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*Document prepared by experts from Germany*

10.2

## **Assessing Uniformity According to the Features of Propagation**

The variation in the expression of characteristics within varieties is a critical consideration in the judgment of uniformity. This variation has both genotypic and environmental components. The features of propagation influence only the genotypic component. The level of environmental variation depends on the sensitivity of individual plants to environmental influences. There is 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 high level of genotypic homogeneity is expected for vegetatively propagated and truly self-pollinated varieties. Variation within such varieties should result, predominantly, from environmental influences.
- Variation 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, the tolerance limit for uniformity is higher than for vegetatively propagated and truly self-pollinated varieties.
- In cross-pollinated varieties (including synthetic varieties) variation 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.

The variation within varieties which results from the features of propagation and environmental influence is important for the choice of the method for uniformity assessment (off-types vs. variances). Appropriate uniformity standards for different types of varieties must be developed according to the features of propagation (certain population standards).

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

For characteristics with a low level of genotype and environmental variation it is possible to detect plants which are visually dissimilar to the variety and are considered as off-types. A plant is considered to be an off-type if it can be clearly distinguished from the variety in the expression of a characteristic. The standard for the recognition of an off-type in a variety is the same as for distinctness between varieties. This makes it clear, that the variation within varieties is considered in relation to the standard for distinctness. In cases where off-types can be detected visually the off-type procedure is the recommended method for uniformity assessment.

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

In vegetatively propagated, self-pollinated and mainly self-pollinated varieties, the recommended limit for the number of off-types is based on a fixed population standard and acceptance probability (absolute population standard, see chapter 10.3.2.1). The population standard and the acceptance probability is recommended in the individual Test Guidelines.

The recommended limit for the number of off-types in cross-pollinated varieties (including synthetic varieties) is based on the limit for off-types in comparable varieties. The comparable varieties or types are the basis for the population standard (relative population standard, see chapter 10.3.2.2) which is used with a fixed acceptance probability.

If off-types cannot be detected visually, uniformity must be assessed on the basis of measurements. There is no recommended method for the detection of off-types by measurements. Where measurements are used, it is recommended that uniformity is assessed on the basis of variances.

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

If the detection of off-types is not possible because of considerable genotypic and/or environmental variation within varieties, uniformity should be assessed on the basis of this variation. The variability of a candidate variety should not exceed the variability of comparable varieties or types. 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 one recommended statistical method for this comparison (see chapter 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**

For multiple cross hybrids, a segregation of certain 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. The agreement with the predicted segregation ratio is assessed by the method outlined in Chapter 10.3.3.

If the inheritance of a segregating characteristic is not known, the expression of the characteristics is recorded as in cross-pollinated varieties for segregating qualitative characteristics. The observed segregation ratio should be described. An assessment of uniformity is not possible. (The rules outlined for predictable segregation ratios in Chapter 10.3.3 should be used for testing stability.)

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