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UPOV

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Tenth Session
Wageningen, the Netherlands, June 2 to 4, 1992

REPORT

adopted by the Technical Working Party on Automation and Computer Programs

Opening of the Session

1. The tenth session of the Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the Working Party") was held in Wageningen (The Netherlands), from June 2 to 4, 1992. The list of participants is reproduced in the Annex to this report.

2. Mr. C.A.A.A. Maenhout, Director of CPRO-DLO, welcomed the participants to his office in Wageningen and explained the new structure of CPRO. 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 tenth session, which is reproduced in document TWC/10/1.

Reports 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

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 of that session reproduced in document TC/27/9. Mr. Grégoire (France) reported on the main subjects of the last session of the Technical Working Party for Fruit Crops (TWF), referring in particular to the application of the COYD analysis to banana, mango and pineapple, the request for advice on computer programs and the measurements in connection with shape. The Working Party also noted discussions on the order of states in the cases where states were added to an existing characteristic on the occasion of a revision. The Working Party insisted that the logical order be used in the latter case.

Reports on New Developments in Member States

5. The Working Party received short reports from some of the experts on recent developments in their countries. The expert from Germany stressed the change in the strategy in his Office where at present they would be working towards standardization of hardware and software, in order to be able to decrease costs. In Israel, the experts were working towards an approach for faster handling of the system in bringing the data processing unit right to the field. In Poland, a new department for DUS testing had been established with a new computer unit and they were working on the design of the data base. The Spanish expert reported that his Institute was no longer an autonomous institute, but integrated within the Ministry of Agriculture. They were working towards an integrated system of qualitative and quantitative characteristics. In Hungary, they were at the moment investigating how they could connect the evaluation system with the variety description system. In Japan, the DUS testing was not computerized. The expert hoped that the future UPOV Centralized Data Base would be established in a way that it was exchangeable with their present system. In The Netherlands, at present, good hardware and software for data processing existed. The administrative data, however, were not yet included in that system. At present, the building up of a data base was under way. In Denmark, a system for administrative data had been built up which was implemented on PCs in a local network.

Combined Over-Years Distinctness (COYD) Analysis, Including Long-Term LSD

6. Mr. Falkenberg (Denmark) introduced document TWC/10/10 on the Evaluation of the Use of Long-Term LSD Values for Distinctness Tests of Perennial Ryegrass in Denmark. He concluded that there was a reasonably good correlation between the estimated long-term LSD and the LSD value calculated from the last two years' data. The estimated LSD value showed some variability from year to year, but only in a few cases were there indications of a trend over the 10 to 12 years examined. The use of close groups seemed to be valuable, since it systematically reduced the LSD value. However, it had to be examined how a long-term LSD value based on close groups could be used in practice.

7. Having discussed in general the application of the long-term LSD method, the Working Party finally concluded that in all cases where at least 20 degrees of freedom were available the ordinary COYD method should apply. Only if less than 20 degrees of freedom were available through the low number of varieties tested, should the long-term LSD be calculated. Before application, however, each crop and for each testing center it was to be tested whether the long-term LSD was stable over the years. In case it was not stable, it could only be applied very carefully. The Working Party considered the recommendation to use the long-term LSD provisionally. It would follow the experience gained in the coming years before making a definite recommendation. The Working Party agreed that there was always a certain natural grouping and it would therefore be left to the expert to decide within each group whether he would apply the long-term LSD or not. Experts were invited to examine further whether it was possible to apply the closed group LSD or not.

8. After an enquiry made during the session, the Working Party noted that, in five of the member States represented during the session, the COYD analysis would be applied to varieties of grasses and in some of them also to varieties of clover, sugar beet, maize, rape seed, field bean, lucerne. It would be under study in some of the member States for varieties of flax, linseed, onion, shallot and leek. As agreed in the past, some countries would still apply the COYD analysis at the 5% LSD level for a transitional period. They planned, however, to change as of 1994 to the 1% level. The Working Party agreed that it was important to convince more member States to change to the COYD analysis. Therefore, the importance of the method should be stressed to others and for this purpose the expert from the United Kingdom was asked to rewrite the present document on the COYD analysis, foreseeing two parts: a first part in which the usefulness and the idea of the method would be explained in simple terms while, in the second part, the full method would be given including all information necessary to enable application of the method without the need to request the computer program.

Combined Over-Years Uniformity (COYU) Analysis

9. The Working Party noted the introduction to document TWC/10/7 prepared by experts from Germany on the study of the proposed COYU analysis levels. The document concluded by stating that the probability levels that had been agreed for experiments on grasses for 1991 and 1992 would allow a smooth transition from the present homogeneity criteria to the COYU criteria. After having heard the reports of the other experts on their experience with the application of the COYU analysis, the Working Party noted that all those experts who had studied the application of that method had had no experience which would prevent them from changing to the method with the required levels. The Working Party thought, however, that some more experience and study, covering more countries and species, would be necessary before a final decision on the level could be taken. The Working Party hoped to be able to fix the levels next year. It agreed therefore to continue trials next year with the levels as proposed during the last session of the Working Party (rejection after 3 years: 0.2%, rejection after 2 years: 0.2% and acceptance after 2 years: 2%). The Working Party agreed that the experts from Denmark would collect all information from the other member States by February 1, 1993, for the preparation of a document to be circulated by April 1, 1993, to all members of the Working Party.

10. The Working Party agreed furthermore that, as already decided for the COYD analysis, the expert from the United Kingdom would be asked to revise the present document on the COYU analysis in a similar way in two parts: one simple explanation and thereafter a full description of the method in a way that would enable experts to apply the method without the need to request the computer program.

Testing of Homogeneity

11. The experts from The Netherlands, Mr. Ghijsen and Mr. Van der Heijden, introduced documents TWC/10/5 and TWC/10/9. The Working Party had a lengthy discussion on the sample size and their probability levels for the acceptance of a variety and on the effect of a low number of plants with respect to the risk of accepting too heterogeneous varieties. It stated that in certain cases as, for example, in electrophoresis tests, the low number of seeds involved would mean that it was almost impossible to check homogeneity if only 20 grains were used. This would raise the question of what was a reasonable number to be tested compared with the workload involved. The Working Party finally agreed to present the two above-mentioned documents to the other Technical Working Parties and ask for their comments with respect to that question. In addition, the experts from The Netherlands would check what were the ISTA rules with respect to homogeneity and inform the Working Party of their findings.

12. After the acceptance of document TC/XXV/8 by the Technical Committee, certain experts raised the question of what the present situation was with respect to the testing of homogeneity for vegetatively propagated varieties and truly self-pollinated varieties and especially whether the table mentioned in paragraph 28 of the General Introduction to the Test Guidelines was completely replaced by document TC/XXV/8. The Working Party therefore asked the Technical Committee to clarify the situation.

Multi-Variate Analysis

13. Mr. Talbot (United Kingdom) introduced document TWC/10/4 on the Multi-variate Distinctness Criterion prepared by Dr. Weatherup (United Kingdom). He concluded with Dr. Weatherup that Mahalanobis D^2 statistics could be used to distinguish between variety pairs without much change in the testing stringency compared with the COYD analysis. However, further work would be required to ensure the validity of the method in the DUS case where only two or three years or replicates of data were available. The statistics could also be used as an investigational tool to assist in the determination of the plant feature, such as a contrast of characteristic differences which could lead to distinctness being established by uni-variate procedures. The Working Party agreed that this method should not be an additional method to the COYD analysis. The method could, however, be used to confirm that the COYD analysis worked well. It could also be used to identify those characteristics which were the distinguishing characteristics of the variety. It could be used as a safeguard against making wrong decisions in using a number of uni-variate analyses. By this method, experts would have the possibility of detecting new relations between characteristics and arrive at newly derived characteristics for the use of distinctness. The experts from the United Kingdom would investigate the matter further and prepare, by April 1, 1993, a paper for the next session of the Working Party.

Description of Varieties

14. Between-Center Scores. The Working Party noted that no document had been prepared for this item which showed that there was no strong demand for further discussion. It finally agreed that it would discontinue discussion on this subject and leave it to the experts who needed further advice to approach their local statisticians.

15. Computer Format for Exchange of Description of Varieties. The Working Party agreed that it would need a standardized computer format for the exchange of descriptions of varieties in electronic form. It set up a small subgroup with experts from Germany, France and the United Kingdom to prepare a draft format for the exchange of lists of varieties under test in electronic form, including their grouping characteristics. The expert from the United Kingdom would prepare a paper for circulation via the Office of UPOV on that format. Comments on the paper should be sent to the expert from the United Kingdom for compilation into a document by the end of February 1993.

Access to International Data, UPOV Central Computerized Data Base

16. UPOV Central Computerized Data Base. The Working Party noted the explanations given by the Office of UPOV on document TWC/10/2 and the history leading to that document. A lengthy discussion took place on the usefulness of such a data base, on its possibilities and on what should be placed in such a data base. The Working Party discussed several possibilities for obtaining further information and for the testing of the program used by WIPO on compact discs with international trade mark information. It finally proposed that a small subgroup should be set up within UPOV comprising one or two experts from the Working Party as well as crop experts and experts with administrative and legal knowledge, which could contact WIPO and the company that produced the software to get more information on the possibilities offered by the software. As a result of such a meeting of the subgroup, a paper could be prepared for the autumn session of the Technical Committee which might decide on further steps to be taken. It might be best to develop two proposals, one limited to the checking of variety denominations (the minimum information) and another with about 20 further items, and to ask for the cost of these two proposals. Mr. Grégoire (France) and Dr. Laidig (Germany) were proposed as possible experts from the Working Party.

17. Computing Centre Electronic Communications. The Working Party noted a table on computing centre electronic communications, circulated during the meeting. The experts were asked to inform Mr. Talbot (United Kingdom) by the middle of June on any updating of that table. The updated version would be circulated via UPOV by the end of June 1993.

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

18. The Working Party noted that no request for changes of the information as included in Annex VIII of document TWC/VI/13 had been received by the experts from the United Kingdom. The Working Party asked its experts to send any further information and especially additional information on commercial packages used by the member States as well as any relevant macros to Mr. Talbot (United Kingdom) by mid June for the preparation of an updated list for circulation by the end of June via UPOV.

Minimum Distances Between Varieties

19. Mr. Van der Heijden (The Netherlands) introduced document TWC/10/6 on differences between varieties. The document explained the zero hypothesis which meant that when two varieties "a" and "b" were compared, the normal assumption was to consider the two varieties identical. Because of the use of

the limited number of plants a statistical test had to be applied to analyze whether the difference between the two random samples was significant (>LSD). It further explained the two types of error that could be made in this respect. The first one in deciding that two varieties were different based upon the results of the experiment whereas in reality they were not (the error was called probability level and given the symbol alpha). The second kind of error in deciding the two varieties were not different, whereas in reality they were (the error was called discriminating power and given the symbol beta). It furthermore gave various alternatives which were used to prevent accepting differences which were unusually small. These alternatives were:

(i) Standard procedure, use of alpha = 0.01 whether the LSD was small or large;

(ii) Set the minimum value (threshold) for LSD. Normally alpha was set at 0.01, but if this gave an LSD of, let's say, smaller than 1.5, then 1.5 was used as LSD;

(iii) Decrease alpha (for example, divided by 2) for the characteristics in which unusually small variances sometimes occur;

(iv) Add a certain fixed value, also called minumum difference, to the LSD. This method was described in paper TWC/VIII/14.

20. The Working Party had a lengthy discussion on the various methods and concluded that the best discriminating power was obtained through method (i). The second best was alternative (ii) which should be used if alternative (i) could not be used because it yielded too small an LSD-value. Alternatives (iii) and (iv) had very poor discriminating powers and could not be recommended. The Working Party stated that restricting the approach characteristic by characteristic was wrong because the decision would have to be taken per variety and not per characteristic. Statistics could only help to solve the problem of minimum distance. The Working Party agreed to ask Mr. Ghijsen (The Netherlands) to prepare a further paper on minimum distance by the end of February for discussion during its coming session.

Review of Documents on Statistical Methods Discussed During Past Sessions

21. The Working Party noted document TWC/10/3 containing a review of statistical documents. After a general discussion on the way the papers should be presented in such a document, the Working Party agreed that each paper should contain a brief description of the method, followed by a short history of the development of the method, with a review of the most important papers prepared in that connection. The document should, in addition to the short list of most important papers to be annexed to each part, contain also at the very end a complete list of all the documents issued, including circulars of importance and also other documents which did not have the code TWC but which were important and had been prepared during the process of reaching the final conclusion. Thus, for example, document TC/XXV/8, prepared for the Technical Committee, should be part of that document. With respect to the papers on COYD and COYU, they should be worded in such a way that they could form part of the annexes to the revised General Introduction. Both papers should comprise a first part in which the method would be described in simple terms understood by a non-statistician and in a second part the full description of the method should follow including the program for the calculation of COYU and COYD to enable experts to do the final calculation on

the basis of the information on paper without having to request the computer program in electronic form. The Working Party agreed that all those involved in the preparation of document TWC/10/3 would, before the end of February 1993, re-write their parts of that document according to the above agreement. From now on, all documents should also contain key words to ease reference. The revised document TWC/10/3 should not only explain methods that had already been completed, but also explain methods during their stage of development. Thus, for example, document TWC/10/10 on the long-term LSD should form part of the new document. The Working Party would update that document every year either by additions to an existing document or, after several editions, by a completely revised new document.

Handling of Visually Assessed Characteristics

22. Dr. Laidig (Germany) introduced document TWC/10/8. In the document, a first step was made to start work on data of visually observed characteristics which were difficult to handle and therefore avoided by statisticians. He explained the different scales included, the nominal scale, the ordinal or rank scale, interval and ratio scale and counts. As a result of his study, he concluded that descriptive statistics provided the expert an intuitive understanding of the data additional to his experience. Attention should be paid to strongly correlated characteristics and it should be checked whether some of them could be eliminated to save time and cost. The analysis of variance could be applied for an equatory use if the data had a 1 to 9 scale with a non-degenerated sampling distribution. F-values for years made it possible to find the characteristics which were mostly influenced by year effects. F-values for varieties showed whether characteristics had a high discriminative power or not. A comparison of LSD values derived by the analysis of variance with the minimum distance derived by expert knowledge provided the expert with a helpful check of his work. As the study was only a first step on how to find and how to handle visually observed characteristics, more experience would be necessary and further studies would have to be made, especially by extending the studies to other species. The techniques were very helpful in establishing or revising Test Guidelines and should be used by the experts when drafting new or revising existing Test Guidelines.

23. Mr. Jansen (The Netherlands) described and explained to the Working Party the analysis of ordinal data studied by him. He concluded that for data recorded on an ordinal scale, the assumptions underlying the analysis of variance may be violated. A threshold model was therefore proposed which could be used as a basis for an alternative way of analysis. The types of result of the analysis were similar to those obtained from the analysis of variance and could be used to indicate pair-wise the differences between varieties. Further investigations into the properties of the analysis would be carried out by him to get an insight into the applicability of the method proposed. He offered to prepare a document by April 1993 for discussion during the coming session of the Working Party. He invited the other experts to send him data for checking for such a paper.

24. The Working Party agreed that it was necessary to encourage more work on the analysis of visually assessed characteristics with the aim of improving the understanding of the characteristics. It therefore proposed that everybody would check the application of the analysis to visually assessed characteristics, at home, and present results by the end of February for discussion during the coming session of the Working Party.

Future Program, Date and Place of Next Session

25. At the invitation of the expert from the United Kingdom, the Working Party agreed to hold its eleventh session in Cambridge, United Kingdom, from June 2 to 4, 1993. The meeting would start at 9 a.m. on June 2 and close at noon on June 4, 1993. 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-eighth 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 prepare a revised document with a simple explanation and a full description of the method by the end of February 1993;

(b) Long-Term LSD: all experts to study the method on selected species by February 1993;

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

(a) Mr. Talbot to prepare a revised document in two parts, a simple explanation and a full description of the method, by the end of February 1993;

(b) All experts to study the proposed levels by the end of February 1993;

(c) The expert from Denmark to prepare a paper by the end of March 1993;

(v) Testing of homogeneity: UPOV to collect comments on documents TWC/10/5 and TWC/10/9, the Technical Committee to detail the present situation with respect to document TC/XXV/8;

(vi) Multi-variate analysis: Mr. Talbot (United Kingdom) to prepare a paper by the end of February 1993;

(vii) Description of varieties: Mr. Talbot (United Kingdom) to prepare a paper, for circulation via the Office of UPOV, on the computer format for the exchange of data; comments to be collected and compiled in a document by Mr. Talbot by the end of February 1993;

(viii) Access to international data:

(a) to note the results of the preparation of a possible UPOV data base;

(b) Mr. Talbot (United Kingdom) to update the list of Computing Center Electronic Communications by the end of June 1992, on the basis of comments on that list to be sent to him by mid June 1992.

(ix) Programs which can be readily assimilated into other plant variety computer systems: Mr. Talbot (United Kingdom) to update Annex VIII to document TWC/VI/13 by the end of June 1992 on the basis of comments to be sent to him by mid June 1992.

(x) Minimum distances between varieties: Mr. Ghijsen (The Netherlands) to prepare a paper by the end of February 1993;

(xi) Review of documents on statistical methods discussed during past sessions of the Working Party: all experts involved with the preparation of document TWC/10/3 to send revised texts to the Office of UPOV by the end of February 1993;

(xii) Handling of visually assessed characteristics: Mr. Jansen (The Netherlands) to prepare a document by April 1993;

(xiii) Characteristics of shape: Mr. van der Heijden (The Netherlands) to prepare a document by the end of February 1993.

The Working Party noted an invitation to meet in 1994 in Israel.

Visits and Demonstrations

26. On the afternoon of June 1, 1992, the Working Party watched demonstrations and received explanations on the study of image analysis with the aim of using that method for the measuring of already existing characteristics, especially shape characteristics. In the afternoon of June 3, the Working Party visited the Floriade 1992 at Zoetermeer, near The Hague.

27. This report has been adopted by correspondence.

[Annex follows]

ANNEX

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LIST OF PARTICIPANTS
AT THE TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS
WAGENINGEN, THE NETHERLANDS, JUNE 2 TO 4, 1992

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