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"International Seed Federation (ISF) Expert Group Disease Resistance Terminology (DRT):

Policy Guidelines for Disease Listing, Naming, and Codification Standards"

The International Seed Federation (ISF) Expert Group Disease Resistance Terminology (DRT) establishes a set of rigorous policy guidelines aimed at standardizing the inclusion, naming, and codification of pests relevant to international vegetable seed sector. This document delineates clear and precise principles along with rules that govern how pests are listed, how their names are sourced, the protocol for managing name changes subsequent to taxonomic revisions, and the overall rules for codification.

These guidelines are the result of deliberate consensus among the ISF Expert Group DRT members. The adopted principles and rules are designed to ensure consistency and accuracy in disease resistance terminology, crucial for the integrity and reliability of the work in the seed industry. These standards will remain unchanged until collectively reviewed and updated by the group, allowing the methodology to adapt as necessary while maintaining a structured approach.

This document serves as a comprehensive policy guideline established by the International Seed Federation (ISF) Expert Group Disease Resistance Terminology (DRT). The objective is to articulate clear principles and rules governing the inclusion of pests on the list, the source of names, handling of name changes after taxonomic adjustments, and general codification rules. These principles, once adopted, are intended to be steadfast until reviewed and modified by the consensus of the group members.

1. Inclusion of Pests on the List:

The underlying principle guiding the compilation of the list emphasizes the inclusion of pests under specific conditions, such as the presence of resistance claims, imminent resistance claims due to ongoing breeding programs, and pests of economic significance. New pests will only be added if they align with these principles.

2. Source of Names on the List:

The ISF Expert Group DRT ensures consistency by referencing internationally recognized institutions for the terminology used in the list. The sources for fungi, bacteria, viruses, insects, and nematodes are specified, with any deviations clearly explained in footnotes.

Every effort has been made to remain consistent with the terminology used by internationally recognized institutions. In case of any deviation, an explanatory footnote is provided in the list.

Fungi

The ISF Expert Group (EG) DRT uses the Species Fungorum as the primary source of information for fungi and oomycetes. As Species Fungorum adheres to the principle that no separate anamorph and teleomorph names are used anymore, this means that only the name mentioned in Species Fungorum is used.

Bacteria

The reference for bacteria is the International Committee for the Taxonomy of Plant Pathogenic Bacteria of the International Society of Plant Pathology (ISPP).

Viruses

*The reference for viruses is the International Committee for Taxonomy of Viruses (ICTV). This means that the names in the list will not mention the genus in the virus name. For example, not "Tomato spotted wilt **orthotospo**virus", but instead "Tomato spotted wilt virus". The writing of names will be in line with the publication of Zerbini e.a. (2022), which means not italicized and only the first word and place names capitalized (like Tomato leaf curl New Delhi virus).*

Insects

Due to a lack of a global and unique reference, the ISF DRT EG uses the sources listed below in the following order:

1. *Entomological Society of America (ESA);*
2. *American Phytopathological Society (APS);*
3. *Fauna Europaea;*
4. *Catalogue of Life (COL); and*
5. *Global Biodiversity Information Facility (GBIF).*

Nematodes

The ISF DRT EG uses the following sources:

1. *Society of Nematologists;*
2. *American Phytopathological Society (APS);*
3. *Fauna Europaea;*
4. *Catalogue of Life (COL); and*
5. *Global Biodiversity Information Facility (GBIF).*

3. Name Changes after Taxonomic Changes:

In the event of taxonomic changes, a defined procedure is established. This involves listing both the old and new names, allowing for a transitional period of six years before full implementation. This timeframe accommodates global adaptation and considers the periodic evaluation of taxonomic changes by relevant organizations.

Taxonomic changes to the Latin binomial may also necessitate a change in the code. The following procedure has been established:

A. *List the old name and quote the new name between brackets, i.e. 'old name' (now 'new name')*
B. *List the new name and quote the old name between brackets i.e. 'new name' (ex 'old name')*
C. *Quote the new name only*

The transition from one step to the next is three years to allow companies and their customers worldwide to become accustomed to the change. It also takes into consideration the fact that organizations such as ICTV meet only once in three years to evaluate proposed taxonomic changes. Companies may choose to use the new name and accompanying code in catalogues and other communication earlier if they wish.

4. Codification Rules:

Clear codification rules are outlined for viruses, fungi, bacteria, nematodes, and insects. These rules include the use of specific codes, avoidance of same codes for different pests affecting a single crop, and the use of separators to denote different elements in the code. Deviations from established codes are accompanied by explanatory footnotes.

By adhering to these principles and rules, the ISF Expert Group DRT aims to establish a consistent and reliable framework for disease resistance terminology. Any future modifications or updates to these principles will be subject to the collective decision of the group members. This policy document serves as a foundation for the group's work, fostering clarity, transparency, and cohesion in addressing challenges related to plant health and seed movement on a global scale.

Viruses:

- *Codes adopted by ICTV will be used. They are in capital letters, except in cases where a letter in lower case 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 used by ICTV, an explanatory footnote will be added to the list.*

Fungi, bacteria, nematodes and insects:

- *In general two letters corresponding to the first letter of the genus and species of the Latin name will be used, e.g. Fusarium oxysporum = Fo.*

- *The use of a single code for different pests affecting a crop species will be avoided. In such cases the second or any other relevant letter of the species name will be added to the code, e.g. Corynespora cassiicola and Cladosporium cucumerinum are two different pests in gherkin and the assigned codes are Cca and Ccu, respectively.*

- *For different subspecies, pathovars or formae speciales of a pest in the same crop species the subspecies will be defined by an additional letter in lower case, e.g. Fol and For respectively for Fusarium oxysporum f. sp. lycopersici and Fusarium oxysporum f. sp. radicis-lycopersici in tomato.*

Use of separators:

- */ (slash) – to separate pest codes*

- *: (colon) – to separate the species code from the strain/race/pathotype code. The colon is followed by a space*
- *, (comma) – to separate strain/race numbers/letters. The comma is followed by a space*
- *– (hyphen) – to indicate an uninterrupted series of strain/race numbers*
- *. (dot) – to separate numbers defining a compound strain/race number/letters*
- *order of pathogen codes: viruses, bacteria, fungi, insects, nematodes*

*Using the above convention rules, resistance in a bean variety to Uromyces appendiculatus (Ua) races 41 and 44 and Colletotrichum lindemuthianum (Cl) races 6 and 55 would be denoted as "Ua: 41, 44 / Cl: 6, 55". A series of race numbers following a logical and uninterrupted order will be abbreviated in a 'from **[1]** to' mode. For instance Fol: 1, 2, 3 would be noted as Fol: 1-3. Strains 7 to 40 of Bremia in lettuce will be noted as Bl: 7-40. An interrupted series will be presented in the following manner – Bl: 7-9, 16-18, 20-27, 29-40. An example of a virus strain with a compound name is Pepper mild mottle virus (PMMoV): 1.2.3.*