Disease resistance characteristics in DUS examination

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Importance of disease resistance characteristics for DUS examination

- How to guarantee the “D” during DUS examination?
- Control of distinctness between new application and already existing varieties of common knowledge
- Large variety collection for many crops
- Number of disease resistances increases in many vegetable crops
- Management of variety collection: morphological and resistance groups

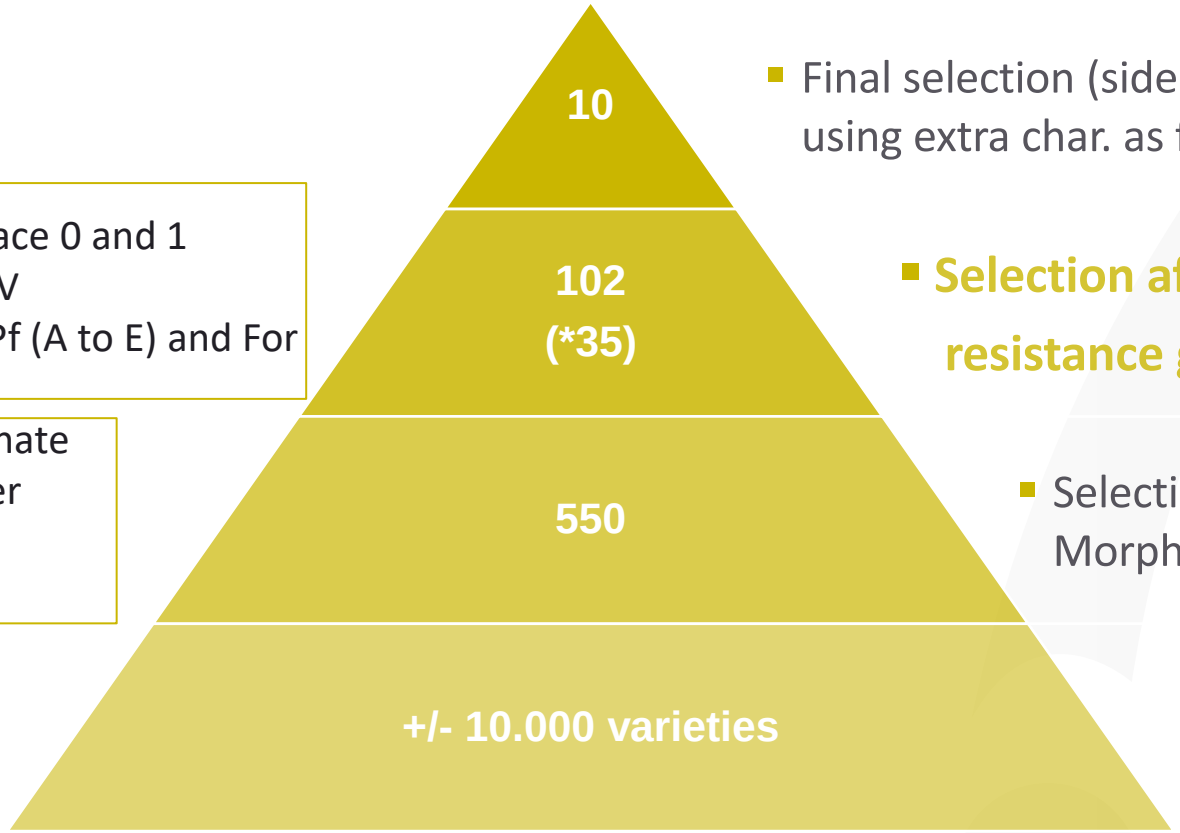
Need to use resistance characteristics, to reduce amount of comparing varieties in the trials

Decrease space (field/ greenhouse), workload, examination fee

E.g. selection of comparing varieties for tomato “application λ”

Resistant to ToMV, Verticillium, Fol race 0 and 1
Nematodes and susceptible for TSWV
*extra resistances used at EU level: Pf (A to E) and For

Growth type: indeterminate
Fruit with green shoulder
Number of locules: 2-3
Fruit shape: circular



- Final selection (side by side comparison) using extra char. as fruit size,…
- **Selection after use of resistance grouping char.**
- Selection after use of Morphological grouping char.
- Common knowledge

Not feasible to ignore resistances by selecting comparing varieties, even within a resistance group sometimes very large number of varieties to be included in the trial

Importance of disease resistance characteristics for DUS examination

- What if the “D” is not guaranteed using all the already existing characteristics from the guideline?
  - New variety not sufficiently distinct from existing one or **distinction only based on a “new” characteristic**
- Procedure of additional characteristic needed
- Often used prior to introduction of new resistances (or new races) in a guideline
- E.g. ToBRFV in tomato, in NL already 15 varieties-pairs not distinguishable without using this resistance

Elaboration and harmonization/validation needed of a (new) resistance test protocol

Need of introduction of new characteristic: e.g. ToBRFV resistance in tomato guideline

- CPVO project, harmonization work already started in early stage (2022)
- Test protocol (bioassay) based on ToMV test
- ToBRFV resistance is complex, different genetic backgrounds are involved
- How to deal with this kind of resistance? Type of UPOV characteristic?
- Request to CPVO to use it as “additional characteristic” (2023)

Solanum lycopersicum L. - Tomato						
Type of expression	**Characteristic**	**Growth stage**	**Method of observation**	**State of expression**	**Example varieties**	**Note**
QL	Resistance to ToBRFV		VG	absent medium or high	Monalbo, Mobaci Lansor, Teenon	1 9

- Now only 2 classes: susceptible (S) and medium or high (IR or HR)
- In the future it is expected that a differentiation can be made between both levels

Harmonization needed for introduction in DUS and on market

Importance of harmonization

- Harmonised claims (market and DUS), ISF and Euroseeds involved
  - Different levels of resistance (IR/HR)
    - Need of clear threshold control varieties
    - Definition of levels only possible after better knowledge of the resistance mechanism, and after harmonization/validation of the needed threshold between Examination Offices (EOs)
  - Need for harmonised and validated testing protocols
- ISF, Expert Group Disease Resistance Terminology: not restricted to EU but worldwide
- Take-over reports worldwide: resistances used in reports at National or regional level should be also “recognized” at international level due to take-over reports worldwide

For the sake of harmonization, resistance characteristics must be included in the UPOV guidelines

Resistance = sustainable

- Global seed industry: resistances important at many levels: food security, innovation, economic impact and especially for sustainability

- Therefore, resistances are becoming more and more important also in ornamental and agricultural crops

- Wish for inclusion of resistances in the DUS test of other species than vegetables

Wish from companies to include these resistances in variety descriptions

Introduction of new techniques as alternative methods

- Markers versus bioassay: Advantage of introduction of alternative markers test
  - Not limited to a season
  - Several resistances with the same DNA: more efficient/ cheaper
  - Isolated DNA material can be reused later for other diseases/ test developments
  - No problem with quarantine pathogen

- Specific marker test good alternative, even in countries where resistance biotests are not standard use

After validation and harmonization of a new/ alternative test method between Examination Offices (EOs), introduction in protocol is required, at EU level, to be able to use it for DUS purposes

Questions?