

Definitions of the Terminology Describing the Validation of Disease Testing for the Vegetable and Ornamental Seed Industry

Disease testing can be performed for different purposes, such as characterization (grouping based on similarities of response) and for defining levels of resistance between different host varieties.

Pest (following FAO definition): “Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.” Pathogens (microorganisms such as bacteria, viruses and fungi that cause a disease) are therefore included in the term ‘pest’.

In plant pathology, a pest organism collected from the field, is named an isolate, reflecting a population of microorganisms, viruses(/viroids), phytoplasmas, nematodes or insects.

The virulence and level of pathogenicity of such isolate can be characterized using differentiating hosts which allows further specification in a particular biotype, pathotype, race or strain within the (sub)species or forma specialis of the investigated pest.

When used in the scope of disease testing, the term isolate is used to indicate specific defined versions of the pest involved:

- **Isolate:** Isolate of a pest, validated for expected performance within a standard resistance protocol.
- **Type isolate:** A decontaminated, phenotypically or genetically uniform well-characterized isolate of a pest, collected from a specific place and time, which is validated for expected performance within a standard resistance protocol. Type isolates are referred to in publicly available protocols and available in public collections like MATREF, Plantum or CPPSI.

Characterization within a pest:

To identify and distinguish different biotypes, pathotypes, races or strains within a (sub)species or forma specialis of a given pest, plant pathologists use sets of differential hosts (e.g., plant cultivars) with known susceptible and resistant reactions to pathogenic variations of a pest.

For the sake of uniformity biotypes, pathotypes, races or strains are all referred to as “race”.

Races are recognized and named by an official body like IBEB, IWGP, ISF.

- **Race characterization:**
Identification of races within a pest species, sub-species or forma specialis is based on the performance of known differentials tested in a routine protocol under standard, controlled conditions.
- **Differentials:** Crop genotypes (lines or hybrids) with known resistance response that are part of a differential set
- **Differential Set:** A panel of differentials to identify and distinguish different races within a pest species, sub-species or forma specialis.

Defining resistance levels:

Claims on the level of resistance to a given pest in a crop genotype are based primarily on tests carried out under controlled environmental conditions, using a defined control set that consists of a well-characterized isolates of a pest and a panel of host varieties.

In some cases, claims of resistance are based on field tests carried out under carefully monitored natural conditions.

Within the Vegetable and Ornamental Seed Industry different types of resistance claims are used: technical claims and commercial claims.

- **Technical claims:** Performance of a variety based on a routine protocol under standard, controlled conditions and a known isolate.
- **Commercial claims:** Performance of a variety based on yield- or financial loss under field conditions, uncontrolled conditions, and unknown, uncharacterised isolates.

For Technical claims, used in DUS testing, the following types of controls are defined.

Because within the UPOV guidelines resistance to a certain pest is considered a “characteristic”, this terminology will be used here

- **Example varieties** (following UPOV definition in TGP/7 and GN28): Varieties to clarify the states of expression of a resistance characteristic in a standard (resistance) protocol to illustrate the resistance characteristic and/or for describing the state of expression to each variety.
- **Controls:** Specific crop genotypes in resistance tests, used for test validation and interpretation, in a standard resistance protocol.
- **Threshold varieties:** Special control varieties validated to specify strictly the borders between two levels of resistance (notes) based on symptom expression obtained by a standard resistance protocol.

Specifically for Commercial claims, the following type of control is defined:

Euroseeds Example Variety: Varieties to clarify the states of expression of the level of resistance to a given pest that can be expected under practical conditions based on symptom expression and/or economic loss.

Footnote: for more information on named initiatives in this document, visit the section Other Initiatives in the main menu of Disease Resistances. [Other Initiatives – International Seed Federation \(worldseed.org\)](http://www.worldseed.org)