UPOV

International Union for the Protection of New Varieties of Plants

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ASSESSING DISTINCTNESS IN DISEASE RESISTANCE CHARACTERISTICS

Document prepared by experts from France and the Netherlands

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EXECUTIVE SUMMARY

1. The purpose of this document is to propose a general approach for the scale of notes and establishing distinctness on the basis of a one-note difference between varieties for disease resistance characteristics.

2. The TWV is invited to consider the criteria for disease resistance characteristics in UPOV Test Guidelines, as set out in paragraph 11 of this document.

BACKGROUND

3. The TWV, at its fifty-sixth session[1], considered whether to revise the states of expression in the example characteristic in document TGP/12/2, Section 2.3.2, to address the use of the word “highly” in only one state of expression (see document TWV/56/22 “Report”, paragraphs 16 to 20).

4. The TWV noted that the scale “susceptible; intermediately resistant; and highly resistant” had been previously used in the Test Guidelines for Cucumber, Lettuce and Melon and was commonly used in the vegetable sector.

5. The TWV noted the explanation from France that state of expression “susceptible” covered a range of expressions, including “highly susceptible”. The TWV discussed how to apply general UPOV guidance for drafting disease resistance characteristics and agreed there was no consensus to amend guidance in document TGP/12 to delete the word “highly” from state of expression “highly resistant”.

6. The TWV agreed to invite the experts from France and the Netherlands to propose draft guidance explaining the particular features of disease resistance characteristics that require special treatment in relation to general UPOV guidance, to be presented to the TWV, at its fifty-seventh session. The draft guidance should address matters such as establishing distinctness for quantitative disease resistance characteristics on the basis of a difference of one note between varieties; and explore possibilities for correlating the scales of UPOV characteristics with those used by phytopathologists for variety descriptions.

PROPOSAL

7. Disease resistance characteristics may be controlled by a single gene (monogenic), by few genes or a combination of genes (polygenic).

8. Monogenic diseases would normally be qualitative (QL) characteristics, such as when the presence of the resistance gene would restrict the growth and development of a specified pest or pathogen and/or the damage they cause when compared to susceptible plant varieties under similar environmental conditions and pest or pathogen pressure.

[1] Held via virtual means, from April 18 to 22, 2022

9. Resistances controlled by few genes (2 or 3) may cause a more or less discontinuous range of expressions. The possibility to distinguish the states of expression determines the type of characteristic (QL/ QN/ PQ), see (b).

10. Polygenic disease resistances have a continuous range of levels of susceptibility / resistance across varieties, and are quantitative characteristics (QN). Nonetheless, in some cases information may not be available for certain levels of susceptibility / resistance, such as when there are no known varieties with high level of resistance to illustrate a particular QN characteristic.

11. The following criteria are proposed for disease resistance characteristics in UPOV Test Guidelines:

(a) Standard scales of notes for quantitative (QN) characteristics should be used as far as possible for disease resistance characteristics, such as the condensed scale (Notes 1-3). The “standard” scale with nine notes may not be required or appropriate in most cases. Example: “Resistance to disease ‘x’” with states of expression “absent or low”, note 1; “medium”, note 2; and “high”, note 3.

(b) A qualitative (QL) scale of notes could be used on exceptional cases for quantitative disease resistance characteristics where not possible to use a standard quantitative (QN) scale. For example, “Resistance to disease ‘x’” with states of expression “absent”, note 1; and “present”, note 9. In this case, the presence of “Resistance to disease ‘x’” (note 9) would cover different levels of resistance which cannot be consistently distinguished because of too much influence of testing circumstances. Such characteristics should be explained providing the basis for distinctness to be assessed on a clear difference separating both states of expression, e.g. with “delineating” or “threshold control” varieties (see g). This situation could be expected for disease resistance characteristics controlled by few genes, but also in case not enough information is available to enable using quantitative (QN) scales. Nonetheless, such characteristics should be revised over time to ensure compliance with general UPOV guidance (e.g. use of QN scale of notes).

(c) The most suitable scale of notes for quantitative disease resistance characteristics should be considered on a case-by-case basis for each disease and crop.

(d) Using standard scales of notes would avoid the need to develop specific guidance on scales of notes for disease resistance characteristics and facilitate adoption of draft Test Guidelines under revision.

(e) The relationship between the terminology used for disease resistance characteristics in Test Guidelines and for marketing of varieties could be described in the section on explanations on the table of characteristics.

(f) Distinctness may be assessed on the basis of a one note difference for disease resistance characteristics using a condensed quantitative scale of three notes (Notes 1-3). In this case, the pair of varieties should have been subject to side-by-side comparison in the same trial (pairwise distinctness) or examined with the same test protocol and using the same control varieties (validation of descriptions and positioning in variety collection).

(g) “Delineating” or “threshold control” varieties must be used to explain the characteristic and define the cut-off points between states of expression. They have to be included in the trial.

(h) Disease resistance characteristics are important for the management of variety collections and reducing the size of trials for vegetables. Nonetheless, it may not be possible for all UPOV members to examine the same characteristics due to lack of access to inoculum, quarantine regulations, regional environmental conditions or other factors. Therefore, it would generally not be appropriate to indicate these characteristics as compulsory and denoted with an asterisk. Members of the Union can select those characteristics most suitable for their particular circumstances.

(i) These criteria should be applied to all future Test Guidelines proposals. Experts currently developing or revising Test Guidelines should consider applying these criteria as far as possible. Discussions on applying these criteria to individual Test Guidelines could be organized before the TWV, as required.

(j) Previously adopted disease resistance characteristics may need to be revised to confirm type of expression, scale of notes and explanations on assessment. The TWV may wish to consider commissioning an inventory of disease resistance characteristics in Test Guidelines for future revision.

12. The TWV is invited to consider the criteria for disease resistance characteristics in UPOV Test Guidelines, as set out in paragraph 11 of this document.

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