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UPOV

TWC/VIII/13
Original: English
Date: October 10, 1990

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

# TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

## Eighth Session
## Belfast, United Kingdom, June 6 to 8, 1990

REPORT

adopted by the Technical Working Party on Automation and Computer Programs

Opening of the Session

1. The eighth session of the Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the Working Party") was held at Belfast, United Kingdom, from June 6 to 8, 1990. The list of participants is reproduced in Annex I to this report.

2. Dr. C.H. McMurray, Chief Scientific Officer, welcomed the participants to the Department of Agriculture for Northern Ireland at Belfast. The session was opened by Dr. F. Laidig (Germany), Chairman of the Working Party.

Adoption of the Agenda

3. The Working Party adopted the agenda for its eighth session, which is reproduced in document TWC/VIII/1.

Reports on Subjects of Special Interest to the Working Party Raised During the Twenty-Fifth 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 to the full report on that session reproduced in document TC/XXV/11 for further information.

Combined Over-Years (COY) Analysis

5. The Working Party noted the results of the discussions on the question of the combined Over-Years analysis in the Technical Committee as reproduced in paragraphs 22 to 25 of document TC/XXV/11, and that for grasses the significance level of 1% after two years of tests and the same significance level after 3 years of tests had been agreed upon by the Technical Committee as proposed by the Working Party. A transitional period of three years had, however, been decided for those member States which foresaw difficulties in the introduction of the new significance level for grasses. With respect to other species, the Technical Committee had furthermore asked the Technical Working Party for Agricultural Crops and the Technical Working Party for Vegetables to apply, wherever possible, the COY analysis to agricultural and vegetable species.

6. The Working Party asked the expert from France to explain the COY analysis to the members of the Technical Working Party for Vegetables during its next session to be held near Avignon, to guide the TWV to further studies for vegetable species.

7. In an enquiry during the session on the use or the intended use of the COY analysis it emerged that The Netherlands, the United Kingdom, and France applied it at the 1% level, and Germany and Denmark at the 5% level to grasses, Germany to maize and rape at 5%, and France to luzerne at the 1% level. It was or will be applied in parallel with the present method by Germany for vegetables, by the United Kingdom for winter rape, sugar beet, onion, carrot and peas, by Spain for maize, and by Denmark for winter rape and sugar beet.

8. Mr. Kristensen introduced document TWC/VII/2 on the Additional Calculations for Non-Independent Characteristics in the Application of the COY-analysis. He concluded that the calculations using artificial correlation matrices showed that as long as the correlations between characteristics were below .5, and at most ten characteristics were used, the type I error was only affected marginally by correlations between characteristics. If the probability level in the COY analysis was 5%, then the overall probability for declaring a pair of varieties with identical means distinct, could be as high as 35-40% if ten characteristics were used. Only when the correlations between the characteristics were very strong, would this probability decrease. Using a 1% probability level in the individual test, the overall probability could be kept below 10%. Therefore, no great error was made if it was continued to assume that no correlation between characteristics existed.

9. The Working Party agreed to keep the results in mind when studying the application of the COY analysis to vegetables. Not too many characteristics should be used and only those with a high discriminatory power.

10. Dr. Weatherup (United Kingdom) introduced document TWC/VIII/5 on Variety Grouping for Herbage DUS Analysis. In the document, a grouping of perennial ryegrass varieties by maturity was compared to a grouping by character size. The size groups showed larger within-group variation than maturity groups. The reason for this might be the strong influence of heading date on characteristics measured at that time or at related times. Size groups also showed larger variety times year mean squares for characteristics measured at heading date which showed that less year variation is removed in these groups leaving a larger residual variation. Thus there would be no advantage in changing the present procedure of analysing by maturity groups.

11. During the discussions, the question arose whether bigger differences would be observed in case observations were collected at the same date or at the same stage of physiological development of the varieties concerned. The Working Party agreed that all depended on the definition of the characteristics. That should be taken into account more when establishing Test Guidelines.

12. Mr. Grégoire (France) introduced a document on a grouped COY analysis, which was distributed during the session and is reproduced as Annex II to this report. He described three types of data sets: (i) in the case of a dependence between the level of expression of the characteristics and standard deviation, the grouped COY analysis would give more appropriate results than the non-grouped one; (ii) in the case of no clear dependence between the level of expression of the characteristic and the standard deviation, the grouped COY analysis would give less appropriate results; (iii) in the case of an appearance of groups, a calculation group by group would be most appropriate if the number of varieties so permitted.

13. The Working Party finally recommended that grouping should not be the routine procedure to be applied and be used only in case of the impression that the assumptions of the classical method were not justified.

Long-Term LSD

14. Mr. Talbot (United Kingdom) introduced document TWC/VIII/10 on the Estimation of COY Variance and Long-Term LSD. He explained that the document 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. He concluded that: (i) variation between varieties close together was less than variation between varieties further apart; (ii) variation could be related to the level of expression of a characteristic; (iii) the use of MJRA could be helpful in reducing LSDs; (iv) variation could be considerably affected by occasional extreme values; (v) variation within groups of years may be very different from the long-term average variance. As the question of how to derive estimates of variance should be addressed before considering estimating a long-term LSD from past data, possible approaches could include the use of (i) MJRA where appropriate; (ii) grouped COY; (iii) national groups of varieties; (iv) robust estimators.

15. After discussion, the Working Party agreed that Mr. Talbot (United Kingdom) would establish a computer program on these calculations and circulate it to all experts who had received the program for the COY analysis. Dr. Laidig (Germany) would try to apply that program to varieties of Persian clover and Mr. Law (United Kingdom) to vegetable varieties. All other experts were also invited to try out the program and send their findings and comments to UPOV by March 1, 1991.

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

16. Mr. Talbot (United Kingdom) set out the reasons behind the program for the testing of homogeneity using the Combined Over-Years Uniformity criterion and the basic principle of the analysis to compare during the testing of uniformity the candidate variety with the most similar varieties. He then introduced document TWC/VIII/8, prepared by himself and Mr. Grégoire (France), on the Evaluation of Over-Years Criterion for Uniformity. The document contained a summary of data from a number of member States and for several crops which had been studied and compared with the current UPOV uniformity criterion as laid down in the General Introduction to the Test Guidelines. During that study, the following two deficiencies in the present UPOV criterion had been noted, namely (i) the criterion assumed that all established varieties had approximately the same uniformity, while in practice there were real differences between varieties and (ii) the feature of between-plant uniformity for many characteristics was that it could change between the varieties in response to the level of expression of the characteristic which was being measured. The document concluded by proposing certain probability levels for the Over-Years criterion which were comparable with the current UPOV criterion.

17. The Working Party reconfirmed that the COU Criterion was a unique method and recommended to the Technical Committee that all member States should move towards studying that method and applying it to cross-fertilized species. At present, however, further studies would be necessary before the probability levels could be fixed. Having made a short enquiry into the desirable levels in the different member States, the Working Party finally agreed to study for the next session the following different levels in order to be able to take a final decision during its next session:

| | | | | |
|---|---|---|---|---|
| 3 year rejection | : 2%; | 1%; | 0.5%; | 0.2% |
| 2 year acceptance | : 2%; | 1%; | 0.5%; | 0.2% |
| 2 year rejection | : 10%; | 5%; | 2% | |

Some experts expressed already their reservations towards a rejection after 2 years. The results of this study should be sent to Dr. Laidig (Germany) by March 1, 1991. Dr. Laidig would then prepare a summary by April 1, 1991. Mr. Talbot would, in addition, prepare a document on the advantages of the COU Analysis by the end of August for presentation to the Technical Committee.

Common Data Structure For Data From Electrophoresis or Other New Methods

18. Mr. Grégoire (France) introduced document TWC/VIII/3 on a Common Data Structure for Electrophoretic Data, prepared by himself with the help of Mrs. Campbell (United Kingdom), Dr. Laidig (Germany) and Mr. van der Heijden (The Netherlands). The document raised two main aspects, namely (i) general principles for computer database structures with respect to international harmonization and exchange of information; and (ii) a proposal for a database design using a relational model for electrophoretic data. The document was not intended to establish a rule or a guideline for databases, but to help the computer experts when thinking of databases. It was not intended to be used by biochemists for their laboratory work, but to be a help to exchange or display general information on electrophoresis for varieties.

19. The Working Party agreed to circulate the document to the members of the Technical Working Party for Agricultural Crops and Technical Working Party for Vegetables, as well as to the TWA Subgroup on Electrophoresis in Cereals and invite their comments. The document could then be adjusted in the light of the comments received during the next session. Mr. Grégoire (France) would also try to attend the coming sessions of the Technical Working Party for Vegetables and the TWA Subgroup on Electrophoresis and explain the document.

20. Dr. Fuchs (Germany) reported on the last meeting of the above-mentioned subgroup and the electrophoretic ringtest on wheat, barley and oats. The evaluation was still to be completed. The next meeting was scheduled for October 16 and 17, 1990, in Surgères, France.

21. In this connection, the Working Party noted paragraph 46 of document TC/XXV/11 indicating that image analysis was, at present, not yet considered suitable for cereals. However, the Working Party considered the method to be an excellent tool to take measurements for several other species. Experts from the United Kingdom, Germany and France also reported briefly on their studies to measure colors.

## Description of Varieties

### Most Similar Varieties

22. Dr. Weatherup (United Kingdom) introduced document TWC/VIII/6 on Methods for Identifying Similar Varieties and document TWC/VIII/7 on Dissimilarity Between Varieties Using Non-Continuous Measurements. In the first document, several methods are compared, starting from the Euclidian distance via the sum of squares of standardized differences ($S^2$) to the Mahalonobis generalized distance ($D^2$), which was proposed to be used. Using the calculated $D^2$ values, those varieties most similar to a candidate variety could be identified from their ranking of varieties by their $D^2$ values relative to the candidate. Groups of similar varieties could be established through a cluster analysis performed on the calculated $D^2$ values between all varieties. Alternatively, an ordination could be performed using a principal coordinate analysis. The second document described the method of applying the Gower's similarity coefficient for (i) dichotomous characteristics, (ii) qualitative characteristics and (iii) quantitative characteristics other than of measurements of a continuous scale.

23. The Working Party considered whether the latter method for non-continuous measurements could be applied to prepare groups for the testing, to weigh the F-value according to the mentioned equitation (3) or whether it could be applied to electrophoresis results. Mr. Van der Heijden (The Netherlands) agreed to try and apply it to electrophoresis data, Mrs. Campbell (United Kingdom) would try it on ornamental data which, however, would first have to be transcribed into numerical data.

24. Mrs. Campbell (United Kingdom) introduced the first part of document TWC/VIII/11 on the Identification of Similar Varieties. The document referred to the plans of a survey on existing methods for identifying similar varieties to which only two countries responded. The survey had revealed two possible approaches, the first involving the forming of some corporate measure of similarity or distance of individual characteristics which was applied in Northern Ireland and described in the documents by Dr. Weatherup mentioned in paragraph 22 above, and the second aiming to look at each recorded characteristic on a "once-at-a-time" basis as applied in Germany and in England and Wales.

25. Dr. Fuchs (Germany) introduced the second part of document TWC/VIII/11 and explained the method for the identification of similar varieties used in Germany, distributing at the same time some examples of results.

26. Mr. Grégoire (France) introduced document TWC/VIII/12, entitled A Tool to Compare Varieties, distributed during the session. The document described the program used in France to list maize varieties similar to the candidate variety, the aim being to have an overall criterion which dealt with qualitative, quantitative and electrophoretic data. The program summarized the characteristic-by-characteristic difference to obtain a total difference over all characteristics. The program allowed different weights to different characteristics. The experts classified the characteristics into three groups: (i) polygenic characteristics or characteristics with few fluctuations, (ii) oligogenic characteristics and (iii) characteristics difficult to estimate or fluctuating characteristics. The aim was to give more weight to a difference in a class (i) characteristic and less weight to a difference in a class (iii) characteristic. In the program the limit value for an output was a parameter.

27. The Working Party noted that the methods used in member States to arrive at similar varieties were quite alike, although differing in the details. It considered it useful to bring the various methods together. Mrs. Campbell (United Kingdom) would, by the end of July 1990, prepare a summary of the procedures, together with an indication of the intended distribution to the other Technical Working Parties for information and comments. The Working Party also asked that the Technical Committee be informed of the fact that there were different views as to the usefulness of indicating similar varieties in the variety descriptions.

Standardized Variety Description

28. Mr. Talbot (United Kingdom) introduced document TWC/VII/19 on Between-Center Standardization of Variety Descriptive Scores Based on Continuous Measurements. The document outlined a method for standardizing between centers those variety descriptive scores that were based on continuous measurements. It explained the different steps to be taken and applied them to an example of pea seed weight.

29. The Working Party asked the Technical Working Party for Vegetables to study the document and to inform it of any remarks on that document.

30. The Working Party also felt it necessary to gain more experience with that method. It agreed to apply the method to the cereal Test Guidelines at present under revision. Mr. Kristensen (Denmark) would contact Miss Rasmussen (Denmark) for the selection of certain characteristics for which data for possible example varieties would be collected from the member States. Mr. Kristensen would prepare a document on the results for the next session.

Access to International Data

31. The Working Party noted document TC/XXV/10 on Interactive Access to International Data, prepared by Mrs. Campbell (United Kingdom) at the request of the Working Party formulated during its last session, as well as the results of the discussions on the question of access by authorities of member States responsible for plant variety protection and testing to data held by the offices of other member States, held by the Technical Committee as reproduced in document TC/XXV/11, paragraph 19. The Technical Committee had

recognized the usefulness of that kind of access, but had pointed out that some categories of information, especially of a technical nature, may raise problems in that connection. It had agreed to discuss the subject further in a joint session with the Administrative and Legal Committee in the spring of 1990. That joint session had, however, to postpone discussions on that subject because of the importance of the revision of the UPOV Convention. The Technical Committee had proposed to study (i) what type of information was important for the Technical Working Parties and (ii) what would be the benefit of having that information available on-line.

32. The Working Party did not agree on the question. After an enquiry during the session it became apparent that the majority did not consider it to be of high priority. The main problem of on-line access would be the status of the accessed information, i.e. whether it was officially authorized information or of an intermediate nature, which might even mislead those accessing it. Therefore, many experts still preferred written, authorized publications.

33. On the other hand, it was not denied that transmission in electronic form--for example by electronic mail or with a disquette--of certain published data could be advantageous, as it could reduce the time between authorization for publication and availability to experts. Certain information, if transmitted in electronic form, could also save time enabling the receiving office to include it immediately in its computer without the necessity to type it in manually.

34. The Working Party discussed the idea to establish a pilot project for a common data structure and to try it out on data from a certain species in order to gain experience. However, at the present stage, it finally decided against such a project. Instead, it agreed to try and facilitate the transmission in electronic form of published information and its possible inclusion in other computers. As a start, Mrs. Campbell (United Kingdom) agreed to prepare, by March 1991, an electronic format for published variety descriptions which would facilitate the incorporation of variety descriptions transmitted in electronic form directly into other computers.

35. Mrs. Campbell (United Kingdom) introduced document TWC/VIII/4 on the NIAB/PVRO Corporate Data Structure. The database structure explained in the document was intended to support various application areas, including the administration of national list and plant breeders' rights schemes, DUS and VCU trials, seed certification and the supporting seed testing procedures. The intention was to minimize data duplication and related overheads by holding the data once and once only and making it accessible to all other approved applications for reading or updating. An access control system, itself consisting of database tables, had been built to ensure that only authorized applications and users could access specific areas of the database. If the requirements of other countries could be considered and incorporated at the consolidation stage of the above data structure, then it might be possible to develop a recommended data structure for those countries that have not yet computerized their systems as well as for those who might be changing their systems at some time in the future. Such a structure would enable an easy standard access to authorized data in other countries and provide a good basis for the exchange of variety information.

36. The Working Party invited the experts to study the DUS Logical Data Structure at home, to check whether it could be suitable in their respective countries and to send any comments and/or remarks to Mrs. Campbell.

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

37. The Working Party noted that, with respect to Annex VIII of document TWC/VI/13 containing an overview of the different programs, only one reply had been received by Mrs. Campbell (United Kingdom). The reply was from Denmark and stated that some programs in the list would no longer be in use.

38. Having discussed the usefulness of such a list and the indication of programs depending on other packages, the Working Party finally decided to continue to update that list. Mrs. Campbell would prepare an updated version to be circulated for further updating by the end of August 1990. From a survey during the session it appeared that GENSTAT was used in the Federal Republic of Germany, The Netherlands, the United Kingdom and South Africa, while SAS was used in Denmark, partly in Israel and in the seed industry in France. Germany also intended to switch to SAS.

Cooperation With Breeders in the Testing of Varieties

39. The Working Party noted part of the information contained in document TC/XXV/5 on cooperation with breeders in testing. It noted that the second year of testing of the pilot project in Denmark had not been too successful, as stated in the report reproduced as Annex III to this report.

40. The Working Party further noted that, according to the Technical Committee, cooperation with breeders in the testing of varieties would be very important for the authorities in the near future when dealing with the enlargement of the lists of species of which varieties were eligible for protection and the increase of applications for protection of varieties. It agreed that breeders needed to be involved more in the growing tests, especially for smaller species for which few applications were received, but the question was mainly one for the Technical Working Parties dealing with individual species than for this Working Party. It would, however, offer its help if required.

States of Expression in Test Guidelines

41. The Working Party noted document TC/XXIII/5, containing proposals for the use of states of expression in certain given examples. It noted that the document had been adopted by the Technical Committee during its last session in October 1989 with the exceptions as mentioned in paragraph 52 of document TC/XXV/11. There was therefore no further need to go into detail in that document. Dr. Laidig (Germany) would continue to check the draft Test Guidelines on the logical order of states of expression of the characteristics. Dr. Laidig reported that during these checks he had come across two problems, namely the case of shape characteristics with two states of expression only and the case of a non-clear absence of an expression connected with several degrees of presence. In the latter case, there should be only one characteristic with the first state reading "absent or very weak." In the first case, in many instances, it would be advisable to have three states in a similar manner to that mentioned in the amended example 11.1 of document TC/XXV/5.

Minimum Distances Between Varieties

42. Mr. Talbot (United Kingdom) introduced document TWC/VIII/9. The first part of the document contained background information on the term of "minimum distance" with the two key notions contained in the UPOV Convention, namely "clearly distinguishable" and "important characteristic" and on the development from the 2 x 1% method for distinctness up to the application of the COY analysis. Problems had arisen with the question of minimum distances in cases where (i) the LSD was smaller than the minimum distance; (ii) the LSD was larger than the minimum distance; (iii) the minimum distance had to be estimated from small data sets; (iv) difficulties had arisen to maintain the same variety; (v) difficulties had arisen in establishing distinctness in shape characteristics; (vi) minimum distances were established with the help of biochemical techniques; or (vii) multivariate minimum distances were established. Mr. Talbot concluded that of the questions raised, the most important to be tackled would be the application of computational methods in the area of shape characteristics, electrophoretic data and multivariate distance measures.

43. The Working Party considered document TWC/VIII/9 to be an excellent document which should be presented to the Technical Committee as well as distributed to the other Technical Working Parties for comments.

44. The Working Party had a long discussion on the problem of how to justify differences between varieties larger than the LSD. During these discussions, it was made clear that minimum distance and LSD were two different things. The minimum distance would be fixed by the crop expert, whereas the LSD depended on the statistical evaluation of test results. The two together would make up the effective difference required between two varieties.

45. Mrs. Campbell (United Kingdom) was asked to prepare a document to explain the above to the other Technical Working Parties (see document TWC/VIII/14). The main part of that document stated as follows:

"...

Hypothesis Testing

It is important to separate out the concept of minimum difference and least significant difference. In statistical terms they are not the same, although they may take the same numerical value.

When a statistical test is performed to assess whether or not a variety is distinct, a hypothesis is tested.

(i) The usual form is as follows:

The null hypothesis is $H_0$: $m_1 - m_2 = 0$ tested against the alternative hypothesis $H_1$: $m_1 - m_2 > < 0$, where $m_1$ and $m_2$ are the true population means of the measured characteristic of the candidate variety and the reference variety respectively.

(ii) If the minimum distance which it is required to preserve around a variety is d, say, then the hypothesis tested would be as follows:

The null hypothesis is $H_0$: $m_1 - m_2 \leq d$ tested against the alternative hypothesis $H_2$: $m_1 - m_2 > d$.

In fact the hypothesis testing has always taken the form (i) rather than (ii), which means that at present the minimum distance used in distinctness testing is zero.

Applying the Test

When using (i), the least significant distance (LSD) is calculated. This is a variable quantity and depends on the number of replicates, years, etc. and also upon the level of significance adopted. If the difference between the sample means of the two varieties under consideration is greater than the LSD, the conclusion is that the population means differ and the varieties are said to be distinct for that characteristic.

If the difference between the sample means is less than the LSD, the conclusion should be that there is no evidence to reject the hypothesis that the varieties have the same value for that characteristic. Further evidence may be gathered from an additional year's data. This will have the effect of increasing the degrees of freedom and, possibly, lowering the LSD value.

When the LSD is "too small"

Sometimes the calculated LSD is smaller than the quantity which the crop expert feels is a sensible unit of measurement. In this case, crop experts (through the Technical Working Parties), should agree the minimum distance which should be adopted for that particular character. Then the hypothesis test under (ii) can be applied.

In this case, in order to establish distinctness, the difference between the sample means of the two varieties will have to be greater than the minimum distance (as established by the crop experts) plus the calculated LSD.

..."

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

46. At the proposal of Mr. Talbot (United Kingdom) the Working Party agreed to prepare a review of certain documents on statistical methods discussed during past sessions. Mr. Weatherup (United Kingdom) would prepare a review on the COY analysis and on the similarity analysis, Mr. Talbot (United Kingdom) on the COU analysis and Mr. Kristensen (Denmark) on the remaining subjects. The documents to be prepared by the end of the year would be sent to Dr. Laidig (Germany) who would merge them into one document before March 1, 1991.

47. The Working Party agreed to establish an index system to facilitate the tracing of documents. Therefore, all future documents to be prepared for the Working Party should be given key words by the respective authors.

Chairmanship

48. As the chairmanship of Dr. Laidig (Germany) will end with the closing of the next ordinary session of the Council in October 1990, the Working Party unanimously proposed to the Technical Committee that it should recommend to the Council the election of Mr. K. Kristensen (Denmark) as new Chairman of the Working Party for the next three years. [The Council, during its session on October 18 and 19, 1990, unanimously elected Mr. K. Kristensen (Denmark) as Chairman of the Working Party for a term ending at the end of the ordinary session of the Council in 1993]

Future Program, Date and Place of Next Session

49. At the invitation of the expert from France, the Working Party agreed to hold its ninth session in La Minière, France, from May 29 to 31, 1991. The meeting would start at 9.00 a.m. on May 29 and close at 1 p.m. on May 31, 1991. During its session, the Working Party would either continue or commence discussions on the following items:

(i) Report 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 (oral reports);

(ii) Combined Over-Years (COY) Analysis: Mr. Talbot to prepare, if possible, a program on Long-Term LSD to be circulated by the end of the year; Dr. Laidig to apply it to Persian clover; Mr. Law to vegetables; all others to also try it; all comments to be sent to UPOV by March 1, 1991;

(iii) Testing of homogeneity in cross-fertilized plants (COU analysis): Mr. Talbot to prepare a document on the advantages of the COU analysis by the end of August 1990 for the Technical Committee; all to study the different probability levels and to send comments to Dr. Laidig by March 1, 1991; Dr. Laidig to prepare a summary by April 1, 1991;

(iv) Common data structure for data from electrophoresis or other new methods: comments on document TWC/VIII/3 are expected from the Technical Working Party for Agricultural Crops, the Technical Working Party for Vegetables and the TWA Subgroup on Cereals;

(v) Description of varieties:

(a) Similar Varieties: Mr. Van der Heijden to try to apply the method in document TWC/VIII/7 to electrophoresis; Mrs. Campbell might try and apply it to ornamental data; Mrs. Campbell furthermore to prepare, by the end of July 1990, a summary of the procedures to get at similar varieties for presentation to the Technical Working Parties;

(b) Selection of Example Varieties: Mr. Kristensen to prepare in cooperation with Miss Rasmussen a document on the selection of example varieties for selected cereal characteristics;

(vi) Access to international data: Mrs. Campbell to prepare an electronic format for variety descriptions by March 1991;

(vii) Programs which can readily be assimilated into other plant variety computer systems: Updated information to be sent to Mrs. Campbell;

(viii) Minimum distances between varieties: Comments to document TWC/VIII/9 are expected from the Technical Committee or Technical Working Parties; comments are expected to document TWC/VIII/14 on the difference between minimum distances and LSD;

(ix) Review of Documents on Statistical Methods Discussed During Past Sessions of the Working Party: Dr. Weatherup to prepare a review on COY analysis and similarity analysis; Mr. Talbot to prepare a review on the COU analysis; Mr. Kristensen to prepare a review on the remaining subjects.

Visits and Demonstrations

50. On the afternoon of June 6, the Working Party visited the biometric computer facilities at the Biometrics Division of the Department of Agriculture for Northern Ireland at Newforge Lane and followed demonstrations of the programs used in the United Kingdom. It furthermore visited the trial grounds of the plant testing station at Crossnacreevy.

51. This report has been adopted by correspondence.

[Three annexes follow]

ANNEX I

LIST OF PARTICIPANTS
AT THE TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS
BELFAST, UNITED KINGDOM, JUNE 6 TO 8, 1990

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[Annex II follows]

ANNEX II

TWC/VIII
S. GREGOIRE FRANCE

## Grouped COY

Some data have been computed using the COYVAR1 program circulated by M. TALBOT.

No actual figures are given on these computations but some comments are listed below.

### Comments on the use of grouped COY

In all cases the COY analysis and the COU analysis were computed.
In the COU analysis X-Y graphs were produced (X= character studied, Y=Log(SD)) for each character each year, and for the over-year means.
Three different typical types of data sets are described in this document.

Case A:

There is a dependance between the level of expression of the character and the standard-deviation.

In that case the grouped COY would give more appropriate results than the classical COY approach.

Case B:

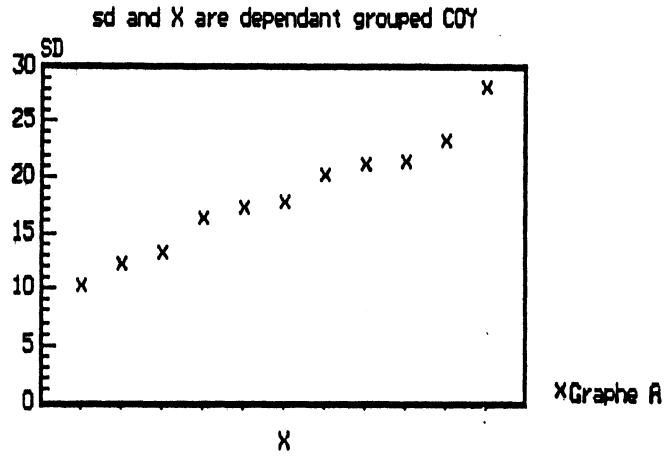
There is no clear dependance between the level of expression of the character and the standard deviation.

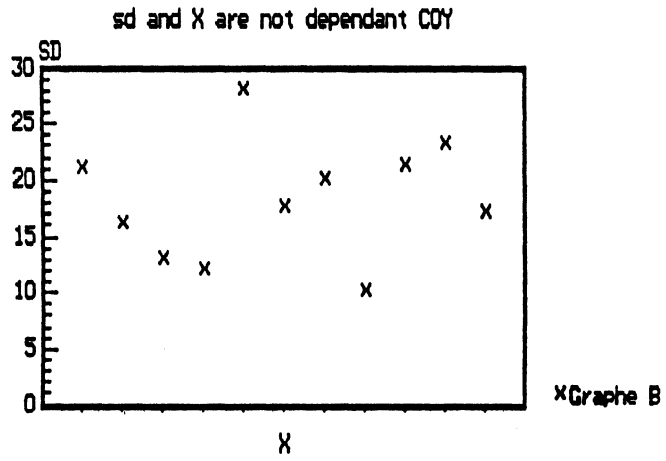
In that case the classical approach would give more appropriate results than the grouped approach.

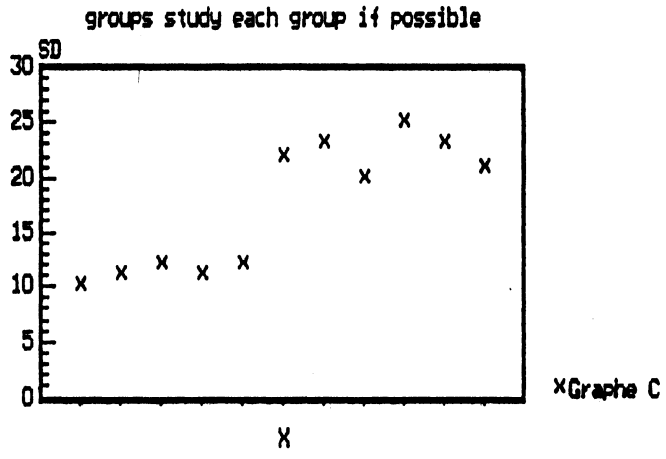
Case C:

Groups appear.

In that case if the number of varieties is sufficient a compute group by group would be appropriate.




[Annex III follows]

ANNEX III

# VARIETY TESTING. A PILOT PROJECT IN DENMARK.

## Variety testing made by the breeder:

The background for the project and the results of the first year of testing in 1987 are published as an annex to the report from the Technical Working Party for Ornamental Plants and Forest Trees held in Ghent, Belgium in 1988 (Document TWO/XX/16).

**Second year of trials (1988):**
After first year's results the guideline and the growing conditions were altered. The guideline was changed in the characteristics, which showed the greatest difference between the describers and the growing places. Some characteristics were deleted from the guideline and in other characteristics the definitions were altered. The growing conditions were made more uniform at the different growing places.

There were one new describer and two new varieties in the second year compared to the first year.

In addition to the above mentioned changes the experimental design was similar to that of the first year (see the report from the 1987-trial).

**Comments on the 1988 results.**
When making the experiment there were some problems causing that the data are incomplete. This incompletion makes the analysis of the data more difficult and the conclusions in the second year are subject to a greater uncertainty compared to the trial in 1987.

Despite these problems the following conclusions can be drawn from the second year:

(1) In several characteristics there is in the second year a greater difference between the describers, and in some characteristics there are also a larger effect of the growing place compared to the first year of experimentation. This is found despite the improvement of the guideline and the more uniform growing conditions.
(2) The varieties could not be separated by the same characteristics by all the describers. It should be mentioned that in the experiment it was not tried to separate the varieties at the time when the descriptions were completed. The comparisons were only made on paper after the measurements were completed and analysed.
(3) The two years of experiments show that there are differences between the different years on the variety descriptions made.
(4) As in the first year there are also in second year differences between the characteristics in the guideline as to how easy they are to handle. Especially there are difficulties with characteristics where colors are to be determined.

**Conclusions of the experiments in 1987 and 1988:**

From the two experiments it can be concluded that variety descriptions made by different describers and at different growing places cannot be compared with enough certainty to be used for granting Plant Breeders Rights. The results show, however, so good an accordance that description of a new variety and comparison with the relevant reference varieties made by one experienced describer at one growing place could be used for granting Plant Breeders Rights.

To give the best possible description it is necessary to make a more detailed guideline with better explanations and definitions than usually made in the UPOV guideline. In this new guideline it must be defined more accurately where and how the individual characteristics are to be measured. Some of the growing conditions must also be determined more specifically in the testing procedure.

For selecting the relevant reference varieties it is also necessary for the competent authorities to have a more detailed technical questionnaire, which the applicant has to fill in when applying for Plant Breeders Rights. This questionnaire must include some specific pictures.

**The testing procedure:**
When testing at the breeder's place is going to be used there must for each plant species be appointed a committee with a very good knowledge about the varieties on the market. This expert committee must consist of members representing the breeders and others representing the testing authority. The job for the committee is to point out the relevant reference varieties.

The breeder has to grow his new variety and the selected reference varieties at his nursery. He will then make a description of his new variety according to the guideline and point out how it is distinct from the other varieties. The descriptions will be sent to the authorities who are dealing with the specific plant species, and the Plant Breeders Rights will be granted if the description fulfils the demands. At the time of the trial the testing authority will inspect the plants on trial to see if the new variety is homogeneous and to have an overall view of the trial as such.

**Time schedule for the testing procedure.**

week 45: Latest date for submission of application and technical questionnaire with pictures.
week 47: Expert committee selects reference varieties.
week 3: Propagation of the new variety and the selected reference varieties.
week 32: Start of short day treatment.
week 33: Pinching.
week 40-43: Flowering and filling in of the description according to the guideline.
week 46: Latest submission of description.

The testing authorities can come for supervision at any time they want.

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This system will be tried with some of the new varieties of Schlumbergera for which there will be applied for Plant Breeders Rights in 1989-90. Parallel to this new testing procedure the varieties will be tested according to the normal UPOV procedure so the results can be compared.

**Usability of the new system.**

There are several points and problems that have to be solved before this testing system can be used in practice. It seems that there are the following problems:

1. Applications from countries different from the country of the testing authority.
2. Plant species with a large number of applications.
3. Control of homogeneity, especially if the testing place is distant from the testing authority.
4. Appointment of an expert committee.
5. Testing of candidate varieties from different breeders applied for in the same year, which should be tested against each other.

ad 1. It makes the administration more difficult if the applications come from many different countries.

ad 2. It will be more difficult to administrate the testing system if there are many applications within a species. If there is a large number of applications it is properly more economic to test the varieties at one central testing station.

ad 3. The testing authority shall inspect the trial, among other things to see if the new variety is homogeneous. If the trial is effected in another country this inspection can be made by the official authorities from the same country as the breeder.

ad 4. The work of the expert committee is to select the reference varieties against which the breeders have to test their new varieties. In order to work properly it is necessary for the expert committee to have full knowledge of the varieties grown in commercial nurseries. It can be difficult to have this knowledge if it is different varieties that are grown in different countries.

ad 5. There may be problems if candidate varieties are to be distributed to other breeders for testing purpose. The problem can possibly be solved by making contracts guaranteeing that the plant material will be destroyed after the testing is finished. It is a question that should be discussed with the international breeders organizations. If it is not possible to distribute candidate varieties to other breeders it will make the work a lot more difficult, and at best it will take a year more before protection can be granted.

The above mentioned problems make it clear that the system is best suited for plant species where there are only few breeders and few applications. In addition to that it will be beneficial if the breeders are located in a small geographical area. It is

also very important with a close relation between the testing authority and the breeder in this new testing system.

Årslev the 13th December 1989
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[End of Annex III and of document]