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## INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

**TECHNICAL WORKING PARTY  
ON  
AUTOMATION AND COMPUTER PROGRAMS****Ninth Session****Guyancourt, France, May 29 to 31, 1991**

REPORT

adopted by the Technical Working Party on Automation and Computer ProgramsOpening of the Session

1. The ninth session of the Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the Working Party") was held at La Minière, Guyancourt, France, from May 29 to 31, 1991. The list of participants is reproduced in the Annex to this report.
2. Mr. P.L. Lefort, Director of GEVES, welcomed the participants to his office at La Minière and explained the new structure of GEVES, which had become a "groupement d'intérêt public." The session was opened by Mr. K. Kristensen (Denmark), Chairman of the Working Party.

Adoption of the Agenda

3. The Working Party adopted the agenda for its ninth session, which is reproduced in document TWC/9/1, after having agreed to include after item 3 an item consisting of a report on the results of the Diplomatic Conference for the Revision of the UPOV Convention.

Reports on Subjects of Special Interest to the Working Party Raised During the Twenty-Sixth Session of the Technical Committee and on Questions Raised by Other Technical Working Parties

4. Dr. Thiele-Wittig reported on the main subjects of interest to the Working Party raised during the last session of the Technical Committee, referring for further information to the full report on that session reproduced in document TC/26/5. Mr. Grégoire (France) reported on the main subjects of the last meeting of the Subgroup on Electrophoresis for Cereals and on the last session of the Technical Working Party for Vegetables (TWV). The Subgroup on Electrophoresis still had to settle several other questions of a more technical nature before being able to study document TWC/VIII/3 on a Common Data Structure for Electrophoresis (see also paragraph 24). The TWV, having dealt with several questions also handled by the present Working Party, finally had no further questions to raise.

Report on the Results of the Diplomatic Conference for the Revision of the UPOV Convention

5. Dr. M.-H. Thiele-Wittig informed the Working Party of the main results of the Diplomatic Conference for the Revision of the UPOV Convention which took place from March 4 to 19, 1991, and which on March 19, 1991, unanimously adopted a new text for the UPOV Convention. He highlighted the definition of variety, the increased scope of protection, the application of the Convention after certain periods to all plant genera and species, the optional exception relating to farm saved seed, the possibility for intergovernmental organizations that had their own plant breeders' rights systems to become members, and the introduction of the system of dependency for essentially derived varieties. He closed with the remark, that during the Diplomatic Conference, a Resolution had been adopted which requested the Secretary-General of UPOV to set up guidelines on "essentially derived varieties."

6. On the basis of the above information and document TWA/XIX/8 Rev., the Working Party had a general discussion on the meaning of the words "at least one characteristic" in the definition of a variety. The words would again open up the question of the use of multi-variate analysis for distinction purposes. Several experts expressed their view that multi-variate analysis of all characteristics might lead to something that could not be considered a predefined characteristic and might not be meaningful. A selection of certain characteristics, as shape, which would be separated into several measured characteristics to be evaluated by multi-variate analysis, would on the other hand make sense. The Working Party agreed that it should be left to the crop expert to decide. If the expert used multi-variate analysis to support differences determined visually (e.g. bulb form, leaf shape, etc.), that analysis would be a good tool. The Working Party agreed that Dr. Weatherup (United Kingdom), in cooperation with Mr. Van der Heijden (Netherlands), should by the end of the year draw up a paper that went into the question in detail and gave some examples of meaningful characteristics.

Combined Over-Years Distinctness (COYD) Analysis

7. The Working Party noted the results of the Technical Committee's discussions on the question of Combined Over-Years analysis, as reproduced in paragraph 27 of document TC/26/5, and the fact that the Technical Committee had asked the Technical Working Parties to encourage their members to apply the COY criteria. The Working Party agreed to amend the abbreviations from COY to COYD and from COU to COYU to align the two abbreviations better.

8. Long-Term LSD. The Working Party recalled document TWC/VIII/10 on the Estimation of COYD Variance and Long-Term LSD, which approached two problems, namely how to calculate LSD from a small number of varieties and the variation of characteristics which in many species depended on their expression. As agreed during the last session, Mr. Talbot (United Kingdom) had written a computer program on these calculations and circulated it to all experts who had received the program for COYD analysis. Dr. Laidig (Germany) had tried to apply that program to varieties of Persian Clover while Mr. Law (United Kingdom) had tried it on vegetable varieties. All other experts had also been invited to try out the program and send their findings and comments to UPOV. Dr. Laidig reported that the results of his study were not yet satisfactory, having differed according to whether he had applied the joint regression analysis, the close group variance or the robust estimation technique. He proposed at present to add LSD without joint regression and to study the problem further.

9. The Working Party finally agreed that experts from Denmark would study long-term LSD further on spring rape and perennial ryegrass, while experts from The Netherlands did the same on perennial ryegrass and Dr. Weatherup (United Kingdom) did so on ryegrass, and that experts from Germany would specify further the problems encountered so far. The studies should cover different methods in order that the best might be found by simulation from large data sets. In the meantime, for distinctness on small data sets the old UPOV method should continue to be used.

10. Use of COYD Analysis. In a round table enquiry it became apparent that at present COYD analysis was used for the following species:

- GB ryegrass, white clover, cocksfoot, red fescue, timothy and sugar beet, with plans for further extension;
- DE grasses, maize in parallel with old criteria, maize, rape and field beans as from the following year;
- NL grasses;
- DK grasses, clover, rape;
- FR grasses, luzerne;
- ES not yet used;
- PL not yet used.

11. The Working Party agreed to adapt the computer program for use on a PC. In addition, the handling of missing data should be included as well as the possibility of combining the two-years and three-years data sets. Dr. Weatherup (United Kingdom) would circulate the amended program by the end of November.

12. The Working Party considered further possible steps to ensure broader use but saw no need for further action apart from the adaptation for use on a PC. At the national level, computer experts should approach crop experts and try to convince them to use COYD. Dr. Weatherup (United Kingdom) would in addition prepare a simpler and more user-friendly explanation of the method.

Testing of Homogeneity in Cross-Fertilized Plants (COYU Analysis)

13. The Working Party recalled the reasons behind the program for the testing of homogeneity using the Combined Over-Years Uniformity (COYU) criterion, and the basic principle of the analysis, which was to compare the candidate variety with the most similar varieties during the testing of uniformity.

14. Dr. Weatherup (United Kingdom) introduced document TWC/9/5, containing a comparison between actual uniformity decisions and those found using the COYU criterion in the United Kingdom for PRG (diploid) varieties. He concluded that in the United Kingdom a level of  $P = 0.01$  for acceptance at two years and  $P = 0.001$  for rejection at three years would provide a standard of stringency similar to the present criterion. The level for rejection at two years would require further study.

15. Mr. Van der Heijden (The Netherlands) introduced document TWC/9/6, which contained a comparison of data for red fescue and Italian Ryegrass. He concluded that the COYU seemed a good criterion for determining the uniformity of cross-fertilized varieties. The best agreement with the present criterion was obtained at the 0.5% level for two-year and three-year testing.

16. Mr. Deneken (Denmark) introduced document TWC/9/11, on the application of COYU analysis. In the past, almost no new variety had been rejected in Denmark for lack of homogeneity. From the results he concluded that a three-year rejection level of 0.005 and a two-year rejection level of 0.002 would be acceptable.

17. Mr. Grégoire (France) reported on the results in France, which had been sent to Germany and incorporated in the summary established by Dr. Laidig in document TWC/9/8. A rejection level of 0.5% after three years and an acceptance level of 5% would be acceptable. In France, GEVES would prefer cases of rejection after two years to be notified to the breeder, leaving it to him to request a third year of test if he so desires.

18. Dr. Laidig (Germany) introduced document TWC/9/8, containing a summary of results of data received from Denmark, France, the United Kingdom and Germany. From those data and the data in the above-mentioned documents TWC/9/5, TWC/9/6 and TWC/9/11, the Working Party established during the meeting the following table of probability levels (expressed in percentages) which would allow a smooth transition to be made from the present criterion to the COYU criterion:

	<u>GB</u>	<u>DE</u>	<u>NL</u>	<u>DK</u>	<u>FR</u>
rejection after three years	0.1	0.2	0.5	0.5	0.5
rejection after two years	>0.1	0.2	?	0.2	none
acceptance after two years	1	5	?	?	5

19. On the basis of the above table the Working Party agreed to experiment during two years (1991 and 1992) on grasses with the following probability levels:

rejection after three years	0.2%
rejection after two years	0.2%
acceptance after two years	2 %

Rejection after two years would not be mandatory for all member States. Member States wishing to apply the levels already for decisions on uniformity would be free to do so, while those having problems with the levels could still use the old uniformity criterion.

20. In case the study suggested that the above levels were not appropriate, the following levels should also be studied:

rejection after three years	0.1% and 0.5%
rejection after two years	0.1% and 0.5%
acceptance after two years	1 % and 5 %.

This would allow another, more appropriate level to be selected if necessary. The Working Party asked Mr. Talbot (United Kingdom) to amend the computer program so that the additional three levels could be studied at the same time.

21. The Working Party confirmed that all characteristics used for distinctness purposes should also be checked for uniformity. It noted that some member States used a larger number of characteristics for distinctness purposes than others, and that in those States the risk of rejecting a variety for lack of uniformity was greater. That was also the reason why those States found it more difficult to accept higher levels.

22. Off-types for Different Acceptance Probabilities and Population Standards. The Working Party noted the problems encountered by the Technical Working Party for Agricultural Crops (TWA) with the tables of maximum numbers of off-types for different acceptance probabilities and population standards (document TC/XXV/8) for self-fertilized and vegetatively propagated species, and those arising from the doubling of the number of off-types for mainly self-fertilized varieties according to the General Introduction to the Test Guidelines. It proposed to the Technical Committee that it amend the latter rule and recommend instead a change in the population standard (in most cases a doubling but for certain species even a tripling). This would give the rule a statistically sounder basis.

23. The Working Party cleared up a misunderstanding concerning the recipients of document TC/XXV/8: it had not at all been intended that the Technical Working Parties should be asked to decide what table to apply for what species and that the decision on the actual sample size should then be left to the member States. The tables had rather been compiled to facilitate the Technical Working Parties' task of choosing the most appropriate sample size for each species, which should then be included in the individual Test Guidelines and complied with by all member States. The Working Party felt the need to explain to the crop experts, in a more detailed and easily understandable manner, how to devise a sampling scheme and the meaning of the various parameters. Mrs. Campbell (United Kingdom), in cooperation with Mr. Ghijsen (The Netherlands), would prepare a paper on those lines by the end of the year for circulation to the Working Party.

#### Common Data Structure For Data From Electrophoresis or Other New Methods

24. The Working Party recalled document TWC/VIII/3 on a Common Data Structure for Electrophoretic Data, which raised two main points, namely (i) general principles for computer data base structures with respect to international harmonization and exchange of information; and (ii) a proposal for a data base design using a relational model for electrophoretic data. The document had been circulated to the members of the Technical Working Party for Agricultural Crops and the Technical Working Party for Vegetables, and also to the TWA Subgroup on Electrophoresis in Cereals for comments; the latter had not yet studied it in detail, however, owing to other more urgent problems.

25. The Working Party was informed of an ISTA paper on the statistical handling of electrophoretic data, and some other references which would be circulated to its members, via the UPOV Office, by the German and Dutch experts.

26. At present, the situation in Germany with respect to electrophoresis was unchanged compared with that reported on two years previously (see document TWC/VII/15). In France, a one-dimensional program was being studied by INRA, and might be incorporated in a commercial program, while an existing two-dimensional program was under test. The Netherlands, the United Kingdom and Spain had some simple computer programs on electrophoretic data under study. The Working Party would examine the above-mentioned papers and follow closely the work of the Subgroup on Electrophoresis.

#### Description of Varieties

27. Most Similar Varieties. Mr. Van der Heijden (The Netherlands) introduced document TWC/9/7 on the calculation of similarities between varieties using electrophoretic data. The calculation involved two different sets on potato varieties and on varieties of Lolium. He concluded that for electrophoresis bands where no genetic information or physical interpretation was available, Gower's similarity index seemed to be a suitable tool, otherwise the phi-squared index might be used.

28. The Working Party noted that there were different needs for the calculation of similar varieties, whether it was in order to find similar varieties to be grown alongside the candidate variety or to specify them in the final variety description. It finally agreed to close the discussion on that subject unless the crop experts came up with well-formulated wishes or questions.

29. Standardized Variety Description, Selection of Example Varieties. The Working Party noted the introduction given by Mr. Deneken (Denmark) to document TWC/9/10 on Between-Center Standardization of Variety Descriptive Scores Based on Continuous Measurements, drawn up on the basis of document TWC/VII/19, which outlined a method for standardizing between centers those variety descriptive scores that were based on continuous measurements in the cereal Test Guidelines at present under revision. In cooperation with Miss Rasmussen (Denmark), certain characteristics had been selected in order to produce an objective set of scores for varieties that two or more centers had in common, which could then be used at each center to estimate scores for new varieties that would be compatible between centers. He concluded that the method seemed to be acceptable only for some characteristics and crops, and needed further study before it could be recommended.

30. The Working Party confirmed its wish to study further both that method and others, to find out what varieties showed less variation in different environmental conditions, and to remove certain unstable varieties. The experts from Denmark would continue their study on cereals and prepare a new paper before the end of the year.

31. Computer Format For Variety Description Transfer. Mrs. Campbell (United Kingdom) explained her idea for the use of delineating characters in the transfer of variety descriptions in order to obviate the sending of the whole variety description form by making it possible to send only the answers. Several different delineating characters would be necessary, however, for instance to distinguish between the numbers of the questions, between the columns, between UPOV characteristics and other characteristics, and so on. Mrs. Campbell would prepare a paper on the subject by March 1992. The transfer of such data would also require only simple software to reprint the full variety description form. A further question left to the receiving office was how to read the information in its own data base.

#### Access to International Data

32. The Working Party noted the results of the discussions held by the Technical Committee on the question of the access that the authorities of member States responsible for plant variety protection and testing could have to data held by the offices of other member States, which were reproduced in document TC/26/5, paragraph 20. The Technical Committee had recognized the usefulness of that kind of access, but had pointed out that some categories of information might present problems. It had asked the Technical Working Parties, as a first step, to study the possibilities for the exchange, in electronic form via diskettes, of published information between member States.

33. Mrs. Campbell (United Kingdom) introduced document TWC/9/4, which gave a review of the question of international access to data as dealt with by the Working Party during the past four years. The document listed (i) the type of information that member States exchanged at present, (ii) the ways in which that information was transmitted (hard copy, fax, floppy disc or magnetic tape, international network or interrogation of international data bases), including advantages and disadvantages, (iii) the experience within UPOV and (iv) the way forward. The Working Party asked Mrs. Campbell to make a few corrections to the document, namely in paragraphs 3.4(ii) and 4, and to add information on fees that might be charged, possible implications and technical and practical aspects.

#### Programs Which Can Be Readily Assimilated into Other Plant Variety Computer Systems

34. Mrs. Campbell (United Kingdom) reported that with respect to Annex VIII to document TWC/VI/13, containing an overview of the various programs, only one reply had been received, namely from Denmark, which stated that some programs in the list would no longer be in use. The experts were asked to inform her of any further changes or additional details, and especially to indicate which programs were available free of charge. An updated list would be circulated by the end of July 1991 for further comments, which should reach Mrs. Campbell by the end of the year.

#### Minimum Distances Between Varieties

35. The Working Party noted documents TWC/VIII/9 Rev. and TWC/VIII/14, on minimum distances and LSD, and the difficulties that the Technical Working Party for Agricultural Crops had in understanding their contents. It had difficulty especially with the difference between minimum distance and significant difference, the fact that the significant difference could be smaller than the recording unit, and the different meaning of minimum distance between varieties and the minimum difference between characteristics. It was noted that in the past experts had often used the wrong terms when referring to certain differences. In future, the use of the exact terminology should be ensured, and experts from the Working Party should attend sessions of other Technical Working Parties in their countries to explain the meanings of the various terms to the crop experts. It was agreed that it was up to the crop expert to fix the minimum distance, and that he would do so normally in his decision on the layout of the test and the choice of interpretation of the results. There was no link between the recording unit and the LSD, and it should therefore play no role in the definition of the minimum difference in a given characteristic. The Working Party felt that a description of the



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various terms, including their interrelationship and how they were used in decisions on distinctness, was necessary for better understanding on the part of the crop experts. The expert from The Netherlands, in cooperation with the experts from the United Kingdom and Germany, would prepare a paper for circulation by December 1, 1991.

Review of Documents on Statistical Methods Discussed During Past Sessions of the Working Party

36. The Working Party noted that documents TWC/9/2 and 3 contained lists of documents on COYD analysis and on similarity analysis prepared by Dr. Weatherup (United Kingdom), but that some documents were still missing. It asked the other experts once again to send their information to Dr. Laidig (Germany) by the end of the year for the preparation of a combined document for circulation at the end of March 1992. Submissions should highlight the most important documents on each subject and the most detailed description of a given method, and so should also include certain Technical Committee documents on the subject.

37. The Working Party agreed on an index system to facilitate the tracing of documents. All future documents to be prepared for the Working Party would therefore be given keywords by their authors. The keyword would appear immediately after the title of a given document. The authors of the documents for the present session would send the keywords chosen for their documents to the expert from The Netherlands, who would establish a list of keywords for the next session of the Working Party.

Cooperation With Breeders in the Testing of Varieties

38. The Working Party noted document TWC/9/9, which was a draft of the final report on the pilot project in Denmark concerning variety testing done by the breeder. Any comments on that report should be sent to the experts from Denmark.

Future Program, Date and Place of Next Session

39. At the invitation of the expert from The Netherlands, the Working Party agreed to hold its tenth session in Wageningen, The Netherlands, from June 2 to 4, 1992. The meeting would start at 9 a.m. on June 2 and close at 4 p.m. on June 4, 1992. During its session, the Working Party would either continue or start discussions on the following items:

(i) Report on subjects of special interest to the Working Party raised during the twenty-seventh session of the Technical Committee and on questions raised by other Technical Working Parties: oral reports;

(ii) Report on new developments in member States: oral reports;

(iii) Combined Over-Years Distinctness (COYD) Analysis:

(a) Amendments: Dr. Weatherup (United Kingdom) to amend and circulate the program and to prepare a simpler explanation by the end of November 1991;

(b) Long-Term LSD: the experts from Denmark, The Netherlands, the United Kingdom and Germany to study the method on selected species by January 1992;

(iv) Combined Over-Years Uniformity (COYU) analysis:

- (a) Mr. Talbot to amend the program by November 1991;
- (b) All experts to study the proposed levels by January 1992;

(v) Testing of homogeneity: Mrs. Campbell, in cooperation with Mr. Ghijsen (The Netherlands), to prepare a paper on the devising of a sampling scheme by the end of the year;

(vi) Multi-variate analysis: Dr. Weatherup (United Kingdom), in cooperation with Mr. Van der Heijden (The Netherlands), to prepare a paper by the end of 1991;

(vii) Description of varieties:

(a) Computer format for variety description transfer: Mrs. Campbell to prepare a paper by March 1992;

(b) UPOV scores: Mr. Kristensen (Denmark) to prepare a paper by the end of 1991;

(viii) Access to international data: Mrs. Campbell to amend document TWC/9/4 before the end of 1991;

(ix) Programs which can be readily assimilated into other plant variety computer systems: Mrs. Campbell (United Kingdom) to update Annex VIII to document TWC/VII/13 by the end of July; comments on the new version to be sent to Mrs. Campbell by the end of 1991;

(x) Minimum distances between varieties: Mr. Van der Heijden (The Netherlands), in cooperation with Dr. Weatherup (United Kingdom) and Dr. Laidig (Germany), to prepare a paper by December 1, 1991;

(xi) Review of documents on statistical methods discussed during past sessions of the Working Party: Dr. Talbot (United Kingdom), Dr. Weatherup (United Kingdom), Mr. Kristensen (Denmark) to send their lists to Dr. Laidig by the end of 1991 for a combined document to be prepared before the end of March 1992; all authors of documents for the ninth session to send the respective keywords to Mr. Van der Heijden (The Netherlands) for the compilation of a list of keywords by the end of 1991;

(xii) Handling of visually assessed characteristics: the experts from The Netherlands and Germany to investigate.

#### Visits and Demonstrations

40. On the afternoon of May 29, 1991, the Working Party visited the installations of Agri-Obtention, which markets all varieties emerging from INRA. On the afternoon of May 30, the Working Party watched demonstrations in the computer unit of the Groupe d'étude et de contrôle des variétés et des semences (GEVES) at La Minière, with special emphasis on how the Plant Variety Protection Gazette was printed directly from a computer file, on the use of hand-held data capture devices, on the use of comparisons of inbred lines of maize and on the computer connection with Northern Ireland.

41. This report has been adopted by correspondence.

## ANNEX

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LA MINIERE, GUYANCOURT, FRANCE, MAY 29 TO 31, 1991

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