

Report on developments in UPOV concerning biochemical and molecular techniques

The fifty-first session of the Technical Committee,
March 24, 2015

Overview

- Use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS)
- Frequently Asked Question (FAQ):
molecular techniques

STATUS OF UPOV DOCUMENTS CONCERNING MOLECULAR TECHNIQUES

1. ADOPTED in OCT. 2010 (UPOV/INF/17) and OCT. 2011 (UPOV/INF/18)

Document reference	Title
UPOV/INF/17/1	Guidelines for DNA Profiling: Molecular Marker Selection and Database Construction (“BMT Guidelines”)
UPOV/INF/18/1	Possible Use of Molecular Markers in the Examination of Distinctness, Uniformity and Stability

2. ADOPTED in OCT. 2013

Document reference	Title
TGP/15	Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)

UPOV/INF/17/1 (INFormation document)

“Guidelines for DNA Profiling: Molecular Marker Selection and Database Construction (“BMT Guidelines”)”

The purpose of this document (BMT Guidelines) is to provide guidance for developing harmonized methodologies with the aim of generating high quality molecular data for a range of applications. The BMT Guidelines are also intended to address the construction of databases containing molecular profiles of plant varieties [...]

UPOV/INF/18/1 (INFormation document)

“Possible Use of Molecular Markers in the Examination of Distinctness, Uniformity and Stability”

The purpose of this document is to provide guidance on the possible use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS). [...]

→ *Both documents have been **adopted and published on UPOV website.***

APPLICATION MODELS in INF/18

MODELS WITH A POSITIVE ASSESSMENT



- Characteristic-specific molecular markers
- Combining phenotypic and molecular distances in the management of variety collections
- Calibrated molecular distances in the management of variety collections

MODELS WITHOUT A POSITIVE ASSESSMENT

- Use of molecular marker characteristics

TGP/15/1

“Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)”

The purpose of this document is to provide guidance on the use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS) on the basis of the models in document UPOV/INF/18 that have received a positive assessment and for which accepted examples have been provided.

→ Adopted by the Council of UPOV in October, 2013.



APPLICATION MODEL: Characteristic-specific molecular markers

Molecular markers can be used as a method of examining DUS characteristics if there is a reliable link between the marker and the characteristic;

e.g. there is verification of the reliability of the link between the marker and the characteristic;

APPLICATION MODEL:

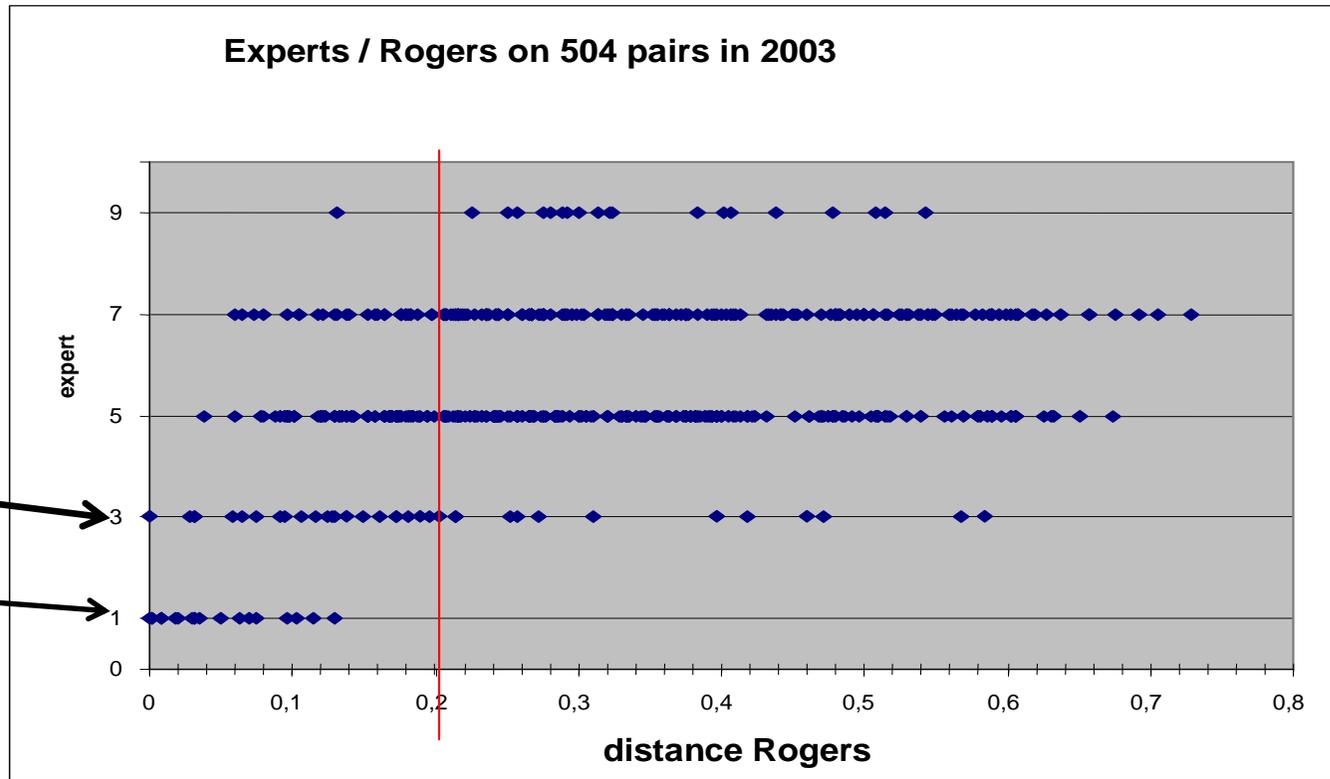
Combining phenotypic and molecular distances in the management of variety collections

DUS growing trial:

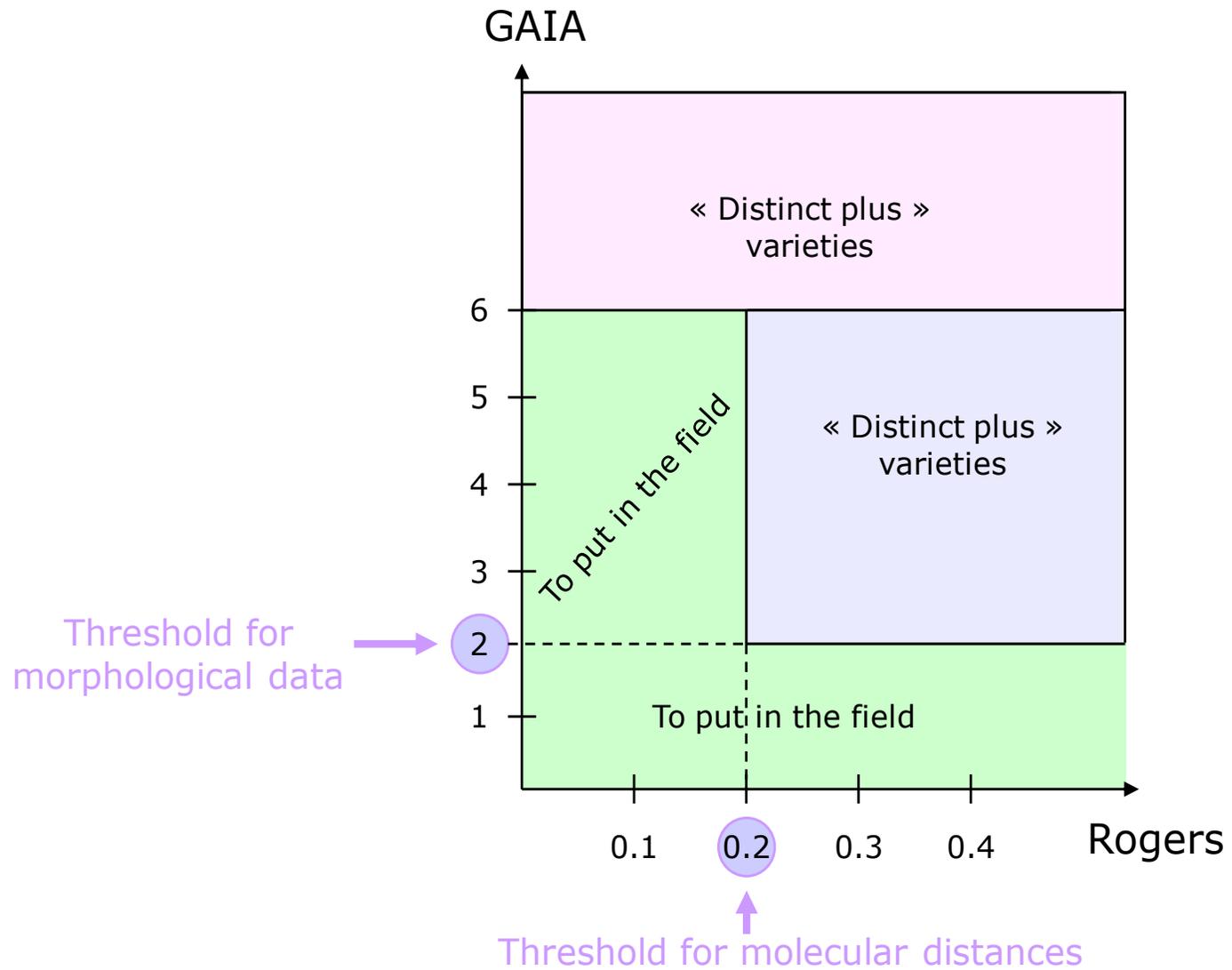
- Eliminate varieties of common knowledge by setting threshold “Distinctness plus”

A combination of phenotypic differences and molecular distances can be used to identify within the variety collection, those varieties which need to be compared with candidate varieties in order to improve the selection of “Distinct plus” varieties

EVALUATION OF THE LEVEL OF CORRELATION BETWEEN MOLECULAR AND MORPHOLOGICAL DATA



Each data point corresponds to the lowest note determined by the panel of experts and the Roger's distance, for a given pair



Relation: no varieties are “similar or very close”
when Rogers > 0.2

Overview

- Use of biochemical and molecular markers in the examination of Distinctness, Uniformity and Stability (DUS)
- Frequently Asked Question (FAQ):
molecular techniques

Background

- C(Extr.)/31 (April 2014) adopted FAQs

(see document C(Extr.)31/5 “Report on the Decisions”, paragraph 15)

<http://www.upov.int/about/en/faq/>

Question: Does UPOV allow molecular techniques (DNA profiles) in the DUS examination?

- It is important to note that, in some cases, varieties may have a different DNA profile but be phenotypically identical, whilst, in other cases, varieties which have a large phenotypic difference may have the same DNA profile for a particular set of molecular markers (e.g. some mutations).
- In relation to the use of molecular markers that are not related to phenotypic differences, the concern is that it might be possible to use a limitless number of markers to find differences between varieties at the genetic level that are not reflected in phenotypic characteristics.

On the above basis, UPOV has agreed the following uses in relation to DUS examination:

Question: Does UPOV allow molecular techniques (DNA profiles) in the DUS examination?(Cont.)

- (a) Molecular markers can be used as a method of examining DUS characteristics that satisfy the criteria for characteristics set out in the General Introduction if there is a reliable link between the marker and the characteristic.
- (b) A combination of phenotypic differences and molecular distances can be used to improve the selection of varieties to be compared in the growing trial if the molecular distances are sufficiently related to phenotypic differences and the method does not create an increased risk of not selecting a variety in the variety collection which should be compared to candidate varieties in the DUS growing trial.

Question: Does UPOV allow molecular techniques (DNA profiles) in the DUS examination?(Cont.)

The situation in UPOV is explained in documents TGP/15 'Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)' and UPOV/INF/18 'Possible use of Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)'.

Q & A for a wider audience

- The CC agreed that the **draft FAQ** concerning information on the situation in UPOV with regard to the use of molecular techniques **for a wider audience, including the public in general, should be referred to the TC for consideration.**

THANK YOU