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**PRINCIPLES ON THE USE OF DISEASE RESISTANCE CHARACTERISTICS
IN UPOV TEST GUIDELINES**

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Introduction

1. The main principles on the use of disease resistance characteristics will be set out in document TGP/12 "Guidance on Certain Physiological Characteristics". In addition to these, the following details should be taken into consideration when drafting or applying UPOV Test Guidelines with disease resistance characteristics.

Nomenclature of the pathogens

2. The proper denomination of pathogens is important in order to correctly identify the various diseases. As in the plant kingdom, the names of pathogens sometimes change as a consequence of improved insight in the pathogen and its relation with other pathogens. In order to allow the user to follow these developments if needed, it is advised to include in the UPOV Test Guidelines a reference to the organization that is governing these taxonomic developments. In practice this mainly concerns the following internationally recognized organizations:

- the American Phytopathological Society (APS) for fungi,
- the International Committee for the Taxonomy of Plant Pathogenic Bacteria of the International Society of Plant Pathology (ISPP) for bacteria,

- CAB International Bioscience (formerly the International Mycological Institute, IMI) for fungi and bacteria,
- the International Committee for Taxonomy of Viruses (ICTV) for viruses.

Tracking changes

3. As with plant names, the average user of a pathogen name sometimes is familiar with the old name, but needs some time to adjust to the new names. This may cause confusion if new names are not yet recognized as such. When faced with this problem, the International Seed Federation (ISF) disease resistance coding working group, a group of phytopathologists from breeding companies, GEVES (France) and Naktuinbouw (Netherlands), introduced the following solution:

A new denomination is given in brackets behind the old name with the prefix 'new' for a period of 5 years. After 5 years, the situation is reversed: the new name is given with behind it in brackets the old name with the prefix 'old' for a further period of 5 years. After the latter period of five years, only the new name is given.

4. As UPOV Test Guidelines are only revised with long intervals, such solution would be suitable for UPOV Test Guidelines as well, thus avoiding the need of frequent partial revisions of guidelines for the change of pathogen names. It is proposed to introduce this principle in the UPOV Test Guidelines. Examples of such solutions that are in use in practice at the moment:

Melon:	<i>Sphaerotheca fuliginea</i> (now <i>Podosphaeria xanthii</i>)
Cucumber:	<i>Erysiphe cichoracearum</i> (now <i>Golovinomyces cichoracearum</i>) <i>Sphaerotheca fuliginea</i> (now <i>Podosphaeria xanthii</i>)
Pumpkin:	<i>Erysiphe cichoracearum</i> (now <i>Golovinomyces cichoracearum</i>) <i>Sphaerotheca fuliginea</i> (now <i>Podosphaeria xanthii</i>)
Tomato	<i>Fulvia fulva</i> (ex <i>Cladosporium fulvum</i>) <i>Oidium neolycopersici</i> (ex <i>Oidium lycopersicum</i>)

Use of abbreviations

5. The scientific binomial for the pathogens is often replaced by a code in order to facilitate the communication between buyer and customer. Also in testing laboratories these codes are in use. In order to harmonize the use of such codes, the ISF disease resistance coding working group has introduced a system of codes. The codes are logically derived from the names of the pathogens and apply the following rules:¹

Viruses

6. Codes as adopted by ICTV are used. They are in capital letters, except in cases where a letter (in lower caps) is added to differentiate between two viruses with the same initials, e.g. TMV and ToMV. In case there is a deviation from the code as used by ICTV, an explanatory note would be added to the text.

¹ See the ISF website: www.worldseed.org

Fungi, Bacteria, Nematodes and Insects

7. In general two letters corresponding to the first letter of the genus and species of the Latin name are used. For example: *Fusarium oxysporum* = Fo.
8. For more than one species within a genus all causing the same disease, the abbreviation of the genus may be used. For example, in the case of *Verticillium* wilt disease, both *Verticillium albo-atrum* (Va) and *V. dahliae* (Vd) have been found to be causal agents. Then Va + Vd can be indicated by V.
9. The use of a single code for different pest organisms within one crop is avoided. In such cases, the second or any other relevant letter of the species name is added to the code. For example: *Corynespora cassicola* and *Cladosporium cucumerinum* are two different diseases in gherkin and the assigned codes are: Cca and Ccu.
10. For different subspecies of a pest organism in the same crop causing different diseases, the subspecies has been defined with a small letter. For example Fol and For, respectively for *Fusarium oxysporum* f.sp. *lycopersici* and *Fusarium oxysporum* f.sp. *radicis-lycopersici* in tomato.

Separators

11. It is also recommended that the following separators be used:

/ (slash) to separate pest organism codes,
: (colon) to separate the species code from the strain/race/pathotype code(s),
, (comma) to separate strain codes.

12. Using the above, convention resistance to Ua and Cl strains 1 and 2, for instance, will be denoted as Ua / Cl:1,2. Fol:1,2,3 indicates resistance to strains 1, 2 and 3, and Cl:α,β,δ indicates resistant to strains α, β and δ.

13. It is proposed to introduce the disease codes in the UPOV Test Guidelines.

The nomenclature of races and strains

14. As there is only limited scientific interest in pathogen levels below the pathogen, and the use of races and strains is extremely important to identify exactly the resistances in plant varieties, the main work on denomination of these races and strains is done by the ISF disease resistance coding working group. It is proposed to implement their race and strain nomenclature in the UPOV Test Guidelines.

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