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NEW ISSUES ARISING FOR DUS EXAMINATION

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The annex to this document contains a copy of a presentation “Vegetatively propagated varieties in a normally seed-propagated species: Pepper”, prepared by an expert from the Netherlands, to be considered by the fifty-fourth session of the Technical Working Party for Vegetables (TWV).

[Annex follows]

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Vegetatively propagated varieties in a normally seed propagated species

PEPPER

Background

- The method of propagation should not influence the expression and observation of characteristics
- In some vegetable crops such as tomato, pepper, etc., techniques and methods for breeding and propagation nowadays are used different from the classical ones: instead of propagation by seed, vegetative propagation.
- The identity material consists of rooted cuttings.

- Nb.: Grafted cuttings are not accepted as identity material.

Pepper
Vegetatively propagated plant material to submit

- The DUS test is performed with young rooted cuttings (basic material) provided by the applicant;
- If a second cycle is needed, new rooted cuttings are required;
- The quality of the material is very dependent on the source of the material; i.e. the propagation by the applicant;
- It is very difficult to compare the vegetatively propagated material with seed propagated material, because the growing cycles are not simultaneous

Pepper
Consequences for characteristics

- Characteristics like plant height, time of beginning of flowering and time of maturity are influenced by the development stage of the plant material;
- Resistance characteristics: additional (p.e. inoculation/type of medium, reading etc.) or new methods necessary especially for soil borne diseases.

Pepper
Approach to perform a satisfactory examination

- The plant material needs to meet clearly defined conditions on quality, health, size, root system;
- Vegetatively propagated material of known seed propagated example varieties to be included in trials to calibrate the expression for some characteristics.
- In case of doubts about a vegetatively propagated variety possibly directly derived from an existing seed propagated variety, DNA analysis may be used;

Assessment DUS testing of vegetative varieties compared to seed varieties

- **Method**: Varieties were chosen to represent the whole range of expressions for the characteristics Plant height, Time of flowering and Time of harvest maturity.

- **Comparison of**
  - Plants from seedlings vs. plants from cuttings
  - Cuttings from young plants vs. cuttings from older plants
  - From cuttings only

Pepper
Assessment of consequences for DUS testing

- Are there morphological differences when one variety is both vegetatively propagated and seed propagated?
- Are there morphological differences when cuttings are taken from young plants or older plants?
- In vegetatively propagated varieties: is it possible to observe the characteristics Plant height, Time of flowering and Time of harvest maturity?

Results

Pepper:

- Plants from seedlings vs. plants from cuttings: no differences found.
- Cuttings from young plants vs. cuttings from older plants: no differences found.
- Observation of characteristics Plant height, Time of flowering and Time of harvest maturity was not possible due to an unequal development of plants from seedlings and plants from cuttings. Especially the cuttings had a different speed of root formation.

Morphological characteristics
Results

- Pepper:
  - It is difficult to have all cuttings to form roots at the same time;
  - When both plants from seeds and plants from cuttings are in the same plant stage at the time of planting, no differences are found. To observe distinctness is therefore possible in the same trial.
  - But, for good comparison of time-influenced characteristics like Plant height, Time of flowering and Time of harvest maturity, it is very important to have synchronized plants from seeds and plants from cuttings, planted in the same time in the trial. A growing instruction needs to be developed.

Resistance characteristics Tobamovirus and PVY

- Until recently vegetatively propagated applications were mostly morphological clearly distinct because of seedless fruits. Distinctness on resistances therefore was not needed.
- Nowadays there are also seed propagated applications with seedless fruits. Distinctness on resistances may become more important.
- Both types of varieties need to be included in the same resistance test and tested with the same method.

Resistance characteristics Tobamovirus

For Pepper resistance tests some adaptations/additions are needed to the regular protocol.

Tobacco mosaic virus (ToMV) – Pathotype 0 (TMV: 0), and *Pepper mild mottle virus* Pathotype 1.2 (PMMoV: 1.2) and Pathotype 1.2.3 (PMMoV: 1.2.3)

Until now the following method is used to test on Tobamovirus:

- The youngest, fully developed leaf is used (length and age of the plant is not critical) instead of young plants at the stage of developed cotyledons - first pointing leaf. The detached leaves are inoculated according to the regular protocol. After 7-14 days, observations made according to regular protocol. Detached leaves of tobacco (N. xanthi) should be added to check the inoculum quality.
- However mosaic symptoms are not clearly visible on susceptible varieties.
- Resistant varieties show necrotic spots, but the intensity can be low.

- Project: Development of a protocol for this test using rooted cuttings, under controlled environment in a climate chamber, to find out whether mosaic symptoms develop on susceptible varieties.

Resistance characteristics
Tobamovirus

3 resistant varieties on the left showing necrotic spots and waterlogging, on the right a susceptible variety showing no symptoms.

Resistance characteristics
Potato virus Y

Potato virus Y (PVY) – Pathotype 0 (PVY: 0)

- Cuttings are made from vegetatively propagated varieties as well as from seed propagated varieties.
- After transplanting the rooted cuttings, inoculation according to the regular protocol.

- Project: Development of a protocol for this test using rooted cuttings, which tested in controlled environment in a climate chamber, to find out whether mosaic symptoms develop on susceptible varieties.

Conclusions

- DUS testing of vegetatively propagated varieties needs more labour and planning to synchronise with seed varieties;
- Protocols are needed for taking and growing cuttings;
- Protocols are needed for resistance tests;
- The testing of vegetatively propagated varieties is more expensive.

[End of Annex and of document]