

TECHNICAL WORKING PARTY FOR FRUIT CROPS

Forty-Seventh Session

PREPARATORY WORKSHOP

Angers, France, November 13, 2016

PROGRAM

1. Introduction to UPOV and the role of UPOV Technical Working Parties (TWPs)
2. Overview of the General Introduction (document TG/1/3 and TGP documents)
 - Characteristics as the Basis for DUS Examination and Selection of Characteristics
3. Guidance on drafting Test Guidelines (document TGP/7)
 - a) Subject of the Test Guidelines, Material Required and Method of Examination;
 - b) Method of Observation (MS, MG, VS, VG);
 - c) Types of Expression (QL, PQ, QN), notes and distinctness;
 - d) Shape and Color Characteristics;
 - e) Example Varieties;
 - f) The process for developing UPOV Test Guidelines, including: TG Template; Additional Standard Wording; and Guidance Notes;
4. Agenda for the TWP Session
5. Feedback from participants

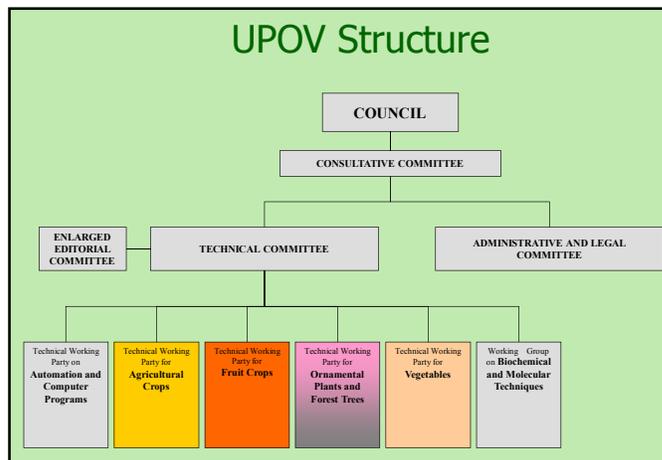
1. INTRODUCTION TO UPOV AND THE ROLE OF UPOV TECHNICAL WORKING PARTIES (TWPS)

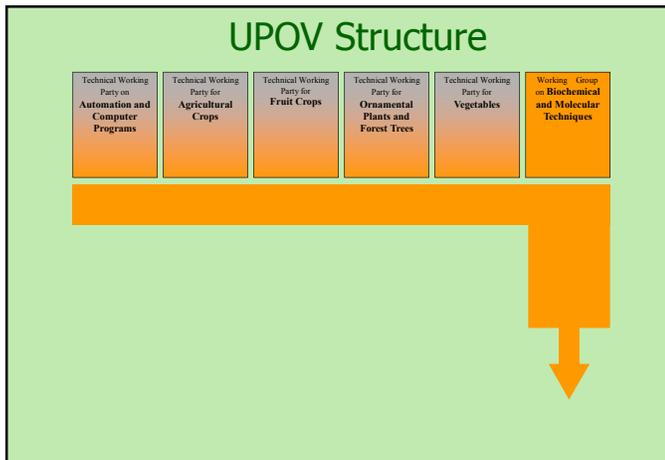
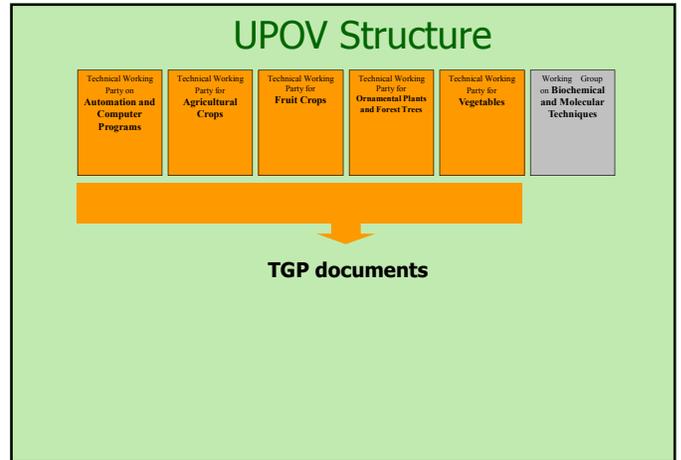
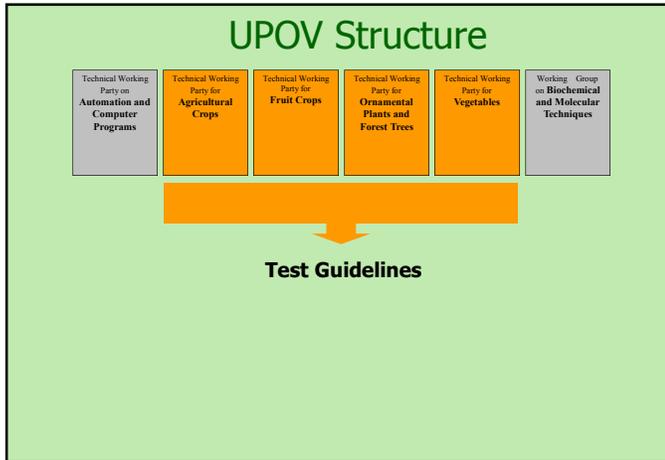
UPOV: INDEPENDENT INTERGOVERNMENTAL ORGANIZATION

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





- ### 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.

2. OVERVIEW OF THE GENERAL INTRODUCTION (document TG/1/3 and TGP documents)

a) Characteristics as the Basis for DUS Examination

b) Selection of Characteristics

2. OVERVIEW OF THE GENERAL INTRODUCTION (document TG/1/3 and TGP documents)

a) Characteristics as the Basis for DUS Examination

b) Selection of Characteristics

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

2. OVERVIEW OF THE GENERAL INTRODUCTION (document TG/1/3 and TGP documents)

a) Characteristics as the Basis for DUS Examination

b) 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

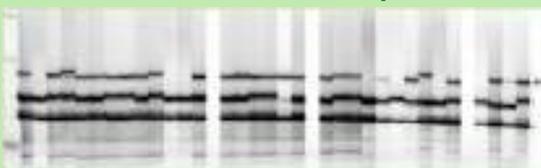
Criteria	Fruit: color	Leaf: shape	Yield
(a) results from a given genotype or combination of genotypes	Yes	Yes	Yes
(b) sufficiently consistent and repeatable in a particular environment	Yes	Yes	(No)
(c) exhibits sufficient variation between varieties to be able to establish distinctness	Yes	Yes	???
(d) 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?



TGP/7 : "Development of Test Guidelines"

Additional Information and guidance on Asterisked, grouping and TQ characteristics

Standard Test Guidelines Characteristic

Function	Criteria
<p>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>	<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	semierecto	D0158-1	2
	spreading	étalé	breitwüchsig	abierto	Sunnem 03	3
	semi-trailing	semi-étalé	halbhängend	semirrastrero	Impsaf	4
	trailing	coureux	hängend	rastrero	Organza	5

Asterisked Characteristic

Function	Criteria
<p>1.Characteristics that are important for the international harmonization of variety descriptions.</p>	<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:

- (a) Plant: growth habit (characteristic 1)
- (b) Leaf blade: variegation (characteristic 11)
- (c) 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 (37)		
orange red	Cox's Orange Pippin, Egremont Russet	1 []
pink red	Cripps Pink, Delorogue	2 []
red	Alaska, Galaxy, Red Elstar, Royal Prince	3 []
purple red	Red Jonaprince, Spartan	4 []
brown red	Fiesta, Johna, Lord Burghley	5 []
5.6 Fruit: pattern of over color (39)		
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)	Helios	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. GUIDANCE ON DRAFTING TEST GUIDELINES (Document TGP/7)

3. GUIDANCE ON DRAFTING TEST GUIDELINES

a) Subject of the Test Guidelines, Material Required and Method of Examination

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"

TGP/7 : "Development of Test Guidelines"

Section 1. Introduction

TOP/7/2 - Section 1: Introduction
page 6

SECTION 1: INTRODUCTION

1.1 UPOV Test Guidelines as the Basis for the DUS Test

The General Introduction (Chapter 2, section 2.2.1) states that "Where UPOV has established specific Test Guidelines for a particular species, or other group(s) of varieties, these represent an agreed and harmonized approach for the examination of new varieties and, in conjunction with the basic principles contained in the General Introduction, should form the basis of the DUS test." It further states in Chapter 8, section 8.2.1, that "The individual Test Guidelines are prepared or, where appropriate, revised according to the procedures set out in document TGP/7, 'Development of Test Guidelines'". Thus, the purpose of this document is to provide guidance on the development of these UPOV Test Guidelines ("Test Guidelines").

1.2 Individual Authorities' Test Guidelines

The General Introduction also states that "Where UPOV has not established individual Test Guidelines relevant to the variety to be examined, the examination should be carried out in accordance with the principles in this document [the General Introduction] and, in particular, the recommendations contained in Chapter 9, 'Conduct of DUS Testing in the Absence of Test Guidelines'. In particular, the recommendations in Chapter 9 are based on the approach whereby, in the absence of Test Guidelines, the DUS examiner proceeds in the same general way as if developing new Test Guidelines". Section 4 "Development of individual authorities' test guidelines" provides guidance on the development of individual authorities' test guidelines.

1.3 Structure of TGP/7

TGF-150.1
Vegetative Propagation System, 2008 (4. 2)

7. Table of Characteristics, Tableau des caractéristiques, Methodenkarte, Tabla de características

	English	French	Arabic	Spanish	Example Varieties: - Examples - Exemples - Ejemplos - Ejemplos	Dist. Area
1. VG	Plant density of foliage	Plante: densité de feuillage	Planta: densidad de follaje	Planta: densidad del follaje		
QN	leaf shape	feuille	hoja	hoja	De novo	1
	veinlet	veine	vein	vein	Blanc de Châteauneuf	1
	stem	tronc	tallo	tronco	Chardonnay de France	1
2. VG	Plant number of branches	Plante: nombre de ramifications	Planta: número de ramas	Planta: número de ramas		
QN	leaf size	feuille	hoja	hoja	De novo	1
	veinlet	veine	vein	vein	Blanc de Châteauneuf	1
	stem	tronc	tallo	tronco	Blanc de Châteauneuf	1

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 ([MG]/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

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 ([MG]/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**

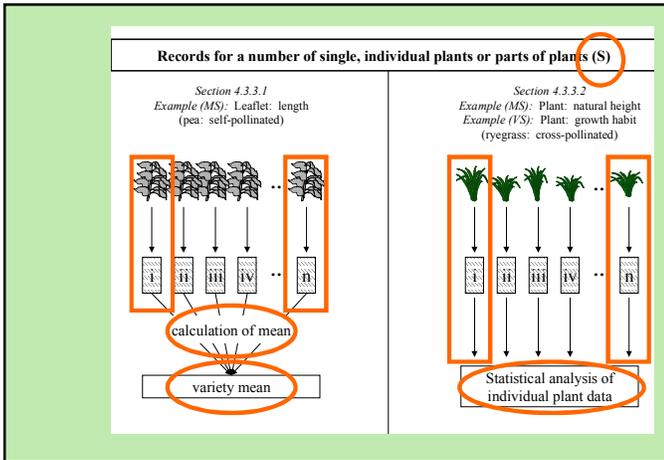
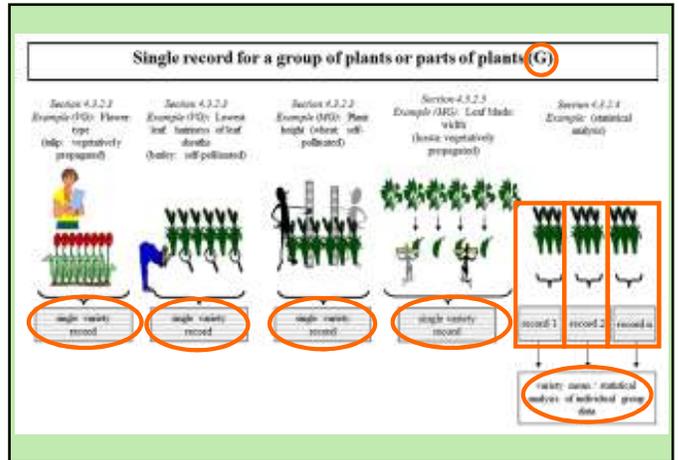
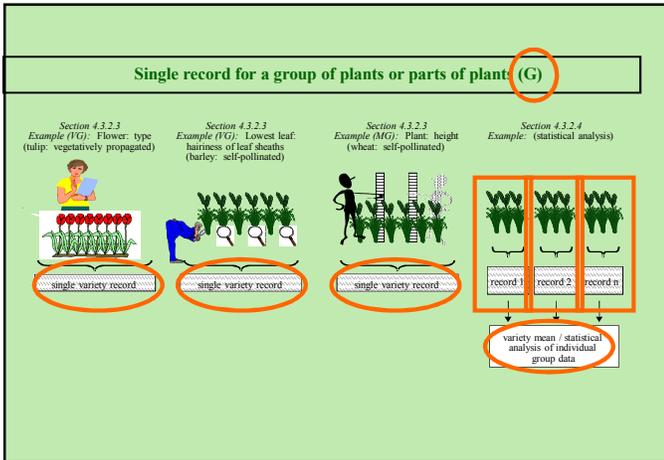
Method of propagation of the variety	Type of expression of characteristic		
	QL (QUAL itative)	PQ (PSEUDO qualitative)	QN (QUANT itative)
Vegetatively propagated, self-pollinated	Notes (VG)	Notes (VG) Side-by-side (VG)	Notes (VG/MG/MS) Side-by-side (VG) Statistics (MG/MS)
Cross-pollinated	Notes (VG)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



EXERCISE

3. GUIDANCE ON DRAFTING TEST GUIDELINES

c) Types of Expression (QL, PQ, QN), 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 Beispielsorten Variedades ejemplo	Nota Nota
1. (*) (*) QN	Plant: growth habit	Plante : port	Pflanze: Wuchsform	Planta: porte		
	upright	dressé	aufrecht	erecto	Imppiak	1
	semi-upright	semi dressé	halbaufrrecht	semierecto	D0158-1	2
	spreading	étalé	breitwüchsig	abierto	Sunnen 03	3
	semi-trailing	semi-étalé	halbhängend	semirastroso	Impsaf	4
	trailing	coureux	hängend	rastroso	Organza	5
2. (*)	Plant: height	Plante : hauteur	Pflanze: Höhe	Planta: altura		
QN	short	basse	niedrig	baja	Yateye	3
	medium	moyenne	mittel	media	D0158-1	5
	tall	haute	hoch	alta	Imppiak	7

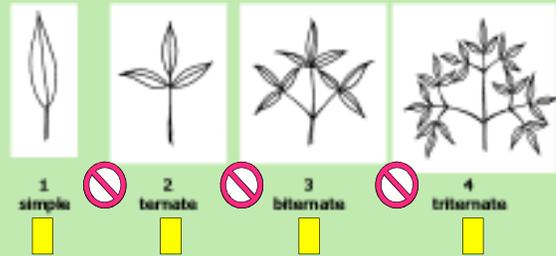
QUALITATIVE Characteristics

“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



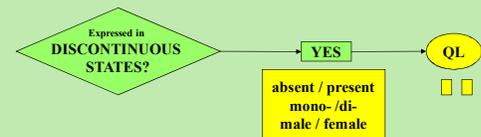
Qualitative (QL) characteristic?

Anthocyanin coloration: QL (=absent / present)?

NO!

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

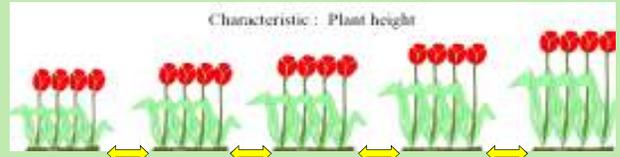
QL, QN or PQ?



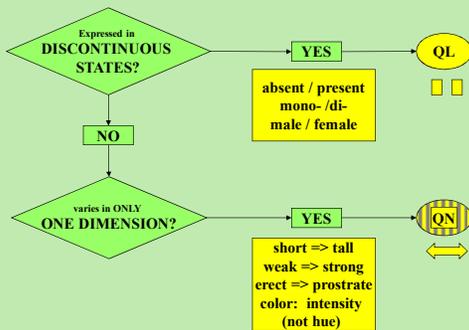
QUANTITATIVE Characteristics

“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



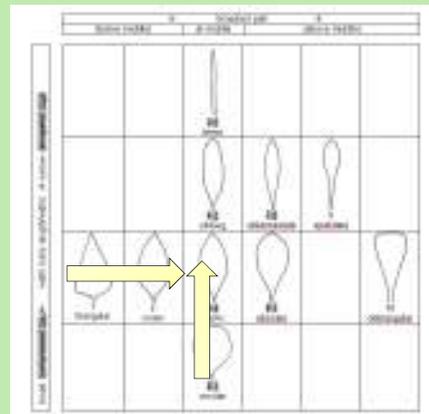
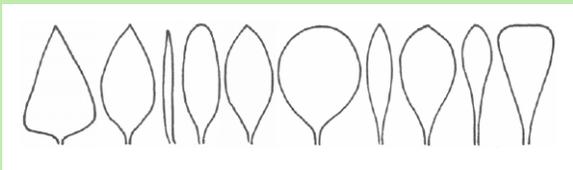
QL, QN or PQ?

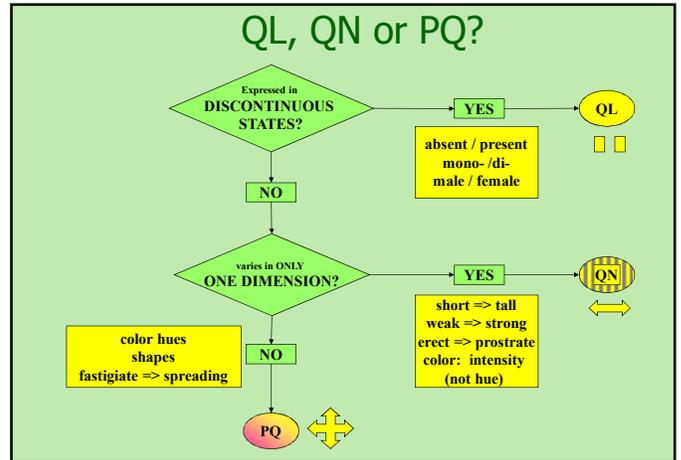
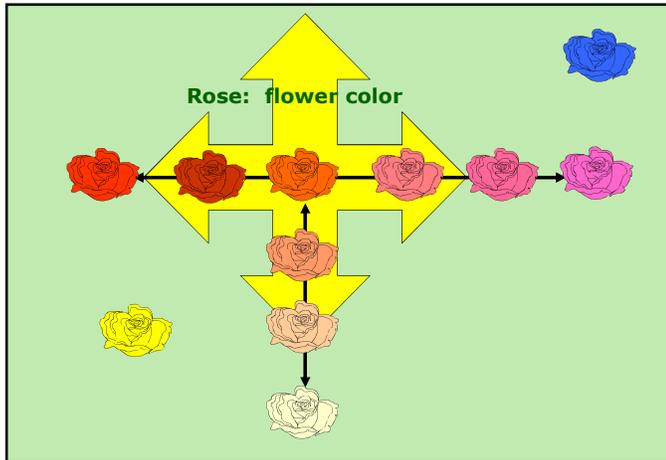


PSEUDO-QUALITATIVE Characteristics

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

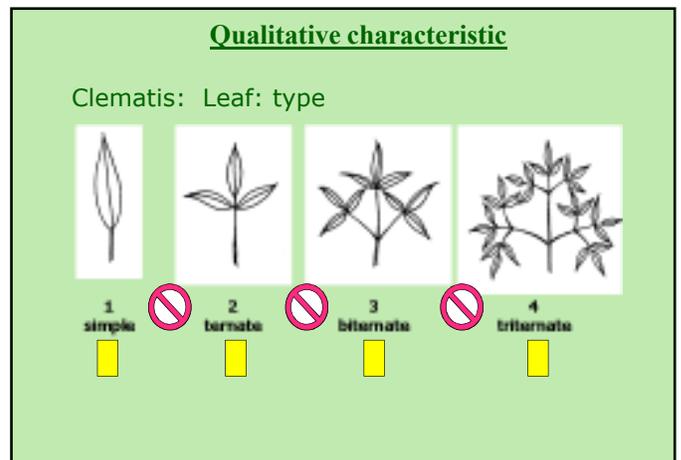
NOTES and DISTINCTNESS according to TYPE OF EXPRESSION (QL, PQ, QN)

Types of Expression

QL: QUALITATIVE

QN: QUANTITATIVE

PQ: PSEUDO-QUALITATIVE



Qualitative Characteristics (special cases)

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

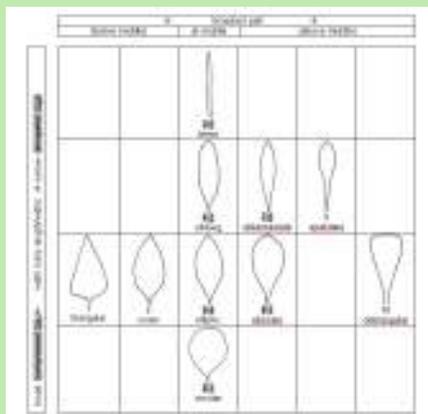
QL: QUALITATIVE

QN: QUANTITATIVE

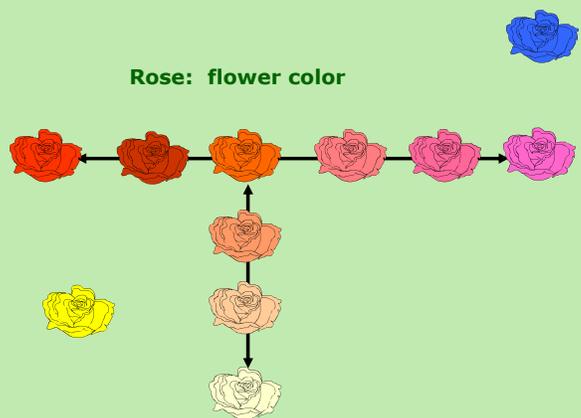
PQ: PSEUDO-QUALITATIVE

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.



Rose: flower color

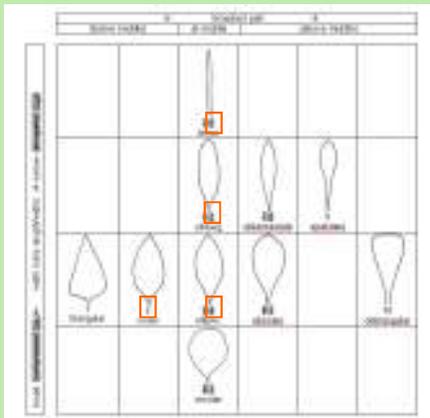


PSEUDO-QUALITATIVE Characteristics (typical examples)

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	purpur	púrpura	6

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

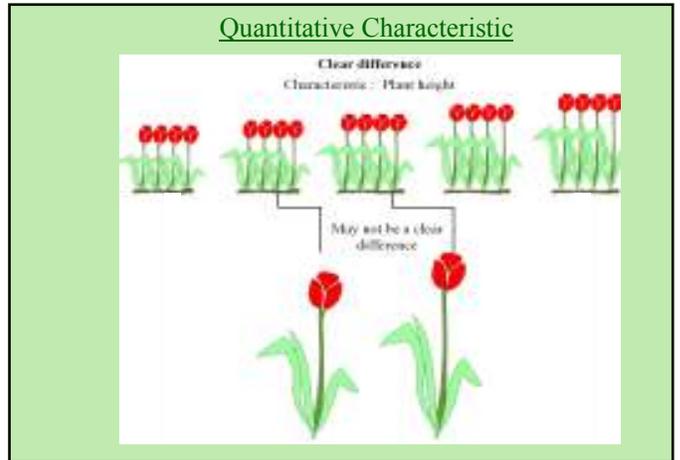
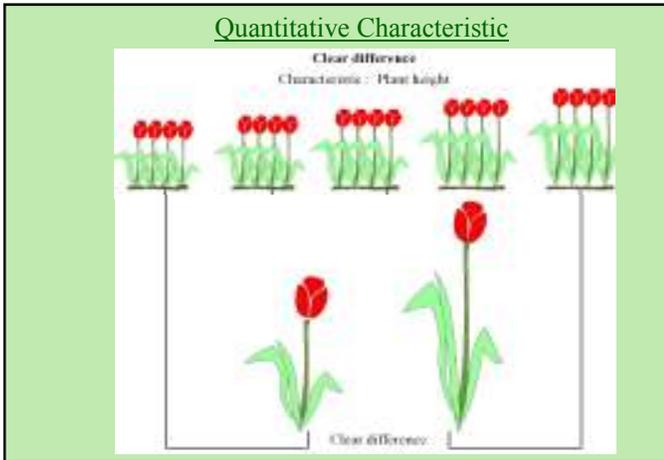
PQ: PSEUDO-QUALITATIVE

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 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
	Size relative to:	Angle:	Position:	Length in relation to:
1	much smaller	very acute	at base	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 (at least 3 notes)

Example 2	
1	e.g. absent or weak <i>(absent or weakly expressed)</i>
2	moderate (or medium) <i>(moderately expressed)</i>
3	strong <i>(strongly expressed)</i>

State	Example 1
	Stem: attitude
1	erect
3	semi-erect
5	prostrate

NOTES
versus
SIDE-BY-SIDE COMPARISON
(Quantitative characteristics)

TGP/9/1 "Examining Distinctness"

5.2 Approaches for assessing distinctness

5.2.1 Introduction

5.2.1.1 Approaches for assessment of distinctness based on the growing trial can be summarized as follows:

- (a) **Side-by-side visual comparison** in the growing trial (see Section 5.2.2);
- (b) **Assessment by Notes / single variety records ("Notes")**: the assessment of distinctness is based on the recorded state of expression of the characteristics of the variety (see Section 5.2.3);
- (c) Statistical analysis of growing trial data:

Quantitative Characteristics: distinctness

The General Introduction explains that, in the case of visually observed quantitative characteristics:

"5.5.2.2.2 **A direct comparison between two similar varieties is always recommended**, since direct pairwise comparisons are the most reliable. In each comparison, **a difference between two varieties is acceptable as soon as it can be assessed visually and could be measured, although such measurement might be impractical or require unreasonable effort.**"

TGP/9/1 "Examining Distinctness"

5.2.3.1.2 Where the requirements for distinctness assessment by Notes / single variety records are met it would usually also be possible to make a side-by-side visual comparison. However, in the case of assessment by Notes / single variety records, such proximity is not required, which is a particular advantage where the growing trial contains a large number of varieties and where there are limited possibilities for ensuring that all similar varieties are grouped together in the growing trial. ...

On the other hand, because the varieties are not the subject of a side-by-side visual comparison, the difference required between varieties as a basis for distinctness is, with the exception of qualitative characteristics (see below), somewhat greater.

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?

Variety	A	B							
									

...and comparison with descriptions in databases



1.....2.....3.....4.....5.....6.....7.....8.....9

4 5

4.5

"Two Note" rule...

1.....2.....3.....4.....5.....6.....7.....8.....9

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/Diascie, 2007-03-28 - 9 -						
	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
6. (*)	(a) Leaf blade: length	Limbe: longueur	Blattspreite: Länge	Limbo: longitud		
QN	short	courte	kurz	corto	Codier, Strawberry Sundae	3
	medium	moyenne	mittel	medio	Codisre	5
	long	longue	lang	largo	Bahwinlapi, Bahwinlwhit	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/Diascie, 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 antocianica por debajo de la inflorescencia		
QN	absent or weak	absente ou faible	fehlernd oder gering	ausente o débil	Heckham	1
	medium	moyenne	mittel	media	Heccace	2
	strong	forte	stark	fuerte		3

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

Process levels other than Notes...

Beate Rücker
Federal Variety Office, Hannover, Germany

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

UPOV Documents
First restricted area

- (CA) Administrative and Legal Committee
- (GMLAG) Administrative and Legal Committee Advisory Group
- (TC) Technical Committee
- (TEC-ERC) Enlarged Editorial Committee
- (TAP) Technical Working Party for Agricultural Crops
- (TAPC) Technical Working Party on Automation and Computer Programs
- (TAPC) Technical Working Party for Fruit Crops
- (TAPC) Technical Working Party for Ornamental Plants and Forest Trees
- (TAPC) Technical Working Party for Vegetables
- (TAPC) Technical Working Party on Biotechnological Techniques, and DNA Profiling in Particular
- (TAPC) Technical Working Party on Biotechnological and Molecular Techniques, and DNA Profiling in Particular - One Subgroup
- (TAPC) All five Working Groups to Study the Impact of Plant Breeders' Rights
- (WG-FOD) All five Working Groups on the Publication of Variety Descriptions
- (WG-ND) All five Working Groups on Variety Descriptions

Revised on DUS Testing UPOV, Geneva, March 18 to 20, 2010

3. GUIDANCE ON DRAFTING TEST GUIDELINES

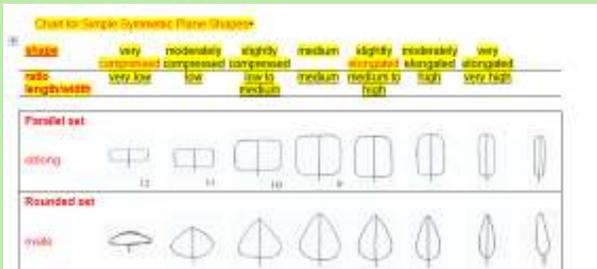
d) Shape and Color Characteristics

TGP/14: Shape

Characteristics related to shape, could use the following:

- Overall shape: e.g. ovate (1), elliptic (2), circular (3), obovate (4)...
- Individual components of shape
 - Ratio length/ width (from low to high)
 - Position of broadest part
 - Shape of base
 - Shape of apex
 - Lateral outline

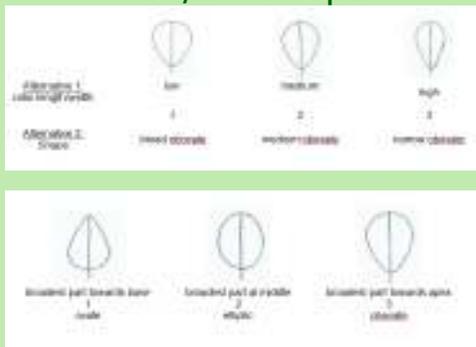
TGP/14: Shape



TGP/14: Shape



TGP/14: Shape

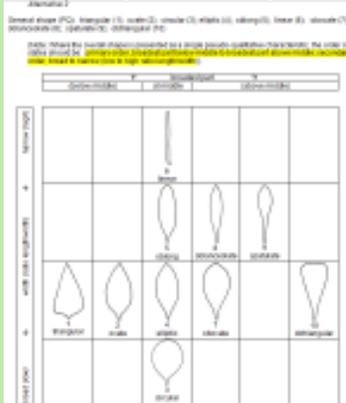


TGP/14: Shape



- Alternative 1*
- (a) position of broadest part (QN):
e.g. strongly towards base (1); moderately towards base (3); at middle (5); moderately towards apex (7); strongly towards apex (9)
- (b) ratio length/width (QN):
e.g. very low (1); low (3); medium (5); high (7); very high (9)

TGP/14: Shape



TGP/14: Color

	state of expression	example
low ↓ level of precision ↓ high	single color	yellow, orange, red
	color range	(a) yellow, yellow orange, orange, orange red, red (b) white, yellowish white, yellow, yellowish orange
	intensity	light yellow, medium yellow, dark yellow
	RHS Colour Chart No.	RHS 41 B

Species?
Level of variation?

TGP/14: Color

Single color

- A single color has the lowest precision to describe the state of expression.
- Example: Flower: color: white (1); yellow (2); orange (3); red (4)

TGP/14: Color

Color range

- (a) In color combinations the second color indicates the predominant color with blending of both colors, resulting in what can look like a single color. For example in "green red" the predominant color is red and in "red green" the predominant color is green.
- Example: Flower: color: white (1); yellow white (2); yellow (3); yellow orange (4); orange (5)
- (b) The use of "ish" in color combinations indicates that there is a predominant color (e.g. yellow) together with another minor color. For example,
- yellowish, covers all colors which are predominantly yellow (would include, for example, white yellow; brown yellow; orange yellow; etc.)
- yellowish green covers all colors which are predominantly green with some yellow (would include, for example, white yellow green; brown yellow green; orange yellow green etc.)
- Example: Flower: color: whitish (1); yellowish (2); greenish (3)

TGP/14: Color

Intensity

- Depending on the organ described, the intensity can be presented either in relation to a single color or in combination with different colors (example 2).
- Example 1: Leaf: green color of upper side: light (3); medium (5); dark (9)
- Example 2: Flower: color: white (1); light yellow (2); medium yellow (3); dark yellow (4); orange (5)

TGP/14: Color

Color Chart

- The "RHS Colour Chart" because of its worldwide availability.
 - 5 editions of this color chart, dating from 1966, 1986, 1995, 2001 and 2007.
 - Reference number of the RHS color, color name and edition of the chart to be mentioned.
 - UPOV names for colors in ANNEX.
 - Other color charts might also be appropriate.
- "Because daylight varies, color determinations made against a color chart should be made either in a suitable cabinet providing artificial daylight or in the middle of the day in a room without direct sunlight. The spectral distribution of the illuminant for artificial daylight should conform with the CIE Standard of Preferred Daylight D 6500 and should fall within the tolerances set out in the British Standard 950, Part 1. These determinations should be made with the plant part placed against a white background".
- Observations should not be made in direct sunlight. The observations should be made on a cloudy day with sufficient light intensity, or in a shaded area.

Allocation of UPOV Color Groups for each RHS Color in RHS Reference order
RHS COLORS (RHS COLOUR CHART, EDITIONS 1986, 1995, 2001 AND 2007)
BY UPOV COLOR GROUPS

UPOV group No.	No. RHS	English	français	deutsch	español
11	001A	yellow	jaune	gelb	amarillo
5	001B	yellow green	vert-jaune	gelbgrün	verde amarillento
5	001C	yellow green	vert-jaune	gelbgrün	verde amarillento
5	001D	yellow green	vert-jaune	gelbgrün	verde amarillento
11	002A	yellow	jaune	gelb	amarillo
11	002B	yellow	jaune	gelb	amarillo
5	002C	yellow green	vert-jaune	gelbgrün	verde amarillento
5	002D	yellow green	vert-jaune	gelbgrün	verde amarillento
11	003A	yellow	jaune	gelb	amarillo
11	003B	yellow	jaune	gelb	amarillo
11	003C	yellow	jaune	gelb	amarillo
5	003D	yellow green	vert-jaune	gelbgrün	verde amarillento
11	004A	yellow	jaune	gelb	amarillo
11	004B	yellow	jaune	gelb	amarillo
5	004C	yellow green	vert-jaune	gelbgrün	verde amarillento
10	004D	light yellow	jaune clair	hellgelb	amarillo claro
11	005A	yellow	jaune	gelb	amarillo
11	005B	yellow	jaune	gelb	amarillo
11	005C	yellow	jaune	gelb	amarillo
10	005D	light yellow	jaune clair	hellgelb	amarillo claro
11	006A	yellow	jaune	gelb	amarillo
11	006B	yellow	jaune	gelb	amarillo
11	006C	yellow	jaune	gelb	amarillo
10	006D	light yellow	jaune clair	hellgelb	amarillo claro
11	007A	yellow	jaune	gelb	amarillo
11	007B	yellow	jaune	gelb	amarillo
11	007C	yellow	jaune	gelb	amarillo
11	007D	yellow	jaune	gelb	amarillo

TGP/14: Color

Order of states of expression

- normally presented in the following order: white, green, yellow, orange, pink, red, purple, violet, blue, brown, black
- chronological appearance of the color (e.g. as the fruit ripens)

TGP/14: Color

APPROACHES TO DESCRIBE COLORS AND COLOR PATTERNS

- depends on the number of colors...
- the types of color distribution...
- and the number of color patterns possible for the species concerned.

TGP/14: Color

Approach according to the size of the surface area

- (a) only a few colors, a few types of color distribution and a few patterns to be described,
- the colors are described according to the size of the surface area they cover

TGP/14: Color

Approach according to tissue layers

- one layer is covering the other:
- (a) Ground color (not always the largest surface area):
 - (i) the first color to appear chronologically.
 - (ii) has a continuous dispersion across the surface.
- (b) Over color (not always occupying the smallest surface area):
 - a second color, such as a flush, spots or blotches developed over time.

APPLE – TG/14/9

35. (*)	Fruit: ground color		37. (*)	Fruit: hue of over color – with bloom removed	
PQ	(f) not visible	1	PQ	(f) orange red	1
	whitish yellow	2		pink red	2
	yellow	3		red	3
	whitish green	4		purple red	4
	yellow green	5		brown red	5
	green	6			

Phalaenopsis (TG/213/2(proj.7))



Petal: ground color – RHS Colour Chart 155A - white
Petal: over color – RHS Colour Chart 83A – dark violet

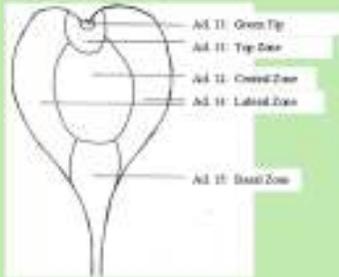
TGP/14: Color

Approach according to defined parts of an organ

- (a) If the different parts of a plant organ can have different colors, the color of these different parts can be described separately.
- Example:
 - Petal: color of margin
 - Petal: color of middle zone
 - Petal: color of base
- (b) When an organ has one color with different intensities, the parts of the organ which are lighter or darker could be described as follows:
- Example:
 - Ray floret: color distribution on upper side:
 - lighter towards base (1); even (2); lighter towards apex (3)

TGP/14: Color

Ad 17: Outer part, i.e. side of central zone
 Ad 18: Outer part, i.e. side of top zone (green in marked)
 Ad 19: Outer part, i.e. side of lateral zone
 Ad 20: Outer part, i.e. side of basal zone



Approach according to the RHS Colour Chart number ("Lisbon" approach)

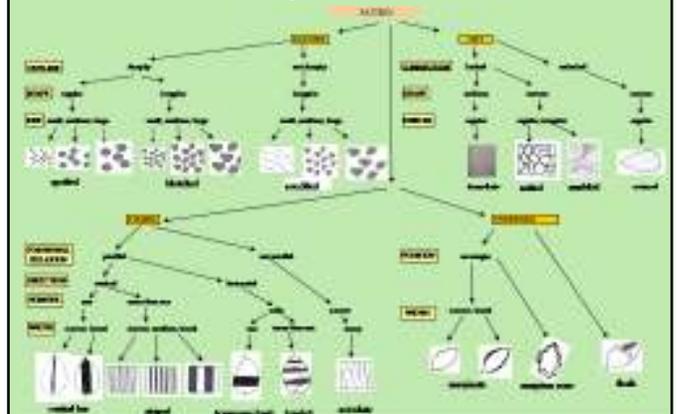
- All colors of the plant part concerned are assessed using the RHS Colour Charts first.
- The color should first be described, followed by:
 - area,
 - distribution,
 - Pattern
 - conspicuousness of the color (if necessary).
- The same sequence should be followed for color two, color three and so on. I

Heuchera and Heucherella (TG/280/1)



- 36. Leaf blade: color one – RHS Colour Chart – Yellow-Green 144C
- 37. Leaf blade: color one: distribution – marginal zone (7)
- 38. Leaf blade: color one: pattern – solid or nearly solid (5)
- 39. Leaf blade: color one: total area – very small to small (2)
- 40. Leaf blade: color two – RHS Colour Chart – Greyed-Orange 176B
- 41: Leaf blade: color two: distribution – along veins (2)
- 42: Leaf blade: color two: pattern – solid or nearly solid (5)
- 43: Leaf blade: color two: total area – small (3)
- 44: Leaf blade: color three – RHS Colour Chart – Greyed-Orange 177D but more grey
- 45: Leaf blade: color three: distribution – between veins in intermediate zone (6)
- 46: Leaf blade: color three: pattern – solid or nearly solid (5)
- 47: Leaf blade: color three: total area – large (7)
- 48: Leaf blade: color four – RHS Colour Chart – not applicable
- 49: Leaf blade: color four: distribution – none (1)
- 50: Leaf blade: color four: pattern – not applicable
- 51: Leaf blade: color four: total area – not applicable

TGP/14: Color



3. GUIDANCE ON DRAFTING TEST GUIDELINES

e) Example Varieties

TG139
Lettuce/Laitue/Salat/Lechuga, 2004-03-31
- 7 -

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

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

TG219/1
Perrilla/Pérille/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 lower side	Limbe: intensité de la couleur pourpre de la face inférieure	Blattspreite: Purpurfarbe der Unterseite	Limbo: intensidad del color púrpura del envés		
QN (a)	very light	très claire	sehr hell	muy claro		1
	light	claire	hell	claro	Perlime	3
	medium	moyenne	mittel	medio		5
	dark	foncée	dunkel	oscuro	Perro	7
	very dark	très foncée	sehr dunkel	muy oscuro	Bora, Purple	9
15. VG	Leaf blade: profile	Limbe: profil	Blattspreite: Profil	Limbo: perfil		
QN (a)	concave	concave	konkav	cóncavo	Perro	3
	plane	plan	flach	plano, Saucyupul		5
	convex	convexe	konvex	convexo		7

TG227/1
Brachycome/Blauer Gärtelblüthenchen, 2005-04-06
- 7 -

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

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
1. (*)	Plant: growth type	Plante: type de croissance	Pflanze: Wuchstyp	Planta: tipo de crecimiento		
	QN (a)	basal clusters	en amas à la base	basale Büschel	en racimos basales	
	bushy	buissonnant	büschlig	arboresivo		2
2. (*)	Only varieties with bushy growth type	Variétés à type de croissance buissonnante	Nur Sorten mit büschligem Wuchs	Solo variedades con tipo de crecimiento arbóreo		
	Plant: predominant attitude of stems	Plante: prédominance d'attitude des tiges	Wuchsform: vorherrschende Haltung der Triebe	Planta: porte predominante de los tallos		
QN (a)	upright	dressées	aufrecht	erecto		1
	semi upright	demi-dressées	halbaufrecht	semierecto		3
	horizontal	horizontales	wagrecht	horizontal		5
3.	Only varieties with bushy growth type	Variétés à type de croissance buissonnante	Nur Sorten mit büschligem Wuchs	Solo variedades con tipo de crecimiento arbóreo		
	Plant: number of stems	Plante: nombre de tiges	Wuchsform: Anzahl Triebe	Planta: número de tallos		
QN (a)	few	peu nombreuses	klein	bajo		3
	medium	moyennement nombreuses	mittel	medio		5
	many	nombreuses	groß	alto		7
4. (*)	Plant: height including flowers	Plante: hauteur, fleurs comprises	Pflanze: Höhe einschließlich Blüten	Planta: altura, incluidas las flores		
	QN (a)	short	basse	stodrig	corta	Mardi Gris
	medium	moyenne	mittel	media	Brushday	5
	tall	élevée	hoch	larga	Happy Face Pink	7

Example Varieties: the Objective

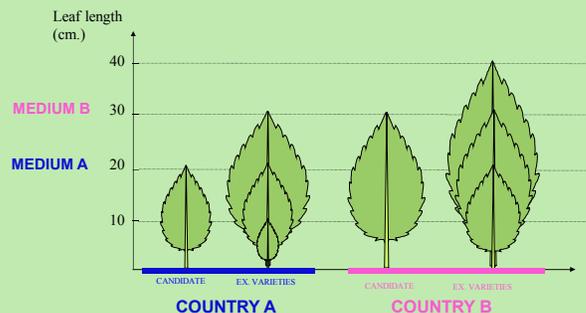
Clarify states of expression

Illustrate characteristics

Determine the state of expression

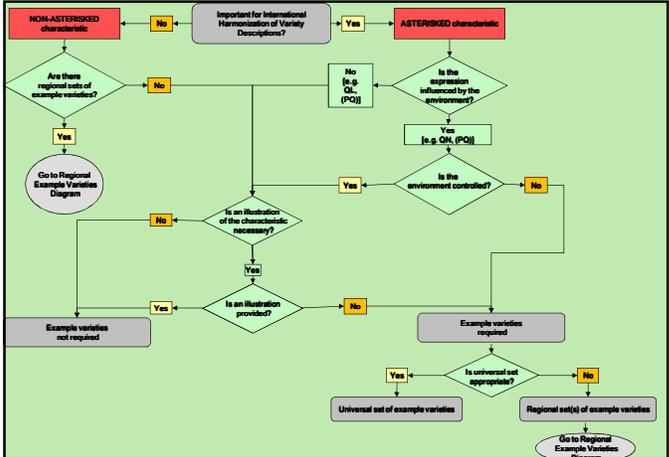
Harmonized descriptions

Example Varieties versus Measurements



Example Varieties – the need

NEED { in characteristics used to harmonize descriptions and which are influenced by the environment



3. GUIDANCE ON DRAFTING TEST GUIDELINES

f) The process for developing UPOV Test Guidelines, including: TG Template; Additional Standard Wording; and Guidance Notes;

Genera and Species

- **>3,450 genera and species** with varieties examined for PBR
- **>3,305 genera and species** for which UPOV members have practical DUS experience
- **313 Test Guidelines** adopted

Note: **313 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 (2013):	Alpha (proj. 1)
TWX (2014):	Alpha (proj. 2)
TWX (2015):	Alpha (proj. 3)
Enlarged Editorial Committee (2016):	Alpha (proj. 4)
Technical Committee (2016):	Alpha (proj. 5)
Final adopted document (2016):	TG/500/1

4. AGENDA for the TWP Session

Example TWP Session

Session	Monday	Tuesday	Wednesday	Thursday	Friday
TOPIC 1: INTRODUCTION TO TWP	Aspects of development in TWP	TWP document development	TWP document development	Experiences with various types and genres	Discussion, reflection, application, synthesis, exchange of ideas
TOPIC 2: RESEARCH	Research (Introduction of students' experiences)	TWP document development	Research Test: Introduction subgroup	Co-located method development	Recommendation on Test conditions
TOPIC 3: RESEARCH	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Future program Adoption of output
TOPIC 4: RESEARCH	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Research Test: Introduction subgroup	Research Test: Introduction subgroup

EXCHANGING INFORMATION

AN OPPORTUNITY
for
TRAINING