

TECHNICAL WORKING PARTY FOR AGRICULTURAL CROPS

Forty-First Session

PREPARATORY WORKSHOP

Angers, France
May 20, 2012

PROGRAM

1. Introduction to UPOV
2. Overview of the General Introduction (document TG/1/3 and TGP documents)
3. Guidance on drafting Test Guidelines (document TGP/7)
 - (a) Selection of characteristics
 - (b) Guidance on drafting characteristics
 - (i) Types of expression (QL, QN, PQ), notes and distinctness
 - (ii) Method of observation (V/M: G/S)
 - (iii) Asterisked, grouping and TQ characteristics
 - (iv) Example varieties
 - (c) The process for developing UPOV Test Guidelines

PROGRAM

4. Situation in UPOV Concerning the possible use of Molecular Techniques in the DUS Examination
5. UPOV databases (UPOV-ROM Plant Variety Database; GENIE database)
6. The UPOV website
7. Role of UPOV Technical Working Parties (TWPs) and the BMT
8. Agenda for the TWA Session
9. Feedback

1. INTRODUCTION TO UPOV

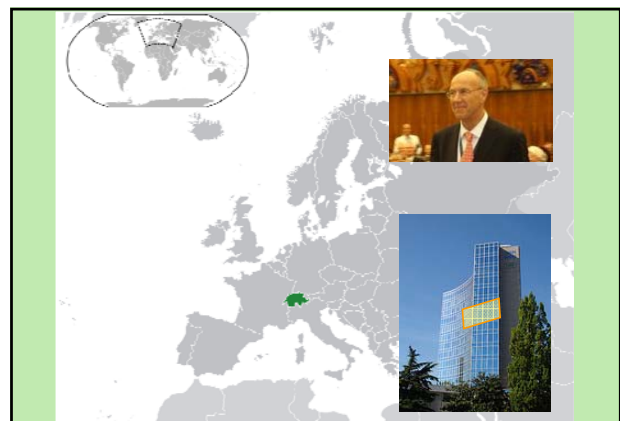
UPOV: INDEPENDENT INTERGOVERNMENTAL ORGANIZATION

The International **Convention** for the Protection of New Varieties of Plants

established in 1961

The International **Union** for the Protection of New Varieties of Plants

Union internationale pour la protection des obtentions végétales



2. OVERVIEW OF THE GENERAL INTRODUCTION

(DOCUMENT TG/1/3 AND TGP DOCUMENTS)

GUIDANCE FOR DUS EXAMINATION

THE CONDITIONS FOR GRANTING A BREEDER'S RIGHT

Criteria to be satisfied

- NOVELTY
 - **DISTINCTNESS**
 - **UNIFORMITY**
 - **STABILITY**
- } "DUS"

THE CONDITIONS FOR GRANTING A BREEDER'S RIGHT

Other conditions

- VARIETY DENOMINATION
- FORMALITIES
- PAYMENT OF FEES

NO OTHER CONDITIONS!

Guidance for DUS Examination

facilitates:

BEST PRACTICE (based on experience)

- => good decisions
- => good definition of the object of protection (strong protection)
- => efficiency in method of examination (learn from the best)

HARMONIZATION

- => efficiency
 - mutual acceptance of DUS reports (minimize cost of examination for individual authorities)
 - mutual recognition of variety descriptions (all parties speak the same "language")
 - simple and cheap system for applicants (minimize cost for breeders)

UPOV provides guidance by:

- The "General Introduction" (TG/1/3)
 - General technical principles
 - Organization of DUS Testing
 - Associated "TGP" Documents (e.g. statistical methods)

= version 3

TG/1/3 General Introduction



"Associated" TGP Documents

Ref.	Title
TG/00	List of TGP Documents and Latest Issue Dates
TGP/1	General Introduction With Explanations
TGP/2	List of Test Guidelines Adopted by UPOV
TGP/3	Varieties of Common Knowledge
TGP/4	Constitution and Maintenance of Variety Collections
TGP/5	Experience and Cooperation in DUS testing
TGP/6	Arrangements for DUS testing
TGP/7	Development of Test Guidelines
TGP/8	Trial Design and Techniques Used in the Examination of DUS
TGP/9	Examining Distinctness
TGP/10	Examining Uniformity
TGP/11	Examining Stability
TGP/12	Special Characteristics
TGP/13	Guidance for New Types and Species
TGP/14	Glossary of Technical, Botanical and Statistical Terms Used in UPOV Documents
TGP/15	New Types of Characteristics

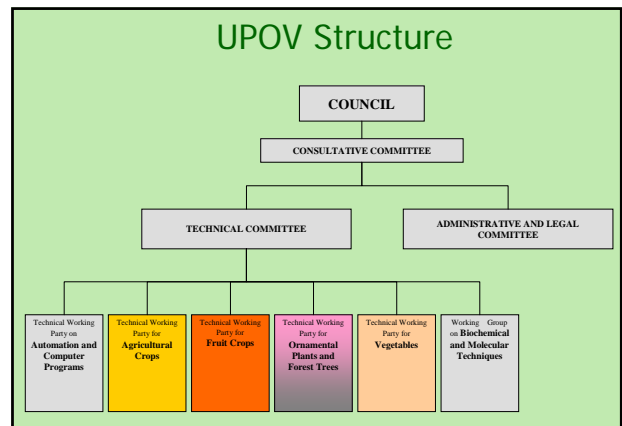
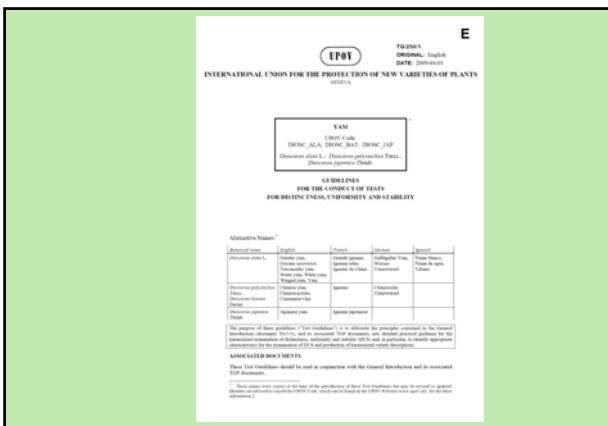
3. GUIDANCE ON DRAFTING TEST GUIDELINES

UPOV provides guidance by:

- The "General Introduction" (TG/1/3)
 - General technical principles
 - Organization of DUS Testing
 - Associated "TGP" Documents (e.g. statistical methods)

AND

- **"Test Guidelines"**
 - Species/Crop-specific recommendations developed by crop experts
 - TGP/7 "Development of Test Guidelines" adopted



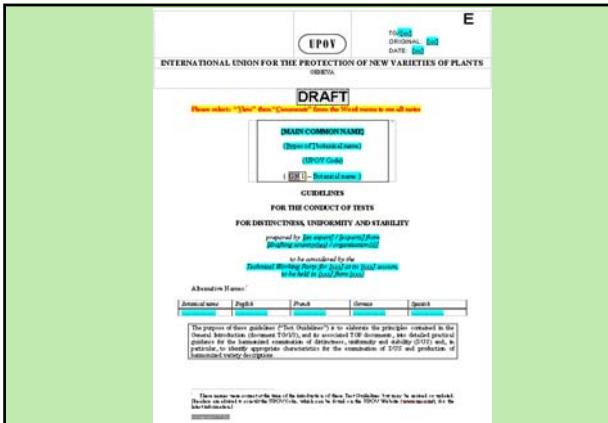
TGP/7 "Development of Test Guidelines"

1. Introduction

2. Procedure for the Introduction and Revision of UPOV Test Guidelines

3. Guidance for Drafting Test Guidelines

- The **TG Template**
- **Additional Standard Wording** for the TG Template
- **Guidance Notes** for the TG Template



- ## 10 Chapters of UPOV Test Guidelines
1. Subject of the Test Guidelines
 2. Material Required
 3. Methods of Examination
 4. Assessment of Distinctness, Uniformity and Stability
 5. Grouping of Varieties and Organization of the Growing Trial
 6. Introduction to the Table of Characteristics
 - 7. Table of Characteristics**
 8. Explanation on the Table of Characteristics
 9. Literature
 10. Technical Questionnaire

3. TEST GUIDELINES

(a) Selection of characteristics

- ### "CHARACTERISTICS"
- may have direct commercial relevance
 - Flower color (ornamental)
 - Fruit color
 - but **commercial relevance NOT required**
 - Leaf shape

Selection of Characteristics

The basic requirements that a characteristic should fulfill before it is used for DUS testing or producing a variety description are that its expression (TG/1/3: Section 4.2.1) :

- (a) **results from a given genotype** or combination of genotypes;
- (b) is sufficiently **consistent and repeatable** in a **particular environment**;
- (c) exhibits sufficient **variation between varieties** to be able to establish distinctness;
- (d) is capable of **precise definition and recognition**;
- (e) allows **uniformity requirements** to be fulfilled;
- (f) allows **stability requirements** to be fulfilled, meaning that it produces consistent and repeatable results after repeated propagation or, where appropriate, at the end of each cycle of propagation.

- ### Selection of Characteristics
- Yield ???
 - Straw strength ???
 - Etc.

Selection of Characteristics

Criteria	Fruit: color	Leaf: shape	Yield
(a) results from a given genotype or combination of genotypes	Yes	Yes	
(b) sufficiently consistent and repeatable in a particular environment	Yes	Yes	
(c) exhibits sufficient variation between varieties to be able to establish distinctness	Yes	Yes	
(d) is capable of precise definition and recognition	Yes	Yes	
(e) allows uniformity requirements to be fulfilled	Yes	Yes	
(f) allows stability requirements to be fulfilled	Yes	Yes	
Commercial value	Yes	No	
ACCEPTABILITY	Yes	Yes	

Selection of Characteristics

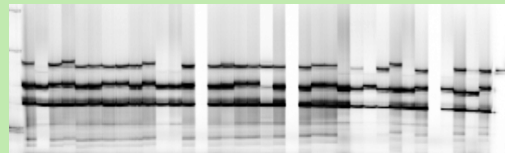
Criteria	Fruit: color	Leaf: shape	Yield
(a) results from a given genotype or combination of genotypes	Yes	Yes	Yes
(b) sufficiently consistent and repeatable in a particular environment	Yes	Yes	(No)
(c) exhibits sufficient variation between varieties to be able to establish distinctness	Yes	Yes	???
(d) is capable of precise definition and recognition	Yes	Yes	(No)
(e) allows uniformity requirements to be fulfilled	Yes	Yes	???
(f) allows stability requirements to be fulfilled	Yes	Yes	???
Commercial value	Yes	No	Yes
ACCEPTABILITY	Yes	Yes	No

Special Characteristics: Disease Resistance

Criteria	Disease Resistance
(a) results from a given genotype or combination of genotypes	*Knowledge of nature of genetic control of resistance is important
(b) sufficiently consistent and repeatable in a particular environment	*Standardize conditions (greenhouse / laboratory) & methodology *Standardize inoculum *Ring-test
(c) exhibits sufficient variation between varieties to be able to establish distinctness	*Susceptible / Resistant OR varying degrees of resistance?
(d) is capable of precise definition and recognition	*Define and recognize races and strains
(e) allows uniformity requirements to be fulfilled	see above
(f) allows stability requirements to be fulfilled	see above
Difficult and expensive	



Molecular Techniques?



3. TEST GUIDELINES

(b) Guidance on drafting characteristics

(i) Types of expression (QL, QN, PQ), notes and distinctness

TYPE OF EXPRESSION OF CHARACTERISTICS (QL, QN, PQ)

Types of Expression

QL: QUALITATIVE

QN: QUANTITATIVE

PQ: PSEUDO-QUALITATIVE

7. Table of Characteristics/ Tableau des caractères/ Merkmalstabelle/ Tabla de caracteres

Char. No.	English	français	Deutsch	español	Example Varieties Ejemplos Beispiele/variantes Variedades ejemplo	Note/ Nota
1. (*) (Q)	Plant: growth habit	Plante : port	Pflanze: Wuchsform	Planta: porte		
QN	upright	dressé	aufrecht	erecto	Isampuk	1
	semi-upright	semi dressé	halbhoch	semierecto	DO158-1	2
	spreading	étalé	breitbüchsig	abierto	Suzanne 63	3
	semi-trailing	semi-étalé	halbhängend	semicascoso	Isampuk	4
	trailing	couronné	hängend	rastroso	Organza	5
2. (*)	Plant: height	Plante : hauteur	Pflanze: Höhe	Planta: altura		
QN	short	basse	niedrig	baja	Yatayo	3
	medium	moyenne	mittel	media	DO158-1	5
	tall	haute	hoch	alta	Isampuk	7

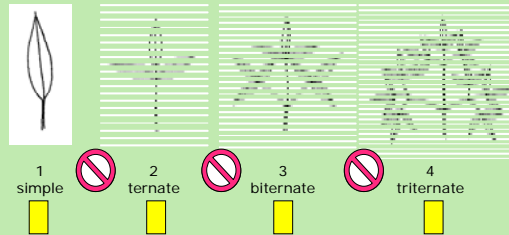
QUALITATIVE Characteristics

“Qualitative characteristics” are those that are **expressed in discontinuous states** (e.g. sex of plant: dioecious female (1), dioecious male (2), monoecious unisexual (3), monoecious hermaphrodite (4)).

These states are self-explanatory and independently meaningful. All states are necessary to describe the full range of the characteristic, and every form of expression can be described by a single state. The order of states is not important. As a rule, the **characteristics are not influenced by environment**.

Qualitative characteristic

Clematis: Leaf: type



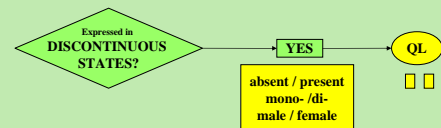
Qualitative (QL) characteristic?

Anthocyanin coloration: QL (=absent / present)?

NO!

	Variety A	Variety B	Variety C
Environment A	absent	present	absent
Environment B	absent	present	present

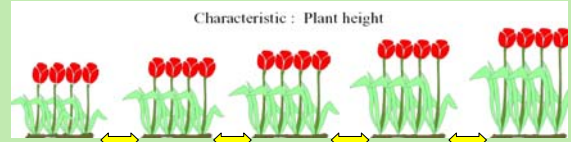
QL, QN or PQ?



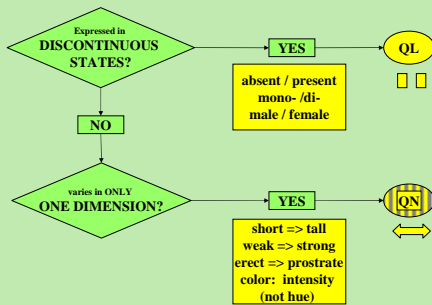
QUANTITATIVE Characteristics

“Quantitative characteristics” are those where the expression covers the full range of variation from one extreme to the other. The **expression can be recorded on a one-dimensional, continuous or discrete, linear scale**. The range of expression is divided into a number of states for the purpose of description (e.g. length of stem: very short (1), short (3), medium (5), long (7), very long (9)). The division seeks to provide, as far as is practical, an even distribution across the scale. The Test Guidelines do not specify the difference needed for distinctness. The states of expression should, however, be meaningful for DUS assessment.

Quantitative Characteristic



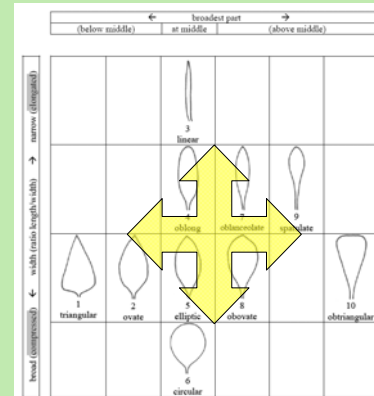
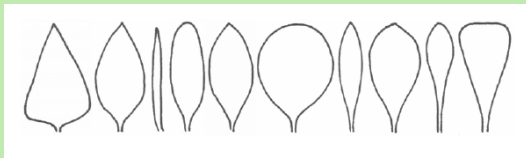
QL, QN or PQ?

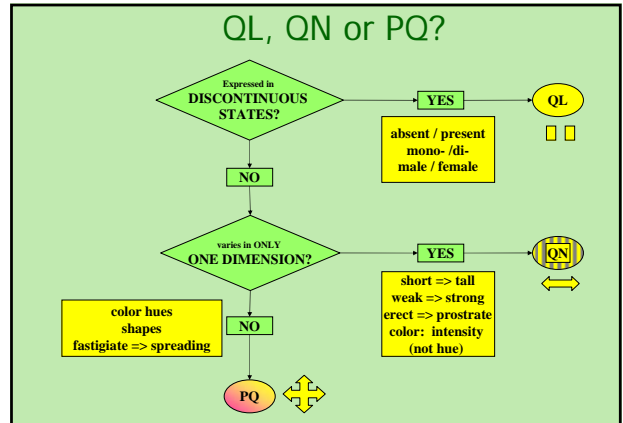
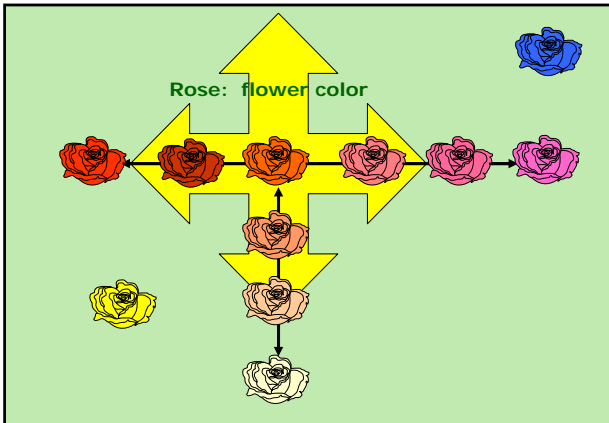


PSEUDO-QUALITATIVE Characteristics

In the case of “pseudo-qualitative characteristics,” the **range of expression is at least partly continuous, but varies in more than one dimension** (e.g. shape: ovate (1), elliptic (2), circular (3), obovate (4)) and cannot be adequately described by just defining two ends of a linear range. In a similar way to qualitative (discontinuous) characteristics – hence the term “pseudo-qualitative” – each individual state of expression needs to be identified to adequately describe the range of the characteristic.

Example





EXERCISE

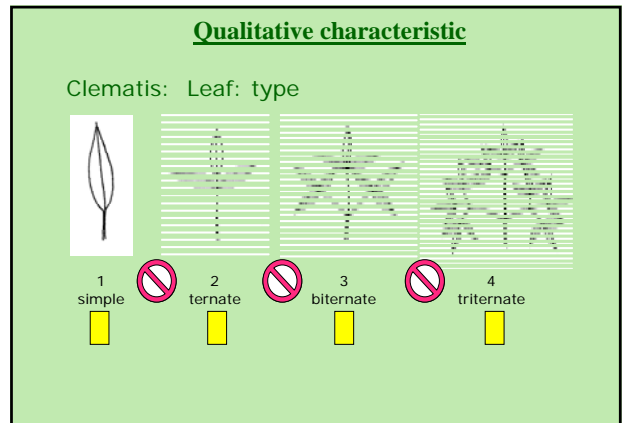
NOTES and DISTINCTNESS
according to
TYPE OF EXPRESSION
(QL, PQ, QN)

Types of Expression

QL: QUALITATIVE

QN: QUANTITATIVE

PQ: PSEUDO-QUALITATIVE



Qualitative Characteristics (special cases)

Char No.	Method of description	english	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
1.	MS Plant: ploidy (*) C						
QL		diploid					2
		tetraploid					4
3.	VG Stem: anthocyanin coloration (*)						
QL		absent				Gumpoong	1
		present				Chanpoong, Gopoong	9

Qualitative Characteristics: **distinctness**

In qualitative characteristics, the difference between two varieties may be considered clear if one or more characteristics have expressions that fall into **two different states in the Test Guidelines**. Varieties should not be considered distinct for a qualitative characteristic if they have the same state of expression.

(e.g. sex of plant: dioecious female (1), dioecious male (2), monoecious unisexual (3), monoecious hermaphrodite (4)).

Types of Expression

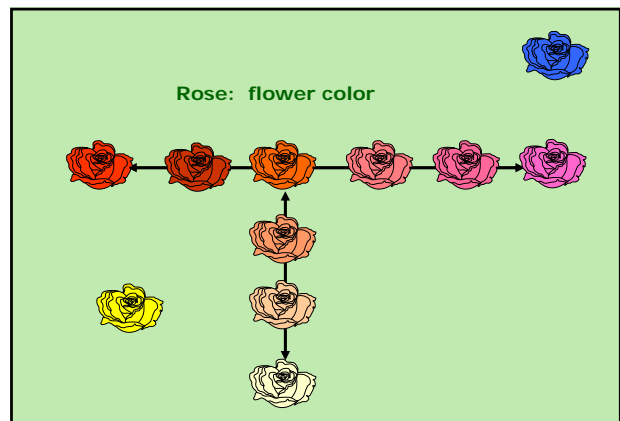
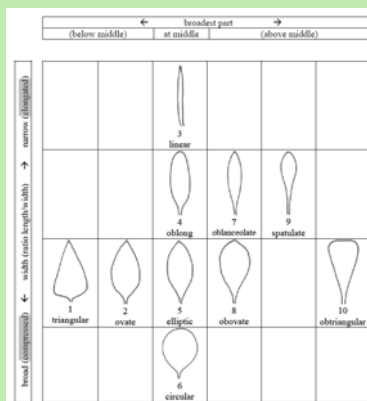
QL: QUALITATIVE

QN: QUANTITATIVE

PQ: PSEUDO-QUALITATIVE

PSEUDO-QUALITATIVE Characteristics

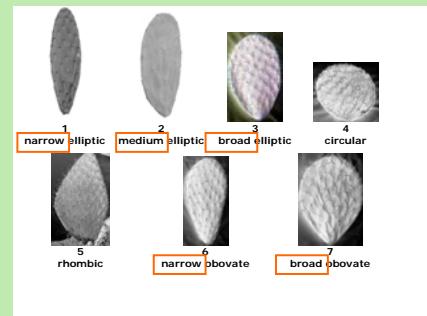
In the case of “pseudo-qualitative characteristics,” the **range of expression is at least partly continuous, but varies in more than one dimension** (e.g. shape: ovate (1), elliptic (2), circular (3), obovate (4)) and cannot be adequately described by just defining two ends of a linear range. In a similar way to qualitative (discontinuous) characteristics – hence the term “pseudo-qualitative” – each individual state of expression needs to be identified to adequately describe the range of the characteristic.



PSEUDO-QUALITATIVE Characteristics (typical examples)

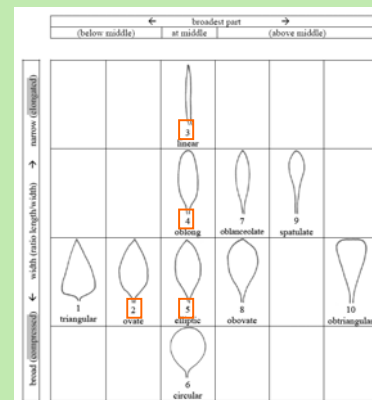
24. Flower: color of the center (+)	Fleur: couleur du centre	Farbe der Mitte	Flor: color del centro	
PQ green	vert	grün	verde	1
yellow	jaune	gelb	amarillo	2
orange	orange	orange	naranja	3
pink	rose	rosa	rosa	4
red	rouge	rot	rojo	5
purple	pourpre	purpura	plapura	6

Opuntia: Shape of Cladode



Pseudo-Qualitative Characteristics: **distinctness**

A different state in the Test Guidelines may not be sufficient to establish distinctness (see also section 5.5.2.3). However, in certain circumstances, varieties described by the same state of expression may be clearly distinguishable.



Types of Expression

QL: QUALITATIVE

QN: QUANTITATIVE

PQ: PSEUDO-QUALITATIVE

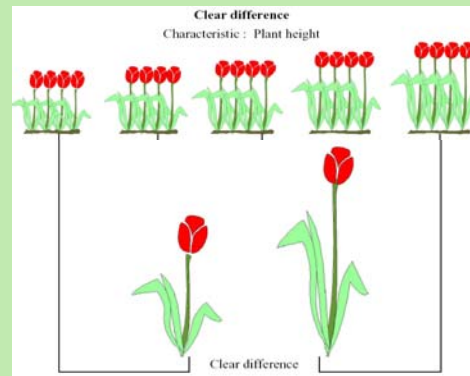
QUANTITATIVE Characteristics

“Quantitative characteristics” are those where the expression covers the full range of variation from one extreme to the other. The **expression can be recorded on a one-dimensional, continuous or discrete, linear scale**. The range of expression is divided into a number of states for the purpose of description (e.g. length of stem: very short (1), short (3), medium (5), long (7), very long (9)). The division seeks to provide, as far as is practical, an even distribution across the scale. The Test Guidelines do not specify the difference needed for distinctness. The states of expression should, however, be meaningful for DUS assessment.

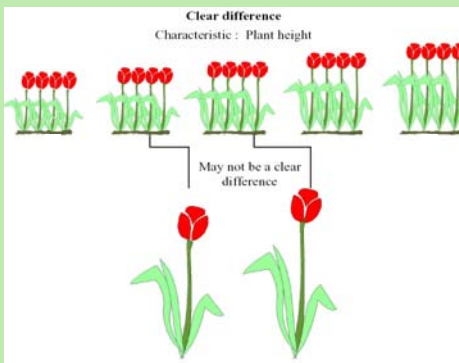
Quantitative Characteristics: distinctness

Quantitative characteristics are considered for distinctness according to the method of observation and the features of propagation of the variety concerned...

Quantitative Characteristic



Quantitative Characteristic



Quantitative Characteristics (1-9)

weak/strong
short/long
small/large

Note	State	Note	State
1	very weak (or: absent or very weak)	1	very small (or: absent or very small)
2	very weak to weak	2	very small to small
3	weak	3	small
4	weak to medium	4	small to medium
5	medium	5	medium
6	medium to strong	6	medium to large
7	strong	7	large
8	strong to very strong	8	large to very large
9	very strong	9	very large

Quantitative Characteristics (1-9)

Standard Range Version 1	Standard Range Version 2	Standard Range Version 3	Standard Range Version 4
1 very weak (or: absent or very weak)	1 very weak (or: absent or very weak)	-	-
3 weak	3 weak	3 weak	3 weak
5 medium	5 medium	5 medium	5 medium
7 strong	7 strong	7 strong	7 strong
9 very strong	-	9 very strong	-

Quantitative Characteristics (1-9)

State	Example 1	Example 2	Example 3	Example 4
1	Size relative to: much smaller	Angle: very acute	Position: at base	Length in relation to: equal
3	moderately smaller	moderately acute	one quarter from base	slightly shorter
5	same size	right angle	in middle	moderately shorter
7	moderately larger	moderately obtuse	one quarter from apex end	much shorter
9	much larger	very obtuse	at apex	very much shorter

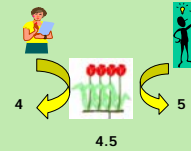
Quantitative Characteristics: distinctness

Quantitative characteristics are considered for distinctness according to the method of observation and the features of propagation of the variety concerned.

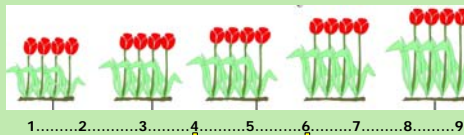
Test Guidelines (TGP/7 proposed revised text)

Difference of **two Notes** to represent a clear difference if the **comparison** between two varieties is performed **at the level of Notes**:

WHY?



“Two Note” rule...



3.5 - 4.5 5.5 - 6.5

...means at least **ONE** note difference!

Quantitative Characteristics: distinctness

Quantitative characteristics are considered for distinctness according to the method of observation and the features of propagation of the variety concerned.

Test Guidelines (TGP/7 proposed revised text)

Difference of **two Notes** to represent a clear difference if the **comparison** between two varieties is performed **at the level of Notes**:

Quantitative Characteristics: distinctness

TG 233.1 Diascia Diasce, 2007-03-28 - 9 -					
English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
6. (a) Leaf blade: length	Limbe: longueur	Blattspitze: Länge	Limbe: longitud		
QN short	courte	kurz	corto	Codina, Strawberry Sandie	3
medium	moyenne	mittel	medio	Codinace	5
long	longue	lang	largo	Bah'arlapa, Bah'arwhar	7

1 to 9 scale: Notes 1 and 3, Notes 2 and 4, Notes 3 and 5 etc.
represent a clear difference

Quantitative Characteristics: distinctness

TG 233.1 Diascia Diasce, 2007-03-28 - 9 -						
English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota	
5. Stem: anthocyanin coloration below inflorescence	Tige: pigmentation anthocyanique sous inflorescence	Trieb: Anthocyanfärbung unter dem Blütenstand	Tallo: pigmentación antocianina por debajo de la inflorescencia			
QN absent or weak	absente ou faible	fehlernd oder gering	ausente o débil	Hecliam	1	
medium	moyenne	mittel	media	Heclace	2	
strong	forte	stark	fuerte		3	

1 to 3 scale: only Notes 1 and 3 represent a clear difference

Process levels other than Notes...

Transformation of Observations and Measurements into Notes for Distinctness and for Variety Descriptions

Beate Rücker
Federal Variety Office, Hannover, Germany

Seminar on DUS Testing, Geneva, March 18-20, 2010

UPOV Documents

First restricted area	Second restricted area
UPOV	International and Legal Committee
UPOV/SC	Administrative and Legal Committee Subgroup
UPOV/TC	Technical Committee
UPOV/SC/TC	Biological/Ethical Committee
UPOV/TC/1	Technical Working Party for Agricultural Crops
UPOV/TC/2	Technical Working Party on Substrates and Collection Programs
UPOV/TC/3	Technical Working Party for Fruit Crops
UPOV/TC/4	Technical Working Party for Ornamental Plants and Forest Trees
UPOV/TC/5	Technical Working Party for Vegetables
UPOV/TC/6	Working Group on Botanical and Molecular Techniques, and Other Working in Partnership
UPOV/TC/7	Ad Hoc Subgroup of Technical and Legal Experts of Botanical and Molecular Techniques
UPOV/TC/8	Ad Hoc Subgroup on Development of Molecular Techniques, and Other Working in Partnership ("Ad Hoc Subgroups")
UPOV/TC/9	Ad Hoc Working Group to Study the Impact of Genetic Resources Agreements
UPOV/TC/10	Ad Hoc Working Group on the Publication of Variety Descriptions
UPOV/TC/11	Ad Hoc Working Group on Variety Descriptions
UPOV/TC/12	Ad Hoc Working Group on Variety Descriptions
UPOV/TC/13	Ad Hoc Working Group on Variety Descriptions

3. TEST GUIDELINES

(b) Guidance on drafting characteristics

(ii) Method of observation (V/M; G/S)

TG/250/1
Yam/igname/Yamswurzel/Sane, 2009-04-01
- 7 -

7. Table of Characteristics/ Tableau des caractères/ Merkmalstabelle/ Tabla de caracteres

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Note
1.	VG Plant: density of foliage	Plante : densité du feuillage	Pflanze: Dichte des Laubes	Planta: densidad del follaje		
QN (a)	sparse	faible	locker	escasa	Ite-imo	3
	medium	moyenne	mittel	media	Motomoto-imo	5
	dense	dense	dicht	densa	Gankumjika-tisibo	7
2.	VG Plant: number of branches	Plante : nombre de ramifications	Pflanze: Anzahl Triebe	Planta: número de ramas		
QN (a)	few	peu	gering	bajo	Ite-imo	3
	medium	moyen	mittel	medio	Fimoungi	5
	many	grand	groß	alto	Segoda-2	7

Method of Observation

M: Measurement:

an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.);

V: Visual observation:

includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts).

"Visual" observation refers to the sensory observations of the expert and, therefore, also includes smell, taste and touch.

TGP/9/1 "Examining Distinctness"

Method of propagation of the variety	Type of expression of characteristic		
	QL (QUAL itative)	PQ (PSEUDO qualitative)	QN (QUANT itative)
Vegetatively propagated, self-pollinated	Notes (VG)	Notes (VG) Side-by-side (VG)	Notes (VG/MG/MS) Side-by-side (VG) Statistics (MG/MS)
Cross-pollinated	Notes (VG) Statistics (VS*)	Notes (VG) Side-by-side (VG) Statistics (VS*)	Statistics (IMG)/MS/VS Side-by-side (VG) Notes (VG/MG/MS)
Hybrids	Notes (VG) Statistics (VS*)	Notes (VG) Side-by-side (VG) Statistics (VS*)	**

TGP/9/1 "Examining Distinctness"

Method of propagation of the variety	Type of expression of characteristic		
	QL (QUAL itative)	PQ (PSEUDO qualitative)	QN (QUANT itative)
Vegetatively propagated, Self-pollinated	Notes (VG)	Notes (VG) Side-by-side (VG)	Notes (VG/MG/MS) Side-by-side (VG) Statistics (MG/MS)
Cross-pollinated	Notes (VG) Statistics (VS*)	Notes (VG) Side-by-side (VG) Statistics (VS*)	Statistics (IMG)/MS/VS Side-by-side (VG) Notes (VG/MG/MS)
Hybrids	Notes (VG) Statistics (VS*)	Notes (VG) Side-by-side (VG) Statistics (VS*)	**

TGP/9/1 "Examining Distinctness"

**V = Visual observation or
M = Measurement**

Method of propagation of the variety	Type of expression of characteristic		
	QL (QUAL itative)	PQ (PSEUDO qualitative)	QN (QUANT itative)
Vegetatively propagated, self-pollinated	Notes (VG)	Notes (VG) Side-by-side (VG)	Notes (VG/MG/MS) Side-by-side (VG) Statistics (MG/MS)
Cross-pollinated	Notes (VG) Statistics (VS')	Notes (VG) Side-by-side (VG) Statistics (VS')	Statistics (IMG)/MS/VS Side-by-side (VG) Notes (VG/MG/MS)
Hybrids	Notes (VG) Statistics (VS')	Notes (VG) Side-by-side (VG) Statistics (VS')	**

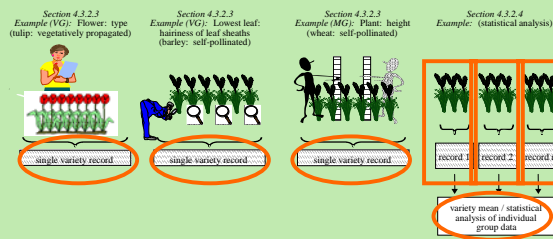
Type of Record (for the purposes of distinctness)

G: **single record** for a variety, or a **GROUP** of plants or parts of plants;

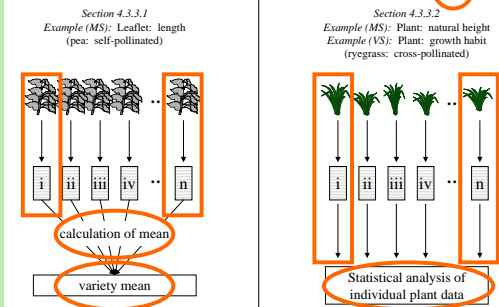
In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

S: **records** for a number of **SINGLE**, individual plants or parts of plants ...

Single record for a group of plants or parts of plants (G)



Records for a number of single, individual plants or parts of plants (S)



EXERCISE

3. TEST GUIDELINES

(b) Guidance on drafting characteristics

(iii) Asterisked, grouping and TQ characteristics

Standard Test Guidelines Characteristic

Function	Criteria
1.Characteristics that are accepted by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.	<p>1.Must satisfy the criteria for use of any characteristic for DUS as set out in Chapter 4, section 4.2.</p> <p>2.Must have been used to develop a variety description by at least one member of the Union.</p> <p>3.Where there is a long list of such characteristics and, where considered appropriate, there may be an indication of the extent of use of each characteristic.</p>

Asterisked Characteristic

7. Table of Characteristics/ Tableau des caractères/ Merkmalstabelle/ Tabla de caracteres

Char. No.	English	français	Deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
	Plant: growth habit	Plante : port	Pflanze: Wuchsform	Planta: porte		
QN	upright	dressé	aufrecht	erecto	Imppink	1
	semi-upright	semi dressé	halbaufrecht	semirecto	DO158-1	2
	spreading	étalé	breitwüchsig	abierto	Sunsem 03	3
	semi-trailing	semi-étalé	halbhängend	semirastroso	Impsaf	4
	trailing	coureux	hängend	rastroso	Organza	5

Asterisked Characteristic

Function	Criteria
1.Characteristics that are important for the international harmonization of variety descriptions.	<p>1.Must be a characteristic included in the Test Guidelines.</p> <p>2. Should always be examined for DUS and included in the variety description by all members of the Union</p> <p>EXCEPT when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.</p> <p>3.Must be useful for function 1.</p> <p>4.Particular care should be taken before selection of disease resistance characteristics.</p>

Grouping Characteristic

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

- Plant: growth habit (characteristic 1)
- Leaf blade: variegation (characteristic 11)
- Upper lobes of corolla: main color (characteristic 24), with the following groups:
 - Gr. 1: white
 - Gr. 2: yellow
 - Gr. 3: orange
 - Gr. 4: pink
 - Gr. 5: red
 - Gr. 6: red purple
 - Gr. 7: violet
 - Gr. 8: blue

Apple: Fruit color



Apple: Fruit color



10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page (x) of (y)	Reference Number:
		Application date: (not to be filled in by the applicant)
TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1 Botanical name	<input type="text" value="Malus domestica Borkh."/>	
1.2 Common name	<input type="text" value="Apple"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page (x) of (y)	Reference Number:
5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).		
Characteristics	Example Varieties	Note
5.5 Fruit: hue of over color – with bloom removed (57)		
orange red	Cox's Orange Pippin, Egremont Pippin	1]
pink red	Cripps Pink, Delbarge	2]
red	Akane, Galaxy, Red Elstar, Regal Prince	3]
purple red	Red Jonaprince, Spartan	4]
brown red	Fiesta, Joban, Lord Burglady	5]
5.6 Fruit: pattern of over color (58)		
only solid flush	Red Jonaprince, Richared Delicious	1]
solid flush with weakly defined stripes	Galaxy	2]
solid flush with strongly defined stripes	Jonagored	3]
weakly defined flush with strongly defined stripes	Gravensteiner	4]
only stripes (no flush)	Helen	5]
flushed and mottled	Elstar	6]
flushed, striped and mottled	Jonagold	7]

Grouping Characteristic

Function	Criteria
characteristics in which the documented states of expression, even where recorded at different locations , can be used either individually or in combination with other such characteristics: 1. to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness, and/or 2. to organize the growing trial so that similar varieties are grouped together	1.(a) Qualitative characteristics or (b) Quantitative or pseudo-qualitative characteristics which provide useful discrimination between the varieties of common knowledge from documented states of expression recorded at different locations. 2. Must be useful for functions 1 and 2. 3. Should be an asterisked characteristic and/or included in the Technical Questionnaire or application form.

Relationship between functions

- (a) **GROUPING CHARACTERISTICS** selected from the Table of Characteristics should, in general, **receive an asterisk** in the Table of Characteristics and be **included in the Technical Questionnaire**.
- (b) **TQ CHARACTERISTICS** selected from the Table of Characteristics should, in general, **receive an asterisk** in the Table of Characteristics and be **used as grouping characteristics**. TQ characteristics are **not restricted** to those characteristics used as **grouping characteristics**;
- (c) **ASTERISKED CHARACTERISTICS** are **not restricted** to those characteristics selected as **grouping or TQ characteristics**.

3. TEST GUIDELINES

(b) Guidance on drafting characteristics

(iv) Example varieties

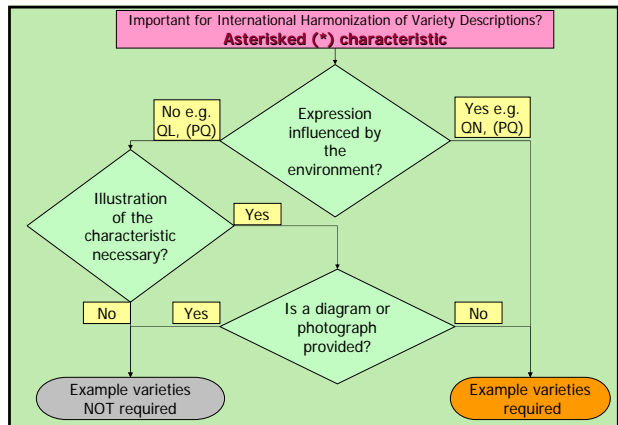
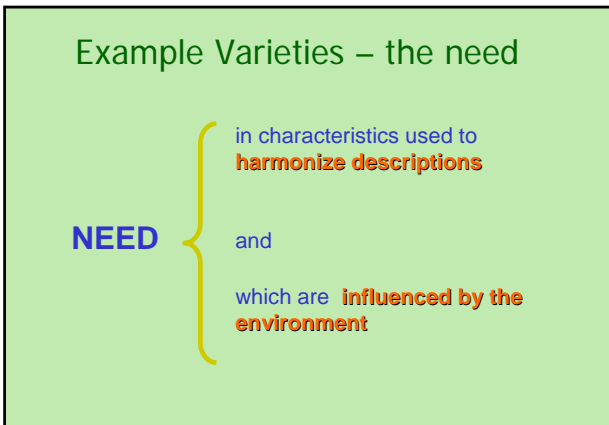
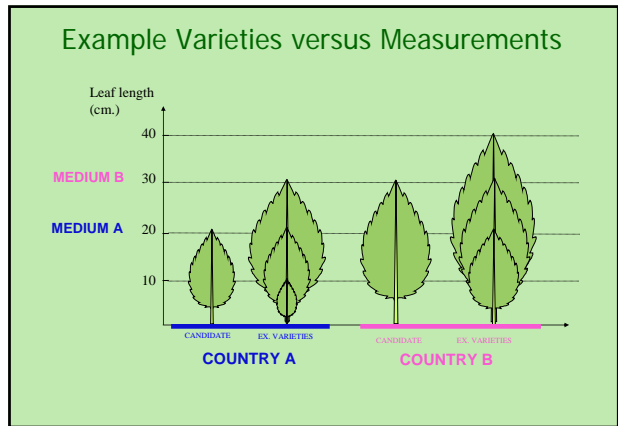
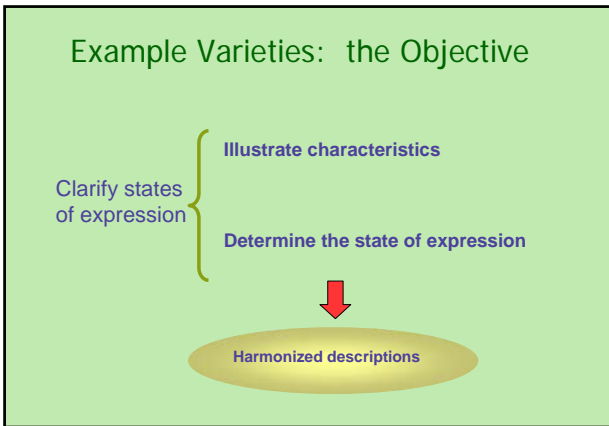
TG119
Lettuce: Laine/Salat: Letchna, 2004-03-31
7

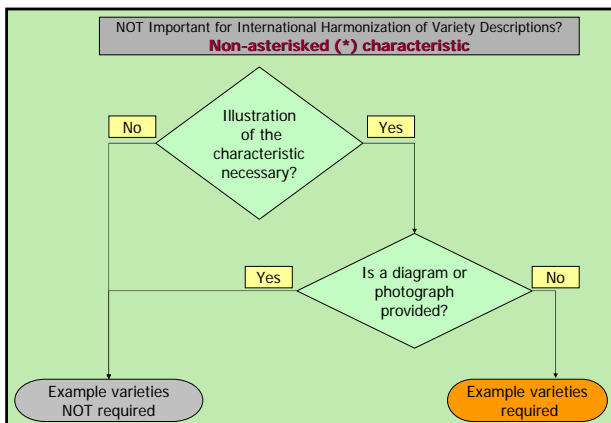
7. Table of Characteristics/ Tableau des caractères/ Merkmalstabelle/ Tabla de caracteres

	English	français	Deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplos	Note/ Nota
1. (*)	Seed: color	Semence: couleur	Samen: Farbe	Semilla: color		
	white	blanche	weiß	blanco	Varpia	1
	yellow	jaune	gelb	amarillo	Durango	2
	black	noire	schwarz	negro	Kagraner Sommer	3
2. (*)	Seedling: anthocyanin coloration	Plantelet: pigmentation anthocyanique	Keimlingfarbe: Anthocyanfärbung	Plántula: pigmentación antocianica		
	absent	absente	fehlernd	ausente	Varpia	1
	present	présente	vorhanden	presente	Péat	9
3.	Seedling: size of cotyledon (fully developed)	Plantelet: taille du cotyledon (à complet développement)	Keimlinggröße: Größe des Keimblatts (voll entwickelt)	Plántula: tamaño del cotiledón (plumanteo desarrollado)		
	small	petit	klein	pequeño	Romance	3
	medium	moyen	mittel	medio	Expresse	5
	large	grand	groß	grande	Varpia	7

T43-219-1 Perilla Perilla Perilla, 2004-03-31 - 10 -					
English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
14. VG Leaf blade: intensity of purplish color of <u>lower</u> side					
Limbe: intensité de la couleur pourpre de la face inférieure					
Blattspreite: Intensität der Purpurfarbe der Unterseite					
Limbo: intensidad del color púrpura del envés					
QN (Q)	very light	très claire	sehr hell	muy claro	1
	light	claire	hell	claro	3
	medium	moyenne	mittel	medio	5
	dark	foncée	dunkel	oscuro	7
	very dark	très foncée	sehr dunkel	muy oscuro	9
15. VG Leaf blade: profile					
Limbe: profil					
Blattspreite: Profil					
Limbo: perfil					
QN (Q)	concave	concave	konkav	cóncavo	3
	plane	plan	flach	plano	5
	convex	convexe	konvex	convexo	7

Table of Characteristics: Tablero de Características: Merkmalstafel: Table de caractéristiques						
English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota	
1. Plant growth type						
Plante: type de croissance						
Pflanze: Wuchsform						
Planta: tipo de crecimiento						
QL (Q)	trunk clustered	un arbre à la base touffue	Stängel Büschel	en racines buñales	1	
	trunk	troncament	Stängel	arborescente	2	
2. Limb curvature with leaf base						
Limb: courbure de la base de la feuille						
Blattspreite: Krümmung der Basis der Blattspreite						
Limbo: curvatura de la base de la hoja						
QN (Q)	upright	divergent	aufrecht	erecto	1	
	semi upright	semi-obtus	halbaufracht	semierecto	3	
	horizontal	horizontalis	wagrecht	horizontal	5	
3. Limb curvature with leaf base						
Limb: courbure de la base de la feuille						
Blattspreite: Krümmung der Basis der Blattspreite						
Limbo: curvatura de la base de la hoja						
QN (Q)	div	semi-obtus	obtus	obtus	3	
	medium	semi-obtus	obtus	obtus	5	
	obtus	semi-obtus	obtus	obtus	7	
4. Plant height including flowers						
Plante: hauteur, fleurs comprises						
Pflanze: Höhe einschließlich Blüten						
Planta: altura, flores incluidas						
QN (Q)	short	basse	niedrig	corta	3	
	medium	moyenne	mittel	media	5	
	tall	élevée	hoch	larga	7	





3. TEST GUIDELINES (document TGP/7)

(c) The process for developing UPOV Test Guidelines

Genera and Species

- **>3,000 genera and species** with varieties examined for PBR
- **>2,700 genera and species** for which UPOV members have practical DUS experience
- **281 Test Guidelines** adopted

Note: **281 Test Guidelines estimated to cover 90% of PBR-related varieties in UPOV Plant Variety Database**

PRIORITY for UPOV Test Guidelines

PRIORITY for species or crops with high:

- number of **authorities** receiving PBR applications;
- number of **PBR applications**;
- number of **foreign applications** received by UPOV members;
- **economic importance**;
- level of **breeding activity**

EXAMPLE (New Test Guidelines)

Test Guidelines: *Plantus magnifica* L.
(Common name: **Alpha**)

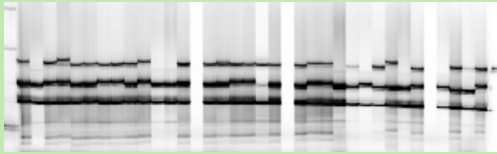
Technical Working Party: **TWX**

TWX (2005):	Alpha (proj. 1)
TWX (2006):	Alpha (proj. 2)
TWX (2007):	Alpha (proj. 3)
Enlarged Editorial Committee (2008):	Alpha (proj. 4)
Technical Committee (2008):	Alpha (proj. 5)
Final adopted document (2008):	TG/500/1

4. Situation in UPOV Concerning the possible use of **Molecular Techniques** in the DUS Examination



Molecular Techniques?



Legal and other considerations

- Conformity with the UPOV Convention
- Potential impact on the strength of protection

Technical considerations

- Reliability and robustness of techniques
- Accessibility of the technology
- Harmonization of methodologies
- Cost of examination
- Implications for breeders (e.g. cost and time involved for new uniformity requirements)

Harmonized approach

Harmonization

- ⇒ facilitates cooperation in DUS testing
e.g. purchase of DUS reports
- ⇒ internationally recognized variety descriptions (effective protection)



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

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



Model: characteristic-specific molecular markers

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

View of the BMT Review Group, Technical Committee, Administrative and Legal Committee:

on the basis of the assumptions in the proposal, acceptable within the terms of the UPOV Convention and would not undermine the effectiveness of protection offered under the UPOV system



Model: characteristic-specific molecular markers

Assumptions for a gene specific marker:

- DUS examination:** same no. of plants, growing cycles, DUS criteria;
- Linkage:** ensure that the marker is a reliable predictor;
- Different markers** for same gene would be treated as different methods for examining the **same characteristic**;
- Different genes** would be treated as different methods for examining the **same characteristic**;
- Different markers** linked to **different regulatory elements** for the **same gene** would all be treated as different methods for examining the **same characteristic**.

matter for the relevant authority to consider if the assumptions are met

POSSIBLE APPLICATION MODELS

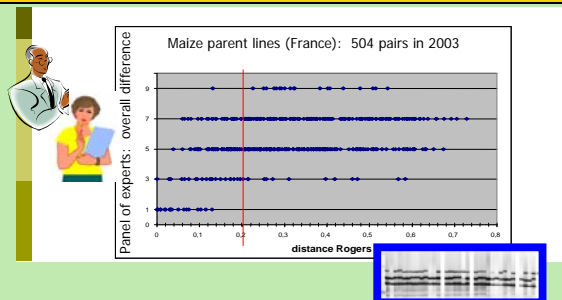
MODELS WITH A POSITIVE ASSESSMENT

- 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

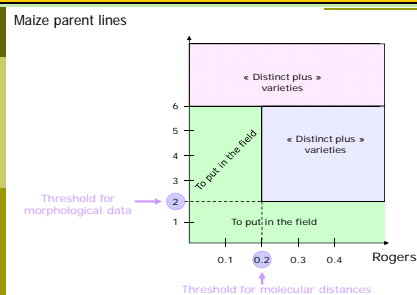
- Use of molecular marker characteristics

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



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

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



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



Example: maize parental lines

View of the BMT Review Group, Technical Committee, Administrative and Legal Committee:

where used for the management of variety collections, was acceptable within the terms of the UPOV Convention and would not undermine the effectiveness of protection offered under the UPOV system

POSSIBLE APPLICATION MODELS

MODELS WITH A POSITIVE ASSESSMENT

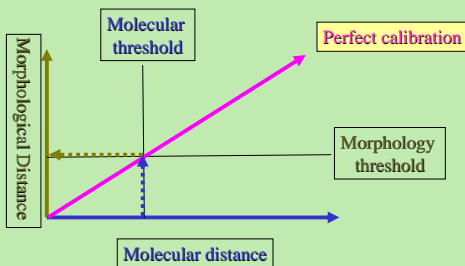
- Characteristic-specific molecular markers
- Combining phenotypic and molecular distances in the management of variety collections

[Calibrated molecular distances in the management of variety collections]

MODELS WITHOUT A POSITIVE ASSESSMENT

- Use of molecular marker characteristics

Model: Calibrated molecular distances in the management of variety collections



Model: Calibrated molecular distances in the management of variety collections

View of the BMT Review Group, Technical Committee, Administrative and Legal Committee:

where used for the management of reference collections was, on the basis of the assumptions in the proposals, acceptable within the terms of the UPOV Convention and would not undermine the effectiveness of protection offered under the UPOV system

whilst recognizing the need to improve the relationship between morphological and molecular distances

Model: Calibrated molecular distances in the management of variety collections

Assumptions for calibration of threshold levels :

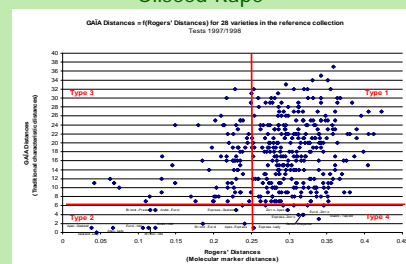
- Uniformity and Stability:**
 - [molecular] differences calculated between varieties **take into account the variation within varieties**;
 - suitable uniformity standards could be developed for molecular markers **without requiring varieties, in general, to be more uniform**
- would only be used for the establishment of a "Distinctness plus" threshold in the management of reference collections;
- would meet all the normal requirements for any characteristic to be used in the DUS examination and, in particular, would be checked to ensure they are **sufficiently consistent and repeatable**.

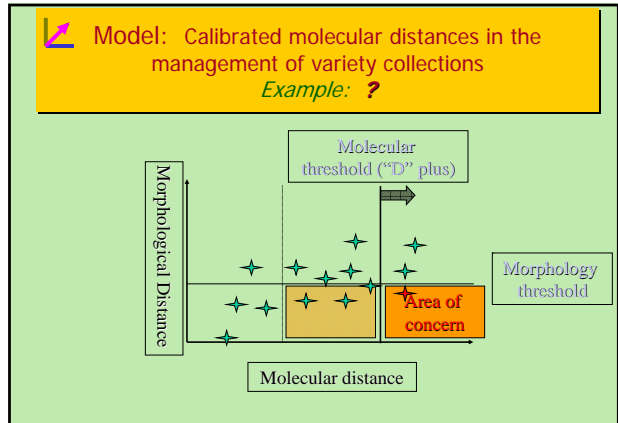
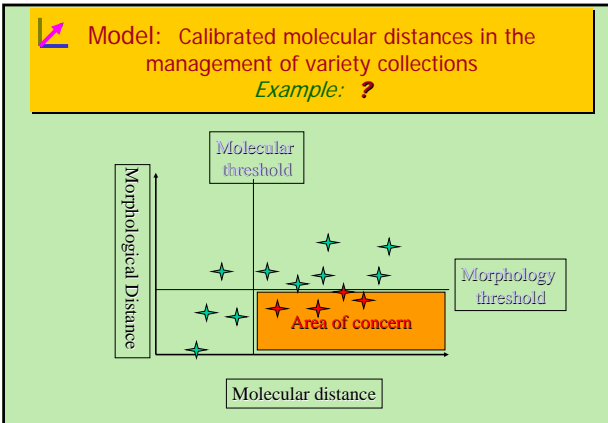
matter for the relevant authority to consider if the assumptions are met

Model: Calibrated molecular distances in the management of variety collections

Example: ?

Oilseed Rape





- 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

Model: Use of molecular marker characteristics

View of the BMT Review Group, Technical Committee, Administrative and Legal Committee:

- no consensus on the acceptability of the Option 3 proposals within the terms of the UPOV Convention and no consensus on whether they would undermine the effectiveness of protection offered under the UPOV system.
- concerns were raised that, in these proposals, using this approach, it might be possible to use a limitless number of markers to find differences between varieties. The concern was also raised that differences would be found at the genetic level which were not reflected in morphological characteristics

Harmonized approach

Harmonization

- ⇒ facilitates cooperation in DUS testing
e.g. purchase of DUS reports
- ⇒ internationally recognized variety descriptions (effective protection)

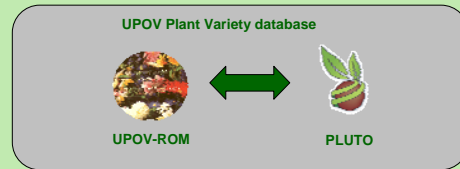
- POSSIBLE APPLICATION MODELS**
- MODELS WITH A POSITIVE ASSESSMENT**
- Characteristic-specific molecular markers
 - Combining phenotypic and molecular distances in the management of variety collections
 - [Calibrated molecular distances in the management of variety collections]
- MODELS WITHOUT A POSITIVE ASSESSMENT**
- Use of molecular marker characteristics

5. UPOV DATABASES

Article 20 of the 1991 Act (Variety denominations)

(2) [Characteristics of the **denomination**]

In particular, it **must be different from every denomination** which designates, in the territory of any Contracting Party, **an existing variety** of the same plant species or of a closely related species.



Year	Country	Search	Year	Year	Year
2005	USA	AGROCLON	2005	1986-03-01	1986-03-01
2005	USA	AGROCLON	2005	1986-03-01	1986-03-01
2005	USA	AGROCLON	2005	1986-03-01	1986-03-01
2005	USA	AGROCLON	2005	1986-03-01	1986-03-01

GENIE Database (Genus / species)



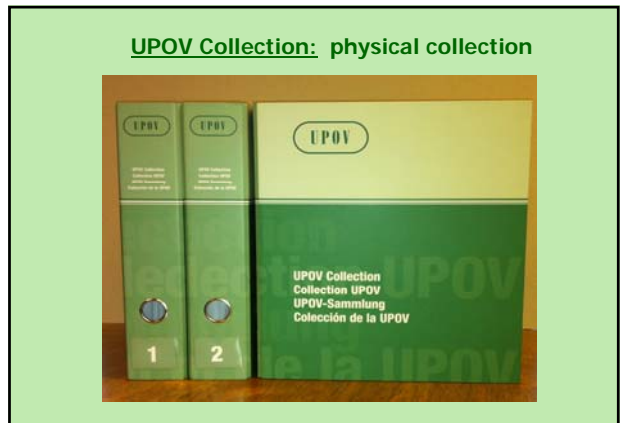
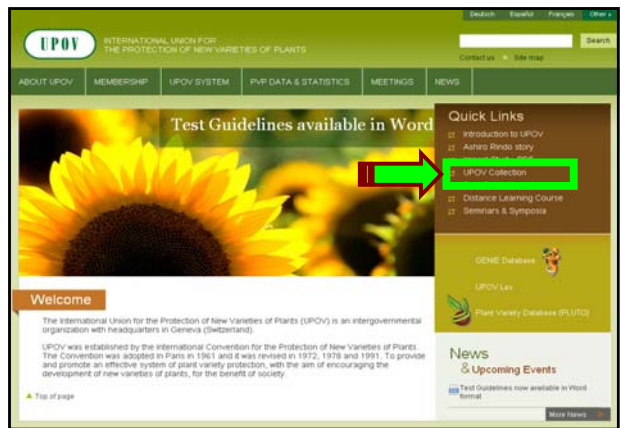
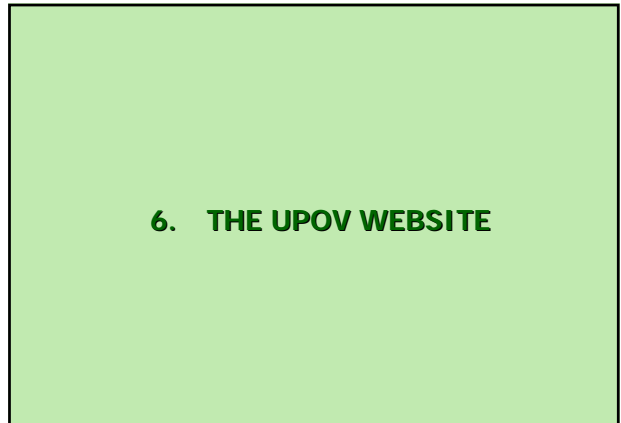
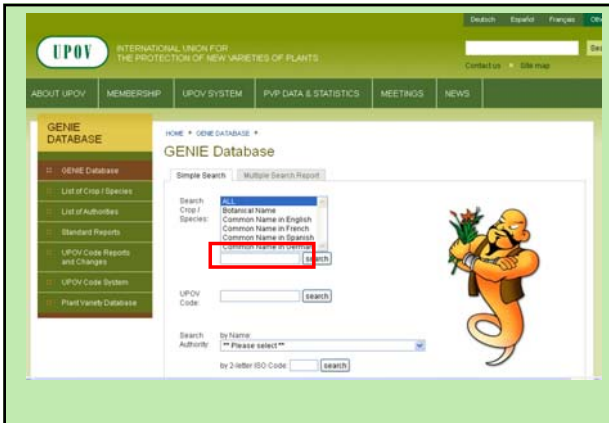
GENIE Database



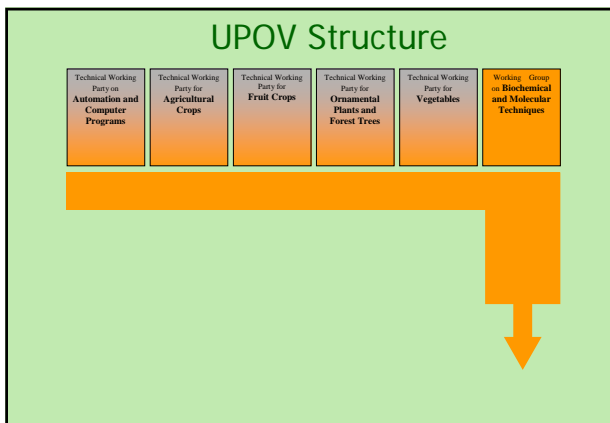
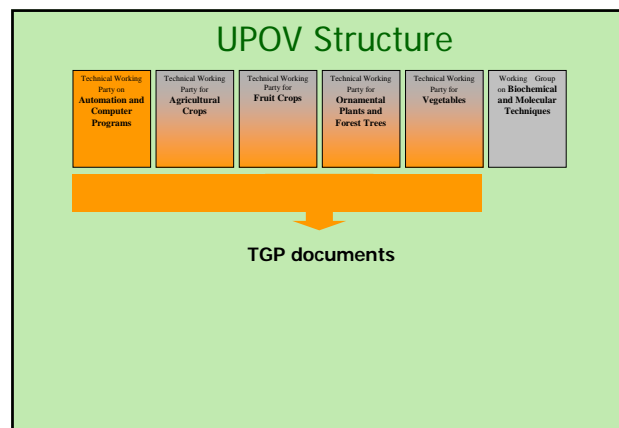
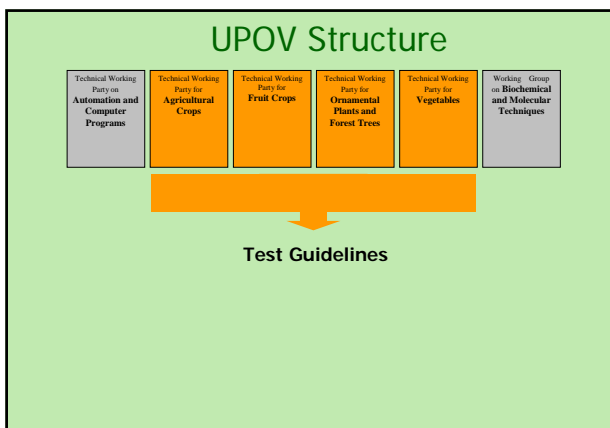
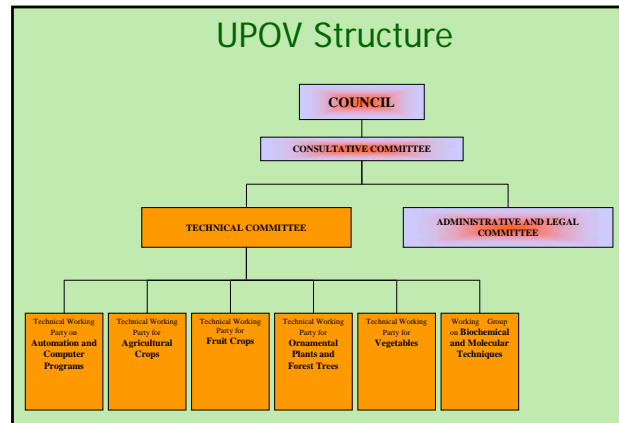
Variety denomination related information
Protection offered by UPOV members

DUS information

- UPOV Test Guidelines
- practical experience of UPOV (document TC/44/4)
- cooperation in DUS examination (document C/41/5)



7. ROLE OF THE TECHNICAL WORKING PARTIES AND THE BMT



- ### Role of the BMT
- The BMT is a group open to DUS experts, biochemical and molecular specialists and plant breeders, whose role is to:
- (i) Review general developments in biochemical and molecular techniques;
 - (ii) Maintain an awareness of relevant applications of biochemical and molecular techniques in plant breeding;
 - (iii) Consider the possible application of biochemical and molecular techniques in DUS testing and report its considerations to the TC;
 - (iv) If appropriate, establish guidelines for biochemical and molecular methodologies and their harmonization [...];
 - (v) Consider initiatives from TWPs, for the establishment of crop specific subgroups [...];
 - (vi) Develop guidelines regarding the management and harmonization of databases of biochemical and molecular information, in conjunction with the TWC;
 - (vii) Receive reports from Crop Subgroups and the BMT Review Group;
 - (viii) Provide a forum for discussion on the use of biochemical and molecular techniques in the consideration of essential derivation and variety identification.

8. AGENDA for the TWP Session

Example TWP Session									
Sunday	Monday		Tuesday		Wednesday		Thursday		Friday
[TECHNICAL WORKSHOP] (optional)	Reports on developments in PVP		TOP document development		TOP document development		Experiences with new types and species Variety denominations		Databases, Electronic application systems Exchangeable software
COFFEE	COFFEE		COFFEE		COFFEE		COFFEE		COFFEE
[TECHNICAL WORKSHOP] (optional)	Reports (Continuation) Molecular techniques		TOP document development		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Uniformity method development		Recommendations on Test Guidelines
	LUNCH		LUNCH		LUNCH		LUNCH		LUNCH
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Future program Adoption of report
COFFEE	COFFEE		COFFEE		TECHNICAL VISIT		COFFEE		
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	END OF SESSION
	Continuation		RECEPTION				Continuation		

EXCHANGING INFORMATION

Example TWP Session									
Sunday	Monday		Tuesday		Wednesday		Thursday		Friday
[TECHNICAL WORKSHOP] (optional)	Reports on developments in PVP		TOP document development		TOP document development		Experiences with new types and species Variety denominations		Databases, Electronic application systems Exchangeable software
COFFEE	COFFEE		COFFEE		COFFEE		COFFEE		COFFEE
[TECHNICAL WORKSHOP] (optional)	Reports (Continuation) Molecular techniques		TOP document development		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Uniformity method development		Recommendations on Test Guidelines
	LUNCH		LUNCH		LUNCH		LUNCH		LUNCH
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Future program Adoption of report
COFFEE	COFFEE		COFFEE		TECHNICAL VISIT		COFFEE		
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	END OF SESSION
	Continuation		RECEPTION				Continuation		

AN OPPORTUNITY for TRAINING

Example TWP Session									
Sunday	Monday		Tuesday		Wednesday		Thursday		Friday
[TECHNICAL WORKSHOP] (optional)	Reports on developments in PVP		TOP document development		TOP document development		Experiences with new types and species Variety denominations		Databases, Electronic application systems Exchangeable software
COFFEE	COFFEE		COFFEE		COFFEE		COFFEE		COFFEE
[TECHNICAL WORKSHOP] (optional)	Reports (Continuation) Molecular techniques		TOP document development		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Uniformity method development		Recommendations on Test Guidelines
	LUNCH		LUNCH		LUNCH		LUNCH		LUNCH
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Future program Adoption of report
COFFEE	COFFEE		COFFEE		TECHNICAL VISIT		COFFEE		
PREPARATORY WORKSHOP	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	TECHNICAL VISIT		Room 1 Test Guidelines subgroup	Room 2 Test Guidelines subgroup	END OF SESSION
	Continuation		RECEPTION				Continuation		

TWP Venues

	TWA	TWC	TWF	TWO	TWV	BMT
1994	Spain	Israel	New Zealand	Australia	United Kingdom	France
1995	Germany	Poland	United Kingdom	Netherlands	Netherlands	Netherlands
1996	Greece	Germany	Israel	Israel	Czech Rep.	
1997	Uruguay	Hungary	Netherlands	Denmark	Spain	United Kingdom
1998	France	Belgium	Australia	New Zealand	Poland	USA
1999	Canada	Finland	Slovakia	Czech Rep.	Germany	
2000	Sweden	Ukraine	Hungary	Hungary	France	France
2001	Mexico	Czech Rep.	Spain	Japan	Italy	Germany
2002	Brazil	Mexico	Argentina	Ecuador	Japan	
2003	Japan	Denmark	Canada	Canada	Netherlands	Japan
2004	Poland	Japan China (workshop)	Germany	Germany	Rep. of Korea	
2005	New Zealand	Canada	Japan	Rep. of Korea	Slovakia	USA
2006	China	Kenya	Israel	Israel	Mexico	Rep. of Korea
2007	Hungary	Romania	Rep. of Korea	China	Kenya	
2008	South Africa	Rep. of Korea	Portugal	Netherlands	Poland	Spain
2009	Rep. of Korea	USA	France	European Union	China	
2010	Croatia	European Union	Mexico	Mexico	Bulgaria	Canada
2011	Brazil	Geneva - LPOV	Japan	Japan	USA	Brazil
2012	France	Rep. Moldova	China	Rep. of Korea	Netherlands	

8. FEEDBACK

THANK YOU