



TWO/45/9

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

Geneva

**TECHNICAL WORKING PARTY FOR ORNAMENTAL PLANTS AND FOREST TREES****Forty-Fifth Session****Jeju, Republic of Korea, August 6 to 10, 2012****SUMMARY OF ASSESSING UNIFORMITY BY OFF-TYPES ON THE BASIS  
OF MORE THAN ONE SAMPLE OR SUB-SAMPLE***Document prepared by the Office of the Union*

1. The purpose of this document is to present a summary of approaches used by members of the Union in assessing uniformity by off-types on the basis of more than one sample or sub-sample.

Background

2. At its twenty-second session, held in Tsukuba, Japan, from June 14 to 17, 2004, the Technical Working Party on Automation and Computer Programs (TWC) agreed to produce a questionnaire to seek information on population standards used in the assessment of uniformity by off-types, in particular when tests from more than one year were used.
3. At the twenty-fifth session of the TWC, held in Romania, from September 3 to 6, 2007, the TWC discussed the draft questionnaire on off-types contained in document TWC/25/18. The TWC noted that the questionnaire was intended to address only situations where uniformity by off-types was assessed on the basis of more than one sample, or on a sub-sample of a single sample, and agreed that the title of the questionnaire should be amended accordingly. The TWC agreed that the results of the questionnaire should be reviewed with a view to incorporating guidance in document TGP/8, Part II, "I. The Method of Uniformity Assessment on the Basis of Off-Types".
4. At its twenty-sixth session, held in Jeju, Republic of Korea, from September 2 to 5, 2008, the TWC considered document TWC/26/8 "Population standards used for assessing uniformity by off-types on the basis of more than one sample", prepared by experts from Germany, the United Kingdom and the Office of the Union. The TWC agreed that a questionnaire could be issued on the basis of the Annex to document TWC/26/8, with certain minor amendments. However, the TWC noted that the example provided in the Annex to document TWC/26/8 indicated that it would be useful for the TWC to discuss the use of such an approach.

Developments in 2009*Technical Committee*

5. The Technical Committee (TC), at its forty-fifth session, held in Geneva from March 30 to April 1, 2009, considered the draft questionnaire "Population standards used for assessing uniformity by off-types on the basis of more than one sample", as presented in the Annex to document TC/45/3. The TC agreed that the draft questionnaire, as presented in the Annex to document TC/45/3, should be circulated for consideration by the Technical Working Parties (TWPs) at their sessions in 2009 and requested the Office of

the Union to provide a new draft of the questionnaire, based on the TWP comments, for approval at the forty-sixth session of the TC in 2010. The TC agreed that the approved questionnaire should be issued by the Office of the Union to the TC representatives of the members of the Union and the replies presented for consideration by the TC at its forty-seventh session. On the basis of the replies, the TC would consider whether that matter should be included in a future revision of document TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".

#### *Technical Working Party for Vegetables*

6. At its forty-third session, held in Beijing, China, from April 20 to 24, 2009, the Technical Working Party for Vegetables (TWV) considered the draft questionnaire presented in the Annex to document TWV/43/14 "Assessing Uniformity by Off-Types on the Basis of More Than One Sample or Sub-Samples". The TWV agreed that the questionnaire should provide a further example to illustrate options where uniformity was assessed in a plant sample of 40 plants in each of two independent growing cycles, in two separate plantings. In the first option, the uniformity would be assessed in 80 plants over the two growing cycles. In the second option, the uniformity would be assessed in 40 plants in each of the two years, with a decision rule that failure in one year would lead to a third year of examination, with the final decision being based on two years out of three.

#### *Technical Working Party on Automation and Computer Programs*

7. At its twenty-seventh session, held in Alexandria, Virginia, United States of America, from June 16 to 19, 2009, the TWC considered the draft questionnaire presented in the Annex to document TWC/27/13 "Assessing Uniformity by Off-Types on the Basis of More Than One Sample or Sub-Samples". With regard to the draft questionnaire in the Annex to that document, it was agreed that paragraph 1.4 should read as follows "Please complete the attached form with information on how uniformity is assessed by off-types for cases where more than one sample or sub-sample are used, as explained in paragraph 1.3."

#### *Technical Working Party for Agricultural Crops*

8. At its thirty-eighth session, held in Seoul, Republic of Korea, from August 31 to September 4, 2009, the Technical Working Party for Agricultural Crops (TWA) considered document TWA/38/12. The TWA agreed that the draft questionnaire presented in document TWA/38/12 should, before the example, present a blank questionnaire to clarify the questions on which information was requested. The TWA considered that the decision rule presented in the example in the Annex to the document was not clear and proposed that it be clarified, particularly for the decision rule at the end of each growing cycle, and agreed that reference should be made to growing "cycles" rather than "years".

9. The TWA considered that the experts from each Technical Working Party should be invited to complete the questionnaire with information for relevant crops/species. In that regard, it agreed that the TWA experts should be invited to supply information on potato and wheat or, if not suitable for the member of the Union concerned, to complete the questionnaire for another vegetatively propagated root crop and self-pollinated cereal.

#### *Technical Working Party for Ornamental Plants and Forest Trees*

10. At its forty-second session, held in Angers, France, from September 14 to 18, 2009, the Technical Working Party for Ornamental Plants and Forest Trees (TWO) considered document TWO/42/12 and agreed that it would not be relevant to request information on assessing uniformity by off-types on the basis of more than one sample or sub-samples for ornamental plants or forest trees.

#### *Technical Working Party on Fruit Crops*

11. At its fortieth session, held in Angers, France, from September 21 to 25, 2009, the Technical Working Party for Fruit Crops (TWF) considered document TWF/40/12 and agreed that TWF experts should be invited to supply information on apple by means of the questionnaire.

## Developments in 2010

### *Technical Committee*

12. At its forty-sixth session, held in Geneva from March 22 to 24, 2010, the TC considered document TC/46/14 "Assessing Uniformity by Off-Types on the Basis of More Than One Sample or Sub-samples". The TC agreed that the TWV, at its forty-fourth session, to be held in Veliko Tarnovo, Bulgaria, from July 5 to 9, 2010, should be invited to agree on a vegetable crop for inclusion in the questionnaire. The Office of the Union would complete and issue the questionnaire after a vegetable crop had been selected by the TWV. The TC agreed that the translation of the questionnaire should be checked by the relevant language experts of the Editorial Committee and also agreed that paragraph 1.4 should be elaborated to explain that the process and the way in which the data was obtained and used in the decision-making process should be reflected in the responses to the questionnaire.

13. The TC requested the Office of the Union to send the questionnaire to the TC representatives of the members of the Union for completion, and to provide a document compiling the replies for consideration at the forty-seventh session of the TC. The TC also requested that the document identify any matters that might be considered in relation to the revision of document TGP/8.

14. At its forty-fourth session, held in Veliko Tarnovo, Bulgaria, from July 5 to 9, 2010, the TWV considered document TWV/44/9 "Assessing Uniformity by Off-Types on the Basis of More Than One Sample or Sub-Samples" and agreed that Cauliflower should be added as a vegetable example for the questionnaire "Population standards used for assessing uniformity by off-types on the basis of more than one sample", with the necessary information to be provided by experts from France.

## Developments in 2011

15. On February 7, 2011, the Office of the Union issued Circular E-1466 to the designated persons of members in the TC with the questionnaire "Population standards used for assessing uniformity by off-types on the basis of more than one sample". Annexes I to VI to this document contain the replies to Circular E-1466 received from Bulgaria, Chile, the European Union, Croatia, Czech Republic, Estonia, Georgia, Germany, Hungary, Ireland, Latvia, New Zealand, Republic of Moldova, Singapore, Spain and Sweden. The following table lists the replies by crop and indicates the Annex to this document in which the information is presented.

Crop/Species	Annex	UPOV Member
Wheat	Annex I	Bulgaria, Chile, Croatia, Czech Republic, Estonia, European Union, Georgia, Germany, Hungary, Italy, New Zealand, Norway, Republic of Moldova, Spain, Sweden
Potato	Annex II	Bulgaria, Chile, Czech Republic, European Union, Georgia, Germany, Ireland, Italy, New Zealand, Republic of Moldova
Apple	Annex III	Bulgaria, Chile, Czech Republic, European Union, Georgia, Germany, Latvia, New Zealand, Republic of Moldova
Cauliflower	Annex IV	Bulgaria, Czech Republic, European Union, France, Italy, Spain
Chinese cabbage	Annex V	Singapore
Lettuce	Annex VI	New Zealand
Barley	Annex VII	Italy

### *Technical Committee*

16. The TC, at its forty-seventh session held in Geneva from April 4 to 6, 2011, considered the information provided in Annexes I to VII to this document, in relation to matters that might be considered in a future version of document TGP/8.

### *Technical Working Party for Agricultural Crops*

17. The TWA, at its fortieth session, held in Brasilia, Brazil, from May 16 to 20, 2011, considered document TWA/40/9. An expert from France explained that the different approaches for assessing

uniformity by off-types on the basis of more than one sample or sub-samples were not exclusively a statistical issue. The expert from Germany clarified that, even though applying the same population standard recommended by Test Guidelines, there may be reasons, such as variation between years or different administrative procedures, for using different approaches. She wondered whether it would be appropriate to develop a general recommendation beyond what is already in the Test Guidelines. She added that the information on population standard in the Test Guidelines provided a good recommendation. Experts from Australia, the Netherlands and the Czech Republic considered that, if different approaches could lead to different results, it might be useful for the TWC to provide some guidance on the possible consequences of different approaches.

18. The TWA agreed that the use of different approaches was the result of different factors, and that it may not be possible to develop general guidance beyond the recommendations already provided in the Test Guidelines. However, some experts considered that it might be useful for the TWC to consider the information contained in the replies to the questionnaire "Population standards used for assessing uniformity by off-types on the basis of more than one sample" and to provide some guidance on the consequences of different approaches (see document TWA/40/23 "Report", paragraphs 42 and 43).

#### *Technical Working Party on Automation and Computer Programs*

19. The TWC, at its twenty-ninth session, held in Geneva, from June 7 to 10, 2011, considered document TWC/29/9. The TWC agreed that Mr. Uwe Meyer (Germany) and Mr. Humberto Vaquera Huerta (Mexico), with the assistance of crop experts, would prepare a document to explore the consequences of different approaches on using real data.

20. Furthermore the TWC requested the UPOV Office to prepare a summary document of the results of the questionnaire (see document TWC/29/31 "Report", paragraphs 57 and 58).

#### *Technical Working Party for Vegetables*

21. The TWV, at its forty-fifth session, held in Monterey, United States of America, from July 25 to 29, 2011, considered document TWV/45/9.

22. The TWV noted that a large proportion of information provided in the annexes to document TWV/45/9 did not correspond to the assessment of uniformity by off-types on the basis of more than one sample or sub-sample. It agreed that a summary of the information corresponding to the assessment of uniformity by off-types on the basis of more than one sample or sub-sample should be prepared by the Office of the Union in order to be able to consider the matter. It agreed that the summary should categorize the different situations where more than one sample or sub-sample were used and should also consider how the results from separate samples / sub-samples were combined for an overall assessment of uniformity of a variety (see document TWV/45/26 "Report", paragraph 74).

#### *Technical Working Party for Ornamental Plants and Forest Trees*

23. The TWO, at its forty-fourth session held in Fukuyama City, Hiroshima Prefecture, Japan, from November 7 to 11, 2011, noted the information contained in document TWO/44/9 (see document TWO/44/25 "Report", paragraph 52).

#### *Technical Working Party on Fruit Crops*

24. The TWF held its forty-second session in Hiroshima, Japan, from November 14 to 18, 2011, considered document TWF/42/9 (see document TWF/42/26 Rev. "Revised Report", paragraph 59).

## Developments in 2012

### *Technical Committee*

25. The TC, at its forty-eighth session held in Geneva from March 26 to 28, 2012 considered document TC/48/14 "Assessing uniformity by off-types on the basis of more than one sample or sub-sample".

26. The TC, at its forty-eighth session, requested the Office of the Union to prepare a summary of the information in the Annexes to document TC/48/14, corresponding to the assessment of uniformity by off-types on the basis of more than one sample or sub-sample. The summary would categorize the different situations where more than one sample or sub-sample were used and how the results from separate samples/sub-samples were combined for an overall assessment of uniformity of a variety.

27. The TC, at its forty-eighth session agreed to invite the TWC to consider the information contained in the replies to the questionnaire "Population standards used for assessing uniformity by off types on the basis of more than one sample", as contained in the annexes to document TC/48/14 and in the summary to be produced by the Office of the Union, and to provide guidance on the consequences of different approaches (see document TC/48/22 "Report on the Conclusions", paragraphs 128 to 130).

### Summary of approaches

28. Annexes I to IV of this document summarize different situations when different samples are combined for the overall assessment of uniformity of a variety, on the basis of a summary prepared by the Office of Union, as amended by the Technical Working Party for Agricultural Crops (TWA), at its forty-first session held in Angers, France, from May 21 to 25, 2012 (see document TWA/41/34 "Report", paragraphs 46 to 50), as follows:

#### *Situation A: Two growing cycles in a single location*

Approach: Third growing cycle in the case of inconsistent results  
Approach: Combining the results of two growing cycles

#### *Situation B: Two growing locations in the same year*

Approach: Third growing cycle in the case of inconsistent results  
Approach: Combining the results of two locations

#### *Situation C: More than one test/trial in the same growing cycle*

Approach: Additional growing cycle in the case of inconsistent results

#### *Situation D: Assessing sub-samples within a single test/trial*

Approach: Sub-sample as a first step of assessment

29. The summary in Annexes I to IV only relates to situations where more than one sample, or sub-sample, concern the examination of the same characteristic. In the case of different samples, or sub-samples (e.g. special test), to examine a different characteristic there is no requirement to combine the results because a variety is required to be uniform for all relevant characteristics.

30. Annexes I to IV also present the comments made by the TWA at its forty-first session, held in Angers , France, from May 21 to 25, 2012, by the TWV, at its forty-sixth session, held near the city of Venlo, Netherlands, from June 11 to 15, 2012 and by the TWC, at its thirtieth session, held in Chisinau, Republic of Moldova, from June 26 to 29, 2012.

[Annexes follow]

## SITUATION A: TWO GROWING CYCLES IN A SINGLE LOCATION

**Approach: Third growing cycle in the case of inconsistent results**

(Bulgaria, Chile (Wheat), Czech Republic, European Union (Potato), Germany, Georgia, Italy (Potato), Ireland (Potato) Latvia, New Zealand (Lettuce and Apple mutations)).

A variety is considered uniform if it is within the uniformity standard in both of the two growing cycles.

A variety is considered non-uniform if it fails to meet the uniformity standard in both of the two growing cycles.

If at the end of the two growing cycles the variety is within the uniformity standard in one growing cycle but is not within the uniformity standard in the other growing cycle, then uniformity is assessed in a third growing cycle after consultation with the applicant. If in the third growing cycle the variety is within the uniformity standard, the variety is considered uniform. If in the third growing cycle the variety fails to meet the uniformity standard, the variety is considered non-uniform.

**Approach: Combining the results of two growing cycles**

Republic of Moldova, Chile (Potato), Spain (Cauliflower)).

A variety is considered uniform if it is within the uniformity standard in both of the two growing cycles.

A variety is considered non-uniform if it fails to meet the uniformity standard in both of the two growing cycles.

A variety is considered uniform if the total number of off-types at the end of the two growing cycles does not exceed the number of allowed off-types for the combined sample.

The TWA, at its forty-first session, agreed that clarification should be provided for Situations A and B if the approach combining the results from two growing cycles was considered to correspond to the requirement for “independent” growing cycles ( see document TWA/41/34 “Report”, paragraph 47).

The TWV, at its forty-sixth session held near the city of Venlo, Netherlands, June 11 to 15, 2012, noted the different approaches and the similarity between the approaches used in different UPOV members. It agreed to invite the Technical Working Party on Automation and Computer Programs (TWC) to advise whether to use individual or combined results. The experts from Germany, Italy, France and the Netherlands offered to provide examples and data to the TWC, if needed (see document TWV/46/41 “Report”, paragraph 55).

The TWC, at its thirtieth session held Chisinau, Republic of Moldova, June 26 to 29, 2012, noted the need for further explanation on the situations described, such as the clarification of whether two growing cycles related to the use of the same sample and were carried out in the same year. The TWC agreed that more detailed information and further analysis were needed in order to give guidance on consequences on the use of the different approaches. The TWC agreed that France, Germany and the Netherlands would present one or more concrete situations in their countries and the statistical basis of their analysis for its next session (see document TWC/30/41 “Report”, paragraphs 82 to 85).

[Annex II follows]

## SITUATION B: TWO GROWING LOCATIONS IN THE SAME YEAR

**Approach: Third growing cycle for inconsistent results**

A variety is considered uniform if it is within the uniformity standard in both of the growing locations.

A variety is considered non-uniform if it fails to meet the uniformity standard in both of the growing locations.

If the variety is within the uniformity standard in one growing location but is not within the uniformity standard in the other growing location, then

Alternative (a) the trial is repeated at both locations for a second year;

Alternative (b) the trial is repeated at the Leading station (location)  
(European Union(Cauliflower))

**Approach: Combining the results of two locations**

(France (Cauliflower))

A variety is considered uniform if it is within the uniformity standard in both locations.

A variety is considered non-uniform if it fails to meet the uniformity standard in both locations.

A variety is considered within the uniformity standard if the number of off-type plants or parts of plants does not exceed the allowed number of off-types for the combined sample (two locations).

The TWA, at its forty-first session, agreed that clarification should be provided for Situations A and B if the approach combining the results from two growing cycles was considered to correspond to the requirement for “independent” growing cycles ( see document TWA/41/34 “Report”, paragraph 47).

The TWV, at its forty-sixth session held near the city of Venlo, Netherlands, June 11 to 15, 2012, noted the different approaches and the similarity between the approaches used in different UPOV members. It agreed to invite the Technical Working Party on Automation and Computer Programs (TWC) to advise whether to use individual or combined results. The experts from Germany, Italy, France and the Netherlands offered to provide examples and data to the TWC, if needed (see document TWV/46/41 “Report”, paragraph 55).

The TWC, at its thirtieth session held Chisinau, Republic of Moldova, June 26 to 29, 2012, noted the need for further explanation on the situations described, such as the clarification of whether two growing cycles related to the use of the same sample and were carried out in the same year. The TWC agreed that more detailed information and further analysis were needed in order to give guidance on consequences on the use of the different approaches. The TWC agreed that France, Germany and the Netherlands would present one or more concrete situations in their countries and the statistical basis of their analysis for its next session (see document TWC/30/41 “Report”, paragraphs 82 to 85).

[Annex III follows]

**SITUATION C: MORE THAN ONE TEST/TRIAL FOR A CHARACTERISTIC IN THE SAME GROWING CYCLE**

**Approach: Additional growing cycle in the case of inconsistent results**

(Bulgaria, Czech Republic, Germany, Hungary, Italy (Wheat), New Zealand (Wheat) Spain (Wheat)).

A variety is considered to be uniform for a characteristic if it is within the uniformity standard for the characteristic in all tests/trials.

A variety is considered non-uniform if it fails to meet the uniformity standard for the characteristic in all tests/trials.

In the case where a variety is within the uniformity standard for the characteristic in one test/trial (e.g. main trial) and not in another test/trial (e.g. ear-row plot), both tests/trials are repeated in a further growing cycle.

The TWV, at its forty-sixth session held near the city of Venlo, Netherlands, June 11 to 15, 2012, noted the different approaches and the similarity between the approaches used in different UPOV members. It agreed to invite the Technical Working Party on Automation and Computer Programs (TWC) to advise whether to use individual or combined results. The experts from Germany, Italy, France and the Netherlands offered to provide examples and data to the TWC, if needed (see document TWV/46/41 "Report", paragraph 55).

The TWC, at its thirtieth session held Chisinau, Republic of Moldova, June 26 to 29, 2012, noted the need for further explanation on the situations described, such as the clarification of whether two growing cycles related to the use of the same sample and were carried out in the same year. The TWC agreed that more detailed information and further analysis were needed in order to give guidance on consequences on the use of the different approaches. The TWC agreed that France, Germany and the Netherlands would present one or more concrete situations in their countries and the statistical basis of their analysis for its next session (see document TWC/30/41 "Report", paragraphs 82 to 85).

[Annex IV follows]



SITUATION D: ASSESSING SUB-SAMPLES WITHIN A SINGLE TEST/TRIAL
<p>Wheat (Croatia, Czech Republic, Estonia, European Union, Germany, Hungary, Norway, Spain, Sweden) Barley (Italy)</p> <p><b>Approach: Use of sub-sample as a first step of assessment</b></p> <p>A variety is considered uniform if no off-types are observed in a sub-sample.</p> <p>A variety is considered non-uniform if the number of off-types in the sub-sample exceeds the accepted number of off-types for the whole sample.</p> <p>If the number of off-types is 1 or more, but below the accepted number of off-types for the whole sample, the whole sample is assessed.</p>
<p>The TWA, at its forty-first session, agreed that the explanation should be generalized (i.e. no reference to 0 off-types in the subsample) and should provide an explanation of the statistical basis for the approach. The TWA also agreed that the statistical experts from France and Germany should be invited to explain the statistical basis for the acceptable number of off-types in the subsample of 20 plants used in the context of a sample size of 100 plants (see document TWA/41/34 "Report", paragraph 50).</p>
<p>The TWV, at its forty-sixth session held near the city of Venlo, Netherlands, June 11 to 15, 2012, noted the different approaches and the similarity between the approaches used in different UPOV members. It agreed to invite the Technical Working Party on Automation and Computer Programs (TWC) to advise whether to use individual or combined results. The experts from Germany, Italy, France and the Netherlands offered to provide examples and data to the TWC, if needed (see document TWV/46/41 "Report", paragraph 55).</p>
<p>The TWC, at its thirtieth session held Chisinau, Republic of Moldova, June 26 to 29, 2012, noted the need for further explanation on the situations described, such as the clarification of whether two growing cycles related to the use of the same sample and were carried out in the same year. The TWC agreed that more detailed information and further analysis were needed in order to give guidance on consequences on the use of the different approaches. The TWC agreed that France, Germany and the Netherlands would present one or more concrete situations in their countries and the statistical basis of their analysis for its next session.</p> <p>The TWC agreed that the statistical basis for the acceptable number of off-types in the subsample of 20 plants used in the context of a sample size of 100 plants (situation D) would be assessed by experts from France and Germany (see document TWC/30/41 "Report", paragraphs 82 to 85).</p>

[End of Annex IV and of document]