

**Technical Committee**

**TC/55/15**

**Fifty-Fifth Session  
Geneva, October 28 and 29, 2019**

**Original:** English  
**Date:** August 21, 2019

**CHARACTERISTIC-SPECIFIC MARKER WITH INCOMPLETE INFORMATION ON STATE OF EXPRESSION**

*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 present a proposal for a revision of document TGP/15 “Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)” for inclusion of a new example for Model (1) “Characteristic-specific molecular marker”.

2. The TC is invited to consider the proposal for a new example to be added to document TGP/15 to illustrate a situation where the characteristic-specific marker does not provide complete information on the state of expression of a characteristic, as set out in the Annex to this document, in conjunction with the comments of the TWA, TWC and BMT.

3. The structure of this document is as follows:

EXECUTIVE SUMMARY.....	1
BACKGROUND .....	1
DEVELOPMENTS AT THE TECHNICAL WORKING PARTIES.....	2
PROPOSAL .....	2
ANNEX      Gene-specific marker for disease resistance in tomato	

4. The following abbreviations are used in this document:

- BMT: Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular
- TC: Technical Committee
- TWA: Technical Working Party for Agricultural Crops
- TWC: Technical Working Party on Automation and Computer Programs
- TWF: Technical Working Party for Fruit Crops
- TWO: Technical Working Party for Ornamental Plants and Forest Trees
- TWPs: Technical Working Parties
- TWV: Technical Working Party for Vegetables

**BACKGROUND**

5. The TC, at its fifty-fourth session, held in Geneva on October 29 and 30, 2018, noted that the BMT, at its seventeenth session, had considered document BMT/17/21 “Do resistance markers for tomato fulfil the requirements of TGP/15” and received a presentation by Ms. Amanda van Dijk-Veldhuizen (Netherlands). A copy of the presentation was provided as document BMT/17/21 Add. (see document TC/54/31 “Report”, paragraphs 274 and 275).

6. The TC agreed with the proposal by the BMT that a new example be added to document TGP/15 to illustrate a situation where the characteristic-specific marker did not provide complete information on the state of expression of a characteristic, on the basis of the proposal by the Netherlands presented in document BMT/17/21. The TC agreed to invite the experts from the Netherlands to prepare a proposal to be presented to the TWPs and BMT and agreed that the resultant proposal should be presented to the TC, at its fifty-fifth session.

## DEVELOPMENTS AT THE TECHNICAL WORKING PARTIES

7. The TWO, at its fifty-first session, held in Christchurch, New Zealand, from February 18 to 22, 2019, the TWV, at its fifty-third session, held in Seoul, Republic of Korea, from May 20 to 24, 2019, and the TWF, at its fiftieth session, held in Budapest, Hungary, from June 24 to 28, 2019, considered document TWP/3/12 "Characteristic-specific marker with incomplete information on state of expression" (see documents TWO/51/12 "Report", paragraphs 33 to 35, TWV/53/14 "Report", paragraphs 28 to 30 and TWF/50/13 "Report", paragraphs 28 and 29).
8. The TWO, TWV and TWF agreed with the proposed example to be added to document TGP/15 to illustrate a situation where the characteristic-specific marker does not provide complete information on the state of expression of a characteristic, as set out in the Annex to this document.
9. The TWO noted that disease resistance characteristics were not commonly used in ornamental plants.
10. The TWV agreed that a new sentence should be added to TGP/15 in the case where a variety was claimed by the applicant to be resistant in the TQ but the marker test is negative, a bio-assay should be conducted/performed and be conclusive.
11. Comments by the TWA, at its forty-eighth session, to be held in Montevideo, Uruguay, from September 16 to 20, 2019, the TWC, at its thirty-seventh session, to be held in Hangzhou, China, from October 14 to 16, 2019, and the BMT, at its eighteenth session, to be held in Hangzhou, China, from October 16 to 18, 2019, will be presented as an addendum to this document.

## PROPOSAL

12. The Annex to this document presents a proposal prepared by experts from the Netherlands for a new example to be added to document TGP/15, Model "Characteristic-specific molecular markers", to illustrate a situation where the characteristic-specific marker does not provide complete information on the state of expression of a characteristic.
13. The TC may wish to consider whether the request by the TWV in paragraph 10 is covered in the draft guidance by the following sentence:

"6. If a variety is claimed to be resistant to ToMV Strain 0 and the DNA marker test result is tm2/tm2 (homozygous susceptible) a bioassay needs to be performed to determine whether the variety is resistant on the basis of another gene, such as Tm1."

*14. The TC is invited to consider the proposal for a new example to be added to document TGP/15 to illustrate a situation where the characteristic-specific marker does not provide complete information on the state of expression of a characteristic, as set out in the Annex to this document, in conjunction with the comments of the TWA, TWC and BMT.*

[Annex follows]

## EXAMPLE 2: GENE SPECIFIC MARKER FOR DISEASE RESISTANCE IN TOMATO

*prepared by experts from The Netherlands*

## Example

- Resistance to Tomato mosaic virus (ToMV) is included in the Test Guidelines for Tomato.
- Resistance to ToMV Strain 0 is conferred by the presence of one or more genes, including Tm1; Tm2; and Tm2<sup>2</sup>.

Table 1: Schematic overview of resistance to Tomato mosaic virus and resistance alleles:

Genetic background	tm2/tm2 and tm1/tm1	Tm2/Tm2 or Tm2/tm2 and Tm1/Tm1 or Tm1/tm1 or tm1/tm1	Tm2 <sup>2</sup> /Tm2 <sup>2</sup> or Tm2 <sup>2</sup> /Tm2 or Tm2 <sup>2</sup> /tm2 and Tm1/Tm1 or Tm1/tm1 or tm1/tm1	tm2tm2 and Tm1/Tm1 or Tm1/tm1
Marker Tm2/2 <sup>2</sup>	susceptible allele	resistant allele	resistant allele	susceptible allele
Resistance to ToMV - Strain 0	absent	present	present	present

- A marker identifies the presence of resistance alleles Tm2 and Tm2<sup>2</sup> and the susceptible allele tm2. Marker Tm2/2<sup>2</sup> is positioned in the protein coding sequence.
- A variety will be resistant to ToMV Strain 0 if resistance allele Tm2 or resistance allele Tm2<sup>2</sup> is present. In this case, the DNA marker test could replace the traditional bioassay to assess resistance to ToMV Strain 0.
- A variety with homozygous allele tm2 will be susceptible to ToMV Strain 0 unless resistance is coded by resistance allele Tm1. In this case, resistance to ToMV Strain 0 cannot be assessed by a DNA marker test because there is no reliable marker for gene Tm1.
- If a variety is claimed to be resistant to ToMV Strain 0 and the DNA marker test result is tm2/tm2 (homozygous susceptible) a bioassay needs to be performed to determine whether the variety is resistant on the basis of another gene, such as Tm1. If a variety is claimed to be susceptible to ToMV Strain 0, a bioassay should be performed to determine whether the variety is resistant.

[End of Annex and of document]