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DRAFT  
REVISED WORKING DOCUMENT FOR A NEW  
GENERAL INTRODUCTION TO THE ASSESSMENT OF DISTINCTNESS,  
UNIFORMITY AND STABILITY IN NEW VARIETIES OF PLANTS

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## ANNEX

## 1. INTRODUCTION

1. This general introduction contains the basic UPOV principles for the testing of plant varieties with a view to achieving standardized variety descriptions and establishing distinctness, uniformity and stability (DUS) according to a harmonized method in accordance with the Act of 1991 of the International Convention for the Protection of new Varieties of Plants (hereafter referred to as the “Convention”). It gives guidance on how those principles should be applied in DUS testing. Associated documents (listed in the Annex with their TGP/ codes.) containing more detailed aspects are referred to in the relevant sections. In particular, document TGP/1 reproduces the text of this general introduction but enlarges on it with explanations on certain paragraphs so that they may be more readily understood.

2. The Technical Committee established by the UPOV Council is the supervisory body of the UPOV Technical Working Parties. It has the authority to take decisions on technical matters and so has thus developed and adopted the present basic principles for testing.

### Explanation

*This document is document TGP/1. The general introduction does not contain any explanations.*

3. This document uses a number of technical terms which are defined and explained in document TGP/16.

4. This general introduction and the documents associated with it are kept under review by the Technical Committee of UPOV and are subject to periodical updating. Member States will automatically receive updates direct from UPOV, but details of the current versions of all documents are available on TGP/00, which readers are advised to consult if they are in doubt as to the validity of the documents in their possession.

### Explanation

*(i) While the former General Introduction was an introduction to the actual UPOV Test Guidelines, this draft is an introduction to the assessment of DUS and the testing of plant varieties in general, and so covers also those species for which Test Guidelines have not yet been adopted by UPOV. Its purpose is to give guidance to member States on how to set up testing facilities for those species or explain to applicants how to do their own testing.*

*(ii) The document also places more emphasis on the fact that the UPOV Test Guidelines have a double purpose: on the one hand they are guidelines for the preparation of harmonized, standardized variety descriptions, which make for easier exchange of information among member State. On the other hand, they represent the first stage in the assessment of the distinctness, uniformity and stability of varieties, to be followed by a second stage, consisting of the basic rules on the treatment of the data collected, which are laid down in this document and in the collection of TGP documents complementing it.*

5. The International Convention for the Protection of New Varieties of Plants stipulates that protection is only granted after examination of the variety. The prescribed examination should be adapted to the special characteristics of each genus or species, and should by necessity take account of any special growing requirements.

Explanation

*(i) Before the UPOV system came into being, many countries had their own rules for the examination of varieties. The technical criteria for the grant of rights differed from one country to another, and even the variety concept itself was not seen in the same light in all countries. Technical standards and testing procedures depended largely on the expertise of the official concerned. This lack of harmony caused problems, especially when a breeder sought protection for his variety in two or more countries. A variety that was considered distinct, uniform and stable in one country might be rejected in another, and vice versa. It was realized that harmonization was urgently required, and this responsibility was taken on by UPOV with the adoption in 1961 of the International Convention for the Protection of New Varieties of Plants, which has since been revised several times, most recently in 1991.*

*(ii) UPOV decided to employ the term “variety” in English, even though the word “cultivar” is also widely used.*

6. Protection will only be granted to a variety if it has been proved to be clearly distinguishable from any variety whose existence is a matter of common knowledge (Convention - Article 7) and sufficiently uniform (Convention - Article 8) and stable (Convention - Article 9) in its relevant characteristics. The testing system for assessing distinctness, uniformity and stability is generally referred to as DUS testing. It is a technical examination performed according to standardized procedures and basic principles laid down by UPOV in the Convention. It is based on a comparative growing test, which involves sampling, observation and measurement or both, and the processing and evaluation of the results or other data. Tests are conducted either by the official national government authorities themselves or on their behalf by specialized bodies or, subject to varying degrees of control by national government authorities, by the applicants or breeders themselves. In order that DUS criteria may be interpreted according to a common reference, UPOV has set up some basic principles which are summarized in this document.

7. With these basic principles and the individual Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability, or UPOV “Test Guidelines” in short, prepared for each taxon (genus, species, group of species or part of a species), UPOV member States have a common basis on which to establish variety descriptions in standardized form and collect information for the assessment varieties for distinctness, uniformity and stability, all of which facilitates international cooperation in examination.

Explanation

*These basic principles and the Test Guidelines also help applicants to secure the grant of rights by giving them information on the characteristics to be studied and*

*on the questions that they will be asked about their varieties at the time of application for protection.*

8. It is important that the Test Guidelines should remain a reliable basis for producing variety descriptions that can be used to determine which varieties need to be included in the growing trials to establish distinctness.
9. The Test Guidelines are only the first stage in the assessment of DUS, as they are silent on the size of the difference that determines distinctness; it is after all possible for two varieties to have identical descriptions and yet be sufficiently distinguishable to constitute different protectable varieties, or conversely for two candidates to have different descriptions and yet be insufficiently distinguishable to be classified as separate protectable varieties. The Test Guidelines therefore have to be used in combination with the basic principles in the present document, which afford guidance in the interpretation of the observations required for the DUS assessment.
10. The basic principles and the individual Test Guidelines prepared for each genus or species or a further subdivision, should not be considered an absolutely rigid system. There may be cases or situations which are not covered within the present framework, and these should be dealt with in a manner which is in keeping with these principles.
11. The list of individual Test Guidelines adopted by UPOV can be found in document TGP/2. A CD-ROM (TG-ROM) is issued by UPOV comprising all adopted Test Guidelines in electronic form.

## 2. RELEVANT ARTICLES OF THE UPOV CONVENTION

### 2.1 Definition of a Plant Variety

12. Article 1 of the UPOV Convention gives a broad definition of the plant variety concept, including varieties that do not necessarily qualify for the grant of a breeder's right.
13. Article 1(vi) 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;
- considered as a unit with regard to its suitability for being propagated unchanged.”

### Explanation

*These requirements indicate already that there may be groupings of plants which do not fulfill those requirements and which therefore cannot be considered to form a plant variety.*

14. Accepting the above definition of variety, there are specific technical criteria for the testing of distinctness, uniformity and stability that determine a variety's eligibility for protection under the UPOV Convention that have been developed to meet the requirements of Chapter III (Articles 5 to 9) of the UPOV Convention.

## 2.2 Conditions for Protection

15. Article 5 reads as follows:

“(1) [*Criteria to be satisfied*] The breeder's right shall be granted where the variety is

- (i) new,
- (ii) distinct,
- (iii) uniform and
- (iv) stable.

“(2) [*Other conditions*] The grant of the breeder's right shall not be subject to any further or different conditions, provided that the variety is designated by a denomination in accordance with the provisions of Article 20, that the applicant complies with the formalities provided for by the law of the Contracting Party with whose authority the application has been filed and that he pays the required fees.”

16. The novelty requirement serves to ensure that the variety has not already been exploited commercially. It therefore does not call for a technical assessment, but for a legal assessment. The distinctness, uniformity and stability requirements do require technical assessment of the variety; they are further defined in Articles 7 to 9 of the UPOV Convention.

17. The UPOV Convention introduces the concept of the “essentially derived varieties” (EDV) in Article 14 (5). However, the DUS testing system is not required to determine whether a variety is an EDV.

## 2.3 Distinctness

18. Article 7 reads as follows:

“The variety shall be deemed to be distinct if it is clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application. In particular, the filing of an application for the granting of a breeder's right or for the entering of another variety in an official



register of varieties, in any country, shall be deemed to render that other variety a matter of common knowledge from the date of the application, provided that the application leads to the granting of a breeder's right or to the entering of the said other variety in the official register of varieties, as the case may be."

19. For further details on distinctness, see Chapter 6.

20. More information on common knowledge will be found in document TGP/3.

## 2.4 Uniformity

21. Article 8 reads as follows:

"The variety shall be deemed to be uniform if, subject to the variation that may be expected from the particular features of its propagation, it is sufficiently uniform in its relevant characteristics."

22. For further details on uniformity, see Chapter 7.

## 2.5 Stability

23. Article 9 reads as follows:

"The variety shall be deemed to be stable if its relevant characteristics remain unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle."

24. For further details on stability, see Chapter 8.

## 3. BASIS FOR THE ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

### 3.1 UPOV Principles for DUS Assessment

25. The following basic principles should govern all technical tests devised for the assessment of distinctness, uniformity and stability to which applications for plant variety protection are subjected, regardless of whether or not UPOV has established individual Test Guidelines.

26. Where UPOV has established separate Test Guidelines, they and the basic principles, especially those set forth in Chapter 10 below, should be observed in the testing.

27. Where UPOV has not established individual Test Guidelines for a given species, the same principles apply, especially those for the selection of suitable characteristics. More details are also given in Chapter 11.

28. A State that receives an application for a variety of a species on which it has not previously performed tests should follow the steps listed below:

- (a) it should verify whether UPOV Test Guidelines have been established; if not,
- (b) it should use document TGP/5 to search for States that have granted protection for varieties of that species; if not,
- (c) it should preferably discuss with offices of neighboring countries, countries in the same region or countries with comparable climates whether Test Guidelines could be established between them for that species; if not,
- (d) it should draw up its own Test Guidelines and inform the Office of UPOV, so that document TGP/5 may be updated.

29. The only binding obligations on UPOV member States are those contained in the text of the UPOV Convention itself. UPOV can moreover only make recommendations on that text or offer guidance in its interpretation. These basic principles, as incorporated in the present document and in the individual UPOV Test Guidelines, are intended to give guidance for the interpretation of Articles 7, 8 and 9 of the UPOV Convention. Their purpose is to ensure that the Articles in question are applied as consistently as possible and that decisions are taken in a similar way and lead to the same or similar results.

Explanation

(i) *How far the UPOV Test Guidelines are reflected in national practice or national law will depend on the situation in each member State, on its national legislation and on the status that they are given in that legislation. In some States they are no more than mere guidelines, to be either heeded or ignored at will, while in others they have a certain force. In most States it is up to the authority responsible for the granting of rights or for the testing of varieties, or the expert responsible for the testing of a given species, to determine how far the UPOV Test Guidelines are actually applied in national tests.*

(ii) *In practice the UPOV Test Guidelines are taken over in many member States without any change at all (no deletion of characteristics, no addition). In other member States all characteristics with an asterisk and a selection of those without are taken over. As they are not exhaustive, further characteristics may be added. Generally speaking, the UPOV Test Guidelines are broadly accepted and observed on account of the broad participation in their preparation and the continuous updating, which also vouches for their quality. Use of the UPOV Test Guidelines is independent of whether a given State has a system of official growing tests done by government testing authorities or a breeder testing system where the applicant is responsible for the growing test and the submission of a test report.*

(iii) *Although the UPOV Test Guidelines are only guidelines, they nevertheless play a certain role in court proceedings for infringement, as they represent an*

*internationally agreed official opinion based on the technical knowledge of experts from UPOV member States responsible for plant variety protection and for the testing of the species concerned.*

### 3.2 Characteristics

30. The word “characteristics”, used in the UPOV Convention for the definition of the variety concept and in the two articles on uniformity and stability, is the basis for distinctness. The three requirements of :

- distinctness,
- uniformity and
- stability

are therefore assessed in UPOV member States on the basis of characteristics and their expressions.

### 3.3 Artificial Factors, Secondary Organisms, Chemicals

31. The expressions of a characteristic or several characteristics of a variety may be affected by foreign factors such as pests and disease, growth retardants, past effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc. Depending on the species concerned, the testing authority has to ensure either that the varieties under test are all free of a given factor, organism or chemical or that all varieties under test, including all comparable varieties, contain those parts so that the results may be compared with each other. Therefore, many individual Test Guidelines require virus-free material, material not obtained from tissue culture or material of a specific age after grafting. Alternatively the submitted plant material sent in is only used as parent material from which vegetative material is taken by the national office in order to provide a satisfactory assessment.

### 3.4 Comparison with Similar Varieties

32. To test whether a candidate variety meets the DUS criteria, it is compared with varieties that are a matter of common knowledge. To satisfy the requirement of distinctness, a candidate variety must be clearly distinguishable from all other varieties whose existence is a matter of common knowledge. The varieties are called the varieties of common knowledge. Varieties of common knowledge for UPOV purposes are explained in detail in document TGP/3.

No comparison will be made against varieties where propagating material is not available. However, a comparison is not required because the variety is not considered to be a variety of common knowledge.

33. A systematic individual comparison may not be required against those varieties of common knowledge which are within a group known to have specific expressions of characteristics reliably ensuring that the variety will be sufficiently distinct from the candidate

variety. These characteristics or the expressions in these characteristics can therefore be used to reduce the number of varieties of common knowledge against which a systematic individual comparison is required.

Explanation

*Examples of characteristics for the reduction of varieties of common knowledge could be that*

*(i) the varieties come from a different growing environment (e.g. adaptation to different day-length, greenhouse versus open air),*

*(ii) the varieties have different end uses (starch potato versus potato for human consumption).*

34. Where varieties can be further distinguished in a reliable way from a candidate by comparing written evidence, it is not necessary to include these in a growing trial with the respective candidate variety. However, where there is no possibility to clearly distinguish them from the candidate variety, the varieties should be grown together with the candidate variety.

35. A Technical Questionnaire, completed by the applicant and submitted with the application, specifies characteristics of importance for identifying the varieties most similar to the candidate. Where necessary those varieties are grown and directly compared with the candidate.

36. Common knowledge for UPOV purposes is explained in detail in document TGP/3.

37. The varieties to be taken into account for comparison should not be limited to national borders. An application for protection or for entry in an official register anywhere in the world makes the variety a matter of common knowledge, provided that the application leads to the granting of a breeder's right or the entering of the said other variety in the official register of varieties, as the case may be.

Explanation

*(i) With the entry into force of the 1991 Act of the UPOV Convention, more and more States are offering protection to the whole plant kingdom and will increasingly have to rely on the applicant or on botanical gardens, gene banks, specific institutes or regional groups to maintain part of their reference collections.*

*(ii) In order to keep up with the increasing number of varieties worldwide, UPOV collects and publishes information on varieties on the UPOV-ROM Plant Variety Database, a central computerized database which at present is periodically updated.*

38. For the management of reference collections and the grouping of varieties in growing trials it is important to identify varieties on the basis of available descriptions in order to select

those varieties which require direct comparison of plant material. Considering all existing varieties of a species at a worldwide level may become increasingly necessary as the number of varieties increase and the markets become more global. Characteristics with clear-cut states of expression and which are least influenced by the environment are used in the first instance to identify those varieties which require closer comparison

39. Guidance for the management of reference collections is given in detail in document TGP/4.

Explanation

*The term “Reference Collection” is often used to describe the collection of varieties which are to be “compared” against a candidate variety. However, there are different views on the scope of varieties which fall within this collection. In some cases, (predominantly the agricultural crops) the reference collection is considered to include all varieties except those for which propagating material is not available or which are within a group known to have specific expressions of characteristics reliably ensuring that the variety will be sufficiently distinct from the candidate variety. However, at the other end of the range (particularly the ornamental species), the reference collection is considered to comprise only of those varieties against which a **growing** comparison is required. For this reason the General Introduction avoids the use of this term in a general way.*

3.5 Representative Plant Material

40. The material to be submitted for the assessment of DUS must be representative of the candidate variety as it would be marketed. For seed propagated varieties and especially for cross-fertilized varieties that means that the material tested should be of the same generation level as that later on placed on the market. If necessary, for certain species the national authority may make exceptions to that rule.

4. COOPERATION IN TESTING

41. Cooperation with other member States in DUS assessment reduces the overall time, expense and expertise involved in the DUS tests and maintaining reference collections for each genus or species in which varieties are tested. For details of current international cooperation arrangements see document TGP/5.

Explanation

*The task of those national authorities that choose to accept full responsibility for the technical examination, including their own growing tests, is becoming increasingly demanding, especially since their lists of plant species eligible for protection are continually being extended. These lists have been abandoned under the 1991 Act of the Convention, and varieties of all botanical taxa must be eligible for protection within a period of five or ten years after it comes into effect in a particular State. It is unthinkable for official testing stations to have to*

*provide testing facilities with growing tests for all taxa in which applications may be filed, and member States are increasingly considering the adoption of systems of cooperation with breeders and applicants or with the competent authorities of other States.*

#### 4.1 International Cooperation Between Testing Authorities

42. The ultimate form of international cooperation is a “centralized” testing system where the entire assessment is carried out by one authority on behalf of other member States, regardless of the variety concerned or the applicant. This could be for a specific region, for example, or in the case of glasshouse-tested plants, for most if not all member States.

##### Explanation

(i) *International cooperation often begins as a mere exchange of variety data which may then develop in a more formal bilateral testing agreement. UPOV has prepared a Model Administrative Agreement for International Cooperation in the Testing of Varieties (Section 19 of the UPOV Collection of Important Documents) to facilitate the conclusion of bilateral variety testing agreements. UPOV has also drawn up a model UPOV Report on Technical Examination and UPOV Variety Description (Section 23 of the UPOV Collection).*

(ii) *Chrysanthemums, for example, are tested in the United Kingdom on behalf of most other member States. South Africa has offered reciprocal facilities for the testing of varieties for some of its indigenous ornamental genera. A great advantage of central testing is that it provides a single basis for decisions on distinctness, uniformity and stability for all varieties of a given genus or species.*

(iii) *Document TGP/5, which gives further information on cooperation in examination, also contains the text drawn up for each ordinary Council session.*

(iv) *Document TGP/5 also contains the List of Species in Which Practical Technical Knowledge has Been Acquired or for Which National Guidelines Have Been Established, which is updated yearly and which gives technical experts useful information on whom to contact in other member States with respect to a given species.*

(v) *A list of e-mail addresses of technical experts in UPOV member States is available on the Internet site <http://www.bioss.sari.ac.uk/links/upov/upemail.html>.*

#### 4.2 Cooperation with Breeders and Applicants

43. In most countries, variety testing is administered by an official authority, although the breeders participate in the growing tests to varying degrees.

44. Close cooperation with breeders has always been promoted by UPOV, even in the case of member States with a strict system of government-conducted testing. Some member States have a system whereby breeders or applicants are asked to perform the whole test on the basis of prescribed national Test Guidelines or Technical Questionnaires. They make the observations and produce a full test report according to strict technical procedures and the high standards required by UPOV. The decision on DUS is based entirely on the test results supplied by the breeder or applicant, verified by the national authority.

45. UPOV has drawn up a list of conditions for the examination of a variety on the basis of trials carried out by or on behalf of applicants or breeders. Details of the conditions are given in document TGP/6.

46. Document TGP/6 also gives useful information on the different possibilities of applicant involvement in the growing tests.

#### Explanation

*(i) Cooperation is particularly useful for species in which breeding activity is limited to a few breeders who are highly specialized in their particular field.*

*(ii) In minor crops with few varieties, where the applicant has had a satisfactory trial with the full range of reference varieties concerned, officials have been able to carry out the observations on the breeder's premises.*

*(iii) When an unofficial testing authority or the applicant or breeder does the growing tests, the establishment of a variety database under the responsibility of the national authority should be envisaged in order to secure the list of reference varieties used in a particular examination.*

## 5. DEFINITION AND OBSERVATION OF CHARACTERISTICS USED IN THE TESTING OF VARIETIES

### 5.1 Selection of Characteristics

47. Where UPOV Test Guidelines are in place, the characteristics listed are those considered important for the description of varieties and therefore also for the assessment of DUS. All characteristics must be the expression resulting from a given genotype or combination of genotypes and should meet the basic requirements set out below.

48. The basic requirements that a characteristic has to fulfill before it can be included in the UPOV Test Guidelines or used for DUS testing are the following:

- (a) it should be able to establish distinctness;
- (b) it should be capable of precise definition;
- (c) it should allow uniformity requirements to be fulfilled;

- (d) it should produce consistent and repeatable results for existing varieties;
- (e) it should allow a clear differentiation to be made between varieties of the species concerned;
- (f) it should be clearly defined in the method of observation and evaluation of the results;

49. For the inclusion in the Test Guidelines, further criteria are mentioned in Chapter 10.3.6 and in document TGP/7.

Explanation

*Some member States also require that the observation and evaluation of the characteristic should be possible with reasonable effort and expenditure, and that the breeder should be able to keep his variety uniform and stable in those characteristics with reasonable effort.*

50. As a general rule and with only a very small number of exceptions, the Table of Characteristics should include as many characteristics as necessary to differentiate the varieties in the reference collections of the countries contributing to the Test Guidelines.

51. The Tables of Characteristics of the individual Test Guidelines are not exhaustive and could be expanded with further characteristics if that proves to be useful and the characteristics meet the conditions set out above.

Explanation

*Some member States accept a large number of characteristics for description and for DUS testing, which means that the breeder has to make his variety uniform in all those characteristics. Other States may accept a smaller number in order to avoid an unnecessary workload for the breeder (who would have to keep this variety uniform in all of them) but with the attendant risk of it being more difficult to distinguish a candidate variety within that limited number of characteristics.*

52. Where there are no UPOV Test Guidelines in place, all characteristics used for the assessment of DUS should still meet the conditions specified above (see also Chapter 11).

53. Characteristics in the Test Guidelines are not selected on the basis of their commercial value to a variety.

Explanation

*(i) Under the UPOV system, characteristics are selected from the point of view of suitability for description and for DUS testing and not for their commercial value. The superiority or usefulness of a variety is not a criterion for protection, since the economic value of its so-called performance characteristics may change from time to time and from country to country. In certain ornamental varieties it would be almost impossible to assess value, which is a matter of personal*



*preference. It is for the users of the variety, not for the testing authorities, to decide on its superiority or usefulness.*

*(ii) Characteristics of commercial value, such as yield, are in many cases largely affected by environment. This is why, in the presence of sufficient other characteristics, UPOV tries to avoid including such characteristics in the Test Guidelines. However, if a characteristic of commercial value fulfills all the requirements mentioned above, it can also be used for the assessment of distinctness.*

54. Although some degree of fluctuation in the expression of genetically controlled differences is expected under different environmental circumstances, priority is given to those inherited characteristics that are least susceptible to environmental influences. Precisely defined testing procedures are also important in minimizing the influence of environmental conditions. In testing one has to be careful to ensure that expressions of characteristics are not affected by foreign factors such as pests and disease, growth retardants, past effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc. Depending on the species concerned, the testing authority has to ensure either that the varieties under test are all free of a given factor, organism or chemical or that all varieties under test, including all comparable varieties, contain those parts so that the results may be compared with each other. Therefore, many individual Test Guidelines require virus-free material, material not obtained from tissue culture or material of a specific age after grafting. Alternatively the submitted plant material sent in is only used as parent material from which vegetative material is taken by the national office in order to provide a satisfactory assessment.

55. Characteristics based on the response to living organisms (e.g. disease resistance characteristics), chemicals (e.g. herbicide resistance characteristics), as well as characteristics based on chemical constituents may be included, provided that they can be precisely tested and are useful for establishing distinctness. It is important for these characteristics to be well defined, for an accepted, standardized method to be established for evaluation and for that method to be clearly referred to in a well known publication or to be included in the Test Guidelines. More details can be found in document TGP/12.

56. Different levels of resistance are only acceptable as a characteristic for establishing distinctness if the states of expression can be clearly established and the test results are consistent and technically reliable on the basis of a ring test made beforehand between member States.

57. There are specific rules for the handling of bulk samples which are set out in document TGP/12.

58. A characteristic can only be used to distinguish a pair of varieties if both the candidate variety and the closest variety are sufficiently uniform in that characteristic.

## 5.2 Categorization of Characteristics

### 5.2.1 Categories of Characteristics at UPOV Level

59. The UPOV categories of characteristics for use in DUS testing are

(a) UPOV grouping characteristics: These are characteristics that can be universally used for grouping varieties. They are such that the level of expression laid down in written states of expression (as in a variety description) will be sufficient for distinctness to be reliably established without a growing comparison, and should be sufficiently independent of environmental influences in all regions for that reason. Such characteristics will normally be asterisked characteristics (see below) and should be included in the UPOV Technical Questionnaire.

#### Explanation

(i) *In growing tests groups are formed in such a way that normally a candidate variety will only be compared to varieties in its group. All varieties similar to the candidate should thus be in that group while all varieties obviously sufficiently distinct will be placed in different groups. While in most agricultural species the groups are actually formed in the growing trials, in fruit tree species the groups may only appear on paper or in the head of the technical expert, as obviously trees cannot be rearranged annually according to new candidate varieties.*

(ii) *In certain cases well established and internationally accepted classification systems (e.g. the Horticultural Classification of Lilies for Registration or the Classification of Roses According to Flower Color Groups) which are not characteristics at all may also be used for grouping.*

(iii) *In cases where the Test Guidelines cover several botanical groups, the first grouping is done according to the botanical groups, which are also not characteristics.*

(iv) *In exceptional cases at national level grouping characteristics that do not have an asterisk are also used. This applies for example to characteristics that may not be observable in certain countries but are excellent grouping characteristics in countries where they can be observed.*

(b) Asterisked UPOV Test Guidelines characteristics: There are characteristics that UPOV considers important for the testing of DUS and has agreed should be used as a matter of routine by all States for all varieties in every growing cycle during which the examinations are made. They should always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible. (They are marked with an asterisk (\*) in the UPOV Test Guidelines). (See also paragraph 163).

Explanation

*The fact that a given characteristic has an asterisk does not necessarily mean that it is more important or better for DUS testing than one without an asterisk or even one not included in the UPOV Test Guidelines, but fulfilling the normal criteria for use in DUS testing. The asterisk merely establishes a common base of routine characteristics to facilitate the cross-border comparison of variety descriptions.*

(c) Standard UPOV Test Guidelines characteristics: These are characteristics that UPOV considers appropriate for the testing of DUS but have not been considered necessary by all member States (they are included in the UPOV Test Guidelines without an asterisk).

(d) Standard characteristics not included in the UPOV Test Guidelines: These characteristics are suitable for the testing of DUS but are only important in one or a few member States, or are needed only very rarely for distinctness. They are not included in the UPOV Test Guidelines.

(e) UPOV supporting evidence characteristics: These are characteristics that UPOV does not consider sufficient on their own to establish distinctness, but which may provide supporting evidence for other differences which then are used for distinctness. They are not included in the UPOV Test Guidelines, but some, if they meet certain requirements, are included in an Annex to the Test Guidelines, with a specific reservation that they do not form part of the actual Test Guidelines. For further details on the use of supporting evidence characteristics see document TGP/14.

60. For the use of hybrid formula in the assessment of DUS see document TGP/4.

5.2.2 Categories of Characteristics at National Level

61. In selecting the characteristics to be used at the national level for DUS assessment the relevant authorities will identify characteristics and use them in the following way:

- (a) grouping characteristics;
- (b) routine characteristics,
- (c) non-routine characteristics.

62. Grouping characteristics: These are characteristics that are used to organize the candidate varieties and the reference varieties in the growing test in different groups so that a variety in one group is no longer compared with a variety in any of the other groups. They are such that the written states of expression will be sufficient for distinctness to be reliably established, and should be sufficiently independent of environmental influences in all regions for that reason. These characteristics need to be included in the Technical Questionnaire to ensure that grouping can occur prior to testing.

Explanation

*See also paragraph 59(a).*

63. Routine characteristics are characteristics routinely used every year for the testing of all varieties. They should in the first instance cover all characteristics marked with an asterisk (and, thus, all UPOV grouping characteristics) in the UPOV Test Guidelines. Where there is a need to establish distinctness on a routine basis on further characteristics, these may be selected from the standard UPOV Test Guidelines characteristics or from those non-UPOV Test Guidelines characteristics which are suitable for the testing of DUS but are only important in one or few member States and therefore are not included in the UPOV Test Guidelines. It is recommended that where non-UPOV Test Guidelines characteristics are routinely used UPOV should be informed (see document TGP/5) and the characteristics should be considered for inclusion in the UPOV Test Guidelines on the occasion of the next revision.

64. Non-routine characteristics are standard UPOV Test Guidelines characteristics or standard characteristics not included in the UPOV Test Guidelines which means that these characteristics are suitable for the testing of DUS but are only important in one or a few member States, or are needed only very rarely for distinctness and are therefore not included in the UPOV Test Guidelines. They are only used for DUS where routine characteristics fail to determine distinctness.

65. Non-routine characteristics should fulfill all the basic requirements that any characteristic has to fulfill before it can be used for DUS testing (see Chapter 5.1).

### 5.2.3 Categories of Characteristics

66. To enable varieties to be tested and a variety description to be established, characteristics in the UPOV Test Guidelines are subdivided into their different states of expression, or “states” for short, and the wording of each state is followed by a Note. To clarify the states of expression of a characteristic, example varieties are mentioned in the UPOV Test Guidelines. The category of characteristic used to assess DUS are set out below. For detailed information see document TGP/7.

#### 5.2.3.1 *Truly Qualitative Characteristics*

67. “Truly qualitative characteristics” are those that show discrete discontinuous states with no arbitrary limit on their number (for instance, number of whorls: one (1), two (2), three (3)). These are qualitative characteristics with clear-cut (discrete) discontinuous states of expression, each state being self-explanatory and independently meaningful. Each state is clearly different from the others and as a rule the characteristics are not influenced by environment.

#### 5.2.3.2 *Quantitative Characteristics*

68. “Quantitative characteristics” are those that can be recorded on a one-dimensional scale and show continuous variation from one extreme to the other. They are divided into a number of states of expression for the purpose of description. The division is made only for description and not for distinctness purposes. The Test Guidelines do not specify the

difference needed for distinctness. The states of expression should, however, be meaningful for DUS assessment.

### 5.2.3.3 *Pseudo-qualitative Characteristics*

69. “Pseudo-qualitative characteristics” are characteristics that do not fit the definition of truly qualitative characteristics, but are treated as qualitative when it is more reasonable to disregard continuous variation for practical purposes and the states created are meaningful and sufficiently different from each other (e.g. shape: ovate (1), elliptic (2), round (3), obovate (4), or expression: absent or very weakly expressed (1), weakly expressed (2), strongly expressed (3)).

70. For more detailed information see document TGP/7.

### 5.3 Combined Characteristics

71. Characteristics that are assessed separately, but have a clear biological meaning, may subsequently be combined, for example the ratio of length to width. Combined characteristics are treated in the same way as other characteristics.

72. A combined characteristic is to be understood as a combination of two characteristics (e.g. ratio of length to width) or in some cases three. Combined characteristics are not determined by the application of methods like the multivariate analysis, which would merely give a global synthetic measure of distance from a set of characteristics, without identifying an actual characteristic. Multivariate analysis will be defined in document TGP/12.

### 5.4 Observation of Characteristics

73. In order that comparable and reliable results may be obtained in the various member States, as far as possible and considered useful, recommendations are given for exact plot size, sample size, number of replications and duration of tests, or at least minimum recommendations are made.

#### Explanation

*It is recommended that, whenever possible, there be agreement on a fixed sample size in order that comparable results may be obtained, rather than on minimum sizes which may be enlarged if the national authority sees fit.*

74. Qualitative characteristics are usually assessed visually, while quantitative characteristics are usually measured. However, a visual assessment or such other sensory observations as may be applicable (such as taste or smell) may under certain conditions be sufficient, especially where measurement is impracticable or can only be made with considerable effort.

## 5.5 Environmental Influence on Characteristics

75. Quantitative characteristics, and in certain special circumstances also qualitative characteristics, may be subject to environmental influences which may modify the expression of genetically controlled differences. Characteristics which are least influenced by environment are preferred. If, in certain cases, the expression of a characteristic has been influenced more than usual by environmental factors, it should not be used for the assessment of DUS.

76. When a fixed scale is used throughout the trials and over a period of years, the influence of environment on the varieties is reflected in the figures.

## 5.6 Non-traditional Non-morphological Characteristics and New Methods of Variety Testing

77. The classical methods of DUS testing are based almost exclusively on morphological and physiological characteristics. In the course of time, however, technology and procedures have been evolving that have broadened the range of characteristics available and offered the potential for more rapid assessment. In view of the increasing number of varieties that need to be distinguished, there has also been an increase in the need for methods that are less influenced by the environment and may thus be more objective. The use of these new approaches is set out in document TGP/12.

### Explanation

(i) *Document TGP/12 contains a part on Identification Methods Based on Molecular Markers and explains briefly the most important DNA profiling methods at present under study.*

(ii) *Various techniques in image analysis, electrophoresis and molecular and biochemical techniques are already being used by breeders for rapid identification of varieties. UPOV is investigating the possibility of incorporating them in the DUS testing system, either*

*(a) in combination with traditional morphological and physiological characteristics as a means of selecting the most similar varieties which have to be grown next to the candidate variety for close comparison, or*

*(b) as supporting evidence in addition to other differences (in morphological or physiological characteristics) in DUS tests.*

(iii) *The UPOV Working Group on Biochemical and Molecular Techniques and DNA Profiling in Particular ("BMT") is responsible for harmonizing these developments in the various member States in accordance with the UPOV Convention.*

## 5.7 Introduction of New Characteristics

78. 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 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).

## 6. TESTING DISTINCTNESS

### 6.1 General

80. According to Article 7 of the Convention, the variety must be clearly distinguishable from any other variety whose existence is a matter of common knowledge on the filing of the application.

81. The candidate variety has to be compared with those varieties whose existence is a matter of common knowledge. For more detailed information on common knowledge see Chapter 3.4 and document TGP/3.

#### Explanation

*In the Acts preceding the 1991 Act of the UPOV Convention it was stated that the variety had to be clearly distinguishable “by one or more important characteristics.” The word “characteristic” has been retained in the definition of the variety and in the requirements of uniformity and stability, but it no longer features in the requirement for distinctness and even the word “important” has been removed.*

82. It is not permitted to use only a different degree of uniformity for determining distinctness. For the decision on distinctness, only those characteristics in which both the candidate variety as well as the similar varieties are uniform can be used. If in a pair-wise comparison in one of the two varieties the expression of the characteristic is not uniform, the characteristic has to be rejected for distinctness purposes.

#### Explanation

*Before a variety, in a pair-wise comparison, can be declared distinct on the basis of one single characteristic, it has to be ensured that both varieties in the pair are uniform in that characteristic.*

83. For characteristics observed in bulk samples specific rules are laid down in document TGP/12.

## 6.2 Strength of Protection

### 6.2.1 Determining Distinctness

84. In order to sustain a reliable plant breeders' rights system in which each protected variety is clearly distinct, DUS testing has to be reliable and repeatable. The minimum degree of distinctness from the nearest (most similar) variety for the purpose of protection should be large enough to provide sufficient protection. Differences between varieties should not become so small that there is insufficient protection to sustain or encourage the development of new varieties. A larger distance in most cases leads to broader protection, but if it is too large it becomes a disincentive and affords less opportunity for variety development.

### 6.2.2 Essentially Derived Varieties

85. The new criterion of essential derivation as specified in Article 14(5) of the Convention has reinforced the protection of breeders by providing an opportunity for protection to extend beyond the minimum distance. The purpose of DUS assessment is, however, not to decide on whether or not a variety is essentially derived.

### 6.2.3 Variety Forms

86. The introduction of new DUS characteristics cannot be used to select a form from an existing variety as a means of producing a new variety (see also Chapter 5.7).

## 6.3 The Use of Characteristics for Assessing Distinctness

87. Two varieties have to be considered distinct if the difference

- has been established in at least one testing place,
- is consistent and
- is clear.

88. The assessment of distinctness should normally be conducted in one testing place. If any characteristic of the candidate variety cannot be seen in that place, the variety may be tested in an additional place.

### Explanation

*Several member States provide for a second testing place from the outset as a safeguard against extreme weather conditions or other hazards that might make it impossible to collect information on the candidate variety in the given year and thus prolong the test for another year, especially for those species grown in the open.*

89. In order to obtain reliable results for distinctness, the tests have to be consistent. The individual Test Guidelines specify whether several independent growing cycles are required to



show sufficient consistency (e.g. several years or in certain cases several independent locations or different independent environments), or whether for certain species the growing test could be made in one growing cycle.

Explanation

*For most field crops, vegetables and fruit varieties the UPOV Test Guidelines specify two independent growing cycles or even more. For ornamental varieties for most species one growing cycle is sufficient, especially if the plants are vegetatively reproduced and grown in a glasshouse under controlled, standardized conditions, as by repeated vegetative propagation they already proved to be stable.*

90. Whether a difference between two varieties is clear depends on many factors, and primarily on the type of characteristic used to establish distinctness, namely whether it is a truly qualitative characteristic, a quantitative characteristic or a pseudo-qualitative characteristic (e.g. a quantitative characteristic presented for certain reasons in a qualitative way in the UPOV Test Guidelines (see Chapter 5.2.3)).

6.3.1 Truly Qualitative Characteristics

91. In the case of truly qualitative characteristics the difference between two varieties is to be considered clear if the characteristics show expressions that fall into two different states in the Test Guidelines (see also Chapter 5.2.3.1).

Explanation

*In truly qualitative characteristics each state is clearly separated from the other without any transition; the minimum distance is therefore always one expression. There are in fact very few truly qualitative characteristics, however.*

6.3.2 Quantitative Characteristics

92. Quantitative characteristics can be either visually observed or measured (see also Chapter 5.2.3.2).

6.3.3 Pseudo-qualitative Characteristics

93. In the case of characteristics treated as qualitative but which are not genuinely qualitative, a possible fluctuation has to be allowed for when establishing distinctness, so a different state in the Test Guidelines may not be sufficient to establish distinctness (see also Chapter 5.2.3.3).

#### 6.3.4 Other Possibilities for Assessing Distinctness

94. The above method of DUS assessment is based on individual characteristics, but the UPOV Convention may allow for other possibilities as well. These include:

- (a) the combination of biologically linked characteristics (e.g. length and width) to obtain a clear difference, as long as this is definable and reproducible (see also Chapter 5.3);
- (b) the general combination of characteristics (see also Chapter 5.3; any UPOV approved methods will be set out in document TGP/12);
- (c) supporting evidence characteristics (see also Chapter 5.2.1);
- (d) hybrid formula (see document TGP/4).

95. Different degrees of uniformity are not accepted as a characteristic for distinctness.

96. Different levels of expression that can be assessed in bulk samples are considered in document TGP/12.

#### 6.4 Interpretation of Observations for the Assessment of Distinctness without the Application of Statistical Methods

97. In many species in which varieties are vegetatively propagated, assessments on distinctness are usually made by visual observation and in principle no statistical methods are applied. If in exceptional cases the application of statistics is needed to assess distinctness, statistical methods can be found in document TGP/9.

98. For more details on the assessment of distinctness without the application of statistical methods see document TGP/9.

#### 6.5 Interpretation of Observations for the Assessment of Distinctness with the Application of Statistical Methods

##### 6.5.1 General

99. For measured characteristics as well as for visually assessed characteristics statistical methods can be applied. Appropriate methods have to be chosen for the interpretation of observations. The data structure and the type of scale from a statistical point of view (nominal, ordinal, interval or ratio) is decisive for the choice of appropriate methods. The data structure depends on the way of assessment (visual assessment or measurements, observation of plots or single plants) which is influenced by the characteristic, the species, the experimental design and other factors. Experts should be conscious of certain basic rules of statistics and especially that the use of statistics is linked to mathematical assumptions and usual experimental design practices such as randomization. Therefore these assumptions ought to be verified before applying statistical methods. Some statistical methods are, however, rather robust and can be used with certain precaution even if some assumptions are not fully met.

100. Document TGP/8 gives guidance on good statistical practices for DUS assessment. Keys for the choice of methods in relation to the data structure are given in documents TGP/9 and TGP/12.

101. A combined characteristic should only be used for distinctness if the uniformity test on the combined characteristic itself, and not only on the components, has been successful.

#### 6.5.2 Visually Assessed Characteristics

102. Where visual characteristics have been recorded with a scale that does not fulfill the assumptions of the usual parametric statistics, usually only non-parametric statistical procedures are applicable. The calculation of the mean value, for example, is only permitted if the Notes are taken on a graded scale which shows equal intervals throughout the scale. In the case of non-parametric procedures the use of a scale which has been established on the basis of example varieties representative of the different states of the characteristics is recommended. The same variety should then always receive about the same Note and thereby facilitate the interpretation of data. More details on the handling of visually assessed characteristics are given in document TGP/9.

##### 6.5.2.1 *Visually Assessed Truly Qualitative Characteristics*

103. For visually assessed truly qualitative characteristics, different states of expression in direct comparisons are generally sufficient to assess distinctness. In most cases therefore no statistical methods are needed for the interpretation of the results.

##### 6.5.2.2 *Visually Assessed Quantitative Characteristics*

104. Quantitative characteristics are not necessarily assessed by measuring or counting and can be assessed visually (e.g. intensity of anthocyanin coloration). If a normally visually assessed quantitative characteristic is the only distinguishing characteristic in relation to another variety, in case of doubt it should be measured where possible with reasonable effort.

105. A direct comparison between two similar varieties is always recommended since direct pair-wise comparisons are the most reliable. In each comparison it is acceptable to note a difference between two varieties as soon as it can be visually assessed and could be measured, although measurement might be impracticable or require unreasonable effort.

106. The simplest criterion for establishing distinctness is that of consistent differences (significant differences with the same sign) in pair-wise comparisons, provided that they can be expected to recur in the subsequent trials. The number of comparisons has to be sufficient to ensure reliability.

107. For more details on the handling of visually observed characteristics see document TGP/9.

### 6.5.2.3 *Visually Assessed Pseudo-qualitative Characteristics*

108. The use of statistics for the assessment of pseudo-qualitative characteristics depends on the individual case and no general recommendation can be made. In certain cases the same rules apply as for truly qualitative characteristics, and in others the same rules as for quantitative characteristics.

### 6.5.3 Measured Characteristics

109. UPOV has proposed several statistical methods for the handling of measured quantitative characteristics. In the standard method the difference between two varieties is considered clear if it exceeds the LSD at the 1% probability level. Differences can be considered consistent if they occur with the same sign in two consecutive years, or two out of three years.

110. For vegetatively propagated or self-fertilized varieties such a simple method may be sufficient, as they are usually very uniform (see also Chapter 7.4.1). For cross-pollinated varieties UPOV has developed more sophisticated methods which take into account different sources of possible variation.

111. A method has been developed which requires the size of the differences to be consistent over the years and which takes into account the variation between years. It is called the Combined Over Years Distinctness (COYD) analysis and is explained in document TGP/9. A refinement to the COYD analysis is also included and should be used to adjust the COYD analysis when environmental conditions cause a significant change in the spacing between variety means in a year, such as when a late spring causes the convergence of heading dates. It is supplemented by a further Least Significant Difference (LSD) method for cases where few varieties in the growing tests lead to less than about 20 degrees of freedom. Its main use is for measurement in cross-fertilized varieties, but if desired it can also be used for measurement in vegetatively propagated or self-fertilized varieties. For more details on the handling of measured quantitative characteristics see document TGP/9.

#### Explanation

*(i) The COYD method and a computer program for its application are explained in document TGP/9. Up to now COYD has been used mainly for forage crops and seldom for cross-fertilized vegetable species.*

*(ii) Most vegetatively propagated varieties are not necessarily planted in a statistically proper design, which means that the full requirements for the application of statistical methods as for example the long-term LSD may not be met. The method may nevertheless be used in such cases, however, with the necessary precautions (see document TGP/9).*

## 6.6 Combined Characteristics

112. Cases can arise in which differences between two varieties may be observed in several separately assessed characteristics that have a clear biological meaning. They may subsequently be combined, for example the ratio of length to width. Combined characteristics are treated in the same way as other characteristics.

113. A combined characteristic is to be understood as a combination of two characteristics (e.g. ratio of length to width) or in some cases three. Combined characteristics are not determined by the application of methods like the multivariate analysis, which would merely give a global synthetic measure of distance from a set of characteristics, without identifying an actual characteristic. Multivariate analysis will be defined in document TGP/12.

## 6.7 System for Determining Distinctness

114. Individual member States may develop their own systematic way of determining distinctness based on the principles laid down in this document. However, a model procedure has been developed to demonstrate the practical application of UPOV principles. This is set out in document TGP/15.

## 7. TESTING UNIFORMITY

### 7.1 General

115. According to Article 8 of the Convention, a variety is deemed uniform if, subject to the variation that may be expected from the particular features of its propagation, it is sufficiently uniform in its relevant characteristics. Relevant characteristics of a variety include at least all characteristics used as a basis for distinctness or included in the variety description established at the date of grant of protection of that variety. In addition, all obvious characteristics may be considered relevant, irrespective of whether they appear in the Test Guidelines or not. That means that the absolute level of uniformity required for vegetatively propagated varieties, truly self-pollinated varieties, mainly self-pollinated varieties, inbred lines of hybrid varieties, cross-pollinated varieties, mainly cross-pollinated varieties, synthetic varieties and hybrid varieties will be different (see Chapter 7.4).

116. The UPOV requirement on distinctness (Chapter 6.1), attaches great importance to uniformity standards being set at a reasonable level for the first varieties in a new plant species or type. Guidance on this is given in document TGP/10.

### 7.2 Interpretation of Observations for the Assessment of Uniformity without the Application of Statistical Methods

117. In many species in which varieties are vegetatively propagated, normally assessments on uniformity are made visually and in principle no statistical methods are applied. If in exceptional cases the application of statistics is needed to assess uniformity, statistical methods can be found in document TGP/10.

118. For more details on the assessment of uniformity without the application of statistical methods see document TGP/10.

### 7.3. Interpretation of Observations for the Assessment of Uniformity with the Application of Statistical Methods

119. Various statistical methods are used in the assessment of uniformity, depending on the reproductive system of the variety and its reaction to environmental variation. For vegetatively propagated and self-pollinated varieties the basis of assessment is normally the number of off-types in the variety, judged on the basis of a population standard and an acceptance probability fixed in the corresponding Test Guidelines. In particular for cross-pollinated varieties the basis of assessment is the variation within the candidate variety compared with the variation in comparable varieties (relative uniformity) (see document TGP/10).

### 7.4 Off-types as the Basis for Assessing Uniformity

120. For vegetatively propagated varieties, self-pollinated varieties and inbred lines of hybrid varieties, the assessment of uniformity is based on the concept of off-types.

121. A plant is to be considered an off-type if it can be clearly distinguished from the variety in the expression of any characteristic of the whole or part of the plant that is used in the testing of distinctness, taking into consideration the particular species.

#### Explanation

*This wording makes it clearer that (e.g. in the case of a mutation on part of the whole plant) an off-type in some organs (e.g. in some of the fruits) and not necessarily in all of them could make the plant an off-type.*

122. That definition makes it clear that in the assessment of uniformity the standard for distinctness between off-types and a candidate variety is the same as for distinctness between a candidate variety and other varieties.

123. For a judgment on whether a plant is an off-type, therefore, the same rules apply as stated for distinctness.

(a) For truly qualitative characteristics a plant with an expression of a different state of expression would indicate an off-type (see Chapter 6.5.2.1).

(b) For visually assessed quantitative characteristics a plant is considered an off-type if the difference can be visually assessed and can be measured, although measurement might be impractical (see Chapter 6.5.2.2).

(c) For pseudo-qualitative characteristics the judgment would depend on the type of characteristic (see Chapter 6.5.2.3).

Explanation

*Most characteristics of vegetatively propagated varieties and self-pollinated varieties are observed visually, so it is only necessary in few cases actually to apply statistics to decide whether or not a plant is an off-type.*

124. The test material may contain plants that are very different from those of the variety. These are not necessarily treated as off-types, and may be disregarded as long as their number does not interfere with the test. In choosing the term “may be disregarded” UPOV makes it clear that it would depend on the judgment of the crop expert whether they are disregarded or not. In practice that would mean that in tests conducted with a small number of plants just one single plant could interfere with the test and could not be disregarded.

125. Methods for handling measurements from individual plants in order to assess off-types in vegetatively propagated varieties and truly or mainly self-pollinated varieties are set out in document TGP/10.

7.4.1 Assessment of Uniformity in Vegetatively Propagated Varieties

126. Experience has shown that for vegetatively propagated varieties of most species, the acceptable number of off-types tolerated in samples of various sizes is based on a population standard of 1 per cent and on an acceptance probability of at least 95 per cent. Where justified, the Test Guidelines may recommend a higher population standard (e.g. in many fruit species 2 per cent in case of varieties resulting from mutations).

127. The population standard can be expressed as the percentage of off-types to be accepted if all individuals of the variety could be examined. The probability of correctly accepting a uniform variety is called the acceptance probability. Based on statistical calculations for population standards and acceptance probabilities, in each of the individual UPOV Test Guidelines, the Technical Working Parties state whether the population standard to be used is 1% and the acceptance probability at least 95%, or whether the species or a certain type of variety of that species warrants a different population standard and acceptance probability. The Test Guidelines also state for a given sample size the maximum number of off-types tolerated. More detailed information can be found in document TGP/10.

7.4.2 Assessment of Uniformity in Self-pollinated Varieties and Inbred Lines of Hybrid Varieties

128. The same criteria and tolerances applicable to vegetatively propagated varieties (see the previous paragraph) apply also to truly self-pollinated varieties.

129. For the purpose of DUS testing mainly self-pollinated varieties are those that are not fully self-pollinated but are treated as self-pollinated for testing. For those as well for as inbred lines of hybrid varieties, a higher tolerance is admitted and the population standard for the calculation of the maximum number of off-types allowed for truly self-pollinated varieties is, as a rule, doubled. This is explained further in document TGP/10 (see also Chapter 7.6.1).

Explanation

(i) *Please note that it is not the number of off-types tolerated that is doubled (as it was in the past), but the population standard.*

(ii) *The rule of doubling of the population standard applies therefore also, for example, to self-incompatible varieties.*

(iii) *Single-cross hybrids are covered below under Chapter 7.6.1.*

7.5 Assessment of Uniformity in Cross-Pollinated Varieties and in Synthetic Varieties

130. Cross-pollinated varieties, mainly cross-pollinated varieties and synthetic varieties generally exhibit wider variations within the variety than vegetatively propagated varieties or self-pollinated varieties and inbred lines of hybrid varieties, and it is sometimes difficult to determine off-types. Therefore no fixed tolerance can be set, but relative tolerance limits are used by comparison with comparable varieties already known. That means that the candidate variety should not be significantly less uniform than the comparable varieties. For more detailed information on comparable varieties and relative uniformity, including guidance on setting standards for new types, see documents TGP/10 and TGP/13.

Explanation

*Comparable varieties are varieties of the same type. Depending on the number of varieties, differentiation could go into very great detail, for instance in a given group (e.g. only tall varieties, only early emerging or early flowering varieties).*

7.5.1 Visually Assessed Characteristics

131. For visually assessed qualitative characteristics the number of plants visually different from those of the variety should not significantly exceed the number found in comparable types of varieties already known. For visually assessed quantitative characteristics, the acceptable level of variation for the variety should not significantly exceed the level of variation found in comparable varieties already known. For more details on the handling of uniformity of visually assessed characteristics see document TGP/10.

7.5.2 Measured Characteristics

132. For measured characteristics, the acceptable level of variation for the variety should not significantly exceed the level of variation found in comparable varieties already known. UPOV has proposed several statistical methods for dealing with uniformity in measured quantitative characteristics. One method, which takes into account variations between years, is the Combined Over Years Uniformity (COYU) method.



133. For more details on the handling of uniformity in measured quantitative characteristics see document TGP/10.

#### 7.6 Assessment of Uniformity in Hybrid Varieties

134. The assessment of uniformity in hybrid varieties depends on the type of hybrid, whether it is a single-cross hybrid or of another category of hybrids, or whether it is a hybrid from lines that are not inbred lines themselves but hybrids from narrowed populations or from another cross-pollinating line.

135. In order that hybrid varieties may be treated as such for testing and thus benefit from different treatment, the testing authority should be satisfied that the candidate variety is in fact a hybrid. Submission and testing of the progenitor lines is a common requirement for checking this.

##### Explanation

*There may in certain cases be some other way of satisfying the testing authority that the candidate variety is in fact a hybrid. That is why, for some vegetable species, national authorities do not systematically request the applicant to submit the progenitor lines for a candidate hybrid variety.*

#### 7.6.1 Assessment of Uniformity in Hybrid Varieties from Inbred Lines

136. Single-cross hybrid varieties have to be treated as mainly self-pollinated varieties. Therefore, compared to truly self-pollinated varieties (Chapter 7.4.2), for the purpose of DUS testing, a higher tolerance is admitted and the population standard for the calculation of the maximum number of off-types allowed for truly self-pollinated varieties is, as a rule, doubled. This is explained further in document TGP/1 (see also Chapter 7.4.1)

137. In addition to that double population standard, an additional tolerance in the variety has to be allowed for the occurrence of inbred plants. It is not possible to fix a percentage, as decisions differ according to the species and method of propagation. However, the percentage of inbred plants should not be so high as to interfere with the trials. The maximum number tolerated will be fixed in the Test Guidelines.

#### 7.6.2 Assessment of Uniformity in Complex Hybrid Varieties

138. For other categories of hybrids than only from inbred lines (e.g. three way crosses or double crosses), a segregation of certain characteristics is acceptable if it is compatible with the method of propagation of the variety.

(a) If the heredity of a clear-cut segregating characteristic is known, that characteristic has to behave in the predicted manner.

(b) If the heredity of the characteristic is not known, it has to be treated as in the case of other kinds of cross-pollinated variety (synthetic varieties or populations), in other words the uniformity has to be compared with that of comparable varieties already known (see Chapter 7.5).

(c) For the fixing of a tolerance for the occurrence of inbred plants or parent plants, the same considerations apply as for a single-cross hybrid variety (see Chapter 7.6.1).

139. The uniformity and stability of a hybrid variety may be assessed by examining the uniformity and stability of the hybrid itself or, under certain conditions that of the progenitor and the hybrid. Where neither is possible or practicable, the variety cannot be either described or protected.

140. For hybrid varieties from hybrid parents or cross-pollinated parents not being inbred lines but populations, relative tolerance limits should be used; they should therefore be treated as synthetic varieties or populations (see Chapter 7.5) as long as no other proof is given.

## 8. TESTING STABILITY

141. According to Article 9 of the Convention, a variety is deemed to be stable if its relevant characteristics remain unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle. The relevant characteristics are at least those characteristics used for the assessment of distinctness or which are included in the variety description drawn up on the date of the grant of protection.

142. Careful attention has to be paid to stability when testing for distinctness and uniformity. Where appropriate, stability is tested by growing a further generation from new seed stock to be supplied by the applicant to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

143. If the variety is not stable, material produced will soon not conform to the variety description drawn up on the date of the grant of protection, and so will no longer be of the protected variety.

144. The stability of a hybrid variety should be assessed by examination of the uniformity and stability of its progenitor lines and the variety itself. Where neither is possible or practicable, the variety cannot be shown to possess stability.

### Explanation

(i) *It is not usually possible during a period of two or three years to perform tests on stability that produce results as certain as the testing of distinctness and uniformity does. Generally, when a submitted sample has been shown to be uniform, the material can also be considered stable.*

(ii) *If the variety is not stable, this is self-policing. The variety will no longer be the same variety but a different one as the relevant characteristics, in other words*

*those listed in the variety description drawn up on the date of the granting of protection, will have changed.*

*(iii) As mentioned in paragraph 40 above, the assessment of DUS is done on the variety as appearing on the market, meaning, especially in cross-fertilized species, on the same generation as that which is marketed. Therefore the material sent in for testing should be of that generation and, apart from hybrids where also the lines are assessed, the variety is judged on that generation and not on a different generation or several different generations.*

## 9. MAINTENANCE OF REFERENCE COLLECTIONS

145. Every country is expected to maintain, or arrange for another country to maintain on its behalf, reference collections of viable seed or of vegetative plant material of the varieties to which it has granted protection. The reference collections should also contain seed or vegetative plant material of any other varieties of common knowledge. Seed or vegetative plant material should preferably be obtained from the breeder and, when it is necessary to renew the seed or plant material in stock, the new consignment should be checked in a growing test against material in stock before use. For more details see also document TGP/3 on common knowledge.

### Explanation

*At present only living material of the variety that is capable of reproducing it can be considered reference material. If an old variety is no longer available as living material but only as a description, it is no longer common knowledge. A description of an old variety, a test report or the knowledge of an expert panel, however detailed it may be, even with herbarium material, is not enough on its own for the decision of distinctness if no more living material exists.*

## 10. COMPOSITION OF UPOV TEST GUIDELINES

### 10.1 Introduction

146. It is necessary to prepare Test Guidelines for each species separately, in a few cases for a whole genus or in extreme cases even for a higher grouping. Different groups inside a species can be dealt with in different Test Guidelines if they can be clearly separated, either botanically or by other clear grouping characteristics.

### Explanation

*(i) The more hybrids there are between species, the fewer groupings are possible. More groups are possible in annual species than in perennials, and in mainly seed-propagated species than in mainly vegetatively propagated species.*

*(ii) In addition to the basic principles for testing, some basic general rules are also established which apply to all individual Test Guidelines. One important*

*rule is the composition and layout of the documents. This has changed with time. While some older documents still have a different layout, all newer ones are grouped into ten chapters.*

*(iii) The current texts of the UPOV Test Guidelines are contained in a collection forming Part II of the Collection of Important Texts and Documents. UPOV is preparing a CD-ROM (TG-ROM) which will contain all adopted Test Guidelines in electronic form.*

*(iv) The use of the Test Guidelines is frequently misunderstood. Their first function is mainly description. Experts have to be prevented from confusing the description and distinctness of a variety. It is possible for two varieties to have identical descriptions but nevertheless be sufficiently distinct to be different varieties, or for two samples of plant material to have different descriptions but not be sufficiently distinct to be from two varieties eligible for protection.*

*(v) For the establishment of Test Guidelines and for description purposes in the case of “other than truly qualitative or quantitative characteristics”, the aim is to form the states in such a way that as far as possible a clear difference can be presumed with a difference of two states of expression. This however is only a broad aim for the preparation of Test Guidelines.*

147. The individual Test Guidelines are prepared in a number of Technical Working Parties specialized in different groups of species (Agricultural Crops, Fruit Crops, Ornamental Plants and Forest Trees, Vegetables). Once completed, the draft is sent for comments to the international professional organizations and to important institutions working in the field of the species concerned. On the basis of the comments received, the Draft Test Guidelines are finalized by the Technical Working Party concerned and presented to the UPOV Technical Committee for final adoption and publication.

#### Explanation

*(i) Normally discussions start in the Technical Working Parties on the basis of a recommendation and a draft prepared by an expert on the basis of an inventory of existing testing work done and existing national test guidelines, compiled either by the same expert or by correspondence within a subgroup of experts from several interested States or States actually doing tests for the species concerned.*

*(ii) The same procedure applies to the periodical revision of existing UPOV Test Guidelines. At each session the relevant Technical Working Parties review the existing Test Guidelines and decide which of them require revision.*

148. Document TGP/2 contains a list of all Test Guidelines adopted by UPOV.

## 10.2 Cover Page

### 10.2.1 Original Language

149. The Test Guidelines are in most cases originally drafted in English, adopted in that form and then translated into the other UPOV languages ( French, German and Spanish).

### 10.2.2 Reference to the Basic Principles of DUS Testing (General Introduction)

150. Each individual Test Guidelines document makes a reference to the General Introduction on its first page to ensure that harmonized basic principles to be followed in the application of the Test Guidelines are remembered.

#### Explanation

*The reference is needed especially for users of the Test Guidelines who may be interested in a single species only, and will not be as familiar with the general UPOV philosophy.*

## 10.3 Individual Chapters of the Test Guidelines

151. UPOV Test Guidelines contain ten chapters. The individual chapters give technical recommendations and special guidance with respect to the species concerned. In Chapter VII, which is the main chapter, the characteristics that should be observed are listed. The chapter headings are as follows:

- Chapter I: Subject of these Guidelines
- Chapter II: Material Required
- Chapter III: Conduct of Tests
- Chapter IV: Methods and Observations
- Chapter V: Grouping of Varieties
- Chapter VI: Characteristics and Symbols
- Chapter VII: Table of Characteristics
- Chapter VIII: Explanations on the Table of Characteristics
- Chapter IX: Literature
- Chapter X: Technical Questionnaire

### 10.3.1 Subject of these Guidelines (Chapter I)

152. Separate Test Guidelines are usually drawn up for each species. It may however be considered necessary to include two or more species, a whole genus or even a larger unit in

one Test Guidelines document, or to subdivide a species into different Test Guidelines. Subdivision is only possible if the borderline between the groups inside a genus or species can be clearly defined in order to avoid the risk of a candidate variety tested in the wrong group or according to the wrong Test Guidelines being declared distinct when in reality it is not.

Explanation

(i) *In Latin names no abbreviations are used, even if a number of species from the same genus are listed, for instance Vitis candicans, then Vitis labrusca—not V. labrusca.*

(ii) *Family names are normally included in Test Guidelines of ornamental species.*

(iii) *Botanical names written in italics are only used for taxa from the genus downwards. Family names are not written in italics.*

10.3.2 Material Required (Chapter II)

153. This chapter indicates the recommended quantity and quality of material to be submitted to the testing authority, for instance so many grams of seed or so many seeds, plants or cuttings. It remarks on the health requirements for the material, for instance it should be visibly healthy, not lacking in vigor or affected by any important pests or diseases or, more specifically, free of all known viruses, or viruses or diseases actually mentioned. It also states that the material should not have been treated chemically or otherwise (no short day or long day treatment, no cold treatment, etc.) unless the authority so requests. It also states, for several species, that the material should not come from *in vitro* propagation, as that may affect certain expressions of the variety (see also paragraph 31 on artificial factors, secondary organisms, chemicals, etc.).

10.3.3 Conduct of Tests (Chapter III)

154. This chapter shows how the test should be conducted, for instance:

(a) the number of growing periods or years during which the plants should be observed;

(b) the number of places (usually only one);

(c) the number of plants;

(d) the number of replications.

155. It further states that when separate plots are grown for visual assessment and measuring they have to be subjected to the same treatment, and also that, if additional special tests have been prescribed, they have to follow the same basic principles. In order to achieve comparable results, it is important that the same number of plants and the same number of

replications should be observed in different countries, as otherwise, especially when statistics are used, a larger number of plants or more replications would lead to smaller differences being considered statistically significant.

156. When distinctness and uniformity are determined by visual assessment, the whole plot or a representative sample out of the plot is observed. When distinctness and uniformity are determined by measurements, these are normally made only on a restricted number of plants in accordance with the appropriate method set out in document TGP/9.

Explanation

(i) *Uniformity is in the first instance observed on characteristics listed in the Test Guidelines. However, any clear difference in an obvious characteristic may be considered, whether in the Test Guidelines or not.*

(ii) *Measurements from identified off-types should not be included in the assessment of distinctness. The off-types themselves should, however, be included in the assessment of uniformity.*

10.3.4 Methods and Observations (Chapter IV)

157. This chapter explains

- (a) how the variety should be observed;
- (b) how many of the plants grown should be observed for distinctness;
- (c) which organs from which part of the plant should be observed (e.g. main stem, side branches, leaves from the outer side of a plant, from a fixed height or from the middle part of a branch or terminal flowers or fruits, or whether the terminal flower or fruit should be excluded);
- (d) at what time the observations on a given organ should be made, etc.

158. Chapter IV also sets the statistical standards for observations made by measurement. In vegetatively or self-fertilized species, for instance, it fixes the population standard and acceptance probability and the number of off-types tolerated for a given sample size. In principle all general information on the observation of characteristics is included here, while more specific (or more detailed) information such as drawings or chemical tests is included in Chapter VIII (Explanations on the Table of Characteristics).

Explanation

(i) *All Test Guidelines for vegetatively propagated or self-fertilized varieties have to contain a paragraph setting the population standard and the acceptance probability.*

(ii) *All Test Guidelines for cross-fertilized varieties have to contain a reference to the assessment of uniformity as specified in this document.*

### 10.3.5 Grouping of Varieties (Chapter V)

159. This chapter first gives general information on the criteria for selecting universal grouping characteristics to identify similar varieties and place in other groups those varieties that require no further comparison. Where there are few varieties, grouping in the growing trials may not be very important, and thus some UPOV Test Guidelines do not give any grouping characteristics. Depending on the species, different characteristics are selected, preferably qualitative ones and those quantitative characteristics that are less affected by environment across the full range of testing regions, for instance color in ornamental species, earliness in cereals or size for trees or bushes of some fruit species (see also paragraph 54).

160. Grouping characteristics that meet these criteria will always be asterisked in the Test Guidelines.

#### Explanation

(i) *The purpose of grouping characteristics is to help plan the layout of the trial and select appropriate reference varieties.*

(ii) *Grouping characteristics should in the first instance be qualitative characteristics. In case of doubt, candidate varieties would have to be tested in more than one group.*

(iii) *In the Technical Notes the grouping characteristics should be given the same wording and states of expression as in the Table of Characteristics.*

(iv) *Grouping characteristics should normally cover most of the characteristics of the list appearing in the Technical Questionnaire. These are mainly based on information supplied by the applicant. They should be so presented that the breeder or applicant will interpret them correctly and be able to provide correct information.*

(v) *The grouping characteristics are normally listed chronologically as in the Table of Characteristics. Another order is acceptable, however, if so desired by the Technical Working Party concerned.*

### 10.3.6 Characteristics and Symbols (Chapter VI)

161. It may not always be necessary to use all the characteristics listed in the individual Test Guidelines to describe a variety and assess DUS. This chapter therefore explains the different categories of characteristics mentioned in the chapters that follow (see also Chapter 5.2.1). Those categories are the following:



### 10.3.6.1 UPOV Grouping Characteristics

162. These are characteristics mentioned in Chapter V of the Test Guidelines and in the Technical Questionnaire. Normally they all have to be asterisked characteristics (see also paragraph 59).

### 10.3.6.2 Asterisked UPOV Test Guidelines Characteristics

163. This group includes those characteristics that all the UPOV experts accepted at the time of the drafting of the Test Guidelines, and which all experts agreed to use every time in a description in order to harmonize the descriptions issued by the member States in accordance with the Convention. For that reason the number of such characteristics should, where practicable, be set at a level which will produce a core description of the variety that will be of practical value to its recipients. The use of those characteristics is “obligatory” insofar as one can speak of a mandatory requirement in a document that *per se* is only a recommendation (see also paragraph 59).

164. This group of characteristics has been marked with an asterisk (\*) to show that the characteristics should be included in the variety descriptions of all varieties in every growing period in which examinations are made, except when this is precluded by the state of expression of a preceding characteristic or regional environmental conditions.

165. A characteristic should only be given an asterisk if it meets the following criteria:

- (a) it is important for description;
- (b) it is needed as minimum information for the exchange of information on the variety;
- (c) all UPOV experts agree to it (if one State objects to a characteristic being given an asterisk and states the reasons (e.g. no discriminating force under the conditions prevailing in his country), it should not be given one);
- (d) at least the position of example varieties within the range remains the same in the various countries when the expressions change from country to country (e.g. example variety A should, in all countries, be earlier than example variety B);
- (e) for pest or disease resistance characteristics it should have only the states “absent, present.” Characteristics with levels of resistance should normally not be given an asterisk (see paragraph 56).

### 10.3.6.3 Standard UPOV Test Guidelines Characteristics

166. This group includes those characteristics that many UPOV experts consider useful for description and for DUS testing, but which not all experts in member States can accept as routine characteristics, either because they are considered unnecessary and no more than an

addition to the workload, or because the environment of their country is such that they cannot be observed.

#### *10.3.6.4 Standard Characteristics Not Included in the UPOV Test Guidelines*

167. This group covers additional standard characteristics used during the DUS tests by some member States but not mentioned in the Test Guidelines (see also Chapter 5.2.1). Such characteristics should be notified to UPOV for information to the member States (see document TGP/5).

#### *10.3.6.5 UPOV Supporting Evidence Characteristics*

168. A further group comprises characteristics that UPOV does not consider sufficient on their own to establish distinctness, but which may provide supporting evidence for other differences which then are used for distinctness. These characteristics are not included in the UPOV Test Guidelines, but some, if they meet certain requirements, are included in an Annex to the Test Guidelines, with a specific reservation that they do not form part of the actual Test Guidelines. For further details on the use of supporting evidence characteristics see document TGP/14.

##### *Explanation*

*These characteristics are so far limited to characteristics determined by means of electrophoresis. UPOV has yet to decide on the size of the difference required, and especially on whether it could be lower than if no supporting evidence were provided by this category of characteristics.*

#### *10.3.6.6 Hybrid Formula*

169. For this type of characteristic see document TGP/4.

#### *10.3.6.7 States of Expression, Notes, Example Varieties, Explanations*

170. In the Table of Characteristics, a scale of possible states of expression (known as “states”) is given for each characteristic. States are accompanied by “Notes” containing code numbers which permit the computerization of variety descriptions. As far as possible, “example varieties” are also cited for each state. Some characteristics are marked with a plus sign (+), which means that the characteristic is illustrated by explanations and drawings or that testing methods are given in the chapter entitled “Explanations and Methods.”

171. Chapter VI explains other signs that are added to the characteristics in the Table of Characteristics in Chapter VII, and also refers to Chapter VIII which gives explanations and details on those characteristics.

### 10.3.7 Table of Characteristics (Chapter VII)

#### 10.3.7.1 *General*

172. The Table of Characteristics is the main part of the Test Guidelines. It contains a list of all characteristics considered by UPOV to be suitable for the description of varieties and for DUS testing. For each characteristic listed, several individual columns with information are provided and different states of expression are mentioned. For more details on the various categories of characteristics and the harmonization of states of expression see document TGP/7.

#### 10.3.7.2 *Layout*

173. In the new layout—some documents may still use a different, older layout—the first column contains the chronological numbering of the characteristics and some other signs. It also states whether the characteristic is an “obligatory” one by marking or not marking it with an asterisk. It may in addition contain a plus sign (+), which refers to more detailed information on the characteristic in chapter VIII (Explanations on the Table of Characteristics). Then comes the full text of the characteristic with its different states of expression, in four separate columns, one for each of the official UPOV languages. They are followed by a column with example varieties for most states of expression. Example varieties are varieties considered representative of the given state of expression. In the final column of the Table of Characteristics, opposite the states of expression for each characteristic, there are numerical Notes or codes for the purpose of electronic data processing.

174. In some Test Guidelines there is an additional column before the full text of the characteristics which gives, for each characteristic, a number from a growth stage code indicating the optimum growth stage for recording that characteristic. The same column may also give other information, for instance references to other lists of characteristics from other organizations, suggestions on whether the characteristic should be observed visually or measured, etc.

#### *Explanation*

*In the past UPOV issued all Test Guidelines in a single three-language version with the English, French and German texts in one single document. With the introduction of Spanish the Test Guidelines would have become too voluminous and so it was decided that a separate version would be produced for each of the languages.*

175. The use of Notes facilitates the storage and handling of data and the comparison of variety descriptions. It also makes for easier processing of the data in a computer. Finally it enforces discipline, as it requires the experts to look at all characteristics in a more systematic way, especially when the Test Guidelines are actually drawn up.

Explanation

(i) *The layout of the three-language version—still used even now for many of the less-recently adopted UPOV Test Guidelines—is different in that the first column shows whether or not the characteristic is an “obligatory” one by marking or not marking it with an asterisk. The next column gives the chronological numbering of the characteristics, and is followed by the column with the full text of the characteristic in all three languages. After that there are three columns with the various states of expression in English, French and German. All other parts are the same as in the new layout.*

(ii) *With the use of Notes it is for instance possible to present, on just one page in a table, the full variety descriptions of 50 to 100 varieties. This makes it easier to review the entire range of the collection in a given species.*

10.3.7.3 *Order of Characteristics*

176. In the Test Guidelines, morphological characteristics are generally arranged in the botanical order of organs. Where applicable, distinctions are made between different stages in the life of a plant, such as dormant and growing periods, juvenile and mature stages, or grain submitted by the applicant and grain harvested from the plants in the growing trials. The following order is used for the various organs:

- grain (seed submitted)
- seedling
- plant (e.g. attitude)
- root
- root system or other subterranean organs
- stem
- leaf (blade, petiole, stipule)
- inflorescence
- flower (calyx, sepal, corolla, petal, stamen, pistil)
- fruit
- grain (harvested)

177. Within the above order, the following subdivision has been adopted for the characteristics of the various organs of plants:

- attitude
- height
- length
- width
- size
- shape
- color
- other details (such as surface, etc., and individual parts of the organ such as base, top and margin).

178. Physiological characteristics should be included at the end of the Table unless specific growth stages are involved, in which case they may be included in their correct chronological position (e.g. time of bud burst) to ensure that one does not forget to make the observation at the appropriate stage.

179. In certain cases this order has been replaced by a chronological order of recording, starting from the time of planting or sowing (in some cases even before) until harvest (or even thereafter), especially if the recording follows an existing code of growth stages of the species concerned, or has been combined with the botanical order of organs, with a chronological order of recording being applied within each organ.

#### 10.3.7.4 *Order of States of Expression Inside a Characteristic*

180. Insofar as it is possible to impose an order on the expressions inside a characteristic, the smaller, lesser or lower expressions should be assigned the lower Note. The order of states should as far as possible be:

- from weak to strong
- from light to dark
- from low to high
- from narrow to broad

181. In the case of colors the chronological appearance of the color (e.g. as the fruit ripens) may also be used. The same sequence should be used for organs with similar states within a single document (e.g. color of leaf and color of stem).

182. In the case of shape characteristics the order should as a general rule be from the lesser expression to the higher or greater expression. Shapes of apex should go from pointed to rounded or from raised to depressed.

183. More details on the order of states of expression are contained in document TGP/7.

#### 10.3.7.5 *Categories of Characteristics*

##### 10.3.7.5.1 Qualitative Characteristics

184. Truly qualitative characteristics are classified by consecutive numbers according to the state, starting with Note 1 and often with no upper limit, for example:

<u>Plant: sex</u>	<u>Note</u>
dioecious female	(1)
dioecious male	(2)
monoecious unisexual	(3)
monoecious hermaphrodite	(4)

185. There are a few exceptions to that rule, so—in order to avoid confusion—in the case of ploidy, the number of chromosome sets is accepted as the Note (e.g. diploid (2), tetraploid (4)).

#### 10.3.7.5.2 Quantitative Characteristics

186. As a general rule, states are formed in such a way that for the weak and strong expressions a reasonable word pair is chosen, for example:

weak/strong  
short/long  
small/large

187. These word pairs are given Notes 3 and 7 and the intermediate state Note 5. The remaining states of the scale using Notes 1 to 9 are formed according to the following example:

<u>State</u>	<u>Note</u>
very weak	(1)
very weak to weak	(2)
weak	(3)
weak to medium	(4)
medium	(5)
medium to strong	(6)
strong	(7)
strong to very strong	(8)
very strong	(9)

188. In all cases of quantitative characteristics the full scale 1, 2, 3, 4, 5, 6, 7, 8, 9 is applicable. However, for the practical purposes of presentation, only Notes 3, 5, 7 or 1, 3, 5, 7, 9 are given in the Test Guidelines to indicate that the quantitative scale is applicable. This is done purely for reasons of simplification and in order to save typing work and document space. In all cases, however, it means that the full scale (1 to 9) is applicable.

#### Explanation

*As the whole 1 to 9 scale is always applicable, it makes no difference whether a certain state is mentioned or not. Additional states are only given if additional information on example varieties is needed. The allocation of Note 1 does not require a mention of Note 9 for symmetry or vice versa. Usually the use of Notes 3, 5 and 7 is sufficient to indicate that the whole 1 to 9 scale is applicable.*

189. In alternative observations, where there is a clear-cut separation between absence and presence, the state “absent” is given by Note 1 and the state “present” Note 9. If in a characteristic it is necessary to make a distinction between complete absence and different degrees of presence, the characteristic is split into an alternative (qualitative) characteristic

with the states “absent (1)” and “present (9)” and a quantitative characteristic with Notes from 1 to 9.

190. For those characteristics where it is not possible to make a clear-cut distinction between “absent” and “very weak,” Note 1 denotes “absent or very weak” and then represents the first state in the 1 to 9 scale for quantitative characteristics.

191. For quantitative characteristics, example varieties should—as far as possible—be given, at least for a few states of expression (e.g. 3, 5, 7).

#### 10.3.7.5.3 Pseudo-qualitative Characteristics

192. Pseudo-qualitative characteristics are characteristics that are treated as qualitative characteristics when it is more reasonable, for practical purposes, to disregard the continuous variation and the states created are meaningful and sufficiently different from one another, for example:

<u>Leaf: shape</u>	<u>Note</u>
ovate	(1)
elliptic	(2)
round	(3)
obovate	(4)

or

<u>Expression</u>	<u>Note</u>
absent or very weakly expressed	(1)
weakly expressed	(2)
strongly expressed	(3)

#### 10.3.7.6 Harmonization of States of Expression

193. Many quantitative characteristics are presented in a qualitative way. However, care should be taken when the description is used as a first step in establishing distinctness, as it makes a difference whether the characteristic is a truly qualitative characteristic or not.

194. The harmonization of states of expression is dealt with in detail in document TGP/7.

#### Explanation

*Document TGP/7 on the Establishment of Tables of Characteristics in UPOV Test Guidelines contains also a part on translations in the four UPOV languages (English, French, German and Spanish) of the main terms used in the Table of Characteristics.*

#### 10.3.7.7 *Example Varieties*

195. Wherever possible, example varieties are given to illustrate different states of expression of the various characteristics. Actual measurements are only valid for a given testing place, or even for a given year of testing at that place, and are therefore less suitable in UPOV Test Guidelines applicable worldwide. This does not mean that they are not or should not be used for the decision on DUS. Actual measurements are therefore seldom used in UPOV Test Guidelines. Example varieties from different regions should not be combined for a characteristic unless they have been tested in the same place. In the UPOV Test Guidelines the location should preferably be specified where the example varieties mentioned showed the expressions given. As example variety in principle only those varieties should be indicated which are available without restriction to other testing authorities.

196. Example varieties inside a given characteristic should not change their order under different environmental conditions (see also paragraph 165(d)).

197. A species should preferably not be listed as an example except where there is no doubt that the whole species shows the expression that it represents, and only if no example variety exists.

#### *Explanation*

*A species cannot be mentioned alongside an example variety. As soon as a variety exists in a given species, that variety alone should be mentioned and not the species or another species.*

198. UPOV is aware of the fact that many of the example varieties that are mentioned have only regional relevance, while some may also change slightly in their expression from place to place, but so far they are regarded as fulfilling the purpose of explaining a given expression much better than any measurement. Example varieties are used only as an aid: testing would become too difficult if an example variety had to be used for each characteristic and for each state. Example varieties are those that were available to the expert who drafted the document. It is not possible either to use the same example varieties worldwide. Each State will have to prepare its own list of example varieties grown in its region or country. Example varieties thus mainly represent or give an idea of the state of expression of a given characteristic, either at the testing place of the expert who prepared the draft for the Test Guidelines or the revision of existing Test Guidelines or at testing places with similar environments. National authorities will choose, from the example varieties given in the Test Guidelines or from further varieties grown in their region, those that they consider most appropriate.

199. Where the set of example varieties given for characteristics in the Test Guidelines is not applicable to (or useful for) two or more member States from a different region, a second set of example varieties from that region may be given in the Test Guidelines. In that case, the concordance of the example varieties in the different sets should be aimed at, especially with respect to quantitative characteristics in the course of the preparation of the Test Guidelines through the exchange of information and data between the different regions.



Explanation

(i) *The exceptional inclusion of a second set of example varieties in the Test Guidelines should only be allowed where those of a given region cannot be grown in some other major producing area of the species.*

(ii) *In order to ensure that a set of example varieties selected for a different region represents the same states of expression as are given in the Table of Characteristics, it is proposed that one should:*

(a) *compare, if possible, example varieties for the second set in a trial directly with some example varieties given in the Table of Characteristics (for quantitative characteristics preferably for at least two states of expression) in order to connect the scales or, if that is not possible,*

(b) *check, for other varieties that may be grown in both regions, the variety descriptions established in the location where the example varieties were selected for the Table of Characteristics against the descriptions established in that second region, and use those varieties as examples for the relevant states of expression where both descriptions agree, and*

(c) *in general, compare the DUS test findings with data and information about characteristics obtained from the first location, including detailed definitions or explanations of characteristics, numerical values recorded on the example varieties and photographs of the example varieties.*

10.3.8 Explanations on the Table of Characteristics (Chapter VIII)

200. The Table of Characteristics of the Test Guidelines is usually followed by a chapter entitled “Explanations on the Table of Characteristics.” It gives explanations useful for understanding the meaning of a given characteristic, or defining the exact time, place or position of the observation of that characteristic and the way in which it has to be made (e.g. visual observation or measurement, in the middle part of a shoot, on the current year’s shoot). It may draw attention to precautions that need to be taken. Very often it provides drawings pointing to the exact position on the plant where the observation has to be made, giving the part of the plant to be observed or the different states of expression (e.g. “dentation,” “serration,” “crenation,” etc., in relation to incisions on the margins) or explains the meaning of certain shapes with the aid of drawings. For pest and disease resistance characteristics it describes the standard method of observation and fixes pathotypes. For laboratory methods it also describes the method. For certain crops it reproduces a growth stage code which is then used in the Table of Characteristics to specify the time of observation of each characteristic.

201. More detailed information on the use of shapes can be found on the observation of colors in documents TGP/11 and TGP/16.

Explanation

(i) *Remarks or explanations should be incorporated in the Test Guidelines as follows:*

(a) *short remarks on one to three characteristics should be placed in brackets after the wording of the characteristic in Chapter VII (Table of Characteristics);*

(b) *remarks or explanations on certain organs or groups of characteristics should be placed in Chapter IV (Methods and Observations);*

(c) *longer remarks or explanations on several characteristics should be placed in Chapter VIII (Explanations on the Table of Characteristics).*

(ii) *There is no need for drawings for length, width or size as they have no meaning, except in certain special cases to show from where to where measurements should be taken.*

10.3.9 Literature (Chapter IX)

202. This chapter cites the titles of literature on the species concerned or on the testing of several species including the species concerned, which may be helpful to the testing authorities in the execution of the test, or useful for experts who have to develop a testing system for the species. If the list of literature is rather long, a smaller number of more important publications should be highlighted.

10.3.10 Technical Questionnaire (Chapter X)

203. This final chapter gives the layout of the standard UPOV Technical Questionnaire for a given taxon (genus, species, group of species or part of a species), which has to be completed when plant breeders' rights are applied for. A specimen Technical Questionnaire is reproduced in document TGP/7. In the Technical Questionnaire, certain information has to be given in the following eight sections:

204. Section 1 on Genus/Species asks for the Latin and common names of the taxon to which the candidate variety belongs.

205. Section 2 asks for the applicant's name and address and other communication possibilities (telephone and fax numbers, e-mail address).

206. Section 3 asks for the proposed denomination or breeder's reference of the candidate variety.

207. Section 4 on Information on Origin, Maintenance and Reproduction of the Variety asks for the breeding history, the parents of the variety, whether they are known or unknown (discovery), whether the variety results from a crossing or a mutation, the type of variety (e.g.

hybrid or open-pollinated variety and, in the case of a hybrid, also information on the inbred lines and the formula), the method of propagation (e.g. *in vitro* or otherwise). For some species, like apples or pears needing other varieties as pollenizers for the production of fruit, it asks for the name of pollenizer varieties.

208. Section 5 on Characteristics of the Variety to be Indicated requests information on the expression of the variety in a limited number of characteristics, including at least the grouping characteristics, which are considered necessary for placing the variety in the right order in official government growing trials. In specific cases, in addition to the characteristics in the Table of Characteristics, indications are also used which give valuable information on the variety (for example, the “Horticultural Classification of Lily for Registration” in the case of a lily variety). This limited number of characteristics is mainly applicable for countries that conduct official government growing tests. In other systems, where the applicant does more of the testing, or even the whole growing test himself, he will of course have to use all characteristics of the Table of Characteristics (Chapter VII) prescribed by the national competent authority, and even additional characteristics as agreed to by that authority. The national authority will decide what part of that information has to be supplied already at the time of application and what part may be submitted later.

209. Section 6 on Similar Varieties and Differences from these Varieties requires information on similar varieties and differences in relation to those varieties. The applicant is asked to state the denomination(s) of those varieties which are similar to his variety, the characteristic(s) in which the similar variety(ies) is (are) different and the states of expression in that (those) characteristic(s) of the similar variety(ies) and of the candidate variety. This information is important to save the testing authorities from failing to grow, from the outset, a similar variety known to the breeder or applicant.

210. Section 7 on Additional Information Which May Help to Distinguish the Variety asks for any additional information that could be given to help distinguish the variety, mainly information on pest and disease resistance and on special conditions for growing (e.g. time of sowing or planting or any special conditions for the examination of the variety). Technical Questionnaires for ornamental and fruit species also ask for a representative color photograph of the candidate variety as a source of helpful additional information and also to prove that the variety really existed at the time of the application. It should in particular be noted that in countries offering official government growing tests the applicant is not required to provide a full description at the time of the application. A full official description eventually becomes available as the end product of the growing test.

211. Section 8 on Authorization for Release requests the applicant to state whether the variety requires prior authorization for release under legislation concerning the protection of the environment or human and animal health, and whether such authorization has been obtained. This is mainly to ensure that in the case of a “GMO” (Genetically Modified Organism) the testing authorities are warned, in case they have to take certain precautions during testing or obtain necessary authorizations, but it also covers other possible environment or health problems. Apart from those precautions, a GM variety is tested according to the same principles as any other variety.

#### 10.4 Annexes to Test Guidelines (Supporting Evidence Characteristics)

212. In some Test Guidelines, another category of characteristics (additional to the asterisk and non-asterisk characteristics) has been included in an Annex. That Annex is not an official part of the Test Guidelines and is only added for information, because the majority of the UPOV member States are of the opinion that it is not possible to establish distinctness solely on the basis of a difference found in those characteristics. They should therefore only be used as supporting evidence to back up other differences in morphological or physiological characteristics (see Chapter 5.2.1).

##### Explanation

*At present characteristics determined by means of electrophoresis are added to the Test Guidelines as an Annex in the case of a few species only.*

213. UPOV agreed to include such characteristics in an Annex only if—in addition to the normal conditions for the inclusion of characteristics in UPOV Test Guidelines—certain other conditions had been met. Those other conditions are set out in document TGP/14 and include the requirement that a good harmonized method has been proved to give comparable results in other member States.

##### Explanation

*A further requirement is that there should be a sound knowledge of the genetic background to the different results obtained. Therefore, in the Test Guidelines for Wheat, for example, only one electrophoretic method has been annexed, namely that on glutenins, as the conditions were met only for glutenins. The method on gliadins, although widely used for purposes other than plant variety protection, was rejected, mainly because too little information was available on the genetic background.*

214. More information on supporting evidence can be found in document TGP/14.

#### 11. CONDUCT OF TESTING IN THE ABSENCE OF UPOV TEST GUIDELINES

215. UPOV uses the following procedure to provide guidance on the testing of distinctness, uniformity and stability where there are no UPOV Test Guidelines for a given species:

(a) An office is invited to consult document TGP/5 to ascertain whether other UPOV member States have already carried out testing on the required species or have national test guidelines.

(b) Where such experience is available or national test guidelines exist, countries are invited to approach the States concerned and seek to harmonize their testing procedures as far as possible, and preferably to inform UPOV of the existence of that harmonized testing procedure, or if appropriate recommend that UPOV prepare UPOV Test Guidelines for the species concerned.

(c) Where neither practical testing experience nor national test guidelines are available in other countries, States should devise their own testing procedures. It would be advisable to inform UPOV accordingly so that the information may be passed to all member States, as other States might consider preparing test guidelines of their own for the same species.

(d) When working out their testing procedures, offices are invited align them on the principles set forth in this General Introduction, particularly those in Sections 4 to 9. The easiest way of devising a testing procedure would be to start with the closest existing UPOV Test Guidelines document to the species concerned, or the closest in terms of the handling of varieties of that species (e.g. varieties are also seed-propagated or vegetatively propagated, are also trees, are grafted, etc.) and to make whatever changes are necessary to adjust the Guidelines to the species concerned.

(e) The testing procedure should if possible comply with the requirements of UPOV Test Guidelines to the extent that experience and information permit. In any event, the testing procedure should incorporate at least the following steps:

Subject of Test Guidelines	(see 10.3.1 above)
Material Required	(see 10.3.2 above)
Conduct of Tests	(see 10.3.3 above)
Methods and Observations	(see 10.3.4 above)
Table of Characteristics	(see 10.3.7 above)
Technical Questionnaire	(see 10.3.10 above).

[Annex follows]

## ANNEX

**DRAFTS OR OUTLINES FOR  
DOCUMENTS COMPLEMENTING THE GENERAL INTRODUCTION  
TO THE ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND  
STABILITY IN NEW VARIETIES OF PLANTS**

<b>PLANNED DOCUMENT</b>	<b>PRESENT DOCUMENT</b>	<b>TITLE</b>
<b>TG/00</b>	<i>Coordinator: UPOV Office Annex of TC/36/8</i>	List of TGP Documents and Latest Issue Dates
<b>TGP/1</b>	<i>Coordinator: UPOV Office TC/36/8</i>	General Introduction With Explanations
<b>TGP/2</b>	<i>Coordinator: UPOV Office <a href="http://www.upov.int/eng/document/index">http://www.upov.int/eng/ document/index</a> or TC/36/2, Annex</i>	List of Test Guidelines Adopted by UPOV
<b>TGP/3</b>	<i>Coordinator: Ms. Scott, GB</i>	<u>Varieties of Common Knowledge</u>
(a):		The Concept of Varieties of Common Knowledge
(b):		The Notion of Breeder
<b>TGP/4</b>	<i>Coordinator: Mr. Guiard, FR</i>	<u>Management of Reference Collections</u>
(a):		General Management
(b):	To be prepared by FR	Use of Hybrid Formula in DUS Assessment
<b>TGP/5</b>	<i>Coordinator: UPOV Office</i>	<u>Available Knowledge on DUS Testing, Cooperation in Examination</u>
(a):	C/32/5	Cooperation in Examination
(b):		Model Administrative Agreement for International Cooperation in the Testing of Varieties
(c):		UPOV Report on Technical Examination and UPOV Variety Description
(d):	TC/36/4	Notification of National Test Guidelines for Species for Which no UPOV Test Guidelines Exist List of Species in Which Practical Technical Knowledge has Been Acquired or for Which National Guidelines Have Been Established and E-mail Addresses
(e):	File to be prepared on the Website	Notification of Routine Characteristics not Included in UPOV Test Guidelines
(f):	<a href="http://www.bioss.sari.ac.uk/upov/upemail.html">http://www.bioss.sari.ac.uk/ upov/upemail.html</a>	E-mail addresses of Technical Experts

PLANNED DOCUMENT	PRESENT DOCUMENT	TITLE
<b>TGP/6</b>	<i>Coordinator: Mr. Hossain, AU</i>	<u>DUS Testing Done by the Applicant/Breeder</u>
(a):	To be prepared by AU	Practical Application
(b):		Conditions for the Examination of a Variety Based on Trials Carried Out by or on Behalf of Breeders
(c):	TC/32/4, to be updated	Level of Involvement of the Applicant in the Growing Test
<b>TGP/7</b>	<i>Coordinator: Mrs. Buitendag, ZA</i> TC/36/5  TC/33/9	<u>Establishing of Tables of Characteristics in UPOV Test Guidelines</u>  Vocabulary for states of expression  Technical Questionnaire to be Completed in Connection with an Application for Plant Breeders' Rights
<b>TGP/8</b>	<i>Coordinator: Mr. Law, GB</i>	<u>Good Statistical Practices for DUS Assessment</u>
(a):	To be prepared by TWC	<u>Chapter I:</u> measured data, checking of the truth of the assumptions, actions and methods when those assumptions were not proved true
(b):	To be prepared by TWC	<u>Chapter II:</u> outliers, adequate randomization, one tail and two tail distributions, sufficient replications and number of plants for individual plant recording
(c):	To be prepared by TWC	<u>Chapter III:</u> COY approach
<b>TGP/9</b>	<i>Coordinator: Mr. Law, GB</i>	<u>Testing Distinctness</u>
(a):	To be prepared by GB	<u>Without the application of statistical methods</u>
(b):		<u>With the application of statistical methods</u>
(b1):	To be prepared by TWC	<u>Visually Assessed Characteristics</u> (i) Qualitative Characteristics (non-parametric methods) (ii) Pseudo-qualitative Characteristics (one observation per plant, per plot/row) (iii) Quantitative Characteristics (one observation per plant, per plot/row)
(b2):	To be prepared by TWC  TC/33/7  To be prepared by TWC	<u>Measured Characteristics</u> (i) Self-fertilized and Vegetatively Propagated Species (LSD, other methods) (ii) Cross-fertilized Species  Combined-over-years Distinctness Criterion (COY)  Summary on COYD
	TWC/15/17	Distinctness, Uniformity and Stability Trial Analysis System for Windows (DUSTW)

PLANNED DOCUMENT	PRESENT DOCUMENT	TITLE
(c):	<p><a href="http://www.bioss.sari.ac.uk/upov//pdus/coyd/sl/intro.htm">http://www.bioss.sari.ac.uk/upov//pdus/coyd/sl/intro.htm</a></p> <p>To be prepared on the Website</p> <p>To be prepared by TWC</p> <p>Other methods still to be listed by TWC</p>	<p>Screen-based Input Module for COYD</p> <p>Computer-generated Demonstration of COYD</p> <p>DUSTNT Computer Program</p> <p>Application of Statistics in Non-randomized Plots</p>
<p><b>TGP/10</b></p> <p>(a):</p> <p>(b):</p> <p>(b1):</p> <p>(b2):</p>	<p><i>Coordinator: Mr. Law, GB</i></p> <p>To be prepared by GB</p> <p>To be prepared by TWC</p> <p>TC/34/5 Rev.</p> <p>TC/33/7</p> <p><a href="http://www.bioss.sari.ac.uk/upov//pdus/coyu/sl/intro.htm">http://www.bioss.sari.ac.uk/upov//pdus/coyu/sl/intro.htm</a></p> <p>To be updated by GB</p>	<p><u>Testing of Uniformity</u></p> <p><u>Without the Application of Statistical Methods</u></p> <p><u>With the Application of Statistical Methods</u></p> <p><u>Visually Assessed Characteristics</u></p> <p>(i) Qualitative Characteristics (one observation per plant)</p> <p>(ii) Pseudo-qualitative characteristics (one observation per plant)</p> <p>(iii) Quantitative Characteristics (one observation per plant)</p> <p><u>Measured Characteristics</u></p> <p>(i) Self-fertilized and Vegetatively Propagated Species</p> <p>(ii) Cross-fertilized Species (COYU and Website)</p> <p>Relative Uniformity, Comparable Varieties</p>
<p><b>TGP/11</b></p> <p>(a):</p> <p>(b):</p> <p>(c):</p>	<p><i>Coordinator: Mr. Barendrecht, NL</i></p> <p>To be prepared by TWO</p> <p>To be prepared by JP</p>	<p><u>Observation of Colors</u></p> <p>Use of Color Charts, Connection, Munsel, etc. HCC, Color Pictures, no Use of Colorimeter</p> <p>Correspondence Between Different Color Charts, RHS Colour Chart, Japanese Color Standard for Horticultural Plants (JHS)</p> <p>Grouping of Colors of the RHS Colour Chart</p> <p>Standardization of Pictures</p>



PLANNED DOCUMENT	PRESENT DOCUMENT	TITLE
<p><b>TGP/12</b></p> <p>(a):</p> <p>(b):</p> <p>(c):</p> <p>(d):</p> <p>(e):</p> <p>(f):</p> <p>(g):</p> <p>(h):</p>	<p><i>Coordinator: UPOV Office</i></p> <p>To be prepared by TWC, TWF, TWO, TWV</p> <p>BMT/3/2, to be updated</p> <p>To be prepared by FR</p> <p>TWC/14/14, to be updated</p> <p>TC/32/6, to be prepared</p>	<p><u>Non-traditional Non-morphological Characteristics and Methods for Variety Testing</u></p> <p>Biochemical Characteristics, Electrophoresis, Molecular Marker, Digital Images, etc.</p> <p>Image Analysis</p> <p>Identification Methods Based on Molecular Techniques</p> <p>Resistance to Diseases</p> <p>DUS Assessment of Bulk Samples</p> <p>Combining Characteristics in DUS Assessment (old TGP/14)</p> <p><u>Other Statistical Methods</u></p> <p>Similarity, Clustering and Dendrograms</p> <p>Sequential Analysis</p>
<p><b>TGP/13</b></p> <p>(a):</p> <p>(b):</p>	<p><i>Coordinator: Ms. Scott, GB</i></p> <p>To be updated by GB</p>	<p><u>Guidance for New Types</u></p> <p>Relative Uniformity, Guidance for New Types</p> <p>DUS Testing of New Species</p>
<p><b>TGP/14</b></p>	<p><i>Coordinator: Mr. Guiard, FR</i></p>	<p>Supporting Evidence</p>
<p><b>TGP/15</b></p>	<p><i>Coordinator: Mrs. Buitendag, ZA</i></p> <p>To be prepared</p>	<p>Model System for Determining Distinctness</p>
<p><b>TGP/16</b></p>	<p><i>Coordinators:</i> <i>UPOV Office</i> <i>Ms. Scott, GB +</i> <i>Mrs. Buitendag, ZA</i> <i>Mr. Law, GB +</i> <i>Mr. Pilarczyk, PL</i> To be prepared by TWA, TWC, TWF, TWO, TWV</p>	<p>Definition of Technical, Botanical and Statistical Terms Used in UPOV Documents</p>

[End of document]

