UPOV

International Union for the Protection of New Varieties of Plants

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INTEGRATION OF MOLECULAR DATA INTO DUS TESTING IN DURUM WHEAT: USE OF A STANDARDIZED METHOD FOR THE EFFICIENT MANAGEMENT OF REFERENCE COLLECTIONS

Document prepared by experts from Austria

The Annex to this document contains a copy of a presentation on “Integration of molecular data into DUS testing in Durum Wheat: Use of a standardized method for the efficient management of reference collections”, prepared by experts from Austria, to be made at the sixteenth session of the Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular (BMT).

[Annex follows]

ANNEX

INTEGRATION OF MOLECULAR DATA INTO DUS TESTING IN DURUM WHEAT: USE OF A STANDARDIZED METHOD FOR THE EFFICIENT MANAGEMENT OF REFERENCE COLLECTIONS

Presentation prepared by experts from Austria

AGES

Integration of Molecular Data into DUS Testing in Durum Wheat:
Use of a Standardized Method for the Efficient Management of Reference Collections

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REFERENCE COLLECTIONS ARE MANDATORY

AGES

According to UPOV and CPVO rules

- A comprehensive reference collection has to be present in each entrusted Examination Office (EO)
  - CPVO: Austria, France, Hungary, Italy, and Spain in the case of durum wheat
  - The challenge: Expensive and extensive
  - The aim: Reduce the number of plants to be grown in field trials, enable pre-selection

- The idea in a nutshell
  - Durum wheat (2n = 4X = 28, AABB), allotetraploid, about 12 Gb
  - In total ca. 600 varieties/candidate varieties will be genotyped
    1. Varieties covered by CPVR
    2. Varieties listed in the Common Catalogue
    3. Candidate varieties
  - Use of a commercial DNA SNP-chip

SAME MARKERS, DIFFERENT APPROACHES & AIMS

SNPs for genotyping in crop plants

- Frequent type of genetic variation
- Occur throughout the genome
- Bi-/multiallelic, co-dominant
- Useful for determining genetic relationships
- Can act as markers for genes

- Widely used in plant breeding: Genotyping-by-sequencing (GBS)
- Different platforms, different approaches
- In all species/crops → see diverse CPVO-projects

DNA SNP-CHIP FOR GENOTYPING: ADVANTAGES

The method is feasible, easy to use and may be implemented by any EO

- Genome-wide distribution of SNPs
  - 12,235 markers can be analysed in durum wheat
  - Highly informative
- Efficient and suitable for routine analysis
  - Harmonisation: use of the same markers; same source, platform, technology
  - High reliability and reproducibility within and between laboratories
  - High throughput screening, short processing times
- Cost-effective: based on an established system
  - Low costs per sample/per data point compared with other marker systems
  - No development costs for the individual laboratory
  - No specific technical skills and equipment required
  - Genotyping arrays are being developed for a large number of important crop plants

DNA SNP-CHIP FOR GENOTYPING: LIMITATIONS

Genotype and phenotype are not necessarily correlated

- Does not cover the entire sequence information
- To be evaluated: Potential to reduce the number of comparators
- A SNP *may* serve as a marker for a specific characteristic
- Not suitable to replace field trials

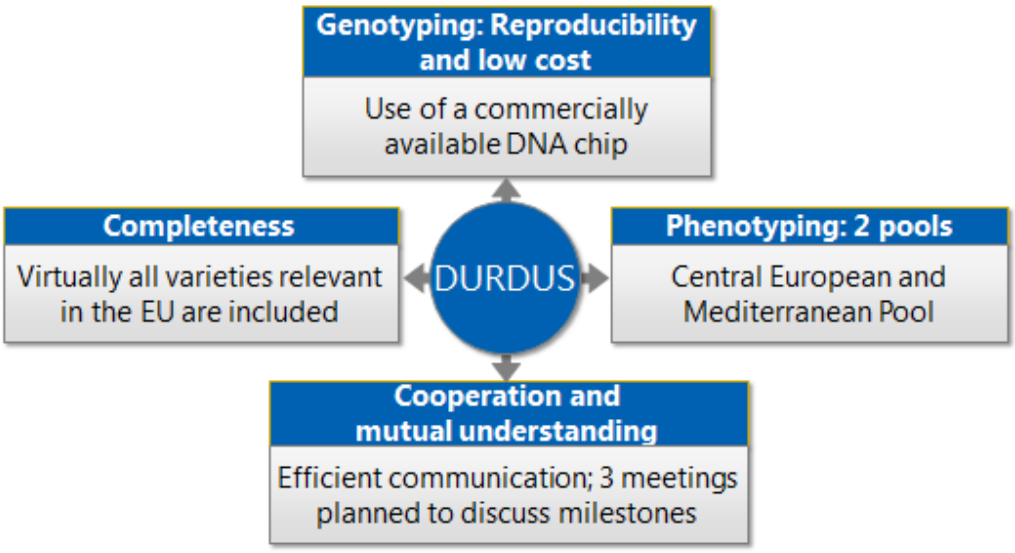
DURDUS PROPOSAL

Objective: Efficient management of reference collections

- Combine genotypic and phenotypic data to optimise reference collection management in durum wheat
  - Follows the UPOV model "Combining Phenotypic and Molecular Distances in the Management of Variety Collections"
- Method: Investigation of classical variety descriptions in parallel with the use of SNPs
  - Central European and Mediterranean Pool
- Aim: Limitation of field trials to necessary comparators
  - Cost efficiency
  - Conservation of resources

KEY FEATURES OF THE DURDUS PROJECT

Workplan developed involving all entrusted EOs



OUTLOOK ON PROJECT RESULTS AND BEYOND

The first step: Proof-of-concept in durum wheat

- Main objective: Review of the suitability of the DNA chip-based method
- Recommendations for a possible limit to the distinctness
- Investigation of costs versus potential savings

- Potential follow-up
  - Database of phenotypic and molecular data
  - Careful analysis of data protection needs

- Future-oriented
  - Proof-of-concept: Extension to other species

[End of Annex and of document]