



TWC/23/21

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

**TECHNICAL WORKING PARTY
ON
AUTOMATION AND COMPUTER PROGRAMS**

**Twenty-Third Session
Ottawa, June 13 to 16, 2005**

REPORT

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 (TWC) held its twenty-third session in Ottawa, from June 13 to 16, 2005. The list of participants is reproduced in Annex I to this report.
2. The TWC was welcomed by Mr. Garry Koivisto, Executive Director of the Canadian Food Inspection Agency. A copy of the welcome speech is reproduced in Annex II to this document.
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 revised agenda as reproduced in document TWC/23/1 Rev., after agreeing to the work plan proposed by the Chairman and to the addition of the following items:

- (i) description of varieties in different UPOV countries (document TWC23/17);
- (ii) use of generalized linear models in DUS: logistic regression approach (document TWC/23/18);
- (iii) Chinese maize standard DNA fingerprint database (document TWC/23/19);
- (iv) TGP/12 Section 3: Examination of Combined Characteristics Using Image Analysis (document TWC/23/20);
- (v) adoption of the report

Short Reports on Developments in Plant Variety Protection

(a) Reports from members and observers

5. Mr. Mike Burvill, Examiner of the Plant Breeder's Rights Office made a presentation on the plant breeder's right system in Canada, a copy of which is reproduced in Annex III to this document.

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

7. The TWC heard a report on developments in the United Kingdom. In Scotland, image analysis was being used for pea and was being developed for parsnip. Methods for predicting COYD results after one year of testing were being developed in order to reduce the number of reference varieties which needed to be grown. In Northern Ireland, the use of a cyclic control system had enabled the number of reference varieties to be grown in any year to be reduced by around one third. The impact of the use of incomplete block design in DUS testing for grasses was being studied. The TWC heard that new data loggers, to replace the husky data loggers, were under evaluation. It was explained that a software interface between the data loggers and the personal computers was being developed and it was noted that the existence of firewalls within the computer systems was limiting the options for the interface.

8. An expert from Germany reported on a joint project between France, Germany and Spain on the databasing of maize inbred lines. The database would contain variety description and denomination information and the aim was to use that information to reduce the number of reference varieties required for DUS testing. The TWC heard that the UPOV codes would be introduced in the UPOV-ROM data. In conjunction with the United Kingdom, Germany was involved in a European Union twinning project with Bulgaria.

9. In France, the work on its quality assurance program continued. Investigations were being made on ways in which costs could be reduced whilst maintaining quality levels. In France, there was only one location for DUS testing of vegetable varieties, whilst there were, in general, two locations for agricultural crops. For example, one option being investigated was a reduction in the number of DUS testing locations for agricultural crops. At that time, a single location had been introduced for Glycine max and Vicia sativa. Analytical accounting was being used to identify the costs involved in all elements of work. A workshop on GAIA had been run in February 2005.

10. In Denmark, the means which were being considered in order to reduce testing costs

included, where possible, a reduction in the number of measurements and the number of plants observed. Another aspect under consideration was to merge the two types of plot – row plots and spaced plants – into a single trial type.

11. The expert from the Czech Republic reported that she had attended the workshop on GAIA, run by GEVES (France). The GAIA program was being used for maize and was being extended to some other species.

12. The TWC heard that, in Finland, three separate agencies dealing with food, agriculture and plant matters had been merged into a single agency, although that had not had an effect on the DUS test arrangements.

13. The experts from the Republic of Korea reported that the National Seed Management Office (NSMO) had developed an internet application on the NSMO homepage in 2004 and also explained that the SAS program connected to NSMO's database had been changed for different statistic programs. They also reported that the NSMO had installed many access points and antennae in their fields and greenhouses to collect and input data directly from the field into a database, through wireless internet network by using a PDA. With respect to developments in image analysis, the Republic of Korea had started two programs in 2003, one for color analysis, and the other for shape recognition. The program for shape recognition was used in 11 crops. It was planned to develop that program to incorporate also measurements of length, area, and angle by image analysis.

14. In Japan, a draft law to amend the Seeds and Seedlings Law, which would extend the coverage of protection to products made directly from harvested material of the protected variety, was under consideration by the Diet. A list of different kinds of products to be covered by the plant breeder's right would be established by a Government Order. The maximum duration of the breeder's right would be also prolonged from 25 years to 30 years for woody plants and from 20 years to 25 years for the other plants.

15. The expert from Kenya reported the development of a database for use within the organization and also reported on the initiation of the work for the development of the national test guidelines for tea.

16. Experts from the Ministry of Agriculture (MOA) of China reported that the list of species covered by the plant breeder's right system has been extended to a total of 62 species at that time. They also reported that the number of applications for plant breeder's right filed at the MOA has been increasing every year. In 2004, 735 applications had been filed, representing an increase of 30% compared to 2003. At the end of 2004, the total number of applications filed was 2046 and 503 plant breeder's rights had been granted. They reported that during 2004 the Ministry of Agriculture, the State Forestry Administration and the State Intellectual Property Office, in cooperation with the Office of the Union, had organized a "Seminar on the Advantages of the 1991 Act of the UPOV Convention" and a "Workshop on Data Handling". The TWC was informed about the development of a database for molecular markers for varieties of maize and heard that a presentation would be made during the TWC session.

17. The expert from Hungary reported that the incorporation of the GAIA program into their computer system has started, with the intention of giving access to several experts.

18. The expert from Poland reported on the incorporation of new computer equipment and

explained that the use of paper forms had been almost completely replaced by electronic forms.

19. The expert from the Netherlands reported on the enactment of a new legislation providing for the merging of the four bodies responsible for plant breeder's right into a single one. He also reported a process of rating the activities with the aim of covering the costs by the fees was taking place; that discussions were taking place to consider resources to continue the involvement of Dutch experts in UPOV activities. Finally, the expert confirmed the development of image analysis for the examination of color characteristics and characteristics of cotyledons of best varieties.

(b) Reports on developments within UPOV

20. The TWC received an oral report from the Office of the Union (the Office) on the latest developments within UPOV, a copy of which is attached as Annex IV to this document.

UPOV Information Databases

21. The TWC took note of the information provided in document TWC/23/4, presented by the Office. As a part of its presentation, the Office provided a demonstration of the Microsoft Access prototype of the GENIE database.

22. The TWC was informed that the spreadsheets containing the UPOV codes and the related name information necessary for identifying the appropriate UPOV codes for inclusion in the UPOV-ROM Plant Variety Database, had been posted on the first restricted area of the UPOV website. It was explained that a first update of that information was expected around August 2005. The program of updating had not yet been fixed, but it was expected that updating would be made either monthly or every two months. Where new codes were required in between updates on the website, the Office would promptly issue the new codes directly to the requesters and would incorporate the information in the spreadsheets on the next update on the website.

Project to Consider the Publication of Variety Descriptions

23. The TWC considered document TWC/23/6, presented by the Office, and document TWC/23/17, introduced by Mr. Sylvain Grégoire (France).

24. The TWC received a brief report on discussions in the Technical Working Party for Vegetables (TWV). It heard, in particular, that the TWV had supported the availability of variety descriptions, whilst noting the limitations of publishing full variety descriptions, which meant that it would be difficult to publish variety descriptions at the UPOV level for the foreseeable future. The TWV had agreed that, if a project went ahead, it would be practical to concentrate any initiatives on grouping characteristics in the first instance. The TWV had expressed its strong support for ring-tests in conjunction with a trial-based meeting as a means for developing a clear interpretation of Test Guidelines and for preparing for revisions to Test Guidelines. It had also agreed that the Test Guidelines should explain the use of the 3, 5, 7 notes in the 1-9 scale for quantitative characteristics and proposed that TGP/7 be revised accordingly.

25. An expert from France briefly reported on the joint project between France, Germany and Spain on the databasing of maize inbred lines. That project had demonstrated that the scales used in different countries could shift according to the range of varieties in their variety collections. The project, which was accompanied by joint trial visits by DUS examiners from the participating countries, had been very useful in identifying variations in the interpretation of characteristics. It had also been possible to use the results to identify characteristics with more consistent descriptions for a given variety across the countries involved. The results identified some such characteristics which had been expected to produce consistent descriptions. However, some characteristics which were expected to behave in a consistent way were not as consistent as expected and some others, which were not expected to behave in a consistent way, had produced relatively consistent results. The expert noted that there was a need to adopt a step-by-step approach to achieve closer correspondence in variety descriptions and the approach needed to be done on a characteristic-by-characteristic and country-by-country basis.

TGP Documents

26. The TWC noted the information on the development of TGP documents provided in documents TWC/23/3 and TC/41/5 Add.

(a) *TGP Documents to which the Technical Committee has given highest priority:*

TGP/4/1 Draft 4 Constitution and Management of Variety Collections

27. The TWC noted document TGP/4/1 Draft 4 and received an oral report of the comments made by the TWV.

TGP/9/1 Draft 4 Examining Distinctness

28. The TWC discussed document TGP/9/1 Draft 4 and received an oral report of the comments made by the TWV. The TWC agreed to propose the following:

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|-----------------------------|---|
| General | to include a glossary of abbreviations used in the document, e.g. QL, PQ, QN, VS, VG, MS, MG. |
| Schematic overview (page 6) | to amend “multivariate analysis” to read “phenotypic distance”. |
| 2.2.3.2.2 | table 5.1: note “9” for Candidate variety B to read note “2”. |
| 2.2.3.2.5 | to read “It may also be possible to use further characteristics for grouping in the second growing cycle, because the grouping will be based on observations obtained from the same growing trial, i.e. the first growing trial.” |
| 2.3 | title to read “Phenotypic distance” |
| 2.3.1.1,
2.3.1.2 | to delete reference to multivariate analysis and revise the text accordingly |

- 2.3.2.1.1 the TWC considered whether a more appropriate word than “calibrated” might be found, but concluded that the word “calibrated” could be accepted.
- It was agreed that paragraphs 2.3.2.1.2 to 2.3.2.1.10 should be preceded by a brief explanation that those subsections would explain the elements within the GAIA method. The text would be provided by the expert from France.
- 2.3.2.2 to read “Other methods”
- 3.2.2 to read “When varieties are grown in successive years...”
- 3.2.3 second sentence to read “In such cases, the independence of growing cycles is considered to be satisfied”.
- 3.5.1.3, 3.5.1.4 to use an example which does not use color groups, in order to avoid confusion between color groups and groups within the trial.
- 4.1.3 to add “counts” as an additional example of a measurement.
- 4.1.8 to delete the sentence “Normally the same data can be used for distinctness and for the variety description.”
- 4.2.1.1.(b) to read “For the assessment of distinctness, visual observations require sufficient variation between varieties, and a low level of variation within varieties. Measurements provide a higher level of information. The features of propagation determine the level of genotypic variation within varieties. Vegetatively propagated, truly self-pollinated and mainly self-pollinated varieties normally have relatively little variation within varieties. Within cross-pollinated and synthetic varieties, variation is normally greater than for self-pollinated and vegetatively propagated varieties, especially in quantitative and some pseudo-qualitative characteristics.
- 4.3.1 to consider deleting all references to the assessment of uniformity.
Barley (self-pollinated): to amend from “VS” to “VG”.
- 4.3.2.2 to read “In the case of barley, distinctness for the characteristic “Plant: length” is usually based on a single record for each variety. The individual measurements within a plot determine the mean plot value and those measurements are not considered for further evaluations. [Uniformity in this example is assessed on the basis of off-types, which are observed visually].”
- 5.3.3.2.1 final sentence to read “The tests in each year are based on Student’s two-tailed t-test of the variety means with standard errors estimated using the plot residual mean square from the analysis of the variety x replicate plot means.”
- 5.6.1 VG/MG row: to check if the term “repetition” is appropriate
- 6.4 subparagraph numbering (6.3.1 etc.) to be corrected.
- 6.3.4 (6.4.4) to read “*Randomized variety plots*: duplicate samples of the same variety receive individual codes and are randomly distributed in the trial.”

TGP/10/1 Draft 1 Examining Uniformity

29. The TWC discussed document TGP/10/1 Draft 1 and received an oral report of the comments made by the TWV. The TWC agreed to propose the following:

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|-----------------------|--|
| General | to review the content of the document with a view to providing a similar level of information to that provided in TGP/9/1 Draft 1. |
| 1.1 | to provide information on pseudo-qualitative characteristics |
| 1.1.3 | to be further elaborated to avoid possible confusion between variation in the expression of a characteristic for a variety and variation in expression for a characteristic across varieties |
| 1.2.2 (a) | to clarify what the experience relates to |
| 1.2.2 (b),
1.2.3 | to be deleted (see comments on document TWC/23/11) |
| 1.2.5 | remark to be deleted |
| 1.3.2 | to read “[...] COYU is a suitable statistical method [...]” |
| 1.3.3 | “, long term LSD” to be deleted |
| 1.4.1 | final sentence to be deleted |
| 1.4.2 | final two sentences to be deleted |
| 1.4.3 | “(section 10.2.2)” to be deleted |
| 2.1 | detailed methodology and Appendix A to be moved to TGP/8 |
| 2.1.3.2 | fifth bullet point: “s” at the end of “reference” to be deleted |
| 3 General | detailed statistical methodology to be moved to TGP/8 |
| 3.1.1.2 | to be deleted |
| 3.1.1.3 | to be deleted |
| 3.1.3.2 | final sentence to be deleted |
| 3.1.5.16 | to read “Schemes e and f both result [...]” |
| 3.1.5.17,
3.1.5.18 | to be further clarified |
| 3.1.11.1 | to replace “figures” with “values” |
| 3.1.11.2 | final sentence to read “Thus, the largest sample sizes in the range of sample sizes with a given maximum number of off-types should be used.” |
| 3.2.13
(3.1.13) | to be moved to TGP/8 and missing graphs in Table and figures 2 to 4 to be reinstated. |

*(b) Other TGP documents:**TGP/8/1 Draft 1 Use of Statistical Procedures in DUS Testing Use of Statistical Procedures in DUS Testing*

30. The TWC considered document TGP/8/1 Draft 1 and agreed the following changes:

General The TWC agreed with the comments made by the TWV at its thirty-ninth session held in Nitra, Slovakia, from June 6 to 10, 2005, that the structure of TGP/8 should be modified to follow the schematic overview of TGP/3, TGP/4 and TGP/9 as presented in TGP/9/1 Draft 4, showing where statistical methods could be applied as well as explaining the reasons for their use at the beginning of each section. It was agreed that, as proposed by the TWV, it would be useful to indicate in the relevant Test Guidelines if statistical analysis was appropriate.

Section 1: Introduction

General The TWC agreed that, in general, the wording should be modified to present the content as recommendation or proposal rather than making statements. It further agreed the following changes

5 to read “In those cases where specific ordering is required to observe a characteristic (e.g. comparison of color or architecture) one should be aware that this should be done in one replication, and one should be careful with conclusions on other measurements. This brings our focus to another case where some grouping is required from the statistical point of view because otherwise competition would influence the observation, e.g. early varieties would hamper the development of late ones.”

6 to delete “all” from the first sentence.

8 fourth sentence to read “A candidate variety can thus be compared with others using a criterion that includes this extra source of variation (variety-by-year interaction in combined-over-year ‘COY’ analysis).”

9 to delete the second and third sentences. The second example, using bulk samples to be replaced by a more typical example.

Second paragraph: to delete “but also understood by a novice”

Section 2: Experimental design practices

2.1.4 To clarify the second sentence.

To verify the definition of grouping characteristics according to the General Introduction.

Seventh sentence to read: “In this way similar varieties are compared with each other in the trial.”

2.2.2 wording in table:

row 2 / column 2 to read “two varieties non distinct for the characteristic”

row 2 / column 3 to read “variety is uniform for the characteristic”

2.2.3 Second sentence to read “They are called type I error and type II error.”

2.3 Title of section 2.3 to read “Completely randomized design and randomized complete block design”

2.3 To clarify that, for reasons of space, the diagrams showing the allocation of varieties of paragraphs 2.3.1, 2.3.2 and 2.3.3 four varieties are presented in two rows.

- 2.3.6 To read “Management may [...] For some crops it may be necessary also to have guard plants (areas) in order to avoid large competition effects. However, overly large plots is a waste of land and will often increase the random variability between plots. [...]”
- 2.4.1 To read “If the number of varieties becomes large (>20-40), it may be impossible to construct complete blocks that would be sufficiently homogeneous”
- 2.4.3 To delete the last sentence
- 2.5.1 second sentence to read “A similar theory to that used in split-plot designs may be used for setting up a design where the comparisons between certain pairs of varieties are to be optimized.”

Section 3: Types of characteristics and their scale levels

- 3.4.2.1 To use an example of a non-quantitative characteristic.
- Table 2 To modify the table for consistency with the following paragraphs.
- 3.6.2 final sentence before “Remark” to be reviewed
- Table 3 To check the marks inside the boxes
- Table 4 To delete the references “R”; “NR-P” and “NR-D”;
To refer to “2 by 1%” instead of “2 out of 3 method”
To delete threshold model.
- Table 5 To delete the references “R”; “NR-P” and “NR-D”;

Section 4: Validation of data and data assumptions

- 4.3.4 To make a reference to specific part of Section 2
- 4.3.6 To make a reference to specific part of Section 5

Section 5: Statistical methods for DUS examination

- General To incorporate COYU as for COYD
- General To incorporate section “5.2 Other methods”.
- 5.1.3.2.1 to read “Dagnelie” (in lower case)
- 5.1.3.2.4 Last sentence to read “Otherwise it does not have a significant effect at the p% level.

Section 6: Examining DUS in bulk samples

- 6.2.6 and To be presented as examples instead of in the main text of the document.
- 6.3.4

Section 7: The GAIA methodology

General The TWC noted that the GAIA software had been updated by the experts from France and agreed that the GAIA software could be made available through a link on the UPOV website.

To delete the references to multivariate analysis and to refer to phenotypic distance.

There is a need to harmonise the wording of section 7 with the wording in section 3 (see on page 59: 7.4.1 ... qualitative, quantitative and electrophoretic characteristics and on following pages).

Experts from France supported by the chairman have to harmonise the wording.

Appendix A 4

General To incorporate the missing sections from the previous version and to recreate the original structure.

31. The TWC agreed that Mrs. Sally Watson, in conjunction with the drafters of the sections of the document and the Office, would prepare a new draft of the document for the next session of the TWC, incorporating the necessary changes to the structure.

TGP/13 Guidance for New Types and Species (document TGP/13 draft 3)

32. The TWC noted that in the program for the development of TGP documents agreed by the Technical Committee at its forty-first session from April 4 to 6, 2005, it was not proposed for TGP/13 to be considered by the TWC and the document was not discussed.

TGP/14.3 Draft 2 Statistical Terms

33. The TWC discussed document TGP/14.3 Draft 2, which was introduced by Mr. Paul Keizer (Netherlands). The TWC agreed as follows:

General	The TWC noted that the document TGP/14.3 could not be finalized before the adoption of TGP/8, TGP/9 and TGP/10 and agreed that the document should not be advanced too quickly in order to avoid a need for constant revision according to changes in those other documents.
General	all missing definitions to be provided in the next draft
Blocking	explanation to be abbreviated
Confounding	“variables” to be replaced by “factors”. The same change to be considered where the term “variables” is used in other definitions
COYD	first sentence to read “Abbreviation of Combined-Over-Years Distinctness criterion.”

COYU	first sentence to read “Abbreviation of Combined-Over-Years Uniformity criterion.”
Least Significant Difference	formula to be amended
Off type	to be deleted
Randomization	explanation to be abbreviated
Relative Frequency Distribution	to refer to Frequency Distribution
Scale of Measurement	to add “Ratio Scale” after Interval Scale.
Source of Variation	to be deleted
Stochastic Variable	to check if still mentioned in the TGP documents and to be deleted if not
Student’s t-Distribution	to be added
t-Distribution	to be added
Type of Scale	to be deleted

Development of COY

Standard probability levels for COY

34. The TWC discussed document TWV/23/10. It was noted that the document represented a revised version of the questionnaire considered at the previous session. The Chairman noted that there were some differences in the levels of probabilities used and considered that that could cause some problems, in particular in the case for countries which exchange DUS reports. An expert from United Kingdom noted that the probability levels in the United Kingdom had been chosen with the aim of obtaining similar results to those obtained with the method used previously.

35. The TWC agreed that the results of the questionnaire should be submitted to other TWPs for consideration and proposed that, in the meantime, the TWC participants should consult with their crop experts concerning the differences in probability levels. It also agreed that, after two or three years, a new document should be prepared.

Possibility of reducing the number of plants for quantitative characteristics for reference varieties

36. Mr. Kristian Kristensen (Denmark) introduced document TWC/23/12. An expert from France noted that it was the first time that a document on that subject had been presented in the TWC. He considered that, on the one hand, it was necessary to explore possibilities to reduce the number of plants to be able to reduce the costs of the trial, but on the other hand, reduction in the number of plants would have an impact on the components of the variance. It was agreed that it would be useful, as a next stage, to consider the different decisions which would result from such changes.

Influence of the number of plants per plot on uniformity and distinctness for quantitative characteristics in rapeseed.

37. Mr. Uwe Meyer (Germany) introduced document TWC/23/15. An expert from France considered that a requirement to observe different number of plants for different characteristics could be impractical. The expert from Poland noted that some characteristics were more important for than others for DUS purposes and suggested that it could be possible to have, for example, two groups of characteristics with different numbers of plants to be observed.

38. The TWC agreed that a new version of document TWC/23/12 and TWC/23/15 (together), which should include information about the impact on the decisions on distinctness and uniformity, should be prepared for the following session of the TWC.

A proposal for an adjustment to the COYD method when varieties are grouped within the DUS trial

39. Mr. Adrian Roberts (United Kingdom) introduced document TWC/23/8. The expert from Poland asked about the reasons for the negative values in table 2 and, taking into account that the COY method assumed that all varieties have the same variation, he proposed to use the largest group residual sum of squares for the calculations.

40. The TWC agreed that a new document be prepared for the following session.

A comparison of COYU and a method based on Bennett's Test for coefficients of variation (document TWC/23/9)

41. The TWC considered document TWC/23/9, introduced by Mr. Wieslaw Pilarczyk (Poland). It was clarified that the reference to "COYU" in the document should be replaced by reference to "UNIF".

42. An expert from Denmark noted that it would not be possible to use the approach outlined in the document for some characteristics, e.g. those such as heading date, which did not have a logical zero point.

43. The expert from Poland explained that an important advantage of the Bennett's method was its transparency, because the data was not subject to a series of transformations. An expert from Denmark observed that he was very satisfied with the COYU method, particularly now that the method was clearly explained in TGP/9. He reported that, as a crop expert, he would view the actual data directly in cases where there were problems.

44. The Chairman noted that a key difference in the Bennett's method, as compared to COYU, was the use of coefficients of variation instead of standard deviations. He noted that in cases where, for example, two characteristics with different means needed to be compared it would be advantageous to use the coefficients of variation. However, in the UPOV situation, the requirement was to compare varieties.

45. It was agreed that it was important to consider possible new methods in the TWC and it was agreed that a new document should be prepared for consideration by the TWC at its twenty-fourth session. In that new document it was proposed that the method should be applied over years to allow a comparison with COYU. It was also agreed that it would be

useful to avoid restricting the exercise to real data and to look at data sets which would allow an examination of how the method diverged from COYU.

Examination of statistical procedures for checking uniformity in variety trials

46. The Chairman introduced document TWC/23/13. Experts from United Kingdom considered that the document presented a good analysis of potential weaknesses of using moving average. They recalled that when COYU had been introduced the moving average method was easy to accept and incorporate and noted that there were other methods to smooth data, some of which, for example Cubic splines, also allowed the calculation of the degree of smoothness. They further noted that the third paragraph on page 15 should be reworded because the COY approach did not make assumptions. An expert from Denmark noted that on page 15, in the second sentence of the fifth paragraph the term “below” should be replaced by “equal to” and that the following sentences should be reworded accordingly. The expert from the Netherlands was in favor of exploring the use of more simple techniques, such as that proposed in document TWC/23/9, and to use mixed models only when there was no other option.

47. The TWC agreed that a revised version of the document should be prepared for the following session.

Use of generalized linear models in DUS: logistic regression approach

48. Mr. John Ngeny (Kenya) made a presentation based on document TWC/23/18. One expert from United Kingdom suggested to study the effect of variety-by-year interaction. The expert from Denmark noted that the results already suggested the existence of some variety-by-year interaction. The Chairman proposed to include an example of a quantitative characteristic in future versions of the document to allow comparison with COYD.

49. The TWC agreed that a new document should be prepared for the following session which should consider the variety-by-year interaction and quantitative characteristics.

Population standards used for assessing uniformity of off-types

50. The TWC considered document TWC/23/14, introduced by the Chairman. He explained that the purpose of the document was to present a draft questionnaire for consideration by the TWC prior to its circulation. An expert from France noted that the proposed table was not suitable for all the proposed cases and considered that it would be advisable to develop separate tables and examples to cover the different general cases. Experts from the United Kingdom and Denmark considered that it would be better to present the columns for probability standard and for acceptance probability in the form of (%). An expert from United Kingdom noted that, in general, the number of off-types is determined taking into account all characteristics of the plant and wondered if it was appropriate to refer to individual characteristics in the first column of the table. It was agreed to include the species in the first column and to refer to characteristics only when there was a particular case.

51. The TWC agreed to circulate a revised draft of the questionnaire to the TWC by September 1, 2005, with a deadline for comments of November 1, 2005. The questionnaire

would then be issued at the beginning of January, 2006. The TWC also agreed that, in conjunction with the presentation of the results in document TWC/23/10, the TWP members should be informed that the TWC was working on a questionnaire on the population standards used for assessing uniformity of off-types.

Criteria for determining off-type plants

52. The TWC received a report from the Office on the background and contents of document TWO/37/7-TWF/35/7. It was agreed that a further report should be made at the next session of the TWC.

53. An expert from France noted that the difficulty to decide whether a plant is an off-type or not could be looked at in the light of robustness for false positive and false negative results. In that respect he reported that ISTA provided an interactive tool on its website (<http://www.seedtest.org/en/content---1--1143.html>) to assess the impact on alpha and beta values. He suggested that that consideration might be included in TGP/10.

Calculation of relative tolerances in the number of off-types 2005

54. The Chairman introduced document TWC/23/11. Several experts questioned the need to use relative population standards and considered that it would be necessary to identify the components of the variance, in particular the environmental-by-variety interaction, to clarify the situation, whilst recognizing the need for more data for that purpose. The Chairman noted that fodder radish was the only crop in which it was known that relative tolerances in the number of off-types was applied.

55. The TWC considered that it was necessary to study more cases to decide on a recommendation and that, whenever possible, fixed population standard values to calculate the acceptable number of off-types should be used.

Molecular Techniques

(a) Report on developments

56. The TWC received an oral report on developments within UPOV concerning molecular techniques, on the basis of document TWC/23/2.

(b) Databases for data produced by molecular methods

(i) Cooperation in the development of databases

57. The TWC received a presentation by Mr. Sylvain Grégoire (France), on the basis of document TWC/23/7-BMT/9/3.

58. The Chairman noted that it, in his experience, it was most appropriate to identify the core data to be contained in the databases of all cooperating partners and to exchange only that core data (the exchangeable database), rather than seeking to develop a single, complete database for use by all partners. It was important to accept that different partners would have different ways of using the data and it would not be practical to seek to design a single database to cover all possibilities, not least because the maintenance of such a database would be very onerous. An expert from Denmark explained that he did not have the capacity to

develop a new database and would also welcome the development of a complete database package for those in need of such a package.

59. It was noted that databases at the national or laboratory level could contain many datasets for the same variety and it would be important for cooperating partners to agree on the requirements for the representative variety description for each contributor to be included in the exchangeable database. It was confirmed that the exchangeable database would always need to contain information on the source of the variety data.

60. In response to a question from an expert from the United Kingdom, it was clarified that cross-pollinated varieties could be handled in the database because it was possible to describe the allelic frequencies within a locus.

61. The TWC agreed that the six core logic objects identified in Figure 1 of document TWC/23/7-BMT/9/3 represented the key components of an exchangeable database and should be the basis from which to work.

62. It was agreed that codification of the logical objects was of crucial importance for the development of an exchangeable database. In that respect, it was recalled that the species codification was addressed by the UPOV code and, apart from some exceptions such as candidate varieties, the variety denomination provided codification for varieties. It was also thought that the identification of the marker technique (e.g. SSR, SNPs etc) was straightforward. However, the codification of the loci and the alleles was an area which would require further development by the relevant experts.

(ii) Chinese Maize Standard DNA Fingerprint Database

63. The TWC received a presentation by Mr. Jiuran Zhao (China), on the basis of document TWC/23/19.

64. It was noted that in document TWC/23/19, the reference to 10 pairs of extended core primers in paragraph 4 of the section on development in China should read 20 pairs of extended core primers.

65. Mr. Gerhard Deneken (Denmark), Chairman of the BMT, welcomed the presentation of the document and encouraged the experts from China to participate in the work of the *Ad Hoc* Crop Subgroup on Molecular Techniques (Crop Subgroup) for Maize.

66. It was clarified that the work on molecular data in relation to distinctness was in the form of research and was not being used in the examination of DUS at that time. However, molecular data was being used in relation to variety identification.

(iii) Guidelines for Molecular Marker Selection and Database Construction
“BMT Guidelines”

67. The TWC considered document BMT Guidelines (proj.3), which was introduced by the Office and by Mr. Gerhard Deneken, Chairman of the BMT.

68. In relation to section 5 “Databases” of document BMT Guidelines (proj.3), it was recalled that the TWC had earlier in its session agreed that the six core logic objects identified in Figure 1 of document TWC/23/7-BMT/9/3 represented the key components of an exchangeable database and should be the basis from which to work. It was agreed that the

TWC and, in particular, Mr. Sylvain Grégoire (France) should be invited to contribute to the drafting of section 5 on that basis. It was also recalled that it had earlier been agreed that codification of the logical objects was of crucial importance for the development of an exchangeable database. The TWC agreed that the BMT should be invited to consider that matter in relation to the development of the BMT Guidelines.

69. Mr. Grégoire suggested that it would be useful to move forward with a practical exercise, involving a small number of crops, in the development of an exchangeable database. He noted that from an IT perspective such an exercise would be straightforward, but that it would require all participating partners to identify the markers to be used and to clarify and agree on the status of the information to be included in the database and the accessibility of that data, e.g. to contributing partners or to all interested experts from members of the Union.

70. The TWC agreed that it would be useful to clarify that the development of a database of molecular information should be considered separately from any computations involving the data. The processing capacities which were possible within databases were rather limited and it would, in general, be necessary to export the data in order to perform computations.

Variety Denomination Classes

71. The TWC noted document TWC/23/5 and received an oral report on developments at the TWV concerning variety denomination classes. It agreed that it would be useful to receive report on developments at the next session and, in particular, to be informed of any changes to the existing classes. The Office explained that it was intended to have a single update and not a continuing series of changes.

TGP/12 Section 3: Examination of Combined Characteristics using Image Analysis

72. The TWC considered document TWC/23/20.

73. It was agreed that paragraphs 10 and 11 should be combined and it should be explained that storage of the original image may be necessary, with compressing used where it was necessary to transfer information.

74. The TWC concluded that the possible development of a document for TGP/12 Section 3 should be considered at the next session, but that a new document should not be prepared.

Database to Search for TWC Documents

75. The TWC received a presentation from Mr. Thomas Drobek (Germany) based on document TWC/23/16 and received a demonstration of a prototype Access database.

76. It was clarified that the database would, in the first instance, contain the TWC documents plus draft TGP documents and other Technical Working Party documents which were of relevance for the TWC.

77. The Office explained that the UPOV website would only support Oracle databases. It was agreed that the database should only be made available in the form of a CD-ROM and should only be available to members of the TWC.

78. It was agreed that Germany would be responsible for the maintenance of the database, but support from other members of the TWC was encouraged. The Office offered to provide Word and pdf versions of TWC documents to assist in the building of the database.

Database of Images for Ornamental Species

79. The TWC received a presentation from Mr. Paul Keizer (Netherlands) on a project for the development of a database for images of ornamental varieties.

Future Program, Date and Place of the Next Session

80. At the invitation of Kenya the TWC agreed to hold its twenty-fourth session in Nairobi, with a provisional date set for June 19 to 22, 2006. During the twenty-fourth 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) Developments in UPOV concerning the use of molecular techniques in DUS testing (document to be prepared by the Office of the Union)
 - (b) Guidelines for Molecular Marker Selection and Database Construction "BMT Guidelines" (document to be prepared by the Office of the Union)
 - (c) Creation of databases for molecular markers (document to be prepared by experts from France)
5. UPOV Information Databases (document to be prepared by the Office of the Union)
6. Variety denomination classes (document to be prepared by the Office of the Union)
7. Project to consider the publication of variety descriptions (document to be prepared by the Office of the Union)
8. TGP documents
 - (a) TGP documents to which the TC has given highest priority:
 - i. TGP/9 Examining Distinctness (document to be prepared by the Office of the Union)
 - ii. TGP/10 Examining Uniformity (document to be prepared by the Office of the Union)

- (b) Other TGP documents:
 - iii. TGP/8 Use of Statistical Procedures in DUS Testing (document to be prepared by the United Kingdom)
 - iv. TGP/11.1 Examination of Stability and “Verification” (document to be prepared by the CPVO)
 - v. TGP/12 Special Characteristics (document to be prepared by the Office of the Union)
 - vi. TGP/14 Section 3: Statistical Terms (document to be prepared by the Netherlands)
- 9. Development of COY
 - (a) COY: selecting the optimum number of plants (document to be prepared by Denmark and Germany)
 - (b) A comparison of COYU and a method based on Bennett’s Test for coefficients of variation (document to be prepared by Poland)
 - (c) Examination of statistical procedures for checking uniformity in variety trials (document to be prepared by Germany)
- 10. Population standards used for assessing uniformity of off-types (document to be prepared by the Office of the Union)
- 11. Generalized linear models (document to be prepared by Kenya)
- 12. Segregation ratios (document to be prepared by France and Denmark)
- 13. Image Analysis in Parsnip (document to be prepared by United Kingdom)
- 14. DUS Examination using two locations (document to be prepared by Germany)
- 15. Exchangeable software and TWC documents (documents to be prepared by Germany and the Office of the Union)
- 16. Date and place of the next session
- 17. Future program
- 18. Adoption of the report (if time permits)
- 19. Closing of the session

UPOV Medal

81. Mr. Uwe Meyer (Germany) was awarded a UPOV bronze medal in recognition of his chairmanship of the TWC from 2003 to 2005.

82. *The TWC adopted this report at the close of its session.*

[Annexes follow]

ANNEX I

LIST OF PARTICIPANTS

I. MEMBERS

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[Annex II follows]

TWC/23/21

ANNEX II

OPENING REMARKS

UPOV TECHNICAL WORKING GROUP ON AUTOMATION AND COMPUTER
PROGRAMS

OTTAWA, JUNE 13 - 16 2005

Mr. Garry Koivisto

Executive Director of the Canadian Food Inspection Agency.

On behalf of the Plant Breeders' Rights Office of the Canadian Food Inspection Agency, I am very pleased to welcome you all to Ottawa, Canada. We are honoured to be hosting UPOV's twenty-third session of the Technical Working Party on Automation and Computer Programs.

Our Plant Breeders' Rights Office is part of the Canadian Food Inspection Agency (CFIA). The agency is a relatively new organization, having been formed in 1997. It integrates the delivery of inspection and quarantine services that were previously provided by Agriculture and Agri-Food Canada, Health Canada, Industry Canada and the Department of Fisheries and Oceans. The Agency's mandate is to safe-guard Canada's food supply which includes the plants and animals upon which safe and high quality food depends.

The president of the CFIA reports to the Minister of Agriculture and Agri-Food. The CFIA administers 13 pieces of legislation, one of them being the Plant Breeders' Rights Act. The Canadian PBR Act came into effect on August 1, 1990 and is administered by the Plant Breeders' Rights Office of the CFIA. Canada became a member of UPOV in 1991, under the 1978 UPOV Convention. The PBR Act required that a Ten Year report be prepared "as soon as practicable" after the Act had been in force for ten years. The purpose of the report was to indicate the impact of the legislation on investment in plant breeding in Canada, access to protected foreign varieties, protection of Canadian varieties abroad, and improvement of plant varieties to the public benefit.

The report was completed and tabled in Parliament in June, 2002. The overall findings were that there has been an increase in investment in plant breeding and an improvement in the access to foreign varieties in both the agricultural and horticultural sectors since the enactment of the PBR Act. Plant Breeders' Rights appears to be one factor that has had a positive impact on the availability of improved varieties. The report also indicates that PBR has not had the predicted negative impacts such as increased seed prices and reduction in the number of varieties available. The Ten Year Report recommended that Canada move towards ratification of the 1991 UPOV Convention as soon as possible. Recent initiatives on the part of the CFIA, with solid support from the plant breeding industry, are gaining momentum and we are hopeful that the amendments may be introduced in Parliament in the near future. Once these changes to our Act are in effect, Canada will move toward ratifying the 1991 UPOV Convention.

As a member of UPOV, Canada has benefitted from the many years of experience of other member countries. Participation in a meeting such as this is very valuable for the exchange of information and for an understanding of the various plant breeders' rights systems throughout the world. It is through cooperation with our UPOV colleagues that we are able to implement fair and consistent policies with regards to the protection of the intellectual property of breeders around the world.

I am pleased that there are representatives here from 17 countries and 4 continents. For many of you it may be your first time in Canada. I wish you all a very productive meeting and enjoyable stay here. During the coming week I hope you will have the opportunity to see some of the interesting local sights.

If you require any assistance during your stay, please do not hesitate to contact any of our office staff.

[Annex III follows]

Plant Breeders' Rights in Canada

UPOV

Technical Working Party on Automation and
Computer Programs

June 13-16, 2005

Marriott Residence Inn

Ottawa, Ontario

Plant Breeders' Rights Advisory Committee

- Act requires formation of PBR Advisory Committee consisting of breeders, growers and reps. from interested groups
- Adv. Cttee recommended implementation of Act on species by species basis
- Since Dec. 1998 all plant species, excluding bacteria, fungi and algae are eligible
- Adv. Cttee endorsed adoption of Australian type breeder testing system

Plant Breeders' Rights Office

- Commissioner
- 5 examiners
- 1 project coordinator
- 1 admin. assistant

Duties of Plant Breeders' Rights Office

- Review and acceptance of applications
- Site examination of every DUS trial
- Examination of data and comparative descriptions from DUS trials
- Writing of variety descriptions and publication of the Plant Varieties Journal
- Granting of rights

Duties of Plant Breeders' Rights Office (cont'd)

- Development of objective description forms based on UPOV test guidelines
- Development of national guidelines where no UPOV TG exists
- Drafting regulations and consultation with Adv. Cttee on regulatory change
- International cooperation & communication
- Development of internal policies

Fees for PBR

- Fees charged to applicants are:

Application	\$250
Examination	\$750
Grant of Rights	\$500
Annual renewal	\$300
- No increase in fees since Act came into force on August 1, 1990

Other fees

Protective direction fee	\$50
Claim of priority	\$50
Filing objection	\$200
Application for compulsory license	\$250
★PBRO now nearing full cost recovery	

Use of PBR in Canada

	Applications	Rights Granted
Agricultural	1008	424
Horticultural	3953	1694
Total	4961	2118

Note: PBRO has no backlog of applications

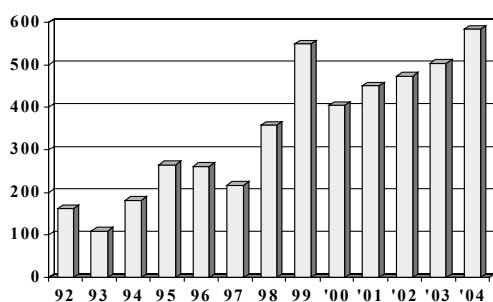
Horticultural Crops

	Applications	Rights Granted
Fruit	237	92
Ornamental	3372	1457
Vegetable	326	142
Miscellaneous	18	3

Agricultural Crops

	Applications	Rights Granted
Cereal	261	116
Forage	13	2
Oilseed	587	223
Pulsecrop	138	82
Miscellaneous	9	1

PBR applications per year



Examination Process

- At filing applicant/agent advised of examination requirements
- For most vegetatively propagated varieties DUS tests must be initiated within 2 years, and for seed propagated crops within 3 years
- For woody species more time allowed to establish plants & meet other requirements
- Applicant/agent provided with ODF and detailed instructions on conducting trials

DUS Tests

- Canada has no formal accreditation system
- BUT..... most ornamental trials (~90%) are now conducted by 2 private companies which specialize in DUS testing
- Some breeders continue to conduct their own trials (e.g. fruit and field crops)
- Every trial is visited by an examiner from the PBR Office

Site Examination Request

- In January every applicant/agent is asked to submit site exam requests for the coming year
- Requests and fees due by May 1st
- Applicant must justify choice of reference variety(ies) that will be included in trials
- Examiners schedule site visit with applicant/agent
- 511 varieties are in DUS trials in 2005

Site Examination

- Examiner confirms that trials have been conducted according to guidelines
- Examiner verifies uniformity of plants in trials
- Examiner describes candidate in comparison to reference varieties, concentrating on distinguishing characteristics
- Examiner takes comparative photographs
- Examiner writes report for the variety file

Review of trial results

- Applicant/agent must submit trial data, comparative descriptions (ODF) and photos within 6 months of examiner's visit
- Examiner reviews submission and compares results to the site exam report
- Examiner drafts official variety description for publication in Plant Varieties Journal

Publication

- Draft description is sent to breeder or agent who conducted trials for review/revision
- Finalized descriptions and photos are published in next issue of Journal
- Six month objection period (peer review) begins following release date of Plant Varieties Journal
- At end of objection period the file is reviewed by a different examiner & the Commissioner

Grant of Rights

- If no objections, the applicant is notified that variety is eligible for grant of rights
- Applicant must pay fee (\$500) and verify variety denomination and holder of rights
- Rights are granted on the day that all submissions are received in the PBR Office
- One month before the anniversary date each year a notice sent out requesting annual fee

Objective Description Forms

- Recommends testing protocol such as number of plants, years, grouping characteristics etc.
- Based on UPOV test guidelines
- For characteristics of plant parts the tester records state of expression for candidate and each comparison variety (from UPOV TG's)
- Illustrations and explanations are important to ensure consistent interpretation of terminology

Cereal trials



Barley
Lethbridge,
AB

Canola trials



Saskatoon,
Sask.

Field trials



Variety Rights
Management
Oxford Station
Ontario

Field trials



Roses,
Variety Rights
Management
Oxford Station
Ontario

Greenhouse trials



BioFlora Inc.
St. Thomas
Ontario

Greenhouse trials



BioFlora Inc.
St. Thomas
Ontario

Greenhouse trials



Examiner
at work
Aug. 2003

Fruit field trials



Strawberries
AAFC
L'Acadie
Québec

Tree Fruit trials



Apples
Summerland
B.C.

Tree Fruit trials



Cherries
Summerland
B.C.

[Annex IV follows]

UPOV

The purpose of the present UPOV Act is to promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.

Recent developments within UPOV

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Developments

New members of the Union

- Singapore (July 30, 2004)
- Jordan (October 24, 2004)
- Uzbekistan (November 14, 2004)
- Azerbaijan (December 9, 2004)

Accessions to 1991 Act:

- Austria

Examination of Laws by the Council

- Malaysia
- Mauritius
- Turkey

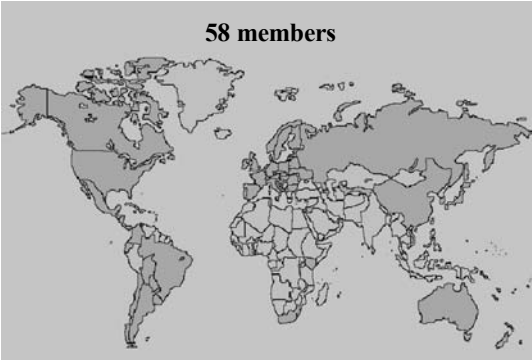
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UPOV Membership

58 members



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UPOV

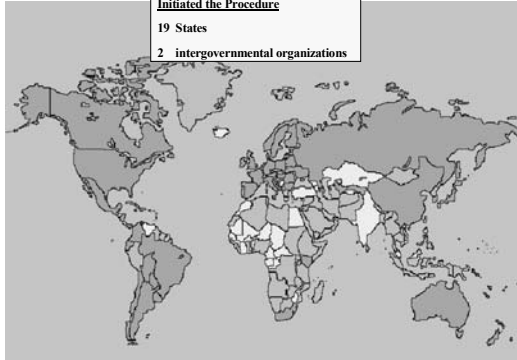
The purpose of the present UPOV Act is to promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.

UPOV Membership

Initiated the Procedure

19 States

2 intergovernmental organizations



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PLANT VARIETY PROTECTION SITUATION

- 58 members of the Union
- 19 States have initiated the procedure for becoming members of the Union
- 2 intergovernmental organizations have initiated the procedure for becoming members of the Union:
 - European Community
 - OAPI (16 countries)
- 47 States have contacted the Office of the Union for assistance in the development of legislation on plant variety protection


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UPOV Membership

31 members of the 1991 Act



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UPOV

Reproductive and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society."

People

The Council elected:

- Mr. Krieno Fikkert (Netherlands),
Chairman of the Administrative and Legal Committee
- Mrs. Carmen Gianni (Argentina),
Vice-Chairperson of the Administrative and Legal Committee
- Ms. Julia Borys (Poland),
Chairperson of the Technical Committee
- Mrs. Françoise Blouet (France),
Vice-Chairperson of the Technical Committee

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UPOV

Reproductive and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society."

Consultative Committee

- special meeting on the afternoon of October 25, 2005, for international breeders' organizations to express their views and concerns on issues regarding the **enforcement of plant breeders' rights**
- added **International Association of Horticultural Producers (AIPH)** to the list of non-governmental organizations invited to the sessions of the Administrative and Legal Committee (CAJ)
- **rules governing observer status** in UPOV bodies would be placed in the unrestricted area of the UPOV website

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Administrative and Legal Committee (CAJ)

- Draft Explanatory Notes on Article 15(1)(i) and (2) of the 1991 Act of the UPOV Convention: Acts done Privately and for Non-Commercial Purposes and Provisions on Farm-Saved Seed
- Guidance Concerning Information, Documents or Material Furnished by the Breeder for Examination Purposes
- Molecular Techniques

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Developments in Technical Committee

- 41st session (April 2005)

items covered in the TWC agenda

- TGP documents
- UPOV-ROM; GENIE database; UPOV code
- Variety denominations
- Publication of variety descriptions
- Molecular techniques
- Preparatory workshops

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Developments in Technical Committee

TC proposed to the Council that it elect for the:

- TWA Mrs. Beate Rücker (Germany)
- TWC Mrs. Sally Watson (United Kingdom)
- TWF Mr. Alejandro Barrientos Priego (Mexico)
- TWO Ms. Sandy Marshall (Canada)
- TWV Mr. Niall Green (United Kingdom)
- BMT Mr. Henk Bonthuis (Netherlands)

as Chairpersons for the term from 2006 to 2008.

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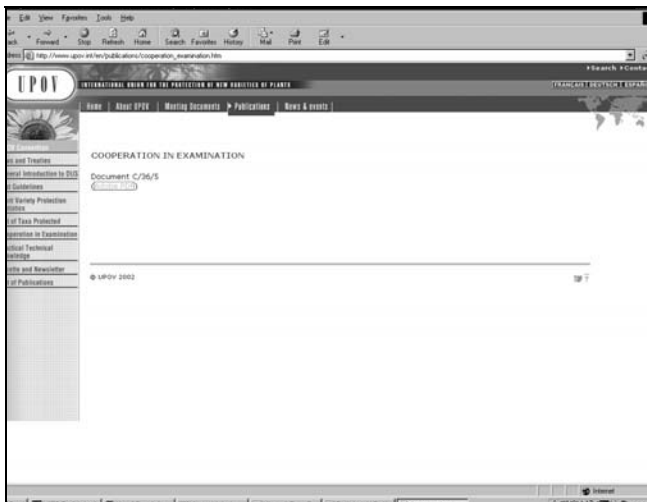
TGP Documents

Document reference	Title
TGP/0	List of TGP Documents and Latest Issue Dates
TGP/2	List of Test Guidelines Adopted by UPOV
TGP/5	Experience and Cooperation in DUS Testing
TGP/6	Arrangements for DUS Testing
TGP/7	Development of Test Guidelines

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TGP/5	
Section 1	Model Administrative Agreement for International Cooperation in the Testing of Varieties
Section 2	UPOV Model Form for the Application for Plant Breeders' Rights
Section 3	Technical Questionnaire to be Completed in Connection with an Application for Plant Breeders' Rights
Section 4	UPOV Model Form for the Designation of the Sample of the Variety
Section 5	UPOV Request for Examination Results and UPOV Answer to the Request for Examination Results
Section 6	UPOV Report on Technical Examination and UPOV Variety Description
Section 7	UPOV Interim Report on Technical Examination
Section 8	Cooperation in Examination
Section 9	List of Species in Which Practical Knowledge has Been Acquired or for Which National Test Guidelines Have Been Established
Section 10	Notification of Additional Characteristics

TGP/6	
Section 1	Introduction
Section 2	Examples of Arrangements for DUS Testing
Section 3	Declaration on the Conditions for the Examination of a Variety Based on Trials Carried Out by or on behalf of Breeders



Website: Publications Menu

- UPOV Convention
- List of Publications
- Gazette and Newsletter
- Laws and Treaties
- Plant Variety Protection Statistics
- General Introduction to DUS
- TGP Documents [New] (June 20)**
- Test Guidelines
- Practical Technical Knowledge
- Cooperation in Examination

Website: First restricted area

- Meeting documents
- UPOV-ROM/UPOV Code
- Drafters' Kit for Test Guidelines
- Guidance Note: UPOV Technical Working Party Arrangements
- Second Restricted Area

Drafters' Kit for Test Guidelines

- General Introduction to DUS
- Test Guidelines in pdf format (end June / July)
- Test Guidelines in Word Format (end June / July)**
- TGP/7 "Development of Test Guidelines"
- Electronic TG Template
- TGP/7 Annex 4: Collection of Approved Characteristics
 - User notes (EFGS) (English only by June 3)
 - Index table (Excel) (EFGS) (English only by June 3)
 - Collection of Approved Characteristics (Word) (Quad)
- Additional Characteristics (EFGS) (July)

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Test Guidelines adopted

English	Botanical name	Document No.
Lucerne	Medicago sativa L., M. x varia Martyn	TG/6/5
French Bean	Phaseolus vulgaris L.	TG/12/9
Apple (fruit varieties)	Malus Mill.	TG/14/9
Apricot	Prunus armeniaca L., Armeniaca vulgaris Lam.	TG/70/4
Parsley	Petroselinum crispum (Mill.) Nyman ex A.W. Hill	TG/136/5
Chick-Pea	Cicer arietinum L.	TG/143/4
Industrial Chicory	Cichorium intybus L. partim	TG/172/4
Sugarcane	Saccharum L.	TG/186/1
Antirrhinum	Antirrhinum majus L.	TG/ANTIR
Argyranthemum	Argyranthemum frutescens (L.) Sch. Bip.	TG/ARGYR
Brachyscome	Brachyscome Cass.	TG/BRACHY
Ginseng	Panax ginseng C.A. Meyer	TG/GINSENG
Waxflower	Chamelaucium Desf.	TG/WAXFL

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Other developments

- Distance learning program
 - call for tutors
 - first run in September
- Asian Regional Technical Meeting

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THANK YOU

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[End of Annex IV and of document]