UPOV
International Union for the Protection of New Varieties of Plants

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Technical Working Party for Vegetables

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ADDENDUM TO: ASSESSING DISTINCTNESS IN DISEASE RESISTANCE CHARACTERISTICS

Document prepared by experts from France and the Netherlands (Kingdom of the), with the support of European Union, Japan and breeders' organizations

The annex to this document contains a copy of a presentation "Disease resistance characteristics /states of expressions / applied scales", to be made by experts from France and the Netherlands (Kingdom of the), with the support of European Union, Japan and breeders' organizations, at the fifty-eighth session of the Technical Working Party for Vegetables (TWV).

[Annex follows]

TWV 2024
Disease resistance characteristics /states of expressions / applied scales
Background of the discussion
TWV/57/26 Corr._TWV 2023 Report

23. The TWV agreed there were certain quantitative (QN) disease resistance characteristics where it was not possible to describe different levels of resistance according to QN states of expression because of the influence of testing conditions and the lack of information on genetic background.

24. The TWV agreed to invite the experts from France and the Netherlands, with the support of the European Union, Japan and the breeders' organizations, to draft a proposal for a special type of quantitative disease resistance characteristic with only two states of expression. The TWV agreed that the proposal with an explanation on the criteria for using this type of characteristic should be presented at the fifty-eighth session of the TWV.

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Present situations

It is defined by a least **3 founding UPOV documents :**

- TG/1/3
- TGP/7/9
- TGP/12

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TG/1/3 General Introduction
CHAPTER 4 – CHARACTERISTICS USED IN DUS TESTING.

4.4 Types of Expression of Characteristics

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TGP/7/9 DEVELOPMENT OF TEST GUIDELINES Annex 3 Guidance notes

GN 20: Presentation of characteristics: States of expression according to type of expression of a characteristic

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TGP/12/4 Guidance on Certain Physiological Characteristics

SECTION I: DEVELOPMENT OF CHARACTERISTICS BASED ON A RESPONSE TO AN EXTERNAL FACTOR

2. DISEASE RESISTANCE

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*To summerize the **current situation**…*

Some slides to illustrate

How we are describing

the disease resistance characteristics,

depending of their expression type.

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DISCONTINUOUS RANGE OF EXPRESSION to cover **all the observed variability**

Qualitative (QL) resistance characteristic

SCALE 1

Clear cut between the two stages

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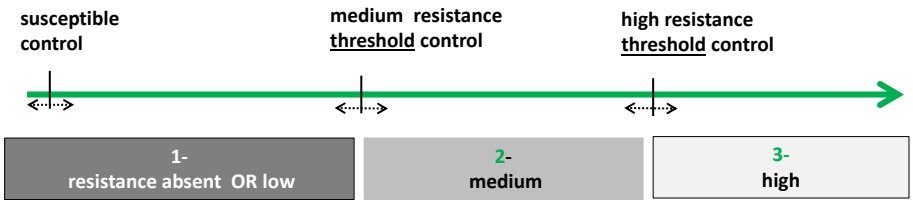
CONTINUOUS RANGE OF EXPRESSION to cover **all the observed variability**

QUANTItative (QN) **resistance characteristic**



SCALE 2

SCALE 3

Not used in Vegetable species' guidelines. **Not wished up to now**.

REGULAR divisions of the scale to describe the intensity of the observed variability.

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Current situations at UPOV level :

Scale 1/9 : for QUALITATIVE (QL) characteristics

DISCONTINUOUS observed variability

Scale 1-2-3: for QUANTITATIVE (QN) characteristics

CONTINOUS observed variability, with a *balanced* scale

with thresholds between 1 and 2, 2 and 3, thanks to well identified controls.

And what about the «QN» char. which have been described with the scale 1/9

- scale which is now dedicated to QL char.

- Without the need/wish or the possibility to apply/manage the 1-2-3 scale?

And which remain managed with 2 levels of expression?

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Proposal of a new UPOV **type of Expression** of characteristics

*To enable the **appropriate use of characteristics in DUS testing**, it is important to understand the different ways in which characteristics can be expressed.*

A new type of Expression of Characteristic have to be discussed.

We propose:

Wording to improve?

Pseudo-Quantitative Characteristics (PQN):

It corresponds to an "almost" **QUANTITATIVE characterisctic but with only 2 states of expression and some specificities.**

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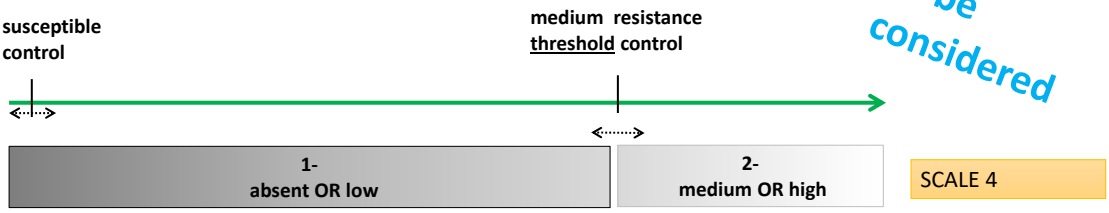
More or less **CONTINUOUS RANGE** OF EXPRESSION to cover all the observed variability

PSEUDO QUANTItative (PQN) resistance characteristic



IRREGULAR divisions of the scale to describe the intensity of the observed variability.

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Comparing QN / PQN definitions:
Common points, differences

"**Quantitative characteristics**"

are those where the expression covers the **full range of variation from one extreme to the other.**

The expression can be recorded on a one-dimensional, continuous or discrete, **linear scale.**

The range of expressions is divided into a **number of states** for the purpose of description (e.g. length of stem: very short (1), short (3), medium (5), long (7), very long (9)[1]. The division seeks to provide, as far as is practical, an **even distribution across the scale.**

The Test Guidelines do not specify the difference needed for distinctness[2].

The states of expression **should**, however, be meaningful for DUS assessment.

"**Pseudo-Quantitative characteristics**"

are those which are quantitative, where the expression **does not cover the full range of variation.**

The expression can be recorded on a one-dimensional, continuous **but nonlinear scale.**

The range of expressions is divided in **2 states** for the purpose of description, with notes 1 and 2, (e.g. Resistance to ….: **absent or low** (1), **medium or high** (2)). The division provides a **non-regular distribution across the scale.**

The states of expression provide a sufficient distinctness with only 1 note difference, in the case of a condense scale.

The states of expression **are**, however, meaningful for DUS assessment.

Situation validated, but not yet updated in the definition of a **Quantitative characteristic (QN)**

[1] *or with a condensed scale: absent or low **(1)**, medium **(2)**, high **(3)***
[2] *The states of expression provide a sufficient distinctness with only 1 note difference, in the case of a condense scale.*

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In summary…

- Proposal of a **potential NEW type of expression**: *Pseudo QUANTITATIVE (PQN)*
  - **OR a revision of the QN characterictic definition** to introduce the particularities to cover the « PQN » char.
- Proposal of a **new scale**, with only **2 levels** (**1**= **absent or low** - **2**= **medium or high**)
- These proposed evolvements don't modifify the **current disease resistance test protocols**, *except an updating of the UPOV state of expression and its associated scale of notation (to replace « 1/9 » by « 1-2 »).*

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Questions which still remain…

Nothing new…
Nothing easy…

- *How to describe "**clear difference" between borderline similar varieties in different states of expression**, such as **one susceptible** and **another resistant**, **both close to the cut-off point?***
- *How to avoid that one **variety similar to the threshold control** is **described differently** by **different examiners?***

The possible answers (risks limitation) are **NOT** in the **type of the scale**…
but, in the **way to manage the description** of a QN (or PQN) characteristic.

KEY POINTS

- A harmonised published protocol
- A panel of consensual threshold controls
- Replication of the test *if necessary*
- Use of statistical analysis (*robustness of the test*)

In case of difficulties
Cooperation between OEs

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2 proposed annexes, *for « pedagogic » purposes*

Annex I: **Proposed examples** to illustrate the **used scales**

QL ToMV: 0/ tomato, TSWV/ pepper, *Passalora fulva*/ tomato
QN *Meloidogyne incognita* / tomato, CMV/ cucumber
PQN CGMMV / cucumber, Fom: 2 / melon, Fol: 0 and 1 / tomato

With **extracts of the current protocols** (*latest revisions*), to support the proposal.

Annex II: How to **identify** and **validate** a **threshold control?**

These controls are the base of the decision to apply a **change between subsequent UPOV notes**.

They are carefully chosen to **manage and secure** the **cutting point** of a more or less continuous range of expressions.

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Which could be the following steps?

2024:
The understanding and possible agreement of the UPOV members.

To be considered during the 2025 TWV:

- Communication on a Literature Survey covering all the disease resistance chacateristics mentionned in **UPOV Test Guidelines (146 couples)**

- To illustrate the different « proposed » scales.
- a memory aid for listing / prioritizing the required upcoming revisions

➢*interesting preliminary contributions* from GEVES and breeders' organisation. (March 2024)

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This prestation is the result of fruitfull exchanges and contributions from

FR, NL, JP, European Union, and breeders' organizations.

The discussion is open.

Thanks a lot for your attention

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[End of Annex and of document]