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GENEVA

TECHNICAL COMMITTEE

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**MATTERS ARISING FROM THE 1994 SESSIONS OF THE TECHNICAL WORKING PARTIES,
INCLUDING THE BMT, TO BE DEALT WITH BY THE TECHNICAL COMMITTEE**

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This document summarizes, in its Annex, matters arising from the 1994 sessions of the Technical Working Parties and the BMT, which have to be dealt with by the Technical Committee (hereinafter referred to as "the Committee"). They comprise important subjects discussed or decisions taken by the Technical Working Parties and the BMT, which are communicated to the Committee

- (i) for information;
- (ii) for information and for a possible decision to be taken by the Committee;
- (iii) for a decision to be taken by the Committee
- (iv) at the request of the Committee or in preparation for discussions planned in the Committee under separate agenda items.

The headings of the different items are listed on page 1 of the Annex.

As the TWF, TWO and TWV meet just a few weeks before the Committee, some further questions will be presented in an addendum to this document or orally during the session.

To shorten references to the various Technical Working Parties and the BMT in this document, use is made of the following codes that designate their documents:

- TWA - Technical Working Party for Agricultural Crops;
- TWC - Technical Working Party on Automation and Computer Programs;
- TWF - Technical Working Party for Fruit Crops;
- TWO - Technical Working Party for Ornamental Plants and Forest Trees;
- TWV - Technical Working Party for Vegetables;
- BMT - Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular.

[Annex follows]

ANNEX

**MATTERS ARISING FROM THE 1994 SESSIONS OF THE TECHNICAL WORKING PARTIES,
INCLUDING THE BMT, TO BE DEALT WITH BY THE TECHNICAL COMMITTEE**

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**MATTERS ARISING FROM THE 1994 SESSIONS OF THE TECHNICAL WORKING PARTIES,
INCLUDING THE BMT, TO BE DEALT WITH BY THE TECHNICAL COMMITTEE**

I. MATTERS FOR INFORMATION:

Diskettes containing a set of statistical tools

1. The TWC was informed that diskettes containing a set of statistical tools of assistance to researchers in DUS testing, operating under MS/DOS, had been supplied by the expert from the United Kingdom to seven member States for testing and were available to the others.

(see TWC/12/11 Prov., paragraph 23)

2. The Committee is invited to note the above information.

Multivariate Analysis

3. The TWC noted that the computer program of the multivariate method for distinctness testing based on the Mahalanobis' generalized distance D^2 between two varieties was included in the diskette supplied by the expert from the United Kingdom to seven member States for testing. It furthermore noted that:

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

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

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

4. With regard to the purpose of using multivariate analysis the following was said in the TWC:

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

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

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

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

5. As regards future activities, work of the TWC should concern:

- (i) the refinement of the methods;
- (ii) the application of the methods to:
 - (a) visually assessed characteristics;
 - (b) the validation of data (detection of outliers);
 - (c) the detection of the most similar variety;
 - (d) cluster analysis;
 - (e) image analysis.

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

(see TWC/12/11 Prov., paragraphs 69 to 75)

7. The Committee is invited to note the above information.

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

8. The TWC keeps annually updated tables with information on access to international data and on the programs which can be readily assimilated into other plant variety computer systems. To ensure that the tables would be as complete as possible, the TWC decided:

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

(ii) that a questionnaire should be circulated to the heads of plant variety protection offices and the members of the Technical Committee.

(see TWC/12/11 Prov., paragraphs 76 to 78)

9. The Committee is invited to note the above information.

Handling of Visually Assessed Characteristics

10. The TWC noted the potential of a statistical analysis of the characteristics observed on a particular species, based upon the data from tested varieties as laid down in document TWC/11/12. General biometric studies of the kind presented in that document would be useful to crop experts, in particular, when they revised Test Guidelines and decided on the characteristics to be included in the revised edition and on the scale of states of expression to be used. Precautions would have to be taken, however, when using results of such studies. For instance:

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

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

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

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

12. The TWC decided to pursue the work to show on the basis of a practical example--French beans--the possible contribution of general biometric studies, performed on both visually observed characteristics and measured characteristics, to the establishment of Test Guidelines.

(see TWC/12/11 Prov., paragraphs 28 to 30)

13. The Committee is invited to note the above information.

Evaluation of the Long-Term LSD

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

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

(ii) If this condition was not met, the method should be used with the long-term LSD as described in document TWC/12/4.

(iii) The question whether the long-term LSD could be used to take decisions on the basis of a one-year test should be further discussed at the next session. It was felt that the long-term LSD might be used, with caution, but only to inform the breeder of a possible failure of his variety.

(see TWC/12/11 Prov., paragraph 35 to 37)

15. The Committee is invited to note the above information.

Risks Taken With Tests Over Two or Three Years Rather Than One

16. The TWC briefly discussed the following two possible approaches to judge the risks taken with tests over two or three years rather than one:

(i) calculate the total sample size, choose the population standard that corresponds to the same alpha and beta risks, and take decisions on the basis of the aggregate sample;

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

It noted that the first approach seemed to offer a better balance between the alpha and beta risks. It also noted that a sequential analysis approach could be used as well. It will prepare a paper on this subject for the next session.

(see TWC/12/11 Prov., paragraph 48 and 49)

17. The Committee is invited to note the above information.

Clarification of the Application of Certain Terms in the Table of Characteristics

18. The TWA clarified that the terms "a single observation of a group of plants or parts of plants" and "a number of individual rows, plants or parts of plants" in chapter IV in the Test Guidelines applied to uniformity only and should not be confused with the indication of the abbreviations "VG" or "VS" in the Table of Characteristics having the same meaning but applying to distinctness only and remaining silent on the testing of uniformity.

(see TWA/23/16 Prov., paragraph 21)

19. The Committee is invited to note the above information.

II. MATTERS FOR INFORMATION AND FOR A POSSIBLE DECISION TO BE TAKEN BY THE COMMITTEE

Electrophoretic characteristics in Cereals

20. The TWA agreed to include electrophoretic characteristics in the draft Test Guidelines for Barley, Maize and Wheat. It confirmed, however, that this inclusion did not mean that from now on they would be used as routine characteristics. They were included without an asterisk and most countries intended to use them only as a last resort if a new variety could otherwise not be distinguished from an existing variety. They would only be used with the agreement of the applicant. However, if used, the candidate variety would have to be uniform in those characteristics as well as the variety from which it otherwise could not be distinguished. The characteristic would then also be used in the further multiplication to check whether the breeder had maintained his variety uniform.

(see TWA/23/16 Prov., paragraph 6)

21. The TWA noted that for electrophoresis characteristics in maize and wheat certain difficulties arose through interactions between different products or overlapping of bands. Thus, in maize, for certain genes in hybrids a separate interpretation of the single genes was impossible while in homozygote inbred lines the known interactions could help to separate each

characteristic. In maize, certain bands had similar molecular weights. This led to the fact that, in the presence of certain bands of another characteristic two states of expression of a certain characteristic could not be differentiated from one another. Other bands having similar molecular weights could, however, be differentiated from one another by their known association with other bands. These difficulties were, however, mentioned in the explanations in the respective Test Guidelines.

(see TWA/23/16 Prov., paragraphs 5 and 8)

22. The Committee is invited to note the above information and to consider possible steps to be taken.

Electrophoretic characteristics in other agricultural species

23. Soya bean.- The TWA reconfirmed its decision to include electrophoretic characteristics in the Test Guidelines for Soya Bean. The experts from France would prepare a proposal for those characteristics before October 1994.

(see TWA/23/16 Prov., paragraph 34)

24. Potato.- The TWA noted that electrophoretic characteristics had a good discriminative power in potato varieties, although it was not possible to discriminate between all potato varieties by these characteristics. Different views were expressed concerning the inclusion of electrophoresis in the draft Test Guidelines for Potato. Some experts expressed the opinion that, as potatoes were vegetatively propagated, maintaining of the reference collection was an expensive exercise. The systematic observation of electrophoretic characteristics could enable the building-up of a data base which would facilitate the selection of similar varieties to be grown, thus reducing the costs for field tests and the maintaining of too many varieties. This would, however, require a clear description and interpretation of the method and a good calibration of the gels. Others warned against going too far. A system such as that described above would in fact reverse the situation and almost turn the morphological characteristics into "last resort characteristics". There were sufficient morphological characteristics for distinction. Mutations could, in most cases, not be distinguished. Electrophoresis should, as for cereals, be used only as a last resort. Breeders present at the session expressed themselves in favor of the use of electrophoresis. The TWA finally agreed to set up a Subgroup on Potato which would meet in Hanover, Germany, in November 1994 to discuss the possible inclusion of electrophoretic characteristics in the Test Guidelines for Potato.

(see TWA/23/16 Prov., paragraph 10)

25. Grasses.- During the session of the TWA, the possible use of electrophoresis in other agricultural species was also discussed. In order to have a better basis for discussions during the next session, the TWA agreed that different experts would prepare documents on the use of electrophoresis in *Poa pratensis*, ryegrass, and timothy.

(see TWA/23/16 Prov., paragraph 11)

26. The Committee is invited to note the above information and to consider possible steps to be taken.

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

27. The TWC stated that if the population standard was the number of off-types recorded on existing varieties and if there were legal uniformity requirements, for instance for certification, one ought to take those requirements into consideration. It was stated in reply that, where Test Guidelines referred to certification requirements, it was for matters other than uniformity, and that the requirements in question concerned later generations of seed. Those requirements, although they were a relevant factor, were therefore not binding on UPOV for the purposes of uniformity testing.

(see TWC/12/11 Prov., paragraph 47)

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

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

(see TWC/12/11 Prov., paragraph 50 to 53)

30. The Committee is invited to note the above information and to consider possible steps to be taken.

31. The TWA noted that in most adopted Test Guidelines for agricultural crops the same population standard had been applied. In discussions with the national statistics experts it had become clear that the population standard had to be chosen in accordance with the objectives, the control standards, the reproduction biology, the seed generation, etc. It was not the experimental lay-out which was decisive for the population standard (not even indirectly because taking into account the effort necessary (number of plants to be observed) it was impossible to fix the population at the (low) level aimed at in the beginning). The test had to be made by looking at all the characteristics and not characteristic by characteristic. The statistics so far presented did not allow account to be taken of the fact that it could be more or less difficult to recognize whether a given plant was an off-type or not. Nor could they take into account that there were more chances of finding off-types when observing many characteristics than when observing only one.

32. The TWA agreed that a high beta risk (risk of wrongly accepting a heterogeneous variety as uniform) was not only a risk for the user but, and possibly even to a larger extent, a risk for the breeder. Another breeder could make selections in that variety. There was also a risk that the authority could take bad decisions and for the system of plant variety protection in that it made distinction more difficult. Breeders would, however, have no interest in presenting heterogeneous varieties.

33. The TWA concluded that the decision on the right population standard was a matter for the technical expert; statisticians could only give guidance as to the criteria for selection. However, it still had difficulty in fully understanding the criteria for the selection of the right population standard

and the right acceptance probability which would lead to a number of off-types considered to be the right one based on past experience.

34. The main question was whether the population had to remain the same, independent of the type of trial, and only the acceptance probability changed (alpha-1 for ear-rows and alpha-2 for drilled plots) in order to reach the number of off-types accepted at present (e.g. 3 in 100 ear-rows, 5 in 2,000 for drilled plants) of wheat, or should the acceptance probability be kept the same for both trials and the population standard adjusted (P1 for ear-rows and P2 for drilled plots) depending on whether one considered ear-rows or drilled plots. Other experts considered that, as characteristics in drilled plots were observed together while in ear-rows they were observed individually (e.g. drilled plots with the "naked eye" compared to ear-rows with "a magnifying glass"), a different population standard was applicable for the observation of individual characteristics vis-à-vis the observation of several characteristics together. Others considered that different population standards were justified because of different generations looked at, others considered that the ears sent in for ear-rows in wheat might have been more carefully selected by the applicant than seed and would therefore require different treatment.

35. The whole question would thus require further study and discussions with statistics experts. However, this should not delay the adoption of the cereal Test Guidelines which should be presented to the Technical Committee for adoption in the present wording with respect to uniformity.

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

37. The TWA concluded that the discussions on the reasons for different treatment for ear-rows and drilled plots in cereals with good practical experience could lead to a better understanding and a global answer which could also be helpful for further application to crops where less experience was available. The main problem was to find the right questions to be presented to the statisticians in order to get help from them. The TWA will prepare a document on the question of the selection of the right population standard and acceptance probability for ear-rows and drilled plots for the next session of the Working Party.

(see TWA/23/16 Prov., paragraphs 15 to 20 and 52)

38. The Committee is invited to note the above information and to consider possible steps to be taken.

Use of the COYD Analysis Over Two Locations

39. The TWC made several statements on policy aspects of the use of two locations for the testing of distinctness:

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

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

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

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

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

(see TWC/12/11 Prov., paragraphs 32 to 34)

42. The Committee is invited to note the above information and to consider possible steps to be taken.

UPOV Documents in Electronic Form

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

(see TWC/12/11 Prov., paragraph 82)

44. The Committee is invited to note the above information and to consider possible steps to be taken.

Future Long-term Program of the TWC

45. The TWC had a short exchange of views on its long-term program. Two aspects were mentioned:

(i) The volume of the activities deployed in the current member States was increasing in terms of both species covered by the plant variety protection system and varieties which were the subject of applications for protection. The TWC would have to contribute towards keeping the system bearable.

(ii) UPOV was expected to expand in the near future and in the longer term --in part as a result of the Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods, adopted in the context of the Uruguay Round of GATT (the "TRIPS Agreement"). The technology developed so far would have to be shared with the new member States, and the new member

States would need technologies adapted to their circumstances. Particular mention should be made of computer programs for the administrative operation of a plant variety protection system, and the statistical exploitation of the data generated by breeders in the context of protection systems based upon breeders' testing.

46. The Committee is invited to note the above information and to consider possible steps to be taken.

Possible Use of COYD for Species Other Than Cross-Pollinated

47. The TWA reconfirmed its proposal to clarify the range of application of documents TC/30/4 and TWC/11/16 and to combine them to a single document of which document TWC/11/16 would form Part I, applicable to vegetatively and self-fertilized crops, and document TC/30/4 would constitute Part II, applicable to cross-fertilized crops. As the wording of document TC/30/4 was not yet sufficiently simple for easy understanding, the authors would be contacted in order to produce an amended, simplified version. At the same time, the document should also state, in a similar way to document TWC/11/16, the necessary alpha-risk and beta-risk figures and advise on the risks taken if applied to other crops. It should, furthermore, make reference to the Long-Term LSD method and its use in cases of less than 20 varieties and less than 12 degrees of freedom.

(see TWA/23/16 Prov., paragraph 22)

48. The TWC and the TWA raised the question of the possible use of COYD for species other than cross-pollinated ones but did not take a definite decision.

49. The TWA noted during its discussions on *Bromus* that because of the different levels of self-fertilization in the species, a draft had been prepared which would propose the application of the COY analysis as practised so far for cross-fertilized species. Several experts considered it dangerous to start for a "minor crop" with changes in the practice before having discussed whether the COY analysis could in principle be applied to self-fertilized crops and what would be the consequences of such an application. The TWA therefore agreed to postpone discussions on the establishing of Test Guidelines and first handle the question of the principle of the application of the COY analysis. It asked the TWC to make, on the basis of some real data to be supplied by experts from France, a comparison of the application of the present method for self-fertilized crops as laid down in document TWC/11/16 with the COY analysis as laid down in document TC/30/4. Thereafter, the consequences of application of the COY analysis to self-fertilized or mainly self-fertilized crops could be discussed on the basis of the two different results, and a well-founded decision could be taken.

(see TWC/12/11 Prov., paragraph 10 and TWA/23/16 Prov., paragraphs 40 and 41)

50. The Committee is invited to note the above information and to consider possible steps to be taken.

Species in the OECD List for which no UPOV Test Guidelines Exist

51. The TWC noted that the Organisation for Economic Co-operation and Development (OECD) was soon to discuss the question of new agricultural species on the list of species admitted for certification, but for which no UPOV Test Guidelines exist. It also noted that, while the list was rather long, the number of species for which ten or more varieties were mentioned, amounted simply to the following:

- Brassica juncea L. Czernj. et Cosson
- Brassica oleracea (Convar. Acephala) L.
- Sinapis alba L.
- Agrostis capillaris L.
- Arrhenatherum elatius (L.) P. Beauv. ex J.S. et K.B. Presl
- Bromus catharticus Vahl
- Bromus inermis Leysser
- Chloris gayana Kunth
- Phacelia tanacetifolia Benth
- Phalaris aquatica L. (incl. P. stenoptera Hackel, P. tuberosa L.)
- Sorghum bicolor X Sudanense
- Sorghum sudanense Stapf
- Lens culinaris Medikus (L. esculenta Moench)
- Lotus corniculatus L.
- Onobrychis viciifolia Scop. (O. sativa Lam.)
- Trifolium alexandrinum L.
- Trifolium hybridum L.
- Trifolium incarnatum L.
- Trifolium resupinatum L.
- Vicia villosa Roth
- Arachis hypogaea L.
- Cannabis sativa L.
- Papaver somniferum L.
- Trifolium subterraneum L.

All experts were invited to reflect on the question for which of the above-mentioned species, or others in the complete OECD list, UPOV Test Guidelines should be planned. Those experts attending the coming OECD meeting were invited to report on the outcome of the discussions on this subject in the OECD to the TWC at its next session.

(see TWA/23/16 Prov., paragraph 45)

52. The Committee is invited to note the above information and to consider possible steps to be taken.

III. MATTERS FOR A DECISION TO BE TAKEN BY THE COMMITTEE

Sequential Analysis

53. The Working Party noted that under current procedures, the uniformity of a variety is assessed through analysis of a sample of a given size against a predetermined standard followed by a decision to accept or reject. Sequential analysis is a multistep decision-making process: each step, the last excepted, leads to the following possible decisions: accept; reject; examine another sample.

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

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

56. The TWC saw the testing of uniformity in broadcast sown species, the testing of uniformity with electrophoresis or biochemical methods and the checking of stability of hybrids in the laboratory as potential fields of application of sequential analysis.

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

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

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

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

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

(see TWC/12/11 Prov., paragraph 58 to 68)

59. The Committee is invited to take the necessary decisions.

Image Analysis

60. The following elements were mentioned by the TWC in the course of its general discussion:

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

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

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

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

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

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

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

(see TWC/12/11 Prov., paragraph 85)

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

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

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

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

A questionnaire would be prepared to that effect.

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

(see TWC/12/11 Prov., paragraphs 83 to 87)

63. The Committee is invited to take the necessary decisions.

IV. MATTERS PRESENTED AT THE REQUEST OF THE COMMITTEE OR IN PREPARATION FOR DISCUSSIONS PLANNED IN THE COMMITTEE UNDER SEPARATE AGENDA ITEMS

New Methods, Techniques And Equipment in the Examination of Varieties (Item 5 of the draft Agenda)

Use of DNA-profiling Techniques to Test Essential Derivation

64. The following paragraphs give a summary, prepared by the Office of UPOV, of the discussions held during the last session of the BMT. The full report on that session is reproduced in document document BMT/2/9 Prov.

65. It was pointed out that the Diplomatic Conference leading to the 1991 Act of the UPOV Convention had asked the UPOV Secretariat to draw up Guidelines on essential derivation and that the Office had prepared drafts on that matter and discussed them with the professional organizations. In the immediate future, however, it would not proceed further as it was a multiple question and all had agreed that the issue was not related to the procedure of granting protection but to another procedure. A breeder could institute a court case or seek less formal settlements if he considered another variety to be an edv of his protected variety.

(see BMT/2/9 Prov., paragraph 18)

66. Several experts stated that different methods would lead to different results with respect to the distances. UPOV needed to establish guidelines explaining certain criteria, giving advice on the use of certain methods on the calculation of data or how to discard certain methods. It was important, however, before applying any method that the crop expert clearly defined:

- (i) what he wants to measure,
- (ii) how he wants to do that and
- (iii) what precision he would require.

(see BMT/2/9 Prov., paragraphs 15 and 16)

Position of the Breeders Present on the Use of DNA-profiling Techniques to Test Essential Derivation

67. Breeders present expressed the wish to keep the criteria of distinctness, uniformity and stability completely separate from those for essential derivation. If possible, the same should also apply for the tools used to define those criteria. There was a risk that if the same tools were applied to both criteria a risk of confusion would arise. The DNA-profiling techniques are primarily tools to establish a genetic link between varieties and to trace parentage.

(see BMT/2/9 Prov., paragraph 14)

68. Breeders would know when they were doing real breeding work. However, there remained uncertainty as long as the threshold that would be acceptable was not known. Guidance was needed, guidance for the breeder and for the courts on how to interpret the criterion of essential derivation. Although the UPOV Convention indicated some examples of possible edv, it was not considered useful by the breeders to add further examples. It was preferred to search for objective assessments of the genetic distance, crop by crop, discuss the thresholds for each crop and try to reach a common agreement among breeders. Such guidance on the methods could be useful. The advantages and disadvantages of each of the methods, their limits and the way of calculating and interpreting the results should be discussed and fixed crop by crop. It was generally accepted that a certain number of markers, for which it was known that they had good coverage of the whole genome, had a completely different weight than the same number for which that information was not available and which could all come from a small part of the genome only. Other differences existed between markers for which the genetic determination was known and those for which it was unknown.

(see BMT/2/9 Prov., paragraph 19)

69. One breeder proposed that in order to prevent erosion of protection there should be a certain boundary between the original variety and an essentially derived variety (edv). He proposed that a variety with 90% similarity should be considered an edv while below 75% of similarity a variety would not be considered an edv. The range from 75% to 90% of similarity would constitute a grey area. Breeders organizations had, however, not yet reached an agreement where the boundary between an edv and a non-edv should be drawn.

(see BMT/2/9 Prov., paragraph 17)

Use of DNA-profiling Techniques to Test Distinctness, Uniformity and Stability (DUS)

70. It was recalled that in order to be acceptable for use in the testing of distinctness, uniformity and stability, the DNA-profiling method had to lead to results that would fulfil the same requirement as any other new characteristic before it would be accepted. The method would have to be a robust, standardized method, leading to comparable results. It must be precise, it must be possible to reproduce the results between years, between laboratories, in different countries.

(see BMT/2/9 Prov., paragraph 20)

71. Several criteria were mentioned which the methods might have difficulty in fulfilling. Contrary to the case of accepting one new characteristic, in the present case a method might be accepted which would lead to a large number of additional characteristics being accepted in one go and would lead to a reduction of the minimum distance required between varieties. The increase in distinguishing power should not be allowed to reduce that distance. The tool and the power of the tool should be seen separately.

(see BMT/2/9 Prov., paragraph 22)

72. It would always be possible to find a certain difference with the DNA marker. It was generally accepted that that would lead to the effect that any new variety would have to be accepted and granted a new title of protection. That could lead to the destruction of the present system, something which nobody wanted.

(see BMT/2/9 Prov., paragraph 23)

73. When looking at the results of a method one may look only at the structure of the genome without understanding what happens. A gene may be proved to be present but may not express itself. Would it be justified to grant a separate right if in the phenotype, and thus in the field and in the use of the variety, there was no difference at all?

(see BMT/2/9 Prov., paragraph 26)

74. Several experts expressed the idea, although contested by others, that even if it was not possible at present to use DNA profiling for DUS testing, it could be used as complementary information. DNA profiles could identify genotypes which had proved to be distinct by other means and thus give much information which could help to choose the best reference variety. They could help in the grouping of varieties without themselves forming grouping characteristics. The decision would still be made on the basis of the expression of the genotype, e.g. morphological or physiological characteristics. There existed thus two sets of characteristics, one used for

the establishing of distinctness and another set of additional characteristics used only for identification. The DNA profile would thus just be a help and not the basis for the establishing of distinctness. Other experts claimed that even if only used to identify a genotype which had proved to be distinct by other means, a characteristic had to fulfil the requirement of uniformity and stability. These two criteria, however, were not fulfilled at present in most of the DNA profiles.

(see BMT/2/9 Prov., paragraphs 27 and 28)

75. The question of uniformity had not so far been studied sufficiently and it would be premature to make any judgement. It would need special study with respect to synthetic varieties. Many further studies would still be necessary. This would also bring up the question of the consequences of the use of DNA profiling and the extra burden for small breeders who so far do not use them and thus do not select for those characteristics. They would be obliged to start with the methods and make their varieties uniform. Thus breeding and maintaining costs would increase considerably.

(see BMT/2/9 Prov., paragraph 30)

Position of the Breeders Present on the Use of DNA-profiling Techniques to Test Distinctness, Uniformity and Stability (DUS)

76. Breeders were of the opinion that for the testing of distinctness, morphological (or physiological) markers would be much better adapted as they referred to the expression of the genotype as spelled out in the UPOV Convention. In the case of use for distinctness, as stated by UPOV, uniformity and stability were also required. In the case of DNA profiling, it was easy to show a difference in the DNA. It would, however, be difficult for many species and for many markers to prove uniformity and stability. The problem may be overcome in the future, but at present it was a real problem. Breeders would not exclude the fact that for some crops the use of DNA profiling might be useful, but that should be discussed crop by crop. It would therefore be wise to postpone any decision and ask for discussions vis-à-vis the individual crops.

(see BMT/2/9 Prov., paragraph 21)

Future Program of the BMT

77. The Working Group agreed to hold its third session in Wageningen, Netherlands, from September 19 to 21, 1995. Individual experts will prepare documents for several methods and several crops which will, for each given crop: list the different methods under study, list the questions and problems that arise, assess the objectives for the species concerned, compare and evaluate the methods, taking into account especially knowledge of the genetic control of the markers used, the repeatability inside one laboratory and between laboratories, consider the availability of the method to everybody (especially if the method is patented), consider the technical costs involved, evaluate the aspect of uniformity and stability through a plant-to-plant comparison and whether the method might be useful for DUS purposes and or the proof of essential derivation, and propose a standardization of the method considered best for that species. In order to have a better understanding of the different methods and to use the same terms in the above documents and in the discussions during the next session, it was also agreed to try to reach agreement on names and definitions of the different methods.

78. As a result of the above, the agenda for the coming session of the BMT would comprise the following items:

- (i) Definition of methods of DNA profiling;
- (ii) Documents on certain species (Apple, only problems and objections, no results of methods), Barley, Hydrangea (mainly RAPD), Lolium (mainly RAPD + STS, Lucerne, Maize (if possible), Oak (marker), Oilseed Rape, Pinus maritimus (proteins), Poplar (if possible), Prunus (isozymes), Sunflower, Tomato)
- (iii) Statistical Aspects of DNA profiling including analysis of distance;
- (iv) Technical costs and access to the method of DNA profiling;
- (v) Position of the breeders on DNA profiling;
- (vi) Possibilities and consequences of the introduction of DNA-profiling methods for DUS testing;
- (vii) The use of DNA-profiling methods by expert witnesses in disputes on essential derivation.

(see BMT/2/9 Prov., paragraphs 31 to 37)

Use of Disease Resistance Characteristics in Distinctness Testing
(Item 6 of the draft Agenda)

79. The TWA noted document TWA/23/10 containing a summary of discussions in UPOV on resistance to diseases in DUS testing. It also noted the following three main questions: (i) whether to use only cases of clear absence or presence, (ii) to use only clear resistance or also tolerance and (iii) to include them in the Test Guidelines but without an asterisk. The TWA repeated that in agricultural species resistance was, in principle, only used as a last resort. The TWA was, however, aware of the fact that the situation was different in other groups of species and that for vegetable species resistance characteristics in many cases were used as grouping characteristics. The decision whether to use resistance characteristics for distinctness would therefore very much depend on the species concerned and the genetic bases.

80. The TWA reconfirmed the rule that an asterisk could only be given to a characteristic if all member States agreed. There was no special rule for resistance and thus this rule should also apply to resistance characteristics. The decision would have to be taken species by species and characteristic by characteristic.

81. In many cases resistance was not a black and white situation and different degrees of resistance existed. This fact as such was not a problem for the acceptance of the characteristic as long as there was a good description of each state of expression.

82. The question whether the terms tolerance and characteristic on tolerance were acceptable in UPOV Test Guidelines occupied a large part of the discussions. The TWA agreed to the definition of the terms given by breeders and reproduced in Annex IV to document TWA/23/16 Prov. It noted that in many cases tolerance characteristics would not be acceptable for distinctness purposes. The fact of being a tolerance characteristic as such would, however, not ban a characteristic from being used for distinctness. As was the case of any other characteristic, if all normal requirements were fulfilled, a tolerance characteristic could also be included in the UPOV Test Guidelines.

(see TWA/23/16 Prov., paragraphs 24 to 28)

Cooperation With Breeders in the Testing of Varieties)
(Item 7 of the draft Agenda)

83. The TWA noted document TWA/23/7, containing a summary of the survey on the involvement of the applicant or breeder in the examination of a variety based upon trials carried out by or on behalf of the breeder, approved by the Council in 1993 and reproduced in Annex III to document TC/30/6. The TWA noted that some countries had had difficulty in understanding certain questions. It asked for comments to be sent to the Office of UPOV in order to improve the questionnaire and circulate it once more. The TWA encouraged all countries to answer the questionnaire in order to get a better understanding of how testing is done in the various member States. Other Working Parties should also collect similar information and the Technical Committee should be involved as well. It would be of special interest to know why countries had chosen certain testing systems for certain species.

(see TWA/23/16 Prov., paragraph 13)

UPOV Central Computerized Data Base
(Item 8 of the draft Agenda)

84. The TWA noted the history of the discussions concerning a possible UPOV central computerized data base as laid down in document CAJ/32/2- TC/29/2 and Circulars U 2047 and U 2067 and that the Council, during its session in October 1993, had approved the preparation of a prototype for a UPOV Data Base. It also noted the preparation of a UPOV format for the transmission in electronic form to a UPOV central computerized data base on CD-ROM of bibliographic data regarding plant varieties as reproduced in document TWC/12/8. That format will now be given to a firm to develop a prototype on the basis of data to be supplied in that format by the Offices participating in the ad hoc working group. The TWA welcomed the progress made and hoped to receive the first results of the testing of that prototype as well as information on the steps to be taken on the basis of those results at its next session. It expressed the hope that most member States would finally participate in the data base so all varieties might be covered.

(see TWA/23/16 Prov., paragraph 14)

[End of annex and of document]