

Enlarged Editorial Committee

TC-EDC/Mar18/16

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UNIFORMITY ASSESSMENT ON THE BASIS OF OFF-TYPES: METHOD FOR MORE THAN ONE SINGLE TEST (YEAR)*Document prepared by the Office of the Union**Disclaimer: this document does not represent UPOV policies or guidance*

EXECUTIVE SUMMARY

1. The purpose of this document is to report on developments concerning the revision of guidance in document TGP/8/2: Part II: Section 8: “The method of uniformity assessment on the basis of off-types” in order to reflect the practice within members of the Union on the use of methods for more than one single test (year), in conjunction with the revision of document TGP/10 on “Assessing uniformity by off-types on the basis of more than one growing cycle or on the basis of sub-samples”.

2. The TC-EDC is invited to consider inviting the expert from the United Kingdom to draft a proposal for the revision of guidance in document TGP/8/2: Part II: Section 8: Subsection 8.1.7: “Method for more than one single test (year)” for consideration by the TWC, at its session in 2018.

BACKGROUND

3. The TC, at its fifty-third session, held in Geneva from April 3 to 5, 2017, considered document TC/53/19 “Revision of document TGP/10: New section: Assessing uniformity by off-types on basis of more than one growing cycle or on the basis of sub-samples” and agreed that, in conjunction with the revision of document TGP/10, the guidance in document TGP/8/2: Part II: 8: “The method of uniformity assessment on the basis of off-types” should be revised to reflect the practice within members of the Union on the use of methods for more than one single test (year) (see document TC/53/31 “Report”, paragraph 125).

Current guidance in document TGP/8

4. The current guidance in document TGP/8: Part II: Section 8: “The method of uniformity assessment on the basis of off-types”, Subsection 8.1.7: “Method for more than one single test (year)” is reproduced as an Annex to this document.

PROPOSAL

5. It is proposed that the TC-EDC consider inviting the expert from the United Kingdom to draft a proposal for the revision of guidance in document TGP/8/2: Part II: Section 8: Subsection 8.1.7: “Method for more than one single test (year)” for consideration by the TWC, at its session in 2018.

6. *The TC-EDC is invited to consider inviting the expert from the United Kingdom to draft a proposal for the revision of guidance in document TGP/8/2: Part II: Section 8: Subsection 8.1.7: “Method for more than one single test (year)” for consideration by the TWC, at its session in 2018.*

[Annex follows]

ANNEX

EXTRACT FROM DOCUMENT TGP/8: PART II: SECTION 8: "THE METHOD OF UNIFORMITY ASSESSMENT ON THE BASIS OF OFF-TYPES"

*"8.1.7 Method for more than one single test (year)**"8.1.7.1 Introduction*

"8.1.7.1.1 Often a candidate variety is grown in two (or three years). The question then arises of how to combine the uniformity information from the individual years. Two methods will be described:

- "(a) Make the decision after two (or three) years based on the total number of plants examined and the total number of off-types recorded. (A combined test).
- "(b) Use the result of the first year to see if the data suggests a clear decision (reject or accept). If the decision is not clear then proceed with the second year and decide after the second year. (A two-stage test).

"8.1.7.1.2 However, there are some alternatives (e.g. a decision may be made in each year and a final decision may be reached by rejecting the candidate variety if it shows too many off-types in both (or two out of three years)). Also there are complications when more than one single year test is done. It is therefore suggested that a statistician should be consulted when two (or more) year tests have to be used.

"8.1.7.2 Combined test

"The sample size in test i is n_i . So after the last test we have the total sample size $n = \sum n_i$. A decision scheme is set in exactly the same way as if this total sample size had been obtained in a single test. Thus, the total number of off-types recorded through the tests is compared with the maximum number of off-types allowed by the chosen decision scheme.

"8.1.7.3 Two-stage test

"8.1.7.3.1 The method for a two-year test may be described as follows: In the first year take a sample of size n . Reject the candidate variety if more than r_1 off-types are recorded and accept the candidate variety if less than a_1 off-types are recorded. Otherwise, proceed to the second year and take a sample of size n (as in the first year) and reject the candidate variety if the total number of off-types recorded in the two years' test is greater than r . Otherwise, accept the candidate variety. The final risks and the expected sample size in such a procedure may be calculated as follows:

$$\begin{aligned}\alpha &= P(K_1 > r_1) + P(K_1 + K_2 > r \mid K_1) \\ &= P(K_1 > r_1) + P(K_2 > r - K_1 \mid K_1) \\ &= \sum_{i=r_1+1}^n \binom{n}{i} P^i (1-P)^{n-i} + \sum_{i=\alpha_1}^{r_1} \binom{n}{i} P^i (1-P)^{n-i} \sum_{j=r-i+1}^n \binom{n}{i} P^j (1-P)^{n-j} \quad (3)\end{aligned}$$

$$\begin{aligned}\beta_q &= P(K_1 < \alpha_1) + P(K_1 + K_2 \leq r \mid K_1) \\ &= P(K_1 < \alpha_1) + P(K_2 \leq r - K_1 \mid K_1) \\ &= \sum_{i=0}^{\alpha_1-1} \binom{n}{i} P_q^i (1-P_q)^{n-i} + \sum_{i=\alpha_1}^{r_1} \binom{n}{i} P_q^i (1-P_q)^{n-i} \sum_{j=0}^{r-i} \binom{n}{i} P_q^j (1-P_q)^{n-j} \quad (4)\end{aligned}$$

$$n_e = n \left(1 + \sum_{i=\alpha_1}^{r_1} \binom{n}{i} P^i (1-P)^{n-i} \right) \quad (5)$$

“where

- “P = population standard
- “ α = probability of actual Type I error for P
- “ β_q = probability of actual Type II error for q P
- “ n_e = expected sample size
- “ r_1 , α_1 and r are decision-parameters
- “ P_q = q times population standard = q P
- “ K_1 and K_2 are the numbers of off-types found in years 1 and 2 respectively.

“The decision parameters, α_1 , r_1 and r, may be chosen according to the following criteria:

- (a) α must be less than α_0 , where α_0 is the maximum Type I error, i.e. α_0 is 100 minus the required acceptance probability
- (b) β_q (for q=5) should be as small as possible but not smaller than α_0
- (c) if β_q (for q=5) < $\alpha_0 n_e$ should be as small as possible.

“8.1.7.3.2 However, other strategies are available. No tables/figures are produced here as there may be several different decision schemes that satisfy a certain set of risks. It is suggested that a statistician should be consulted if a 2-stage test (or any other sequential tests) is required.

“8.1.7.4 Sequential tests

“The two-stage test mentioned above is a type of sequential test where the result of the first stage determines whether the test needs to be continued for a second stage. Other types of sequential tests may also be applicable. It may be relevant to consider such tests when the practical work allows analyses of off-types to be carried out at certain stages of the examination. The decision schemes for such methods can be set up in many different ways and it is suggested that a statistician should be consulted when sequential methods are to be used.”

[End of Annex and of document]