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UPOV

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY ON AUTOMATION AND COMPUTER PROGRAMS

Thirteenth Session

Slupia Wielka, Poland, June 7 to 9, 1995

REPORT

adopted by the Technical Working Party on Automation and Computer Programs

Opening of the Session

1. The Technical Working Party on Automation and Computer Programs (hereinafter referred to as "the Working Party") held its thirteenth session in Slupia Wielka, Poland, from June 7 to 9, 1995. The list of participants is reproduced in Annex I to this report.

2. Prof. E. Bilski welcomed the participants to the Research Centre of Cultivar Testing (COBURU) at Slupia Wielka. The session was opened by Mr. S. Grégoire, France, Chairman of the Working Party.

Adoption of the Agenda

3. The Working Party adopted the agenda as given in document TWC/13/1, after having agreed to add the following two items: (i) UPOV-ROM Demonstration Disc and (ii) improvement of written documents.

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

4. Mr. M.-H. Thiele-Wittig gave a brief report on the main items discussed during the previous session of the Technical Committee and referred participants needing further details to the full report reproduced in document TC/31/6. Mr. S. Grégoire, France, especially highlighted the information on the CD-ROM demonstration given, the discussions on document TWC/11/16, on the second location, on non-measured (visually-assessed) observations, sequential analysis, image analysis and on help for the treatment of results from biomolecular techniques.

5. UPOV Central Computerized Data Base: The Working Party noted the latest stage of preparation of the UPOV central computerized data base on CD-ROM as set forth in Circular U 2229 dated February 24, 1995. The Office of UPOV had invited all its member States to submit data for the envisaged UPOV-ROM demonstration disc by April 15, 1995. It had received data from 15 States (Argentina, Austria, Canada, Denmark, France, Germany, Hungary, Israel, Japan, New Zealand, Netherlands, Spain, Sweden, United Kingdom, United States of America (PVPO and PTO)). The Office of UPOV, with the help of experts from WIPO, had checked the data received and requested, if necessary and possible, corrections from some countries. Thereafter, all data were submitted to JOUVE for the preparation of the above-mentioned UPOV-ROM Demonstration Disc.

6. The Working Party also noted Circular U 2277 containing a list of open questions on the UPOV-ROM Demonstration Disc introduced by Mr. M.-H. Thiele-Wittig. Owing to a lack of time it was not possible to answer the questions during the session. All experts were therefore invited to send their comments or proposed answers to the Office of UPOV. The Working Party also proposed to send the Circular to the experts that had submitted data asking them for comments.

Report on New Developments in Member States

7. The Working Party received from some of its experts short reports on recent developments in their countries. Several experts reported on the inclusion of the DUST package prepared by Mr. C. Weatherup, United Kingdom, in their system, its translation into their national languages and its application. The Japanese expert reported on the work for a paperless office in recording all documentation on disks. The French and German experts reported on the improvement of the connection between the main office and the trial stations through the system CLIENT/SERVER. The French Office also produced for those trials being undertaken outside their organization a paperless system with diskettes for the sending and receiving of data, including a program for the merging of the data.

8. The expert from Germany also reported on a meeting of the European Union in Brussels that had discussed the best way of establishing a computer system for the handling of the adminstrative data of the new PVR office. The Working Party recommended in that connection to the Technical Committee that the European Union be invited to future sessions of the TWC.

9. The experts from Russia distributed some written information on their organization as reproduced in Annex III to this report.

Handling of Visually-Assessed Characteristics

10. Possibilities of using biometry to help in the establishment of guidelines: Discussions were based on document TWC/13/14, prepared and introduced by Mr. F. Laidig, Germany. He pointed out that when preparing Test Guidelines four questions were important: (i) Are the number of states of expressions, as specified in the Test Guideline for individual characteristics, still appropriate? The data may show that only some states occur in practice; (ii) Which characteristics are stronlgy correlated, and if so, which of them can possibly be dropped? (iii) Which characteristics have a low discriminative power and are better not included in the Test Guidelines? (iv) How large should be the minimum distance of a visually-observed quantitative characteristic in order to establish distinctness, e.g. should the distance cover two or three notes, when the underlying scale is in the range from one to nine? The study was made on French beans as an example, on data of six years using as methods: (i) Histograms of individual characteristics to illustrate the relative frequencies of Notes over all years and varieties; (ii) Pooled sample correlation coefficients within years and between characteristics having a one-to-nine scale to check whether any characteristic should be eliminated because of strong correlation with another one; (iii) A two-way analysis of variance (ANOVA), with the factors years and varieties, as the results needed to be interpreted with caution because the dependent variables were only of ordinal scale. (iv) An empirical minimum distance (MD); the question arose whether the LSD values could help the crop expert to check if the empirically found MD was appropriate as LSD and MD values have quite different meanings when applied as a measure of minimum distance; (v) A percentage of distinct variety pairs (%D) was calculated from six individual years and the empirical minimum distance MD applied. It concluded that the conclusions drawn from this study were based on data from one country only and a specific set of years. The evaluation of individual characteristics in other countries could lead to different results. The Test Guidelines could be considered as a compromise over many countries. Therefore a statistical evaluation from other countries needed to be considered too. This study showed that analysis of past data was of valuable help for the revision of guidelines. It was recommended to use this information in the future. The benefits were a contribution to reducing the work load in DUS testing and improving the reliablity of decisions.

11. Mr. M. Del Fresno, Spain, introduced additional information on the biometrical evaluation of visually-assessed characteristics of French beans with additional histograms as reproduced in Annex IV to this report. The Working Party concluded that the discussion had shown that the method applied could provide useful help in checking Test Guidelines and trying to evaluate the usefulness of given characteristics. However, statistics would be only a help and care should be taken when applying them.

12. Handling of visually-observed characteristics in the decision-making process: Discussions were based on document TWC/13/9, Homogeneity Criterion for Visually-Assessed Characteristics in Turnip Rape, which had been prepared by Mr. M. Talbot, United Kingdom, and was introduced by Mr. J. Law, United Kingdom. The document recorded steps taken in the United Kingdom to prepare guidelines on uniformity in some detail with respect to turnip rape. Three possible approaches had been considered:

(i) Totalling the number of off-types amongst the established varieties and forming a two-way table to which a chi squared test was applied with 1 degree of freedom. This method did not take account of variation from test to test in off-type rates and so may represent too severe a criterion.

(ii) Application of the analysis of variance to the percentage off-types for established varieties. Since the range of percentages was small, an analysis of the untransformed data seemed reasonable. An LSD was then calculated to compare the candidate by means of the established varieties.

(iii) Analysis of the binary data to fit a linear logistic model drawn from the broad class of models known as generalized linear models (GLM). Because of the comparison of a candidate by means of the control, the data for the candidate variety must be included in the analysis. The GLM model was then constructed to include a contrast term which represented a comparison between the candidate and the mean of the established variety.

13. The Working Party followed the conclusion of the document that in principle method three was the preferred procedure since it involved a model which most closely reflected the underlying processes. However, it had the drawback of using the data for the candidate as part of the precision of the test. When the candidate produced many off-types it also tended to be more variable between tests. Some experts feared that heterogeneous varieties could thus lead to a shift to more heterogeneous varieties in the future. The expert from Denmark therefore proposed to study a fourth method appling past experience using the population standard already introduced in UPOV.

14. Some experts feared that it was difficult to accept that in method (iii) the varieties used for comparison would change from year to year. Thus "the rule" changed from year to year, something difficult for the breeders as they would not know what to prepare themselves for.

15. The Working Party finally agreed that the expert from the Netherlands would prepare a paper reviewing the different methods applicable to visually-observed characteristics as to their usefulness in assisting crop experts to take decisions. The Technical Working Party for Agricultural Crops (TWA) should be asked to select a species for which it foresaw a revision of the Test Guidelines and the above procedure in document TWC/13/14 applied for French Bean should be repeated for that species. Furthermore the experts from the United Kingdom and Denmark would apply method (iii) (GLM, United Kingdom) and method (iv) (population standard, Denmark) to real cases and add to their document the appreciation of the crop expert. Experts having real data should send them to Mr. J. Law, United Kingdom, who would then also send them to Mr. K. Kristensen, Denmark, to ensure that the same data were used for both methods. Other experts would be invited to propose further methods together with examples. The experts from Germany will investigate the fluctuation of off-types from year to year in self-fertilized crops.

16. Categorical data and contingency tables: Discussions were based on document TWC/13/3, Application of Weighted Regression Method in Evaluation of Flowering (Heading) of Varieties, prepared and introduced by Mr. W. Pilarczyk, Poland. The document explained the use of two-way contingency tables with ordered categories for the observation of flowering of white clover and the application of the coefficient of concentration on the observation of the number of internodes of maize varieties. The data of varieties were checked from the point of view of concentration of observations around one of the categories. If all plants of a given variety belonged to one category, the variety was the most uniform. If plants were equally spread over all categories, the variety was the most heterogeneous. The method was at present still at the experimental stage and further research was necessary. Several experts explained that in their countries in similar situations (e.g. flowering time) they would observe additional characteristics at the beginning and end of flowering or length of flowering to cover the cases treated in the document.

Use of the COYD Analysis Including Long-term LSD (to give information to the breeder after the first year of test)

17. Discussions were based on document TWC/13/7, Analysis of Single Year Trial Results Using Long-term LSD's for herbage species, prepared by Mr. C. Weatherup, United Kingdom, and introduced by Mr. J. Law, United Kingdom. The document gave results of the application of the long-term LSD to herbage species. It used two ways of comparison: (i) the within trials LSD based on plot variation; (ii) comparison of the same variety means using an LSD derived from a varieties x years analysis covering several years. Because of missing varieties in the latter approach, a fitted constants analysis had been used. A practical difficulty encountered with this comparison was the lack of consistency of the characteristics measured from year to year. Hence, the two methods had been contrasted using the set of characteristics which were common to all years.

18. The document concluded that a long-term LSD calculated at 1 per cent would provide similar stringency to the within year LSD determined at 0.1 per cent. Since, on theoretical considerations, the long-term LSD would be expected to provide the better indication of distinctness using COYD after two to three years, it was therefore recommended that the long-term LSD evaluated at the 1 per cent level was used at the year one stage. However, when some characteristics changed from year to year the use of the long-term LSD posed some practical difficulties in its application necessitating the most recently introduced characteristics to be evaluated using the within trial LSD.

19. The Working Party noted that the method was at present used in the United Kingdom to warn breeders, after the first year, on varieties which potentially may have difficulties to be distinguished after the second year. The level of stringency was therefore set in a way to prefere a longer list of varieties even if many of them finally could be distinguished. The method had already been included in the DUST tool, but so far it had only been applied by the United Kingdom. It was not at all used for taking decisions on distinctness.

20. Ms. F. Blouet, France, introduced document TWA/24/6 prepared by experts from France for the Technical Working Party for Agricultural Crops (TWA) and reporting on DUS trials of Bromus varieties in France. Although Bromus was self-fertilized, France proposed that it should be treated as a cross-fertilized crop with spaced plants and with the application of the COYD and COYU analysis as (i) Bromus was not totally self-fertilized and (ii) breeders were the same as for perennial fodder crops (mainly synthetic varieties of cross-fertilized species) and treated Bromus varieties in the same way. Thus it was not possible to require complete uniformity but only a relative one compared to already known existing varieties. The document compared several examples of Bromus and Dactylis. It concluded that the COYD and COYU criteria as well as other statistical tests could be appropriate to check distinctness and uniformity of Bromus varieties even though they required an extra workload due to the plant-by-plant assessment of characteristics. The examples presented in the document showed that it was a good method to take into account the relative uniformity of the varieties and to facilitate the decision on distinctness.

21. Some experts of the Working Party took the view that the fact that, if treated as a self-fertilized crop, too many Bromus varieties would have to be rejected was not necessarily a valid argument, as lack of uniformity was not necessarily something that had to be attributed to the species but that the breeder might just not have done his homework and left a mixture of lines. While there was less of a problem to apply COYD to all species, including self-fertilized ones (although studies with past data would be necessary to find the right level of stringency), COYU was only to be applied to cross-fertilized and partly cross-fertilized species.

22. The Working Party noted that the Technical Committee would follow the study of the Technical Working Party for Agricultural Crops (TWA) together with the TWC whether the COYD analysis developed for cross-fertilized species could also be applied to self-fertilized species. In order to get a clearer picture of the decisions with respect to the use of COYD, COYU and the inclusion of the long-term LSD already taken by the Technical Committee, the Office of UPOV was asked to include in an Annex to this report a summary of decisions already taken with respect to these methods (see Annex VI).

23. The Chairman reported in this connection on the inclusion, by Mr. C. Weatherup, United Kingdom, on one diskette of the COYD and COYU program together with files and data which could be run on the national computers to check whether in the process of translation and integration into the different national systems the program had not been changed and would lead to the same results, as included on the diskette.

Testing for Off-types Over More Than One Year

24. Discussions were based on document TWC/13/8, Homogeneity Testing over More Than One Year, prepared and introduced by Mr. K. Kristensen, Denmark. The document restated the question that had arisen during the last TWC session of what might happen to the risks involved if the tests for off-types were made independently in two or three succeeding years and the candidate variety was rejected if both years (or two out of three years) showed too many off-types. As an alternative it was suggested to combine the data from the individual years in one test, calculating the total sample size over the years, to choose the same (or lower) alpha-risk to get a better balance of the two risks and base the final decision on this aggregate sample. Also, the use of a sequential test procedure was discussed as an alternative. This paper compared the above-mentioned methods, though a two-stage testing procedure was used instead of the suggested sequential methods. The document raised the following questions: (i) Do we accept basing decisions concerning off-types on one year only? - or do we for reasons other than statistical risks always require at least two years when testing for off-types? (ii) Was a true probability of off-types equal to five times the population standard a reasonable criterion to be used? (iii) Was it reasonable to fix the alpha-risk *a priori* and then minimize the beta-risk or should other criteria, such as alpha squared plus beta squared, be minimized? (iv) Were there non-statistical arguments to take into account when choosing between two (or three) independent tests and a combined (or two-stage) test?

25. The document concluded that the use of two (or three) independent tests without adjusted acceptance probabilities would result in tests with low alpha-risks and often with unacceptable high beta-risks. Using adjusted acceptance probabilities would result in tests with beta-risks which were much lower and closer to the beta-risks of a combined test. A combined test (or two-stage test) would give a beta-risk which in many cases was much smaller than those which could be reached by a test in only one year. When the sample size was large, a two-stage test might often yield final results after only one year. A two-stage test might in some cases give a beta-risk which was slightly smaller than that obtained by a combined test. The Working Party noted that the questions raised in the document were not limited to tests over two years but applicable to all cases where more than one test was made.

26. The Chairman pointed out that document TWC/11/16 had been developed for one test only. It was silent on how to decide if there were more than one test. The Working Party would therefore have to continue discussing the subject during its next session and to consider further possibilities. The expert from Denmark will prepare another paper for that purpose on possibilities of handling data from more than one test or more than one year.

27. The discussions on the document raised again several outstanding questions connected with the definition of the population standard. The Working Party also noted that the Technical Committee will further discuss the balance of the risk of wrongly rejecting a uniform variety as heterogeneous and the risk of wrongly accepting a heterogeneous variety as uniform, as well as the influence of the sample size on these risks.

28. The expert from Spain raised several questions presented to him by crop experts. He asked whether the tables of document TWC/11/16 were to apply to the sample sent in or to the variety and whether there was an adequate distribution. He stated that in many cases the expert would not be aware of the population standard but would only know from his experience the number of off-types he could accept in a given sample. There was a need for a program that could be handled more easily than the tables of document TWC/11/16.

29. Mr. F. Laidig, Germany, recalled that the table in document TWC/11/16 had been prepared for the experts in the Technical Working Parties for use at the time of preparation of the Test Guidelines to help them fix the population standard in the Test Guidelines. They were not intended for use by individual countries to fix an individual population standard at the national level. Mr. Laidig offered to check, together with the Chairman, the draft Test Guidelines prepared by the individual Technical Working Parties, at the time of their presentation to the professional organizations for comments, not only on the right use of states of expression but also on the right indication of statistical aspects and especially of the population standard.

30. The expert from the Czech Republic stated that the task of the statistician was to inform on the risk of a given action and not to suggest a decision. In the different Test Guidelines he missed the safety aspect of the decisions and he could only find statistical significances instead.

31. The expert from Spain drew the Working Party's attention to the questions of the TWA, as reproduced in paragraphs 15 to 21 of document TWA/23/16, with respect to the right choice of the population standard for ear rows and for drilled plots.

32. At the request of the expert from Spain, the Working Party also discussed whether the binomial distribution as assumed in document TWC/11/16 had been adapted to all situations or whether because of sometimes very small samples (e.g. in case of inbred lines of maize) calculations would have to start from a hypergeometrical distribution. Several experts reconfirmed that in a first view it seemed to be correct to start from a binomial distribution. However, in order to clarify the question the expert from Denmark offered to prepare for the next session a paper describing the differences of application of the binomial distribution and the hypergeometric distribution.

33. The Working Party finally agreed to continue its discussion on this subject during its next session. The experts from the Netherlands would prepare a general paper on statistical models for the population standard. The document would also cover the questions of fixed population standards versus standards varying from year to year or dependence on how the work had been done.

34. The expert from Spain would prepare a paper on tools that might help to find the right population standard and decision rule for different sample sizes.

Sequential analysis

35. Discussions were based on document TWC/13/17, which was prepared by experts from France in cooperation with experts from Denmark, Germany and the United Kingdom and introduced by Mr. S. Grégoire, France. Mr. Grégoire gave the background to the study on sequential analysis, starting in the Technical Working Party for Agricultural Crops (TWA) for the possible application to electrophoresis data, over the several documents prepared for last year's session, the discussions during that session and the request of the Technical Committee for a document to be prepared by the TWC. In preparing this document it had been intended to avoid formulas, to stick to the principle of one page and one example with more information in independent parts and different levels. The goal was to check samples of varieties for off-types whereby it had to be avoided to reject good varieties or to accept bad ones. Pages three and four of the document contained the document requested by the Technical Committee with information on the principle of the sequential analysis method and giving an illustration of that analysis with an example. The document then discussed in detail general considerations on UPOV work which reflected the basic practice of the work carried out in UPOV and which were important to be kept in mind when discussing the methodology. It thereafter made a comparison of different approaches with examples illustrating the sequential analysis and other common practices such as "study during one year with a fixed sample size." It finally contained supplements corresponding to the different approaches with information for those who wished to know how the figures for the different examples had been obtained.

36. The expert from the Czech Republic foresaw difficulties in understanding the fact of not fixing one limit between good and bad varieties but two limits (good = 0-1 per cent off-types, bad = 5 per cent off-types or more). The Working Party approved pages three and four whith some minor changes. Several experts considered the middle part of the document to be of lesser importance and that, for the Technical Committee, it could be omitted. Others were not sure whether it should be completely deleted. The Working Party therefore requested several of its experts to inform their national colleagues in the Technical Working Party for Agricultural Crops (TWA) to check the document and to inform them or the Chairman of their impressions and of the usefulness of the different parts for discussions on the subject in the Technical Committee. On the basis of those comments the Chairman would prepare a revised draft document for circulation to the commenting experts before preparing a final document and distributing it to the Technical Committee. Several experts expressed their satisfaction that document TWC/13/17 had already considered several of the remarks made to improve the acceptance of TWC documents.

Image Analysis

37. The Working Party recalled that the Technical Committee had requested that a survey should be made of what had already been done in the field of image analysis and what problems had been encountered with that tool in variety testing. It noted Circular U 2220, containing a summary of 26 answers received on the questionnaire on image analysis. The Circular concluded that at that moment some countries had already started the application of image analysis in their routine variety testing. In addition, several other countries indicated their interest in the application of image analysis in the near future. As it had already been concluded by the TWC at its meeting in April 1994, it would be most profitable to cooperate and standardize before research and applications of members started to diverge. It could be concluded that there had already been a divergence in the choice of hardware

and software in the respective UPOV member States. However, it was thought that at that time it was still possible to standardize the equipment (more or less), using the criteria stated in document TWC/12/6. If they waited until more countries had implemented image analysis, it would be much more difficult although some experts already felt at that moment that seemed to be unrealistic. It might be more realistic to establish a library of tools.

38. The Circular proposed also to form a UPOV working group on image analysis. This Working Group could also expand on the work done by a previous sub-group on color measurements. Fifteen experts who replied had indicated that they were prepared to join such a working group. That working group should be responsible for the standardization of image analysis applications and for the dissemination of results of the various countries. From the answers to the questionnaire it could be concluded that there were three criteria for selecting crops for standardization of image analysis applications: (i) a crop of which characteristics were already measured with image analysis; (ii) a crop that was already under investigation; (iii) a crop that was mentioned as of great interest.

39. The Working Party also noted document TWC/13/16, prepared by experts from Denmark, the Netherlands and the United Kingdom and containing information on a research proposal for the European Communities written as a result of Circular U 2220, a Questionnaire on Image Analysis in Variety Testing. The project was submitted to the FAIR program of the European Communities in March 1995 under the acronym VISOR. The objectives of the project were to:

(i) establish best practice guidelines in applying image analysis to testing for distinctness, uniformity and stability;

(ii) develop computer systems which automate the production of scores for characteristics that are currently visually assessed;

(iii) develop an image database system for plant varieties which can take an image of one variety and compare it with other images of varieties of the same species in order to identify the closest visual match.

40. The Working Party concluded that although the VISOR project was restricted to European Union member States, the approaches could be beneficial to all UPOV member States.

Multivariate Analysis

41. Other approaches to the Mahalanobis' generalized distance D^2 between two varieties, e.g. using logarithms: Discussions were based on document TWC/13/5, Multivariate Evaluation of United Kingdom Problem Pairs in 1992/1994 (Ryegrass Varieties), prepared by Mr. C. Weatherup, United Kingdom, and introduced by Mr. J. Law, United Kingdom. The document noted that during the last session of the TWC it had been agreed that if distinctness using D^2 could not be obtained by combining two characteristics, or at most three characteristics, it was unlikely to be obtained by combining the full set of measured characteristics. Accordingly, the search for a distinct characteristic combination needed only to involve two or three characteristics. Thus multivariate distances D^2 could be used to assist in the separation of problem pairs in variety pairs not distinct using COYD on measured characteristics. However, its application was limited to the determination of characteristic combinations involving just two characteristics on which distinctness could be established using a normal univariate COYD test. Further, only agronomically meaningful characteristic combinations were permitted in the COYD test. Consideration needed to be given to the

requirement that characteristic combinations must be agronomically important before they could be used in dinstinctness. There was no statistical reason why other combinations might not be used but there was a difficulty in providing an explanation in agronomic terms for the existence of such statistical differences. Also the implications for uniformity needed to be taken into account. Could uniformity of a characteristic combination be inferred from the uniformity of its constituent characteristics? If not, should the uniformity of all varieties be established on the combined characteristics?

42. Mr. J. Law also recalled that the characteristic in question had been observed in the past but had been abolished because too few varieties had been separated by that characteristic. In addition the D^2 analysis was only an intermediate tool. For a decision the expert would go back to the data plant by plant. The characteristic would not immediately become a routine characteristic. The additional effort and the use of these characteristics would only be made when the crop expert was convinced of the candidate being distinct but so far had no other tool to prove that distinctness. It was just intended to support the opinion of the crop expert. It was not at all foreseen or proposed that any combination of characteristics be accepted.

43. Most similar variety: Discussions were based on document TWC/13/6, Evaluation of Most Similar Variety, which was prepared by Mr. C. Weatherup, United Kingdom, and introduced by Mr. J. Law, United Kingdom. The document recalled two approaches to the choice of the most similar variety:

(i) t-value method (determination of the over-years t-values between the entrant variety and each of the control varieties on all characteristics. For each variety pair comparison determination of the largest t-value, regardless of sign, over all characteristics. The most similar variety was then defined as the one with the smallest maximum t-value, i.e. the variety with the smallest maximum characteristic difference over all characteristics);

(ii) D^2 method (determination of the over-years Mahalanobis generalized distance, D^2, between the entrant variety and all other varieties and selection of the most similar variety to be the control variety with the smallest value with respect to the entrant variety).

44. The document concluded that of these two approaches D^2 was likely to be the more suitable method as it included the differences of all characteristics weighted according to their correlations while the t-value method was dependent on the result from a single characteristic and hence might not reflect the total difference over all characteristics. In practice, both methods gave similar results. In the United Kingdom, the most similar variety was evaluated using the module MOSTX in the DUSTX package. Before the MOSTX module was run, information on variety means, SE's and distances were provided.

45. The Working Party noted that the indication of the most similar variety was part of the variety description recommended by UPOV although some member States had so far not followed that recommendation. The hope was expressed that with the spreading of the DUST package which included the above D^2 method more countries would calculate the most similar variety. The Czech expert reported that in his country the Euclidian method which was similar to the D^2 method was used to calculate the most similar variety.

46. Detection of outliers by multivariate analysis to the validation of data: Discussions were based on document TWC/13/4, Checking for Outliers in Herbage DUS Data, prepared by Mr. C. Weatherup, the United Kingdom, and

introduced by Mr. J. Law, United Kingdom. The document stated that the use of data loggers in the field could eliminate errors due to keying from field cards and should therefore be employed whenever possible. They could also be programmed to draw the operator's attention to any value outside a pre-set range on each characteristic. However, such a check should be relatively crude since the pre-set range on a characteristic should be sufficiently wide to accommodate all varieties and a value which may be abnormal for a variety having small values on a characteristic may be quite normal for a variety having large values on the same characteristic. Another possibility was the determination of plot ranges for all characteristics. The examination of the ten largest plot ranges in rank order could provide a record validation check since any excessive range relative to other ranges could draw attention to a possible outlying plant for further investigation. That method had the advantage over the previous method by referring each plant measurement to the other plant measurements of the same plot and thus would eliminate the effect of varieties.

47. The above methods, however, only considered the results taking one characteristic at a time and hence did not take account of information on the relationships between characteristics. Often large positive correlations between characteristics exist and hence it would be expected that a large measurement on one of these characteristics would occur with large measurements on the other. That multivariate distance took care of that. It was calculated from all the plants representing the variety in the trial having first removed plot effects. Those distances followed a chi squared distribution with degrees of freedom equal to the number of characteristics involved in their calculation. By choosing a critical value for chi squared at a low probability level and examining those plants whose distances exceed that value, abnormal results could be identified for further investigation. The multivariate distance thus only gave information on the existence of an aberrant plant, it did not give information on which characteristic or which characteristics caused that aberrant nature.

48. The experts will continue their study and will in future try to find means to identify the characteristic causing the high D^2 value and remove that characteristic from the data unless the field can be revisited and the recording repeated. A pragmatic approach had to be taken for the number of observations that may be repeated; it would not be based on statistical calculations but on practical experience. The discussions raised the problem of how to separate an outlier from a real off-type. It would be easy if the plant could be revisited and the observation repeated, however it would be difficult if that was impossible and if it could not be proved whether there was a real off-type or only a wrong observation or note of observation. The discussions made it also clear that the COY method foresaw no mechanisms and no possibility to consider a clear off-type outside the calculations as the method had been prepared for cross-fertilized species.

49. Application of multivariate analysis to small samples in connection with electrophoretic tests: Discussions were based on document TWC/13/15, Application of Statistical Analysis to Small Samples in Connection with Electrophoretic Tests, prepared and introduced by Mr. L. Horvath, Slovakia.

50. He recalled that the statistical basis for distinguishing true and non true varieties under test was the binomial distribution and that for distinguishing all types of spectra presented in electrophoretic gels in the same analytical sample, the statistical basis for analysis was the multinomial distribution. The experimenters usually met the following statistical problems with electrophoretic results: (i) Problems of tolerances and confidence intervals for testing of trueness to cultivars; (ii) Problems of

comparison of results of two or more independent analyses of the same sample and the reproducibility of analysis; an objective testing criterion was needed to compare results of two or more analytical samples; (iii) Problems of the representativity of an analytical sample, and the determination of the coefficient of representativity; the sample size (analytical sample) used for electrophorectic tests of variety testing and seed testing was usually between 20 and 100 seeds and thus the level of representativity of the analytical sample was very significant for a correct evaluation of analytical data.

51. He referred to tables of tolerances and of confidence intervals reproduced in document TWC/12/2. For the comparison of results he recalled that from the statistical point of view the independent selections from multinomial distribution were compared. The actual condition was that row marginal frequencies (numbers of seeds examined) were constant. The question was if probabilities of all of the analyzed multinomial distribution were equivalent or if the analyzed samples were uniform. Results showed that the chi squared Pearson test was in very good harmony with conclusions of analytical experts, who had many years of experience in electrophoretic tests of varieties. For comparison of two samples with binomial distribution and low frequencies of out-types, i.e. when we distinguish only variety and off-types in sample, the Fisher factorial test may be used. For the representation of the analytical sample he recalled that it was defined as a ratio of mean value of the analyzed parameter of the analytical sample to the mean value of that parameter in the basic collection, expressed as percentage. The satisfactory value of the coefficient of representativity in practice lay between 95 and 105 per cent. In an ideal case, the mean values of analyzed parameters in the analytical sample and basic collection were equivalent. From this point of view, differences between mean values of the analytical sample and basic collection were looked for. In cases of electrophoretic identification of varieties and uniformity, for the testing of varieties, relatively small analytical samples were used, usually between 20 to 100 seeds, however, this subsample very often represented a large amount of seeds (for example in 1 kg of seeds of wheat there were about 20,000 individual grains). Therefore the selection of analytical samples must be made very precisely and carefully to prevent systematical and random erros. On the other hand, it was necessary to have an objective method for the testing of representativity of analytical samples.

52. The big advantages of electrophoretic methods were simple quantification of the electrophoretic spectra, good possibilities for mathematical processing of this spectra and a possibility to use the single-grain analysis versus multi-grain (bulk) analysis of seeds. He then explained the use of different formulas for single-grain sample versus bulk sample and the formula for the calculation of the coefficient of representativity.

53. He concluded that experimental testing of this method gave resolutions of about 5 per cent of admixtures of one variety (off-types) in another (true variety) by using bulk sample when, for distinguishing, bands of high intensity were used which were present in the first (or second) variety only. The test of representativity of samples made it possible to find out the significant differences between real varietal purities of the laboratory sample and the analytical sample, or between the analytical sample and the basic collection. In actual cases the application of that test may reduce the range of single-grain electrophoretic analyses, which was economically very advantageous. The cost of that test was relatively low and represented the cost of about three or five analyzed grains of the test variety. The test did not require much time and could be chosen in parallel with any electrophoretic tests.

54. The expert from Slovakia finally corrected the formula given on page four of the document. The Working Party noted that the different methods could be applied irrespective of whether the sample was small or not.

55. Application of multivariate analysis to image analysis: Discussions were based on document TWC/13/10, Plant Variety Color Assessment Using a Still Video Camera, prepared by Messrs. Horgan, Talbot and Davey, United Kingdom, and introduced by Mr. J. Law, United Kingdom. The document described two experiments to investigate the use of a still video camera to distinguish plant varieties on the basis of color differences. In one experiment the color of seven varieties of celery was measured at the seedling stage. Using the color image data, it was possible to discriminate between varieties (with $p < 0.01$) in 19 per cent of the variety pair comparisons. In a second experiment with images of plants of Brussels sprouts growing in the field, 86 per cent of differences between pairs were significant at the 1 per cent level. Three-dimensional histograms were obtained from each image. From these data, summaries of the color of each image were obtained. Simple summaries included the average intensity in each of the three color components and the proportion of pixels for which a color component exceeded a given value. The histograms also allowed measures to be obtained of the overall difference in color distribution between two images. First, cumulative color histograms were calculated. Then, in order to assess which particular varieties could be distinguished, multivariate analysis of variance was used on five variables (average green intensity, average red intensity, average blue intensity, proportion of pixels whose green intensity exceeded 200, proportion of pixels whose green intensity exceeded 225) which summarized the color distribution of those pixels whose green value exceeded 170 (for celery seedlings) or 140 (for Brussels sprouts).

56. The document concluded that results showed that the still video camera had potential for measuring color differences between varieties both in the field and at the seedling stage. In particular, the use of color differences at the seedling stage could help to identify those control varieties which were dissimilar from candidate varieties, thereby reducing the size and cost of registration trials. Although it would be optimistic to expect that all varieties possessed characteristic color properties that could be recognized at the seedling stage, some variety separation was possible. If color assessment of seedlings was to be used on a routine basis, then consideration should be given to seedling management practices and to measures for standardization of lighting conditions.

57. Mr. J. Law added that the method had a large potential and had been able to separate 80 per cent of all varieties of Brussels Sprouts. It would have the advantage of collecting data of a whole new dimension. It had a good reproducibility over sites and years, although it was confronted with all the difficulties of capturing colors under field situations. More research was, however, needed on the influence of the environmental factors.

58. The Working Party agreed that a subgroup should further concentrate on that subject. If the European Union project was approved, that group of experts could form the core group to which others could feed their information. If not, an ad hoc subgroup should be created to advance research and discussions. For that subgroup also experts from the TWO should be involved, thus especially in view of the discussions on image analysis planned in the TWO for September 4, 1995.

Communication

59. Perception of statistical documents and means to improve communication of information: Discussions were based on documents TWC/13/19, Perception of Statistical Documents and Means to Improve Communication of Information, prepared and introduced by Mr. E. Schwarzbach, Czech Republic. The document held a critical view on the work and role of the statisticians. It pointed to ambiguities of terms in common language, to misunderstandings of common statistical terms, to missing translations of statistical interference into common language, to imperfect description of problems and to the misunderstanding of the role of statisticians. While the Working Party appreciated the highlighting of the subject to raise awareness of the possible difficulties, several experts disagreed with various statements mentioned in that document. The Working Party agreed that it was necessary to set up a glossary of statistical terms to facilitate understanding of documents by non-statisticians. As a source of information for that purpose was mentioned: "Rasch, D., Tiku, M.L., Sumpf. D., 1994: Elsevier's Dictionary of Biometry, Amsterdam, 887 p."

60. Improvement of written documents. The Chairman reported on a questionnaire circulated to the Chairmen of the other Technical Working Parties to inquire on the improvement of the acceptance of documents prepared by the TWC. Ms. F. Blouet, France, introduced the answers received. There was less need to ask the other Technical Working Parties what was needed, nor was there a need to prepare extracts frome existing documents. There was a need to inquire which questions needed an answer (e.g. which agronomic question led to the preparation of the method, how did the method work, comparison of new and old methods). There was also a need to supplement methods with examples and to explain the purpose of the method. The Working Party agreed that the quality of the paper was essential for a good understanding and acceptance of a method; that applied to any method and not only to the COYD and COYU method or document TWC/11/16. It was thus necessary to improve documents in general. A difference had to be made between documents for discussion in a TWC session and documents prepared for other Technical Working Parties or the Technical Committee. The latter needed to be complete in themselves, be illustrated by examples, with explanations of the text, with clear and precise notes on the diagrams, with consistent terminology (e.g. not changing between alpa and beta risk, risk type one, type two or risk of breeder, risk of user) with a clear structure of the document (e.g. assumptions of the method, why the method was needed, where it was used, how it worked, examples) with an overview of the paper, a short description in common language (not statistical language) followed by a more detailed description.

61. The Working Party noted that the COYD and COYU method and document TWC/11/16 should be rewritten in a form that later become part of a revised General Introduction to Test Guidelines. While the document on the COYU analysis did so far not require substantial changes, the document on the COYD method should be reviewed, the comparisons with other methods removed, the figures improved and explanations to the figures added. Document TWC/11/16 would have to be reworded to stand on its own; it would have to be extended to cover more than one test, the drawings should be presented with actual points, not in continuing curves; concrete cases should be added, especially for very low sample sizes (e.g. four or six plants in case of vegetatively propagated species). All documents should comprise a definition of the statistical terms used in the document, if possible, the definitions should be copied from existing references to be indicated.

62. Telecommunications, exchangeable software and contacts: Discussions were based on documents TWC/13/11, UPOV Technical Working Parties Electronic Mail Addresses, TWC/13/12, Database Management Systems in Use in UPOV Member States and TWC/13/13, Exchangeable Software, which were introduced by Mr. G. Van der Heijden, Netherlands. It was proposed to include the above information in future in one single document. The documents were noted with appreciation and received some corrections and further electronic mail addresses (see Annex II to this report). Annex V to this report contains the exchangeable software with respect to Slovakia. More countries were invited to supply information on exchangeable software and to check the information they had indicated in the past as some information looked rather outdated.

63. The Working Party noted that the Technical Committee had requested that a survey should be made to inquire who would be interested in documents in electronic form and for which purpose it would be needed, before asking the Office of UPOV to keep the electronic version of documents in full agreement with the printed versions.

64. The expert from the Netherlands gave a short report on the increased use of e-mail facilities and raised the question of whether certain UPOV documents, e.g. the COY method once reworded or document TWC/11/16 or other documents like the UPOV Convention or the UPOV Test Guidelines should be placed on the Internet to be accessible by e-mail. The Working Party agreed that it was the time to consider such a step, but it was also necessary to carefully reflect which document should be made accessible and in which format. It finally recommended to the Technical Committee to consider the subject and offered its help in the study of possibilities. It was of the opinion that access to certain documents via e-mail as well as transfer of data via E-mail was not only of help to the TWC but also to other Technical Working Parties and also to the Technical Committee or other bodies of UPOV.

65. List of statistical documents prepared by the TWC: Discussions were based on documents TWC/13/2 and TWC/13/2 Rev., Documents Produced by the Technical Working Party on Automation and Computer Programs, prepared and introduced by Mr. S. Grégoire, France. The Working Party appreciated the updating of that list which made it easier to find a particular document on a given subject.

Future Program, Date and Place of Next Session

66. At the invitation of the expert from Germany, the Working Party agreed to hold its fourteenth session in Hanover, Germany, from June 4 to 6, 1996. During the session, the Working Party planned to discuss the following items:

(a) Report on subjects of special interest to the Working Party raised during the thirty-second session of the Technical Committee and on questions raised by other Technical Working Parties

(b) Report on new developments in member States (oral reports)

(c) Handling of visually-assessed characteristics

- Possibilities of using biometry to help in the establishment of guidelines with respect to visually-assessed characteristics (DE to prepare a paper on an agricultural species for which the Test Guidelines are under revision);

- Review of different methods helpful in taking decisions on visually-assessed characteristics (NL to prepare a paper);

- Application of the Generalized Linear Model (GLM) to an example of a visually-assessed characteristic (NL to prepare a paper in contact with DK);

- Application of document TWC/11/16 to an example of visually-assessed characteristics (DK to prepare a paper in contact with NL).

(d) Testing of uniformity

- Fluctuation of the population standard from year to year in self-fertilized crops (DE to prepare a paper on the basis of data from past years);

- Statistical models for the population standard (NL to prepare a paper);

- View of crop experts on the variation or non-variation of the population standard from year to year (FR to prepare a questionnaire for crop experts in cross-fertilized crops);

- Tools that may help in finding the right population standard and decision rule for different sample sizes (ES to prepare a paper);

- Guide to help in finding the right method to be used (FR to draft a paper on the basis of the summary of decisions of the Technical Committee on COYD, COYU and on document TWC/11/16);

- Difference of application of binomial distribution and hypergeometric distribution (DK to prepare a paper).

- Application of the four methods discussed for the checking of uniformity to other sets of data (DK and UK to process data and produce a paper).

- Elements on the definition of uniformity from different points of view; national laws, UPOV Convention, crop experts, statistics (CZ to prepare a paper).

- Recommendations for low sample sizes when checked for off-types (FR + UK + D + NL to list and explore possibilities and prepare a paper, proposed coordination by the Chairman, NL)

(e) Sequential analysis (FR to redraft document TWC/13/17 for the Technical Committee)

(f) Image analysis (stage of EU project, result of discussions in the TWO)

(g) Detection of outliers by multivariate analysis to the validation of data (GB to prepare a paper with further results).

(h) Improvement of communication

- Improvement of statistical documents (GB to rewrite the COYD method, DK to rewrite document TWC/11/16 and to enlarge it to cover more than one test);

- Telecommunications, exchangeable software and contacts (GB to receive updated information and to prepare updated versions);

- List of statistical documents prepared by the TWC (FR to prepare an updated list);

- Glossary of definitions (as a starting point all experts preparing documents for the next session to prepare at the end of their document a definition of the terms used in the document).

- Results of the run of the COYD program distributed on diskette during the TWC session to check whether national implementations are in concordance with the latest version of DUST.

Visits

67. In the afternoon of June 8, 1995, the Working Party visited the Testing Station at the Research Center for Cultivars where it received an introduction to the activities of the Center which handled DUS trials, VCU trials as well as the testing of seed samples amounting in 1995 to 118 species under test with 2,189 varieties for DUS and 1,161 seed samples. The Working Party also paid a short visit to the field trials, mainly vegetable varieties and fodder crops. In the morning of June 9, 1995, the Working Party paid a visit to the computing facilities of the Research Center and received information of the activities of the data processing division.

68. The present report has been adopted by correspondence.

[Six annexes follow]

ANNEX I

TECHNICAL WORKING PARTY ON
AUTOMATION AND COMPUTER PROGRAMS
SLUPIA WIELKA, POLAND, JUNE 7 TO 9, 1995

LIST OF PARTICIPANTS

I. MEMBER STATES

CZECH REPUBLIC

Erik SCHWARZBACH, Central Institute for Control and Testing in Agriculture, Hroznova 2, 65 606 Brno (tel. +42-5-337 698, fax +42-5-4321 2440)

DENMARK

Kristian KRISTENSEN, Department of Biometry and Informatics, c/o DINA-KVL, Thorvaldsensvej 40, 1871 Frederiksberg C. (tel. +45-35-28-23 45, fax +45-35-28-23 50, e-mail: kk@dina.kvl.dk)

FINLAND

Kaarina PAAVILAINEN (Ms.), Inspector, Plant Production Inspection Centre, Seed Testing Department, P.O. Box 111, 32201 Loimaa (tel. +358-21-760 561, fax +358-23-205 6222)

FRANCE

Françoise BLOUET (Ms.), GEVES, La Minière, 78285 Guyancourt Cedex (tél. +33-(1)-30 83 35 82, fax +33-(1)-30 83 36 29)

Sylvain GRÉGOIRE, GEVES, La Minière, 78285 Guyancourt Cedex (tél. +33 -(1)-30 83 36 00, fax +33-(1)-30 57 01 47)

GERMANY

Friedrich LAIDIG, Bundessortenamt, Osterfelddamm 80, 30627 Hanover (tel. +49-511-95 66 689, fax +49-511-56 33 62)

Uwe MEYER, Bundessortenamt, Osterfelddamm 80, 30627 Hanover (tel. +49-511-95 666 88, fax +49-511-56 33 62)

HUNGARY

Zoltán VERESS, National Institute for Agricultural Qualification, Keleti K. u. 24, 1024 Budapest II, (tel. +36-1-212-4711, fax +36-1-212-2673)

JAPAN

Masao OKAWA, Seeds and Seedlings Division, Ministry of Agriculture, Forestry and Fisheries, 1-2-1, Kasumigaseki, Chiyoda-ku, 100 Tokyo
(tel. +81-3-3591 0524, fax +81-3-3502 6572)

NETHERLANDS

Gerie VAN DER HEIJDEN, CPRO-DLO, Postbus 16, 6700 AA Wageningen
(tel. +31-317-476841, fax +31-317-418094, e-mail: g.w.a.m.van.der.heijden@cpro.agro.nl)

Fred A. VAN EEUWIJK, CPRO-DLO, Postbus 16, 6700 AA Wageningen
(tel. +31-317-477062, fax +31-317-418094, e-mail: f.a.van.eeuwijk@cpro.agro.nl)

POLAND

Eugeniusz BILSKI, Director, COBORU, Research Center for Cultivars, 63-022 Supia Wielka (tel. Sroda Wielkopolska 535 58, telex 0412276 cobo pl, fax +48-667-535 58)

Stanislaw MUCHA, Deputy Director, Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka (fax +48-667-535 58)

Julia BORYS (Mrs.), Head of DUS Department, Research Centre for Cultivar Testing, 63-022 Slupia Wielka (tel. +48-667-583 59, fax +48-667-535 58)

Renate DASZKIEWICZ (Mrs.), Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka (tel. +48-667-523 41, ext. 240, fax +48-667-535 58)

Jerzy KAMINSKI, Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

Bogna KOWALCZYK (Mrs.), Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

Jakub MALINOWSKI, Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

Irena MUCHA (Mrs.), Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

Wieslaw PILARCZYK, Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka (tel. +48-665-523 41, ext. 274, fax +48-665-535 58)

Elzbieta RADOMSKA (Mrs.), Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

Danuta WIDLARZ (Mrs.), Research Centre for Cultivars Testing (COBORU), 63-022 Slupia Wielka

SLOVAKIA

Lubomír HORVATH, Central Institute for Control and Testing in Agriculture, Matúskova 21, 833 16 Bratislava (tel. +42-7-375 822, fax +42-7-375 454)

SPAIN

Mariano DEL FRESNO ALVAREZ-BUYLLA, Instituto Nacional de Semillas y Plantas de Vivero, José Abascal 56, 28003 Madrid (tel. +34-1-347 6950, telex 47698 INSM, fax +34-1-442 8264)

UNITED KINGDOM

John LAW, National Institute of Agricultural Botany (NIAB), Huntingdon Road, Cambridge CB3 OLE (tel. +44-1223-276 381, ext. 2254, fax +44-1223-277 602)

II. OBSERVER STATES

BELARUS

Leonid GIBURTOVICH, Chief agronomist, State Commission for Variety Testing of Agricultural Crops, Kazincza street 92/1, 220108 Minsk
(tel. (+007-0172-782 155, fax (+007-0172-782155)

Elena KOMOSKAJA (Mrs.), programist, State Commission for Variety Testing of Agricultural Crops, Kazincza street 92/1, 220108 Minsk
(tel.: (+7-0172-782 155, fax +7-0172-782155)

RUSSIAN FEDERATION

Valentine A. CHTCHERBINA, Chief, Informatics Department, State Commission of the Russian Federation for Selection Achievements Test and Protection, Orlicov per., 3a, 107139 Moscow (tel.+7-095-204 48 53, fax +7-095-207 86 26)

Roman K. NETCHAI, Informatics Department, State Commission of the Russian Federation for Selection Achievements Test and Protection, Orlicov per., 3a, 107139 Moscow (tel. +7-095-204 48 53, fax +7-095-207 86 26)

UKRAINE

Nikolai OSTRIK, State Commission of Ukraine for Testing and Protection of Plant Varieties, 9, Suvorova street, Kiew (tel. +7-044-290 3191, fax +7-(044)-290 3365)

Alexander ARISTOV, State Commission of Ukraine for Testing and Protection of Plant Varieties, 9, Suvorova street, Kiew (tel. +7-044-290 3191 or 290 2105, fax +7-044-290 3365)

III. OFFICER

Sylvain GRÉGOIRE, Chairman

IV. OFFICE OF UPOV

Max-Heinrich THIELE-WITTIG, Senior-Counsellor, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland (tel. +41-022-730 9152, telex 412 912 ompi ch, fax +41-022-733 5428)

[Annex II follows]

Annex II

E-mail Addresses of Participants in UPOV Technical Working Party and Technical Committee (TC) Sessions

Country	Working Party/ TC	Department/ Unit	Name	e-mail address
AT		Sortenschutzamt -	B. Fürnweger G. Pesendorfer	no e-mail adress
AU	BMT		C. Buller	buller@rsbs-central.anu.edu.au
AU	BMT		M. Morell	morell@rsbs-central. anu.edu.au
AU	BMT		R. Peakall	rod.peakall@anu.edu.au
AU		Plant Variety Rights Office	M.M. Kethro	no e-mail address
CA	TC	Agriculture Canada	L. Mougeot	mougeotl@ncccot7agr.ca
CA	TC	Agriculture Canada	B. Cole	coleb@ncccot7.agr.ca
CH		Eidg. Forschungsanstalt für Obst-, Wein- und Gartenbau	P. Rusterholz	no e-mail adress (in about 6 months)
CS		Plant Variety Rights	J. Soucek	no e-mail adress
DK	TWC	ABI/DIPS	K. Kristensen	kk@dina.kvl.dk
ES	TC	JNSPV	J.M. Elena	jmer@ispv.inia.es
ES	TWA	JNSPV	L. Salaices	salaice@ispv.inia.es
ES	TWC	JNSPV	M. del Fresno	fresno@ispv.inia.es
FI	TC	PPIC/STD	K. Paavilainen	*)
FR	TWC TWO	GEVES	M.H. Gandelin	gandelin@antibes.inra.fr
FR	TWC	GEVES	S. Grégoire	no e-mail adress

*) Use x-400 address:
"/G=KAARINA/S=PAAVILAINEN/O=MMM/OU1=HKI01/P=AGRIFIN/A=MAILNET/C=FI/"

E-mail Addresses of Participants in UPOV Technical Working Party and Technical Committee (TC) Sessions
(continued from page 1)

Country	Working Party/ TC	Department/ Unit	Name	e-mail address
GB	TC	PVRO	A. Bould	a.bould@pvs.maff.gov.uk
GB	BMT TWA	DANI	M. Camlin	gece6424@agvl.qub.ac.uk
GB	TWC	DANI	C. Weatherup	acjb0341@agvl.qub.ac.uk
GB	TWC	NIAB	G. Pullen	f.g.pullen@pvs.maff.gov.uk
GB	TWC	BIOSS	M. Talbot	m.talbot@sass.sari.ac.uk
GB	TWF	WYE	P. Dodd	p.dodd@wye.lon.ac.uk
GB	TWV	SASA	N. Green	green@sasa.gov.uk
GB	TWC	NIAB	J. Law	j.law@pvs.maff.gov.uk
GB		PVRO	D. Stavard	d.stavard@maff.pvs.gov.uk
GB		Ministry of Agriculture PVRO Office at Cambridge	All staff	(name) ---------@ maff.pvs.gov.uk
IE		Department of Agriculture & Food	I. Byrne	no e-mail adress (in 12 months time)
NL	TC	CPRO-DLO	H.C.H. Ghijsen	h.c.h.ghijsen@cpro.agro.nl
NL	TWO TWF	CPRO-DLO	C.J. Barendrecht	c.j.Barendrecht@cpro.agro.nl
NL	TWV TWO	CPRO-DLD	N.P.A. Van Marrewijk	n.p.a.van.marrewijk @cpro.agro.nl
NL	TWC	CPRO-DLO	F. van Eeuwijk	f.a.van.eeuwijk@cpro. agro.nl
NL	TWC	CPRO-DLO	G. van der Heijden	g.w.a.m.van.der.heijden @cpro.agro.nl
NZ	TWA	PVRO	P. Rhodes	pvro@lincoln-cri-nz

[Annex III follows]

STATE COMMISSION OF THE RUSSIAN FEDERATION FOR SELECTION ACHIEVEMENTS TEST AND PROTECTION

==========

Russia, 107139 Moscow, Orlicov per., 3a
Phone: (095) 204-49-26, 204-45-39; Fax: (095) 207-86-26

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Madams,
Sirs,

I have the honor and pleasure to represent the Russian Federation.

The name of our organization is the State Commission of the Russian Federation for Selection Achievements Test and Protection under the Russian Ministry of Agriculture and Food.

My name is Chtcherbina Valentine. I am Head of Mathematical Methods and Computers Division of the State Commission.

The main direction of works of the Division is connected with creating of common informational space of variety testing in Russia. The basic tasks here are the following:

First: the task of data collecting and providing the possibility of data changing both on the territory of Russia and on the intergovernmental level.

And the second: the task of giving to variety testing specialists of all levels the necessary hardware and software for their functional activity.

Now 3-level informational computer service system is realised in the State Commission. The low level of it is locations of testing. From the locations data on paper carriers is transferred to the true regional centre - the second level. In the regional centres the information is entered into the system, processed and accumulated. This is the process of making and maintaining of data base of the regional centres. Then the information by wire-lines is tranferred to the Centre, i.e. State Commission, and loaded into the centre data base.

There are more then 550 locations.

There are 28 regional centres.

HARDWARE

1. The regional centres are equipped by IBM-compartible personal computers of type AT 286 and communication tools. They are either national-produced modems LEXAND or Heyes-compartible modems of type MNP5. The operation system - MS DOS.

2. In the Centre, i.e. State Commission, a local computer network with system NetWare of type Ethernet for 50 users is developed. File-server of network DEC PC XL 590 is on Pentium 90. Communication tools: network adapters and modems.

SOFTWARE

The special data base has been worked out for testing data on which fundament the user's applications have been made. The main of the applications are:

- reference system which let to specialists to get practically any information of many-years testing results
- program of planning
- input system

**STATE COMMISSION OF THE RUSSIAN FEDERATION
FOR SELECTION ACHIEVEMENTS TEST AND PROTECTION**

Russia, 107139 Moscow, Orlicov per., 3a
***Phone**: (095) 204-49-26, 204-45-39; **Fax**: (095) 207-86-26*

Language of programming is Borland C++.

DBMS SQLBase, version 4.0 is used for organizing and usage of normative-reference information. Query language is RBase-commands.

In the present time the State Commission has purchased multi-users DBMS SQLBase of type client-server working in particular on Novell-platform and also a system for making applications SQL Windows.

In conclusion let you know that on August 6th, 1993 the Law "On Selection Acievements" was adopted in Russia. The main provision of the Law is protection of Selection Achievements on the territory of the Russian Federation. The Law was approved on the extraordinary Session of UPOV, April 26th, 1993. Now the Russian Federation is prerаring to enter in UPOV.

Since 1995 DUS-testing is started in Russia. This is practically a new form of activity for us. It will require creating of true infromational and program securing system.

And here we hope for cooperation with our collegues which let us to solve this problem.

Thank you for attention.

[Annex IV follows]

- *SPAIN* -

BIOMETRICAL EVALUATION OF VISUALLY OBSERVED CHARACTERISTICS

FRENCH BEAN

FRENCH BEAN: TECHNIC COMMENTARS

In Spain dwarf french bean varieties are sown for DUS trials classified in four groups,depending the ground colour of grain and cross section of pod.

1.-Coloured grain and rounded pod (in fig 1C)
2.-Coloured grain and flat pod (in fig 2D)
3.-White grain and flat pod (in fig 3P)
4.-White grain and rounded pod (in fig 4R)

falling 1C and 4R mostly in levels 5,6,7,8 of characteristic 19 2D and 3P in levels 1,2,3,4 of characteristic 19.

Data show the number of plants of each level in the four groups and the total in each level.The histograms show the total number of plants in each level.

Data are from trials of 1993/1994 campaign.

COMMENTS ON GUIDELINE

C8 :not good characteristic,very susceptible to climatic conditions and diseases.

C9 :Terminal leaflet:shape:Not good as it is.It is possible that should be better to change it to Terminal leaflet:base that had like C10 a good d.p.

C10:Terminal leaflet:apex:It is a good character with a good d.p..

C12:Inflorescence:location:Though is possible to take data of this character it is not very reliable as inflorescences in foliage abort frequently.

C14 and C15:Flower:color of standard and colour of wings In Spain there are other colors than white for standard,but wings color is related normally with standard color though a little lighter,as standard is first in its development.

C19 There are many varieties cordate that are a kind of eight-shaped only in a side of the pod and there are pear-shaped also.

C21 Not very reliable for reason of climatic conditions and diseases,only good for very light podded varieties

C26 It is a good varietal character that shows a tendency in varieties to develop curvature and it is better expressed in strong conditions

FRENCH BEAN: TECHNIC COMMENTARS

C27 In Spain is also another level 4 Curved only in apex

C30 Very good character,varieties with a very long beak.

C32 In Spain is a great variability in this character due to varieties of special great grain for edible use

C33 A very good character for the same reason than precedent one

We see no mention to other characters that are very good as

C25 Pod:stringiness

C42 Grain:main secondary color

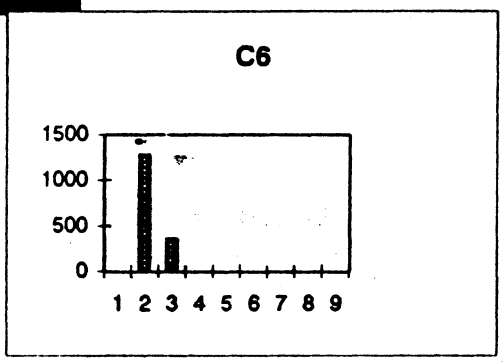
C44 Seed:veins good to distinguish edible bean varieties

French Bean

FRENCH BEAN :HISTOGRAMS

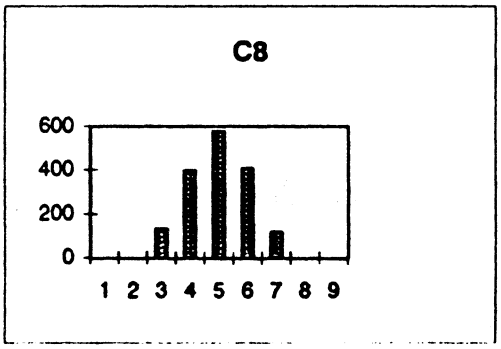
C6:Leaf color [redacted]

1	2	3	4	5	6	7	8	9	
0	240	0	0	0	0	0	0	0	1=C
0	60	360	0	0	0	0	0	0	2=D
0	540	0	0	0	0	0	0	0	3=P
1	432	0	0	0	0	0	0	0	4=R
1	1272	360	0	0	0	0	0	0	Total



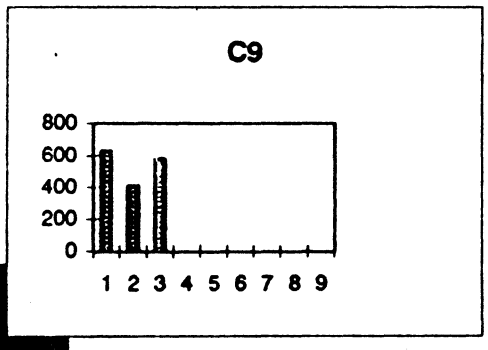
C8:Terminal leaflet:size [redacted]

1	2	3	4	5	6	7	8	9	
0	0	8	56	112	56	8	0	0	1=C
0	0	40	120	200	40	20	0	0	2=D
0	0	30	150	120	150	90	0	0	3=P
0	0	54	72	144	162	0	0	0	4=R
0	0	132	398	576	408	118	0	0	Total



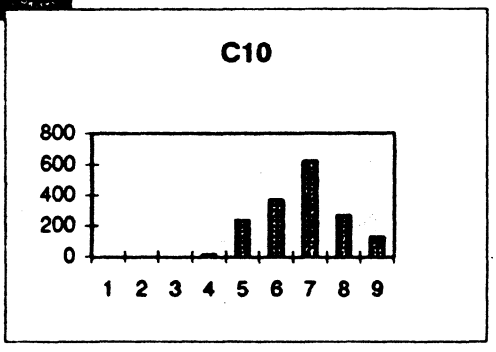
C9:Terminal leaflet:shape [redacted]

1	2	3	4	5	6	7	8	9	
200	16	24	0	0	0	0	0	0	1=C
120	60	240	0	0	0	0	0	0	2=D
170	230	140	0	0	0	0	0	0	3=P
144	108	180	0	0	0	0	0	0	4=R
634	414	584	0	0	0	0	0	0	Total



C10:Terminal leaflet:apex [redacted]

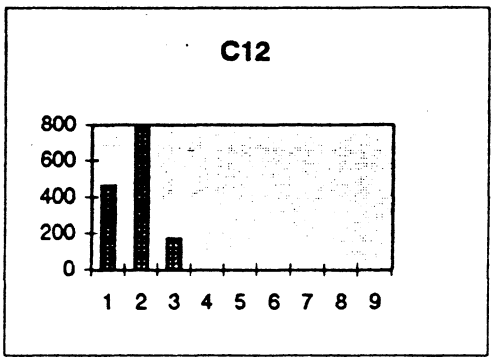
1	2	3	4	5	6	7	8	9	
0	0	0	16	24	80	96	24	0	1=C
0	0	0	0	80	40	100	120	80	2=D
0	0	0	0	90	120	250	50	30	3=P
0	0	0	0	42	126	174	72	18	4=R
0	0	0	16	236	366	620	266	128	Total



French Bean

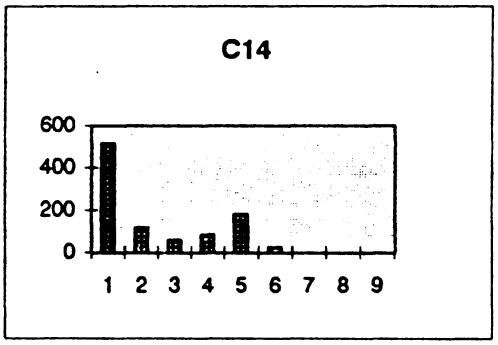
C12:Inflorescence location

1	2	3	4	5	6	7	8	9	
0	144	96	0	0	0	0	0	0	1=C
60	340	20	0	0	0	0	0	0	2=D
78	192	54	0	0	0	0	0	0	3=P
324	108	0	0	0	0	0	0	0	4=R
462	784	170	0	0	0	0	0	0	Total



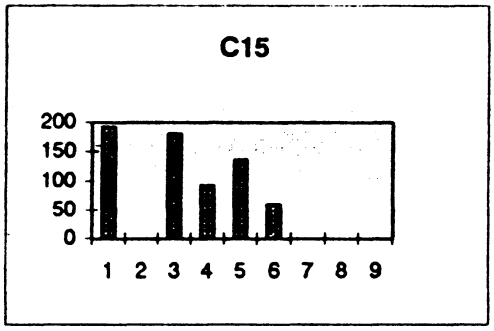
C14:Flower:color of standard

1	2	3	4	5	6	7	8	9	
72	0	0	24	120	24	0	0	0	1=C
120	120	60	60	60	0	0	0	0	2=D
324	0	0	0	0	0	0	0	0	3=P
516	120	60	84	180	24	0	0	0	Total



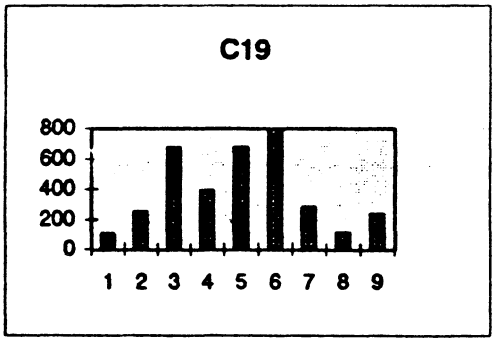
C15:Flower:color of wings

1	2	3	4	5	6	7	8	9	
72	0	0	32	136	0	0	0	0	1=C
120	0	180	60	0	60	0	0	0	2=D
192	0	180	92	136	60	0	0	0	Total



C19:Pod:Cross section

1	2	3	4	5	6	7	8	9	
0	0	4	56	230	179	86	0	48	1=C
0	4	144	152	8	0	0	91	9	2=D
104	245	508	170	0	0	0	24	9	3=P
0	0	15	15	439	619	194	0	173	4=R
104	249	671	393	677	798	280	115	239	Total

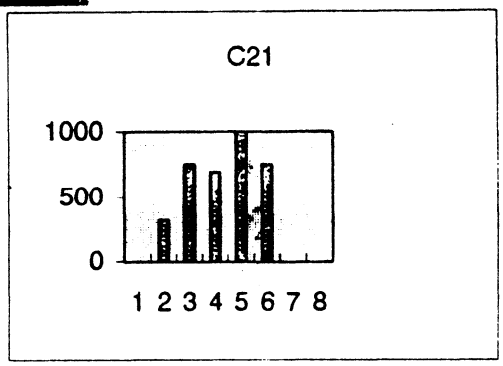


French Bean

C21:Pod:Intensity of ground color

[redacted]

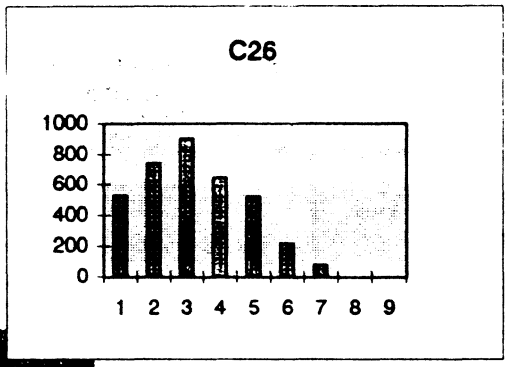
1	2	3	4	5	6	7	8	9	
0	0	0	100	240	260	0	0	0	1=C
0	0	60	120	40	140	60	0	0	2=D
0	0	60	160	360	240	260	0	0	3=P
0	0	200	380	60	360	440	0	0	4=R
0	0	320	760	700	1000	760	0	0	Total



C26:Pod:Degree of curvature

[redacted]

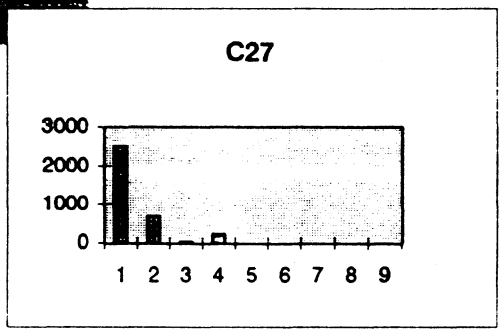
1	2	3	4	5	6	7	8	9	
23	88	186	139	108	50	16	0	0	1=C
95	40	45	60	111	54	41	0	0	2=D
335	339	221	119	55	14	0	0	0	3=P
77	278	453	327	249	102	22	0	0	4=R
530	745	905	645	523	220	79	0	0	Total



C27:Pod:Shape of curvature

[redacted]

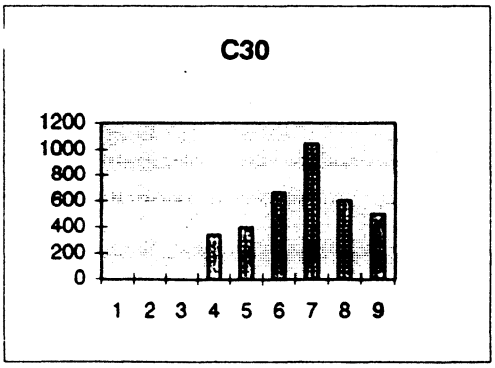
1	2	3	4	5	6	7	8	9	
315	254	6	18	0	0	0	0	0	1=C
389	36	5	2	0	0	0	0	0	2=D
928	29	8	7	0	0	0	0	0	3=P
882	373	7	203	0	0	0	0	0	4=R
2514	692	26	230	0	0	0	0	0	Total



C30:Pod:Length of beak

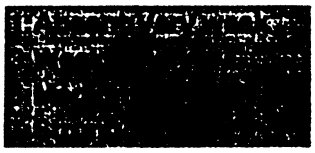
[redacted]

1	2	3	4	5	6	7	8	9	
0	0	0	0	0	60	280	80	180	1=C
0	0	0	80	100	60	160	20	0	2=D
0	0	0	120	20	40	240	340	320	3=P
0	0	0	140	280	500	360	160	0	4=R
0	0	0	340	400	660	1040	600	500	Total

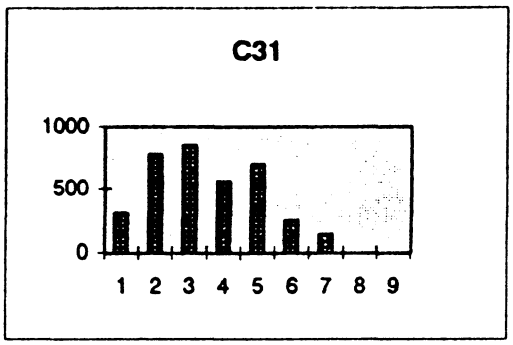


French Bean

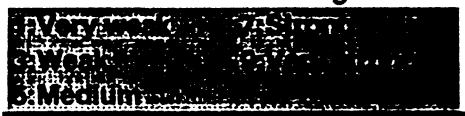
C31:Pod:curvature of beak



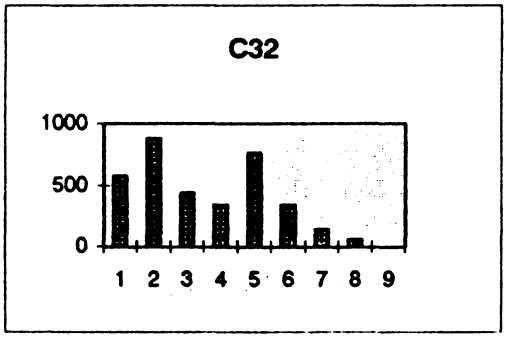
1	2	3	4	5	6	7	8	9	
68	89	85	117	135	63	49	0	0	1=C
33	68	152	72	83	16	9	0	0	2=D
156	462	180	96	119	39	18	0	0	3=P
50	159	434	268	356	130	66	0	0	4=R
307	778	851	553	693	248	142	0	0	Total



C32:Pod:Prominence of grains

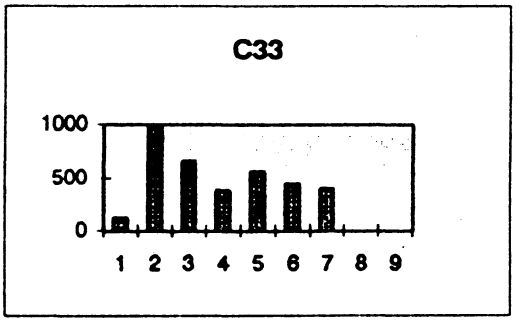


1	2	3	4	5	6	7	8	9	
160	140	180	0	80	40	0	0	0	1=C
0	0	20	100	120	60	60	60	0	2=D
0	0	0	200	560	240	80	0	0	3=P
420	740	240	40	0	0	0	0	0	4=R
580	880	440	340	760	340	140	60	0	Total

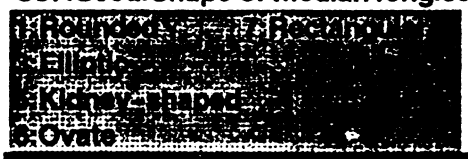


C33:Pod:Texture of surface

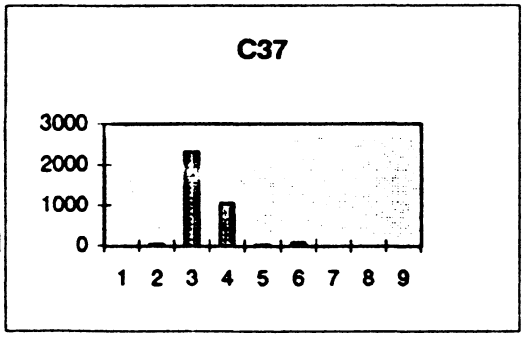
1	2	3	4	5	6	7	8	9	
0	180	0	60	120	120	120	0	0	1=C
40	40	80	80	120	60	0	0	0	2=D
80	320	300	180	80	80	40	0	0	3=P
0	440	280	60	240	180	240	0	0	4=R
120	980	660	380	560	440	400	0	0	Total



C37:Seed:Shape of median long.section



1	2	3	4	5	6	7	8	9	
0	0	457	143	0	0	0	0	0	1=C
0	16	131	248	16	9	0	0	0	2=D
0	18	682	327	10	43	0	0	0	3=P
0	8	1053	344	2	33	0	0	0	4=R
0	42	2323	1062	28	85	0	0	0	Total

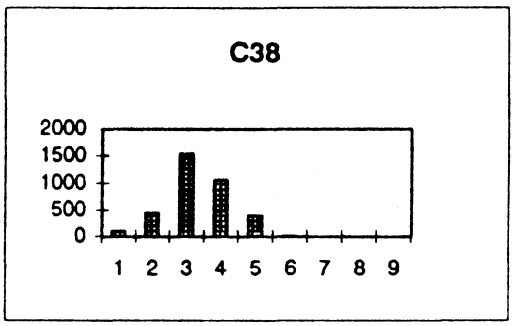


French Bean

C38:Seed shape of cross section

[redacted]

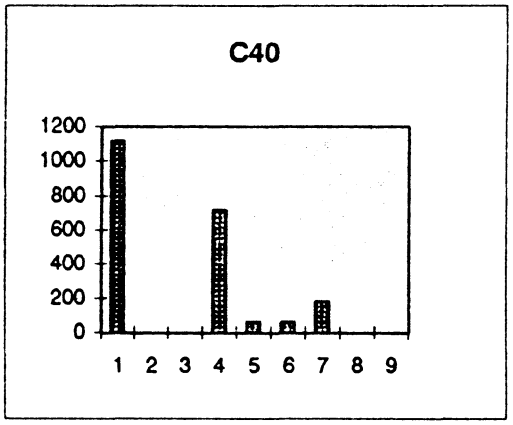
1	2	3	4	5	6	7	8	9	
1	57	226	176	140	0	0	0	0	1=C
60	103	231	26	0	0	0	0	0	2=D
34	272	643	113	14	3	0	0	0	3=P
0	11	439	744	249	6	0	0	0	4=R
95	443	1539	1059	403	9	0	0	0	Total



C40:Grain:main color

[redacted]

1	2	3	4	5	6	7	8	9	
0	0	0	420	0	60	120	0	0	1=C
0	0	0	300	60	0	60	0	0	2=D
684	0	0	0	0	0	0	0	0	3=P
432	0	0	0	0	0	0	0	0	4=R
1116	0	0	720	60	60	180	0	0	Total



[Annex V follows]

EXCHANGEABLE SOFTWARE - SLOVAKIA

Program Name	Function	Programming Language	Available From
ANALIST 1.1	Identification of wheat varieties by using Image Analysis of 16 morphometrical parameters of wheat seeds, compare of morphometrical parameters of tested sample with standard parameters of reference varieties (from catalog), compute the similarity of varieties and ranking of varieties by level of homology of their shapes.	PASCAL 6.0	Mr. Ľubomír Horváth Fax.: 0042 07 821763 Slovakia
ANALIST 2.1	Identification of bean varieties by using Image Analysis of 16 morphometrical parameters of bean seeds, compare of morphometrical parameters of tested sample with standard parameters of reference varieties (from catalog), compute the similarity of varieties and ranking of varieties by level of their homology of shapes.	PASCAL 6.0	
ANALIST 3.1	Identification of individual species of plant seeds and admixtures in tested samples by using 5 morphometrical parameters.	PASCAL 6.0	
SPECTRUM 1.1	Identification of varieties by using electrophoresis and densitometric data. Standardization of electrophoretic spectra by 3 reference bands, compute relative homology of tested and catalogized spectra and ranking of spectra by level of relative weighted homology.	CLIPPER 5.0	

[Annex VI follows]

ANNEX VI

DECISIONS OF THE TECHNICAL COMMITTEE ON THE TESTING OF DISTINCTNESS AND UNIFORMITY IN CROSS-FERTILIZED SPECIES (COYD ANALYSIS AND COYU ANALYSIS, DOCUMENT TC/30/4) AND ON THE TESTING OF UNIFORMITY IN VEGETATIVELY PROPAGATED AND SELF-FERTILIZED SPECIES (DOCUMENT TWC/11/16)

SUMMARY OF EXTRACTS

DECISIONS ON COYD ANALYSIS

TC/XXV/11, paragraphs 22 to 24: Replacement of distinctness criteria for grasses by the COY analysis including the Modified Joint Regression Analysis (MJRA) with a 1% significance level and a transitional period of three years. Wherever possible, the method should be applied to other agricultural species and vegatable species.

TC/27/9, paragraph 29: The TWV should reconsider its present position not to use the COYD method.

TC/28/6, paragraphs 23 and 24: Encouragement to apply COYD not only to grasses. Encouragement to use the long-term LSD method for cases where only less than 20 degrees of freedom are available.

TC/30/6, paragraph 27: Approval of updated version of COYD in document TC/30/4. Recommendation to study the application of COYD to non-cross-fertilized species.

TC/31/6, paragraph 26: Request to study the application of the COYD analysis over two locations.

DECISIONS ON COYU ANALYSIS

TC/26/5, paragraph 25: Approval of the COYU analysis in principle, in the first instance for grasses, but where possible also for other cross-pollinated agricultural species.

TC/30/6, paragraph 30: Approval of updated wording in document TC/30/4 including the fixing of the levels of rejection and acceptance of varieties.

DECISIONS ON UNIFORMITY IN VEGETATIVELY PROPAGATED AND SELF-FERTILIZED SPECIES

TC/27/9, paragraph 31: Replacement of the Table in the General Introduction to the Test Guidelines by the Tables in document TC/XXV/8 (later replaced by TWC/11/16). Doubling of the population standard for mainly self-fertilized species.

TC/28/6, paragraph 27: Approval of new wording of paragraph 28 of the General Introduction

TC/28/6, paragraph 28: Decision that the tables are *not applicable* to clear off-types in *qualitative* characteristics.

TC/30/6, paragraph 31: Approval of updated version in document TWC/11/16 as replacement of paragraph 28 of the General Introduction to Test Guidelines

TC/31/6, paragraph 25: More discussions are necessary before population standards and acceptance probabilities could be fixed for vegetatively propagated species.

FULL TEXT OF EXTRACTS

Extract from TC/XXIII/6 (1987)

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Combined Over-Years Analysis

40. The Committee noted paragraphs 36 to 46 of Annex I of document TC/XXIII/3 and document TC/XXIII/4 as well as the oral explanation by Mrs. Silvey (Chairman of the Technical Working Party on Automation and Computer Programs). The Committee confirmed that the COY analysis was the best statistical method so far available for processing data from measured characteristics. As for extending the application of the COY analysis, the Committee was reminded that it had recommended that the COY analysis should be applied experimentally to cross-fertilized species other than grass. It agreed to await the outcome of the attempt to apply COY analysis to certain vegetable species which was being carried out by the experts in both the Technical Working Party on Automation and Computer Programs and the Technical Working Party for Vegetables.

41. As for the proposals and comments by the Technical Working Party for Agricultural Crops which were reproduced in subparagraphs (i) to (v) of paragraph 45 of Annex I to document TC/XXIII/3, the Committee noted the following replies by Mrs. Silvey:

(i) During its four years of discussions, the Technical Working Party on Automation and Computer Programs had been well aware of the practical need to maintain some continuity from year to year in the strictness of distinctness decisions. For that reason, it was proposed that some member States might apply at least a 5% significance level in the first few years of using the COY analysis. There should, in practice, be little risk of the 5% significance being applied to reduce standards;

(ii) The Technical Working Party on Automation and Computer Programs thought that the introduction of the COY analysis would lead rather to a change in the decision-taking criterion than a change in the testing methods. It was aware of the importance of taking into account the testing and decision-making techniques when examining the adoption and potential benefits of new statistical methods;

(iii) The options, such as the modified joint regression analysis (MJRA), were a refinement of the COY analysis. For the time being, the Technical Working Party on Automation and Computer Programs would consider them on an experimental rather than on an mandatory basis;

(iv) and (v) The Technical Working Party on Automation and Computer Programs welcomed more non-statistical experts on crops participating in its discussions. The key to achieving smooth transition from old to new methods was to have a sufficient period for close consultation between statisticians and crop experts. This should already be happening if the members of the Technical Working Party on Automation and Computer Programs consulted crop colleagues in their own countries and through other Technical Working Parties.

42. Mrs. Silvey introduced document TC/XXIII/4 which included the background information on COY analysis and a brief description of the computer programs which Dr. Weatherup (United Kingdom) offered to circulate on magnetic tapes to the member States at special request. She suggested further that page 3 of Annex IV to document TWC/IV/13 should be included in that document. [After the session of the Committee, Dr. Weatherup prepared a revised document which would be circulated to the members of the Committee as document TC/XXIII/4 Rev.]

43. The Committee noted further that, in addition to the States mentioned in paragraph 36 of Annex I to document TC/XXIII/3, Ireland would apply the COY analysis to grass species for 1987 or 1988 trials. The Committee, being informed that, in two or three years, more experience of using the COY analysis would be accumulated in different member States, agreed to await the report on the application of the COY analysis from those countries. In the meantime, it invited those States not yet applying or studying the COY method to do so and to bring their findings into the discussions at the Technical Working Party or Technical Committee level.

Testing of Homogeneity in Cross-Fertilized Plants

44. The Committee noted that the Technical Working Party on Automation and Computer Programs was studying the over-years criterion on homogeneity in cross-fertilized crops, as reproduced in paragraphs 47 to 49 of Annex I to document TC/XXIII/3. It was further informed that this study was still at a very premature stage and thus agreed to await its further development in the coming years.

Testing of Homogeneity in Self-Fertilized Plants

45. The Committee noted that the Technical Working Party was studying the applicability of a nominal standard for testing homogeneity in self-fertilized plants, as reproduced in paragraphs 50 to 52 of Annex I to document TC/XXIII/3. It agreed, for the time being, to await the results of the further study by the Technical Working Party on Automation and Computer Programs.

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Extract from TC/XXIV/6 (1988)

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49. Testing of Homogeneity. The Committee noted paragraphs 52 to 55 of the Annex to document TC/XXIV/3, It encouraged the further study of the method for the testing of homogeneity in cross-fertilized plants including the moving average method and the over-years uniformity criterion, which was regarded as to offering a great advantage over the present uniformity criterion. The Committee also noted the information on the calculation of maximum tolerable off-type numbers for different sample sizes in self-fertilized plants. it agreed, however, that further studies would have to be made by the Technical Working Party on Automation and Computer Programs in order to find the right tolerances for each species in the individual Test Guidelines,

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Combined Over-Years (COY) Analysis

51. The Committee noted paragraphs 58 to 80 of the Annex to document TC/XXIV/3, with the study on different refinements of COY analysis by Modified Joint Regression Analysis (MJRA), including the calculation of the joint regression significance, and by close-pair comparisons. It also noted the study on its application to species other than grasses. It would rediscuss that application on the basis of further information at its coming session.

52. The Committee recalled that a significance level should be set in 1989 for the application of COY analysis to grasses. so that the method might be actually in use for grasses by its next session.

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Extract from TC/XXV/11 (1989)

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Testing of Homogeneity in Self-Fertilized Plants

20. The Committee noted paragraphs 7 and 8 of Annex I to document TC/XXV/3 and document TC/XXV/8 indicating some parameters defining a sample scheme, the role of the sample size and explanations to the tables in the annex, prepared for different acceptance probabilities and population standards. It asked the individual Technical Working Parties to choose the most appropriate levels for each species when establishing new or revising existing Test Guidelines.

Testing of Homogeneity in Cross-Fertilized Plants With the Combined Over-Years Uniformity (COU) Criterion

21. The Committee noted that the Combined Over-Years Uniformity (COU) criterion was a more objective method for homogeneity decisions of cross-fertilized species than the present

decision practice used in the different member States, as mentioned in paragraphs 9 to 11 of Annex I to document TC/XXV/3. It agreed to discuss the matter further at its next session. It asked the TWC to study the appropriate rejection and acceptance levels further, as well as the species to which the new criterion should be applied first.

Combined Over-Years (COY) Analysis

22. Application of the Combined Over-Years (COY) Analysis to Grasses. The Committee noted paragraphs 12 to 16 of Annex I to document TC/XXV/3. Dr. F. Laidig (Federal Republic of Germany), Chairman of the TWC, reported that, as results from several years of study within the TWC, the COY analysis provided a better basis for distinctness decisions from the statistical point of view than the present UPOV method and that it led to more consistent decisions over the years. The Committee agreed to and adopted the TWC's recommendation to replace the present distinctness criterion for grasses by the COY analysis, including the Modified Joint Regression Analysis (MJRA) option.

23. With respect to the significance level, the Committee noted the different viewpoints in connection with the smooth transition from the present method to the COY analysis. It finally adopted a 1% significance level after two years of tests and the same significance level after three years of tests. A transitional period of three years was decided for those member States which foresaw difficulties in the introduction of the new significance level to grasses.

24. Application of the COY Analysis to Further Species. The Committee noted that the application of the COY analysis to vegetable species and agricultural cross-fertilized species other than grasses had the same advantages as in grasses, as mentioned in paragraphs 17 and 22 of Annex I to document TC/XXV/3. It asked the TWA and the TWV to apply wherever possible the COY analysis to agricultural and vegetable species.

25. Application of the COY Analysis to Small Data Sets. The Committee noted paragraphs 23 to 25 of Annex I to document TC/XXV/3. It noted in particular the fact that for small data sets not permitting the application of the COY analysis, the method consisting in the calculation of a long range LSD from data of the last three to ten years to estimate minimum distances might be very helpful. It agreed to follow the work done in this respect in the TWC.

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Extract from TC/26/5 (1990)

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23. Testing of Homogeneity of Self-Fertilized and Vegetatively Propagated Species: The Committee noted paragraphs 16 to 18 of Annex I to document TC/26/3 and paragraphs 13 to 15 of Annex I to document TC/26/3 Add. It reminded the Technical Working Parties that the tables in document TC/XXV/8 had been intended to assist in the selection of the right sample and the tolerated off-types, which should be fixed in the individual Test Guidelines. The Committee noted that often in the horticultural field only few plants were tested, which allowed for no off-type, or only one off-type, depending on the number of plants tested. In such cases, the tables were of little use.

24. The Committee also noted that the Technical Working Party for Ornamental Plants and Forest Trees would rediscuss, on the basis of papers prepared some years previously, the question of admixtures resulting from pure error on the part of the breeder.

25. Testing of Homogeneity in Cross-Fertilized Plants with the Combined Over-Years Uniformity (COU) Criterion: The Committee noted paragraphs 19 and 20 of Annex I to document TC/26/3, as well as Annex II to the same document, which explained the Combined Over-Years Uniformity (COU) method in detail. It approved in principle the introduction of the COU criterion, in the first instance for grasses, but where possible also for other cross-pollinated agricultural species. It hoped to be able to fix the significance levels for the acceptance and rejection of varieties during its next session.

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27. Combined Over-Years (COY) Analysis: The Committee noted paragraphs 24 to 26 of Annex I to document TC/26/3 and paragraphs 11 and 12 of Annex I to document TC/26/3 Add. It noted the rather slow introduction of COY analysis and asked the Technical Working Parties to encourage their members to apply the new criteria. It was stressed in that respect that no big mainframe computer was necessary, a personal computer being quite sufficient for the application of both COU and COY methods. It reconfirmed its recommendation that experts from the Technical Working Party on Automation and Computer Programs resident in the country hosting a Technical Working Party session be invited to that session, in order that they might explain the method in more detail at the session, and subsequently pass on any problems that might have arisen to the Technical Working Party on Automation and Computer Programs.

28. Long-Term LSD: The Committee noted paragraphs 27 and 28 of Annex I to document TC/26/3.

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Extract from TC/27/9 (1991)

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29. Combined Over-Years Distinctness (COYD) Analysis: The Committee noted that only a few countries at present applied the COYD analysis and welcomed the preparation of a more user-friendly explanation of the method. It asked the TWV to reconsider its present position not to use the method, but to go back to the old distinctness criteria. The Committee would wait to see how the revised program would work and would return to the subject at its next session.

30. Long-Term Least Significant Distance (LSD): The Committee noted the study on the long-term LSD and would await future developments before returning to the subject.

31. Testing of Homogeneity of Self-fertilized and Vegetatively Propagated Varieties: The Committee noted the problems raised by the TWA with respect to mainly self-pollinated varieties and the proposal from the TWC. The Committee finally agreed to change the General Introduction to the Test Guidelines with respect to the indication of off-types for mainly self-pol-

linated varieties. It followed the proposal of the TWC to double the population standards for mainly self-pollinated varieties compared to that for self-fertilized and vegetatively propagated varieties. If problems arose for certain species as a result of this doubling of the population standard, the question could be discussed again.

32. Combined Over-Years Uniformity (COYU) Criterion: The Committee noted the study on the selection of the correct probability level for the COYU criterion. It invited as many member States as possible to participate in this study and will await its outcome before taking a decision on the final implementation of the criterion.

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Extract from TC/28/6 (1992)

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23. Application of the Combined Over-Years Distinctness (COYD): The Committee agreed that it was important to encourage more member States to change to the COYD analysis and to apply it not only to grasses.

24. Long-Term LSD Methods: The Committee encouraged the use of the long-term LSD method for all those cases where the minimum of 20 degrees of freedom for an application of the COYD analysis was not reached because of the reduced number of varieties in the test.

25. Combined Over-Years Uniformity (COYU) Analysis: The Committee encouraged the use of the COYU analysis as soon as the present level for the rejection and acceptance of varieties under study was confirmed.

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27. Testing of Uniformity: The Committee discussed at length the question of off-types and the influence of the sample size on the balance of risk of erroneously accepting a heterogeneous variety as homogeneous or of rejecting a homogeneous variety as heterogeneous. It agreed in principle to the proposal to replace paragraph 28 of the General Introduction to Test Guidelines (document TG/1/2) by the following paragraph:

"For vegetatively propagated and self-fertilized species the sample size and the maximum number of off-types will be given in the individual guidelines and are based on the tables of document TC/XXV/8. The crop experts choose the appropriate table when preparing the guidelines by first fixing the population standard, i.e. the maximum percentage of off-types allowed if the whole population were to be examined. Then the acceptance probability--i.e. the probability that a variety having P% of off-types is correctly considered uniform--and the sample size are chosen. Small sample sizes increase the risk of accepting heterogeneous varieties.

Examples:

Population standard "P"	Acceptance probability	Sample size	Maximum number of off-types allowed	Risk of erroneously accepting a heterogeneous variety with, for instance, x% off-types	x
1%	95%	10	0	60%	5
1%	95%	20	0	36%	5
1%	99%	100	3	26%	5
0.1%	99%	1000	3	1%	1
0.1%	99%	2000	5	0.1%	1"

However, before taking a definite decision on the replacement, the Committee agreed that further discussions would have to take place and the above table should be extended by further examples (to cover population standards from 0.1 to 5 in order to cover all species and to cover the risk alpha for 1% and 5%). A better explanation of the two different risks was needed and the chairmen of the Technical Working Parties were asked to collect information from crop experts which should be given to the chairman of the TWC, which would be asked to prepare an improved wording of the above paragraph and to include more information of the different risks in a revised version of document TC/XXV/8. The whole question should then be presented to the Committee together with the results of the discussions in the individual Technical Working Parties. For the latter discussions, computer experts of the country in which the session was going to take place should participate who should explain the whole question to the crop experts in order to make the subject better understood by them.

28. Testing of Uniformity of Qualitative Characteristics: The Committee did not follow the proposal of the TWA to apply the tables of document TC/XXV/8 also to clear off-types in qualitative characteristics of cross-fertilized plants. The Committee noted that the subject was less a question of homogeneity than of quality of the seed and of accidental mixture with other varieties. Several member States took the position that a certain number of off-types of this kind could be tolerated as long as the number was not so large as to interfere with the trial.

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Extract from TC/30/6 (1993)

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27. Combined Over-Years Disinctness (COYD) Analysis: The Committee noted document TC/30/4 containing the updated version of the COYD analysis. It recommended that the Technical Working Parties encourage a larger application of that criterion and especially the study of its application also to non- cross-fertilized species.

28. Long-Term LSD: The Committee noted the progress in the preparation of the Long-Term LSD method which should be used in case less than 20 degrees of freedom were available because of the low number of varieties in the test. It asked the TWC to finalize the method and to study whether it could be applied to pairs of varieties.

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30. Combined Over-Years Uniformity (COYU) Analysis: The Committee noted the new version of the COYU analysis as reproduced in document TC/30/4 and that in that version the levels for the rejection and acceptance of varieties had finally been fixed. It also noted a proposal to introduce a transitional period of three years for countries for which an immediate introduction would entail too big a change in the number of varieties accepted. This would enable those countries, in the first instance, to change from the present levels to the levels of 0.1%, 0.1 and 1% and, after another two years, to reach the levels proposed in the document. The Committee finally approved the document and the levels given in it as well as the possibilities for the transitional period.

31. Testing of Uniformity: The Committee noted document TWC/11/16 prepared by the TWC to replace document TC/XXV/8. It had a long discussion on the application of that method. Several experts considered it too early to take a final decision on the document. They considered that further discussions might be necessary in the different Technical Working Parties to better understand the method, especially the meaning of population standard, acceptance probability and how to obtain the correct values for these parameters. It also noted that in the Test Guidelines for vegetables presented for adoption the new method had already been introduced and that each of the Test Guidelines contained a special paragraph with the values for the different parameters. As the principle of the application of the new method had already been agreed upon by the adoption of TC/XXV/8 and as that document had been amended, the Committee finally adopted document TWC/11/16 which would replace paragraph 28 of the General Introduction to the Test Guidelines (document TG/1/2) and would from now on be used for the testing of uniformity of vegetatively propagated and truly self-pollinated varieties to obtain the maximum number of off-types tolerated in the test.

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Extract from TC/31/6 (1994)

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Criteria for the Definition of the Population Standard and the Acceptance Probability

25. The Committee noted the information from the different Technical Working Parties and the proposals for the population standard and acceptance probability in the Draft Test Guidelines presented to it for adoption. It noted that especially the TWF and TWO had experienced certain difficulties and that they had disagreed with the calculation of the beta risk as presented by the TWC. According to the TWF and TWO, experience had shown that the high percentage resulting from the calculations within low sample sizes as usual in these two Working Parties would be far from reality. The Committee will further discuss the balance of the risks of wrongly rejecting a uniform variety as heterogeneous and of wrongly accepting a heterogeneous variety as uniform, as well as the influence of the sample size on these risks. It noted that

more discussion and explanations were also necessary in the TWF and TWO before population standards and acceptance probabilities could be given in Test Guidelines for vegetatively propagated species. It furthermore asked that documents TWC/11/16 and TC/30/4 should be revised and drafted in a language which could be more easily read and understood.

Use of the COYD Analysis over Two Locations

26. The Committee noted the information presented by the TWC as reproduced in paragraphs 39 to 41 of document TC/31/3. It noted the different handling of these cases in the different member States. Some States used the second location only if plants did not show a satisfactory development in the first location, while other may use information from the second location in the judgment of distinctness. In some cases, the second place would replace a second year of test. In other cases, the information from the second place would be added to that of the first place. The representative from ASSINSEL asked the Committee on behalf of the grass breeders whether two locations could not be made obligatory as certain varieties may not be able to be distinguished at certain places. The Committee finally agreed to request the TWC to continue its work and also asked the other Technical Working Parties to discuss this subject and to report to it at its next session. Several delegates stressed that UPOV should seek harmonization and ensure that all States follow one and the same procedure.

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