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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**

GENEVA

# TECHNICAL COMMITTEE

## Thirty-Sixth Session
## Geneva, April 3 to 5, 2000

MATTERS ARISING FROM THE 1999 SESSIONS OF THE TECHNICAL WORKING PARTIES TO BE DEALT WITH BY THE TECHNICAL COMMITTEE (ADDENDUM CONCERNING THE SIXTH SESSION OF THE WORKING GROUP ON BIOCHEMICAL AND MOLECULAR TECHNIQUES AND DNA PROFILING IN PARTICULAR)

*Addendum prepared by the Office of the Union*

This addendum summarizes, in its Annex, matters arising from the sixth session of the Working Group on Biochemical and Molecular Techniques and DNA Profiling in Particular (hereinafter referred to as "the BMT") that have to be dealt with by the Technical Committee. They include important subjects discussed or decisions taken by the BMT communicated to the Committee

(a) for information and for a possible decision to be taken by the Committee;

(b) for information;

(c) for discussions planned by the Committee under separate agenda items.

ANNEX

# I. MATTERS FOR THE INFORMATION OF AND FOR A POSSIBLE DECISION TO BE TAKEN BY THE COMMITTEE

1. During the sixth session held in Angers, France from March 1 to 3, 2000, the BMT noted that there were still several fundamental, legal problems which should be solved before the introduction of molecular techniques in DUS testing. Most of the questions relate to the fundamental concept of plant variety protection. The BMT therefore decided to leave these problems to other appropriate fora, the Technical Committee (TC), the Administrative and Legal Committee (CAJ), or/and a special separate working group. The discussions in the BMT concerning these fundamental questions are summarized from paragraphs 2 to 16.

## Phenotype vs Genotype

2. The BMT discussed the interpretation of the wording "the expression of the characteristics resulting from a given genotype or combination of genotype" in Article 1(vi) of the 1991 Act of the UPOV Convention.

3. On one hand, several experts insisted that the purport of the wording should be "phenotypes". The expert from ASSINSEL stated that, in his opinion, the wording had been clearly intended to mean phenotypes in the preparation of the 1991 Act. With this interpretation in conjunction with Article 7, a possible conclusion would be that the use of characteristics other than phenotypic characteristics could not be accepted for the judgement of distinctness. At this stage, molecular characteristics could not be regarded as phenotypic characteristics, because the linkage between phenotypic and molecular information had not been well established, and because some information given by molecular techniques might not relate to any phenotypic information. Therefore, differences in molecular markers possibly resulting from differences in non-coding parts of DNA could not alone establish distinctness between two varieties. He stated that, if this interpretation were strictly applied, molecular techniques would not be used alone for the judgement of distinctness without the revision of the Convention.

4. The Vice Secretary-General of UPOV reminded the BMT that the Administrative and Legal Committee of UPOV (CAJ) had expressed the view that the wording does not necessarily mean "phenotypes". The same language may simply mean that a characteristic must be inherited. No discussion of the subject can be found in the records of the 1991 Diplomatic Conference. The CAJ was of the view that the language of the 1991 Act of the Convention does not require or forbid the use of molecular markers for the judgement of distinctness. Technical circles must recommend whether it is desirable to use such techniques in the light of the overall functioning and objectives of the Convention. His intervention was based on the following propositions in the CAJ (Paragraph 15 of CAJ/36/6):

> (a) "Expression of characteristics" should not be understood in the genetic sense. A "characteristic" was an element, in the abstract, of the description of a variety, and the "expression" was the specific form that the element assumed; for instance, the words applied equally well to the length of a stem as they did to a gene (expression being the allele in that case).

(b) The question whether "directly-read characteristics of the genome" could be taken into account was not settled by the Convention, which did not pronounce on the nature of the characteristics to be considered.

(c) The question had to be settled case by case according to the usual criteria, which included the requirement of the clearness of the difference noted and the need to abide by the essential purpose of the protection system.

(d) It would in particular be contrary to that purpose to allow the protection of one plant group that was too close to another. It would be wrong to conclude from the position set forth in paragraph 6 of document CAJ/36/3 that the use of biochemical characteristics was sufficient for determining distinctness. The 1991 Act did not rule out the use of new technological solutions, but did not validate those solutions either.

(e) It was sometimes suggested that distinctness was associated with the phenotype and the concept of essentially-derived variety with the genotype. The problem was, however, that Article 1(vi) (on the definition of the variety), and Article 14(5)(b) of the 1991 Act used the same terminology.

Minimum distance

5. The BMT also discussed the concept of "minimum distance" and the impact of the introduction of molecular techniques on "minimum distance". The expert from ASSINSEL introduced document BMT/6/6 on "DUS testing: Phenotype vs Genotype". In his presentation, he pointed out that, if molecular characteristics were accepted for DUS testing, one molecular band difference might be regarded as "clearly distinguishable" in Article 7 of the 1991 Act. Is that what UPOV wants? He stressed the need for defining a new concept of "minimum distance" for molecular characteristics, e.g., the number of markers needed to establish distinctness and the necessary quality of the markers. The Chairman questioned how the minimum distance (threshold level for assessing distinctness) was defined for molecular characteristics, considering the fact that single-gene controlled characteristics, such as disease resistance and flower color, could establish distinctness in the current system.

6. One view was that the concept of the minimum distance had reduced significance after the adoption of the 1991 Act. The Vice Secretary-General of UPOV noted that a very small difference, such as a point mutation, could establish distinctness in many species. This was taken by ornamental breeders to be a weakness of the UPOV system. However, the introduction of the essential derivation concept by the 1991 Act had enabled breeders to defend their interests in such cases. The essential derivation concept had released national offices from the most extreme forms of minimum distance dilemma. One expert also stated that the minimum distance had been simply a concept and had never been clearly defined. In practice, the minimum distance had in some cases been almost zero.

7. Another view was that, on judging distinctness, the concept of minimum distance should be taken into consideration in order to ensure the quality of protection. If the concept of the minimum distance were to be nullified, and if all small differences could be accepted as the basis for distinctness, the breeder would have to make use of essential derivation in every case. The introduction of the essential derivation concept should not influence the concept of minimum distance. In addition, the quality and meaning of protection would be significantly degraded, and the existing protection framework would be broken down. The creation of new

varieties would become extremely easy, and the value of protection might be almost nothing. The expert from ASSINSEL stated that breeders did not wish to face such a situation.

New approach for the assessment of distinctness

8. The expert from France proposed a new approach, assessing distinctness not on a characteristic-by-characteristic basis, but by the combination of characteristics. In other words, distinctness would be assessed by the distance between varieties derived from the totality of differences of all characteristics, such as a molecular distance. This approach could be regarded as a true "minimum distance" approach. The minimum distance would be meaningful and not approach zero. This approach would enable the avoidance of granting protection for varieties that did not deserve protection, such as a variety derived by a mutation in a single gene from an existing variety, and the maintenance of the quality of protection. However, he stressed the need for further studies on this approach and proposed to seek the possibility of using molecular characteristics only as supporting evidence until enough information needed for the new approach is accumulated. This proposal attracted much attention from the experts as a possible future approach, although it would result in a significant change in the approach to the judgement of distinctness.

Supporting evidence

9. The BMT also discussed the use of molecular characteristics as supporting evidence for the assessment of distinctness, following a presentation made by the expert from France on the draft document for TGP/13 entitled "Genetic labeling: a support for decision-making about distinctness", which is available as a part of document TC/36/7.

10. One expert from the United Kingdom questioned the status of supporting evidence characteristics. If the final decision on the distinctness of the variety was based on whether molecular characteristics showed clear difference or not, molecular characteristics would play the same role that normal UPOV characteristics did in the decision making. In addition, he observed that the use of molecular techniques as supporting evidence for performance characteristics proposed by the expert from France would fully open the door to performance characteristics for the establishment of distinctness, which, as such, might result in a significant change in the current protection system.

11. The expert from ASSINSEL stated that ASSINSEL has already been in a position to accept supporting evidence characteristics. However, the use of supporting evidence characteristics should be limited to the cases where testing experts are strongly convinced of the distinctness of varieties by the results in the field trial. If the testing experts have no clear conviction based on the field trial, the supporting evidence characteristics should not be used at all. The status of "supporting evidence" characteristics was therefore clearly different from that of normal UPOV characteristics.

12. He also stated that the use of molecular characteristics as supporting evidence characteristics might not be a big problem for ASSINSEL. The important question was whether molecular characteristics should be introduced into the judgement of distinctness, uniformity and stability as normal UPOV characteristics in the future.

Transitional Period

13. The expert from ASSINSEL anticipated that, if molecular markers were to be introduced into DUS testing in the future, the protection system might be significantly changed. He therefore stressed the need for special care during a transitional period to effectively protect the rights of the breeders already protected by the present system, even after the implementation of a new protection system.

14. One expert stated that, even if we decided to allow the use of molecular characteristics, phenotypic characteristics would not be totally replaced by molecular characteristics. A possible, realistic approach would be to introduce molecular characteristics as additional normal characteristics or supporting evidence characteristics in the current system in the same way as for electrophoresis characteristics. The question "how molecular characteristics could fit in with the current system?" should be discussed.

15. The expert from the CPVO also stated that, before discussing any transitional period, the BMT should discuss to what extent and how molecular techniques could be introduced in DUS testing.

Stability

16. The expert from ASSINSEL also expressed its serious concerns with stability. As relatively high mutation rates on molecular markers had been reported in the last session of the BMT, the maintenance of molecular characteristics over the protection period for the stability criteria might present new burdens to breeders/maintainers. Should a mutation in one marker be considered as the loss of stability? He therefore proposed to discuss a sub-threshold for stability in molecular characteristics, taking into account its possible impacts on the maintenance practices of breeders/maintainers.

Access to Data, Construction of DNA Profile Databases

17. The BMT noted that a large number of DNA profiles of varieties had been produced by different projects and by different institutes. It discussed problems associated with the access and sharing of existing DNA profiles and other data, and the construction of databases.

18. Access to DNA profiles: The access to DNA profiles of varieties which had already existed or will be produced, would become an issue for the further studies and future application of molecular techniques. The accumulation of DNA profile data of varieties and the construction of databases were progressed in isolation by different public projects, public institutes and private companies. The access to such data and databases seemed to be generally limited to the members of the projects at this stage.

19. Construction of a central DNA profile database: The ideal solution is the construction of a central DNA database of variety profiles. Some experts thought that UPOV should take the initiative in constructing such a central database sharing existing DNA profiles. The Working Group recognized the need for discussing possible principles and frameworks for constructing an open-system for sharing DNA profile data. A problem would be the standardization of molecular markers. One expert doubted whether molecular markers could be standardized in view of the rapid progress in molecular techniques and markers.

20. Access to other variety information: Several experts reported that breeders were generally very cautious about providing detailed information on varieties to the public. For example, in the case of the EU project, all seed samples had been handled not with variety denominations, but with special codes. As a result, the DNA profiles obtained in the project could not be analyzed in conjunction with phenotypic data and by reference to the mode of propagation. In this connection, the expert from the Netherlands proposed to investigate the possibility of utilizing, for the further studies of molecular techniques, propagating material that is submitted to the national office for protection or listing.

21. Database of phenotypic variety descriptions: The expert from ASSINSEL insisted that UPOV should first construct a database of phenotypic variety descriptions rather than that of DNA profiles. The database of phenotypic variety descriptions would be very useful not only for national offices, but also for breeders. The Vice Secretary-General of UPOV stated that the inclusion of technical information into UPOV ROM was currently under discussion in the Technical Working Parties and the Technical Committee. Several experts explained that the main problem would be the heavy workload needed for processing data in a standardized format by national offices.

22. Ownership of variety descriptions: One expert questioned the ownership of variety descriptions and other data of protected varieties. In the other words, could variety descriptions be freely used by the national office and be placed in public domain, for example in an open database? The BMT realized that it would be a sensitive question. The expert from the CPVO stated that variety descriptions and testing reports of varieties for which application were filed with the CPVO belonged to the CPVO. The expert from ASSINSEL suggested that the applicants had paid testing fees, and that the applicants therefore could assert their rights over the variety descriptions. One official of the UPOV Office stressed that variety description might have a different status to that of testing reports.

*Ad hoc* crop subgroups

23. The BMT agreed that real progress could not be expected without intensive discussion in small groups on specific species. It therefore decided to propose establishing *ad hoc* crop subgroups during the eighteen month interval until the next session to make real progress in discussions on possibilities and consequences of the introduction of molecular techniques in DUS testing, the management of reference collection and the judgement of essential derivation.

24. The BMT discussed the role of *ad hoc* crop subgroups and its relationship with the Technical Working Parties. It agreed that testing experts in the Technical Working Party should be involved with the discussion in the *ad hoc* crop subgroups. It also agreed that the chairmen of the *ad hoc* crop subgroups should be chosen from experts in the Technical Working Party in question. The role of the *ad hoc* crop subgroups would not be to make any decisions, but to prepare documents that could be a basis of further discussions in the BMT, the Technical Working Parties and the Technical Committee. The BMT confirmed that the Technical Working Parties should be the decision-making bodies for the introduction of new characteristics into DUS testing for each species.

25. The Chairman suggested that such subgroups could meet once in year 2000. The official of the UPOV Office also suggested that the main tasks of the subgroups were (i) to analyze existing results of DNA profiling studies, (ii) to attempt to construct possible models

for the assessment of DUS, the effective management of reference collection, and/or the judgement tool of essential derivation, and (iii) to identify unsolved problems for the application in practice and the possible impacts of the introduction on the protection system. The documentation established by the subgroups would be indispensable for making progress in the next session of the BMT.

26. The BMT discussed the selection of species for the subgroups. A majority of experts supported two criteria, (i) the need for the introduction of molecular techniques in DUS testing (species for which a limited number of characteristics are available and species which urgently need effective methods for the management of reference collection) and (ii) the availability of DNA profiling data and on-going studies. It had noted that horticultural Working Parties (TWV, TWF, TWO) had insisted that there were no urgent needs for the introduction of molecular techniques in DUS testing of horticultural species. However, several experts stated that there would be potential needs for molecular techniques, especially in the management of reference collection. The BMT therefore decided to also include horticultural species. In the light of the above two criteria, it chose the following five species:

(a) Oilseed rape
(b) Wheat
(c) Maize
(d) Rose
(e) Tomato

## II. MATTERS FOR INFORMATION

### Progress Report on the Work of the BMT

27. The sixth session of the BMT was held in Angers, France, from March 1 to 3, 2000, in cooperation with the Community Plant Variety Office. Over 80 experts from various parties participated in the session. The detailed report will be available as document BMT/6/13. The important points of discussions that have not been introduced in the previous chapter are summarized as follows:

28. Before opening the sixth session, the Chairman gave an overview of the discussions in the previous session and pointed out the expected points of discussion in the sixth session. In particular, he emphasized that the most important issue for discussion in the sixth session would be the assessment of uniformity and stability by molecular characteristics.

### Official Stance of UPOV and Role of the BMT

29. During the session, there were several opportunities of discussing the role of the BMT and of confirming the current stance of UPOV concerning the use of molecular techniques.

30. One expert of the horticultural working groups (TWF, TWO, and TWV) explained their stance concerning the application of molecular markers for DUS testing in horticultural species. He stated that there was no urgent need for the use of molecular markers in horticultural species.

31. The Vice Secretary-General of UPOV emphasized the importance of making real progress in the discussion of the BMT towards the establishment of principles for the use of molecular techniques in DUS testing. There would be less urgent need in the member States with government testing for the introduction of molecular techniques. However, as the UPOV membership expanded worldwide, member States that adopted breeder-testing systems had increased. He pointed out the possibility that in the future some member States, especially those with breeder testing systems, might start to allow the use of molecular techniques for establishing distinctness upon request from an applicant. The BMT should therefore speed up its discussion to avoid the situation that some member States go their own way without awaiting the establishment of UPOV principles.

32. The expert from ASSINSEL repeated several times during the session that UPOV had not made any decision on the use of molecular techniques for DUS testing and that the position of UPOV in this respect should not be prejudged. All discussions in the BMT were based on the assumption "IF molecular markers were accepted for DUS testing". He stated that, however, it did not mean that ASSINSEL rejected the future use of molecular markers for DUS testing and that ASSINSEL hoped progress for the discussion of the BMT. The expert from France also stressed that the role of the BMT was not only to discuss how to use molecular techniques in DUS testing, but also to analyze and explain possible positive and negative consequences of the introduction of molecular techniques in DUS testing.

Assessment of Variability Within Varieties and Between Varieties, in Particular, Uniformity and Stability in Molecular Markers

33. The BMT noted several reports that are reproduced in detail in document BMT/6/3, BMT/6/4, BMT/6/5, and BMT/6/9.

Correlation between variability in phenotypic characteristics and in molecular markers

34. A French study on inbred lines of Oilseed Rape (BMT/6/9) showed that off-types identified by molecular information corresponded well in most cases with off-types defined by morphological characteristics. The lack of correlation between phenotypic characteristics and molecular data had been regarded as one of the main problems for the use of molecular markers in the past sessions. However, the study which involved molecular distances, a diversity index and a principal component analysis by AFLP markers succeeded in describing variability within varieties which correlated with phenotypic characteristics. The BMT noted that the assessment of uniformity by molecular data could be consistent with assessment by phenotypic characteristics in some species with certain marker sets.

Choice of molecular markers showing uniformity within protected varieties

35. One expert from the United Kingdom referred in his presentation to the problems of molecular markers in relation to the assessment of uniformity. Polymorphism in molecular markers is often observed even within a highly uniform variety. In addition, different molecular markers often show different levels of uniformity in the same variety. In order to solve these problems, he proposed to choose molecular markers that are not only usefully polymorphic between, but also sufficiently uniform within, existing protected varieties. He reported the preliminary result in choosing a set of molecular markers that had showed

uniformity in a small number of varieties. It would be checked whether the selected markers could also show uniformity in a larger number of varieties.

36. Some experts questioned the implications of selecting uniform markers. The question could be what kinds of genetic information would be eliminated by such selections. The selections might be biased toward certain information. One possible explanation could be that non-uniform markers observed within a highly uniform variety corresponded with non-coded or non-expressed genetic information. The BMT noted that the further studies in this respect would be needed.

37. Other experts referred to the risk of selecting molecular markers by the results of a limited number of protected varieties. It was necessary to check whether uniformity in the selected molecular markers could be observed in a large number of varieties, including varieties grown in different regions with different genetic backgrounds if they were to be accepted in the UPOV system. An expert from the Netherlands stated that, in his experience in tomato, a set of molecular markers that showed completely uniform band patterns within all existing varieties was unlikely. Other experts pointed out that the chosen molecular markers should not only show uniformity in uniform varieties, but also to show non-uniformity in varieties which did not meet the uniformity requirements of the current DUS testing system.

Different approaches for the assessment of uniformity in molecular characteristics

38. The BMT briefly discussed the five approaches which were originally suggested in the third session and were presented again in the session by the expert from the United Kingdom (BMT/6/4). The five approaches in document BMT/6/4 are as follows:

> "(i) it could be decided that this lack of uniformity precludes the use of certain molecular markers for DUS testing purposes (use of only molecular markers with sufficient uniformity)[1];
>
> (ii) it could be accepted that the level of non-uniformity exhibited by currently registered varieties (which would need to be determined systematically and empirically) represented a baseline, which candidate varieties in the future would not be allowed to exceed;
>
> (iii) it could be suggested that from a certain date, all future candidates would have to be uniform for a particular selected marker or set of markers;
>
> (iv) it could be suggested that from a certain date, those candidates for which the marker data was the distinctness criterion would have to be uniform for that particular characteristic;
>
> (v) it could be accepted that the repeatability (i.e. stability) of the differences between varieties is more important than the insistence on plant to plant uniformity. Thus if the variability within a variety, as estimated either by single plant analysis or by a bulk analysis, is maintained from generation to generation (and is therefore stable) then this could be accepted as evidence of sufficient uniformity within that variety."

[1] The parenthesis is added for this document.

39. One expert from France stated that approaches to the assessment of uniformity would depend on how molecular techniques are accepted for the assessment of distinctness, for example, as normal UPOV characteristics or as supporting evidence. In his opinion, if molecular techniques were used as supporting evidence, molecular markers could be considered as a tool for identification of varieties rather than that for distinctness. In this case, sufficient uniformity in molecular markers would be required only in a candidate variety and similar varieties to clearly identify them. Uniformity in molecular markers would not need to be observed in all existing varieties.

40. A number of experts also stated that it would be impossible to fix a unique approach for the assessment of uniformity in molecular characteristics, and that approaches and standards for the assessment of uniformity would differ, depending on the modes of propagation of varieties, molecular techniques and molecular markers. They should therefore be discussed case by case.

41. However, with respect to the method for assessing uniformity ((i), (ii) or (v)), many experts supported, if feasible, approach (i), the use only of molecular markers that show uniformity in existing protected varieties. The expert from the United Kingdom stated that the choice of the above approaches depended on how quickly molecular techniques would be introduced. Approach (i) would be preferred, but it would take a relatively long time to choose each marker sets. An expert from France emphasized that the wording should be not "uniformity" but "sufficient uniformity." Several experts also stated that the BMT should keep in mind that uniformity did not require absolute uniformity within a variety.

Technical Feasibility of Uniformity Assessment by Molecular Data

42. In the past sessions of the BMT, the assessment of uniformity had been considered to be the main technical obstacle to the use of molecular markers for DUS testing. However, the presentations given in the session and progress in molecular techniques since the last session seemed to change the views of experts concerning the technical feasibility of uniformity assessment in molecular markers. A majority of experts in the session took the position that the introduction of molecular markers would probably not raise big technical difficulties in assessing and maintaining uniformity of a variety. They stressed that the most important thing would rather be how to assess distinctness in molecular characteristics. Once the position on the assessment of distinctness were determined, the threshold level of uniformity would possibly be decided without technical difficulties. Once the threshold levels for uniformity were clearly fixed for certain marker sets, all future candidate varieties would be able to follow such uniformity standards.

Role of Uniformity Criteria

43. Several experts also stated that uniformity and stability were less important than distinctness, and that priority should be hereafter given to the discussion of distinctness. The expert from ASSINSEL stated that uniformity criteria is only a tool for making a good decision on distinctness and stability, while it is also important for other reasons, such as for ensuring the purity of varieties. Uniformity made it possible to avoid over-lapping varieties and to achieve clear distinctness. It was also a good indicator for stability.

44. An expert from the United Kingdom pointed out that, on the introduction of new characteristics, the uniformity criterion should be studied with a view to preventing other breeders from selecting a small subgroup of plants from existing protected varieties. He referred to the following paragraph in the revised working document for a New General Introduction to the Assessment of Distinctness, Uniformity and Stability in New Varieties of Plants (TC/36/6):

> "73. With the introduction of new characteristics it may be possible to select different forms within a protected variety. The UPOV protection ensures that nobody can take one of these possible forms and register it as a new variety. This is achieved because no candidate can be distinguished from an existing protected variety by a characteristic that is not uniform in the other variety. Therefore it will prevent the use of new DUS characteristics from eroding the protection of existing varieties. This approach requires reasonable levels of uniformity in the initial varieties of new plant species or types, to ensure that variety development is not inhibited (see Chapter 7.1)."

Free Choice or Standardization of Molecular Marker Sets for DUS Testing

45. The BMT discussed whether molecular marker sets to be used for establishing distinctness needed to be standardized. Some experts insisted that, if molecular techniques were accepted for DUS testing, applicants would be free to use any molecular marker set that met certain criteria for distinctness and showed sufficient uniformity in existing protected varieties and a candidate variety. National office would not be able to reject marker sets that fulfilled the specified criteria. In addition, one expert wondered, with a view to the rapid progress of molecular techniques and markers, whether molecular marker sets could be fixed at all.

46. One expert further stated that the acceptance of new characteristics should be judged on whether they could meet criteria for characteristics in UPOV, regardless of the type of techniques. If new techniques showed clear differences between some varieties and sufficient uniformity within existing varieties, and if the results were repeatable and consistent, they should be accepted as characteristics to be used for DUS testing irrespective of the type of techniques. "Clear difference" and "sufficient uniformity" should be statistically judged. The expert from the United Kingdom emphasized that characteristics should be reliable and not lead to easy plagiarism.

47. The Vice Secretary-General of UPOV expressed his concern about a totally free choice. One of the main tasks of UPOV is the international harmonization of variety testing and variety description among member States. If just any choice of molecular markers were accepted, varieties could not be compared with each other on the basis of the variety description. The standardization of molecular marker sets would be indispensable if they were introduced in DUS testing.

Statistical Methods

48. The BMT noted several reports that are reproduced in detail in documents BMT/6/8 and BMT/6/10. It found the statistical software introduced in document BMT/6/10 useful. It also heard the short reports from the Chairman of the Technical Working Party on Automation and Computer Programs (TWC). He stressed that the lack of assimilated data of a good quality

covering molecular data, pedigree and morphological characteristics, were still the main obstacle to the assessment of different statistical methods. It would be necessary to establish a system for sharing existing data.

49. The BMT discussed only a few issues because of the shortness of time. Some experts reported that molecular data would usually be better indicators for pedigree relatedness than phenotypic characteristics. However, pedigree relatedness is important not for protection, but for the judgement of essential derivation. In addition, the BMT discussed the improvement of the precision of molecular distances by a linkage map. It also discussed problems on the direct comparison of different distance estimators, such as molecular distance and phenotypic distance in the section of management of reference collection.

Possibilities and consequences of the introduction of DNA profiling methods for DUS testing and Position of the breeders vis-à-vis DNA profiling

50. The main points of discussion under this item are described from Paragraph 1 to 16 in the previous chapter.

The use of DNA-profiling as a possible tool for management of reference collection in DUS testing

51. The BMT heard a presentation that is reproduced in more detail in document BMT/6/2. In addition, the expert from France briefly introduced the draft document for TGP/4 entitled "Management of reference collection", which is available as a part of document TC/36/7. The BMT was not able to give enough attention to the discussion on this item because of the lack of time.

The use of DNA profiling methods by expert witness in disputes on essential derivation

52. The BMT noted the presentation that is reproduced in detail in document BMT/6/7. Because of the lack of time once again, it could not enter into detailed discussions on this item. However, the BMT discussed essential derivation in conjunction with the discussion on DUS testing.

53. Distinctness and essential derivation: The expert from ASSINSEL emphasized that the notions of distinctness and essential derivation should be clearly kept separate. If molecular techniques were to be accepted for both assessing distinctness and judging essential derivation, there would need to be two different thresholds. The expert from the United Kingdom stated that the judgement of essential derivation would not be based only on characteristics used for distinctness. Much wider information could be used to judge essential derivation. In addition, one expert reminded the BMT that genetic conformity was not the only criteria for the judgement of distinctness.

54. Alternative approaches: One expert proposed an alternative approach for the judgement of essential derivation by molecular techniques. Essential derivation could be judged based on whether a variety maintained certain unique sets of molecular marker patterns of the initial variety that could not have been obtained by independent breeding. Several experts questioned the feasibility of identifying such sets, although the proposed approach was conceptually agreeable. Another problem could be that two independent

breeding activities with the same might result in two different varieties that share a unique set of molecular marker objectives. They would not be essential derived.

55. Continuation of discussion on essential derivation: The Working Group also discussed whether it should continue the discussion on essential derivation in its next session. One expert stated that, to date, essential derivation had not been clearly defined for its application in practice, even about 9 years after the introduction of this concept in the 1991 Act. He emphasized the importance of clarifying the legal definition of essential derivation rather than discussing possible approaches by molecular markers in the BMT.

56. The expert from ASSINSEL stated that, in the Diplomatic Conference, UPOV had been requested to establish guidelines on essential derivation. The discussion on essential derivation in the Working Group could be considered as a part of activities of UPOV to establish such guidelines. The BMT should focus on technical aspects, for example, identifying the methods and tools necessary to assess essential derivation and providing technical information on how to use molecular markers to assess genetic conformity.

57. Finally, the BMT agreed to continue discussions on essential derivation in the next session.

Short presentations of biochemical and molecular techniques: new techniques, advantages and limitations of various techniques (this item could be illustrated with experimental data obtained in different species)

58. The BMT noted several presentations that are reproduced in detail in documents BMT/6/11 and BMT/6/12 and will be available in Annex IV and V of BMT/6/13. Following the presentations, the BMT mainly discussed several issues on the access to data and the construction of databases, which are shown in paragraphs 17 to 22.

Future Program, Date and Place of the Next Session

59. The BMT reaffirmed the importance of continuing sessions of the BMT, in addition to the proposed separate subgroups, as it was the only forum where testing experts, molecular scientists, statisticians and breeders were able to exchange their views and opinions on the use of molecular techniques in DUS testing as well as essential derivation. The Vice Secretary-General of UPOV suggested that the future sessions of the BMT be made more open to those outside of the habitual UPOV circle and that it shift to an open-scientific forum to some extent.

60. The experts from Germany offered to host the seventh session. The BMT accepted that offer and agreed to hold its seventh session in Hanover, Germany, in the middle of October 2001. During the next session, the BMT planned to discuss the following items: (i) Reports on the discussion in the Technical Committee and the Administrative and Legal Committee; (ii) Short presentation on biochemical and molecular techniques: new techniques, advantages and limits of different techniques; (iii) Possibilities and consequences of the introduction of DNA profiling methods in DUS testing (reports from *ad hoc* crop subgroups): (a) Assessment of distinctness, uniformity and stability; (b) Management of reference collection; (c) Essential derivation; (iv) Assessment of variability within varieties and between varieties; (v) Construction and standardization of databases of DNA profiles of varieties; (vi) Statistical

methods: (a) Combination of information from diverse data types (AFLP, SSR, morphological data, etc.); (b) Comparison of genetic distances with phenotypic distances; (c) Confidence intervals and improvement of precision of distance estimates; (vii) The use of DNA profiling as a possible tool for management of reference collections in DUS testing; (viii) The use of DNA profiling methods in examining essential derivation.

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