



Institute for Reference Materials and Measurements (IRMM)

Workshop : “PLANT AUTHENTICATION”

“Definition of a plant variety, its maintenance and monitoring of its properties”

Geel, Belgium, 21 and 22 September 2009

Luis Salaices (OEVV-Spain)

PREVIEW

- 1. About UPOV**
- 2. Varieties**
- 3. DUS examination**
- 4. TG for rice**
- 5. Maintenance of the variety**

1. About UPOV

UPOV MISSION STATEMENT

“To provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society”



UPOV: INDEPENDENT INTERGOVERNMENTAL ORGANIZATION

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

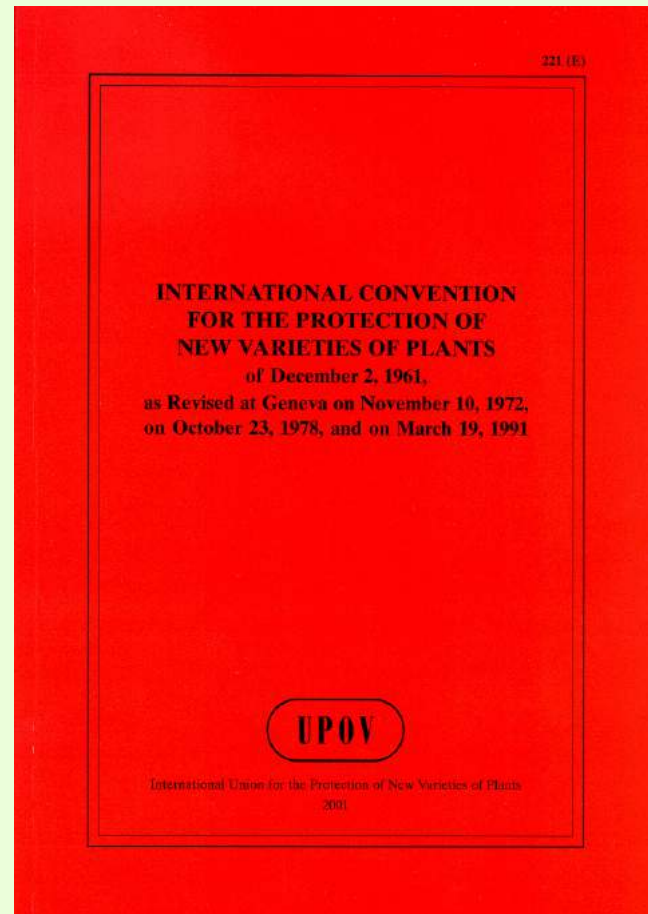
established in 1961

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

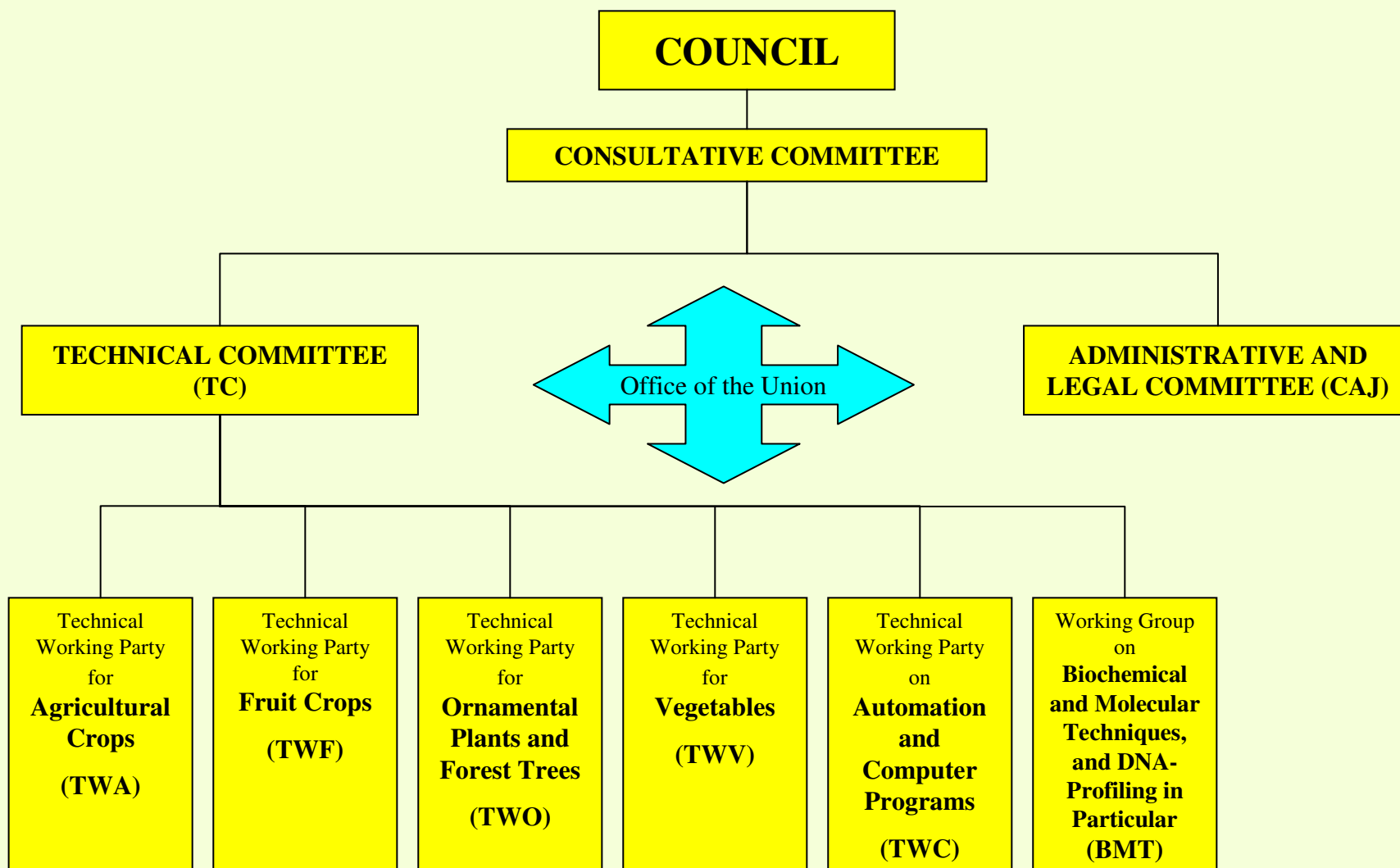
****U**nion internationale pour la
protection des **o**btentions **v**égétales**



UPOV CONVENTION



- **Members of the Union**
 - States
 - Intergovernmental Organization(s)
- **Organs established by the Convention**
 - Council
 - Office of the Union
- **Other Bodies**



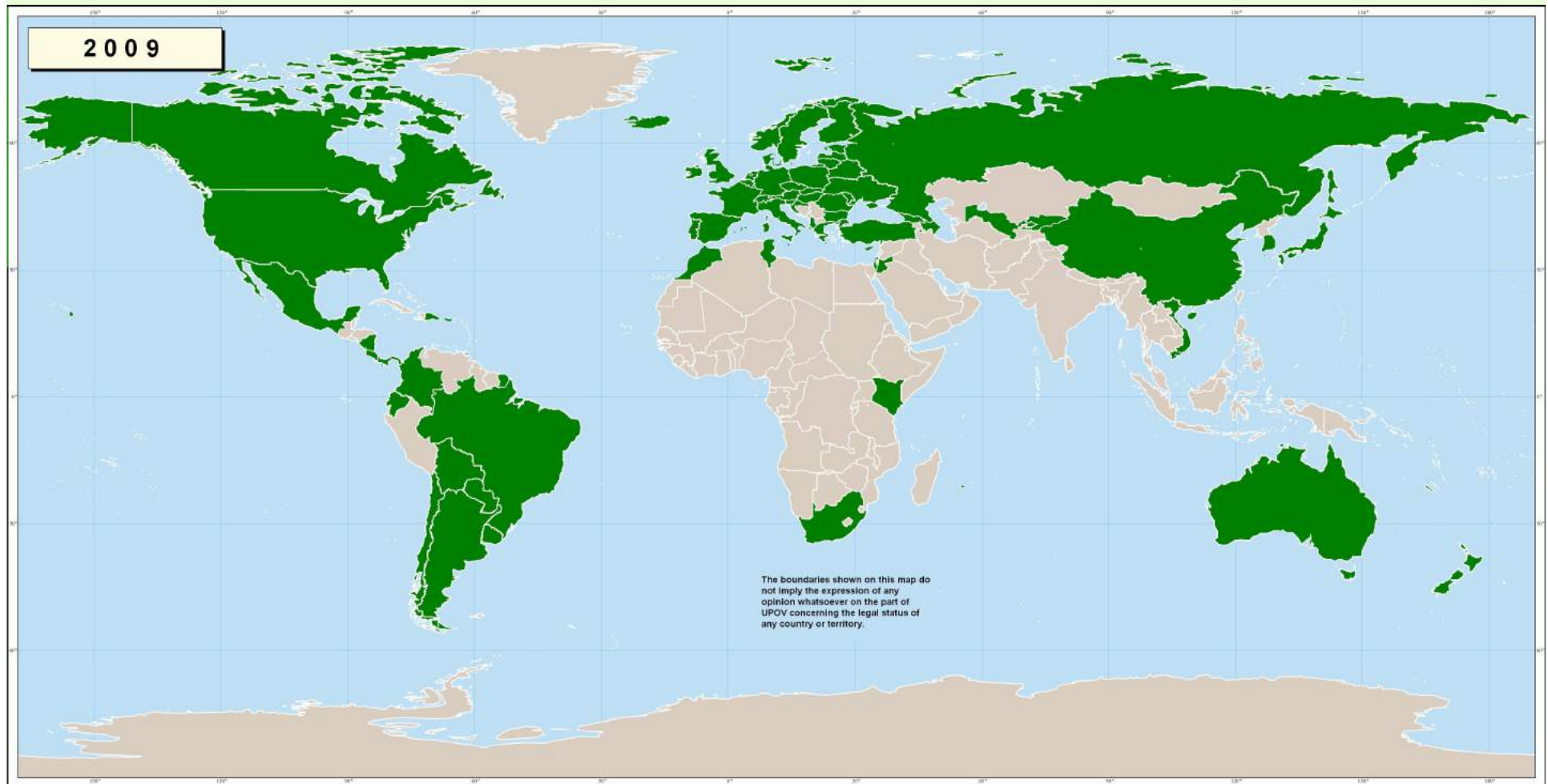
PLANT VARIETY PROTECTION SITUATION

- **67 members of the Union**
- **16 States have initiated the procedure for becoming members of the Union**
- **1 intergovernmental organization has initiated the procedure for becoming members of the Union:**
 - **OAPI (16 countries)**
- **46 States have contacted the Office of the Union for assistance in the development of legislation on plant variety protection**



UPOV Membership/Territories covered

67 members





Members of UPOV (green) & initiating States & organizations (brown)

Initiated the Procedure

17 States

1 intergovernmental organization



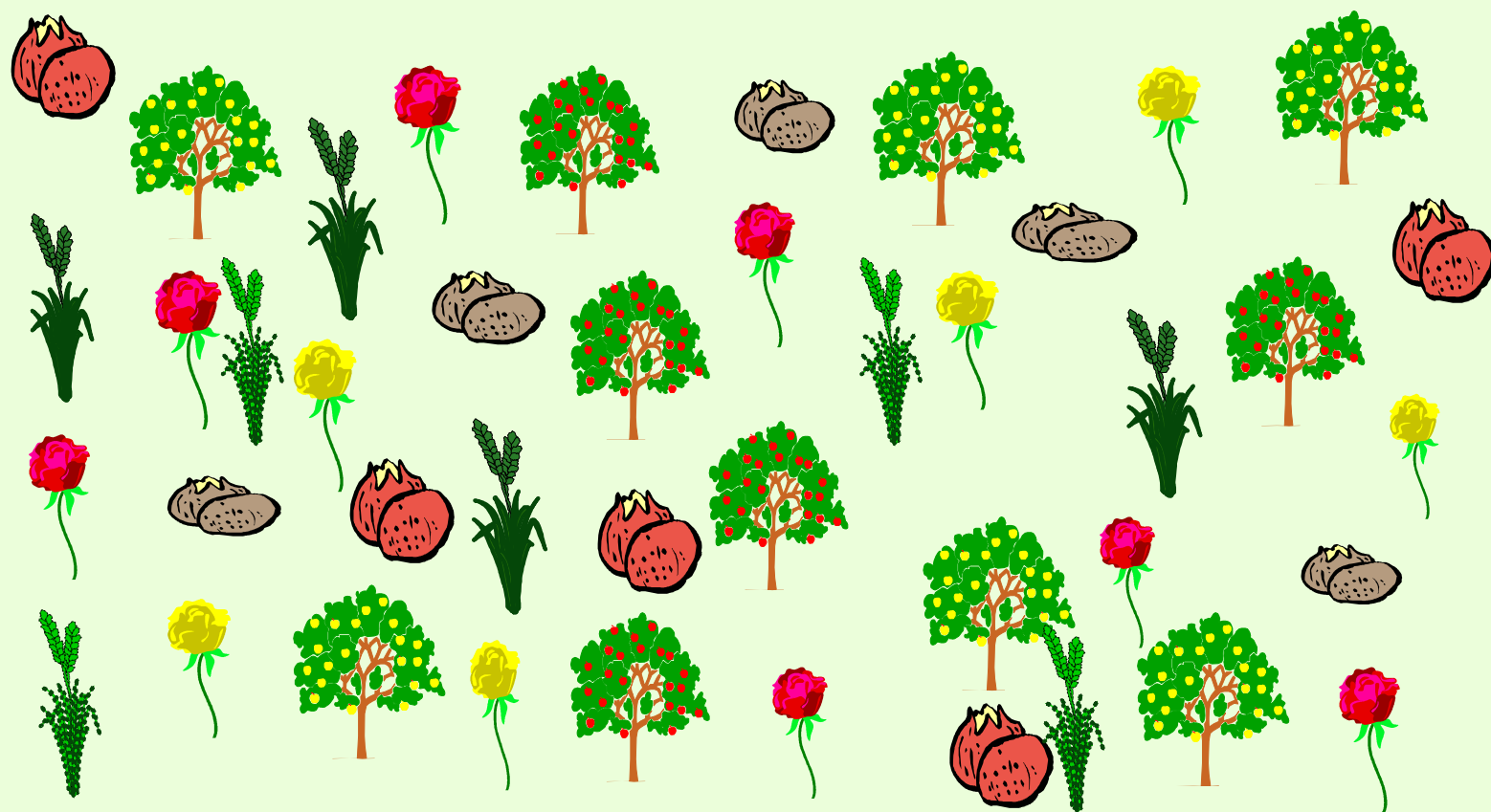
2. Varieties

VARIETY

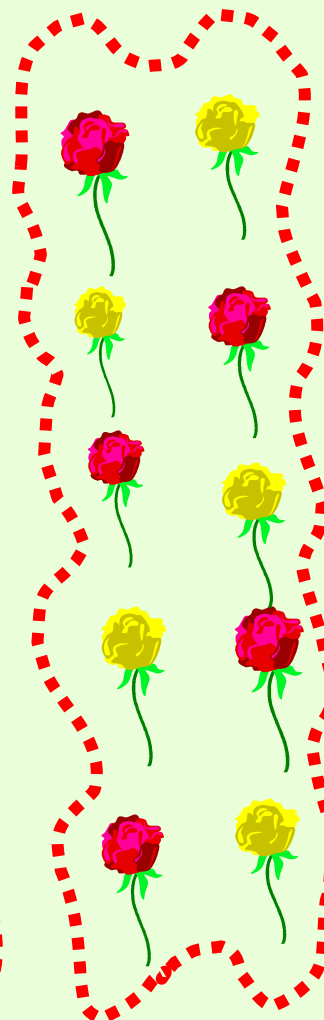
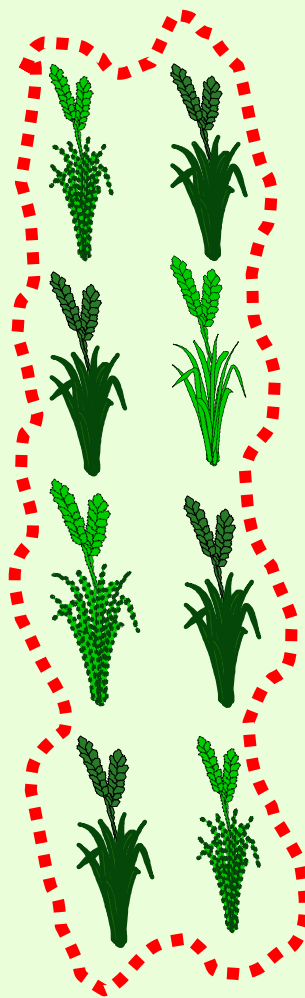
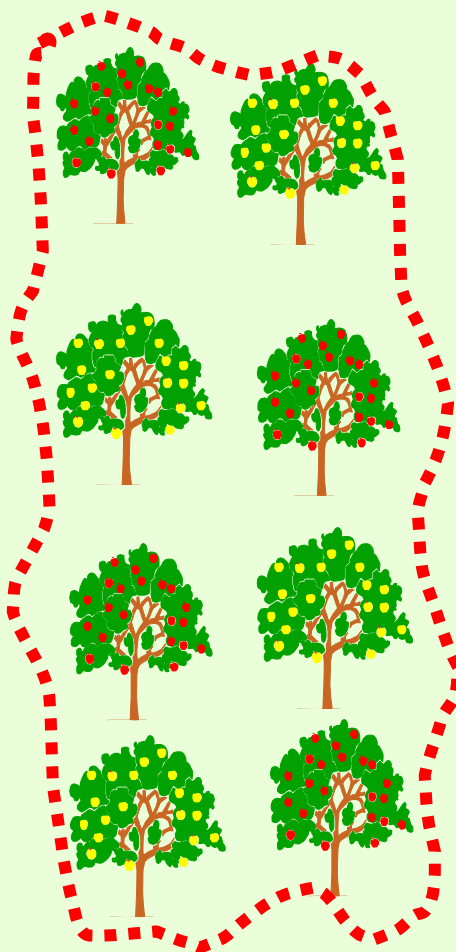
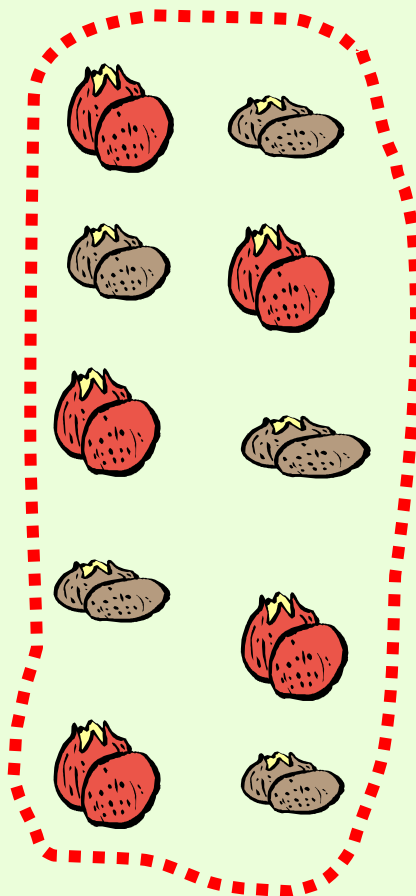


**THE SUBJECT
MATTER OF
PROTECTION**

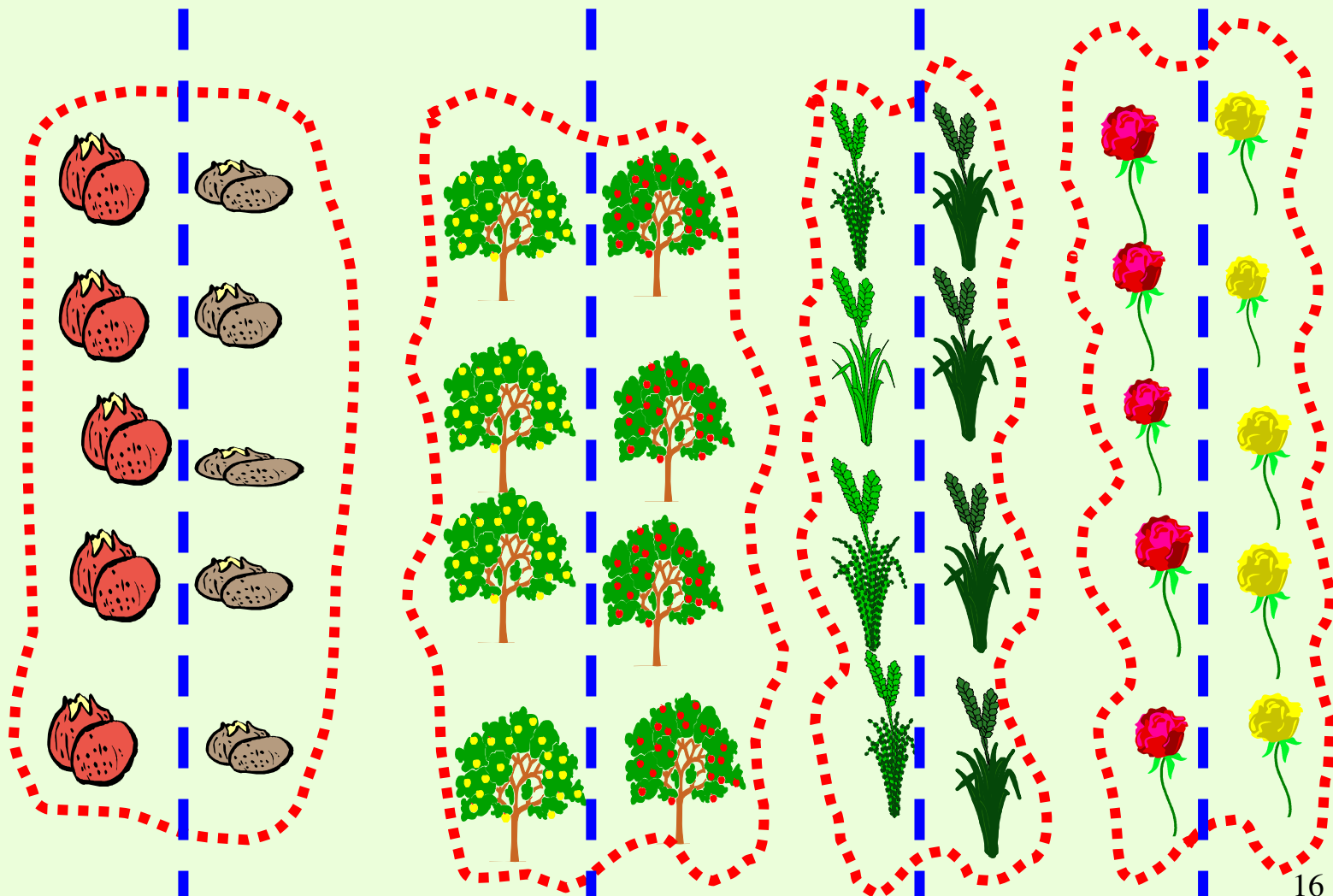
PLANT KINGDOM



SPECIES



VARIETIES



VARIETY

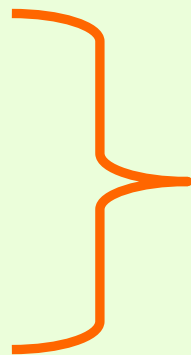
- **plant grouping**- lowest known rank
- **irrespective of whether conditions** for the grant are met
- defined by the expression of the **characteristics resulting from genotype(s)**
- **distinguished** from other plant grouping
- unit suitable for being **propagated unchanged**

3. DUS examination

THE CONDITIONS FOR GRANTING A BREEDER'S RIGHT

Criteria to be satisfied

- NOVELTY
- **D**ISTINCTNESS
- **U**NIFORMITY
- **S**TABILITY



"DUS"

THE CONDITIONS FOR GRANTING A BREEDER'S RIGHT

Other conditions

- VARIETY DENOMINATION
- FORMALITIES
- PAYMENT OF FEES

NO OTHER CONDITIONS!

NATURE OF THE DUS EXAMINATION

Nature of the DUS Examination

The “DUS Test” (field trial)



DISTINCTNESS

Must be clearly distinguishable from any other variety whose existence is a matter of common knowledge

>>> **CHARACTERISTICS** <<<

which

- *may* have direct *commercial relevance*
e.g. Flower color (ornamental); Fruit color
- *but commercial relevance* NOT required -
often no commercial value
e.g. Leaf shape

DISTINCTNESS

Apple: Fruit color



DISTINCTNESS

Maize: Stem base color



DISTINCTNESS

(Must be clearly distinguishable from any other variety whose existence is a matter of common knowledge)

General Introduction (TG/1/3: Section 5.3.3)

A variety may be considered to be **clearly distinguishable** if the **difference in characteristics** is:

- (a) **consistent**, and
- (b) **clear**

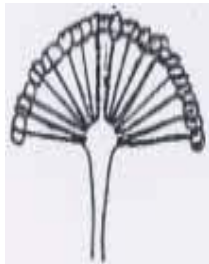
19. VG Inflorescence: type
(*)
(+)

QL

Type 1

Type 2

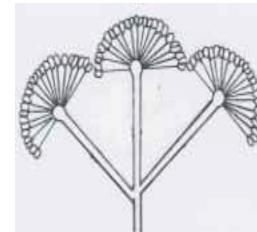
Type 3



1
Type 1



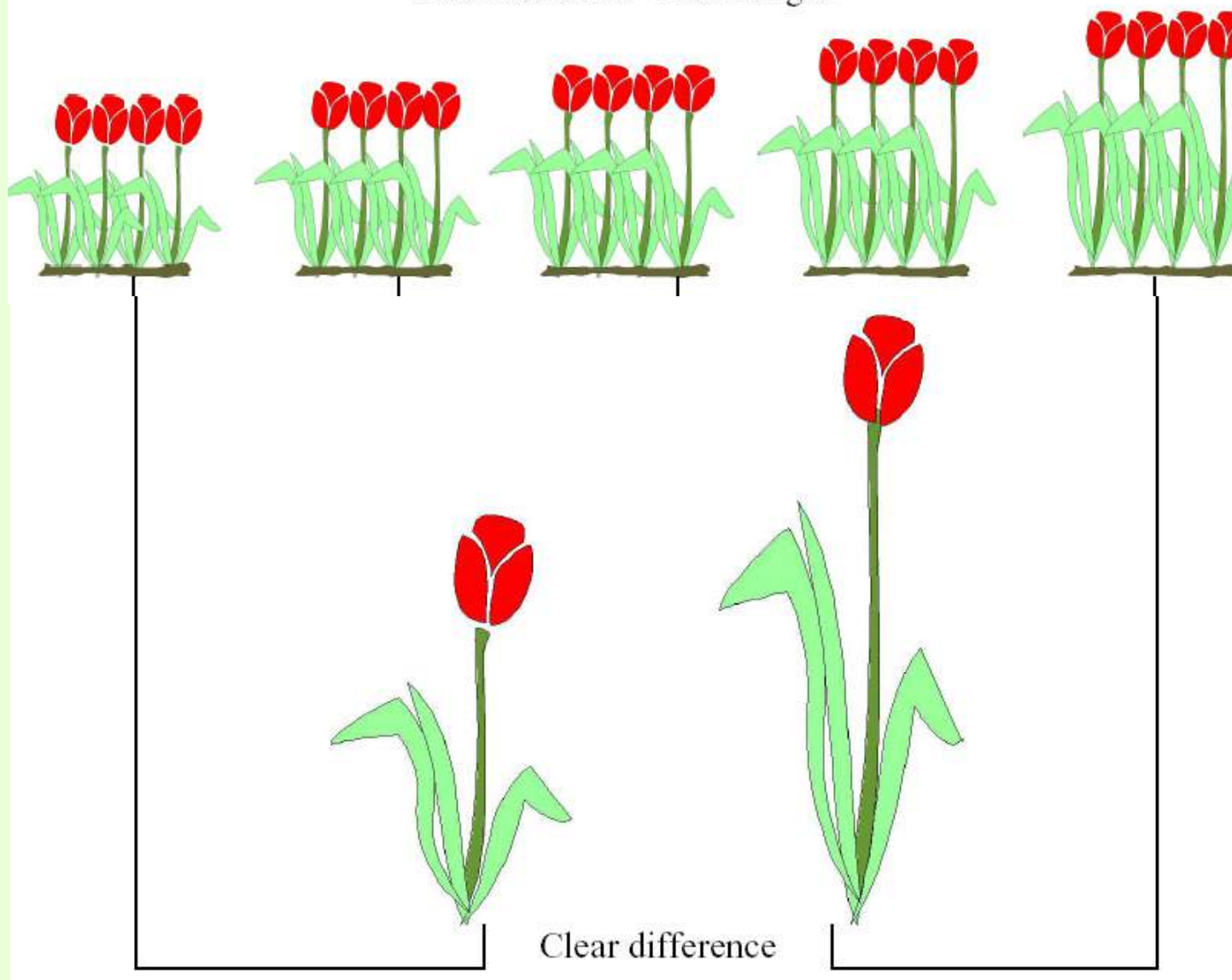
2
Type 2



3
Type 3

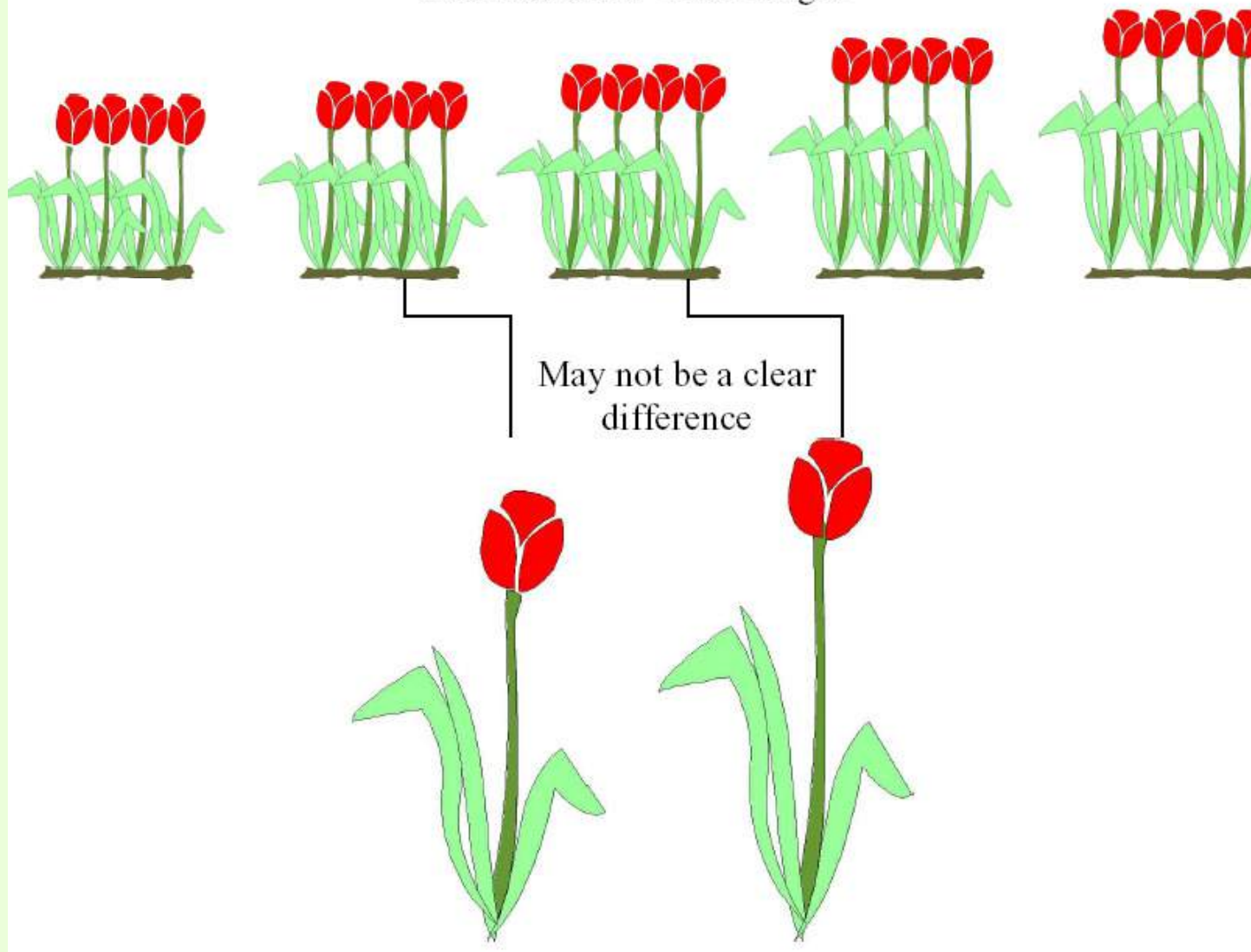
Clear difference

Characteristic : Plant height



Clear difference

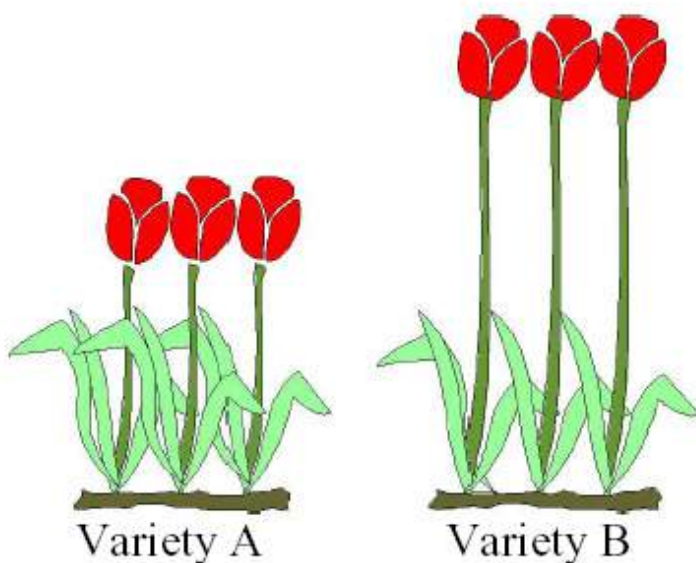
Characteristic : Plant height



DISTINCTNESS

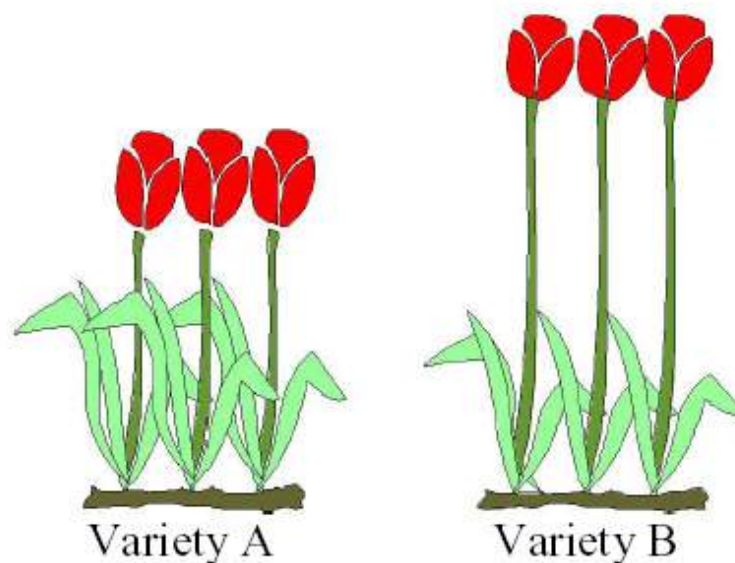
Consistent difference

Growing cycle 1



Variety B is taller than variety A

Growing cycle 2



Variety B is taller than variety A

Each time varieties A and B are cultivated in a given location under certain conditions, variety B is taller than variety A.

- **DISTINCTNESS**
- **UNIFORMITY**
 - Must be *sufficiently* uniform in its *relevant characteristics*, subject to the variation that may be expected from the *particular features of its propagation*

UNIFORMITY

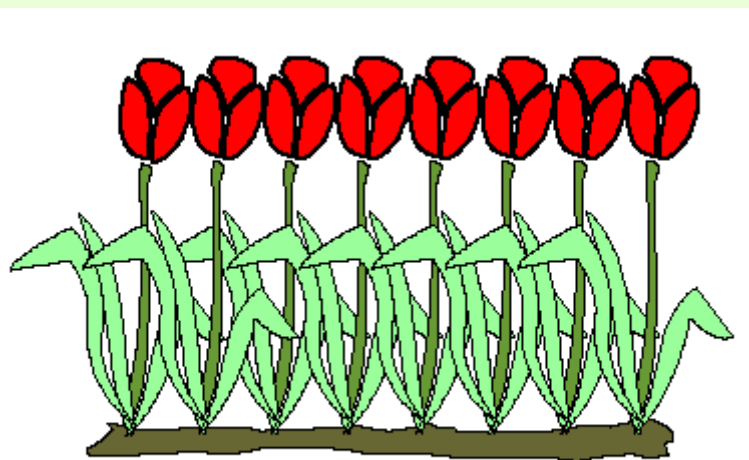
Ryegrass: Spaced plants (Cross-pollinated)



UNIFORMITY

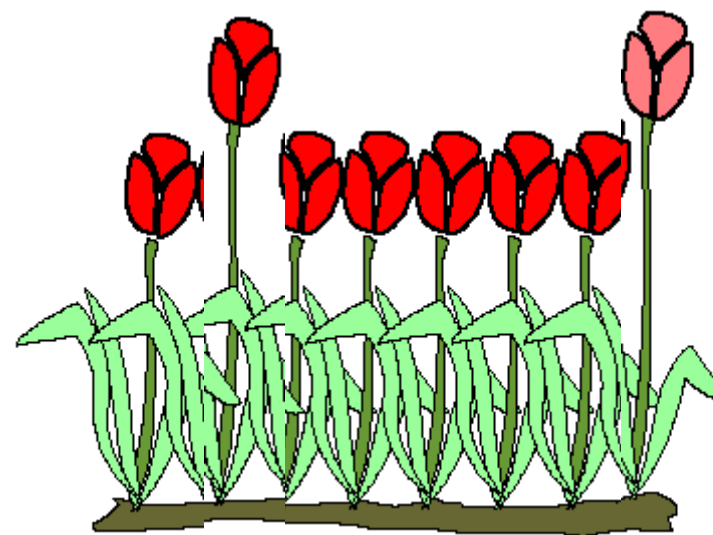
Wheat: (Self-pollinated)





A uniform variety

OFF-TYPES



OFF-TYPES

How many off-types should we accept?

The individual Test Guidelines fix for each crop:

- **the population standard** (percentage of off-types to be accepted if all individuals of the variety could be examined)
- **the acceptance probability** (probability of correctly accepting that a variety is uniform)

OFF-TYPES

According to the size of the sample examined, statistical tables give the maximum number of off-types tolerated in that given samples

*e.g.: population standard = 1% and
acceptance probability = 95%*

<i>Sample size</i>	<i>Number of off-types allowed</i>
<i>1-5</i>	<i>0</i>
<i>6-35</i>	<i>1</i>
<i>36-82</i>	<i>2</i>
<i>83-137</i>	<i>3</i>
<i>138-198</i>	<i>4</i>
<i>199-262</i>	<i>5</i>

UNIFORMITY

Ryegrass: Spaced plants (Cross-pollinated)



Relative Tolerance Limits

Cross-pollinated varieties, including mainly cross-pollinated and synthetic varieties, generally exhibit wider variations within the variety than vegetatively propagated or self-pollinated varieties and inbred lines of hybrid varieties, and it is more difficult to determine off-types.

Therefore, **relative tolerance limits**, for the range of variation, are set by comparison with comparable varieties, or types, already known.

The candidate variety should not be significantly less uniform than the comparable varieties.

- **DISTINCTNESS**
- **UNIFORMITY**
- **STABILITY**
 - Relevant characteristics must remain unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle

SELECTION OF CHARACTERISTICS

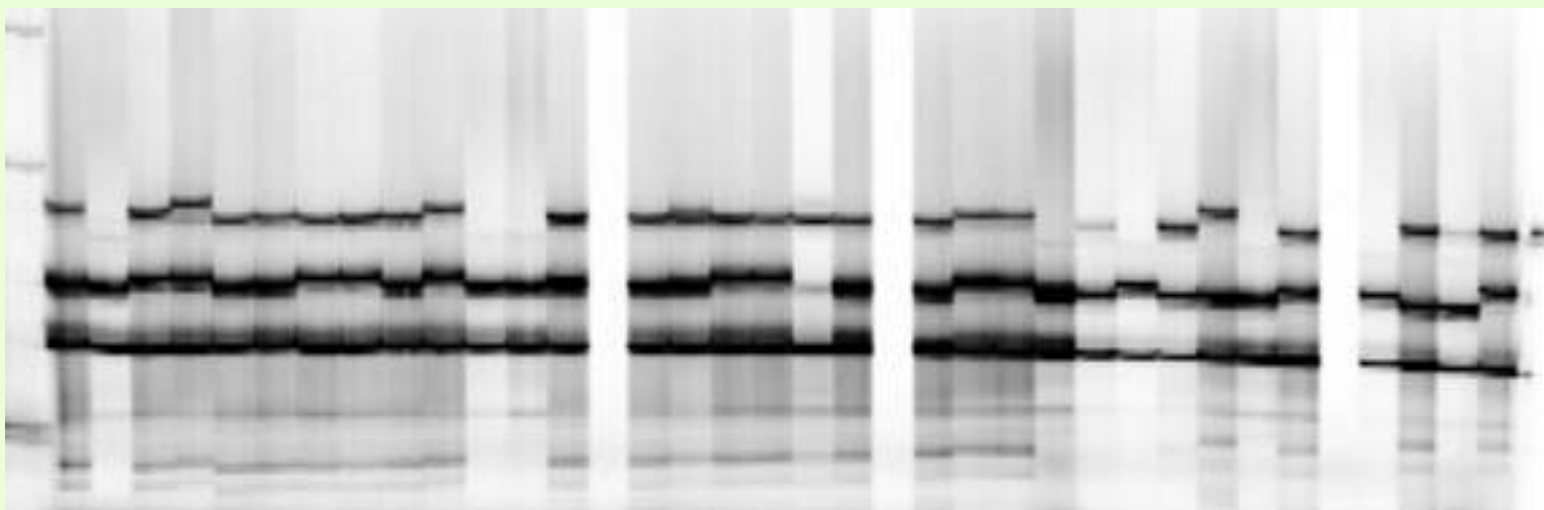
Selection of Characteristics

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.



Molecular Techniques



- UPOV is also aware that, in addition to DUS characteristics, other techniques such as molecular tools might be appropriate for variety identification in relation to the enforcement of plant breeders' rights and technical verification.
- The UPOV Working Group on Biochemical and Molecular Techniques, and DNA-Profiling in Particular (BMT) provides a forum for discussion on the use of biochemical and molecular techniques in the consideration of variety identification

GUIDANCE FOR 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)

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

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**

Test Guidelines

- **257 Test Guidelines** adopted

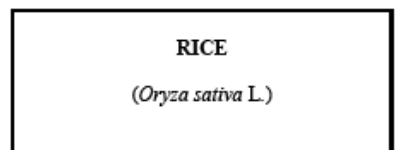
4. TG for rice



TG/16/8
ORIGINAL: English
DATE: 2004-03-31

E

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA



GUIDELINES
FOR THE CONDUCT OF TESTS
FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:*

<i>Latin</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Oryza sativa</i> L.	Rice	Riz	Reis	Arroz

ASSOCIATED DOCUMENTS

These guidelines should be read in conjunction with document TG/1/3, "General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants" (hereinafter referred to as the "General Introduction") and its associated "TGP" documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Oryza sativa* L.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

2.3.1 General

2 kg.

2.3.2 Hybrid varieties

If requested, an additional 2 kg of seed of each component should be submitted.

2.3.2 Panicles

If requested by the competent authority, at least 100 panicles should also be submitted. The panicles should be well developed and not obviously affected by any pest or disease. They should contain a sufficient number of viable seeds to establish a satisfactory row of plants for observation.

2.4 The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should be stated by the applicant.

2.5 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.6 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination3.1 *Duration of Tests*

The minimum duration of tests should normally be two independent growing cycles.

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3. Method of Examination

3.1 *Duration of Tests*

The minimum duration of tests should normally be two independent growing cycles.

3.2 *Testing Place*

The tests should normally be conducted at one place. If any characteristics of the variety, which are relevant for the examination of DUS, cannot be observed at that place, the variety may be tested at an additional place.

3.3 *Conditions for Conducting the Examination*

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.3.1 *Stage of development for the assessment*

The optimal stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described at the end of Chapter 8.

3.3.2 *Type of observation – visual or measurement*

The recommended method of observing the characteristic is indicated by the following key in the second column of the Table of Characteristics:

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants

3.4 *Test Design*

3.4.1 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.4.2 Each test should be designed to result in a total of, at least 1500 plants, which should be divided between two or more replicates.

Single panicle-rows: If tests on panicle-rows are conducted, at least 50 panicle-rows should be observed.

3.5 *Number of Plants / Parts of Plants to be Examined*

Unless otherwise indicated, all observations made on individual plants or determined by measurement or counting should be made on at least 20 plants or parts taken from each of the 20 plants.

3.6 *Additional Tests*

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 *Distinctness*

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The minimum duration of tests recommended in Section 3.1 reflects, in general, the need to ensure that any differences in a characteristic are sufficiently consistent.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.2 *Uniformity*

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 Self-pollinated varieties

(a) *Plots*: For the assessment of uniformity of characteristics on the plot as a whole, a population standard of 0.1 % with an acceptance probability of at least 95% should be applied. In the case of a sample size of 1,500 plants the maximum number of off-types allowed would be 4.

(b) *Single panicle-rows*: For the assessment of uniformity of characteristics on single panicle-rows, plants or parts of plants, a population standard of 1% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 50 panicle rows, the maximum number of aberrant panicle-rows should not exceed 2.

4.2.3 Hybrid varieties

For the assessment of uniformity of single hybrids, a population standard of 1% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 1,500 plants the maximum number of off-types allowed would be 39.

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	10 VS (+)	Coleoptile: anthocyanin coloration	Coléoptile: pigmentation anthocyanique	Keimscheide: Anthocyanfärbung	Coleóptilo: pigmentación antociánica		
	QN	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil		1
		weak	faible	gering	débil		3
		strong	forte	stark	fuerte		5

Ad. 1: Coleoptile: anthocyanin coloration

Non-dormant grains are placed on moistened filter paper and covered with a petri-dish lid during germination. After the coleoptiles have reached a length of about 5 mm in darkness they are placed in artificial light (daylight equivalent) at 750-1250 lux continuously for 3 to 4 days, at a temperature of 25 to 30 degrees Centigrade. The color of the coleoptiles is observed when they are fully developed at stage 09-11 (about 6 to 7 days).

64 characteristics in total

11.	40 VS (+)	Leaf: shape of ligule	Feuille: forme de la ligule	Blatt: Form des Blatthäutchens	Hoja: forma de la ligula	
PQ	(a)	truncate	tronquée	stumpf	truncada	1
		acute	pointue	spitz	aguda	2
		cleft	divisée	gespalten	hendida	3

Ad. 11: Leaf: shape of ligule



1
truncate



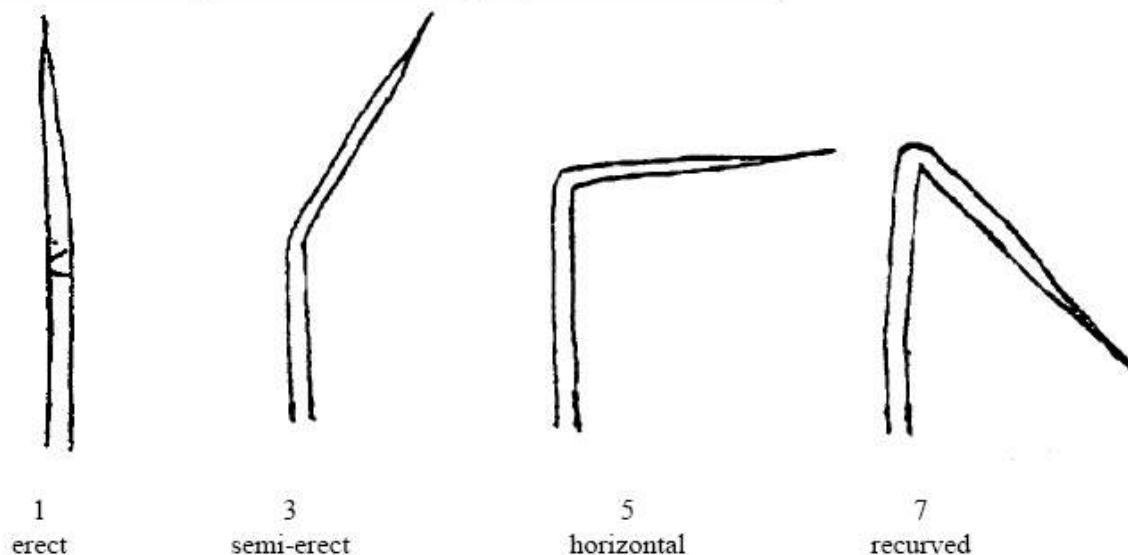
2
acute



3
cleft

15. (*) (+)	60 VG	Flag leaf: attitude of blade (early observation)	Dernière feuille: port du limbe (observation précoce)	Fahnenblatt: Haltung der Spreite (frühe Erfassung)	Hoja bandera: porte del limbo (observación temprana)	
QN		erect	dressé	aufrecht	erecto	1
		semi-erect	demi dressé	halbaufrecht	semierecto	Galatxo 3
		horizontal	horizontal	waagerecht	horizontal	Veta 5
		recurved	recourbé	zurückgebogen	recurvado	7
16. (*) (+)	90 VG	Flag leaf: attitude of blade (late observation)	Dernière feuille: port du limbe (observation tardive)	Fahnenblatt: Haltung der Spreite (späte Erfassung)	Hoja bandera: porte del limbo (observación tardía)	
QN		erect	dressé	aufrecht	erecto	1
		semi-erect	demi dressé	halbaufrecht	semierecto	Fonsa 3
		horizontal	horizontal	waagerecht	horizontal	Puebla 5
		recurved	recourbé	zurückgebogen	recurvado	7

Ad. 15 and 16: Flag leaf: attitude of blade (early and late observation)



40. (+)	90 VS	Panicle: presence of secondary branching	Panicule: présence de ramification secondaire	Rispe: Vorhandensein der sekundären Verzweigung	Panicula: presencia de ramificación secundaria	
QL		absent	absente	fehlend	ausente	1
		present	présente	vorhanden	presente	9

Ad. 40: Panicle: presence of secondary branching



1
absent



9
present

5. Maintenance of the variety

CANCELLATION

A breeder's right MAY be cancelled if :

- the variety is no longer **Uniform** or **Stable**
- the breeder does not enable the **maintenance** of the variety to be verified
- the breeder fails to pay the necessary **fees**
- the breeder fails to provide **another suitable denomination** where the original denomination is cancelled

NO OTHER REASONS



THANK YOU