



TC/47/17

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

**TECHNICAL COMMITTEE**

**Forty-Seventh Session**  
**Geneva, April 4 to 6, 2011**

REVISION OF DOCUMENT TGP/7:  
NUMBER OF PLANTS TO BE EXAMINED (FOR DISTINCTNESS)

*Document prepared by the Office of the Union*

1. The purpose of this document is to:
  - (a) invite the Technical Committee to consider certain matters with regard to the number of plants to be examined for distinctness; and
  - (b) to consider a proposal to amend the wording in document TGP/7/2 “Development of Test Guidelines”, in relation to the wording of Chapter 4.1.4 “Number of Plants / Parts of Plants to be Examined” of the Test Guidelines, and to implement that amendment for all Test Guidelines to be adopted in 2011.
2. The following abbreviations are used in this document:

CAJ: Administrative and Legal Committee  
TC: Technical Committee  
TC-EDC: Enlarged Editorial Committee  
TWA: Technical Working Party for Agricultural Crops  
TWC: Technical Working Party on Automation and Computer Programs  
TWF: Technical Working Party for Fruit Crops  
TWO: Technical Working Party for Ornamental Plants and Forest Trees  
TWPs: Technical Working Parties  
TWV: Technical Working Party for Vegetables

## BACKGROUND

3. The Technical Working Parties (TWPs) considered a document prepared by an expert from Germany concerning the number of plants to be considered for the assessment of distinctness. That document is presented as Annex I to this document and was considered by the TWPs as documents TWA/39/14, TWC/28/14, TWV/44/14, TWO/43/14 and TWF/41/14, respectively. The comments of the TWPs are reproduced in Annex II to this document.

### NUMBER OF PLANTS TO BE EXAMINED FOR DISTINCTNESS

4. The discussions in the TWPs reported in Annex II to this document indicated that it might be appropriate to consider developing guidance in document TGP/7 “Development of Test Guidelines” with regard to the following:

- (a) the selection of plants to be examined for distinctness from within the trial;
- (b) the minimum number of plants of candidate varieties required to be able complete the trial, i.e. the minimum number of plants required to examine distinctness, uniformity and stability; and
- (c) the number of plants required for varieties of common knowledge to be compared with candidate varieties for the purpose of distinctness.

5. It was suggested by the TWPs that Mrs. Beate Rücker (Germany), as the author of Annex I to this document, should be invited to draft suitable guidance for inclusion in a future revision of document TGP/7 on the basis of comments received from the TWPs.

### CHAPTER 4.1.4 “NUMBER OF PLANTS / PARTS OF PLANTS TO BE EXAMINED” OF THE TEST GUIDELINES

6. The wording of Chapter 4.1.4 of the Test Guidelines, according to document TGP/7/2, is as follows:

“4.1.4 Number of Plants / Parts of Plants to be Examined

“Unless otherwise indicated, all observations for the purposes of distinctness should be made on { x } plants or parts taken from each of { x } plants, disregarding any off-type plants.

““{ **ASW 7(b)** (Chapter 4.1.4) – Number of Plants / Parts of Plants to be Examined }””

7. ASW 7(b) states as follows:

“The following sentence may be added where appropriate:

““In the case of observations of parts of plants, the number of parts to be taken from each of the plants should be { y }.””

8. The Technical Working Party for Fruit Crops (TWF), at its forty-first session, held in Cuernavaca, Morelos State, Mexico, made the following comments with regard to the guidance in document TGP/7/2:

“33. The TWF noted that the number of plants to be examined for distinctness would be different for different characteristics. For example, it recalled that characteristics such as time of flowering would need to be observed on all plants in the test (disregarding off-types), or at least on more plants than would need to be observed for certain characteristics observed on parts of plants. In that regard, it noted that, for each characteristic, the number of plants to be observed for distinctness was linked to the number of plants to be observed for uniformity and, indirectly, stability. Therefore, it concluded that it would be more appropriate to revert to the structure in document TGP/7/1 which, in Chapter 3.5 “Number of Plants / Parts of Plants to be Examined”, indicates the number of plants to be observed and not just the number of plants to be observed for distinctness. In particular, it agreed that it would be inappropriate to introduce Chapter 4.1.4 “Number of Plants / Parts of Plants to be Examined” [observations for the purposes of distinctness] in Test Guidelines and recommended that the Technical Committee replace that chapter in all Test Guidelines put forward for adoption and amend document TGP/7/2 at the earliest opportunity.

34. However, the TWF agreed that the Additional Standard Wording (ASW 7) provided for Chapter 3.5 “Number of Plants / Parts of Plants to be Examined” in document TGP/7/1, needed to be amended in order to allow for off-type plants, within the number allowed, to be disregarded from the test.

9. The Enlarged Editorial Committee (TC-EDC), at its meeting on January 6, 2011, noted that Chapter 3.5 “Number of Plants / Parts of Plants to be Examined” had been deleted from document TGP/7/2 and that guidance on the number of plants had been moved to Chapter 4.1.4 in document TGP/7/2. The TC-EDC considered the concerns expressed by the TWF and proposed that the wording in Chapter 4.1.4 of the Test Guidelines should be amended according to the following models, based on the wording in document TGP/7/1, Annex 2, Additional Standard Wording (ASW) ASW 7:

Alternative 1: “Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on { x } plants or parts taken from each of { x } plants and any other observations made on all plants in the test, disregarding any off-type plants.”

Alternative 2: “Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on { x } plants or parts taken from each of { x } plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be { y }.”

10. The TC-EDC agreed that the wording of document TGP/7/2 (see paragraphs 6 and 7), as adopted by the Council at its forty-fourth ordinary session, held in Geneva on October 21, 2010, should not be followed in the draft Test Guidelines to be put forward for adoption by the Technical Committee at its forty-seventh session. On that basis, the draft Test Guidelines to be considered for adoption by the Technical Committee (see document TC/47/2) incorporate the amended wording for Chapter 4.1.4, as set out in paragraph 9.

*11. The Technical Committee is invited to:*

*(a) consider if Mrs. Beate Rücker (Germany), should be invited to draft suitable guidance on the number of plants to be examined for distinctness, as set out in paragraphs 3 and 4 of this document, for inclusion in a future revision of document TGP/7;*

*(b) consider the proposed amendment to the wording of Chapter 4.1.4, as set out in paragraph 9, with a view to a revision of document TGP/7; and*

*(c) note that the draft Test Guidelines to be considered for adoption by the Technical Committee at its forty-seventh session incorporate the amended wording for Chapter 4.1.4, as set out in paragraph 9.*

[Annex I follows]

ANNEX I

NUMBER OF PLANTS TO BE CONSIDERED FOR THE ASSESSMENT OF  
DISTINCTNESS

*Document prepared by an expert from Germany*

Introduction

1. The General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants (TG/1/3) explains that:

“2.4.1 For any variety to be capable of protection it must first be clearly defined. Only after a variety has been defined can it be finally examined for fulfillment of the DUS criteria required for protection. All Acts of the UPOV Convention have established that a variety is defined by its characteristics and that those characteristics are therefore the basis on which a variety can be examined for DUS.”

2. This explanation clarifies that it is essential for the definition of a variety and the assessment of DUS to ensure accuracy and consistency in the observation of characteristics. A crucial element for the definition of a variety is the observation and identification of the “typical” expression of its characteristics. The “typical” expression of a characteristic in a variety is considered to be the mean expression under the specific environmental conditions, provided that the plants are vigorous, healthy and well developed. The mean expression considers possible variation between individual plants which may be caused by environmental and genetic factors.

3. The “typical” expression of the variety is the basis for the assessment of distinctness, uniformity and stability. The comparison of varieties for the assessment of distinctness is only possible if the examiner can be sure that the observed expression of characteristics is representative for the variety. In addition, it is only possible to identify off-types if the true-types can clearly be addressed.

4. Several aspects need to be taken into account in order to observe the “typical” expression of characteristics of varieties, e.g.:

- plant material which is representative for the variety
- performance of tests under appropriate environmental conditions
- suitable growing conditions, including sufficient plot size to prevent observations to be biased by boundary or neighbourhood effects
- appropriate description of the expression of characteristics under consideration of variation within and between varieties (according to Test Guidelines)

5. The minimum number of plants per variety for the reliable observation of the “typical” expression of characteristics is of particular importance. In general, this number is lower than the total number of plants in the growing trial because the total number of plants in the growing trial is influenced by other aspects such as the sample size for uniformity assessment, possible losses, agronomic factors, boundary plants etc.. This document does not consider the total number of plants in the growing trial but discusses only the minimum number of plants for the observation of the “typical” expression.

6. Any comparison for the assessment of distinctness needs to be based on representative data of all varieties – candidate variety and similar varieties. If two similar varieties are compared in a growing trial for the assessment of distinctness, the “typical” expression of characteristics needs to be observed for both varieties under the specific environmental conditions. The precision and reliability of the comparison depends on the precision of both values to be compared.

7. The number of plants/parts of plants to be examined for the assessment of distinctness as indicated in the Test Guidelines according to document TGP/7/2 Draft 5, Annex I, Section 4.1.4 should give guidance on the minimum number of plants to be considered for the observation of the “typical” expression of a variety. Consequently, this minimum number applies to the candidate variety and to the similar variety.

8. Improved guidance will be provided in future in the Test Guidelines because, following the adoption of document TGP/7/2, the indication of the number of plants will be specified in relation to the:

- (a) number of plants in the trial (Annex 1, Section 3.4)
- (b) number of plants/parts of plants to be examined for the assessment of distinctness (Annex 1, Section 4.1.4)
- (c) number of plants/parts of plants for the assessment of uniformity (Annex 1, Section 4.2)

9. Because this specification was not made in previously adopted Test Guidelines, the following examples reflect the experience in Germany.

Example: Barley

10. The Test Guidelines for Barley (document TG/3/11) are applied at the national level as follows:

- (a) Number of plants in the trial
  - 2,000 plants divided between two replicates (drill-plots, normal sowing density as used in practice)
  - 1 plot with single spaced plants (low density: 4.2 m<sup>2</sup>, 6 rows, 29 cm between rows, 5 cm between plants) – plots used for the observation of all characteristics where plants or parts of plants have to be removed from the plot.

11. In principle, all characteristics could be observed on drill-plots with normal sowing density, but for technical reasons it is better to remove plants or parts of plants from a plot with lower sowing density to be sure that individual plants are observed. Otherwise, all characteristics could be observed on plots with low sowing density, but that would require more space in the field.

- (b) Number of plants/parts of plants to be examined for the assessment of distinctness

Characteristics to be observed on drill-plots (VG, MG): 1,000 plants (1 replicate)

Characteristics to be observed on plots with single spaced plants (VG, MS): 20 plants/parts of plants

12. The method of observation and the plot type are defined for each characteristic in the national guidelines.

c) Number of plants/parts of plants for the assessment of uniformity

Characteristics to be observed on drill-plots: 2,000 plants

Characteristics to be observed on single spaced plants: 100 plants/parts of plants

13. The same plot design is used for all varieties in the trial. For the assessment of distinctness, the same sample size is observed for candidate and similar varieties, i.e. the “typical” expression of the varieties is assessed with the same precision. Under consideration of the variation within and between varieties, experience has shown that the observation of 20 plants or parts of plants provides a reliable assessment of the mean expression of the variety. The 20 plants need to be representative for the variety, i.e. off-type plants are excluded when the sample is taken.

14. Several characteristics are observed on a sample size of approximately 1,000 plants for the assessment of distinctness. This sample size is chosen for technical reasons because there are approximately 1,000 plants in a plot and the observations are made on the plot as a whole. The plot size is sufficient to disregard any possible boundary and neighbouring effects and to disregard off-types. In any case, the number of plants provides a reliable, precise mean value of the variety. A slightly lower number of plants would not decrease the precision.

15. In barley and many other field crops, the same trial design is used for the candidate and similar varieties. In addition, the total number of plants per variety in the trial is much higher than the minimum number of plants which would be necessary for a sufficiently precise assessment of the mean expression of a variety. The minimum number of plants for the assessment of distinctness is a more critical aspect in the case of species with a low total number of plants per variety in the trial, for example in many fruit crops, roses and other trees or shrubs.

#### Example: Grapevine

16. The Test Guidelines for Grapevine (document TG/50/9) are applied for fruit varieties in grapevine at the national level as follows:

(a) Number of plants in the trial:

8 plants for candidate varieties

4 plants for varieties in the variety collection

(b) Number of plants/parts of plants to be examined for the assessment of distinctness:

4 plants

c) Number of plants/parts of plants for the assessment of uniformity:

8 plants (only applicable for candidate varieties)

17. Under consideration of the variation within and between varieties, experience has shown that the observation of 4 plants or parts of plants provides a reliable assessment of the

mean expression of the variety. In grapevine, a sample with less than 4 plants carries the risk that the mean expression of a variety cannot be observed with sufficient precision and comparisons could be biased by environmental effects. The plants need to be representative for the variety, i.e. off-type plants are excluded when the characteristic is observed for the assessment of distinctness. In practice, characteristics assessed by a single observation/measurement on a group of plants (VG, MG) will be observed on all plants in the trial, i.e. in the case of candidate varieties of grapevine, on 8 plants. Nevertheless, it is important to indicate the minimum number of plants for the assessment of distinctness. The total number of plants for candidate varieties needs to take into account the assessment of distinctness, uniformity and stability. For similar varieties it is only necessary to consider the requirements of distinctness and stability. This might allow fewer plants of similar varieties, to be grown, which is important in order to save space and cost.

18. A similar approach is applied in other species like garden rose, where 6 plants are grown for the candidates and 3 plants are considered for similar varieties, or apple, where 5 plants are grown for the candidates and 3 plants are considered for similar varieties. In both species the minimum number of plants for the assessment of distinctness is 3.

19. The appropriate sample size for the assessment of distinctness should be defined on a crop-by-crop basis under consideration of the minimum number for the determination of the “typical” expression of a variety. Even if the variation within varieties is very low and the characteristics are very stable, a number of less than 3 plants could be critical. If there are only one or two trees, it might not be possible to evaluate differences between the two individuals and to identify any unexpected developments in one or both plants. In the case of two plants it is impossible to declare one plant as an off-type if there is no additional information about this characteristic of the variety. The minimum number needs to be defined according to the characteristics with the highest probability for variation between plants, which is relevant for quantitative and pseudo-qualitative characteristics, in particular.

[Annex II follows]

ANNEX II

NUMBER OF PLANTS TO BE CONSIDERED FOR THE ASSESSMENT OF  
DISTINCTNESS:

Comments by the Technical Working Parties on the document prepared by an expert from  
Germany

*Comments of the Technical Working Party for Agricultural Crops (TWA)*

1. The Technical Working Party for Agricultural Crops (TWA), at its thirty-ninth session, held in Osijek, Croatia, from May 24 to 28, 2010, considered document TWA/39/14.

2. The TWA noted that the revision of document TGP/7 had indicated the need for clarification on the number of plants to be considered for distinctness. In particular, it had highlighted that the number of plants to be considered for distinctness should:

- (i) allow for off-type plants, within the accepted number, to be disregarded; and
- (ii) relate to both the number of plants of the candidate variety(ies) and of varieties of common knowledge to be compared with the candidate(s) in the growing trial.

3. It was agreed that document TWA/39/14 provided a useful explanation of the issues to be considered by the Technical Working Parties when developing Test Guidelines according to document TGP/7/2. It further agreed that Mrs. Beate Rucker (Germany), as the author of document TWA/39/14, should be invited to draft suitable guidance for inclusion in a future revision of document TGP/7 on the basis of comments received from the TWPs.

*Comments of the Technical Working Party on Automation and Computer Programs (TWC)*

4. The Technical Working Party on Automation and Computer Programs (TWC), at its twenty-eighth session, held in Angers, France, from June 29 to July 2, 2010, considered document TWC/28/14.

5. The TWC proposed that consideration be given to developing guidance on:

- (a) how to select the plants to be examined for distinctness from within the trial;
- (b) the minimum number of plants of candidate varieties required to be able complete the trial, i.e. the minimum number of plants required to examine distinctness and uniformity;
- (c) the number of plants required for varieties of common knowledge (reference varieties) to be compared with the candidate varieties; and
- (d) whether, for Test Guidelines with a small number of plants in the DUS trial (e.g. Grapevine), all the plants of the candidate variety might be examined, disregarding any off-type plants, irrespective of the minimum number to be examined. Thus, in the case of grapevine, all 8 plants of candidate varieties might be examined (or 7 if one plant was an off-type).

*Comments of the Technical Working Party for Vegetables (TWV)*

6. The Technical Working Party for Vegetables (TWV), at its forty-fourth session, held in Veliko Tarnovo, Bulgaria, from July 5 to 9, 2010, considered document TWV/44/14.

7. The TWV agreed that document TWV/44/14 provided a useful explanation of the issues to be considered by the Technical Working Parties when developing Test Guidelines according to document TGP/7/2. It further agreed that Mrs. Beate Rucker (Germany), as the author of that document, should be invited to draft suitable guidance for inclusion in a future revision of document TGP/7 on the basis of comments received from the TWPs.

8. The TWV also agreed with the TWC proposal that consideration be given to developing guidance on:

- (a) how to select the plants to be examined for distinctness from within the trial;
- (b) the minimum number of plants of candidate varieties required to be able complete the trial, i.e. the minimum number of plants required to examine distinctness and uniformity;
- (c) the number of plants required for varieties of common knowledge (reference varieties) to be compared with the candidate varieties; and
- (d) whether, for Test Guidelines with a small number of plants in the DUS trial (e.g. Grapevine), all the plants of the candidate variety might be examined, disregarding any off-type plants, irrespective of the minimum number to be examined. Thus, in the case of grapevine, all 8 plants of candidate varieties might be examined (or 7 if one plant was an off-type).

*Comments of the Technical Working Party for Ornamental Plants and Forest Trees (TWO)*

9. The Technical Working Party for Ornamental Plants and Forest Trees (TWO), at its forty-third session, held in Cuernavaca, Morelos State, Mexico, from September 20 to 24, 2010, considered document TWO/43/14.

10. The TWO noted that the revision of document TGP/7 had indicated the need for clarification on the number of plants to be considered for distinctness. In that regard, the TWO agreed that the number of plants to be considered for distinctness should allow for off-type plants, within the accepted number, to be disregarded. However, it agreed that the wording of Chapter 4.1.4 should be amended to read “Unless otherwise indicated, all observations for the purposes of distinctness should be made on at least { x } plants or parts taken from each of { x } plants, disregarding any off-type plants.”.

11. With regard to document TWO/43/14, the TWO agreed that Chapter 4.1.4 of the Test Guidelines related to the number of plants of candidate varieties and did not refer to reference varieties. It agreed that the number of plants of reference varieties was a separate matter.

*Comments of the Technical Working Party for Fruit Crops (TWF)*

12. The Technical Working Party for Fruit Crops (TWF), at its forty-first session, held in Cuernavaca, Morelos State, Mexico, from September 27 to October 1, 2010, considered document TWF/41/14.

13. The TWF noted that the number of plants to be examined for distinctness would be different for different characteristics. For example, it recalled that characteristics such as time of flowering would need to be observed on all plants in the test (disregarding off-types), or at least on more plants than would need to be observed for certain characteristics observed on

parts of plants. In that regard, it noted that, for each characteristic, the number of plants to be observed for distinctness was linked to the number of plants to be observed for uniformity and, indirectly, stability. Therefore, it concluded that it would be more appropriate to revert to the structure in document TGP/7/1 which, in Chapter 3.5 “Number of Plants / Parts of Plants to be Examined”, indicates the number of plants to be observed and not just the number of plants to be observed for distinctness. In particular, it agreed that it would be inappropriate to introduce Chapter 4.1.4 “Number of Plants / Parts of Plants to be Examined” [observations for the purposes of distinctness] in Test Guidelines and recommended that the Technical Committee replace that chapter in all Test Guidelines put forward for adoption and amend document TGP/7/2 at the earliest opportunity.

14. However, the TWF agreed that the Additional Standard Wording (ASW 7) provided for Chapter 3.5 “Number of Plants / Parts of Plants to be Examined” in document TGP/7/1, needed to be amended in order to allow for off-type plants, within the number allowed, to be disregarded from the test.

15. The TWF agreed that it would be useful to develop guidance in document TGP/7, to be incorporated in all Test Guidelines, for the minimum number of plants required for a DUS test to be conducted. It agreed that such guidance might be in the form of a minimum number of plants in each of the Test Guidelines, or if that was not achievable, general guidance might be developed to explain that a DUS trial containing a number of plants below the number specified in Chapter 3.4 “Test Design” of the Test Guidelines might not necessarily invalidate the trial.

16. The TWF agreed with the TWO that the number of plants specified to be examined for distinctness in the Test Guidelines referred to the number of plants of candidate varieties and did not refer to reference varieties. It agreed that the number of plants of reference varieties was a separate matter.

[End of Annex II and of document]