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UPOV

TWC/12/11
ORIGINAL : English
DATE : July 26, 1994

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Twelfth Session

Tel Aviv, Israel, April 12 to 14, 1994

REPORT

prepared by the Office of the Union

Opening of the Session

1. The Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the Working Party") held its eleventh session in Tel Aviv (Israel) from April 12 to 14, 1994.

2. The list of participants is reproduced in Annex I to this report.

3. The session was opened by Mr. Sylvain Grégoire (France), Chairman of the Working Party. Mr. Baruch Bar Tel (Israel) welcomed the participants.

4. The Working Party was informed that Mr. Max-Heinrich Thiele-Wittig had been unable, for health reasons, to attend the session and act as its secretary. The Working Party decided to write to him to wish him early and full recovery.

5. The secretariat of the session was provided by Mr. André Heitz (Office of the Union).

Adoption of the Agenda

6. The Working Party adopted the agenda as given in document TWC/12/1, after having noted that there would be a number of supplementary items and documents. The list of the documents used in the session is given in Annex II to this report.

Report on Subjects of Special Interest to the Working Party Raised During the Thirtieth Session of the Technical Committee and on Questions Raised by Other Technical Working Parties

7. The Working Party had before it document TC/30/6 (report on the thirtieth session of the Technical Committee) and document TWC/12/7 (items from Technical Working Parties).

8. Concerning the Technical Committee, Mr. Kristian Kristensen (Denmark, outgoing Chairman of the Working Party) referred to the following paragraphs of document TC/30/6: 20 and 21 (participation of representatives of seven international organizations in the future sessions of the Technical Committee); 22 to 31 (matters arising from the work of the Working Party); 40 (characteristics combining a state of absence with two states of presence); 53 (UPOV central computerized data base). He also mentioned that the documents of the Technical Committee would henceforth be available to any interested person.

9. Ms. Françoise Blouet (France) reported on the second session of the Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular, held in Versailles (France), from March 21 to 23, 1994. She emphasized that, at this stage of development, biochemists tended to use a complete package comprising a biochemical method and the associated statistical tool to produce a given kind of results. In future, the approach would have to change: the question to be answered would be identified first, and the appropriate methods would be defined thereafter. The Working Party might then be called upon to assist in their selection. The contribution of the Working Party should also be seen as an assistance to lawyers and administrators in making and substantiating decisions.

10. The following questions arose from the activities of the bodies reviewed under this agenda item:

(i) the question of the possible use of COYD for species other than cross-pollinated ones;

(ii) the question of how to treat "problem pairs" in distinctness testing;

(iii) the question of the kind of work to be expected in relation to biochemical and molecular techniques.

Report on New Developments in Member States

11. **UPOV**.- Finland and Norway acceded to the 1978 Act of the Convention in 1993, bringing the number of member States to 24. Argentina, Austria and Uruguay had requested the advice of the Council on the conformity of their laws with the Convention; they received a positive advice, enabling them to deposit an instrument of accession. Requests for advice had been made by Portugal, the Russian Federation and Ukraine; their laws would be examined by the Council at its eleventh extraordinary session, on April 22, 1994 [a request was also made subsequently by Colombia; the Council gave positive advices, with qualifications in two instances].

12. Work on the 1991 Act was progressing at national and regional level. So far, no instrument of adherence had been deposited.

13. **Czech Republic**.- The national system was based on personal computers ("PCs") operating under MS/DOS and using spreadsheet programs. For the future,

a data base system of "unlimited" size would be sought (the limit would be the capacity of the system). A CD-Rom reading device had been bought.

14. **Denmark**.- Calculations concerning visually assessed and measured characteristics, formerly done on a mainframe, were now made on a PC.

15. **Finland**.- So far, statistics had only been used in special situations. New hardware and software had been acquired recently.

16. **Germany**.- Consideration was being given to changing the strategy for the trials for value for cultivation and use, and reducing them from three to two years. The strategy for the tests for distinctness, uniformity and stability had been changed. Varieties would now be tested for two years in two locations. Positive decisions would be taken on the basis of the results from the main site, where the results of the second were not contradictory. Where conclusive results were not obtained on the main site, the second would be decisive. Any problems would have to be analyzed and solved in the light of experience. However, the question arose whether the results of the two sites could not be combined in one analysis, and the delegation of Germany would seek an exchange of views on this (see paragraphs 32 et seq., below).

17. The down-sizing of the computer system had been completed. A network of PCs working under UNIX was now being used, with SAS as programming language (including for the COY analyses). Framemaker would be used for the preparation of the Gazette.

18. **Israel**.- An overview of the plant variety protection system is given in Annex III to this report.

19. **Japan**.- So far, statistical methods were not used, but their methodology and know-how had been accumulated.

20. A data base system was to be set up in 1994 for the implementation of domestic legislation and the production of the Gazette drawn up in the English language for use by the other UPOV member States. A basic problem was that Japanese software was not compatible with the worldwide standards. Compatible hardware had been acquired in view of the planned UPOV central computerized data base.

21. **Netherlands**.- The setting-up of a data base had been completed recently for joint use by the CPRO and the Raad voor het kwekersrecht. Both were connected by an optical fibre.

22. **Poland**.- The setting-up of a data base had been completed recently. A CD-Rom drive would be available by August next.

23. **United Kingdom**.- Diskettes containing a set of statistical tools of assistance to researchers in DUS testing, operating under MS/DOS, had been supplied to seven member States for testing and were available to the others.

24. **Argentina**.- The law authorizing the deposit of an instrument of accession to the 1978 Act of the Convention had been approved by the Senate and was currently in the Chamber of Deputies.

25. The Argentine plant variety protection system was based on breeders' tests followed by an analysis, by the authority, of the information supplied by the breeders.

26. **Questions raised**.- The reports gave rise to the following:

(i) the question whether statistical data collected on two sites could be combined in a single analysis;

(ii) the question of compatibility between the various computer systems used by member States, with particular reference to problems arising from language peculiarities;

(iii) the question whether UPOV documents could be made available in electronic form;

(iv) the question whether the UPOV central computerized data base could also comprise variety descriptions;

(v) the question of access to information networks (and on what conditions).

Handling of Visually Assessed Characteristics

27. Discussions were based on document TWC/11/12.

28. The Working Party concluded that the work carried out by experts from Germany showed the potential of a statistical analysis of the characteristics observed on a particular species, based upon the data from tested varieties. That work had not been exhaustive in that a similar analysis could also be made on measured characteristics.

29. General biometric studies of the kind presented in document TWC/11/12 would be useful to crop experts, in particular, when they revised Test Guidelines and decided on the characteristics to be included in the revised edition and on the scale of states of expression to be used. Precautions would have to be taken, however, when using results of such studies. For instance:

(i) the applicable legal criterion was that a variety which was the subject of an application had to be "clearly distinguishable [by one or more important characteristics]";

(ii) histograms of the states of expression recorded for a characteristic on the varieties examined in the past should be assessed in the light of the overall variability existing in the species, since the assortment of varieties may change over time, and also from region to region;

(iii) a correlation between two characteristics might not be based on a genetic link, but result from the particular set of varieties examined.

The knowledge and experience of the crop expert was essential for the interpretation of such studies; conversely, such studies would improve the knowledge of the crop expert (for instance by providing an estimation of the efficiency of the various characteristics in distinctness testing) or suggest amendments to the list of characteristics used.

30. The Working Party decided to pursue this work to show on the basis of a practical example--French beans--the possible contribution of general biometric studies, performed on both visually observed characteristics and measured characteristics, to the establishment of Test Guidelines. Mr. Friedrich Laidig (Germany) would coordinate the input from the following member States: Denmark, France, Germany, Netherlands, Poland (both crop experts and statisticians should be involved in this exercise).

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

31. The COYD analysis is described in document TC/30/4.

Use of the COYD Analysis Over Two Locations

32. This question was raised by Mr. Friedrich Laidig (Germany) in his report on new developments in his country (see paragraph 16, above). It was the subject of a short exchange of views.

33. Several statements were made on policy aspects:

(i) Distinctness testing was designed so as to ensure that the final decision may be expected to be repeatable over the years (which represent variable environment conditions); the test was thus (generally) conducted over two, possibly three years in the same location.

(ii) Under current procedures, tests would be done (in some instances) at two locations as an insurance against crop failure at one location, or to have a better expression of certain characteristics.

(iii) The applicable criterion was that distinctness should be established on the basis of data from one location.

However, other positions were conceivable. Testing was subject to the following dilemma: one would wish to show differences between varieties under the same environmental conditions, and one ought to describe the varieties under conditions that were normal for them. The agronomist might also derive more information from tests over several locations than from tests over several years.

34. Different prima facie views were expressed on the question whether a testing location could be substituted for a testing year. In principle, one was not allowed to do that, and if one wanted to do it, precautions had to be taken. In particular, a detailed study had to show that the year x variety and location x variety interactions were similar.

Evaluation of the Long-Term LSD

35. Discussions were based on document TWC/12/4 and the document reproduced in Annex IV to this report.

36. It is recalled that "Long-Term LSD" stands for a refinement of the COYD analysis; under certain circumstances (when the test comprised a small number of varieties) the data would not be analyzed on the basis of the actual LSD, but on an estimate of the LSD derived from the particular test and a set of earlier tests.

37. Many remarks were made and questions were asked on technicalities. The discussion led to the following conclusions:

(i) For the purpose of assessing distinctness, the straight COYD method should be applied whenever possible, i.e., when there were more than 20 degrees of freedom.

(ii) If this condition was not met, the method should be used with the long-term LSD as described in the document.

(iii) The question whether the long-term LSD could be used to take decisions on the basis of a one-year's test should be further discussed at the next session on the basis of a document to be prepared by Mr. Friedrich Laidig (Germany) and Mr. Colin Weatherup (United Kingdom). It was felt that the long-term LSD might be used, with caution, but only to inform the breeder of a possible failure of his variety.

A program for a Robust Estimation of the Long-Term LSD

38. Discussions were based on the document reproduced in Annex V to this report and on a computer printout not reproduced here.

39. The purpose of the program was described as the exclusion of outlyers from the calculation of the error mean square (to reduce it), and not from the calculation of the means. One participant expressed worries over the basic concept of the program on the basis of the uncertainty over the status of an "outlyer."

40. Where varieties were arranged in two groups (e.g. tall varieties and short varieties), the two groups would have to be processed separately.

Testing of Homogeneity - Combined Over-Years Uniformity (COYU) Analysis

41. The COYU analysis is described in document TC/30/4.

Evaluation of the Results of the COYU Analysis

42. Discussions were based on document TWC/12/10 (use of COYU in the United Kingdom in 1993) and the document reproduced in Annex VI to this report (comparisons of some two-years uniformity tests in Denmark, 1993).

43. The conclusion drawn in document TWC/12/10 was noted. It was also noted that in the Danish test, no problem arose with candidate varieties.

Revision of Document TC/XXV/8 on Homogeneity

44. Discussions were based on document TWC/11/16. It was noted that the document had been prepared by experts from Denmark. Document TWO/26/19 was also briefly presented.

45. **Importance of Communication**.- Mr. Erik Schwarzbach (Czech Republic) expressed concern over the way in which this and other documents referring to statistics might be perceived. He agreed to prepare a paper on the subject for the next session.

46. The Chairman stated that the Working Party was conscious of this permanent difficulty and that it endeavored to produce documents and have discussions that were understandable to a broader circle. In fact, efforts had been deployed for quite some years already to meet this challenge.

47. **Criteria for the Definition of a Population Standard**.- It was stated that if the population standard was the number of off-types recorded on existing varieties and if there were legal uniformity requirements, for instance for certification, one ought to take those requirements into consideration. It was

stated in reply that, where Test Guidelines referred to certification requirements, it was for matters other than uniformity, and that the requirements in question concerned later generations of seed. The said requirements, although they were a relevant factor, were therefore not binding on UPOV for the purposes of homogeneity testing.

48. **Risks Taken With Tests Over Two or Three Years Rather Than One.**- This question arose in the context of the discussion on sequential analysis (see paragraph 65, below). The Working Party briefly discussed the following two possible approaches:

(i) calculate the total sample size over the years and use the same population standard as for individual years; choose the same (or lower) alpha risk to get a better balance of alpha and beta risks; and finally take the decisions on the basis of the aggregate sample;

(ii) take interim decisions every year and reject the variety when it is not uniform in both years, or in two years out of three.

It was noted that the first approach seemed to offer a better balance between the alpha and beta risks. It was also noted that a sequential analysis approach could be used as well (on this point, see also paragraph 65, below).

49. Mr. Kristian Kristensen (Denmark) agreed to prepare a paper on this subject for the next session.

Questions Raised by the Technical Working Party for Agricultural Crops

50. Discussions were based on document TWC/12/7 and the note reproduced in Annex VII to this report.

51. The Working Party considered that, basically, the population standard (the maximum level of off-types) had to be fixed on the basis of the applicable technical and legal requirements; differences in the technical aspects of the test--such as observations on ear rows or drilled plots--might well lead to different standards.

52. The second question had to do with precise observations on a fixed number of plants versus overall observation of a plot. It was found that the decision depended on many factors (e.g. skill of the examiner, type of crop, type of characteristic and off-type, density of the stand). The question could not be answered therefore from a statistical point of view.

53. More generally, it was stated that the examiner should look at off-types which the breeder should have rogued out; other elements of heterogeneity could remain in the variety, which was after all a population (rather than the theoretical pure line) in the case of an autogamous crop.

UPOV Central Computerized Data Base

54. Discussions were based on document TWC/12/8 and on the report from France reproduced in Annex VIII to this report.

55. It was emphasized that the draft "format" presented in document TWC/12/8 was almost final and that, subject to the comments and proposals of the Working Party, would be used in the near future as the basis for writing the technical specifications for the contractor who would produce the disks. [These specifications were written at the time of establishing of this report].

56. The following points were raised:

(i) In relation to the question of variety descriptions it was underlined that the proposed data base was open to additions, that it was not proposed at this stage to include descriptions in the data base and that the current priority was to get the CD-Rom, as currently proposed, off the ground.

(ii) It was asked whether ISO Standard 646 would be able to cope with the diacritic signs of certain languages. Subject to a further consideration of the issue, it was suggested that, where relevant, the closest English transliteration of the variety denomination be given in items 540 to 543 and that the correctly spelled denomination be given in item 999 (in the form of an image).

(iii) The question of a common address code was raised.

(iv) The proposed UPOV code for species should be distributed as soon as possible.

(v) It was indicated that no final decision had been made so far as to the kind of information (all individual records or only those which had changed since the previous delivery) that would have to be supplied by member States once the system was operational.

57. The Working Party noted that the national authorities would be contacted by the Office of the Union for the supply of test data for the prototype, and that no specific work was required for the time being from the Working Party.

Sequential Analysis

58. **General**.- Discussions were based on document TWC/12/2, on a presentation, the notes of which are reproduced in Annex IX to this report (introduction to sequential acceptance sampling), and on the paper reproduced in Annex X to this report (testing of uniformity of self-fertilized and vegetatively propagated species by two-stage sampling).

59. Under current procedures, the homogeneity of a variety is assessed through analysis of a sample of a given size against a predetermined standard followed by a decision to accept or reject. Sequential analysis is a multistep decision-making process: each step, the last excepted, leads to the following possible decisions: accept; reject; examine another sample.

60. **Objective to be pursued**.- The Working Party agreed that the primary goal of its work on this topic was be to see whether, given the current technical and statistical background of homogeneity testing (unless that background was changed for some other reason), it was possible to develop a more effective procedure for homogeneity testing. The greater effectiveness could be either in reducing the costs of testing by reducing the average testing effort, or in improving the quality of the test by concentrating the tester's efforts on borderline cases.

61. **Possible future work**.- If sequential analyses were accepted as a possible method, the Working Party might be called upon, firstly, to develop recommendations on the kind of test to be used under particular circumstances and, secondly, to define the parameters of a sequential analysis procedure at the request of crop experts and on the basis of the fundamental parameters (e.g. the current number of plants tested or maximum sample size and the desired number of runs) provided by them.

62. Policy aspects.- Two members of the Working Party expressed a preference for the current procedure. It was stated in that respect that applicants should be confronted with clear-cut rules (with an appropriate statistical basis), and that examiners might be reluctant to use complicated models.

63. Potential fields of application.- It was generally acknowledged that the testing procedures--in particular the fact that for many species the tests would be conducted on a small number of plants--would limit the potential use of sequential analysis.

64. The following potential fields of application were mentioned: the testing of homogeneity in broadcast sown species; the testing of homogeneity with electrophoresis (Annex X being of particular relevance--but as an illustration only since the described two-stage method had not been optimized) or biochemical methods; the checking of stability of hybrids in the laboratory.

65. It was asked whether sequential analysis could be introduced on the basis of the assumption that the successive samples would be analyzed in the successive growing periods; conversely whether the current tables of maximum numbers of off-types, based on the assumption of a one year's test, should be adjusted to maintain the same tester's and applicant's risks where the test was repeated in the second and possibly a third year (see paragraphs 48 and 49, above).

66. The application of sequential analysis to distinctness testing was briefly discussed. It was underlined that one was looking for decisions that would be repeatable, and that the time factor had therefore to be integrated into the procedure by testing varieties over at least two years.

67. Future work.- It was emphasized in conclusion that sequential analysis could be used in checks against a predetermined standard. The self-fertilized crops were amenable to it; however, since the Working Party had proposed--in 1993--a revision of paragraph 28 of the General Introduction to the Test Guidelines (see document TWC/11/16), it was felt that it might be too early to propose yet another refinement (unless another working party requested it). It was therefore decided:

(i) to report to the next session of the Technical Committee on the work done and planned, so as to seek its advice (and at the same time to hear preliminary views from the representatives of the professional organizations);

(ii) to prepare a paper at the next session of the Working Party to describe the method and its potential use on the basis of practical examples;

(iii) to submit the paper to the Technical Committee in the autumn of 1995.

The draft of the paper would be prepared by Messrs. Sylvain Grégoire (France), Kristian Kristensen (Denmark), Friedrich Laidig (Germany) and Mike Talbot (United Kingdom, coordinator).

68. At the end of the session, Mr. Erik Schwarzbach (Czech Republic) proposed a draft recommendation specifying values for the tester's risk and the applicant's risk to be applied in sequential analysis procedures. The Working Party felt that such a recommendation would be premature.

Multivariate Analysis

69. Discussions were based on documents TWC/11/7 and TWC/12/5.

70. In introducing document TWC/12/5, Mr. Colin Weatherup (United Kingdom) mentioned that the computer program of the multivariate method for distinctness testing based on the Mahalanobis' generalized distance D^2 between two varieties was included in the diskette referred to in paragraph 23, above.

71. Mr. Weatherup then highlighted the conclusions to be drawn from the work reflected in the said document:

(i) Multivariate analysis would come into play, in respect of two varieties (a "problem pair"), when those varieties could not be distinguished using the COYD analysis and the crop expert felt that they were distinct;

(ii) Multivariate analysis would lead to a significant ($p < 0.01$) difference only if the most significant difference (in the "best characteristic") was close to the distinctness threshold of COYD;

(iii) Multivariate analysis would (if at all) lead to a significant difference using two or at most three characteristics.

72. Questions were raised and proposals were made as to the technicalities of the method, which might be improved by the use of logarithms, in particular.

73. With regard to the purpose of using multivariate analysis the following was said:

(i) Concern was expressed, on the one hand, at the fact that the higher discriminating power obtaining would lead to a reduction of the minimum distances between varieties. In reply, it was said that the nature of plant breeding was such that those distances were diminishing in certain species, and that multivariate analysis might therefore be a valuable tool in relation to specific crops, notably grasses.

(ii) Concern was also expressed, on the other hand, at the fact that two botanically unrelated characteristics might be combined to support a distinctness decision. It was stated in reply that there was no legal--or even conceptual--obligation to restrict the combinations to those which could be grasped as a new characteristic, and also that certain member States already accepted such combinations in exceptional cases.

(iii) Studies based upon bivariate analyses might point to interesting combinations of characteristics and thus assist in the revision of the Test Guidelines.

(iv) Other methods, such as the principal component analysis, might be used if one was interested in the meaning of combinations in general.

74. As regards future activities, it was underlined that many biochemical methods required one or other form of multivariate analysis of the data generated with them. The Working Party might be called upon to examine the statistical methods, advise on their relevance in the context of variety testing or adapt them to suit the purpose, or develop such methods. It was also mentioned that multivariate analysis would be much involved in the question of essentially derived varieties and that the Working Party might also be called upon to make a contribution, even though the question was principally to be settled by the breeders.

75. Regarding the more immediate future, work should concern:

(i) the refinement of the methods;

(ii) the application of the methods to:

(a) visually assessed characteristics;
(b) the validation of data (detection of outlyers);
(c) the detection of the most similar variety;
(d) cluster analysis;
(e) image analysis.

The activities proposed for the next session are described in Annex XII.

Access to International Data - Programs Which Can be Readily Assimilated Into Other Plant Variety Computer Systems

76. Discussions were based on the tables reproduced in Annex XI to this report.

77. It was decided that a column should be added to the table on electronic communications between computing centers to indicate names of persons.

78. To ensure that the tables would be as complete as possible, the Working Party decided:

(i) that the tables should be circulated in the other Technical Working Parties;

(ii) that a questionnaire--to be prepared by Mr. Gerie van der Heijden (Netherlands) and Mr. Mike Talbot (United Kingdom)--should be circulated to the heads of plant variety protection offices and the members of the Technical Committee.

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

79. Discussions were based on document TWC/12/3.

80. It was generally felt that the document was useful and should be updated on a regular basis. It should be reviewed by the members of the Working Party, and their comments should be sent to Mr. Sylvain Grégoire (France), particularly as regards the list of key words.

81. Interest was also manifested in receiving the document in electronic form. Mr. Grégoire should also be contacted to agree on the format.

82. Finally, interest was manifested in receiving the UPOV documents in electronic form, with particular reference to the CELEX (legal texts of the European Union) data base on CD-Rom. Reference was made in this connection to the technical difficulties, to the experience gained by WIPO with IP-Lex (intellectual property laws and treaties) from which UPOV might eventually benefit, and to the current budgetary constraints.

Image Analysis

83. Discussions were based on documents TWC/12/6 and TWC/12/9.

84. The following elements were mentioned in the course of the general discussion:

(i) The equipment would become affordable in the relatively near future.

(ii) The technique had potential in two main directions:

(a) it would facilitate the observation of certain characteristics already in use (with the maximum benefit to be drawn in the case of shapes);

(b) it would enable the detection of new characteristics, which may be added to those already in use (thus increasing the possibilities of distinguishing varieties) or substituted for other characteristics that were difficult to use for one reason or another.

(iii) The technique, to be a good one in the context of UPOV, should be available to all testing authorities.

(iv) Cooperation may be envisaged (for instance the examining authority could work on the basis of photocopies of the shapes of onion bulbs).

85. A proposal is described on page 9 of document TWC/12/6 for a cooperative project, possibly subsidized by an outside source (for instance the European Union), aiming at standardization of equipment and software and at development of complete protocols for various crops and characteristics.

86. It was generally considered necessary to work on image analysis as a potential tool in the examination of varieties and also with a view to ensuring the necessary degree of coordination within UPOV. Questions were raised as to the organizational aspects of the future work. The following was decided:

(i) The other Technical Working Parties would be consulted as to:

(a) what was already being done in the field of image analysis and variety testing;

(b) what were the problems encountered in variety testing for which image analysis could provide a solution.

Mr. Gerie van der Heijden (Netherlands) would prepare a questionnaire to that effect.

(ii) The Technical Committee should be informed of the discussions of the Working Party so that it may advise the latter on the future activities to be undertaken in this area, and possibly seize the Consultative Committee if a project involving special financing was (or was to be) contemplated.

87. Interest in cooperating in a project was expressed by several members of the Working Party.

Visits and Demonstrations

88. Mr. Baruch Bar Tel and Mr. Gershon Pollatchek gave explanations on the functioning of the Israeli plant variety protection system.

89. The Working Party visited the Neot Kedumim botanical garden, which presents the plants mentioned in the Bible, and also the Volcani Centre, where a video was shown on the agronomic research in Israel.

90. During the session, various programs were demonstrated, in particular the programs for DUS testing developed for PCs (Mr. Colin Weatherup, United Kingdom), QUALSTAT (a program providing assistance in the choice of sample sizes; Mr. Sylvain Grégoire, France) and Celex (legal documents of the European Union; Mr. Erik Schwarzbach, Czech Republic).

Future Program

91. A proposed list of items for the next session, with further organizational details, is given Annex XII.

92. The Working Party had a short exchange of views on its long-term program. Two aspects were mentioned:

(i) The volume of the activities deployed in the current member States was increasing in terms of both species covered by the plant variety protection system and varieties being the subject of applications for protection. The Working Party would have to contribute towards maintaining the practicality of the system.

(ii) UPOV was expected to expand in the near future and in the longer term --in part as a result of the Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods, adopted in the context of the Uruguay Round of GATT (the "TRIPS Agreement"). The technology developed so far would have to be shared with the new member States, and the new member States would need technologies adapted to their circumstances. Particular mention should be made of computer programs for the administrative operation of a plant variety protection system, and the statistical exploitation of the data generated by breeders in the context of protection systems based upon breeders' testing.

93. It was observed in relation to the latter aspect that UPOV should not make things too easy for the prospective member States and put the burden on statisticians.

Place and Date of Next Sessions

94. The next session would take place in Slupia Wielka (near Poznan, in Poland) from June 7 to 9, 1995. It would be followed by a seminar on statistics and variety testing organized by Poland for biometricians working in agronomy.

95. The subsequent session (in 1996) would be hosted by Germany.

[Twelve annexes follow]

ANNEX I

LIST OF PARTICIPANTS

I. MEMBER STATES

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[Annex II follows]

ANNEX II

LIST OF THE DOCUMENTS USED IN THE SESSION

Reference	Title	Author	Cross-reference (Paragraph of Report)
1. Documents of the Session			
TWC/12/1	Draft Agenda	Office of the Union	6
TWC/12/2	Use of Sequential Analysis in Seed Testing	S. Grégoire (F)	58
TWC/12/3	Review of TWC Documents	S. Grégoire (F)	79
TWC/12/4	Evaluation of Long Term LSD's	STC. Weatherup (UK)	35
TWC/12/5	The Application of a Multivariate Method to Distinctness Testing	STC. Weatherup (UK)	69
TWC/12/6	Image Analysis in Variety Testing	PD. Keefe (UK)/ G. van der Heijden (NL)	83
TWC/12/7	Items from Technical Working Parties	Office of the Union	7+50
TWC/12/8	Draft for a UPOV Format for the Transmission in Electronic Form of Bibliographic Data Regarding Plant Varieties	Office of the Union	54
TWC/12/9	Application of Image Analysis to Varietal Characterization	M.H. Gandelin (F)	83
TWC/12/10	Use of COYU in the UK in 1993	B. Waters/STC. Weatherup (UK)	42
TWC/12/11	Report	Office of the Union	-
TWC/12/11 Annex I	List of Participants	Office of the Union	2
TWC/12/11 Annex II	List of the Documents Used in the Session	Office of the Union	6
TWC/12/11 Annex III	The Israel PBR-Office	Experts from Israel	18
TWC/12/11 Annex IV	Evaluating the Long-Term LSD With Vegetable Species	M. Talbot (UK)	35
TWC/12/11 Annex V	A Program for a Robust Estimation of Long-Term LSD	F. Laidig/U. Meyer (D)	38
TWC/12/11 Annex VI	Comparisons of Some 2-Years Uniformity Tests in Denmark, 1993	K. Kristensen (DK)	42
TWC/12/11 Annex VII	Questions Addressed to the TWC by the TWA	S. Grégoire/J. Guiard (F)	50
TWC/12/11 Annex VIII	Report from France on the Application of a Harmonized Format	S. Grégoire/P. Gauthier (F)	54
TWC/12/11 Annex IX	Introduction to Sequential Acceptance Sampling	M. Talbot (UK)	58
TWC/12/11 Annex X	Testing of Uniformity of Self-Fertilized and Vegetatively Propagated Species by Two-Stage Sampling	F. Laidig (D)	58
TWC/12/11 Annex XI	UPOV-Between-Computing Centre Electronic Communications	M. Talbot (UK)	76
TWC/12/11 Annex XII	Proposed List of Items for the Next Session	Office of the Union	91+75
2. Documents of Previous Sessions of the Working Party			
TWC/11/7	The Use of a Multivariate Criterion in Distinctness Testing	STC. Weatherup (UK)	69
TWC/11/12	Handling of Visually Assessed Characteristics	F. Laidig (D)	27
TWC/11/16	Revision of Document TC/XXV/8 on Homogeneity	K. Kristensen (DK)	44
3. Other Documents			
TC/XXV/8	Testing of Homogeneity of Self-Fertilized and Vegetatively Propagated Species	F. Laidig (D)	31+44
TC/30/4	Combined Over-Years Criterion for Distinctness (COYD) and Uniformity (COYU)	STC. Weatherup (UK)	31+41
TC/30/6	Report	Office of the Union	7
TWO/26/19	Homogeneity Check by Controlling the Number of Off-Type	S. Grégoire (F)	44

[Annex III follows]

The Israel PBR-Office

A. Organization of PBR in Israel

1. The Minister of Agriculture

The Minister of Agriculture is responsible for changes and addenda to the PBR Law, such as changes in fees and in the list of taxa eligible for protection. Further, he may prescribe the modes of arranging and keeping the Register of Rights. He appoints the Registrar, the Chairman and the members of the PBR Council.

2. The Registrar

The Registrar serves as legal advisor to the Minister and to the PBR-Council.
His tasks are:

- to provide legal services.
- to issue PBR certificates.
- to keep the Register of Rights.

3. The PBR Council

The PBR Council serves as the professional authority.
Its tasks are:

- to advice on protections
- to discuss rejections
- to recommend on changes to the law

4. Administrative Stages of PBR

- Application
- Publication
- Registration
- ILPBR Gazette
- Register of Rights

5. The Testing Authority

- Observation
- Description
- Report

B. Activities of the PBR Office

1. Past

The following data are calculated up to December 1993

- total # of applications received: 2160
- total # of registrations: 1130
- 80% Ornamentals of which half local varieties

2. Present

- List of Taxa eligible for PBR with 160 Taxa
- Cooperation in Examination with several UPOV members

3. Future

- OCR and Image analysis
- Adaptation of the law to the new UPOV convention of 1991.

C. Technical Aspects

1. Hardware

The Israel PBR Office has been computerized since 1988. Today, the hardware is based on Intel-based Desktop and Laptop PC's. Except for official purposes - such as certificates and publications - use of paper has been almost eliminated. Questionnaires and Application forms are available in ASCII to the clients of the PBR office.

2. Software

Traditionally, most of the data processing has been done with Lotus 1-2-3 Spreadsheet packages. With the increase of data, the need for dedicated RDBMS solutions has grown. Such an application is already used for the PBR Administration and will be introduced to the Testing Authority as well.

[Annex IV follows]

ANNEX IV

EVALUATING THE LONG-TERM LSD WITH VEGETABLE SPECIES

INTRODUCTION

For some species in which candidate varieties are submitted for DUS testing there are only a small number of established varieties available for comparison with the candidate. In these situations the combined over-years (COY) criterion, which is based on the variety x years term, may provide only a relatively small number of error degrees of freedom and the LSD may be inflated as a consequence.

A procedure recommended for overcoming few degrees of freedom in the COY analysis is to analyse a longer run of data for established varieties and to apply the LSD to the comparison of the means in the current two or three years. In this way a more representative estimate of the COY variety x year variance is obtained and the t-value used for calculating the LSD is based on many more degrees of freedom.

The UPOV TWC has suggested that this procedure should be explored in a range of crops to examine how stable the estimate of LSD based on two or three years of data is relative to the long-term LSD. The purpose of this note is to report on the application of the long-term LSD to UK vegetable DUS trials.

THE DATA

The data come from the carrot and leek DUS trials conducted by the Scottish Agricultural Science Agency (SASA), East Craigs, Edinburgh. The carrot data consisted of a total of 286 varieties in trials over the years 1984-89. The leek data were for 139 varieties tested in trials in the years 1985-91. Since all varieties were not tested each year the data matrices have gaps.

RESULTS

The long-term LSD was calculated by analysing the variety x years table by fitting constants using all of the available data for varieties and years. LSDs were also calculated in triplets of years including all of the data for varieties which were sown in one or more of the three years.

The results are presented in Table 1 for carrots and in Table 2 for leeks. In most cases the LSDs for triplets of years are based on more than 50 degrees of freedom and the long term LSD is based on several hundred degrees of freedom.

Comparing the three-year LSDs with the long-term LSD suggests that for most characters there is a good agreement though the long-term LSD tends to be slightly greater than the mean of the 3-year LSDs. However, at least one character, leaf length in carrots, showed considerable variation in LSD, from 32.6 in 85/87 to 57.8 in 87/98. For leeks, the LSDs for leaf angle ranged from 4.5 to 10.1.

CONCLUSIONS

The data in this investigation come from trials where the numbers of varieties are large enough to provide adequate COY error degrees of freedom. Nevertheless, the results provide some indication that, if the number of varieties being tested were reduced, then the long-term LSD would provide a sufficiently stable base for distinctness testing with the majority of characters examined here. For the few characters exhibiting marked fluctuations in LSDs across years then it may be necessary to accept that they must be based on the current three-years of data and that the critical difference will be large.

Clearly, the most desirable situation is to ensure that adequate number of varieties are included in tests. A minimum of twenty degrees of freedom for COY error is suggested. This would involve testing a minimum of 11 varieties each year over a three-year period. It is proposed that the TWC should recommend that where the COY criterion is applied then this should be the desired number of varieties to include in tests.

A useful additional applilcation of the long-term LSD is to provide a rough guide as to the size of differences which represent clear distinctness. In the last two columns of Tables 1 and 2 there are given the minimum differences needed for distinctness after two and one year respectively. Thus, in carrots, a mean leaf length difference of 85 mm or greater after one year indicates that there will b e little difficulty in distinguishing the two varieties after further years of testing. Awareness of such figures can help to identify at an early stage those candidate varieties which may have difficulties.

M Talbot
Edinburgh
1 April 1994

Table 1: SASA CARROT DUS TRIALS 1984-89

Character	Critical difference at 1% level: 3 year LSD				LSD based on 6 Years		
	84/86	85/87	86/88	87/89	3 Year	2 Year	1 Year
20 Leaf length	48.6	32.6	48.9	57.8	49.5	60.6	85.7
31 Root length	18.1	17.8	20.4	19.9	18.9	23.2	32.8
45 Leaf pin	15.0	11.0	10.0	11.2	12.8	15.7	22.1
46 Root Colour	8.2	8.8	6.1	6.2	7.0	8.6	12.2
50 Root diam	4.2	4.2	4.4	4.2	4.2	5.2	7.3
65 Root texture	0.46	0.39	0.41	0.41	0.43	0.52	0.74
66 Root s shape	0.48	0.47	0.48	0.31	0.45	0.55	0.78
67 Root c shape	3.9	4.2	3.8	2.9	3.5	4.3	6.1

Table 2: SASA LEEK DUS TRIALS 1985-91

Character		Critical difference at 1% level: 3 year LSD					LSD based on 7 Years		
		85/87	86/88	87/88	88/90	89/91	3 Year	2 Year	1 Year
1	leaf foliage col.	3.2	4.7	5.0	3.6	3.0	4.0	4.9	7.0
2	leaf angle	4.5	6.7	8.4	10.1	7.3	6.8	8.3	11.7
40	Plant ht.	6.0	6.6	7.3	4.6	4.5	6.3	7.8	11.0
43	Column len.	2.4	2.5	2.6	2.4	2.0	2.5	3.1	4.4
44	V1-Vn len.	34.5	32.2	31.3	22.6	26.0	32.6	39.9	56.5
47	Plant tot. len.	*	*	*	7.8	8.8	8.1	10.0	14.1
49	leaf length	6.5	5.4	5.7	5.1	5.5	5.9	7.2	10.3
51	leaf width	8.6	7.1	7.1	6.7	7.9	7.8	9.6	13.5
52	Col. diam	4.3	3.7	3.8	3.3	4.4	3.9	4.8	6.7
56	Col. bulbing	0.51	0.53	0.56	0.42	0.46	0.49	0.60	0.85

[Annex V follows]

ANNEX V

BUNDESSORTENAMT
HANNOVER

Hannover, 08.04.94

A program for a robust estimation of long-term LSD

1. Introduction

If you want to estimate the variance over two or three years and if you have a small number of degrees of freedom, the LSD is often too large.
A robust estimation of variance combined with the inclusion of more than three years in the evaluation is a possibility to reduce the estimation of LSD.
Here the robust estimation of variance is based on the reduction of residuals from outliers (see figure 1).

2. Components of program

For many characters you can get a table of means over the last one, two or three years with a mark for values substituted.
You can also get LSD's for one, two and three years using a 5, 10 or 15%-level.
A complete table of mean squares and degrees of freedom for all sources is part of the output as well as an information about the portion of missing values.
The residual plots help the DUS-expert to evaluate the severeness of outliers detected.
There are marks for outliers for the two levels.
Tables for the comparison of the original data with the substituted data of the outliers complete the outlier-test.
Finally you can get the distinctness-table for the COY-level.

3. Soft- and hardware

All programs are written in SAS by external students and running on UNIX-Server from Hewlett-Packard(HP9000/G60).

4. Data

The description of all characters we used are given in table 1.
The number of varieties lies between 6 and 63, the number of years between 5 and 6.

5. Other calculations

All records we used for the analysis with the new SAS-program we also gave into the MDIST1-program from Mr. Talbot.

6. Interpretation

The robust procedure forces a reduction of variance and LSD in that cases where outliers are present.
In case B (1-0.1%) we have not often found outliers.
Large differences between robust variances from three-years-evaluation and six-years-evaluation we have only found in cases with a small number of varieties.
Most of the mqrest-values are larger than the overall-variances from MDIST1.
All results you can see in tables 2 and 3.

Table 1: description of characters

Cocksfoot Knaulgras (KL) varieties 20 years 5	M11 : Spitzenblatt: Länge M12 : Spitzenblatt: Breite M21 : Halm: Länge M22 : Blütenstandlänge M31 : Erscheinen der Blütenstände M42 : Wuchsform bei Erscheinen der Blütenstände M51 : Pflanzenlänge Aussaatjahr M52 : Wuchsform Aussaatjahr
Hybrid Ryegrass Bastardweidelgras (WB) varieties 18 years 6	M11 : Spitzenblatt: Länge M12 : Spitzenblatt: Breite M21 : Halm: Länge M22 : Blütenstandlänge M31 : Erscheinen der Blütenstände M41 : Wuchshöhe bei Erscheinen der Blütenstände M42 : Wuchsform bei Erscheinen der Blütenstände M51 : Pflanzenlänge Aussaatjahr M52 : Wuchsform Aussaatjahr
Kentucky Bluegrass Wiesenrispe (WRP) varieties 10 years 6	M11 : Spitzenblatt: Länge M12 : Spitzenblatt: Breite M21 : Halm: Länge M22 : Blütenstandlänge M31 : Erscheinen der Blütenstände M52 : Wuchsform Aussaatjahr M61 : Blattbreite Aussaatjahr M62 : Blattfarbe Aussaatjahr M71 : Ausläufer Anzahl M72 : Ausläufer: Länge
Sheep's Fescue Schafschwingel (SCH) varieties 30 years 6	M11 : Spitzenblatt: Länge M21 : Halm: Länge M22 : Blütenstandlänge M62 : Blattfarbe: Aussaatjahr
Phacelie Pazelie (PHA) varieties 11 years 5	M11 : Blatt: Länge M12 : Blatt: Anthozyanfärbung M13 : Blatt: Struktur M14 : Blatt: Länge der Fieder M15 : Stengellänge mit Fruchtstand M16 : Fruchtstand: Länge M17 : Stengel: Dicke M31 : Blühzeitpunkt tage nach dem 1.4.

Table 1: descripton of characters (part 2)

Persian Clover	M18 : Blatt: Form
Persischer Klee (PKL)	M31 : Blühzeitpunkt
varieties 6	M111: Stengel: Dicke in mm
years 5	M14 : Blatt: Länge der mittleren Blätter
	M15 : Blatt: Breite der mittleren Blätter
	M11 : Stengel: Länge mit Blütenstand
Leak	M22 : Schaftlänge Herbst
Porrey (PO)	M24 : Gesamtlänge Herbst
varieties 63	M25 : Blattspreite Breite Herbst
years 6	M26 : Schaftdurchmesser Herbst
	M29 : Blattspreite Länge Herbst
	M27 : Zwiebelstärke Herbst
	M210: Zwiebelbildung Herbst
Seleriac	M15 : Knolle: Höhe
Sellerie (SEK)	M110: Knolle: Höhe/Breite
varieties 21	M19 : Länge u. Internodium
years 6	M17 : Blattlänge, Spreite + Stiel
	M11 : Blattspreite
	M18 : Größe der Fiederblätter
	M12 : Blattstiellänge
	M14 : Blattstieldicke

Table 2: variances for each case

ART	MERK	overall	regr-ad	mqrest	mqrob1-0.1	mqrob5-1	ClGrMed	ClGr90%
kl	m11	89.60	97.17	115.27	108.02	98.73	102.66	242.13
kl	m12	0.10	0.10	0.10	0.10	0.10	0.10	0.09
kl	m21	16.64	12.82	16.61	16.61	16.22	12.82	14.74
kl	m22	0.37	0.39	0.37	0.37	0.37	0.39	0.47
kl	m31	0.62	0.50	0.61	0.61	0.61	0.50	0.55
kl	m42	0.03	0.03	0.05	0.04	0.04	0.03	0.02
kl	m51	12.46	11.21	11.32	11.32	11.25	11.21	7.24
kl	m52	0.05	0.02	0.04	0.04	0.04	0.02	0.04
pha	m11	57.90	47.17	55.25	55.25	54.40	.	.
pha	m13	0.04	0.07	0.06	0.06	0.05	.	.
pha	m14	12.84	16.17	11.77	11.77	11.73	.	.
pha	m15	4.23	4.34	4.59	4.59	4.30	.	.
pha	m16	0.79	0.82	0.75	0.75	0.75	.	.
pha	m17	0.27	0.34	0.26	0.26	0.26	.	.
pha	m21	0.65	0.50	0.96	0.94	0.85	.	.
pha	m31	0.32	0.31	0.40	0.40	0.37	.	.
pkl	m11	16.56	78.40	16.16	16.16	16.16	.	.
pkl	m111	0.41	0.27	0.43	0.43	0.41	.	.
pkl	m14	10.50	20.24	11.92	11.92	11.75	.	.
pkl	m15	5.83	7.95	5.83	5.83	5.83	.	.
pkl	m18	0.01	0.01	0.01	0.01	0.01	.	.
pkl	m31	3.21	4.54	3.41	3.41	3.35	.	.
po	m210	1.03	1.03	1.33	1.17	1.04	.	.
po	m22	1.19	1.01	2.47	1.88	1.42	.	.
po	m24	10.82	10.90	16.37	14.32	12.03	.	.
po	m25	4.00	3.54	4.61	4.51	4.18	.	.
po	m26	1.58	1.67	2.48	2.11	1.85	.	.
po	m27	1.98	1.93	2.46	2.27	2.10	.	.
po	m29	8.20	7.54	10.15	9.65	8.74	.	.
sch	m11	8.24	8.94	8.94	8.94	8.58	8.17	12.06
sch	m21	6.34	6.19	6.98	6.98	6.98	3.17	5.19
sch	m22	0.35	0.38	0.38	0.38	0.36	0.27	0.38
sch	m62	0.07	0.07	0.12	0.09	0.08	0.09	0.14
sek	m11	4.52	2.71	4.40	4.40	4.26	.	.
sek	m110	18.62	14.99	18.32	18.32	18.12	.	.
sek	m12	4.60	4.59	6.63	6.32	5.74	.	.
sek	m14	0.45	0.47	0.50	0.49	0.45	.	.
sek	m15	0.26	0.29	0.34	0.33	0.31	.	.
sek	m17	11.49	8.34	12.72	12.63	12.08	.	.
sek	m18	0.74	0.63	0.95	0.86	0.80	.	.
sek	m19	1.29	0.75	1.18	1.17	1.13	.	.
wb	m11	40.99	.	347.95	347.95	347.95	.	.
wb	m12	0.06	.	0.06	0.06	0.06	.	.
wb	m21	11.54	.	18.86	18.11	14.67	.	.
wb	m22	1.90	.	2.28	2.28	2.10	.	.
wb	m31	0.66	.	0.70	0.70	0.65	.	.
wb	m41	15.02	.	18.99	18.56	17.09	.	.
wb	m42	0.09	.	0.13	0.13	0.12	.	.
wb	m51	7.29	.	7.82	7.81	7.27	.	.
wb	m52	0.04	.	0.03	0.03	0.03	.	.
wrp	m11	72.63	60.49	96.21	91.39	83.27	59.82	63.54
wrp	m12	0.08	0.04	0.09	0.09	0.08	0.07	0.08
wrp	m21	12.70	8.34	13.09	13.09	12.69	6.51	7.24
wrp	m22	0.65	0.61	0.66	0.66	0.66	0.59	0.68
wrp	m31	1.71	0.68	2.58	2.56	2.29	0.86	1.02
wrp	m52	0.07	0.05	0.09	0.08	0.07	0.05	0.06
wrp	m61	0.05	0.03	0.05	0.05	0.05	0.05	0.06
wrp	m62	0.04	0.04	0.04	0.04	0.04	0.05	0.05
wrp	m71	0.14	0.13	0.14	0.14	0.14	0.14	0.15
wrp	m72	0.15	0.12	0.15	0.15	0.14	0.13	0.16

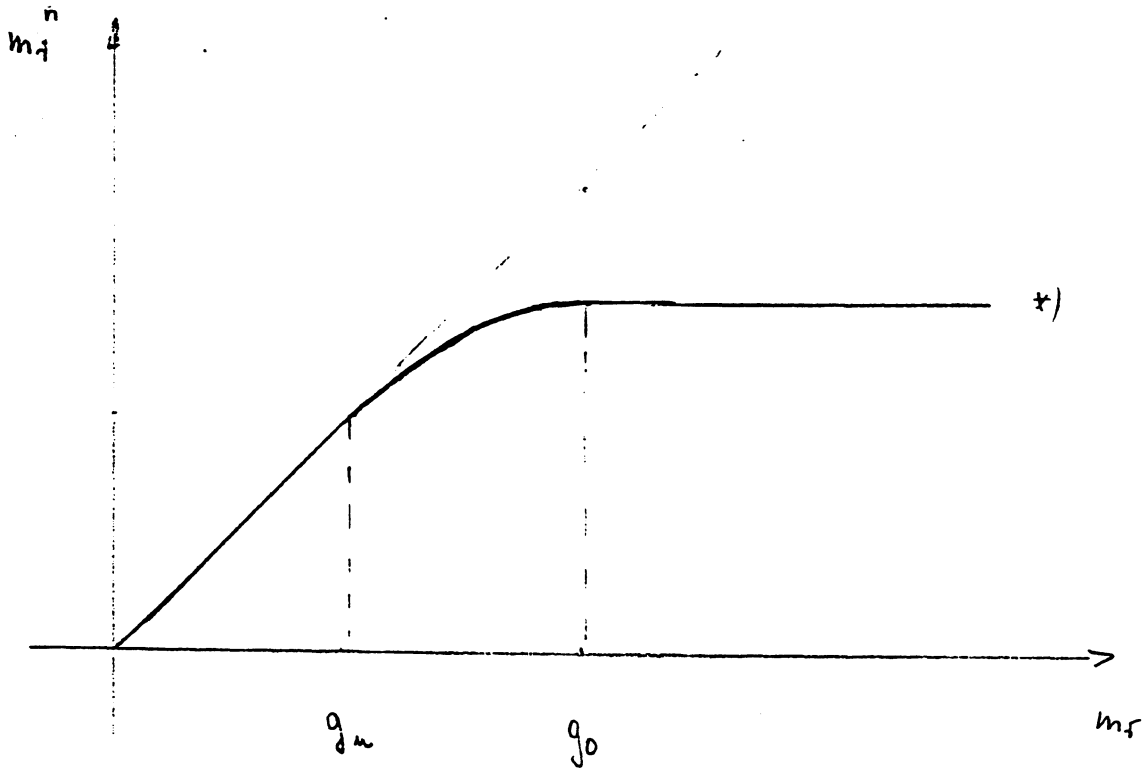
Table 3: comparison of variances over three or six years and degrees of freedom

ART	MERK	mqrest 6	mqrest 3	mqrob1-0.1 6	mqrob1-0.1 3	mqrob5-1 6	mqrob5-1 3
pkl	df=15			15	6	15	6
pkl	m11	16.16		16.16	17.09	16.16	17.09
	m111	0.43		0.43	0.43	0.41	0.43
	m14	11.92		11.92	1.45	11.75	1.45
	m15	5.83		5.83	2.88	5.83	2.88
	m18	0.01		0.01	0.01	0.01	0.01
	m31	3.41		3.41	3.12	3.35	3.11
po	df=145			145	79	145	79
po	m210	1.33		1.17	0.88	1.04	0.85
	m22	2.47		1.88	1.43	1.42	1.04
	m24	16.37		14.32	11.56	12.03	9.57
	m25	4.61		4.51	3.22	4.18	3.01
	m26	2.48		2.11	1.80	1.85	1.63
	m27	2.46		2.27	2.20	2.10	2.00
	m29	10.15		9.65	7.97	8.74	6.73

Table 4 : formulas for the recollection of residuals

CASE	CONDITION	FORMULA
1	$\lvert mr \rvert \leq \sigma * g_u$	$mr^n = mr$
2	$\sigma * g_u < \lvert mr \rvert \leq \sigma * g_o$	$mr^n = sign(mr) * \frac{\sigma}{2} * (g_u + g_o) - \frac{(\lvert mr \rvert - \sigma * g_u)^2}{2\sigma (g_o - g_u)}$
3	$\sigma * g_o < \lvert mr \rvert$	$mr^n = sign(mr) * \frac{\sigma}{2} * (g_u + g_o)$

Figure 1: reduction of residuals



CASE	α_u	α_o	g_u	g_o
A	5%	1%	$u_{2.5\%}$	$u_{0.5\%}$
B	1%	0.1%	$u_{0.5\%}$	$u_{0.05\%}$

*) for formulas see table 4

[Annex VI follows]

Comparisons of some 2-years uniformity tests in Denmark, 1993

Crop	Character	Number of					
		Varieties		Non-uniform			
		Cand	Ref.	Cand.		Ref.	
				1*	2*	1*	2*
Phleum pratense	Ear emergence	10	39	0	0	1	0
	Leaf length			0	0	0	1
	Leaf width			0	0	2	0
	Steam length			0	0	0	0
	Inflorescence length			0	0	0	0
	Node length			0	0	0	0
Dactylis glomerata	Ear Emergence	1	14	0	0	0	0
	Leaf length			0	0	0	0
	Leaf width			0	0	0	0
	Steam length			0	0	0	0
	Inflorescence length			0	0	0	0
	Node length			0	0	0	0
Festuca pratensis	Ear emergence	2	22	0	0	1	0
	Leaf length			0	0	0	0
	Leaf width			0	0	1	0
	Steam length			0	0	0	0
	Inflorescence length			0	0	1	0
	Node length			0	0	0	1
Festuca rubra	Ear emergence	0	23	-	-	0	0
	Leaf length			-	-	0	0
	Leaf width			-	-	0	0
	Steam length			-	-	0	0
	Inflorescence			-	-	0	0
	Node length			-	-	0	0
	All	13	96	0	0	6	2

*) 1 = old UPOV-criteria, 2 og 3
2 = new UPOV-criteria at the 0.2% probability level.

[Annex VII follows]

ANNEX VII

Question adressed to the TWC by the TWA
Homogeneity for an autogamous crop

the study is made on two separate plots on two different materials.

plot	"ear rows plot"	"drilled plots"
type of material	1st or second generation ~~(G1-G2)~~	third or fourth generation ~~(G3-G4)~~
nb of plants observed	40 to 100 plants observed	1000 to 2000 plants observed
type of observation	observation of each plant (UPOV VS single plants observation)	observation or each plant (UPOV visuall assessment) or (depending of characters or examiner observation of plot and detection of visib
characters onbsereved	C1 characters observed	C1 characters observed or C1 + C2 characters observed
decision	tolerance: 3 out of 100 2 out of 40	tolerance 2,5 per 1000 alpha =5%
basis for decision	std pop 1% alpha 5% table 10 TWC/11/16	std pop 2.5 per 1000 alpha 5%

question to be answered by the study:
1 have an estimate the level of homogeneity
2 decide to accept or reject the variety on the basis of homogeneity

background:
the level of off-types tolerated must be proximate to the level tolerated for th corresponding material in certification.

questions asked to the TWC:
question 1
having the two above existing experimental schemes must we choose a different population standard for the two materials?

question 2
Considering the case in which the two tests would be made on the same type of material:
Must we choose different alpha risks considering that the observations on 40 or 100 plants are made very precisely on each plant, but that the observations on 1000 to 2000 plants are not in fact observation of each individual plant, but a look at the plot and a count of off-types seen per character?.

question 3:
having answered to the questions, can the TWC give indications on beta risks.

other questions not asked by TWA but linked:

The number of characters observed for off-types might differ. What is the consequence of observing one, few or many characters for the decision? Is there an impact if characters are correlated?

What is the consequence of observing more than one type of material to judge a variety?

Is a global look searching for off-types instead of a plant to plant observation compatible with the statistical hypothesis?

Supposing a work on the same material, how to manage with one plot observed plant by plant and the other globally searched for off-types?

Observing a fixed number of plant, how to take into account plants which are not clearly true-type/off-type?

[Annex VIII follows]

ANNEX VIII

REPORT FROM FRANCE ON THE APPLICATION OF AN HARMONISED FORMAT

INTRODUCTION:

Experts from different countries worked on the definition of an harmonised format and made some exchanges of data according to that format.
TWC members were active in this work.
In particular, M TALBOT from the United Kingdom, F LAIDIG from Germany , M DEL-FRESNO from Spain, S GREGOIRE + P GAUTHIER from france worked within the TWC (discussions, documents, exchange of data) during the meetings and between meetings; as well as in/for meetings specially organised by UPOV concerning the CD-ROM project.

It is important to note that all UPOV members, working groups and Committees are concerned by the topic and many documents or meetings dealt with this in the past years.

Other organisations such as the European Union, The W.I.P.O., or the US Patent office for instance are concerned with this need to exchange (or obtain information) in a common way.

The experience of such formats or exchange of data is very limited within UPOV.

A harmonised format is useful for at least two needs:

the UPOV CD-ROM project
the exchange of information between members

If possible, a unique format for both needs would be better than different formats project by project. (A unique format does not mean that the way the format is used must be the same in different projects).

REPORT FROM FRANCE:

Not all the steps or discussions will be reminded here after but some of them.

Discussions on what information was needed occurred, and for instance TWC/10/2 (April 1992) shows replies from countries to a questionnaire established after discussions within countries and within different UPOV working groups or committees.

A format for information exchange was then proposed and modified at many occasions from 1992 to now. M Talbot wrote the different versions after each new discussion.
France made at first three different kind of general proposals to organise the data for exchanges.
Then France worked with the other participants on the type of proposal that was recommended by the participants.

At each stage, when an amended version was produced, or to illustrate proposals for the format, P Gauthier from France wrote a program to extract actual data from the running Official database and created files.
Sometimes these files were sent to participants, sometimes they stayed in the computer.

The initial aim was to produce a format able to deal with the two kind of projects (exchange of information published in gazettes and UPOV CD-ROM project).

Specific needs or wishes for one or the other project were successively incorporated or deleted.
As countries do not have the same rules or ways to manage the information, a common but simple way to elaborate a format is not easy.

During the steps of the work, the general philosophy and layout of the format did not change much from the early version. The fact that data in the CD-rom will be only a collection of the different contributions from member states or organisations, but without any check of correspondances between contributions did not change.
On the contrary the detail of which information to deal with, and the way to organise the information changed at each stage. Furthermore, at the beginning Plant Breeder's Rights as dealt within UPOV was the main source of information envisaged. At the present stage PBR is only one of many sources of information.

In November 1993 a special meeting was held in Geneva for the format definition, giving priority to the CD-ROM project.
A report was sent at the beginning of February and a UPOV visit to four countries planed.

When the present document was written, visits did not took place yet, neither comments on the report were made. France is ready to continue work, according to UPOV office wishes, needs or requirements.

Other experiences in exchange formats and regular exchange of data:
The French Gazette is produced by mean of computer extraction in a specific format since January 1990.
The information corresponding to the gazette is given at each gazette production to a French office in another format since 1992.

International norms or standards:
Some norms or standards have been used in the description of an harmonised format for the coding of data.

EDIFACT was examined, but no participants had experience with it. Meanwhile the Netherlands gained some experience.

It is better to finalise an harmonised format as it has been discussed so far, for the step of producing a prototype. But in the future the use of EDIFACT is a possibility to reconsider. In that respect a common training course organised by UPOV or another organisation could be a key to success, another way being to ask to a contractor to prepare and describe to member states the way to produce the concerned data according to EDIFACT specifications.

S GREGOIRE
P GAUTHIER
1994/FEB/23

[Annex IX follows]

TWC/12/11

ANNEX IX

INTRODUCTION TO SEQUENTIAL ACCEPTANCE SAMPLING

These notes are the displayed text of an audio-visual presentation on the application of statistical techniques in plants and seeds work.

Mike Talbot
Scottish Agricultural Statistics Service
Edinburgh
March 1994

AN INTRODUCTION TO

SEQUENTIAL ACCEPTANCE

SAMPLING

IN SEED TESTING

RESULTS FROM EXAMINING A SEED LOT

ORDER OF EXAMINING SEEDS	SEEDS RESPONDING	
	NO.	%
1- 20	20	100
21- 40	39	98
41- 60	58	97
61- 80	76	95
81-100	95	95
101-120	113	94
121-140	132	94
141-160	151	94
161-180	169	94
⋮ ⋮	⋮	⋮
481-500	470	94

WHAT IS SEQUENTIAL ACCEPTANCE SAMPLING ?

* Samples are taken from a lot and examined individually or in groups;

* After each examination a decision is made between :

  Accepting the lot ;

  Rejecting the lot ;

  Examining another sample .

DEVELOPMENT OF SEQUENTIAL SAMPLING

* PRE WORLD WAR 2
  Methods based on simple ad-hoc rules

* 1943
  First formal theory developed
  A. Wald (Statistical Research Group Columbia University)
  G. A. Barnard (Britain)

* 1985
  Computer program for designing Sequential trials
  J. Whitehead and P. Marek

APPLICATIONS OF SEQUENTIAL SAMPLING

* CLINICAL
  Trials of new drugs and treatments

* INDUSTRIAL
  Acceptance Inspection/Sampling of manufactured components

* OTHER APPLICATIONS
  Grading of milk;
  Machine process setting

* SEED TESTING
  Banyai (1978):
    Diploid content of red clover seeds
  Ellis et al (1980):
    Monitoring genebank seed

OUTLINE OF THIS PRESENTATION

* Basics of simple (fixed-sized) acceptance sampling

* Principles of sequential sampling

* Guidelines on applying sequential sampling to seed testing

BASICS OF SIMPLE ACCEPTANCE SAMPLING

* Fixed – size sample

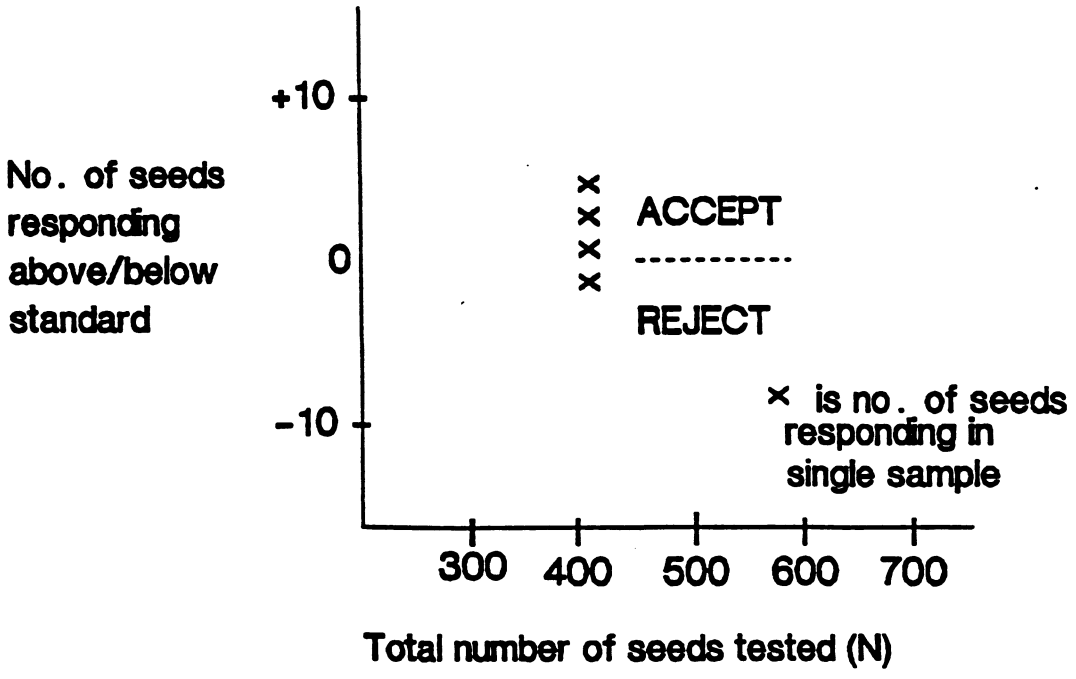
* Taken at random from a seed lot in which proportion p will respond if all are tested

* Observe the proportion p that respond in the sample

* Accept the seed lot if p exceeds a test standard p*

* Reject the seed lot otherwise

A SIMPLE ACCEPTANCE SAMPLING SCHEME



FACTORS IN SETTING TEST STANDARD

p0 – the minimum acceptable level for the proportion responding in the seed lot

p1 – a high level for the proportion responding which if achieved in a seed lot should mean acceptance

---

The test standard is set between p0 & p1

BALANCING THE RISKS

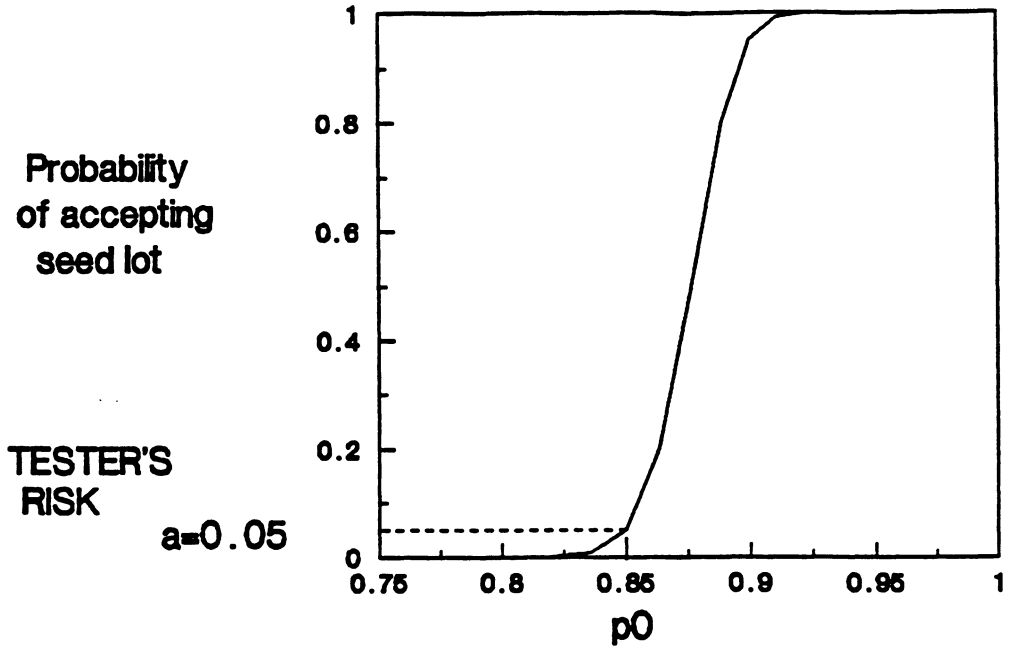
Test standards are set by attempting to find a balance between two competing risks :

a (alpha) – the tester's risk
ie. the probability that a seed lot with a low response proportion (p0) will be accepted

b (beta) – the applicant's risk
ie. the probability that a seed lot with a high response proportion (p1) will be rejected

1-b – the power
(the applicant's risk is usually expressed as a difference from 1, ie. the power of the test to identify seed lots with high response rates)

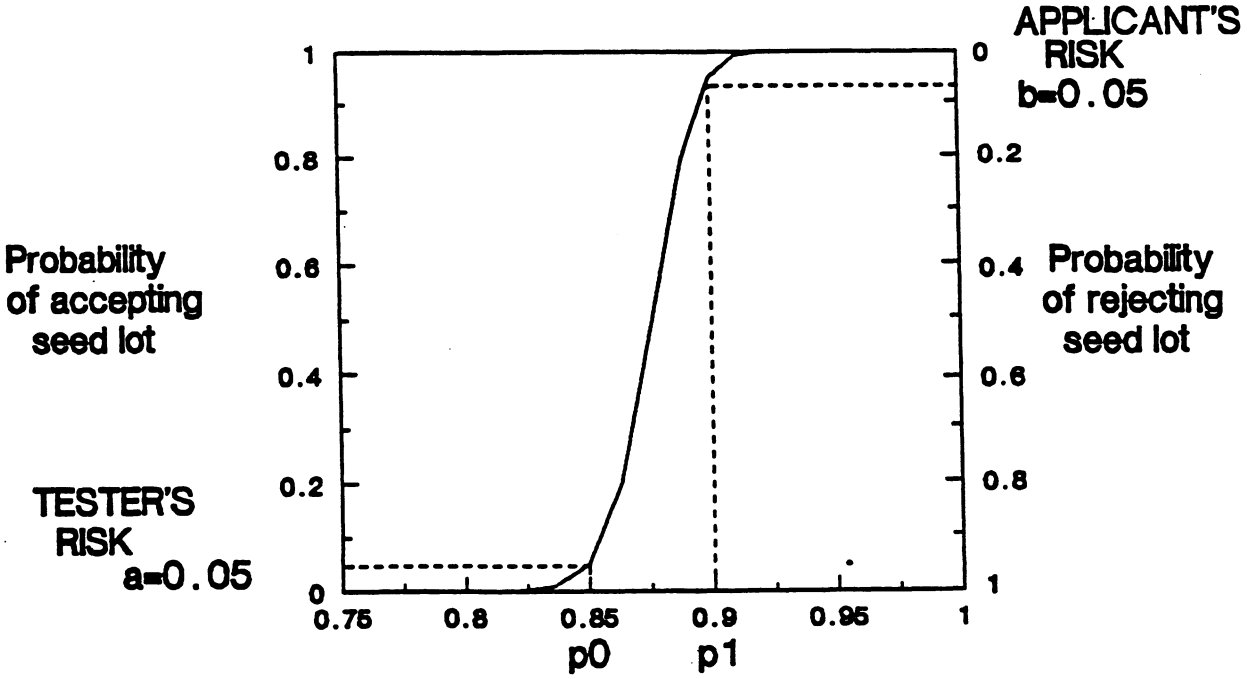
OPERATING CHARACTERISTIC CURVE FOR SCHEME WITH N=467



True seed lot response proportion

Note: p0 – minimum acceptable level for a seed lot

OPERATING CHARACTERISTIC CURVE FOR SCHEME WITH N=467



True seed lot response proportion

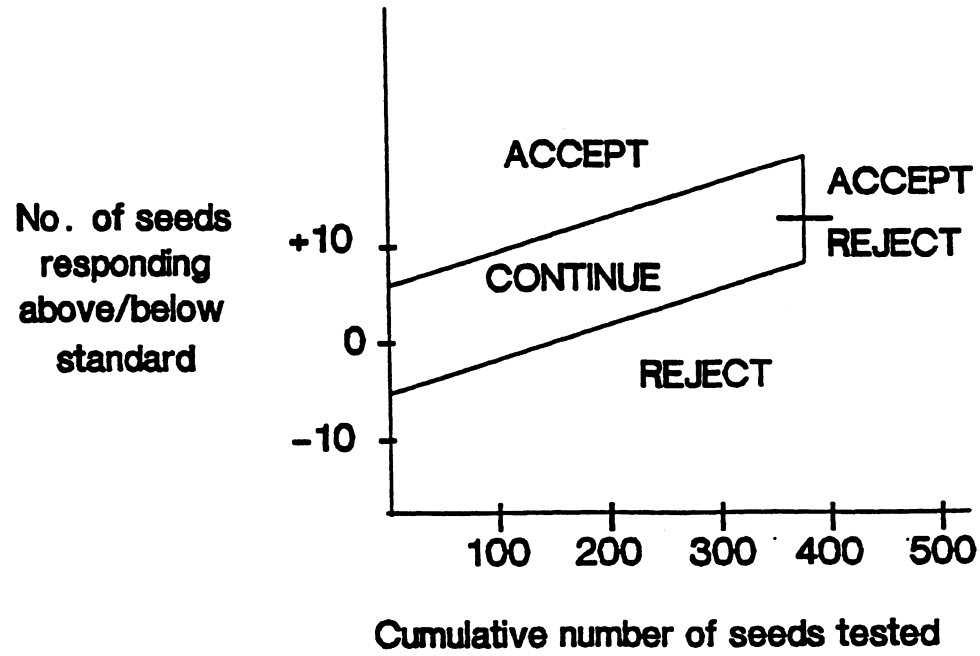
Note: p0 – minimum acceptable level for a seed lot
p1 – high level which certainly should be accepted

TYPES OF SEQUENTIAL TEST METHODS

* Truncated sequential probability ratio test

* Triangular test

A TRUNCATED SEQUENTIAL SAMPLING SCHEME



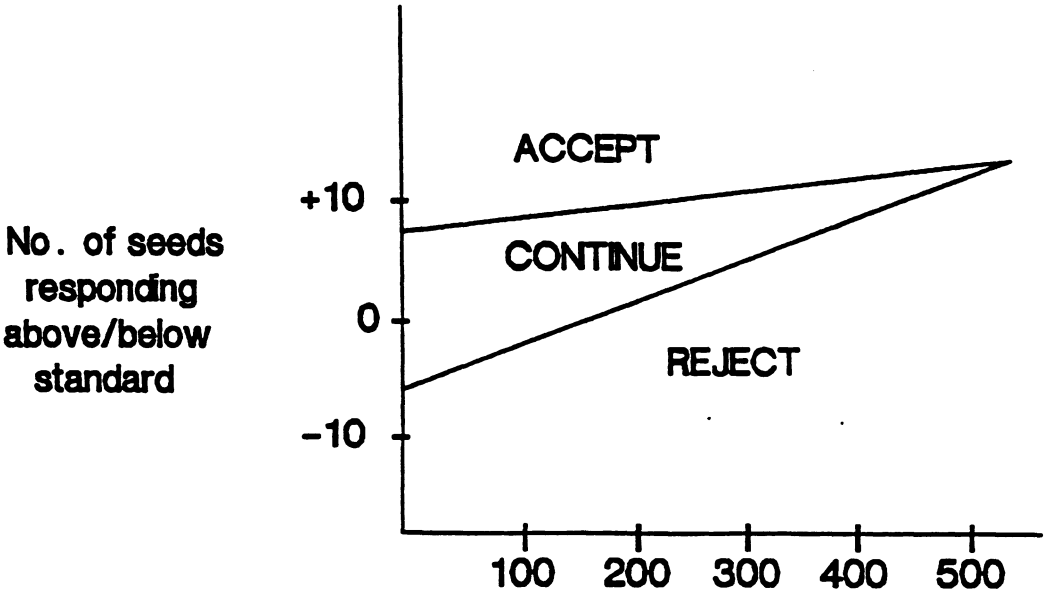
EXAMPLE OF TRUNCATED SEQUENTIAL SAMPLING SCHEME

ALPHA (tester's risk)	= 0.001
POWER (1 - applicant's risk)	= 0.995
p0 (minimum acceptable response)	= 0.800
p1 (high level response)	= 0.900
No. of seeds tested per group	= 20

Inspection number	Seeds tested	Number of seeds responding (n) Reject when n ‹ or =	Accept when n › or =
1	20	10	-
2	40	27	-
3	60	44	59
4	80	61	77
5	100	78	94
⋮	⋮	⋮	⋮
20	400	337	352
21	420	361	362

Note : Equivalent fixed sample size (same risks) is 401

A TRIANGULAR SEQUENTIAL SAMPLING SCHEME



EXAMPLE OF TRIANGULAR SEQUENTIAL SAMPLING SCHEME

ALPHA (tester's risk)	= 0.001
POWER (1 – applicant's risk)	= 0.995
p0 (minimum acceptable response)	= 0.800
p1 (high level response)	= 0.900
No. of seeds tested per group	= 20

Inspection number	Seeds tested	Number of seeds responding (n) Reject when n ‹ or =	Accept when n › or =
1	20	5	–
2	40	23	–
3	60	40	–
4	80	58	–
5	100	76	97
⋮	⋮	⋮	⋮
24	480	412	413
25	500	428	429

Note : Equivalent fixed sample size (same risks) is 401

AN APPLICATION OF THE TRIANGULAR TEST

ORDER OF EXAMINING SEEDS	SEEDS RESPONDING NO.	%	REJECT WHEN no. ‹ or =	ACCEPT WHEN no. › or =
1- 20	20	100	5	–
21- 40	39	98	23	–
41- 60	58	97	40	–
61- 80	76	95	58	–
81-100	95	95	76	97
101-120	113	94	93	114
121-140	132	94	111	131
141-160	ACCEPT		129	147
161-180			146	164
⋮			⋮	⋮
481-500			428	429

WHICH TEST ?

FIXED SAMPLE-SIZE

EASIER TO OPERATE
(only one decision)

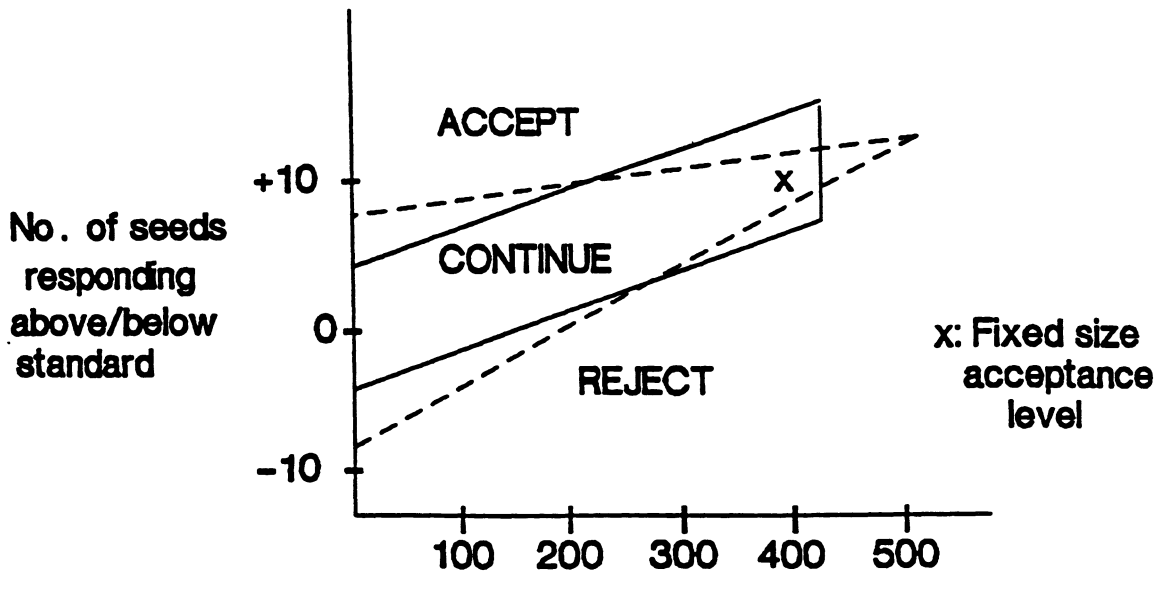
SATISFACTORY IF
a)tests cheap + easy
b)seeds not precious

SEQUENTIAL

MORE CHECKING
(after each inspection)

BEST IF
a)tests rapid + expensive
b)seeds precious

COMPARISON OF DECISION REGIONS FOR TRIANGULAR TRUNCATED AND FIXED-SIZE TESTS



WHICH SEQUENTIAL TEST ?

TRUNCATED

p«p0 or p»p1

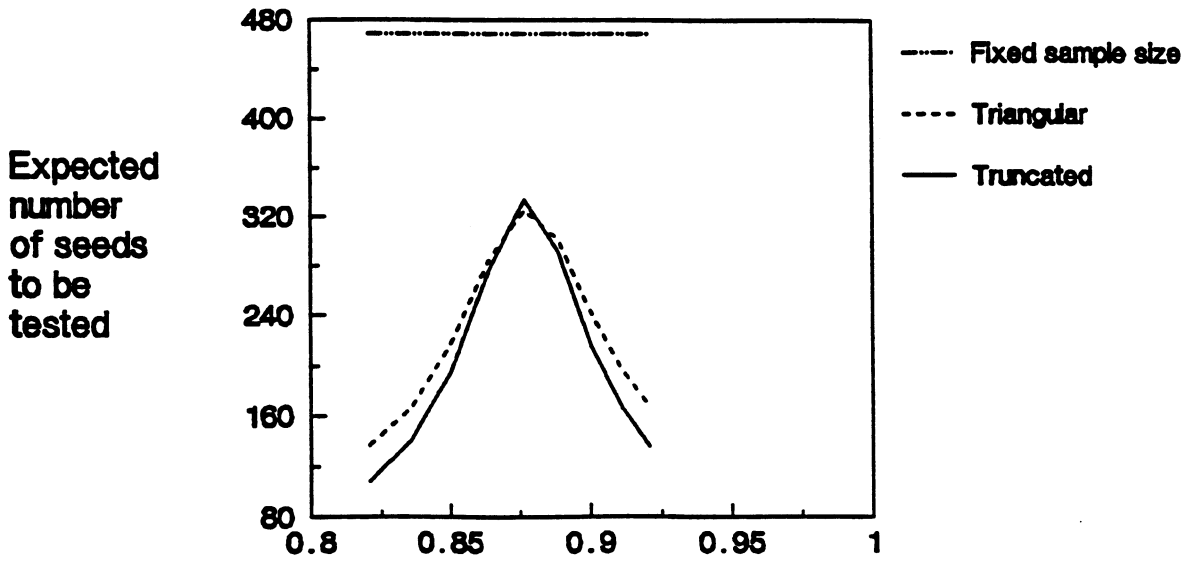
(Extreme proportions likely)

TRIANGULAR

p0 «p «p1

(Proportions more variable)

AVERAGE NUMBER OF SEEDS NEEDED FOR TESTING WITH SEVERAL SAMPLING PROCEDURES



APPLICATIONS OF THE TESTS

* FIXED SAMPLE-SIZE
  FOR GERMINATION TESTS
  -Sequential tests can mean unacceptable delay in results

* TRUNCATED
  FOR VIABILITY TESTS IN GENEBANKS
  -Important to save seeds if accession viability much above regeneratio standard

* TRIANGULAR
  FOR SEED QUALITY TESTING
  -More variability between seed lots tested

OTHER APPLICATIONS OF SEQUENTIAL METHODS IN SEED TESTING

* DETECTION OF PROPORTION OF SIBS/DIPLOIDS
  - use truncated test

* TETRAZOLIUM TEST FOR SEED VIABILITY
  - either truncated or triangular test

* FOR REJECTION/ACCEPTANCE OF LARGE SEED CONSIGNMENT ON DELIVERY TO SEED TRADERS
  - use truncated test to reduce delay in deciding whether to accept a consignment

ADVANTAGES OF A SEQUENTIAL PLAN

* Testing stops as soon as it is possible to make a decision

* Saving in number of seeds used

* Quicker testing

* Cheaper testing

[Annex X follows]

ANNEX X

Z 3 - 529 Hannover, d. 7. April 1994

Testing of Uniformity of Self-fertilized and Vegetatively propagated Species by Two-stage Sampling

1. Introduction

During its eleventh session in Cambridge the TWC decided to study the applicability and the advantages of sequential sampling in order to reduce sample size and costs of testing for off-types.

As decribed in the Technical Guidelines as well as in document TWC/11/6 the presently agreed testing method is based on drawing a single sample with a fixed size.

Testing uniformity of maize by electrophoresis is an example for an expensive method, because for each individual kernel its band pattern has to be produced and evaluated.

Two-stage sampling is a special case of multi-stage or sequential sampling. The sample is divided in two subsamples. The outcome of the first state is either that the sample meets the uniformity standard or does not, or that not enough evidence is given for a decision. Only in the latter case the rest of the sample is analysed in the second stage.

The purpose of this document is to present a worked-out example of a two-stage sample in order to compare it with the corresponding one-stage case.

2. The one-stage case

To test uniformity of maize varieties by analysing their iso-enzymes with electrophoresis, the crop expert considered the following as suitable:

population standard p = 2%

Acceptance probability 99%

sample size n = 40

Keywords: uniformity - off types - sequential sampling - effective sample size

In table 15 of TWC/11/16 the corresponding maximum number of off-types is k = 3 .

The typeI error is $\alpha = 0,8\%$.

3. The two-stage case

The sample is divided into two groups of equal size. The population standard is as in the one-stage-case p = 2% .
The overall number of tolerable off-types is k = 3 .

First stage:

$n_1 = 20$

k_1 is the number of off-types in the first stage

decision rule:

$k_1 \leq 1$ uniformity standard met

$2 \leq k_1 \leq 3$ second stage required

$k_1 > 3$ uniformity standard not met

Second stage:

$n_2 = 20$, $2 \leq k_1 \leq 3$

k_2 is the number of off-types in the second stage

decision rule:

$k_1 + k_2 \leq 3$ uniformity standard met

$k_1 + k_2 > 3$ uniformity standard not met

For the two-stage sampling the global typeI error for the given example is

$$\alpha^* = 100 - 100\left(\sum_{k_1=0}^{1}\sum_{k_2=0}^{20} P(k_1)P(k_2) + \sum_{k_1=2}^{3}\sum_{k_2=0}^{k_1+k_2\leq 3} P(k_1)P(k_2)\right) = 0,6\%$$

(P(k) is the probability of k off-types from a distribution following the binomial law with n = 20 and p = 2%).

α^* = 0,6% shows, that the stated 1% error level is hold by the two-stage procedure. α^* is even slightly smaller than with the original one-stage sampling, where α = 0,8% .

The effective sample size is

$$20 \leq n_e \leq 40 \text{ , with}$$

$$n_e = n_1 + n_2 \cdot \sum_{k_1=2}^{3} P(k_1) \text{ .}$$

(n_2 is multiplied by the probability that the test has to be continued after the first stage)

Given a population standard of p = 2% , the effective sample size is n_e = 21,2 .

When the number of off-types in the population is 2% then only an average sample size of 21 is necessary for testing, i.e. only one in twenty samples will have to be tested in the second stage. However the sample size will increase if the population has more than 2% off-types.

4. TypeII error and n_e

The formula for the typeII error is given by

$$ß^* = 100\left(\sum_{k_1=0}^{1}\sum_{k_2=0}^{20} P(k_1)P(k_2) + \sum_{k_1=2}^{3}\sum_{k_2=0}^{k_1+k_2\leq 3} P(k_1)P(k_2)\right)$$

For example $ß^*$ = 52,7% if the population standard p = 10% and $ß^*$ = 8,1% for p = 20%.

In figure 1 the global typeII error $ß^*$ for the two-stage sampling is compared with ß for n = 40 in the one-stage case. The figure shows that $ß^* > ß$ over all values of p. For a population standard of p = 10% $ß^*$ shows its maximum inflation of about 10% compared with ß.

Figure 1 further indicates a considerable reduction of the sample size n_e . For p = 10% the effective sample size has its maximum of about 30 and for p = 4% a sample size of only 24 is required. For the example given the tester is able to reduce work and cost on the one hand. On the other hand however, the testers risk of declaring a nonuniform variety as uniform is becoming larger. This disadvantage can be removed by increasing n_1 and n_2 appropriately such that $ß^*$ is reduced to approximately the size of ß.

5. Concluding remarks

The example should only demonstrate how the sample size could be reduced by using a sequential type of testing. Reduction of sample size and increase of ß needs to be evaluated before one method can be preferred over the other.

It further should be considered that two-stage sampling needs to test two runs which might be more difficult than to test a larger sample size in one run.

Attention should be paid to the statistical work done in multi-sampling schemes.

Questions to be considered are

- how to control the typeI error,
- what is the optimal decision rule after the first stage,
- how large should be the subsamples n_1 and n_2 in order to keep the typeI and typeII errors as low as in the one-sample case?

F. Laidig
Bundesortenamt
Hannover

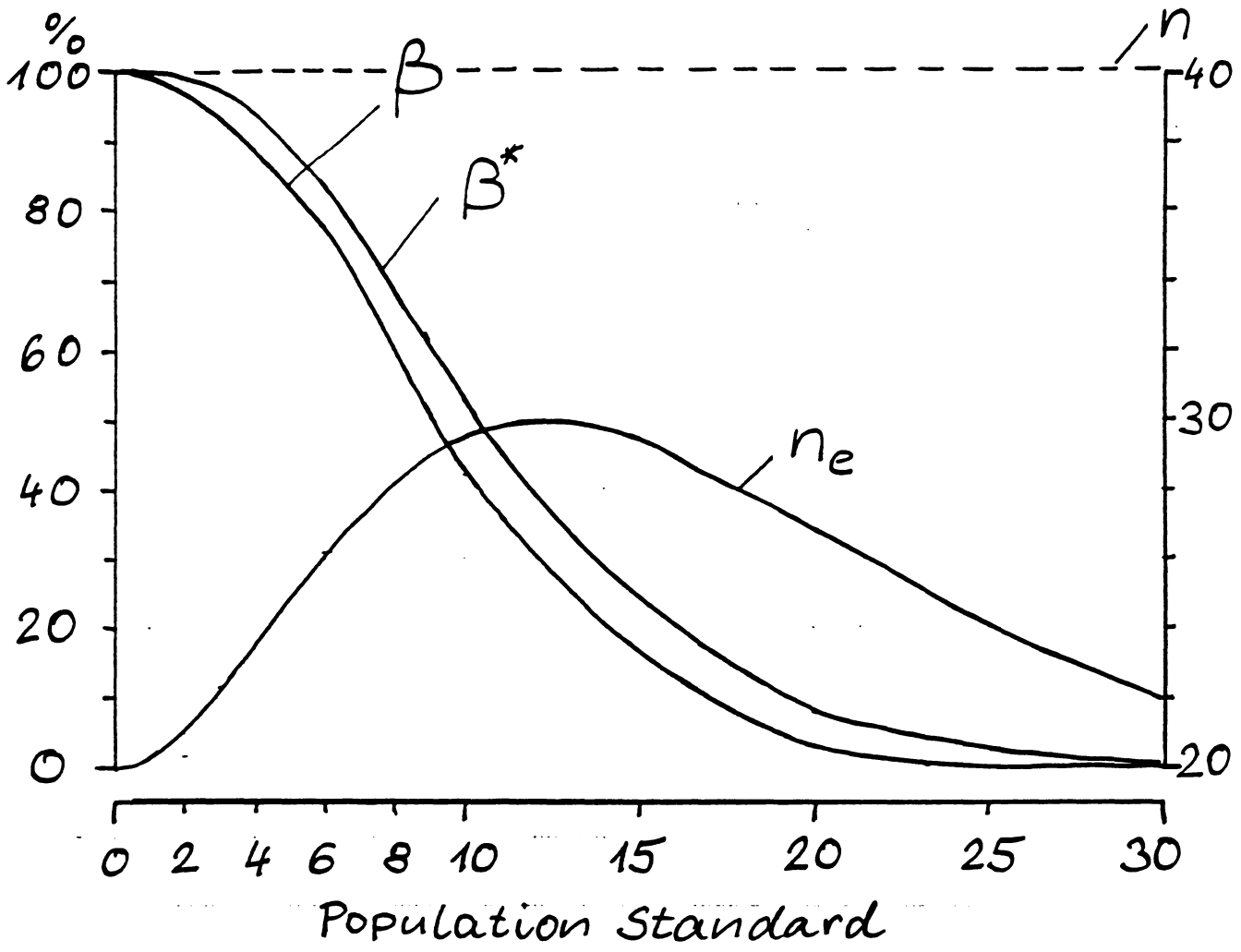


fig. 1: Global type II error β^* and effective sample size n_e for two-stage sampling v.s. β and n for one-stage sampling

[Annex XI follows]

UPOV - BETWEEN - COMPUTING CENTRE ELECTRONIC COMMUNICATIONS

COUNTRY	DEPARTMENT	COMPUTING CENTRE	OPERATING SYSTEM	NETWORK USER ADDRESS
DK	Dept of Biometry and Informatics		PC/DOS/WINDO	kk@dina.kvl.dk
	Dept of Variety Testing, Tystofte		PC/DOS-LANMANAGER	
FR	GEVES	La MINIERE	VAX/VMS	209 178 280 103
NL	CPRO-DLO		VAX/VMS	G.W.A.M.VAN.DER.HEIJDEN@cpro.agro.nl
IL	VOLCANI CENTRE		VAX/VMS	VCMZORO@VOLCANI
GB	NIAB/PVRO	NIAB	DYNIX	-
	DANI	QUCC	VAX/VMS	ACJB0341@UK.AC.QUB.AGV1
	SOAFD/SASS	EUCS	SUN	mike@sass.sari.ac.uk

MARCH 1994

DATA BASE MANAGEMENT SYSTEMS IN USE IN UPOV MEMBER STATES

Name	Hardware - OS	Min. Config	Multi-user	Type	Data used	Interactive	Query language	Security	Recovery	Net-Work	Interface	Comments
ORACLE	VAX II - VMS (NL,UK) PRIME-PRIMOS (UK) SEQUENT (DYNIX) most others IBM, PC etc SUN - UNIX (UK)	1.5mByte recom-mended per user	✓	Relational	Variety (NL,UK) Seed Cert (NL) Administrative (NL,UK) Photo/slides/ herbarium (NL)	✓	SQL	✓	✓	✓	Fortran Pascal Cobol C	
INFORMIX -ONLINE	HEWLETT-PACKARD - HP-UX (D)	16mByte	✓	Relational	Technical (D) Admin (D)	✓	SQL or QUICKSTEP	✓	✓	✓	Fortran C SAS	Interfaces to HIT (WP) and WINGZ (SS)
dBase III+	IBM PC - MS DOS (ES) IBM AT3 - DOS 3.1 (DK) AT286 - DOS 3.3 (DK) Apricot Xen - MS DOS (UK) and Xeni " (UK) all IBM compatibles - PC DOS	256 KB		Relational	Technical (ES,UK) Admin (ES,UK)	✓	dBase commands			✓	Assembly Language only	
dBase III	IBM PC DOS		✓		Technical (F)	✓				✓	SYCERO	
Fox Pro	AT286-AT386 DOS 3.3	512 KB		Relational	Technical (DK)	✓	Fox Pro commands			✓		
Fox Base +	Apricot Xeni - MS DOS (UK)	640 KB	(Multi-user version available)	Relational	Variety (UK) Admin (UK)	✓	Fox Base commands			?	Assembly Language only	
INFORMATION	PRIME-PRIMOS (UK)	1 mB on PCS	✓	Relational-like	Seed - Admin (UK)	✓	INFORM	✓		?	INFO-BASIC interface to 3GLS but not easy	
RDB	VAX 4300 - VMS (F)		✓	Relational	Technical (F) Admin (F)	✓	RDO (SQL-like) + Focus	✓	✓	✓	✓	
IDSMA Version 520	ICLS39 VME (PL)	4.9 Mb	✓	Integrated (CODASYL)	Admin (PL) Variety (PL)	✓	Query Master	✓	✓	✓	COBOL, Application Master	
ACCESS	WINDOWS + DOS	8 Mb	✓	Relational	Technical (F) Admin (F)	✓	✓	✓	✓	✓	✓	

EXCHANGEABLE SOFTWARE - DENMARK

Program Name	Function	Programming Language	Available From
Denmark uses SAS on Pcs and under MVS for calculation of data from both DUS and VCU trials. Administrative data are stored and retrieved from a database developed in FOXPRO (Dbase IV-like) on Pcs. Macros in SAS are available which convert SAS datasets to files which can be read by DUST and related programs. Procedures using SAS can be copied by other users.			
SAS-SUMMARY	Calculates summary measures.		K Kristensen Denmark
SAS-ANOVA SAS-GLM	Calculates analyses of variance, variety means and SLD values.		
SAS-PLOT	Residual plots and plots of standard deviations against plot number and/or means.		
SAS-IBGEN	Generates (0,1) and (0,1,2) incomplete block designs from generating arrays (Adaption of IBGEN from SASS Edinburgh).		
SAS-IBAN	Analyses of incomplete block designs (Adaption of IBAN from SASS Edinburgh).		

EXCHANGEABLE SOFTWARE - FRANCE

Program Name	Function	Programming Language	Available From
COMPAR AISON	The score of the candidate variety for each characteristic in turn is tested against the reference variety. Program stops when one difference is found.	Fortran 77	INRA-GEVES 78285 Guyancourt Cedex
COMPAR TOUT	As above except that all differences between candidate and reference variety are noted.		
CARAMES	For characteristics which used actual measurements comparison is made with a theoretical standard.		
CLASMOYENNE	As above but measurement is converted to a score.		
VCAN JOANA	Used for DUS Forage Crops for quantitative characters. Gives number of plants, means, variances by rep and by sample - carries out ANOVA, sorts, DUNCAN and NEUMAN - KEULS test for qualitative characters.		
VCAL	Gives numbers of plants by score, by rep and by sample. Comparisons between each pair.		
MIMOSA	Summarises the results obtained by VCAN and VCAL.		
LCLM	Help for distinctness, similar varieties. The program is able to use quantitative, qualitative and electrophoretic characters. After a selection of the varieties and characters involved in the study the program compares the varieties. On the printings are the description of the variety and the notes of the varieties which are similar to it.	C language	GEVES FRANCE
METRO	Tool based on a set of user friendly programs for the planning, collecting and storing of experimental data. Used with DOS desk computers and hand held computers. Transfer of data are automatically driven (one desk computer with many hand held computers at the same time). Files may be transferred easily from or to commercial software.	BASIC	GEVES FRANCE
STAT-ITCH	Statistical analysis. Menu driven. Designed by statisticians and agronomists. Cheap to purchase (you pay floppys and documentation).	BASIC	ITCF FRANCE (contact GEVES)

EXCHANGEABLE SOFTWARE - GERMANY

Program Name	Function	Programming Language	Available From
SAS - COY - D	Distinctness tests for candidate varieties with 3, 2 or 1 year of trial results. Calculation of ANOVA summary statistics, MJRA, LSD-values, outlier checking, residual plots, summary table of distinctness results, similar varieties. Options: long range LSD values, robust estimate of error mean square.	-	F. Laidig Bundessortenamt, Hannover
SAS - COY - H	Homogeneity test for candiate varieties with 3 and 2 years of trial results. Functions and output as described in document TC/30/4 (COY-U).	-	

EXCHANGEABLE SOFTWARE - POLAND

Program Name	Function	Programming Language	Available From
POWT3	Analysis of categorial data; the difference between all pairs of varieties are tested.	FORTRAN F1	W. Pilarczyk COBURU Poland
POWT5	Analysis of variance for cumulative observations over a period of time. Program can be used, for example, for the analysis of heading dates and for so called "dynamics of flowering".	FORTRAN F1	

EXCHANGEABLE SOFTWARE - THE NETHERLANDS

Program Name	Function	Programming Language	Available From
Hand held terminal	Programs on hand held terminals FW-60 transfer, file handling and checking of data.	CP/M Pascal 3.0 VAX-Fortran	Gerard Middendorp CPRO-DLO, PO Box 16 6700 AA Wageningen The Netherlands
DUS	Programs for designing trials, processing data from trials (summary measures, analysis of variance. Testing of variety denomination based on word similarity.	VAX-Fortran	Gerard Middendorp CPRO-DLO
VCU	Design and analysis of VCU-trials (1-way, 2-way non-orthogonal, weighted ANOVA, crop-specific).	VAX-Fortran	Gerard Middendorp CPRO-DLO
STUUR	General programs; file handling; manipulating (sorting, statistics etc) of rows and columns.	VAX-Fortran	Gerard Middendorp CPRO-DLO
SCIL-Image	Image analysis package with C-command interpreter, menu's, easily expandable large library of imaging functions.	C	Gerie v.d. Heijden CPRO-DLO

EXCHANGEABLE SOFTWARE - UK

Program Name	Function	Programming Language	Available From
DUST	General program for analysis of data from DUS trials. Includes facilities for COY analysis and a wide range of multivariate analysis techniques.	FORTRAN	Dr S T C Weatherup DANI BELFAST

[Annex XII follows]

TWC/12/11

ANNEX XII

PROPOSED LIST OF ITEMS FOR THE NEXT SESSION

I. GENERAL

1. **Feedback from the Technical Committee and the Technical Working Parties**

2. **New developments in member States**

3. **Perception of statistical background documents**

   Objective: discuss problems of (mis)perception of statistical documents and means of improving the communication of the information.

   Paper: to be prepared by Mr. Erik Schwarzbach (Czech Republic).

II. DISTINCTNESS TESTING

1. **General biometric studies on visually observed and measured characteristics**

   Objective: show on the basis of a practical example--French beans--the possible contribution of such studies, for instance, to the establishment of Test Guidelines.

   Paper: to be coordinated by Mr. Friedrich Laidig (Germany) with input from Denmark, France, Germany, the Netherlands and Poland.

2. **Visually assessed characteristics**

   Objective: examine how to handle visually observed characteristics in the decision-making process.

   Papers: a general paper to be prepared by Mr. Gerie Van der Heijden (Netherlands); a paper on categorical data and contingency tables to be prepared by Mr. Wieslkaw Pilarczyk (Poland).

3. **Use of the COYD analysis for crops other than cross-fertilized ones**

   Background: the Chairman of the Working Party will raise the issue in the Technical Committee. The Working Party would be ready to contribute to the definition of transitional periods; Mr. Colin Weatherup (United Kingdom) could undertake to analyze data.

   Objective: follow up the matter.

4. **Use of the COYD analysis with the long-term LSD to give information to the breeder after first year of test on distinctness and for homogeneity**

Objective: discuss matter further (see paragraph 34(iii) of the report).

Paper: to be prepared by Mr. Friedrich Laidig (Germany) and Mr. Colin Weatherup (United Kingdom).

III. MULTIVARIATE ANALYSIS

1. **Other approaches to the Mahalanobis' generalized distance D^2 between two varieties, e.g. using logarithms**

Paper: none promised (but Mr. Gerie Van der Heijden (Netherlands) or Mr. Colin Weatherup (United Kingdom) may provide one).

2. **"Problem pairs" (very similar varieties) and use of the Mahalanobis' generalized distance D^2 between two varieties**

Objective: rediscuss matter on the basis of the existing documentation (in particular TWC/12/5) and the available software.

3. **Application to the search for the most similar varieties**

Papers: Existing papers plus one to be prepared by Mr. Erik Schwarzbach (Czech Republic) and possibly one prepared by Mr. Colin Weatherup (United Kingdom).

4. **Application to visually observed characteristics**

Paper: none promised.

5. **Application to the validation of data (detection of outlyers)**

Paper: to be prepared by Mr. Colin Weatherup (United Kingdom).

6. **Application to small samples in connection with electrophoretic tests**

Paper: by Mr. Lubomir Horvath (Slovakia), to be translated by him together with Mr. Erik Schwarzbach (Czech Republic).

7. **Application to image analysis**

Paper: to be prepared by Mr. Colin Weatherup on the basis of data supplied by Mr. P.D. Keefe (United Kingdom).

8. **Application to biomolecular methods**

Objective: examine statistical questions, if any are raised by the BMT (or another UPOV body), in relation to a specific biomolecular method and its use to respond to a question of relevance to UPOV (for instance distinctness testing).

IV. HOMOGENEITY TESTING

1. Sequential analysis

Objective: prepare a paper explaining the principles of the method and giving practical examples for submission to the Technical Committee in autumn 1995.

Background: the matter will be submitted to the Technical Committee at its next session to seek advice (and hear preliminary views from the representatives of the professional organizations).

Paper: to be prepared by Mr. Sylvain Grégoire (France), Mr. Kristian Kristensen (Denmark), Mr. Friedrich Laidig (Germany) and Mr. Mike Talbot (United Kingdom, coordinator).

2. Homogeneity testing over more than one year

Objective: define optimal sampling strategy.

Paper: on the matters described in paragraph 48 of the report; to be prepared by Mr. Kristian Kristensen (Denmark).

V. AUTOMATION

1. Image analysis

Background: the other Technical Working Parties will be consulted on the basis of a questionnaire to be prepared by Mr. Gerie Van der Heijden (Netherlands); the Technical Committee and possibly the Consultative Committee will be seized (see paragraph 81(ii) of the report).

VI. INFORMATION AND COMMUNICATIONS

1. Index of statistical documents

Objective: improve and update document TWC/12/3.

Paper: Mr. Sylvain Grégoire (France) to receive comments and proposals from other members of the Working Party (see paragraph 75 of the report).

2. Telecommunications, Exchangeable Software, Contacts, etc.

Objective: establish a data base.

Paper: questionnaire to be prepared by Mr. Gerie Van der Heijden (Netherlands) and Mr. Mike Talbot (United Kingdom), to be circulated by the Office of the Union to the plant variety protection offices and the other Technical Working Parties and to be exploited by Mr. Talbot.

3. **UPOV Central Computerized Data Base**

Objective: follow up matter; evaluate prototype CD-Rom.

Matters of some importance not mentioned in the discussion on the program for the next session:

1. Use of the COYD analysis over two locations

2. Robust estimation of the long-term LSD

3. Homogeneity testing on different test layouts (ear rows and drilled plots)

4. Preparation of reference documents (e.g. a final version of document TWC/11/16)

Matters for the longer-term:

1. Statistics related to biochemical and biomolecular methods

2. Statistics related to essentially derived varieties (see proviso in paragraph 69 of the report)

3. Preparation of CD-Roms other than the one in preparation

4. The matters raised in paragraph 84 of the report

All papers should be prepared in advance of the session and reach the Office of the Union by April 7, 1995, at the latest, to provide enough time for the Office of the Union to distribute them and for experts to study them.

[End of document]