

**Working Group on Biochemical and Molecular Techniques
and DNA-Profiling in Particular****BMT/17/2****Seventeenth Session
Montevideo, Uruguay, September 10 to 13, 2018****Original:** English
Date: September 5, 2018

REPORT ON DEVELOPMENTS IN UPOV*Document prepared by the Office of the Union**Disclaimer: this document does not represent UPOV policies or guidance*

The Annex to this document contains a copy of a presentation "Reports on developments in UPOV" to be made by the Office of the Union at the seventeenth session of the Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular.

[Annex follows]

Working Group on Biochemical and Molecular Techniques
and DNA-Profiling in Particular (BMT)
Seventeenth Session

Report on developments in UPOV
concerning
Biochemical and Molecular Techniques

Office of the Union

 *Montevideo, Uruguay, September 10, 2018*
International Union for the Protection of New Varieties of Plants

Preview

Developments in UPOV:

- General
 - Communicating the benefits of UPOV
 - Topics for discussion in CAJ (October 2018)
- Biochemical and molecular techniques
 - Current guidance
 - 2017 meeting of the UPOV/BMT
 - Developments at TWPs

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The screenshot shows the UPOV website homepage. At the top, there is a language selection menu (Deutsch, Español, Français, Other) and a search bar. Below this is a navigation menu with items: ABOUT UPOV, MEMBERSHIP, UPOV SYSTEM, DATA & STATISTICS, MEETINGS, and NEWS. A red lightning bolt graphic points to the 'UPOV SYSTEM' menu item. The main content area features a large image of sunflowers with the text 'New videos on benefits of the UPOV system in Canada and Kenya'. To the right, there is a 'Stakeholder features' section with a list: Breeders, Farmers and Growers, Policy makers, and General Public. Below this is a 'Quick Links' section with icons for UPOV PRISMA, GENIE Database, UPOV Lex, and Plant Variety Database (PLUTO). A 'Welcome' section at the bottom left contains the text: 'The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization with headquarters in Geneva (Switzerland)'. The page number '4' is visible in the bottom right corner.

Benefits of the UPOV System

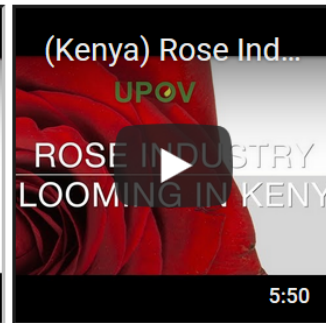
VIDEOS



Canadian cherry growers benefit from government policy

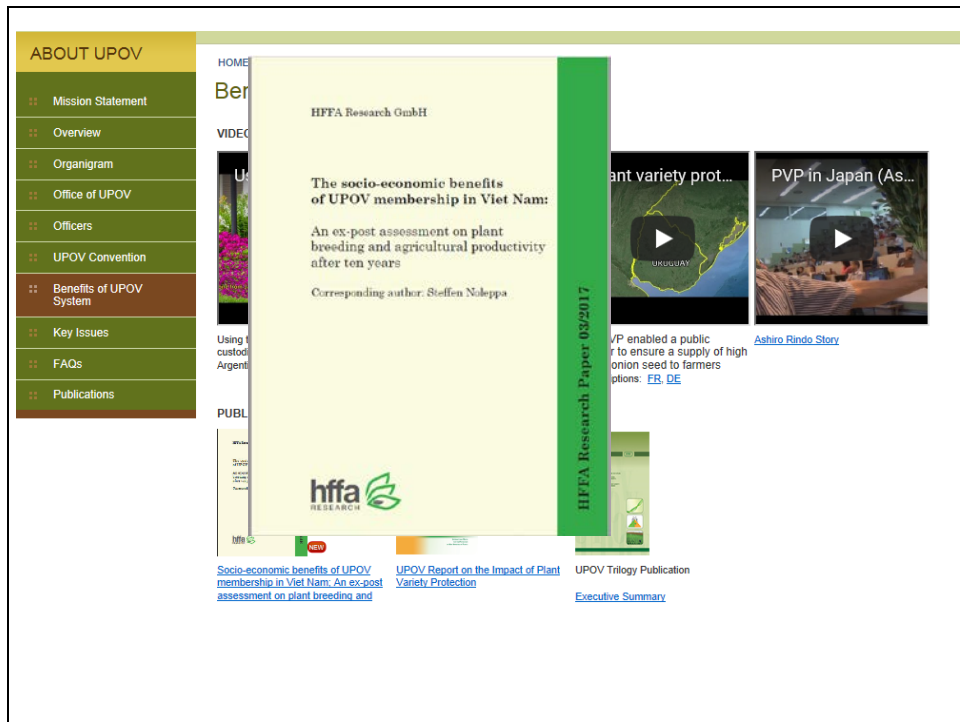
See how the Government of Canada uses PVP to improve the livelihood of Canadian cherry growers

[\(Long version\)](#)



Rose industry blooming in Kenya

Discover how the UPOV system enabled Kenya to develop a \$500 million cut-flower industry that employs 500,000 Kenyans



ABOUT UPOV

- Mission Statement
- Overview
- Organigram
- Office of UPOV
- Officers
- UPOV Convention
- Benefits of UPOV System**
- Key Issues
- FAQs
- Publications

HOME

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PUBL

HFFA Research GmbH

The socio-economic benefits of UPOV membership in Viet Nam: An ex-post assessment on plant breeding and agricultural productivity after ten years

Corresponding author: Steffen Naleppa

HFFA Research Paper 03/2017

ant variety prot...

PVP in Japan (As...

Using t
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PVP enabled a public
r to ensure a supply of high
onion seed to farmers
ptions: [FR](#) [DE](#)

[Socio-economic benefits of UPOV membership in Viet Nam: An ex-post assessment on plant breeding and](#)

[UPOV Report on the Impact of Plant Variety Protection](#)

[UPOV Trilogy Publication Executive Summary](#)

STUDY in VIET NAM*

Annual land productivity developments since Viet Nam joined
UPOV in 2006 in
Rice, Corn (maize) and Sweet Potatoes

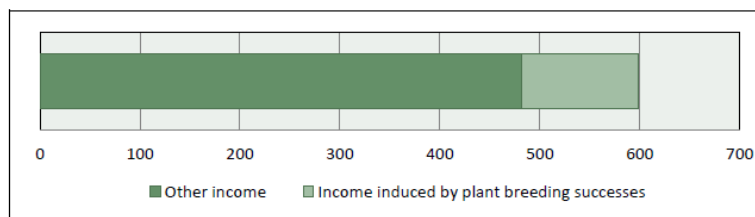
- **1995-2005:** increase in yield mainly through increased level of inputs – no detectable increase due to plant breeding
- **2006-2016:** annual land productivity increase due to plant breeding
 - Rice 1.7 %
 - Corn 2.1 %
 - Sweet potatoes 3.1 %

* "The socio-economic benefits of UPOV membership in Viet Nam; An ex post assessment on plant breeding and agricultural productivity after 10 years" (Corresponding author: Steffen Noleppa) by HFFA Research GmbH

STUDY in VIET NAM

**INCOME of Vietnamese farmers has
increased by 24% since 2006**

Figure 4.6: Income of a Vietnamese farmer induced by plant breeding successes for major arable crops since UPOV membership vs. other income in arable farming (in USD)



Source: Own figure and calculations.

IMPACT OF PVP/UPOV SYSTEM ON VN'S AGRICULTURE

NGUYEN THANH MINH, PVPO, MARD/VIETNAM
PHILLIPINES, August - 2018

Increasing farmer's income



New rose can be more expensive
than old 10 to 15 times

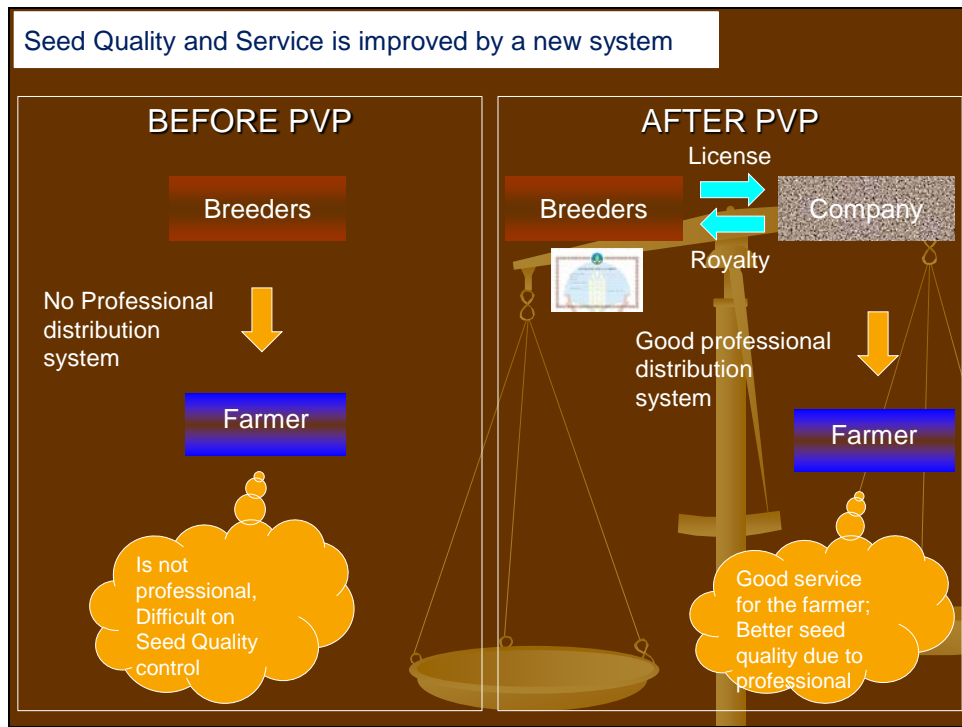


Specialization in value chain



Farmer produce under license from
Owners





STUDY in VIET NAM

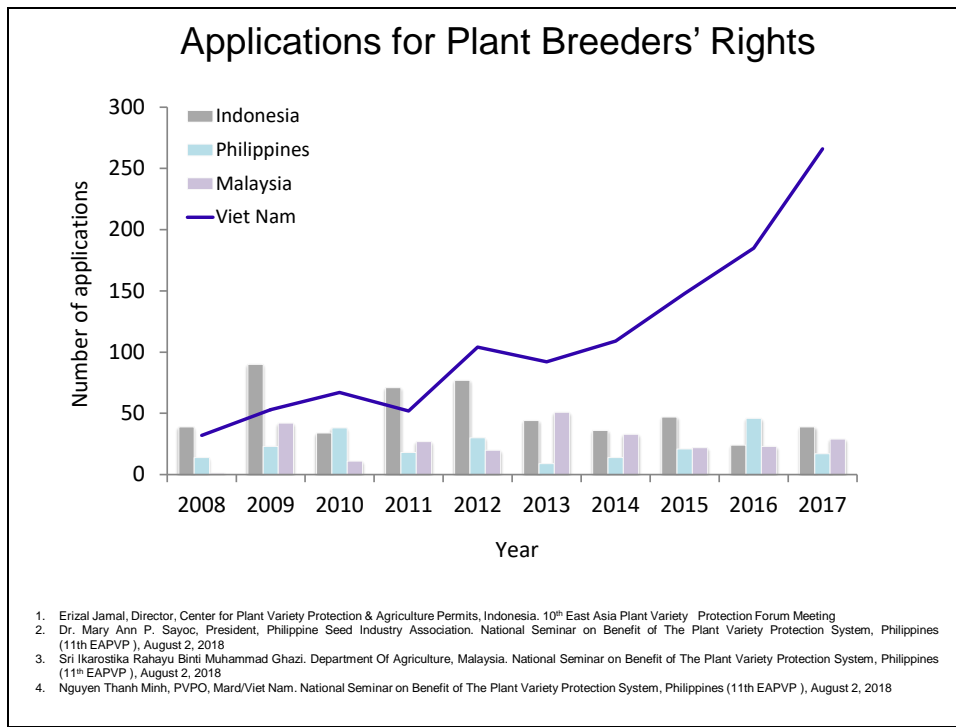
Annual value added:

- Arable farming \$2.3 billion
- Horticulture \$1.0 billion
- Floriculture \$ 0.2 billion

- GDP added upstream/downstream (value chains)
 \$1.5 billion

TOTAL ADDED: \$5 billion

(> 2.5% GDP)



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<i>Reference</i>	<i>Explanatory Notes on:</i>	<i>Timetable</i>
UPOV/EXN/EDV/2 (revision)	Essentially Derived Varieties	Adopted by Council in April 2017

Administrative and Legal Committee (CAJ): October 31, 2018

US, CIOPORA, ESA and ISF to share their perspectives on :

Essentially Derived Varieties

- (i) **essential characteristics**
- (ii) **predominantly derived**
- (iii) indirect derivation, including in relation to parent lines and hybrids
- (iv) **assessment of essentially derived varieties**

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<i>Reference</i>	<i>Explanatory Notes on:</i>	<i>Timetable</i>
UPOV/EXN/PPM/1	Propagating Material	Adopted by Council in April 2017

Administrative and Legal Committee (CAJ): October 31, 2018

ESA and ISF to share their perspectives on :

(b) Conditions and Limitations Concerning the Breeder's Authorization in Respect of **Propagating Material**
- **suitable examples of conditions and limitations**

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<i>Reference</i>	<i>Explanatory Notes on:</i>	<i>Timetable</i>
UPOV/EXN/PRP/2 (revision)	Provisional Protection	Adopted by Council in October 2015

Administrative and Legal Committee (CAJ): October 31, 2018

ESA and ISF to share their perspectives on :

(c) **Scope of Provisional Protection**

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TECHNICAL COMMITTEE
October 29 and 30, 2018, Geneva

Discussion on: minimum distance between varieties

Administrative and Legal Committee (CAJ): October 31, 2018
Program

In response to a suggestion by CIOPORA and AIPH for the CAJ to consider the matter of minimum distance, the CAJ agreed to invite **CIOPORA and AIPH to make a joint presentation on minimum distance** at its seventy-fifth session. The CAJ noted that the matter was under consideration by the TC and that a report on the conclusions of the TC would be provided under agenda item 3 “Report on developments in the Technical Committee” at the seventy-fifth session of the CAJ.

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<p>Technical Working Party for Agricultural Crops (TWA) May 21 to 25, 2018, Naivasha, Kenya Minimum distance between varieties (document by the European Union)</p>
<p>Technical Working Party for Vegetables (TWV) September 17 to 21, 2018, Beijing, China No discussion on minimum distance</p>
<p>Technical Working Party for Fruit Crops (TWF) November 19 to 23, 2018, Santiago de Chile, Chile No discussion on minimum distance</p>
<p>Technical Working Party for Ornamental Plants and Forest Trees (TWO) February 18 to 22, 2019, Christchurch, New Zealand Minimum distances between vegetatively reproduced ornamental and fruit varieties (documents invited)</p>

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STATUS OF UPOV DOCUMENTS CONCERNING MOLECULAR TECHNIQUES

Document reference	Title
UPOV/INF/17/1	Guidelines for DNA Profiling: Molecular Marker Selection and Database Construction (“BMT Guidelines”) (2010)

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/18/1	Possible Use of Molecular Markers in the Examination of Distinctness, Uniformity and Stability (2011)

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). [...]

UPOV/INF/18 POSSIBLE APPLICATION MODELS

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

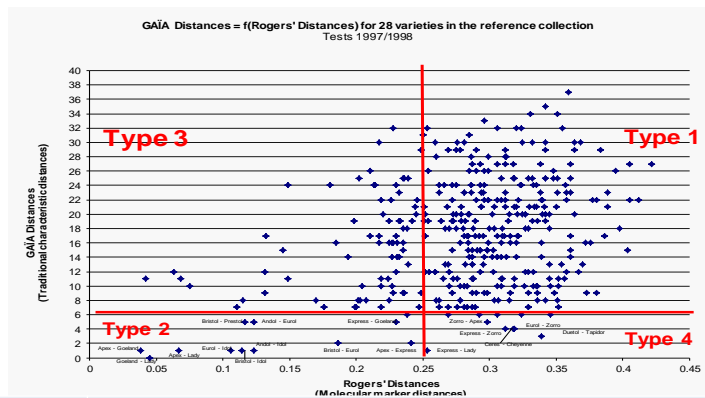
TGP/15/1 (Technical Guidelines Protocol)

“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.

Calibrated molecular distances in the management of variety collections



	Distinctness plus (Traditional characteristics)	Distinctness plus (Molecular markers)
Type 1	Yes	Yes
Type 2	No	No
Type 3	Yes	No
Type 4	No	Yes

UF



Model 1: Characteristic-specific molecular markers

Example: gene specific marker for herbicide tolerance introduced by genetic modification

On the basis that:

[...]

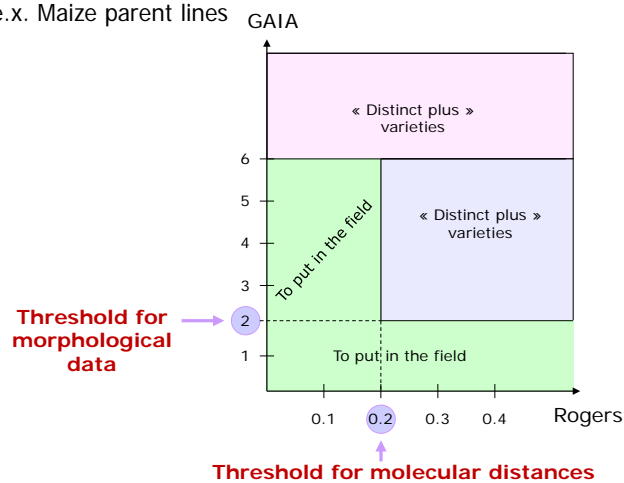
- there is verification of the reliability of the link between the marker and the characteristic;

- different markers for the same characteristic are different methods for examining the same characteristic;

[...]

Model 2: Combining phenotypic and molecular distances in the management of variety collections

e.x. Maize parent lines



Combining phenotypic and molecular distances in the management of variety collections

“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, on the following basis:

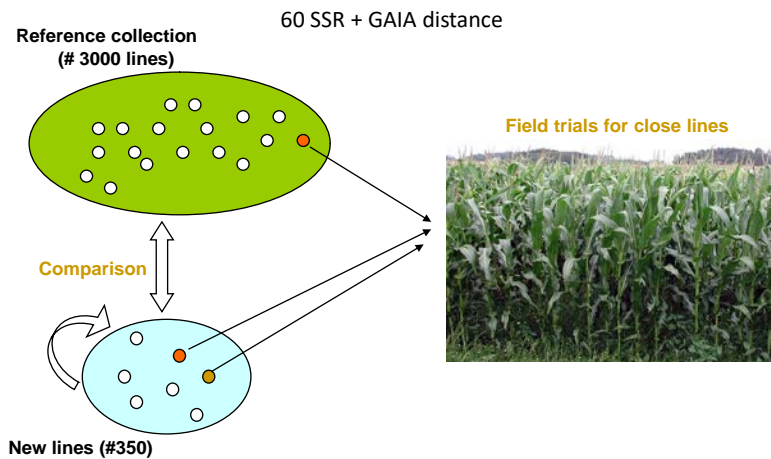
- (a) there is **reliable information that the molecular distances are sufficiently related to phenotypic differences**, such that
- (b) the method selects varieties in the variety collection which are similar to the candidate varieties; and
- (c) **the method does not create an increased risk of not selecting a variety in the variety collection which needs to be compared to the candidate varieties in the field.**

UPOV

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MANAGEMENT OF THE REFERENCE COLLECTION

DISTINCTNESS PROCEDURE



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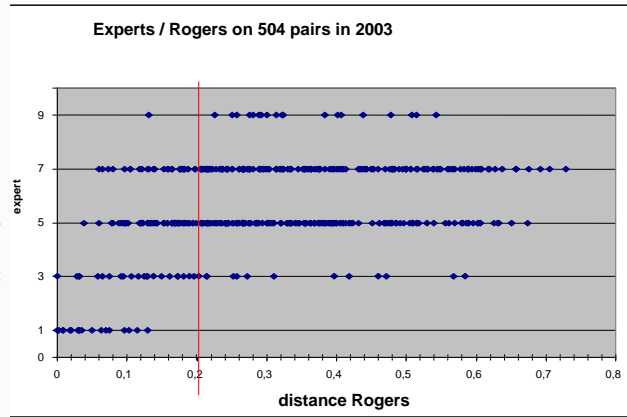
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EVALUATION OF THE LEVEL OF CORRELATION BETWEEN MOLECULAR AND MORPHOLOGICAL DATA

EXPERTS

Of similarity:

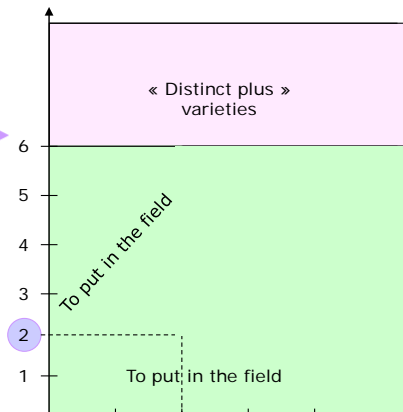
comparison should have been avoided because the varieties are **totally different**;
 comparison should have been avoided because the varieties are **very different**;
 comparison was useful, the varieties are **clearly distinct**;
 two varieties are **distinct but close**;
 two varieties are **similar or very close**;



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

GAIA

Threshold for morphological data



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UPOV

International Union for the Protection of New Varieties of Plants

**Working Group on Biochemical and Molecular Techniques
and DNA-Profiling in Particular**

BMT/16/29

**Sixteenth Session|
La Rochelle, France, November 7 to 10, 2017**

**Original: English
Date: November 10, 2017**

REPORT

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The use of molecular markers (SNP) for maize DUS testing in France (2013 to 2016)

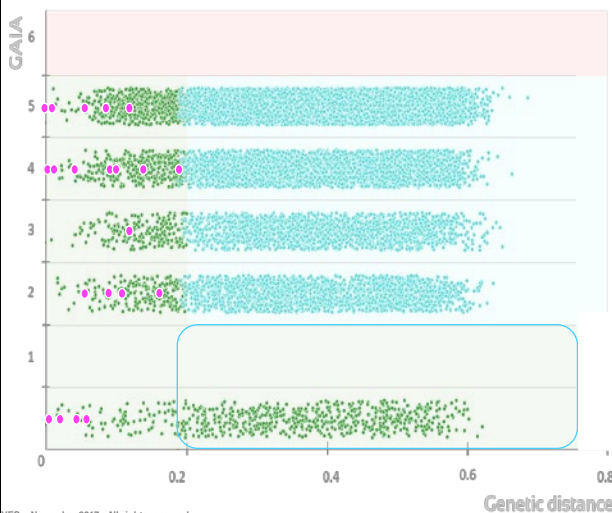
The BMT agreed that France should propose a **revision to document TGP/15** “Guidance on the Use of Biochemical and Molecular Markers in the Examination of Distinctness, Uniformity and Stability (DUS)”, Annex II, “Example: Parent Lines in Maize”, to reflect the refinements that had been made in France on the basis of its experience in the application of the Model “**Combining Phenotypic and Molecular Distances in the Management of Variety Collections**”, for **consideration by the Technical Committee at its fifty-fourth session.**

document BMT/16/8 Add. Annex, page 7

available at: http://www.upov.int/edocs/mdocs/upov/en/bmt_16/bmt_16_8_add.pdf

Report of the DUS Data (2013 to 2016)

● 2013 to 2016 data compilation



– 21 pairs () required one more year of study

– Located in the area GAIA < 6 and GD ≤ 0.2

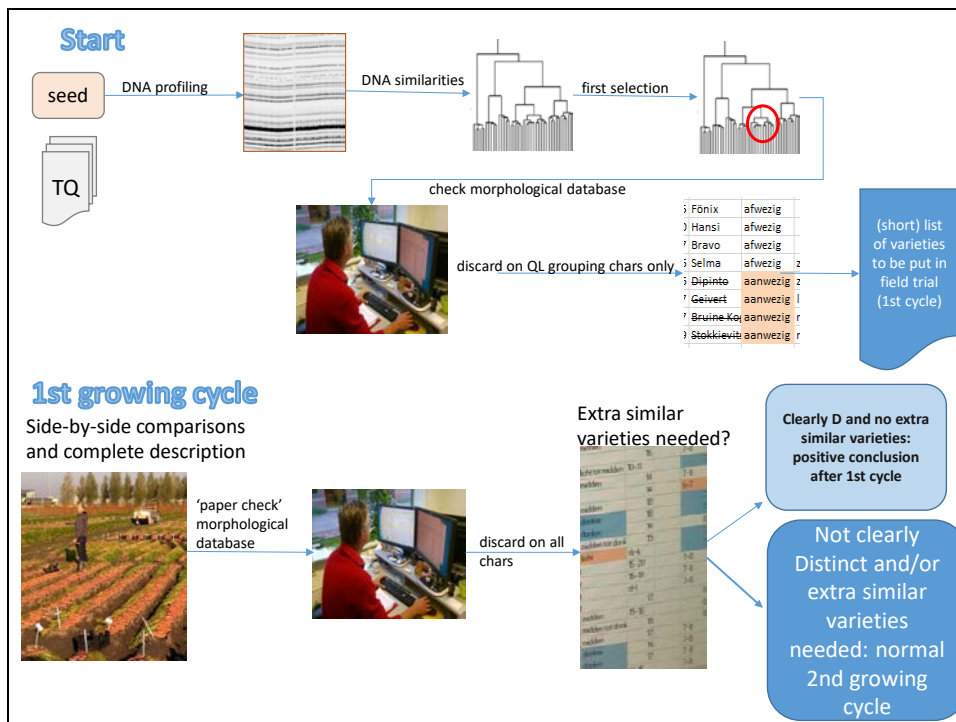
– None have been identified in the zone GAIA < 2 and GD > 0.2

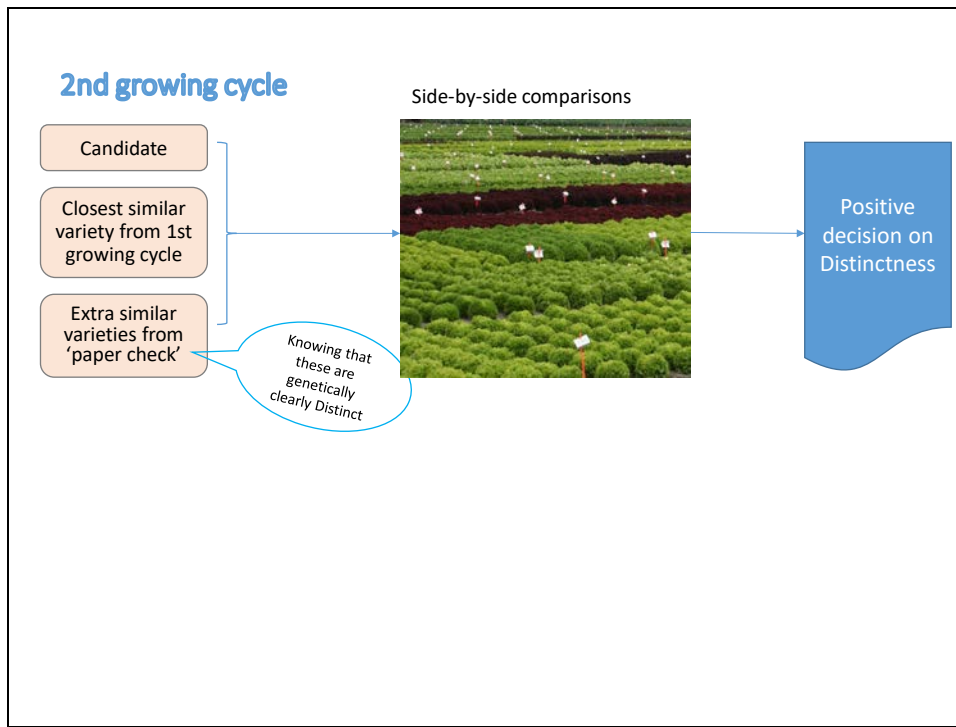
– New threshold to reduce the number of

13/16

Genetic selection of similar varieties for the first growing cycle: example French bean

The BMT agreed that the **approach presented** in document BMT/16/19 and BMT/16/19 Add. **was a suitable use of molecular techniques in the examination of DUS and should be proposed for inclusion in document TGP/15.** On that basis, it was agreed that the Netherlands should prepare an **explanation of the method** as a basis for a revision of document TGP/15 to be considered by the Technical Committee at its fifty-fourth session.





International guidelines on molecular methodologies including cooperation between the OECD, UPOV, ISTA and ISO

The BMT agreed that the initiatives above [joint document on principal features; inventory of marker techniques per crop], and consideration of possible **harmonization of terms and methodologies** used for different crops and the possible development of **standards**, might be advanced through a **further international practical workshop**, to be jointly coordinated by OECD, UPOV and ISTA and supported by Naktuinbouw and/or another partner with the relevant facilities.

Development on Use of Molecular Technique for PVP in Republic of Korea

The BMT noted the proposal made in the presentation to organize an international consortium to work on molecular techniques and agreed to discuss that matter during the cooperation session.

BMT/16 - Coordination Session

Discussion groups were formed or BMT participants to exchange information on their work and explore areas for cooperation.

Agricultural Crops

The United Kingdom will **compile a list** of crops of interest to members of the Union.

Fruit Crops

The following interest in cooperation were identified:

- **Apple:** Australia, Canada, France, Republic of Korea, United Kingdom, CIOPORA
- **Stone fruit:** France, Republic of Korea, Spain, United Kingdom
- **Berries:** Austria, Germany, Netherlands, United Kingdom, CIOPORA
- **Nuts:** China, Spain

Ornamental Plants and Forest Trees

Opportunities for cooperation on **Rose** will be explored by Netherlands (coordinator), China, United Kingdom and CIOPORA.

Vegetables

The following UPOV members will **share their criteria for selecting crops** for work in relation to the use of molecular techniques: Canada; China; France; Germany; Netherlands (coordinator); Republic of Korea; United Kingdom.

Review of document UPOV/INF/17 “Guidelines for DNA-Profiling: Molecular Marker Selection and Database Construction (‘BMT Guidelines’)”

The BMT agreed to invite members and observers to **provide comments** on document UPOV/INF/17 “Guidelines for DNA-profiling: Molecular Marker Selection and Database Construction (‘BMT Guidelines’)”. The comments would be compiled by the Office of the Union in a document that would form the basis of a review of document UPOV/INF/17 by the BMT at its seventeenth session.

The BMT further agreed to propose to introduce a new chapter concerning **cooperation in the exchange of data and construction of databases** in document UPOV/INF/17 on the basis of document BMT/16/5.

Working Group on Biochemical and Molecular Techniques
and DNA-Profiling in Particular

BMT/16/5

Sixteenth Session
La Rochelle, France, November 7 to 10, 2017

Original: English
Date: October 25, 2017

STANDARDS FOR DATABASES CONTAINING MOLECULAR INFORMATION

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

1. The purpose of this document is to explore the possibility to use WIPO standard ST.26 for databases of molecular information.

2. The structure of this document is as follows:

INTRODUCTION.....	1
TYPES OF MOLECULAR DATABASES.....	2
WIPO ST.26.....	3
POSSIBLE USE OF WIPO ST.26 FOR DATABASES OF MOLECULAR INFORMATION.....	3
16.1. Feature Key gene.....	5
16.2. Feature Key source.....	5
16.3. Feature Key STS.....	6
16.4. Feature Key variation.....	6
17.1. Qualifier allele.....	7
17.2. Qualifier chromosome.....	7
17.3. Qualifier compare.....	7
17.4. Qualifier cultivar.....	7
17.5. Qualifier ecotype.....	8
17.6. Qualifier PCR_primers.....	8
17.7. Qualifier phenotype.....	8
17.8. Qualifier variety.....	8
17.9. Qualifier sub_species.....	9

9. The WIPO ST.26 XML structure is composed of:

- General information part:
 - ApplicationIdentification: Mandatory
 - IPOfficeCode
 - ApplicationNumberText
 - FilingDate
 - ApplicantFileReference: Optional
 - EarliestPriorityApplicationIdentification: Mandatory if Priority is claimed
 - ApplicantName: Mandatory
 - ApplicantNameLatin: Optional
 - InventorName: Optional
 - InventorNameLatin: Optional
 - InventionTitle: Mandatory in the language of filing
 - SequenceTotalQuantity: Mandatory
- Sequence data part: this is composed of one or more SequenceData elements. Each SequenceData has a mandatory attribute sequenceIDNumber.

Element	Description	Mandatory/Not Included	
		Sequences	Intentionally Skipped Sequences
INSDSeq_length	Length of the sequence	Mandatory	Mandatory with no value
INSDSeq_moltype	Molecule type	Mandatory	Mandatory with no value
INSDSeq_division	Indication that a sequence is related to a patent application	Mandatory with the value "PAT"	Mandatory with no value
INSDSeq_feature-table	List of annotations of the sequence	Mandatory	Must NOT be included
INSDSeq_sequence	Sequence	Mandatory	Mandatory with the value "000"

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International Union for the Protection of New Varieties of Plants

Technical Working Party for Agricultural Crops

TWA/47/7

Forty-Seventh Session
Naivasha, Kenya, May 21 to 25, 2018

Original: English
Date: May 25, 2018

REPORT

Adopted by the Technical Working Party for Agricultural Crops

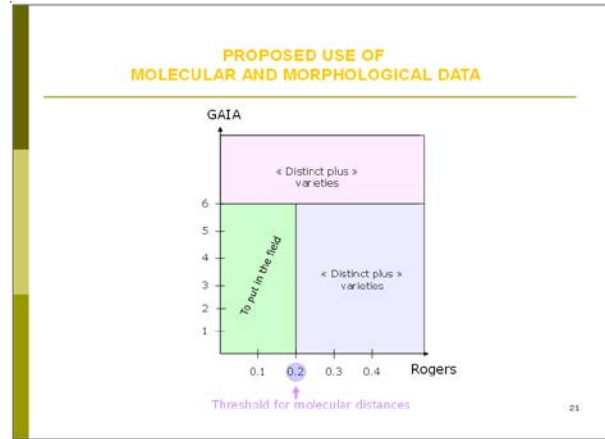
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Molecular Techniques

45. The TWA noted that the studies for the refinement of the model used in France were **still ongoing** and that a final conclusion on the threshold level to be used had not yet been reached (e.g. Rogers distance = 0.2). The TWA noted that this would mean that **a new proposal would need to be presented to the BMT and TWA at future sessions** as a basis to propose a revision of TGP/15 for this model.

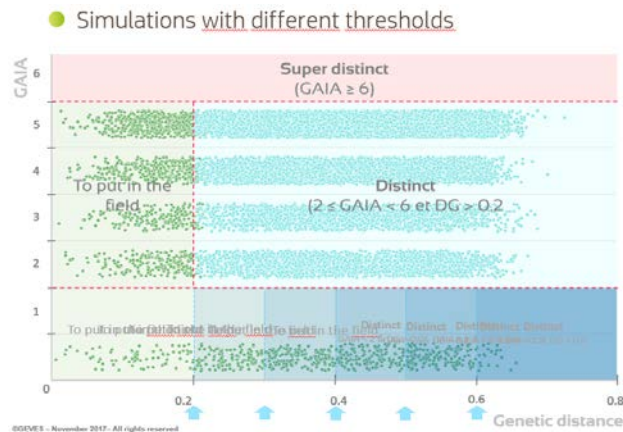
Molecular Techniques

46. The TWA considered document TGP/15/2 Draft 1. The TWA noted that the new slide introduced to illustrate the refinement in the approach used by France **did not reflect a final decision on the genetic distance threshold** to be used in parent lines of maize (below).



Molecular Techniques

47. The TWA agreed that the following extract from document BMT/16/8/Add. **slide 16, should be included** in the proposed revision of document TGP/15:



Molecular Techniques

48. The TWA noted the refinements being made to the model used in France on the following basis:

- a “parameter setting step” analyzing several growing cycles was being used to establish the threshold value;
- any threshold value would be crop-specific and should be determined by crop experts.

49. The TWA noted that the method used in France **only rejected a candidate variety after the third growing cycle.**

New Proposal from France

On the basis of the comments by the TWA/47,
France proposed a new proposal to propose a revision of TGP/15.

At the BMT/17, this matter will be discussed on its agenda item 7
“Revision of document TGP/15 ‘Guidance on the Use of
Biochemical and Molecular Markers in the Examination of
Distinctness, Uniformity and Stability (DUS)’”