


 UPOV

TG/54/7 Rev. 2

ORIGINAL: English

DATE: 2004-03-31 + 2016-03-16
+ 2023-10-24

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

BRUSSELS SPROUT

(*Brassica oleracea* L. var.
gemmifera DC.)

*

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:*

Latin	English	French	German	Spanish
<i>Brassica oleracea</i> L. var. <i>gemmifera</i> DC.	Brussels sprout	Chou de Bruxelles	Rosenkohl	Col de Bruselas

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 *Brassica oleracea* L. var. *gemmifera* DC.

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 seeds or plants.

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

for seed-propagated varieties: 20 g or at least 5,000 seeds;
for vegetatively propagated varieties: 60 plants.

2.4 In the case of seed, 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 *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 Type of observation

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 Each test should be designed to result in a total of at least 40 plants, which should be divided between two or more replicates.

3.4.2 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 on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observations made on all plants in the test.

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*

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:

4.2.1 Cross-pollinated varieties

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

4.2.2 Vegetatively propagated varieties, single cross hybrids and self-pollinated varieties (inbred lines)

For the assessment of uniformity of vegetatively propagated varieties, single cross hybrids and self-pollinated varieties (inbred lines), a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 40 plants, 2 off-types are allowed.

4.2.3 Hybrids

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. In the case of single cross hybrids, the uniformity standards are set out in Section 4.2.2.

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 or plant stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

4.3.3 The stability of a hybrid variety may, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity and stability of its parent lines.

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 is 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: height (characteristic 1)
- (b) Leaf blade: color (characteristic 5)
- (c) Leaf blade: intensity of color (characteristic 6)
- (d) Leaf blade: cupping (characteristic 8)
- (e) Time of harvest maturity (characteristic 19)
- (f) Male sterility (characteristic 21).

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 Section 6.1.2

QL Qualitative characteristic – see Section 6.3

QN Quantitative characteristic – see Section 6.3

PQ Pseudo-qualitative characteristic – see Section 6.3

MG Single measurement of a group of plants or parts of plants – see Section 3.3.1

MS Measurement of a number of individual plants or parts of plants – see Section 3.3.1

VG Visual assessment by a single observation of a group of plants or parts of plants – see Section 3.3.1

VS Visual assessment by observation of individual plants or parts of plants – see Section 3.3.1

(+) See Explanations on the Table of Characteristics in Chapter 8

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

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1. VG/ (*) MG	Plant: height	Plante: hauteur	Pflanze: Höhe	Planta: altura		
QN	short	basse	niedrig	baja	Jade Cross	3
	medium	moyenne	mittel	media	Cascade	5
	tall	haute	hoch	alta	Bridge	7
2. VG	Plant: tendency to form a head	Plante: tendance à former une tête	Pflanze: Neigung zur Kopfbildung	Planta: tendencia a formar un repollo		
QN	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Masterline	1
	weak	faible	gering	débil	Cyrus	3
	medium	moyenne	mittel	media	Bridge	5
	strong	forte	stark	fuerte	Cor	7
	very strong	très forte	sehr stark	muy fuerte	Oliver	9
3. VG (*)	Leaf blade: size	Limbe: taille	Blattspreite: Größe	Limbo: tamaño		
QN	small	petit	klein	pequeño	Angus	3
	medium	moyen	mittel	mediano	Peer Gynt	5
	large	grand	groß	grande	Braveheart	7
4. VG	Leaf blade: length	Limbe: longueur	Blattspreite: Länge	Limbo: longitud		
QN	short	court	kurz	corto	Prince Marvel	3
	medium	moyen	mittel	medio	Cascade	5
	long	long	lang	largo	Braveheart	7
5. VG (*)	Leaf blade: color	Limbe: couleur	Blattspreite: Farbe	Limbo: color		
PQ	green	vert	grün	verde	Masterline	1
	blue green	vert-bleu	blaugrün	verde azulado	Angus	2
	purple	pourpre	purpur	púrpura	Rubine	3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6. (*)	VG	Leaf blade: intensity of color	Limbe: intensité de la couleur	Blattspreite: Intensität der Farbe	Limbo: intensidad del color	
QN	light	claire	hell	claro	Origus, Prince Marvel	3
	medium	moyenne	mittel	medio	Angus, Boxer	5
	dark	foncée	dunkel	oscuro	Estate, Placido, Rubine	7
7.	VG	Leaf blade: waxiness	Limbe: glaucescence	Blattspreite: Wachsschicht	Limbo: cerosidad	
QN	weak	faible	gering	débil	Evesham Special	3
	medium	moyenne	mittel	media	Peer Gynt	5
	strong	forte	stark	fuerte	Cavalier	7
8. (*)	VG	Leaf blade: cupping	Limbe: courbure	Blattspreite: Wölbung	Limbo: acopado	
QN	moderately convex	modérément convexe	mäßig konvex	moderadamente convexo		3
	plane	plane	flach	plano	Braveheart	5
	moderately concave	modérément concave	mäßig konkav	moderadamente cóncavo	Estate	7
	strongly concave	fortement concave	stark konkav	muy cóncavo	Explorer	9
9.	VG	Leaf blade: blistering	Limbe: cloûre	Blattspreite: Blasigkeit	Limbo: abullonado	
QN	weak	faible	gering	débil	Cavalier	3
	medium	moyenne	mittel	medio	Masterline	5
	strong	forte	stark	fuerte	Breeze	7
10.	VG	Leaf blade: reflexing of margin	Limbe: enroulement du bord	Blattspreite: Randbiegung	Limbo: curvatura del margen	
QL	absent	absent	fehlend	ausente	Lunet, Masterline	1
	present	présent	vorhanden	presente	Breeze, Odessa	9

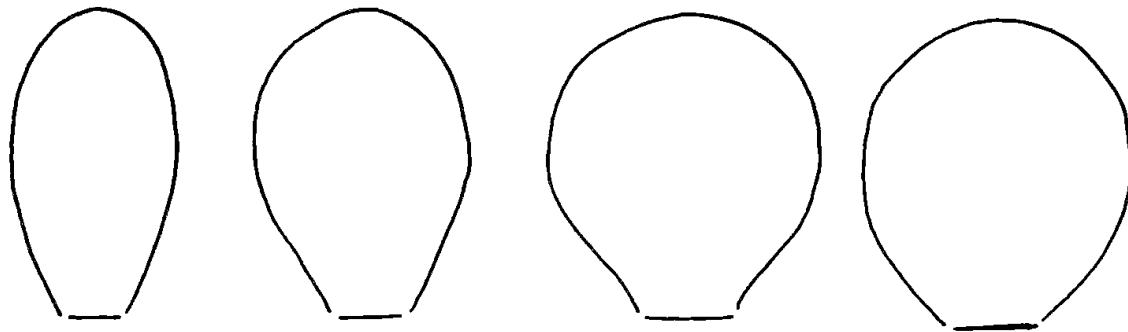
	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
11. VG (*)	Petiole: attitude	Pétiole: port	Blattstiel: Haltung	Pecíolo: porte		
QN	semi erect	demi-dressé	halbaufrecht	semierecto	Montgomery	3
	horizontal	horizontal	waagrecht	horizontal	Angus	5
	semi pendulous	demi-retombant	halbhängend	semi-colgante	Odessa	7
12. VG	Petiole: length compared to blade	Pétiole: longueur par rapport au limbe	Blattstiel: Länge im Verhältnis zur Blattspreite	Pecíolo: longitud en relación con el limbo		
QN	moderately shorter	modérément plus court	mäßig kürzer	moderadamente más corto	Braveheart	3
	equal	égal	gleich lang	igual	Masterline	5
	moderately longer	modérément plus long	mäßig länger	moderadamente más largo	Odessa	7
13. VG	Petiole: anthocyanin coloration	Pétiole: pigmentation anthocyanique	Blattstiel: Anthocyanfärbung	Pecíolo: pigmentación antociánica		
QN	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Revenge	1
	weak	faible	gering	débil	Breeze	3
	medium	moyenne	mittel	media	Odessa	5
	strong	forte	stark	fuerte	Prince Marvel	7
	very strong	très forte	sehr stark	muy fuerte	Rasalon	9
14. VG (+)	Sprout: shape in longitudinal section	Bourgeon: forme en section longitudinale	Knospe: Form im Längsschnitt	Yema: forma en sección longitudinal		
PQ	narrow obovate	obovale étroite	schmal verkehrt eiförmig	oboval estrecha	Explorer	1
	obovate	obovale	verkehrt eiförmig	oboval		2
	broad obovate	obovale large	breit verkehrt eiförmig	oboval ancha	Odessa	3
	circular	circulaire	kreisförmig	circular	Braveheart	4

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
15.	VG	Sprout: color	Bourgeon: couleur	Knospe: Farbe	Yema: color	
PQ	green	vert	grün	verde	Estate	1
	blue green	vert-bleu	blaugrün	verde azulado	Cascade	2
	purple	pourpre	purpur	púrpura	Rubine	3
16.	VG	Sprout: intensity of color	Bourgeon: intensité de la couleur	Knospe: Intensität der Farbe	Yema: intensidad del color	
QN	light	claire	hell	claro	Prince Marvel	3
	medium	moyenne	mittel	medio	Estate	5
	dark	foncée	dunkel	oscuro	Placido, Rubine	7
17.	VG	Sprout: density at harvest maturity	Bourgeon: densité à maturité de récolte	Knospe: Dichte bei Erntereife	Yema: densidad en la madurez para la cosecha	
QN	loose	lâche	locker	laxa	Steffiline	3
	medium	moyenne	mittel	media	Angus	5
	dense	dense	dicht	densa	Prelent	7
18.	VG	Stem: spacing of sprouts	Tige: espacement entre les bourgeons	Sproß: Abstand zwischen den Knospen	Tallo: espaciado entre las yemas	
QN	narrow	faible	gering	estrecho	Estate, Prelent	3
	medium	moyen	mittel	medio	Cavalier, Cor	5
	wide	large	groß	ancho	Silverline	7
19.	VG	Time of harvest maturity	Époque de maturité de récolte	Zeitpunkt der Erntereife	Época de madurez para la cosecha	
(*)						
QN	very early	très précoce	sehr früh	muy temprana	Lancer, Oliver	1
	early	précoce	früh	temprana	Masterline, Peer Gynt	3
	medium	moyenne	mittel	media	Lunet, Odessa	5
	late	tardive	spät	tardía	Braveheart, Bridge	7
	very late	très tardive	sehr spät	muy tardía	Ulysses	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
20. VG (+)	Stem: profile of sprout column	Tige: profil de la partie avec des bourgeons	Sproß: Profil einschließlich der Knospen	Tallo: perfil de la parte con las yemas		
QN	conical	conique	kegelförmig	cónica	Falstaff	1
	conical to cylindrical	cónique à cylindrique	kegelförmig bis zylindrisch	cónica à cilíndrica	Regent, Setterline	2
	cylindrical	cylindrique	zylindrisch	cilíndrica	Angus, Braveheart	3
21. VS/MS (+)	Male sterility	Stérilité mâle	Männliche Sterilität	Androesterilidad		
QL	absent	absente	fehlend	ausente	Attis, Pontus	1
	present	présente	vorhanden	presente	Abacus, Platinus	9

8. Explanations on the Table of Characteristics

Ad. 14: Sprout: shape in longitudinal section



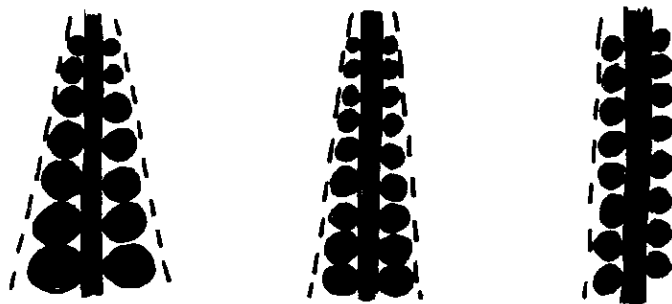
1
narrow obovate

2
obovate

3
broad obovate

4
circular

Ad. 20: Stem: profile of sprout column



1
conical

2
conical to cylindrical

3
cylindrical

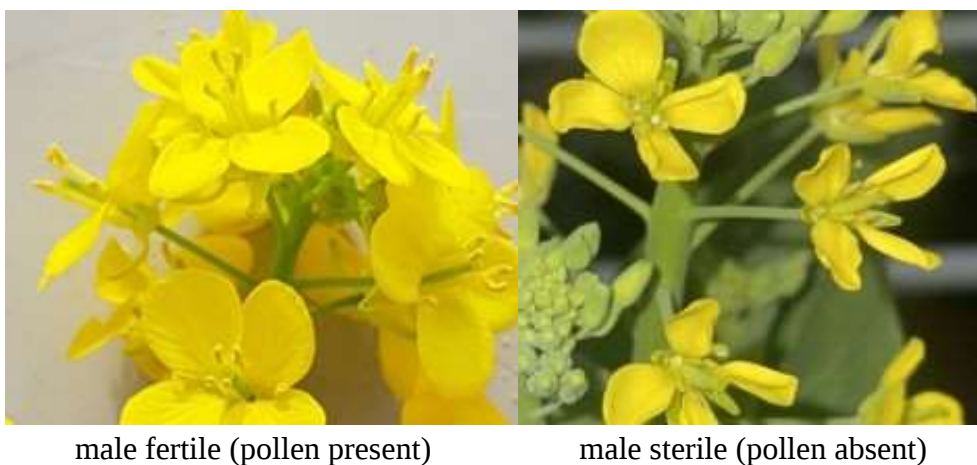
Ad. 21: Male sterility

To be tested in a field trial and/or in a DNA marker test¹.

In the case of a field trial, the type of observation is VS. In the case of a DNA marker test, the type of observation is MS.

Field trial:

Observations should be made on fully opened flowers. Tapping or shaking the flowering stem will release pollen, which, if present, can be observed on dark colored paper or card. The absence of pollen production is an indication of male sterility. The presence of pollen production is an indication of male fertility.



DNA marker test:

If the cytoplasmic male sterility (CMS) marker is absent, the variety is expected to have male fertile flowers. If the CMS marker is present, the variety is expected to have male sterile flowers.

In cases where the DNA marker test result does not confirm the declaration in the TQ, a field trial should be performed to observe whether the variety has male fertile or male sterile flowers due to another mechanism.

¹ The description of the method to test male sterility for *Brassica* (CMS marker) is covered by a trade secret. The owner of the trade secret, Syngenta Seeds B.V., has given its consent for the use of the CMS marker solely for the purposes of examination of Distinctness, Uniformity and Stability (DUS) and for the development of variety descriptions by UPOV and authorities of UPOV members. Syngenta Seeds B.V. declares that neither UPOV, nor authorities of UPOV members that use the CMS marker for the above purposes will be held accountable for possible (mis)use of the CMS marker by third parties. Please contact Naktuinbouw, Netherlands, to obtain the method and information on the CMS marker for the purposes mentioned above.

9. Literature

Tsunoda, S. Hinata, K. and Gomez-Campo, C. 1990: “Brassica Crops and Wild Allies - Biology and Breeding.” Japan Scientific Societies Press, Tokyo, Japan

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		
In the case of hybrid varieties which are the subject of an application for plant breeders' rights, and where the parent lines are to be submitted as a part of the examination of the hybrid variety, this Technical Questionnaire should be completed for each of the parent lines, in addition to being completed for the hybrid variety.		
1. Subject of the Technical Questionnaire 1.1 Latin Name <i>Brassica oleracea</i> L. var. <i>gemmifera</i> DC. 1.2 Common Name Brussels Sprout		
2. Applicant Name Address Telephone No. Fax No. E-mail address Breeder (if different from applicant)		
3. Proposed denomination and breeder's reference Proposed denomination (if available) Breeder's reference		

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 and when discovered
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 Vegetatively propagated varieties []

4.2.3 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 (1)	Plant: height		
	short	Jade Cross	3[]
	medium	Cascade	5[]
	tall	Bridge	7[]
5.2 (5)	Leaf blade: color		
	green	Masterline	1[]
	blue green	Angus	2[]
	purple	Rubine	3[]
5.3 (6)	Leaf blade: intensity of color		
	light	Origus, Prince Marvel	3[]
	medium	Angus, Boxer	5[]
	dark	Estate, Placido, Rubine	7[]
5.4 (8)	Leaf blade: cupping		
	moderately convex		3[]
	plane	Braveheart	5[]
	moderately concave	Estate	7[]
	strongly concave	Explorer	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
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	Characteristics	Example Varieties	Note
5.5 (19)	Time of harvest maturity		
	very early	Lancer, Oliver	1[]
	early	Masterline, Peer Gynt	3[]
	medium	Lunet, Odessa	5[]
	late	Bridge, Braveheart	7[]
	very late	Ulysses	9[]
5.6 (21)	Male sterility		
	absent	Attis, Pontus	1[]
	present	Abacus, Platinus	9[]

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
<i>Example</i>	<i>Plant: height</i>	<i>short</i>	<i>medium</i>

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 Special conditions for the examination of the variety

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

Yes ☐ No ☐

7.2.2 If yes, please give 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.

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

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 or 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]