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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

CARROT

UPOV Code: DAUCU_CAR

Daucus carota L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Daucus carota</i> L.	Carrot	Carotte	Möhre	Zanahoria

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.

* 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 *Daucus carota* 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:

50 g or 50,000 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 *Duration of Tests*

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*

3.3.1 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.

3.3.2 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 400 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 should be made on 40 plants or parts taken from each of 40 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 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*

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 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. For the characteristics external color of root (characteristic 13) and color of core of root (characteristic 19), a population standard of 2% and an acceptance probability of 95% should be applied. In the case of a sample size of 200 plants, 7 off-types are allowed.

4.2.3 Single cross hybrids and inbred lines

For the assessment of uniformity of single cross hybrids and inbred lines, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 400 plants, 13 off-types are allowed.

4.2.4 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 4.2.3.

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.

4.3.3 Where appropriate, or in cases of doubt, 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 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) Leaf: length (including petiole) (characteristic 3)
- (b) Root: length (characteristic 7)
- (c) Root: width (characteristic 8)
- (d) Root: shape in longitudinal section (characteristic 10)
- (e) Root: tip (when fully developed) (characteristic 13)
- (f) Root: external color (characteristic 14)
- (g) Plants: proportion of male sterile plants (characteristic 31)
- (h) Plant: type of male sterility (characteristic 32).

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, MS, VG, VS: See Chapter 3.3.2

(a)-(c) 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.	VG	Foliage: width of crown	Feuille: largeur de la couronne	Laub: Breite des Blattansatzes	Follaje: anchura del cuello		
(+)							
QN	(a)	narrow	étroite	schmal	estrecho	Amsterdam 2	3
		medium	moyenne	mittel	medio	Nantaise améliorée 2, Rothild	5
		broad	large	breit	ancho	Chantenay à cœur rouge 2	7
2.	VG	Leaf: attitude	Feuille: port	Blatt: Stellung	Hoja: porte		
QN	(a)	erect	dressé	aufrecht	erecto	Touchon	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Nantaise améliorée 2	3
		prostrate	étalé	liegend	postrado		5
3.	VG/ (*) MS	Leaf: length (including petiole)	Feuille: longueur (pétiole compris)	Blatt: Länge (einschließlich Stiel)	Hoja: longitud (incluido el peciolo)		
QN	(a)	very short	très courte	sehr kurz	muy corta	Mokum, Mignon	1
		short	courte	kurz	corta	Amsterdam 2, Amsterdam 3	3
		medium	moyenne	mittel	media	Juwarot, Nantaise améliorée 2	5
		long	longue	lang	larga	Chantenay, Chantenay à cœur rouge 2	7
		very long	très longue	sehr lang	muy large	De Colmar à cœur rouge 2, Rothild	9
4.	VG (*)	Leaf: division	Feuille: division	Blatt: Fiederung	Hoja: división		
QN	(a)	fine	fine	fein	fina	Amsterdam 2, Amsterdam 3	3
		medium	moyenne	mittel	mediana	Nantaise améliorée 2, Nantaise améliorée 3	5
		coarse	grossière	grob	grosera	Hypot	7

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota	
5. (*)	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	Adelaide, Leonor	3
		medium	moyenne	mittel	medio	Amsterdam 2, Amsterdam 3	5
		dark	foncée	dunkel	oscuro	Rothild	7
6. (*)	VG	Leaf: anthocyanin coloration of petiole	Feuille: pigmentation anthocyanique du pétiole	Blatt: Anthocyanfärbung des Blattstiels	Hoja: pigmentación antocianica del peciolo		
QL	(a)	absent	absente	fehlend	ausente	Amsterdam 2	1
		present	présente	vorhanden	presente	Tarenco	9
7. (*)	VG/ MS	Root: length	Racine: longueur	Rübe: Länge	Raíz: longitud		
QN	(b)	very short	très courte	sehr kurz	muy corta	Parijse Markt 2, Parijse Markt 3	1
		short	courte	kurz	corta	Chantenay	3
		medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3	5
		long	longue	lang	larga	Berlikumer 2, Berlikumer 3	7
		very long	très longue	sehr lang	muy large	Lange Stompe Winter	9
8. (*)	VG/ MS	Root: width	Racine: largeur	Rübe: Breite	Raíz: anchura		
QN	(b)	narrow	étroite	schmal	estrecha	Amsterdam 2, Amsterdam 3	3
		medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3	5
		broad	large	breit	ancha	De Colmar à cœur rouge 2, Parijse Markt 2, Parijse Markt 3	7

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota	
9. (*)	VG/MS	Root: ratio length/width	Racine: rapport longueur/largeur	Rübe: Verhältnis Länge/Breite	Raíz: relación longitud/anchura		
QN	(b)	very small	très petit	sehr klein	muy pequeña	Parijse Markt 2, Parijse Markt 3, Parmex	1
		small	petit	klein	pequeña	Courte améliorée à forcer	3
		medium	moyen	mittel	media	Chantenay	5
		large	grand	groß	grande	Nantaise améliorée 2, Nantaise améliorée 3	7
		very large	très grand	sehr groß	muy grande	Amsterdam 2	9
10. (*)(+)	VG	Root: shape in longitudinal section	Racine: forme en section longitudinale	Rübe: Form im Längsschnitt	Raíz: forma en sección longitudinal		
PQ	(b)	circular	arrondie	kreisförmig	circular	Parijse Markt 2, Parijse Markt 3	1
		obovate	obovale	verkehrt eiförmig	oboval		2
		medium obtriangular	obtriangulaire moyen	mittel verkehrt dreieckig	obtriangular medio	Chantenay, De Colmar à cœur rouge 2	3
		narrow obtriangular	obtriangulaire étroite	schmal verkehrt dreieckig	obtriangular estrecha	Imperator, De Colmar à cœur rouge 3	4
		narrow obtriangular to narrow oblong	obtriangulaire étroite à rectangulaire étroite	schmal verkehrt dreieckig bis schmal rechteckig	obtriangular estrecha a oblonga estrecha	Maestro	5
		narrow oblong	rectangulaire étroite	schmal rechteckig	oblonga estrecha	Amsterdam 2, Berlikumer 2, Berlikumer 3, Nantaise améliorée 5, Touchon	6

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
11.	MS/ VG (+)	<u>Varieties scoring between 4 and 6 for characteristic 10 only: Root: tendency to conical shape</u>	<u>Variétés notées entre 4 et 6 pour le caractère 10 uniquement : Racine : tendance à avoir une forme conique</u>	<u>Sorten mit Benotung zwischen 4 und 6 nur für Merkmal 10: Rübe: Neigung zu konischer Form</u>	<u>Únicamente las variedades con una nota entre 4 y 6 en el carácter 10: Raíz: tendencia a una forma cónica</u>	
QN	(b)	very weak	très faible	sehr gering	muy ligera	1
		weak	faible	gering	ligera	Amsterdam 2
		medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3
		strong	forte	stark	fuerte	Giganta
		very strong	très forte	sehr stark	muy fuerte	9
12.	VG (*) (+)	Root: shape of shoulder	Racine: forme de l'épaule	Rübe: Form des Kopfes	Raíz: forma del hombro	
PQ	(b)	flat	plat	flach	plana	De Colmar à cœur rouge 2
		flat to rounded	plat à arrondi	flach bis abgerundet	plana a redondeada	Parijse Markt 2
		rounded	arrondi	abgerundet	redondeada	
		rounded to conical	arrondi à conique	abgerundet bis kegelförmig	redondeada a cónica	
		conical	conique	kegelförmig	cónica	Touchon
13.	VG (*)	Root: tip (when fully developed)	Racine: extrémité (à plein développement)	Rübe: Ende (bei voller Entwicklung)	Raíz: punta (en pleno desarrollo)	
QN	(b)	blunt	arrondie	stumpf	romo	Berlikumer 3
		slightly pointed	légèrement pointue	leicht spitz	ligeramente puntiagudo	Mello Yello
		strongly pointed	fortement pointue	sehr spitz	muy puntiagudo	Allred, Orbit

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
14. VG	Root: external color	Racine: couleur externe	Rübe: äußere Farbe	Raíz: color externo		
(*)						
PQ	(b)					
	white	blanche	weiß	blanco	White Satin	1
	yellow	jaune	gelb	amarillo	Mello Yello	2
	orange	orange	orange	naranja	Bingo, Tancar, Goliath, Karotan, Pinocchio	3
	pinkish red	rouge rosâtre	rosarot	rojo rosado	Nutri-red	4
	red	rouge	rot	rojo	Pulsor	5
	purple	pourpre	purpur	púrpura	Purple Haze	6
15. VG	<u>Excluding varieties with white external root color:</u> Root: intensity of external color	<u>À l'exclusion des variétés à racine de couleur externe</u> : Racine : intensité de la couleur externe	<u>Ohne Sorten mit weißer äußerer Farbe der Rübe:</u> Rübe: Intensität der äußeren Farbe	<u>Excluidas las variedades con color externo de la raíz</u> : Raíz: intensidad del color externo		
QN	(b)					
	light	claire	hell	claro	Bingo, Mello Yello, Tancar	3
	medium	moyenne	mittel	medio	Goliath, Nutri-red	5
	dark	foncée	dunkel	oscuro	Karotan, Pinocchio, Purple Haze	7
16. VG	Root: anthocyanin coloration of skin of shoulder	Racine: pigmentation anthocyanique de la peau du collet	Rübe: Anthocyanfärbung der Haut des Kopfes	Raíz: pigmentación antocianica de la epidermis del hombro		
QL	(b)					
	absent	absente	fehlend	ausente	Trevor	1
	present	présente	vorhanden	presente	Touchon	9

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
17.	VG	Root: extent of green color of skin of shoulder	Racine: extension de la coloration verte de la peau du collet	Rübe: Ausdehnung der Grünfärbung der Haut des Kopfes	Raíz: extensión del color verde de la epidermis del hombro	
(+)						
QN	(b)	absent or very small	nulle ou très petite	fehlend oder sehr gering	ausente o muy pequeño	Karotan 1
		small	petite	gering	pequeño	Scarla 3
		medium	moyenne	mittel	medio	De Colmar à cœur rouge 2 5
		large	grande	groß	grande	Touchon 7
		very large	très grande	sehr groß	muy grande	Lange Stompe Winter 9
18.	VG	Root: ridging of surface	Racine: annelure de la surface	Rübe: Ringelung der Oberfläche	Raíz: anillado de la superficie	
QN	(b)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Favor, Sytan 1
		weak	faible	gering	débil	Major 3
		medium	moyenne	mittel	medio	Chantenay 5
		strong	forte	stark	fuerte	De Colmar à cœur rouge 2 7
		very strong	très forte	sehr stark	muy fuerte	9
19.	VG	Root: diameter of core relative to total diameter	Racine: diamètre du cœur par rapport au diamètre total	Rübe: Durchmesser des Herzens im Verhältnis zum gesamten Durchmesser	Raíz: diámetro del corazón en relación con el diámetro total	
(*)						
QN	(b)	very small	très petit	sehr klein	muy pequeño	Amsterdam 2, Amsterdam 3, Tourino 1
		small	petit	klein	pequeño	Nantaise améliorée 2, Nantaise améliorée 3 3
		medium	moyen	mittel	medio	Berlikumer 2, Berlikumer 3 5
		large	grand	groß	grande	De Colmar à cœur rouge 2 7
		very large	très grand	sehr groß	muy grande	Giganta 9

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
20. VG (*)	Root: color of core	Racine: couleur du cœur	Rübe: Farbe des Herzens	Raíz: color del corazón		
PQ (b)	white	blanc	weiß	blanco	White Satin	1
	yellow	jaune	gelb	amarillo	Jaune de Lobberich, Pariser Markt	2
	orange	orange	orange	naranja	Nantaise améliorée 2, Nantaise améliorée 3	3
	pinkish red	rouge rosâtre	rosarot	rojo rosado		4
	red	rouge	rot	rojo	Nutri-red	5
	purple	pourpre	purpurn	púrpura	Afghan purple, Black Deshi	6
21. VG	<u>Excluding varieties with white core:</u> Root: intensity of color of core	<u>À l'exclusion des variétés à cœur blanc :</u> Racine : intensité de la couleur du cœur	<u>Ohne Sorten mit weißem Herzen:</u> Rübe: Intensität der Farbe des Herzens	<u>Excluidas las variedades con corazón blanco:</u> Raíz: intensidad del color del corazón		
QN (b)	light	claire	hell	claro		3
	medium	moyenne	mittel	medio		5
	dark	foncée	dunkel	oscuro		7
22. VG (*)	Root: color of cortex	Racine: couleur du cortex	Rübe: Farbe der Rinde	Raíz: color de la corteza		
PQ (b)	white	blanc	weiß	blanco	White Satin	1
	yellow	jaune	gelb	amarillo	Mellow Yello	2
	orange	orange	orange	naranja	Allred, Carlo	3
	pinkish red	rouge rosâtre	rosarot	rojo rosado		4
	red	rouge	rot	rojo	Nutri-red	5
	purple	pourpre	purpurn	púrpura	Afghan purple, Black Deshi	6

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
23.	VG	Excluding varieties with white cortex: Root: intensity of color of cortex	À l'exclusion des variétés à cortex blanc : Racine : intensité de la couleur du cortex	Ohne Sorten mit weißer Rinde: Rübe: Intensität der Farbe der Rinde	Excluidas las variedades con corteza blanca: Raíz: intensidad del color de la corteza	
QN	(b)	light	clair	hell	claro	3
		medium	moyenne	mittel	medio	5
		dark	foncée	dunkel	oscuro	7
24.	VG	Root: color of core compared to color of cortex	Racine: couleur du cœur par rapport à la couleur du cortex	Rübe: Farbe des Herzens im Verhältnis zur Rinde	Raíz: color del corazón en relación con la corteza	
QN	(b)	lighter	plus claire	heller	más claro	1
		same	même couleur	gleichfarbig	mismo color	2
		darker	plus foncée	dunkler	más oscuro	3
25.	VG	Root: extent of green coloration of interior (in longitudinal section)	Racine: extension de la coloration verte à l'intérieur (en section longitudinale)	Rübe: Ausdehnung der Grünfärbung im Inneren (im Längsschnitt)	Raíz: extensión del color verde del interior (en sección longitudinal)	
QN	(b)	absent or very small	nulle ou très petite	fehlend oder sehr klein	ausente o muy pequeña	Major 1
		small	petite	klein	pequeño	Meaux 3
		medium	moyenne	mittel	medio	Chantenay à cœur rouge 2, De Colmar à cœur rouge 3 5
		large	grande	groß	grande	Touchon 7
		very large	très grande	sehr groß	muy grande	Muscade 9

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
26.	VG	Root: protrusion above soil	Racine: partie hors terre	Rübe: Sitz über dem Boden	Raíz: parte fuera del suelo	
QN	(b)	absent or very small	nulle ou très petite	fehlend oder sehr flach	ausente o muy pequeño	Karotan, Parijse Markt 3 1
		small	petite	flach	pequeño	Amsterdam 2, Amsterdam 3, Nantaise améliorée 2, Nantaise améliorée 3 3
		medium	moyenne	mittel	medio	Tancar, Toudo 5
		large	grande	groß	grande	Lange Stompe Winter, Touchon 7
		very large	très grande	sehr groß	muy grande	Blanche à collet vert hors terre 9
27.	MS	<u>Varieties with blunt tip only: Root: time of development of rounded tip</u>	<u>Variétés avec extrémité arrondie seulement: Racine: époque de boutage</u>	<u>Nur Sorten mit stumpfem Ende: Rübe: Zeitpunkt der Bildung eines runden Endes</u>	<u>Solo variedades con extremo romo: Raíz: época de desarrollo del extremo redondeado</u>	
(+)						
QN		early	précoce	früh	temprana	Touchon 3
		medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3, Tiana 5
		late	tardive	spät	tardía	Bureau, Nantaise améliorée 7, Tancar 7

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
28.	MS	Root: time of coloration of tip in longitudinal section	Racine: époque de coloration de l'extrémité en section longitudinale	Rübe: Zeitpunkt der Färbung der Spitze im Längsschnitt	Raíz: época de coloración del extremo en sección longitudinal	
(+)						
QN	very early	très précoce	sehr früh	muy temprana	Parijse Markt 3	1
	early	précoce	früh	temprana	Amsterdam 2, Amsterdam 3	3
	medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3	5
	late	tardive	spät	tardía	De Colmar à cœur rouge 2, Touchon	7
	very late	très tardive	sehr spät	muy tardía	Goliath	9
29.	VG	Plant: tendency to bolting	Plante: tendance à la montaison	Pflanze: Neigung zum Schossen	Planta: tendencia a la subida a flor	
QN	weak	faible	gering	débil	Molene, Tancar	3
	medium	moyenne	mittel	media	Nantaise améliorée 2, Nantaise améliorée 3	5
	strong	forte	stark	fuerte	Muscade, Touchon	7
30.	VG	Plant: height of primary umbel at time of its flowering	Plante: hauteur de l'ombelle primaire à l'époque de sa floraison	Pflanze: Höhe der ersten Dolde zum Zeitpunkt seiner Blüte	Planta: altura de la umbela primaria en la época de floración	
QN	(c) short	basse	niedrig	baja		3
	medium	moyenne	mittel	media		5
	tall	haute	hoch	alta		7
31.	VS	Plants: proportion of male sterile plants	Plantes: proportion de plantes mâles stériles	Pflanzen: Anteil männlich steriler Pflanzen	Plantas: proporción de plantas androestériles	
(*)						
(+)						
QN	(c) absent or very low	nulle ou très faible	fehlend oder sehr gering	ausente o muy baja	Nantaise améliorée 2, Touchon	1
	intermediate	intermédiaire	mittel	intermedio		2
	high	forte	hoch	alta	Nanco, Tino	3

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota		
32.	VS	Plant: type of male sterility	Plante: type de stérilité mâle	Pflanze: Typ der männlichen Sterilität	Planta: tipo de androestérilidad			
	QL	(c)	brown anther	anthères brunes	braune Antheren	antera marrón	Nanco	1
			petaloid anther	anthères pétaloïdes	petaloïde Antheren	antera petaloïde	Tino	2

8. Explanations on the Table of Characteristics

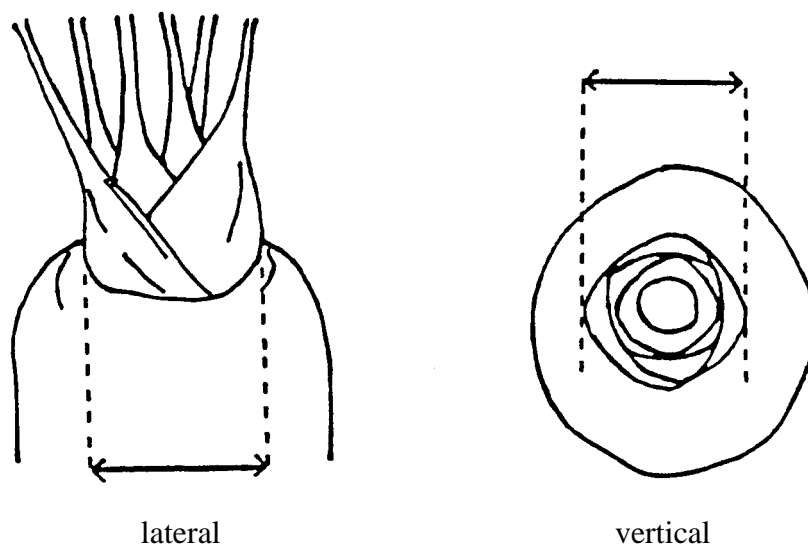
8.1 *Explanations for covering several characteristics*

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

- (a) Foliage and leaf: Observations on the foliage and the leaf should be made at the time of full development of the foliage.
- (b) Root: Observations on the root should be made when the root is fully developed.
- (c) Observations should be made when the plant is flowering during the second growing cycle.

8.2 *Explanations for individual characteristics*

Ad. 1: Foliage: width of crown



Ad. 10: Root: shape in longitudinal section



1
circular



2
obovate



3
medium obtriangular



4
narrow obtriangular



5
narrow obtriangular to
narrow oblong



6
narrow oblong

Ad. 11: Varieties scoring between 4 and 6 for characteristic 10 only: Root: tendency to conical shape

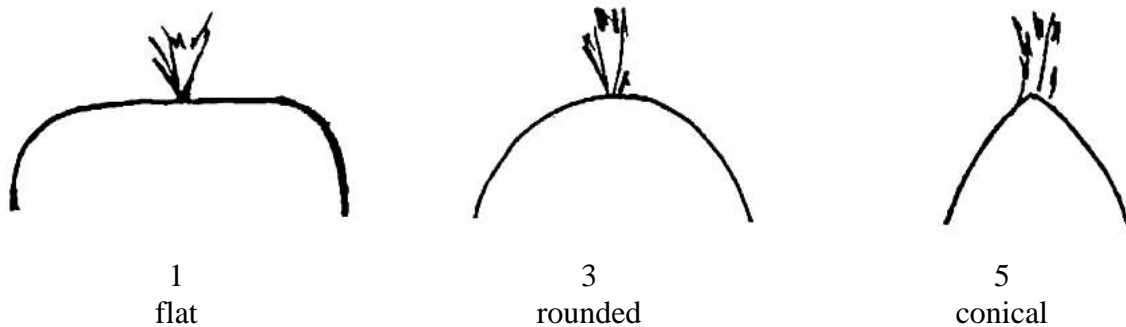
The characteristic can be observed either visually or by using a formula. The density of carrot roots is relatively constant and, therefore, it is possible to use the following formula to determine the tendency to conical shape:

$$\text{shape coefficient} = \text{weight} / (\text{length} \times (3.14 \times \text{diameter}^2 / 4))$$

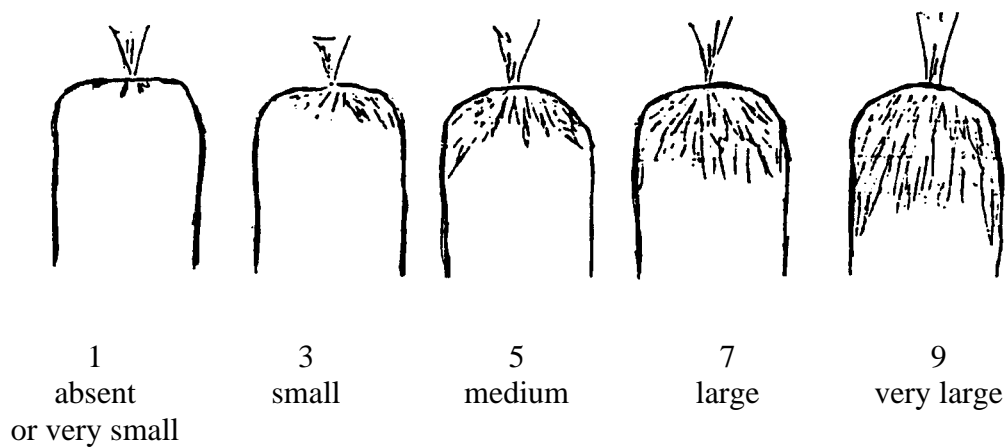
length: as for characteristic 7
diameter: as for characteristic 8

The formula above is the formula for calculating the density of a cylinder: therefore, assuming that the density of carrot roots is constant (i.e. 1), a high shape coefficient (close to 1) indicates roots with a cylindrical shape and a low shape coefficient indicates that the roots are tapered.

Ad. 12: Root: shape of shoulder



Ad. 17: Root: extent of green color of skin of shoulder



Ad. 27: Varieties with blunt tip only: Root: time of development of rounded tip

Ad. 28: Root: time of coloration of tip in longitudinal section

The earliness of carrot varieties can be judged according to two criteria, characteristic 27, time of development of “rounded tip” for the varieties with a blunt tip at maturity and characteristic 28, time of coloration of the tip in longitudinal section.

Three weeks before the normal maturity date of the varieties (where the variety ‘Touchon’ has a blunt tip): pull up of part of the test roots in order to judge the shape of the tip, characteristic 27 (early: blunt tip: variety ‘Touchon’; medium: intermediate tip: varieties ‘Tiana’, ‘Nantaise améliorée 2’, ‘Nantaise améliorée 3’; late: pointed tip: varieties ‘Bureau’, ‘Tancar’, ‘Nantaise améliorée 7’).

Following longitudinal cutting of the roots: examination of the coloration of the tip, characteristic 28 (early: colored tip: varieties ‘Amsterdam 2’, ‘Amsterdam 3’, late: whitish tip: varieties ‘De Colmar à coeur rouge 2’, ‘Touchon’).

A good example of the difference in earliness according to the two characteristics is the variety ‘Touchon’, which is early for characteristic 27 and late for characteristic 28.

Ad. 31: Plants: proportion of male sterile plants

Ad. 32: Plant: type of male sterility

Type of male sterility:

Brown anther type: rudimentary brown anthers;

Petaloid anther type: anthers transformed into petals with different shapes (e.g. bract-like, spoon-like)

9. Literature

No specific literature.

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 Botanical Name	<input type="text" value="Daucus carota L."/>	
1.2 Common Name	<input type="text" value="Carrot"/>	
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 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 Other []
(please provide details)

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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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 (3)	Leaf: length (including petiole)		
	very short	Mokum, Mignon	1[]
	very short to short		2[]
	short	Amsterdam 2, Amsterdam 3	3[]
	short to medium		4[]
	medium	Juwarot, Nantaise améliorée 2	5[]
	medium to long		6[]
	long	Chantenay, Chantenay à cœur rouge 2	7[]
	long to very long		8[]
	very long	De Colmar à cœur rouge 2, Rothild	9[]
5.2 (5)	Leaf: intensity of green color		
	very light		1[]
	very light to light		2[]
	light	Adelaide, Leonor	3[]
	light to medium		4[]
	medium	Amsterdam 2, Amsterdam 3	5[]
	medium to dark		6[]
	dark	Rothild	7[]
	dark to very dark		8[]
	very dark		9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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	Characteristics	Example Varieties	Note
5.3	Leaf: anthocyanin coloration of petiole		
(6)			
	absent	Amsterdam 2	1[]
	present	Tarenco	9[]
5.4	Root: length		
(7)			
	very short	Parijse Markt 2, Parijse Markt 3	1[]
	very short to short		2[]
	short	Chantenay	3[]
	short to medium		4[]
	medium	Nantaise améliorée 2, Nantaise améliorée 3	5[]
	medium to long		6[]
	long	Berlikumer 2, Berlikumer 3	7[]
	long to very long		8[]
	very long	Lange Stompe Winter	9[]
5.5	Root: width		
(8)			
	very narrow		1[]
	very narrow to narrow		2[]
	narrow	Amsterdam 2, Amsterdam 3	3[]
	narrow to medium		4[]
	medium	Nantaise améliorée 2, Nantaise améliorée 3	5[]
	medium to broad		6[]
	broad	De Colmar à cœur rouge 2, Parijse Markt 2, Parijse Markt 3	7[]
	broad to very broad		8[]
	very broad		9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.6 Root: ratio length/ width (9)		
very small	Parijse Markt 2, Parijse Markt 3, Parmex	1[]
very small to small		2[]
small	Courte améliorée à forcer	3[]
small to medium		4[]
medium	Chantenay	5[]
medium to large		6[]
large	Nantaise améliorée 2, Nantaise améliorée 3	7[]
large to very large		8[]
very large	Amsterdam 2	9[]
5.7 Root: shape in longitudinal section (10)		
circular	Parijse Markt 2, Parijse Markt 3	1[]
obovate		2[]
medium obtriangular	Chantenay, De Colmar à cœur rouge 2	3[]
narrow obtriangular	Imperator, De Colmar à cœur rouge 3	4[]
narrow obtriangular to narrow oblong	Maestro	5[]
narrow oblong	Amsterdam 2, Berlikumer 2, Berlikumer 3, Nantaise améliorée 5, Touchon	6[]
5.8 Root: shape of shoulder (12)		
flat	De Colmar à cœur rouge 2	1[]
flat to rounded	Parijse Markt 2	2[]
rounded		3[]
rounded to conical		4[]
conical	Touchon	5[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.9 Root: tip (when fully developed) (13)		
blunt	Berlikumer 3	1[]
slightly pointed	Mello Yello	2[]
strongly pointed	Allred, Orbit	3[]
5.10 Root: external color (14)		
white	White Satin	1[]
yellow	Mello Yello	2[]
orange	Bingo, Goliath, Karotan, Pinocchio, Tancar	3[]
pinkish red	Nutri-red	4[]
red	Pulsor	5[]
purple	Purple Haze	6[]
5.11 <u>Excluding varieties with white external root color:</u> Root: intensity of external color (15)		
very light		1[]
very light to light		2[]
light	Bingo, Mello Yello, Tancar	3[]
light to medium		4[]
medium	Goliath, Nutri-red	5[]
medium to dark		6[]
dark	Karotan, Pinocchio, Purple Haze	7[]
dark to very dark		8[]
very dark		9[]
5.12 Root: anthocyanin coloration of skin of shoulder (16)		
absent	Trevor	1[]
present	Touchon	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.13 Root: diameter of core relative to total diameter (19)		
very small	Amsterdam 2, Amsterdam 3, Tourino	1[]
very small to small		2[]
small	Nantaise améliorée 2, Nantaise améliorée 3	3[]
small to medium		4[]
medium	Berlikumer 2, Berlikumer 3	5[]
medium to large		6[]
large	De Colmar à cœur rouge 2	7[]
large to very large		8[]
very large	Giganta	9[]
5.14 Root: color of core (20)		
white	White Satin	1[]
yellow	Jaune de Lobberich, Pariser Markt	2[]
orange	Nantaise améliorée 2, Nantaise améliorée 3	3[]
pinkish red		4[]
red	Nutri-red	5[]
purple	Afghan purple, Black Deshi	6[]
5.15 Root: color of cortex (22)		
white	White Satin	1[]
yellow	Mellow Yello	2[]
orange	Allred, Carlo	3[]
pinkish red		4[]
red	Nutri-red	5[]
purple	Afghan purple, Black Deshi	6[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.16 (27)	<u>Varieties with blunt tip only:</u> Root: time of development of rounded tip	
very early		1[]
very early to early		2[]
early	Touchon	3[]
early to medium		4[]
medium	Nantaise améliorée 2, Nantaise améliorée 3, Tiana	5[]
medium to late		6[]
late	Bureau, Nantaise améliorée 7, Tancar	7[]
late to very late		8[]
very late		9[]
5.17 (28)	Root: time of coloration of tip in longitudinal section	
very early	Parijse Markt 3	1[]
very early to early		2[]
early	Amsterdam 2, Amsterdam 3	3[]
early to medium		4[]
medium	Nantaise améliorée 2, Nantaise améliorée 3	5[]
medium to late		6[]
late	De Colmar à cœur rouge 2, Touchon	7[]
late to very late		8[]
very late	Goliath	9[]

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
Characteristics		Example Varieties	Note
5.18	Plant: tendency to bolting		
(29)			
	very weak		1[]
	very weak to weak		2[]
	weak	Molene, Tancar	3[]
	weak to medium		4[]
	medium	Nantaise améliorée 2, Nantaise améliorée 3	5[]
	medium to strong		6[]
	strong	Muscade, Touchon	7[]
	strong to very strong		8[]
	very strong		9[]
5.19	Plants: proportion of male sterile plants		
(31)			
	absent or very low	Nantaise améliorée 2, Touchon	1[]
	intermediate		2[]
	high	Nanco, Tino	3[]
5.20	Plant: type of male sterility		
(32)			
	brown anther	Nanco	1[]
	petaloid anther	Tino	2[]

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
<i>Example</i>	<i>Root: external color</i>	<i>orange</i>	<i>pinkish red</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.

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 for 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]