

UPOV

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

INDUSTRIAL CHICORY *

UPOV code: CICH0_INT

(Cichorium intybus L. partim)

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by an expert from the Netherlands (Kingdom of the)**to be considered by the**Technical Committee for adoption by correspondence*

Alternative Names: *

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Cichorium intybus</i> L. partim	Industrial Chicory	Chicorée industrielle	Wurzelichorie	Achicoria

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

Other associated UPOV documents:

TG/154/3 Leaf Chicory

TG/173/3 Witloof, Chicory

* 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 *Cichorium intybus* L. partim of the family *Compositae*, excluding witloof (TG/173/3) and leaf chicory (TG/154/3).

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:

100 g or at least 60,000 seeds.

2.4 The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

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 Examination

3.1 *Number of Growing Cycles*

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

3.2 *Testing Place*

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness".

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.

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*

Each test should be designed to result in a total of at least 100 plants, which should be divided between two or more replicates.

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.

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

Unless otherwise indicated, all observations should be made on 60 plants or parts taken from each of 60 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 differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

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*

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:

(a) The assessment of uniformity for cross-pollinated varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction.

(b) The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.

4.3 *Stability*

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be tested, either by growing a further generation, or by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

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) Ploidy (characteristic 1)
- (b) Leaf: length (characteristic 4)
- (c) Leaf: intensity of green color (characteristic 6)
- (d) Root: length (characteristic 14)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

6. Introduction to the Table of Characteristics

6.1 *Categories of Characteristics*

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 *States of Expression and Corresponding Notes*

States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.3 *Types of Expression*

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 *Example Varieties*

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 *Legend*

(*) Asterisked characteristic – see Chapter 6.1.2

QL: Qualitative characteristic – see Chapter 6.3

QN: Quantitative characteristic – see Chapter 6.3

PQ: Pseudo-qualitative characteristic – see Chapter 6.3

MG: Single measurement of a group of plants or parts of plants – see Chapter 3.3

MS: Measurement of a number of individual plants or parts of plants – see Chapter 3.3

VG: Visual assessment by a single observation of a group of plants or parts of plants – see Chapter 3.3

VS: Visual assessment by observation of individual plants or parts of plants – see Chapter 3.3

(a)-(b) See Explanations on the Table of Characteristics in Chapter 8.1

(+) See Explanations on the Table of Characteristics in Chapter 8.2

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

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1.	MS/ Ploidy	Ploïdie	Ploidie	Ploidía		
(*)	MG/					
(+)	VG					
QL	diploid	diploïde	diploid	diploide	Turquoise	2
	triploid	triploïde	triploid	triploide	Perle	3
	tetraploid	tétraploïde	tetraploid	tetraploide		4
2.	VG Plant: height (at end of first growing season)	Plante: hauteur (à la fin du premier cycle)	Pflanze: Höhe (am Ende der ersten Wachstumsperiode)	Planta: altura (al final del primer período de crecimiento)		
(*)						
(+)						
QN	short	courte	niedrig	baja	Perle	3
	medium	moyenne	mittel	media	Orchies	5
	tall	haute	hoch	alta	Katrien, Luxor	7
3.	VG Foliage: attitude	Feuillage: port	Laub: Haltung	Follaje: porte		
(*)						
QN	erect	dressé	aufrecht	erecto	Luxor, Madona, Rubis	1
	semi-erect	demi-dressé	halbaufrecht	semierecto	Fruitosa, Orchies	3
	horizontal	horizontal	waagrecht	horizontal		5
4.	VG Leaf: length	Feuille: longueur	Blatt: Länge	Hoja: longitud		
(*)						
(+)						
QN	(a) short	courte	kurz	corta	Perle	3
	medium	moyenne	mittel	media	Orchies	5
	long	longue	lang	larga	Jade, Luxor	7
5.	VG Leaf: width	Feuille: largeur	Blatt: Breite	Hoja: anchura		
(*)						
(+)						
QN	(a) narrow	étroite	schmal	estrecha	Eva, Luxor, Vanessa	3
	medium	moyenne	mittel	media	Rubis	5
	broad	large	breit	ancha	Jade	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6. (*)	VG Leaf: intensity of green color	Feuille: intensité de la couleur verte	Blatt: Intensität der Grünfärbung	Hoja: intensidad del color verde		
QN (a)	light	claire	hell	claro	Eva	3
	medium	moyenne	mittel	medio	Katrien	5
	dark	foncée	dunkel	oscuro	Madona, Rubis	7
7.	VG Leaf: glossiness	Feuille: brillance	Blatt: Glanz	Hoja: brillo		
QN (a)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil		1
	weak	faible	gering	débil	Luxor	3
	medium	moyenne	mittel	medio	Rubis	5
	strong	forte	stark	fuerte		7
8.	VG Leaf: shape in cross section	Feuille: forme en section transversale	Blatt: Form im Querschnitt	Hoja: forma en sección transversal		
QN (a)	concave	concave	konkav	cóncava		1
	flat	plane	eben	plana	Luxor, Madona	2
	convex	convexe	konvex	convexa		3
9.	VG Leaf: blistering	Feuille: cloûre	Blatt: Blasigkeit	Hoja: abullonado		
QN (a)	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Jade	1
	weak	faible	gering	débil	Luxor	3
	medium	moyenne	mittel	medio	Bergues	5
	strong	forte	stark	fuerte	Cassel	7
10.	VG Leaf: anthocyanin coloration of midrib	Feuille: pigmentation anthocyanique de la nervure médiane	Blatt: Anthocyanfärbung der Mittelrippe	Hoja: pigmentación antociánica del nervio central		
QN (a)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Bergues	1
	weak	faible	gering	débil	Luxor, Rubis	3
	medium	moyenne	mittel	media		5
	strong	forte	stark	fuerte		7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
11.	VG	Leaf: undulation of margin	Feuille: ondulation du bord	Blatt: Wellung des Randes	Hoja: ondulación del borde	
QN	(a)	weak	faible	gering	débil	Madona, Rubis 3
		medium	moyenne	mittel	media	Marlene 5
		strong	forte	stark	fuerte	7
12.	VG	Leaf: number of incisions of margin	Feuille: nombre d'incisions du bord	Blatt: Anzahl Randeinschnitte	Hoja: número de las incisiones del borde	
QN	(a)	absent or very few	nul ou très petit	fehlend oder sehr gering	ausente o muy baja	Luxor 1
		few	petit	gering	bajo	Marlene, Rubis 3
		medium	moyen	mittel	medio	Katrien 5
		many	grand	groß	alto	7
13.	VG	Leaf: depth of incisions of margin	Feuille: profondeur des incisions du bord	Blatt: Tiefe der Randeinschnitte	Hoja: profundidad de las incisiones del borde	
QN	(a)	shallow	peu profondes	flach	poco profunda	Bergues 3
		medium	moyennes	mittel	media	5
		deep	profondes	tief	profunda	Capucijnerbaard 7
14.	MS	Root: length	Racine: longueur	Rübe: Länge	Raíz: longitud	
(*)						
QN	(b)	short	courte	kurz	corta	3
		medium	moyenne	mittel	media	Madona, Marlene 5
		long	longue	lang	larga	Magdeburger Spitzkopf 7
15.	MS	Root: maximum width	Racine: largeur maximale	Rübe: maximale Breite	Raíz: anchura máxima	
(*)						
QN	(b)	narrow	étroite	schmal	estrecha	Magdeburger Spitzkopf 3
		medium	moyenne	mittel	media	Luxor, Rubis 5
		broad	large	breit	ancha	Bergues 7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
16. (*)(+)	VG	Root: shape of shoulder	Racine: forme de l'épaulement	Rübe: Form der Schulter	Raíz: forma del hombro	
PQ	(b)	flat	plat	flach	plana	Luxor 1
		slightly rounded	légèrement arrondi	leicht abgerundet	ligeramente redondeada	Madona, Rubis 2
		moderately rounded	modérément arrondi	mäßig abgerundet	moderadamente redondeada	
		conical	conique	konisch	cónica	Magdeburger Spitzkopf 4
17. (+)	MG	Root: total sugar content	Racine: teneur en sucre total	Rübe: Gesamt-zuckergehalt	Raíz: contenido de azúcar total	
QN	(b)	very low	très faible	sehr niedrig	muy bajo	Sabau 3 1
		low	faible	niedrig	bajo	Luxor, Markise 3
		medium	moyenne	mittel	medio	Brinco, Orchies, Vanessa 5
		high	forte	hoch	alto	Dageraad, Fredonia, Katrien, Marlene 7
		very high	très forte	sehr hoch	muy alto	Eva 9
18. (*)	VG	Bolting tendency (from an early sowing)	Tendance à la montaison (en semis précoce)	Neigung zum Schossen (bei Frühkultur)	Tendencia a la floración (en siembra temprana)	
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Katrien, Orchies 1
		weak	faible	gering	débil	Bergues, Marlene 3
		medium	moyenne	mittel	media	Madona 5
		strong	forte	stark	fuerte	Vanessa 7
		very strong	très forte	sehr stark	muy fuerte	Inula 9
19.	VG	Flowering stem: height	Tige florifère: hauteur	Blütenstandstiel: Höhe	Tallo floral: altura	
QN		short	basse	niedrig	baja	3
		medium	moyenne	mittel	media	5
		tall	haute	hoch	alta	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
20.	VG	Flowering stem: branching	Tige florifère: ramification	Blütenstandstiel: Verzweigung	Tallo floral: ramificación	
QN	weak	faible	gering	débil		3
	medium	moyenne	mittel	media		5
	strong	forte	stark	fuerte		7
21.		Flower: color	Fleur: couleur	Blüte: Farbe	Flor: color	
PQ	VG	white	blanche	weiß	blanco	1
		pink	rose	rosa	rosa	2
		blue	bleue	blau	azul	Luxor 3
22.		Male sterility	Stérilité mâle	Männliche Sterilität	Androesterilidad	
		(+)				
QL	VS	absent	absente	fehlend	ausente	Luxor 1
		present	présente	vorhanden	presente	Turquoise 9

8. Explanations on the Table of Characteristics

8.1 *Explanations covering several characteristics*

Characteristics containing the following key in the second column of the Table of Characteristics should be examined as indicated below:

- (a) Leaf: All observations on the leaf should be made on the full-grown leaf before deterioration, this means 2 to 3 weeks before harvesting the roots.
- (b) Root: All observations on the root should be made immediately after harvesting.

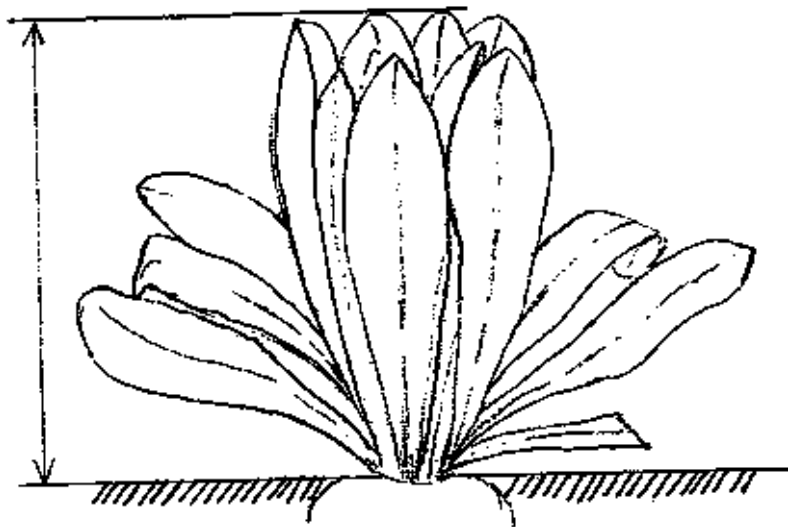
8.2 *Explanations for individual characteristics*

Ad. 1: Ploidy

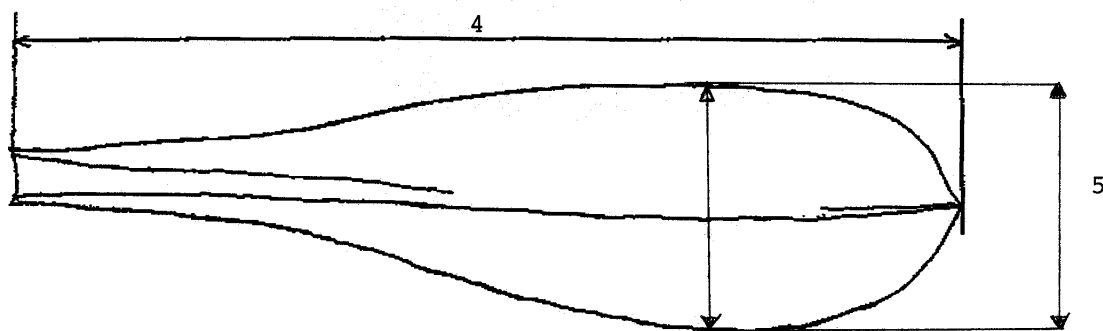
Observations should be made by standard cytological methods such as flow cytometry (DNA quantification method).

Observations should be made on at least 5 plants.

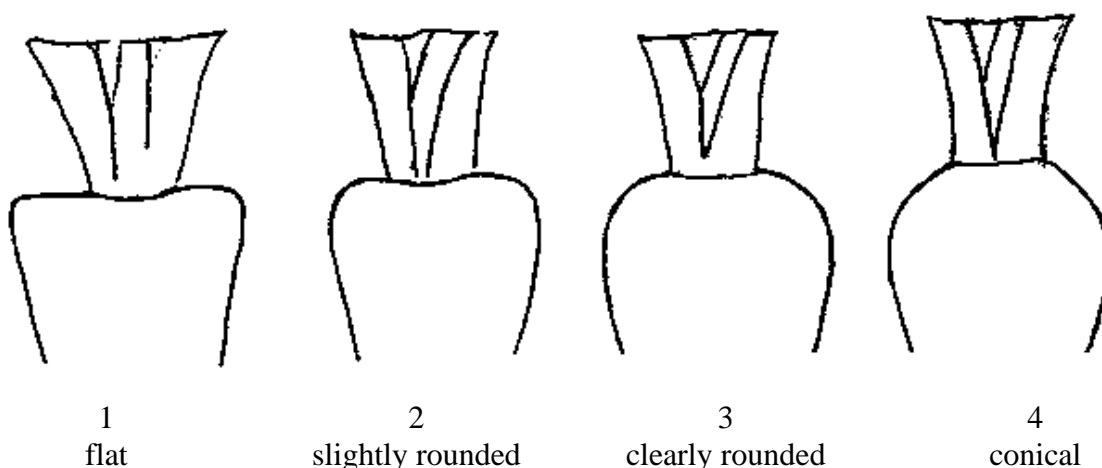
Ad. 2: Plant: height (at end of first growing season)



Ads. 4 and 5: Leaf: length (4) and width (5)



Ad. 16: Root: shape of shoulder



Ad. 17: Root: total sugar content

The total sugar content should be measured on the basis of bulk samples, within one week of the roots being harvested.

A sample of 25 roots should be taken randomly from each plot. The roots should be thoroughly washed and all impurities should be removed.

A representative sub-sample of pulp is produced by taking small quantities of material from throughout each of the roots i.e. from the top to the base, at equal distances, and from the outer to the central part of the root. This can be achieved, for example, by making incisions to the center of the root at 2-3 cm intervals along the length of each root.

The sub-sample of pulp is homogenized and the resultant juice is then filtered under pressure. Readings for the juice are then taken from a refractometer. Three separate readings should be taken to obtain a representative result.

Ad. 22: Male sterility

Check presence of pollen on stamen:

- (a) if pollen on stamen is present than male sterility is absent;
- (b) if pollen on stamen is absent than male sterility is present.

9. Literature

Frese, L., Dambroth, M. and Bramm, A., 1991: Breeding Potential of Root Chicory (*Cichorium intybus* L. var. *sativum*), *Plant Breeding* 106, 107-113.

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="Cichorium intybus L. partim"/>	
1.2 Common Name	<input type="text" value="Industrial Chicory"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	
Fax No.	<input type="text"/>	
E-mail address	<input type="text"/>	
Breeder (if different from applicant)	<input type="text"/>	
3. Proposed denomination and breeder's reference		
Proposed denomination (if available)	<input type="text"/>	
Breeder's reference	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

- (a) controlled cross []
(please state parent varieties)
- (b) partially known cross []
(please state known parent variety(ies))
- (c) unknown cross []

4.1.2 Mutation []
(please state parent variety)

4.1.3 Discovery and development []
(please state where, when and how developed
and how developed)

4.1.4 Other []
(please provide details)

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

- (a) Self-pollination []
- (b) Cross-pollination
 - (i) population []
 - (ii) synthetic variety []
- (c) Hybrid []
- (d) Other []
(please provide details)

4.2.2 Other []
(please provide details)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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
5.1	Ploidy		
(1)			
	diploid	Turquoise	2[]
	triploid	Perle	3[]
	tetraploid		4[]
5.2	Leaf: length		
(4)			
	short	Perle	3[]
	medium	Orchies	5[]
	long	Jade, Luxor	7[]
5.3	Leaf: intensity of green color		
(6)			
	light	Eva	3[]
	medium	Katrien	5[]
	dark	Madona, Rubis	7[]
5.4	Root: length		
(14)			
	short		3[]
	medium	Madona, Marlene	5[]
	long	Magdeburger Spitzkopf	7[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

Please use the table, and space provided for comments, below to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
---	---	--	--

Example

Root: length

short

medium

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [] No []

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [] No []

(If yes, please provide details)

7.3 Other information

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [] No []

(b) Has such authorization been obtained?

Yes [] No []

If the answer to (b) is yes, please attach a copy of the authorization.

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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9. Information on plant material to be examined or submitted for examination.

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 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 the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

- | | | |
|---|---------|--------|
| (a) Microorganisms (e.g. virus, bacteria, phytoplasma) | Yes [] | No [] |
| (b) Chemical treatment (e.g. growth retardant, pesticide) | Yes [] | No [] |
| (c) Tissue culture | Yes [] | No [] |
| (d) Other factors | Yes [] | No [] |

Please provide details of where you have indicated “yes”.

.....

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name

Signature

Date

[End of document]