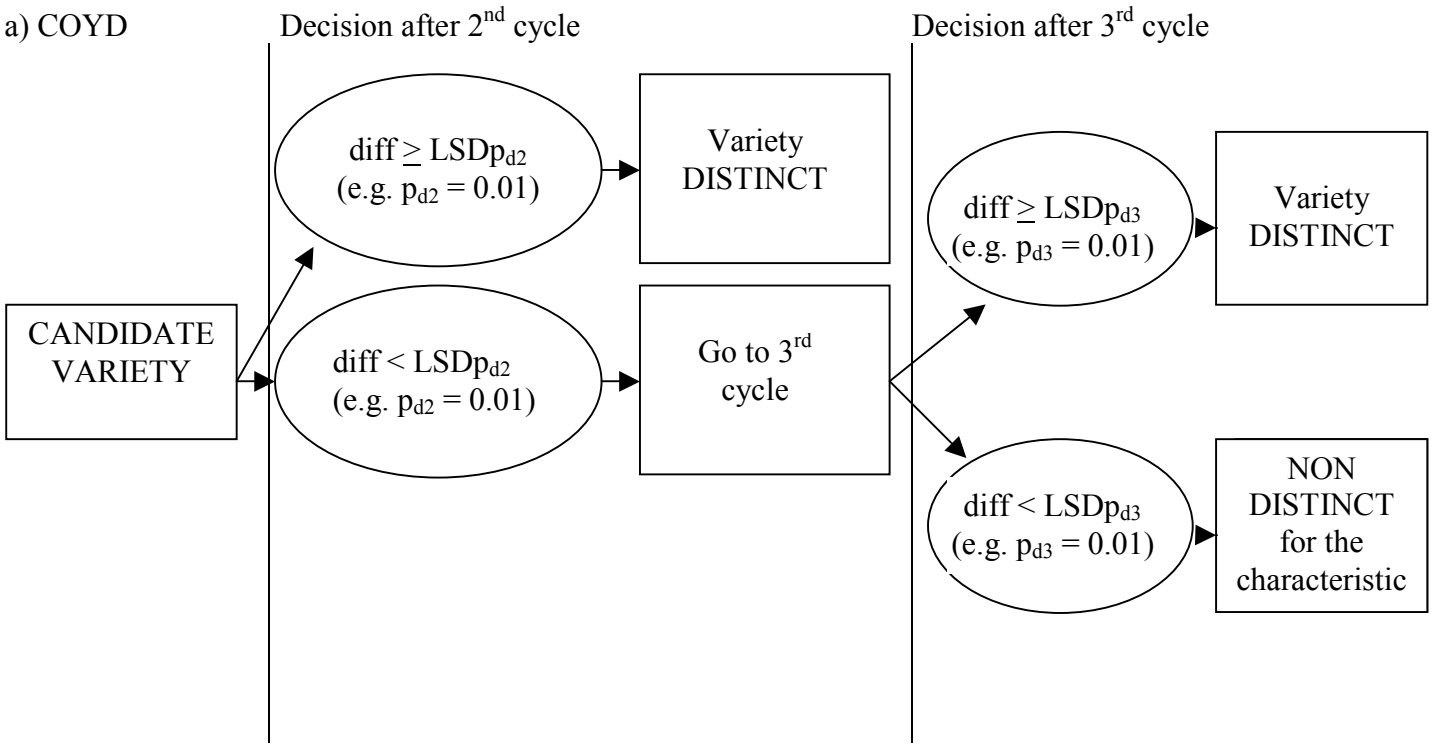
NOTE:-
"diff" is the difference between the means of the candidate variety and another variety for the characteristic
LSDp is the COYD criterion calculated at probability level p.
"U" is the mean adjusted log(SD+1) of the candidate variety for the characteristic.
UCp is the COYU criterion calculated at probability level p.

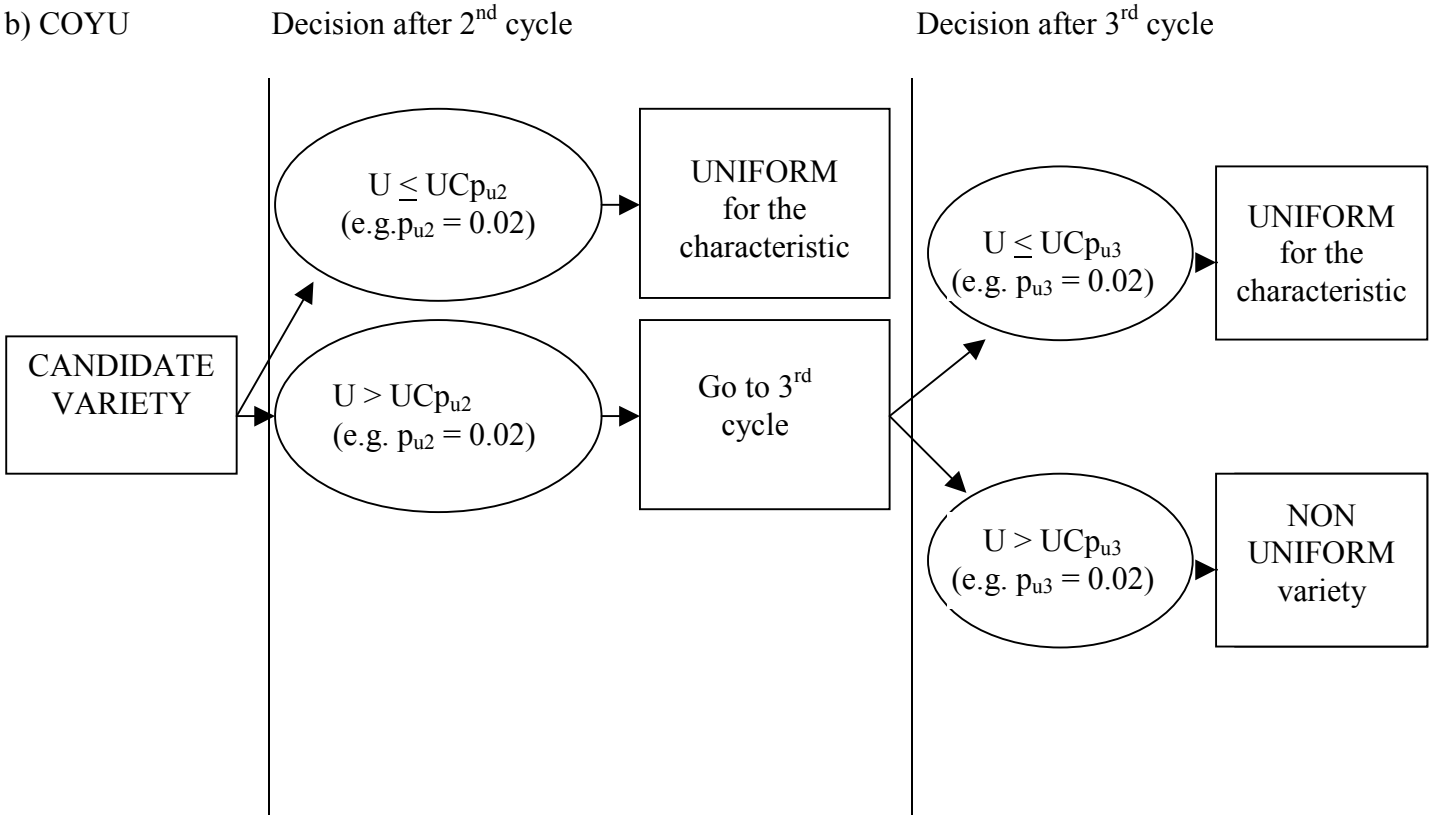
Figure 2. COYD and COYU decisions and standard probability levels (p_i) in Case B



NOTE:-
"diff" is the difference between the means of the candidate variety and another variety for the characteristic
LSDp is the COYD criterion calculated at probability level p.
"U" is the mean adjusted log(SD+1) of the candidate variety for the characteristic.
UCp is the COYU criterion calculated at probability level p.

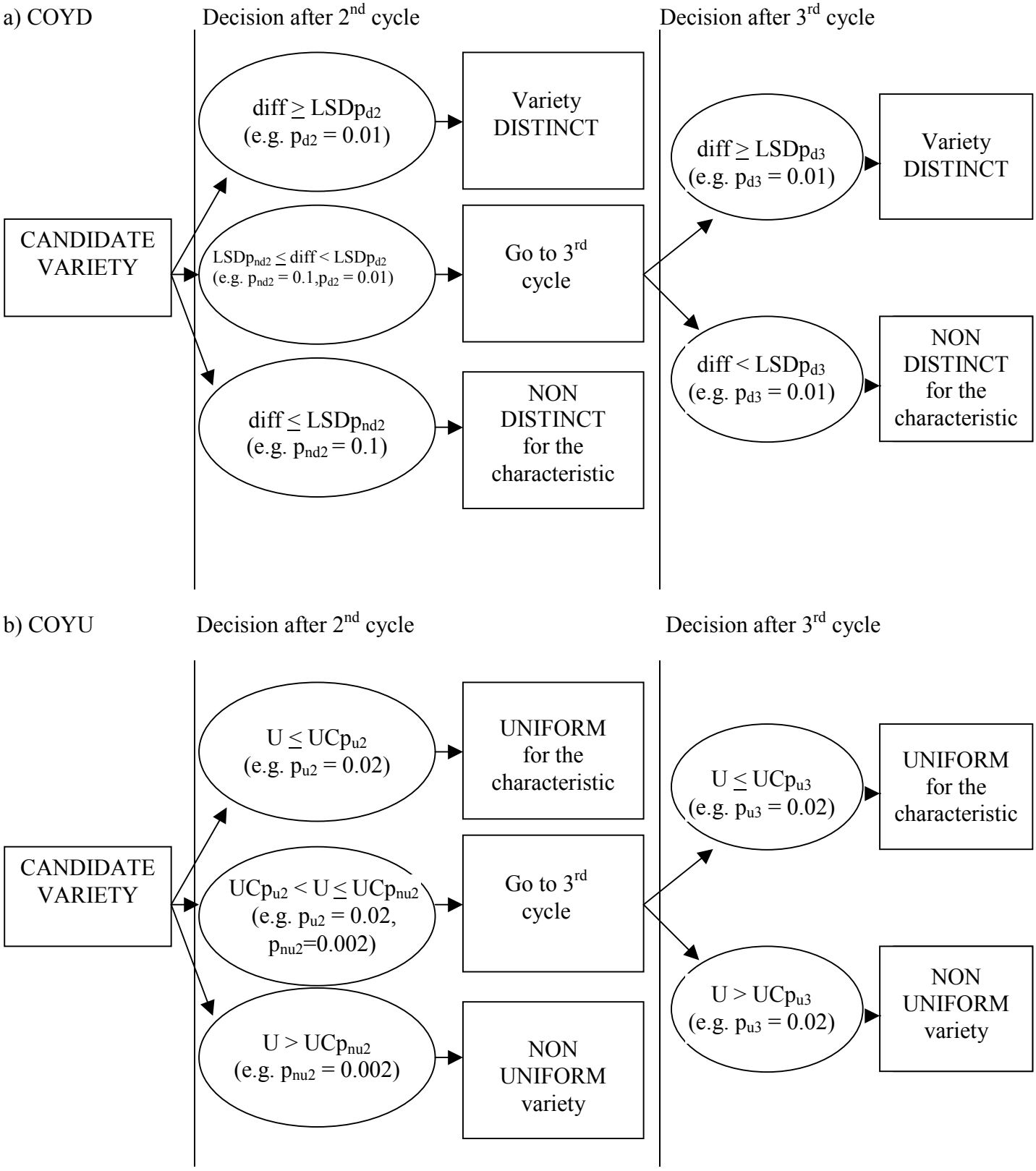
Figure 3. COYD and COYU decisions and standard probability levels (p_i) in Case C





NOTE:-
"diff" is the difference between the means of the candidate variety and another variety for the characteristic
LSDp is the COYD criterion calculated at probability level p.
"U" is the mean adjusted log(SD+1) of the candidate variety for the characteristic.
UCp is the COYU criterion calculated at probability level p.

Figure 4. COYD and COYU decisions and standard probability levels (p_i) in Case D



NOTE:-
"diff" is the difference between the means of the candidate variety and another variety for the characteristic
LSDp is the COYD criterion calculated at probability level p.
"U" is the mean adjusted log(SD+1) of the candidate variety for the characteristic.
UCp is the COYU criterion calculated at probability level p.

[End of Annex II and of document]