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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-Fourth Session
Nairobi, June 19 to 22, 2006

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-fourth session in Nairobi from June 19 to 22, 2006. The list of participants is reproduced in Annex I to this report.

2. The TWC was welcomed by Mr. John Kedera, Managing Director of the Kenya Plant Health Inspectorate Service (KEPHIS).

3. The session was opened by Miss Sally Watson (United Kingdom), Chairperson 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/24/1 Rev., after agreeing to the work plan proposed by the Chairperson.

Short Reports on Developments in Plant Variety Protection

(a) Reports from members and observers

5. Mr. Evans Sikinyi (Kenya) made a presentation on the situation of plant breeders' rights in Kenya. The presentation is reproduced in Annex II to this report.

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

7. The TWC heard a report on developments in the United Kingdom: in Northern Ireland on the ongoing use of a cyclic control system to reduce the size of DUS trials for herbage crops and the use of new devices to download data obtained from the field test into a database by means of an internet connection; in Scotland on the move of the vegetable testing centre headquarters to new premises and that, in order to reduce the costs of the trials, actions were in progress to reduce the size of the trials, to improve COYD when grouping characteristics were used, and to use image analysis.

8. Experts from the Republic of Korea reported that, since the introduction of the plant breeder's right system, 2,666 applications had been filed, 1,541 plant breeders' rights had been granted and 214 applications had been rejected. They also reported that the Republic of Korea would host the tenth session of the BMT, from November 21 to 23, 2006, including a preparatory workshop on November 20, 2006.

9. Experts from Romania reported that, in that country, the plant breeder's right system started in 1998 and UPOV membership began in 2001. Romania was working to implement its legislation in conformity with the Regulations of the European Community. The TWC also noted that developments were taking place in Romania with the aim of improving the testing system and the variety collection, which included progress in the development of a database and the use of statistics for cereals and herbage crops. A twinning program with France and the Netherlands was being developed.

10. The expert from the Netherlands reported on the restructuring of DUS testing, which had resulted in Naktuinbow becoming responsible for DUS testing for all plant species, and informed the TWC that new plant breeders' rights legislation had entered into force in 2006.

11. An expert from France informed the TWC of the enactment, on March 2, 2006, of Law No. 2006-245, which authorized the ratification of the 1991 Act of the UPOV Convention, the collaboration of the GEVES and the National Research Institute of Agriculture in variety testing, the development of molecular markers for the management of variety collection, the development of a model to predict agronomic value and a study on the reaction of varieties to the environment.

12. An expert from Germany reported on a project to develop application forms to be completed via the internet. He explained that the objective was to allow breeders to download application forms from the internet and, by getting access to the database of the *Bundessortenamt* (BSA) via a password, to partially complete it with general information (e.g. breeder's name, address, etc.). The breeder could either submit by surface mail the fully completed and duly signed form to the BSA, in which the technical information of the candidate variety would be presented in the form of a two-dimension bar code, or submit the completed form and variety information electronically via the internet using a high quality

digital signature. He added that pilot studies for this project in maize and wheat would be completed in 2006 and the project would be extended to all other crops in 2007.

13. The expert from Finland reported changes in the administration involving the merging of the National Food Agency, the National Veterinary Agency and the Plant Production Inspection Center, to form the Finnish Food Safety Authority (Evira).

14. An expert from Japan reported that, in 2005, protection had been extended to some products directly derived from harvested material. He also reported on changes in the provisions for variety denominations, which allowed application forms to be completed with letters from the Latin alphabet. The TWC noted that Japan planned to host a workshop on the enforcement of plant breeders' rights from November 15 to 17, 2006, in cooperation with UPOV.

15. The expert from the Czech Republic reported that it planned to start the use of GAIA for the examination of varieties of peas during 2006.

16. An expert from South Africa reported that 1,884 certificates of plant breeders' rights had been granted and that work was going on in the South African Development Community (SADC) region for the development of a regional protocol for plant breeders' rights.

17. The expert from China reported that the plant breeder's right system in that country was administrated by the State Forestry Administration and the Ministry of Agriculture. She further explained that the State Forestry Administration could accept a DUS examination at the breeder's premises or could conduct testing at an official DUS testing station.

18. The expert from the United Republic of Tanzania reported that the plant breeder's right law of that country had entered into force in 2002 and the seed law in 2003. He added that the Seed Certification Institute of the United Republic of Tanzania did the DUS examination following the UPOV Test Guidelines. He also explained that most of the breeders in the United Republic of Tanzania were not aware of the need to protect their varieties; however, in 2006, the first application for a plant breeder's right had been filed.

19. An expert from the Seed Trade Association of Kenya reported that the private sector in the region was increasingly using the plant breeder's right system.

(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.

UPOV Information Databases

21. The TWC took note of the information provided in document TWC/24/4, presented by the Office. The expert from the Netherlands recommended that the spreadsheets to facilitate the submission of data for the Plant Variety Database (UPOV-ROM) could be designed to convert the data into XML format, which, depending on the database, might speed up the uploading into the database.

Project to Consider the Publication of Variety Descriptions

22. The TWC took note of the information provided in document TWC/24/6, presented by the Office.

TGP Documents

23. The TWC noted the information on the development of TGP documents provided in documents TWC/24/3 and TC/42/5 Annex II.

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

TGP/4/1 Draft 7 Constitution and Management of Variety Collections

24. The TWC noted document TGP/4/1 Draft 7, introduced by the Office of the Union. In reply to a question from the expert from the Netherlands about the possible use of molecular markers for verification in the management of variety collections, it was clarified that the situation in UPOV concerning the possible use of molecular markers is set out in documents TC/38/14 -CAJ/45/5 and TC/38/14 Add.-CAJ/45/5 Add., which presented the proposals developed in the *Ad hoc* Crop Subgroups, the recommendations of the BMT Review Group concerning those proposals and the opinion of the TC and the CAJ regarding the recommendations of the BMT Review Group. The TWC made no further comments with respect to document TGP/4/1 Draft 7.

TGP/9/1 Draft 7 Examining Distinctness

25. The TWC discussed document TGP/9/1 Draft 7 and agreed to propose the following:

Section	
1.4	Check the positioning of the box
2.3.1.3	To delete “S” within the parenthesis of the last sentence
2.3.3.2	To keep “less likely to be”, even if it causes divergence with the General Introduction
2.3.3.3	If possible to provide further guidance for the use of QN and PQ characteristics as grouping characteristics
2.4.2	The TWC considered that discrepancies between the characteristics of the variety and the appearance of the variety in the photograph should not be a basis for rejecting the application for the variety. That situation of rejection may also be the case for other information provided in the Technical Questionnaire for which an explanation, as presented in the highlighted text of section 2.4.2, has not been developed. Therefore, the TWC proposed that the additional text of paragraph 2.4.2 read as follows: “If such a photograph is required by the testing authority, the breeder should follow the guidelines as closely as possible. However, if despite the breeder’s endeavor, the resulting photograph does not meet the required standards, this should not be a basis for rejecting the

	application".
2.6.1 General	The wording is confusing; the section is aimed to be an introduction to the combined phenotypic distance approach of selecting varieties for the growing trial but the first two paragraphs explain the characteristic-by-characteristic approach to testing for distinctness. It is too much GAIA-oriented and not an introduction to phenotypic distance in general
2.6.1.2	To be reworded as follows: "2.6.1.2 In the characteristic-by-characteristic/minimum distance approach, at least as a first step, differences between varieties which are less than the minimum difference for a characteristic do not contribute towards distinctness."
2.6.1.5	The paragraph is contradictory. It first states that the parameters for the combined phenotypic distance are determined by the DUS expert and later affirms that it provides an objective basis for decisions of distinctness.
2.6.1.6	To replace the word "optimizes" by "helps" and "distinguish" by "identify/select"
2.6.2.2	To replace "ANOVA and multiple range tests" by "Mahalanobis and other multivariate methods"
4.2.3(a)	To add "(PQ)" to Pseudo-qualitative characteristics
4.2.3(b)	Measurements can be helpful even in vegetatively propagated and self-pollinated varieties when there is variability due to environmental effect, e.g. different locations/years.
4.2.3 (b), (c) and (d)	To have the same structure as the previous subparagraphs (i.e. title, followed by explanation in other line)
5.2.1.1 (b)	To delete "or a combination of characteristics"
Pages 24, 25 and 26	It is difficult to identify the titles, making it difficult to follow the content
5.2.4.9	To check whether the reference in the last sentence should be to paragraph 5.2.4.10 instead of 5.2.4.12
5.2.4.13	To remove the words "for cross-pollinated varieties" - it is unnecessary
5.2.4.14	To delete the word "statistical"
5.2.4.21	To read "5.2.4.21 There are a range of other statistical methods in use in agricultural research that can be used in the examination of distinctness, provided their statistical assumptions are met."
5.3	To explain the reasons for the different order of the methods of observation in the different boxes

5.4.2 General	The TWC has little experience in the use of phenotypic distance for the assessment of distinctness and, therefore, is not in the position to make comments on this section. However, the TWC acknowledges the use of phenotypic distance as one of a number of methods for selecting varieties for the growing trial as well as for organizing the growing trial and would like further clarification in the form of TWC papers from experts on the use of these methods for the assessment of distinctness in the growing trial. The TWC noted that to date it has looked at determining DUS characteristic-by-characteristic at the behest of UPOV and that it welcomed the opportunity to investigate the use of combinations of characteristics, both for distinctness and for uniformity testing. It also commented that it was not being given the full guidance on when the phenotypic distance method is to be used and when it is not to be used.
5.4.2.1	To explain what it is intended to illustrate with each of the examples and to clarify that they are not related to GAIA
5.4.2.2.1.6	To delete the last sentence

TGP/10/1 Draft 4 *Examining Uniformity*

26. The TWC discussed document TGP/10/1 Draft 4 and agreed to propose the following:

Section	
2.1	To clarify that the environmental variation has two components; the environmental component and the observer/technical component
4.4 General	To include the definition of population standard and acceptance probability in Section 3: Statistical Terms
4.2.4.2	The combination of small differences on individual characteristics to determine off-types is not consistent with the characteristic-by-characteristic approach used for the assessment of distinctness
4.2.4.3	The penultimate sentence to read: " … For example, a plant that does not belong to the species of the candidate variety may be considered not to be an off-type and might be disregarded … "
4.4.1.1	To read as follows (additions are underlined, deletions are strikethrough): 4.4.1.1 The General Introduction (Chapter 6: Section 6.4.1.3) explains that "The acceptable number of off-types tolerated in samples of various sizes is often based on 'a fixed population standard' and <u>an</u> 'acceptance probability'. The 'population standard' can be expressed as the <u>maximum</u> percentage of off-types to be accepted if all individuals of the variety could be examined. The probability of correctly accepting ~~that a variety is~~ <u>as</u> uniform <u>a variety with the population standard of off-types</u> is called the 'acceptance probability'".
4.4.1.3 and 4.4.1.4	To include that care is needed when choosing the sample size in order to produce a good test

5.2 General	To clarify whether off-types are removed for the calculations for COYU
5.2.1.2	Second sentence, to replace "variations" by "variation"
5.2.1.4	To include information on the 1.6 × variance method in TGP/8, to remove the reference to long term LSD and to add mention of the 1.26 × standard deviation method in 5.2.1.4 as the alternative name for the 1.6 × variance method.

(b) Other TGP documents:

TGP/8/1 Draft 4 *Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability*

27. The TWC considered document TGP/8/1 Draft 4 and agreed the following changes:

Table of contents	To have upper case in the first word only in the titles of the following sections: PART I: 2.5; 3.4.3; 1.1.8.1; 1.1.8.2; PART II: 3.1.3; 3.1.4; 3.2.9 and 3.2.9.1
PART I	
2.2.2	To add a paragraph to explain the notion of independence from the statistical point of view, which may differ from the one used by crop experts in DUS testing.
2.2.2.2	To replace "grown" by "planted/sowed" and to delete "usually considered to be"
2.2.2.3	To read as follows (additions are underlined, deletions are strikethrough): "2.2.2.3 For some perennial crops, for example in perennial ryegrass, ~~age of the plants may significantly influence the expression of characteristics of varieties in subsequent years. In such cases~~, it is appropriate to observe two independent growing cycles in the form of two separate plantings." "NEW However, in some other perennial vegetatively propagated crops <u>which are expensive and slow to establish</u>, for example fruit trees, the two independent growing cycles can be achieved by examining the same plants over two successive years."
2.2.2.5	To read as follows (additions are underlined): "2.2.2.5 Where two growing cycles are conducted in the same year and at the same time, a suitable distance or a suitable difference in growing conditions between two locations may <u>under certain circumstances</u> satisfy the requirement for independence."
2.2.2.6	To read as follows (additions are underlined): "2.2.2.6 Where the two growing cycles are in the same location and the same year, a suitable time period between plantings may <u>under certain circumstances</u> satisfy the requirement for independence."
2.2.3 General	To format Section 2.2.3.1 in the same way as section 2.2.3.2 for clarity. To check the cross references in the whole section 2.2.3.
2.2.3.1.3	To delete the last sentence

2.2.3.2 (c)	The penultimate sentence of the second paragraph to read as follows (additions are underlined, deletions are strikethrough): For example, the COYD criterion was tested ~~developed~~ ~~for combining~~ on data over different years and not tested on ~~for combining~~ data from different locations.
2.4 General	To consider whether the quotation of TGP/9 can be replaced by cross-references
2.5.1.1	To replace "plots" by "plant pots" at the end of the second sentence
2.5.2.1	The first sentence to read as follows (additions are underlined, deletions are strikethrough): "In deciding on trial layout, it is important that local variation ~~in~~ in conditions are controlled.
2.5.3.2	The second sentence to read as follows (additions are underlined, deletions are strikethrough): "For example, if tall varieties are planted next to short ones there could be a negative influence of the tall ones ~~on~~ interfering with the short ones and a positive influence in the other direction."
2.6	The first sentence of the first paragraph to read as follows (additions are underlined): "This section describes a number of concepts that are relevant when designing growing trials for which distinctness and/or uniformity are to be assessed by statistical analysis of the growing trial data."
2.6.1 General	To explain that the acceptance of H0 is different for distinctness than for uniformity
Two new paragraphs before 2.6.1.4	Note that if the null hypothesis is rejected for distinctness, this leads to the conclusion that the candidate variety is distinct and hence may lead to the acceptance of that candidate variety. On the other hand, if the null hypothesis is rejected for uniformity, the candidate variety is considered not uniform and this leads to the rejection of that candidate variety.
2.6.1.3	The penultimate sentence to read as follows (additions are underlined, deletions are strikethrough): "If the absolute value of the test statistic is not greater than its chosen critical value, the null hypothesis H0 is accepted."
2.6.1.7	The last sentence to read as follows (additions are underlined): "The Crop Expert can reduce the risk of making a type II error by increasing the precision e.g. by increasing the number of replicates and reducing the random variability by choice of number of plants per plot (or sample size), by controlling local, unwanted or nuisance variation through careful choice of experimental design, and improving the way measurements/observations are made and so reducing observer error.
2.6.3 General	To amend paragraph numbering
2.6.3.1	To move the arrow of the diagram to the right side
2.6.4.1	In the fourth sentence, to replace "unbalances" by "partially balanced"

3.1	To number the last paragraph
3.2.3 and 3.2.4	Are incomplete paragraphs
3.3.1.1	To add bullet points to the list of assumptions of variance methods and to delete "and additivity of year and variety effects for COYD", and to change "involve randomization" to "involves randomization".
4	The TWC considers that this section provides useful information for crop experts and therefore it should be kept in TGP/8. However, it has no objection to move Section 4 to another part of TGP/8 if necessary.

PART II

1.1	The TWC agreed to modify the section in reply to the comments raised by the TWPs
2	It is necessary to specify the type of LSD to which this section refers to, e.g. within year/cycle LSD. The TWC does not have experience with this technique and it needs advice from other TWPs on the detail to be included in this section.
3.1	To replace "criterion" by "criteria" in the title of the section
3.1.1.1	To replace "variations" by "variation" in the third sentence
3.2 General	To explain that a reference variety is an established variety which has been included in the growing trial
3.3 General	The TWC considered that TGP/8 should include recommendation on the probability level which can be prepared on the basis of document TWC/23/10 plus the comments of that document from the other TWPs or a reference to TWC/23/10.
3.3	Change the title to read "Schemes used for the application of COYD and COYU"
5	To reword the introduction in line with the comments made on Section 2.6.1.6 of TGP/9
5.1.1	To replace "distinctness" by "differences" in the first sentence and to do the same where relevant throughout the document, except where referring to "distinct-plus", and to put species names in italics throughout
5.1.2	To replace "distinct" by "different" in the first sentence and to do the same where relevant throughout the document
5.1.3	To add a sentence to clarify that the weighting can be used to nullify the apparent difference
5.2.2	To delete "e" and to make reference to the proper section
5.2	To be renumbered and to change title word "informatin" to "information"

5.2.1	"Weighting of characteristics": To clarify that for a given characteristic the matrix is fixed and that it is changed only when there is a good reason and with the agreement of the crop experts and the breeders. To explain that the weightings are selected in order to work always on the safe side. To consider simplifying the formula for weighting.
5.2.1.2	In the second sentence to replace "its expertise" by "his expertise"
5.2.1.6	To refer to the matrix on page 120 as "Weighting matrix 'shape of ear'"
6.2.2	To make changes to formulae to insert words "variance components due to" after each variance symbol
6.3.1.1	To verify the text of the formula

TGP/14.3 Draft 3 Statistical Terms

28. The TWC discussed document TGP/14.3 Draft 3 and agreed as follows:

General	To add the definitions of "population standard" and "acceptance probability"
Alpha (α):	To delete third sentence and to clarify that **(α)** is the significance level
Alpha-design:	To add main features of alpha designs
Alternative Hypothesis	Second sentence to read as follows (additions are underlined, deletions are strikethrough): "If the data ~~are~~ support sufficiently strongly ~~to~~ rejection of the null hypothesis, then the null hypothesis is rejected in favor of an alternative hypothesis"
ANOVA	To spell out "respectively" instead of "resp."
(Balanced) Complete Block Design	To add "/Randomized complete block design" to the name of the definition and the first sentence to read as follows (additions are underlined, deletions are strikethrough): "An experimental lay-out where~~ the experimental units are heterogeneous~~ all treatments are present in all blocks."
Balanced Incomplete Block Design	First sentence to read as follows (additions are underlined, deletions are strikethrough): "This differs ~~with~~ from a balanced complete block design in that the block size is less than the total number of treatments."
Bias	To add the words "it is estimating" at the end of the sentence
Binomial Distribution	To add the formula of π
Blocking	First sentence to read as follows (additions are underlined, deletions are strikethrough): "A method in the design of experiments used to reduce the variability of residuals."
Block Design	To replace "Balanced" by "Randomized"

Box plot	Last sentence to read as follows (additions are underlined, deletions are strikethrough): "Whiskers <u>can</u> extend beyond the ends of the box as far as the minimum and maximum values."
Confidence Interval	To clarify the final sentence and equation
Continuous Variable	Change "the variable ranges" to "the variable's range"

29. The TWC did not have time to finish the discussion on the whole content of TGP/14.3 Draft 3 and agreed that comments be sent to Mr. Gerie van der Heijden (Netherlands) following the TWC.

30. The TWC did not have time to examine the following TGP documents:

TGP/13 Guidance for New Types and Species (document TGP/13 Draft 6)

TGP/14.2.1(&.2) Draft 5 Glossary of Technical, Botanical and Statistical Terms Used in UPOV Documents: Sections 2.1&.2: Botanical Terms: Plant shapes [and structure]

<u>Development of COY</u>

(a) COY: selecting the optimum number of plants (documents TWC/24/10 and TWC/24/12)

31. The TWC discussed document TWV/24/10, introduced by Mr. Uwe Meyer (Germany) and document TWV/24/12, introduced by Mr. Kristian Kristensen (Denmark). The TWC took note that both documents were the continuation of work presented at the twenty-third session of the TWC (see documents TWC/23/10 and TWC/23/15). Mr. Kristensen clarified that the tables included in document TWC/23/10 on the same subject presented at the twenty-third TWC session should be amended to give the same order of characteristics as given in tables 2 and 3 of document TWC/24/12.

32. The expert from Poland noted that the possibility of reducing the number of plants depended on the relative values of the components of variance and the relative stability of the various components. He explained that in cases where the plot component of the variance was too high it would be dangerous to reduce the number of plants to be examined. An expert from France considered it very useful to test different approaches to explore the possible reduction of the number of plants to be examined. He added that it would be interesting to have a tool in the COY-D software to verify whether similar results were obtained. He proposed that these documents should be considered by other Technical Working Parties, in particular the TWA. Mr. Kristensen reported that he had developed a "macro" (computer code) for the calculations, using the statistical program SAS, which he could make available to those experts who were interested. The experts discussed the impacts of reducing the numbers of plants observed on the testing of distinctness and uniformity. Distinctness is assessed by comparing the candidate variety mean to a reference variety mean that would be based on a reduced number of plants, whereas reduced numbers of plants would be available

to estimate the uniformity of the reference varieties and the candidate's uniformity measure is compared with an average uniformity measure of the reference varieties.

33. Taking into account that different characteristics might allow for different levels of reduction in the number of plants, several experts considered that it would be useful to consider the development of COY to use a different number of plants for different characteristics. An expert from France noted that these documents had been developed in reply to a request made by other TWPs and that they would welcome the results. He added that, even though at the end of the studies it would not be possible to give a clear recommendation in respect to the number of plants, the fact that there might be possible different consequences in the reduction of the number of plants in the assessment of distinctness and uniformity was valid information in itself which would be worthwhile exploring. An expert from the United Kingdom considered that the studies should not only focus on the reduction of the LSD but give the actual LSD value as well, in order that the results from the two papers could be directly compared and also to possibly include information on the F-tests. The expert from the Netherlands considered that, in order to verify the consistency of the results, it would be interesting to repeat the studies using a random reduction of the varieties repeated many times. He added that the Monte Carlo methodology might be a good tool for doing that.

34. The TWC agreed that new papers be presented at the following session taking into account the comments and discussion at its session. The TWC also agreed to propose to the Technical Committee that these new documents be considered by the other TWPs.

(b) Further Comparison of Decisions on Uniformity of Rye Varieties based on COYU Approach and on Bennett's Test (document TWC/24/7)

35. Mr. Wieslaw Pilarczyk (Poland) introduced document TWC/24/7. He explained that it was the continuation of a study which had been presented at the TWC at its twenty-third session. The expert from the Netherlands noted that the proposal had been developed exclusively using characteristics in which there was a positive linear relationship between the means and the standard deviations. The Chairperson clarified that it seemed that Bennett's method worked better in those cases than in other cases. An expert from the United Kingdom proposed that in future revisions of the document, McNemar's test might be used, which would be even more powerful for the comparison. He added that he had some concerns that the results showed that the COYU method assessed more varieties as non-uniform varieties than Bennett's test, and he considered that the comparison between both methods could be made by focusing on the disagreements in the results rather than the agreements. One expert from Germany considered that the document might provide a good basis to reply to the crop experts who requested an alternative method to COYU. However, he considered that further development was necessary, in particular to develop guidance for the benefit of the crop experts, and to look more in detail at the relationship between the means and the standard deviations and its impact on the method.

36. The TWC agreed that a new paper be presented at the following session taking into account the comments and discussion at the session.

(c) A Rationale for Elimination of Reference Varieties when COYD is used – work in progress (document TWC/24/9)

37. Mr. Adrian Roberts (United Kingdom) introduced document TWC/24/9. He explained that the objective of the proposal was to reduce the size of the trial by producing thresholds on a characteristic-by-characteristic basis for exclusion of a reference variety from the trial. It was reported that this might be done at two stages: firstly during the first year of the trial, using information provided in the Technical Questionnaire, and secondly, at the start of the second growing trial using information from the first growing trial. He was only considering the second option in his paper. Finally, he added that the proposal was presented in the document with the aim of obtaining comments for further development. An expert from France suggested that future revisions could include tables of the LSD values used for COYD, together with values of the long-term LSD for a single year test, and the thresholds to facilitate the comparison, and he proposed the analysis could be used to provide interim results to the breeder after the first growing cycle. Although the method could not compare between candidate varieties, the expert from the Netherlands did not see any problem with that because candidate varieties would anyway be tested during two growing cycles. Another expert from the United Kingdom proposed to include comparison between decisions already made after two years against the "predicted" decision based on the thresholds after the first year. In reply to the questions of some experts, Mr. Roberts explained that the use of data from different locations implied more complex calculations and that the Bayesian approach could also be used for those cases.

38. The TWC agreed that a new document should be prepared for the following session of the TWC.

Population Standards Used for Assessing Uniformity of Off-Types

39. The TWC heard an oral report from the Office explaining that the TWC, at its twenty-third session in Ottawa from June 13 to 16, 2005, had agreed that a new version of the questionnaire on population standards for the assessment of uniformity on the basis of off-types should be prepared and circulated. However, experts from Germany, the United Kingdom and the Office realized that options A to F presented in the document (see page 1 of Annex to document TWA/23/14) did not reflect the real situation for the assessment of uniformity on the basis of off-types. One expert from Germany clarified that, in his country, only two cases were relevant, one of which might imply the use of a two-step process. An expert from France suggested that the questionnaire should include the instruction that, if a country's situation was not covered by the cases listed in the questionnaire, they should include a translation of the relevant part of the country's protocol on off-type testing as an explanation.

40. The TWC agreed to circulate a revised draft of the questionnaire to the TWC by September 1, 2006, with a deadline for comments of November 1, 2006. The questionnaire would then be issued at the beginning of January 2007.

SELECT: A Method for Identification of Varieties to be Excluded from the Growing Trial

41. Mr. Uwe Meyer (Germany) introduced document TWC/24/8. He explained that the SELECT method made comparisons of variety descriptions in order to select varieties for the

growing trial on the basis of a characteristic-by-characteristic approach in a way that small differences did not count in the assessment. In reply to questions from several experts, Mr. Meyer explained that SELECT made the comparison of the candidate varieties with stabilized descriptions of reference varieties from a database. Descriptions of candidate varieties would be incorporated into the database only when two descriptions of the same variety in the same location were available. An expert from France explained that GAIA did much the same as SELECT. He added that, in GAIA, crop experts determined the weightings in a way that small differences were not counted, and the value of the threshold "distinctness plus" was greater than the threshold used for distinctness in the growing trial, therefore the aim with both GAIA and SELECT was to work "on the safe side". He considered that there was a misunderstanding about the way GAIA compares varieties, which he expected would be clarified in TGP/9. Mr. Meyer considered that if both methods used the same weightings they would provide the same result, however, SELECT was more restrictive than GAIA in the way the variety descriptions could be compared, e.g. in SELECT the threshold to decide whether a variety could be excluded from the growing trial was the result of the addition of differences in up to just three characteristics. An expert from France highlighted the ongoing work at the TWC with the aim of developing methods to reduce the size of the growing trial whilst maintaining the quality of the examination. He considered that the different approaches were not exclusive and that it might be useful to consider the possibility of combining them, for example, the facility to use two levels of threshold in GAIA had proven very useful to the crop experts and might be of use in SELECT. Experts agreed that both GAIA and SELECT might benefit from inclusion of statistical methodology, such as that described in TWC/24/9, to select the weights. The expert from Denmark explained that, to be on the "safe side", it would be necessary to take into account the possible correlation between characteristics in the comparisons made by SELECT and GAIA. An expert from the United Kingdom considered that the term "phenotypic distance" might not be the most appropriate to describe GAIA and proposed that GAIA and SELECT be considered as "decision tools" used to collate information instead. As a consequence of the discussion, the experts from Germany proposed the following restructuring for TGP/9 "Examining Distinctness:"

New Section:

2.6 COMPARISON OF VARIETY DESCRIPTIONS
- 2.6.1 Introduction to be developed
- 2.6.2 Characteristic-by-characteristic approach to be developed
- 2.6.3 Combined Phenotypic Distance
- 2.6.4 Methods
  - 2.6.4.1 GAIA applicable for 2.6.2 and 2.6.3
  - 2.6.4.2 Other Methods

42. The TWC agreed with the proposals for TGP/9, above.

Segregation Ratios

43. Mr. Kristian Kristensen (Denmark) introduced document TWC/24/11, presenting three methods for the comparison of distribution of colors of cotyledons in sugar beet for the assessment of distinctness. Method 1: analysis of the frequency of each color separately using either COY-D (on transformed data); method 2 analyzing all colors simultaneous

assuming that they follow a multinomial distribution using a χ^2 test; and method 3 analyzing all colors simultaneously using a generalized linear mixed model. He explained that method 3 seemed to be the most promising, but the power of its tests might be expected to be rather low - especially for those varieties present in only 2 years (because of few degrees of freedom) and that the occurrence of zero for most varieties (for at least one color) prevented analyses including all varieties. He concluded by asking for suggestions to continue the study.

44. An expert from France suggested that the merging of characteristics might help reduce the problem with zeros, but that this would introduce subjectivity to the analysis. An expert from the United Kingdom suggested that some clarification of the over-dispersion in generalized linear models might be helpful. The TWC agreed that a new paper should be prepared for the following session.

45. Mr. Vincent Gensollen (France) introduced document TWC/24/16. The expert from Denmark inquired how regularly differences in direction changes caused problems in assessing distinctness. It was replied that cases of expression in different directions were very rare. Experts from the United Kingdom and the Netherlands highlighted the large reduction in the numbers of pairs of varieties declared distinct when reducing the number of plants in the trial and considered that it could be useful to inform the breeders. An expert from the United Kingdom said that this reduction was because a within-year test was being used, and hence was not a problem with an over-year test such as that used in COYD. An expert from Germany considered that the assessment of the direction of the difference might prove to be difficult to estimate.

46. The TWC agreed that a new document on the SELECT method would be prepared for its following session.

Molecular Techniques

(a) Developments within UPOV concerning the use of molecular techniques

47. The TWC received an oral report on developments within UPOV concerning molecular techniques, on the basis of document TWC/24/2. An expert from the United Kingdom considered that the use of molecular tools for variety identification on the enforcement of plant breeders' rights, technical verification and the consideration of essential derivation would involve statistics and probability calculations which might require the involvement of the TWC.

(b) Guidelines for Molecular Marker Selection and Database Construction (BMT Guidelines)

48. The TWC considered document BMT Guidelines(proj.6), which was introduced by the Office. Several experts considered that Section 4.3 Sample size should provide more guidance on the selection of the sample size, in particular in the case of cross-pollinated varieties. An expert from Kenya noted that the size of the sample becomes more relevant in the case of expensive seed, such as hybrid varieties of some horticultural crops. The expert from the Netherlands considered that section 4.4 should be reworded to stress the importance of storing the DNA reference sample. An expert from Kenya considered it to be very difficult to standardize the quality criteria proposed in paragraph 5.2.1 (d) and (e). The expert from the Russian Federation agreed but he thought that this problem could be solved by the

development of special kits which could be transferred to the laboratories, as used for some techniques in medical practice.

49. Mr. Sylvain Grégoire (France) introduced section 6 "Databases" of the BMT Guidelines. Mr. Grégoire noted that the aim of the section was to provide the minimum structure for a useful database, and hence a minimum structure that could be exchanged, but also that each UPOV member could expand. He reported on the work which was under development within the European Union in oilseed rape, with the participation of Denmark, France, Germany and the United Kingdom, and in maize, with the participation of Germany and Spain. He further explained that the projects started with a large number of markers which were gradually reduced and added that one of the most difficult aspects to harmonize between the laboratories was the coding of the markers. An expert from Germany explained that, for the developers of the database, it was necessary to obtain good quality data, and to develop a good structure, but for the crop experts the presentation of the data was most relevant.

50. Mr. Ilya Shilov (Russian Federation) made a presentation on research developments on molecular markers in potato and oilseed rape. A copy of the presentation is presented in document TWC/24/2 Add.

Variety Denomination Classes

51. The TWC noted document TWC/24/5 and requested that, once the new recommendations on variety denominations were adopted, the TWC would be informed by the Office on the changes between the new and the previous recommendations.

Image Analysis of Ornamentals with Emphasis to Rose and Alstroemeria (document TWC/24/15)

52. The TWC received a presentation on a project for the development of a database for images of ornamental varieties by Mr. Gerie van der Heijden (Netherlands). An expert from Romania considered it difficult for image analysis to provide similar results to the results from a field trial in the assessment of colors. An expert from the United Kingdom asked whether the shapes of the components of the plants had been taken into account. Mr. van der Heijden explained that it was not possible in the case of flowers of Alstroemeria because of the three-dimensional nature of the flowers. In reply to a question by experts from France, he added that, at that time, one single flower per variety was examined, however, uniformity was assessed on a sample of pots in a greenhouse.

Study on the Use of Data from Multiple Locations in DUS testing (document TWC/24/13)

53. Mr. Uwe Meyer (Germany) introduced document TWC/24/13. In reply to a question from an expert from France, Mr. Meyer explained that crop experts could select the location, but for each variety the crop expert should select the same location every growing cycle. The expert from Denmark considered that the location x year interaction should be included in the option 2 model, whilst the expert from the Netherlands and Mr. Meyer (Germany) considered that it was included in the error.

54. The TWC agreed that a new document should be prepared for its following session.

Exchangeable Software and TWC Documents

55. Mr. Thomas Drobek introduced document TWC/24/14 and distributed CD-ROMs containing a prototype of a database to search for TWC documents. Experts from Romania suggested that the database might be amended to include either a full text search function or a search on keywords, and that it should be presented to other Technical Working Parties for comments. Mr. Drobek answered that including keywords was possible, although they would have to be provided with the document, but that full text searching was not possible, because some documents were scanned documents.

56. The TWC agreed that a new document should be prepared for the next TWC session. It further agreed to propose to the TC that, in future TWC documents, the authors might include a list of key words to facilitate searching by the database and that the database should be presented to other Technical Working Parties for comments. It was also agreed that the Office would circulate to the TWC a list of the exchangeable software, to be updated and then returned to the Office for inclusion in this document.

Future Program, Date and Place of the Next Session

57. At the invitation of Romania, the TWC agreed to hold its twenty-fifth session in Bucharest, Romania, with a provisional date set for September 3 to 6, 2007. During the twenty-fifth 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)
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

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 DUS trials (document to be prepared by Germany)

(d) A rationale for elimination of reference varieties when COYD is used (document to be prepared by the United Kingdom and the Netherlands)

(e) Adjustment to COY for grouping characteristics (documents to be prepared by the United Kingdom)

10. Population standards used for assessing uniformity of off-types (document to be prepared by Germany, the United Kingdom and the Office of the Union)

11. Segregation ratios (document to be prepared by Denmark and France)

12. Image analysis in parsnip (document to be prepared by the United Kingdom)

13. Study on the use of data from multiple locations in DUS testing (document to be prepared by Germany)

14. Exchangeable software and TWC documents (documents to be prepared by Germany and the Office of the Union)

15. Review of test design: checking levels of quality (document to be prepared by France)

16. Date and place of the next session

17. Future program

18. Adoption of the report (if time permits)

19. Closing of the session

58. The TWC highlighted the importance of the submission of draft documents four weeks before the TWC session and requested the drafters to meet this requirement.

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

[Annexes follow]

ANNEX I

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[Annex II follows]

ANNEX II

STATUS OF PLANT VARIETY PROTECTION IN KENYA

Presentation made by Mr. Evans O. Sikinyi, Manager, Plant Variety Rights Office, Kenya Plant Health Inspectorate

STATUS OF PLANT VARIETY PROTECTION IN KENYA

By

M O Gunga
(KEPHIS)

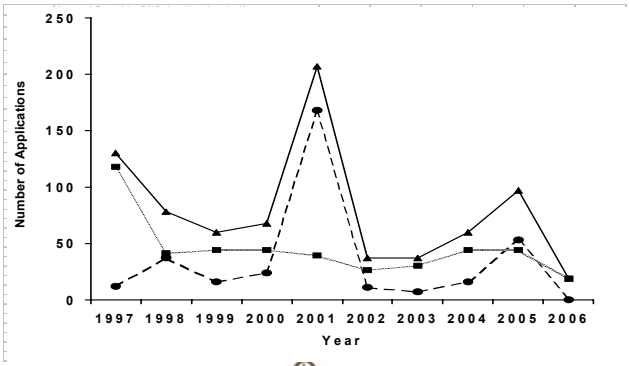
Experiences

- A total of 787 applications for PVP have been received to date
- Local (Kenyan) = 344 (44%) applications
- Foreign = 443 (56%) applications
- Local applicants are from:
  - Public institutions = 294
  - Private institutions = 50
- Food crops = 174
- Cash crops = 613

Table 1. Distribution of PVP Applications by Country

Country	No. of Applications
Kenya	344
Netherlands	217
Germany	110
France	67
United States	11
Israel	8
Italy	7
South Africa	7
Japan	5
New Zealand	4
United Kingdom	2
Ecuador	1
Belgium	1
India	1
Spain	1
Mexico	1
Total	**787**

Figure 1: Annual Trend in PVP Applications in Kenya (1997 - 2006)



- **Agricultural crops = 320 (41%) applications**
  - **- Local = 312 (98%), Foreign = 8 (2%)**
  - **- Applications dominated by cereals, industrial crops and pulses**
- **Horticultural crops = 467 (59%) of total applications**
  - **- Local = 16 (3%), Foreign = 451 (97%)**
  - **- Ornamentals dominate with 417 (89%) applications (comprising 53% of total PVP applications)**
  - **- Foreign applications for ornamentals = 404 (97%),**
  - **- Roses dominate ornamentals with 318 (76%) applications (40% of total PVP applications).**

Figure 3: Distribution of PVP Applications for Agricultural Crops in Kenya

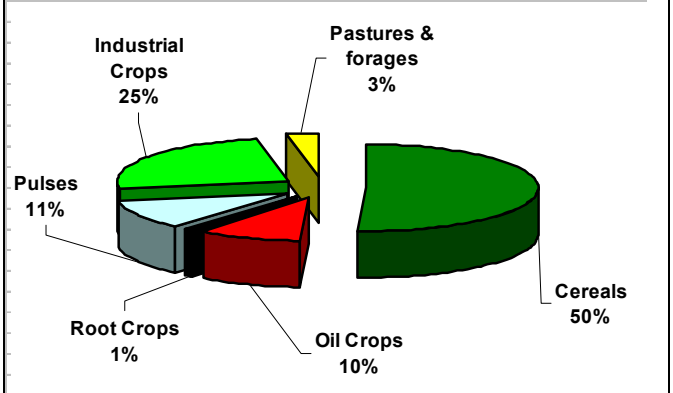
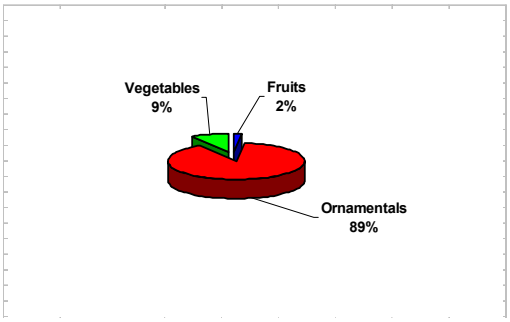


Figure 4. Distribution of Applications for Horticultural Crops in Kenya



Grants

- To date 190 titles have been granted.
- These grants have been made based on
  - DUS examinations conducted in Kenya
  - Test reports taken over from other UPOV member states/authorities
- Many more grants are expected to be made soon.

Constraints

1. Capacity/facilities to test ornamental varieties (which form the bulk of PVP applications)
   - Most of the PVP titles for ornamentals have been based on results taken over from other UPOV members
   - Currently renovating glasshouse and gauze house to facilitate testing of ornamentals
2. Limited understanding of PVP service
   - Kenya plans to undertake an elaborate outreach programme to sensitize and explain to stakeholders the objectives and processes of PVP

Impact

1. *Increased investment in breeding and commercialisation of new varieties*
   - Mainly in physical facilities and technology in the private sector
   - In contrast to private breeding institutions, investment has decreased in public institutions, especially in land acreages and financial allocations.
2. *Increased collaboration between local breeders with foreign breeders and international institutions*
   - Capacity building, funding, germplasm exchange and commercialisation of foreign varieties in Kenya.
   - Local breeders have also extended partnerships with farmers for on-farm testing of newly bred varieties.

Impact contd.

3. *Increased number and range of improved varieties available to the farmers*
   - The number of varieties, especially maize released after introduction of PVP higher and have superior qualities
4. *Enhanced access to internationally bred materials*
   - 57% of PVP applications are from foreign breeders
   - indicates enhanced availability of foreign germplasm, and which can be used further in developing improved varieties in Kenya.

Impact contd.

5. *Generation of foreign exchange and employment*
   - 53% of PVP applications Kenya are for ornamental varieties, and some of which are now commercially produced in the country for export. They are thus source of foreign exchange and employment of local people.
6. *Greater support to cash crop sector*
   PVP service in Kenya supports industrial cash crop agriculture more than the food crop sector. Implications of this trend with regard to national food security objectives may require attention.

[End of Annex II and of document]