



**TGP/10.2 Draft 3**  
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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**  
GENEVA

Associated Document  
to  
The General Introduction to the Examination  
of Distinctness, Uniformity and Stability and the  
Development of Harmonized Descriptions of New Varieties of Plants (document TG/1/3)

**DOCUMENT TGP/10**  
**“EXAMINING UNIFORMITY”**

**Section TGP/10.2: Assessing Uniformity According to the Features of Propagation**

*Document prepared by an expert from Germany  
to be considered by the*

*Technical Working Party on Automation and Computer Programs (TWC), at its  
twenty-second session to be held in Tsukuba, Japan, from June 14 to 17, 2004*

**SECTION 10.2****ASSESSING UNIFORMITY ACCORDING TO  
THE FEATURES OF PROPAGATION**

1. The variation in the expression of characteristics within varieties is the critical consideration in the assessment of uniformity. This variation has both genotypic and environmental components. The genotypic component is mainly influenced by the features of propagation. According to Article 8 of the 1991 Act of the UPOV Convention, uniformity of a variety is therefore considered on the basis of "... the variation that may be expected from the particular features of its propagation, ...". The level of environmental variation depends on the sensitivity of individual plants to environmental influences. There is usually little environmental variation for qualitative characteristics. For quantitative characteristics, the level of environmental variation can differ from species to species and from characteristic to characteristic.

(a) A high level of genotypic homogeneity is expected for vegetatively propagated and truly self-pollinated varieties. Variation in the expression of characteristics within such varieties should result, predominantly, from environmental influences.

(b) Variation in the expression of characteristics within mainly self-pollinated varieties should also result, predominantly, from environmental influences but a low level of genotypical variation caused by some cross pollination is accepted. Therefore more variation may be tolerated than for vegetatively propagated and truly self-pollinated varieties.

(c) In cross-pollinated varieties (including synthetic varieties) variation in the expression of characteristics within varieties results from both genotypical and environmental components. In relation to self-pollinated, vegetatively propagated and mainly self-pollinated varieties a higher genotypical variation is accepted. The overall level of variation is, therefore, generally higher in cross-pollinated and synthetic varieties.

(d) Genotypic variation in hybrid varieties depends on the type of hybrid (single- or multiple-cross), the level of genotypical variation in the parental lines (inbred lines or others) and the system for hybrid seed production (mechanical emasculation, system of male sterility etc.). The tolerance limits for uniformity are set according to the specific situation resulting from genotypic and environmental influences on the variation in the expression of characteristics.

2. As a result of the above, appropriate uniformity standards for the different types of varieties must be developed according to the features of propagation (specific population standards).

3. The type of variation in the expression of characteristics within varieties determines how that characteristic is used to determine uniformity in the crop (off-types in case of discontinuous variation or variances in case of continuous variation of characteristics). Thus, the uniformity of the crop may be determined by off-types alone, by variances of the characteristics alone, or by off-types for some characteristics and by variances for other characteristics.

## 10.2.1 Uniformity Assessment on the Basis of Off-Types

4. For characteristics with a low level of genotype and environmental variation it is possible to detect plants which are visually different to the variety and are considered as off-types. The General Introduction defines off-type as follows:

*“6.4.1.1 Determination of Off-Types by Visual Assessment*

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 features of its propagation. This 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 (see Chapter 5, section 5.5.2).”

In cases where off-types can be detected, the off-type procedure is recommended for the assessment of uniformity.

5. The proportion of off-types tolerated in a variety depends on the features of its propagation.

(a) In vegetatively propagated, self-pollinated and mainly self-pollinated varieties, the recommended limit for the number of off-types is based on an absolute population standard and a fixed acceptance probability (absolute population standard, see Section 10.3.2.1, “absolute” because it is fixed in a general way). The population standard and the acceptance probability as well as the acceptable number of off types for a given sample size are specified in the individual Test Guidelines.

(b) Most characteristics in cross pollinated varieties show continuous variation within varieties (for assessment of uniformity see Section 10.2.2). If, especially in qualitative characteristics, the great majority of individuals of a variety have the same expression, plants with a clearly different expression can be detected as off-types (e.g. root color in fodder beet). In such cases the off-type procedure is appropriate for cross pollinated varieties (including synthetic varieties). The recommended limit for the number of off-types should then be based on the number of off-types in comparable varieties. Comparable varieties are varieties of the same type that have been previously examined and considered to be uniform. The variability of a candidate variety should not exceed the variability of comparable varieties already known (i.e. the number of off-types should not be greater than the number found in the varieties which have been examined and considered to be uniform). Therefore, the comparable varieties are the basis for the calculation of an appropriate population standard which is used with a fixed acceptance probability (relative population standard, see Section 10.3.2.2, “relative” because it is fixed in comparison to other varieties). If the calculated relative population standard would be more stringent than the standard for the same sample size in self-pollinated varieties, the latter should be applied in cross-pollinated varieties, too. An appropriate absolute population standard which is fixed on the basis of experience may also be applied in the case of a very low number of comparable varieties e.g. in new or small species (see TGP/13, chapter 9 *Remark: Is structure of TGP/13 already clear?*).

6. If off-types cannot be detected visually, uniformity must be assessed on the basis of variances. In some cases it may be appropriate to detect off-types in measurements or visual observations taken from individual plants. Guidance for such procedures is given in Section 10.3.2.

### **10.2.2 Uniformity Assessment on the Basis of Variances**

7. If the detection of off-types is not possible because of considerable genotypic and/or environmental variation within varieties, uniformity should be assessed after taking this variation into account. The variability of a candidate variety should not exceed the variability of comparable varieties already known. The comparison between a candidate variety and comparable varieties is carried out on the basis of variances calculated from individual plant observations. The COYU procedure is the recommended statistical method for this comparison (see Section 10.3.1). This procedure calculates the tolerance limit on the basis of comparable varieties already known i.e. uniformity is assessed using a relative tolerance limit.

### **10.2.3 Uniformity Assessment for Varieties with Segregating Characteristics**

8. For multiple cross hybrids and synthetic varieties, a segregation of certain characteristics, in particular qualitative characteristics, is accepted if it is compatible with the expression of the parental lines and the method of propagating the variety. If the inheritance of a segregating characteristic is known, the variety is considered to be uniform if the characteristic behaves in the predicted manner. Guidance for assessing consistency with the predicted segregation ratio is provided in Section 10.3.3.

9. If the inheritance of a clear-cut segregating characteristic is not known, the observed segregation ratio should be described. An assessment of uniformity is not possible for these characteristics. (The rules outlined for predictable segregation ratios in Chapter 10.3.3 should be used for testing stability.)

10. In quantitative characteristics segregation in multiple hybrids may result in a continuous variation. In such cases uniformity is assessed as in cross-pollinated varieties on the basis of relative uniformity standards calculated from the range of variation of comparable varieties.

### **10.2.4 Uniformity Assessment without the use of statistical methods**

11. The development of this section to be considered by the Technical Working Party for Vegetables.

*Remark: I don't see that comment in TWV/37/8 (see also TC/40/5). In my opinion "Uniformity assessment without use of statistical methods" should not be part of TGP/10.2. There is no relation to the features of propagation*

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