UPOV

International Union for the Protection of New Varieties of Plants

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Technical Working Party on Testing Methods and Techniques **TWM/3/7**

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LATEST DEVELOPMENTS IN CHARACTERISTIC-SPECIFIC MOLECULAR MARKERS AT NAKTUINBOUW: A CALL FOR KNOWLEDGE EXCHANGE

Document prepared by an expert from the Netherlands (Kingdom of)

1. Naktuinbouw is the Dutch organization appointed to evaluate plant varieties through DUS testing for registration purposes and/or granting Plant Breeders' Rights, via the Board for Plant Varieties or the Community Plant Variety Office of the European Union (CPVO). In this presentation we will share our latest developments and current portfolio on characteristic-specific molecular markers in different plant species. Our goal is to spark discussion with UPOV members on knowledge exchange over current developments, ambitions, and in-house portfolios, to streamline DUS testing by reducing redundant efforts, saving time and enhancing efficiency.

2. The annex to this document contains a copy of a presentation "Latest developments in characteristic-specific molecular markers at Naktuinbouw: a call for knowledge exchange", to be made by an expert from the Netherlands (Kingdom of), at the third session of the TWM.

[Annex follows]


nak tuinbouw
Latest developments in characteristic-specific molecular markers at Naktuinbouw: a call for knowledge exchange
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Naktuinbouw | Versie ABC.001.00
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Naktuinbouw developments
Naktuinbouw works on the development of different resistance / susceptibility markers for the obligatory diseases to check the claim of the breeder in an earlier stage.
Naktuinbouw ambition
Enhance the efficiency of DUS testing among UPOV members by promoting knowledge exchange on current developments.

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Characteristic specific markers in tomato

Crop	Characteristic	Stage of marker development
Tomato	Resistance to ToMV strain 0, 1, 2 (Tm2/Tm22)	in current use*
	Resistance to TSWV (Sw-5b)	in current use*
	Resistance to Fusarium oxysporum f.sp lycopersici race 0 and race 1 (I2)	in current use, in parallel with bioassay**
	Resistance to Fusarium oxysporum f.sp lycopersici race 2 (I3)	in current use, in parallel with bioassay**
	Resistance to Passalora fulva race 0, group A, B, C, D and E, based on genes CF0, CF2, CF5, CF4 and CF9	in current use, in parallel with bioassay**
	Self-pruning (SP)	under development
	Uniform ripening (U)	under development
	Resistance to Verticillium sp (Va en Vd) race 0; based on genes Ve1 and Ve2	under development
	Resistance to ToBRFV	under development/ in validation

*Included in CPVO protocol and UPOV Test Guidelines
**To be included in CPVO protocol, followed by UPOV Test Guidelines (used to monitor correlation with bioassay)

3

Markers development for morphological characteristics in tomato

- Finalized EU initiative, to promote the introduction of new varieties better adapted to biotic/ abiotic conditions and the improvement of plant variety testing.

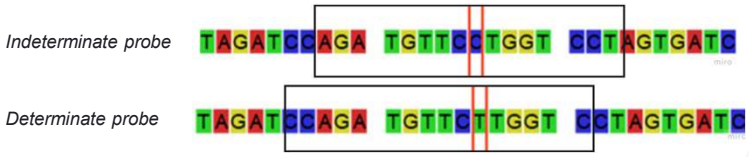
invite

WP3/T3.3: *Focus task to identify specific markers for DUS related traits in tomato, including morphological characteristics.*

4

Plant growth type: Determinate x Indeterminate

- *SELF-PRUNING (SP)* gene: single aminoacid change (P76L) leads to determinate growth.



Plant growth type	Codon	Aminoacid
Indeterminate	CCT	proline
Determinate	CTT	leucine

- *TaqMan assay on 494 varieties showed 100% correlation with phenotype.*

Genotype	Phenotype Indeterminate	Phenotype Determinate	Total
Indeterminate	423		423
Heterozygous indeterminate	31		31
Determinate		40	40
Total	**454**	**40**	**494**

- *Reproducibility and robustness tested*
  - 494 varieties in duplo (988 individual samples).
  - Blind test performed by another team member.

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Next steps

More markers

The current tomato Test Guidelines contains **71 characteristics** to be analyzed, among resistance and morphological ones.

Explore more morphological characteristics candidates for markers developments.

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Characteristic specific markers in other plant species

Crop	Characteristic	Stage of marker development
Lettuce	Resistance to LMV pathotype II (mo1)	in current use*
Various B. oleracea crops	Male sterility (CMS)	in current use*
	Resistance gene to Race 1 of Fusarium oxysporum f. sp. conglutinans (FOC1)	under development
Cauliflower	Flower color (CCD4)	in current use*
Melon	Resistance to *Aphis gossypii*	in validation

*Included in CPVO protocol and UPOV Test Guidelines

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Platform within UPOV to share DUS Examination Offices DNA developments

Focus: efficient collaboration and exchange between DUS Examination Offices (EOs) to optimize resources.

Key strategy: prevent duplication of efforts in similar developments. Open platform within UPOV for DUS EOs to exchange molecular markers portfolios, developments and ambitions to attract collaborations.

This collaborative approach will not only streamline validation processes but will also enhance the reliability and impact of molecular marker advancements by leveraging shared knowledge and methodologies.

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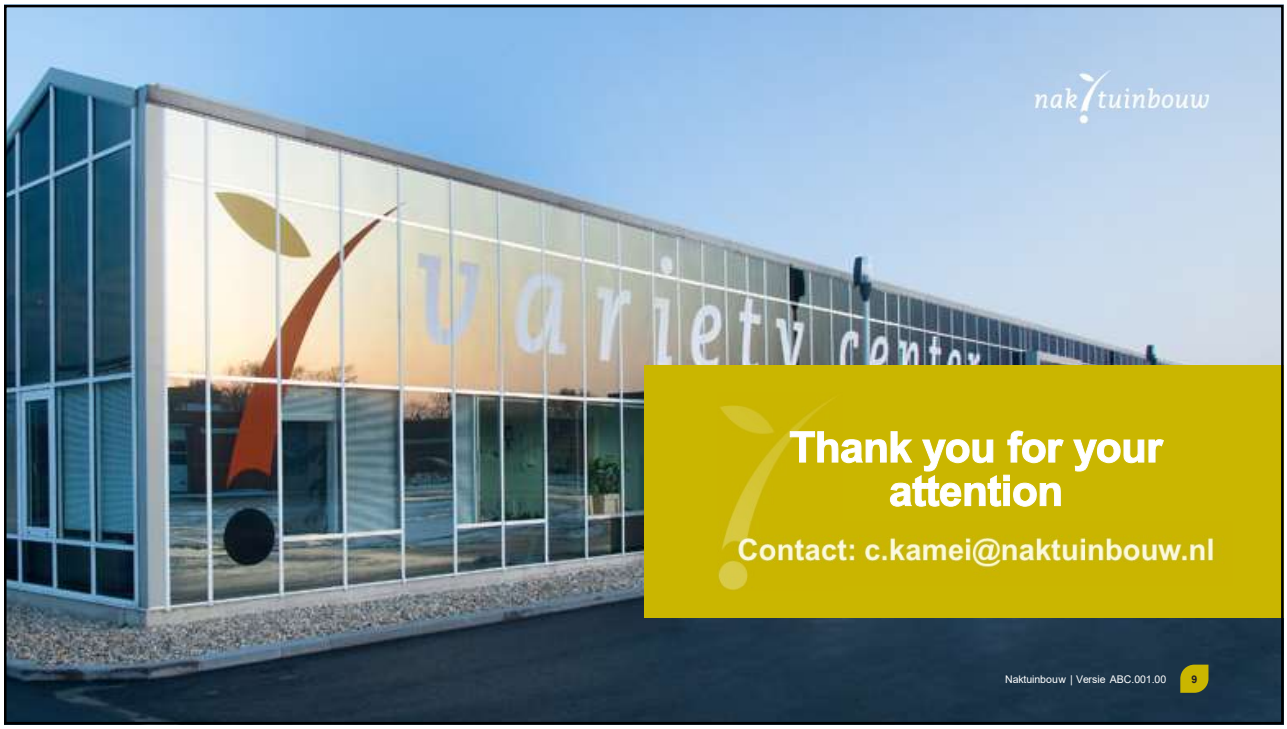

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[End of Annex and of document]