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TWA/39/14
ORIGINAL: English
DATE: May 4, 2010

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY FOR AGRICULTURAL CROPS

Thirty-Ninth Session
Osijek, Croatia, May 24 to 28, 2010

NUMBER OF PLANTS TO BE CONSIDERED FOR THE ASSESSMENT OF DISTINCTNESS (REVISION OF DOCUMENT TGP/7)

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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.

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^2, 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.

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.

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