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

GENEVA

**ADMINISTRATIVE AND LEGAL COMMITTEE****Thirtieth Session****Geneva, April 8 and 9, 1992****DEFINITION OF THE VARIETY  
AND USE OF MULTIVARIATE ANALYSIS**Document prepared by the Office of the UnionIntroduction

1. At its twenty-seventh session, held from October 16 to 18, 1991, the Technical Committee decided that it could not answer the question whether, in the light of the wording of the definition of "variety" in Article 1 of the 1991 Act of the UPOV Convention, the use of multivariate analysis of non-related characteristics should be permitted in future in the examination of distinctness. It also decided that it should reexamine the question after having received the advice of the Administrative and Legal Committee (see paragraph 17 of document TC/27/9).

2. Extracts from document TC/27/3 (paragraphs 3 and 4) and from document TC/27/9 (paragraph 17) are reproduced in the Annex to this document.

3. Paragraph (vi) of Article 1 of the 1991 Act reads as follows:

"vi) 'variety' means a plant grouping within a single botanical taxon of the lowest known rank, which grouping, irrespective of whether the conditions for the grant of a breeder's right are fully met, can be

- defined by the expression of the characteristics resulting from a given genotype or combination of genotypes,
- distinguished from any other plant grouping by the expression of at least one of the said characteristics and
- considered as a unit with regard to its suitability for being propagated unchanged."

4. The question put to the Technical Committee by the Technical Working Party on Automation and Computer Programs was whether the words "at least one of the said characteristics" meant in some way that varieties were only "clearly distinguishable" for the purposes of Article 7 of the 1991 Act if they differed by "at least one" characteristic taken in isolation, in view of the inclusion of these words in the definition of "variety."

5. It should be noted that the 1978 and 1991 Acts do not define "characteristic." The nature of the characteristics to be taken into account in distinctness testing was extensively discussed in the Diplomatic Conference of 1978 (see paragraphs 322 to 347 and 388 to 391 of the Records of the Geneva Conference of 1978). Delegates were reluctant to accept that "any" characteristic could be used in distinctness testing but recognized that the addition of descriptive words such as "morphological" and "physiological" added nothing to the meaning of "characteristic." The language eventually adopted in Article 6(1)(a) of the 1978 Act requires that characteristics which are to be used for distinctness purposes must be "important," must "permit a variety to be defined and distinguished" and must "be capable of precise recognition and description." The word "important" was added to emphasize the fact that it was not just "any" characteristic that could be used in distinctness testing; "important" has been taken in the Revised General Introduction to the Guidelines for the Conduct of Tests for Distinctness, Homogeneity and Stability of New Varieties of Plants (see paragraph 7) to mean "important for distinguishing one variety from another."

6. Article 6(1)(a) of the 1978 Act requires that, for the purpose of protection, a candidate variety must be distinguishable "by one or more ... characteristics" from any other variety which is a matter of common knowledge at the time of the application. The great majority of UPOV member States have used a direct translation of "one or more" in the distinctness criterion of their national laws. Three countries have interpreted "one or more" to mean "at least one" while one country has interpreted it to mean "one character that is important or several characters the combination of which is important." The language of Article 6(1)(a) would seem to permit both interpretations.

7. The existing practice of UPOV is based upon the language of the 1978 Act as amplified by the said Revised General Introduction to the Guidelines. The latter states that the Tables of Characteristics included in Test Guidelines "are not exhaustive but may be enlarged by further characteristics if this proves to be useful" (paragraph 7). It further states, after distinguishing between qualitative and quantitative characteristics, that "'quantitative characteristics' are those which are measurable on a one-dimensional scale and show continuous variation from one extreme to the other" (paragraph 11). Paragraph 12 specifies that "characteristics which are assessed separately may subsequently be combined, for example, the length/width ratio. Combined characteristics have to be treated in the same way as other characteristics" (emphasis added). Paragraph 22 states that "when distinctness depends on measured characteristics, the difference has to be considered clear if it occurs with one per cent probability of an error ..." Paragraph 26 provides that "cases can arise in which for two varieties differences may be observed in several separately assessed characteristics, and if combination of such data is used to establish distinctness, it should be ensured that the degree of reliability is comparable to that provided in paragraphs 22 to 25" (emphasis added).

### The Nature of the Data that can be Combined

8. Multivariate analysis involves the statistical analysis of data gathered in relation to two or several "characteristics" which may be suitably combined. This form of analysis is able to confirm or increase statistically the significance of known differences when data relating to them is combined. Two typical examples can be distinguished:

(i) The combination gives rise to a value which amounts to a new characteristic or which correlates with such a characteristic. A typical example is the product of the length and the breadth of a surface. The technical experts would seem to be in agreement that multivariate analysis is an acceptable tool in this instance.

(ii) The combination, apart from its statistical conclusion, does not correspond to something which clearly amounts to a new characteristic. Opinions of technical experts differ on the admissibility of the method in this case.

### The Objectivity of the Decision to use Multivariate Analysis

9. In practice, multivariate analysis can be used to find a statistically significant ("clear") difference between two varieties (a variety which is the subject of an application for protection and a pre-existing variety) when:

(i) the examiner makes a finding of distinctness on the basis of a difference in a quantitative characteristic which has been observed visually--which does not lend itself readily to statistical analysis--and is able to support his conclusion by such an analysis after reducing the characteristic into elements which are individually measurable (for example, in the case of a shape, the relationship between length and breadth) and then using multivariate analysis in relation to the measured elements;

(ii) the examiner has not found a clear difference for individual "characteristics" or elements of characteristics but considers that the variety which is the subject of the application for protection is different and ought to be protected. A number of statistically unclear differences in individual characteristics may in this case be combined to provide a statistically clear difference.

The technical experts would seem to be in agreement that multivariate analysis is an acceptable tool in the first case (where it is not decisive for the final decision), but would seem to disagree in the second case. Here, multivariate analysis is totally decisive for the final decision and has a direct bearing on the notion of minimum distances between varieties.

10. Legal arguments are sometimes invoked in the technical discussions. The Office of the Union considers that the legal situation would seem to be as set out below.

### The Legal Situation

#### Under the 1978 Act

11. The present distinctness rule (Article 6(1)(a) of the 1978 Act) requires that the variety which is the subject of an application for protection be

clearly distinguishable by one or more important characteristics, which characteristics permit the variety to be defined and distinguished and must be capable of precise recognition and description. The words "one or more" would seem to be susceptible to interpretation as "at least one" or "one or several." "Characteristic" is not itself defined. It may be constituted by individually measured elements which can be combined using multivariate analysis to give a value which is regarded as a "characteristic" on the basis envisaged in the General Introduction to the Guidelines, which expressly leave much to expert judgment subject only to the achievement of a "comparable" degree of reliability to that required for other characteristics. The nature of the individual elements which can be combined to constitute a statistically based characteristic and the question whether such elements do or do not constitute acceptable characteristics when taken individually would seem to be questions for expert judgment in relation to the requirements that such elements "permit a variety to be defined and distinguished" and "are capable of precise recognition and description."

#### Under the 1991 Act

12. Article 7 of the 1991 Act requires only clear distinguishability. The abandonment of the words "by one or more important characteristics" and "the characteristics which permit a variety to be defined and distinguished must be capable of precise recognition and description" which are contained in the 1978 Act was not discussed in the Diplomatic Conference and would not seem to be intended to call for any change in the existing practice of UPOV.

13. On the other hand, paragraph (vi) of Article 1 provides that "variety" means "a plant grouping ... which ... can be ... distinguished from any other plant grouping by the expression of at least one ... characteristic[s]." The word "characteristic" is not defined. A characteristic could in an appropriate case be constituted by a single inherited descriptive feature or could be the result of the combination of data relating to more than one such feature.

14. The definition of variety in the 1991 Act sets a lower requirement for distinctness than that required for protection under the Act. The definition specifies that the conditions for the grant of a breeder's right need not be fully met by a plant grouping in order that it constitute a "variety" and thus suggests, *inter alia*, that a "clear" distinction is not necessary. If multivariate analysis can be used for the purposes of demonstrating the mere existence of a variety for the purpose of the definition of variety, it should be equally usable in a disciplined objective fashion by an expert to demonstrate that two varieties are "clearly distinguishable."

#### Conclusion

15. The Office of the Union suggests that the question whether one or more collections of data concerning a variety can appropriately be combined and analyzed by multivariate analysis is a question to be resolved by experts who must decide whether the outcome of the multivariate analysis constitutes a supplementary characteristic "which permits" the "variety to be defined and distinguished" and which is "capable of precise recognition and description."

[Annex follows]

## ANNEX

## EXTRACTS FROM DOCUMENTS TC/27/3 AND TC/27/9

1. Extracts from Document TC/27/3 (Matters Arising from the 1991 Sessions of the Technical Working Parties to be Dealt with by the Technical Committee)

"3. At Least One Characteristic. The TWC had a general discussion on the meaning of the words "at least one characteristic" in the definition of the term "variety." The words would again open up the question of the use of multivariate analysis for distinction purposes. Several experts expressed their view that multivariate analysis of all characteristics might lead to something that could not be considered a predefined characteristic and might not be meaningful. A selection of certain characteristics, such as shape, which would be separated into several measured characteristics to be evaluated by multivariate analysis, would make sense on the other hand. The TWC agreed that it should be left to the crop expert to decide. If the expert used multivariate analysis to support differences determined visually (e.g. bulb form, leaf shape, etc.), that analysis would be a good tool. It further agreed that Dr. Weatherup (United Kingdom), in cooperation with Mr. Van der Heijden (Netherlands), should draw up by the end of the year a paper that went into the question in detail and gave some examples of meaningful characteristics.

"4. The TWO discussed at length whether the words "distinguished ... by ... at least one ... characteristic" included the application of multivariate analysis. The majority took the position that it was impossible to exclude that method from distinctness testing as the testing authorities would otherwise lose touch with reality. The application to predefined or derived characteristics like shape, observed through measurement of length and width, was not expected to create problems. The application to all observed characteristics, however, would require further study. The question was raised whether small differences in a number of characteristics could be sufficient to establish distinctness in the absence of a large difference in one single characteristic. The TWO agreed to continue the discussion on the basis of a document, to be prepared by experts from the United Kingdom (Mrs. Campbell), on varieties of chrysanthemum which would have been difficult to distinguish without multivariate analysis and of another document to be prepared by experts from Germany.

"(see TWC/9/12 Prov., paragraph 6, TWO/24/12 Prov., paragraph 13)"

2. Extract from Document TC/27/9 (Report)

"17. At Least One Characteristic. The Committee discussed at length whether, in view of the words "at least one characteristic" in the definition of "variety," the application of the multi-variate analysis was admissible in the testing for distinctness. It agreed that the application of a complex characteristic--such as shape, for example--to different parameters was in conformity with the wording of the definition of variety, while its application to all characteristics, whether related to each other or not, was not in conformity. The question of its application to a few non-related characteristics could not be solved and would have to be rediscussed after having heard the opinion of the Administrative and Legal Committee."

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