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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**

GENEVA

**DRAFT**

**CARROT**

*(Daucus carota L.)*

**GUIDELINES**

**FOR THE CONDUCT OF TESTS**

**FOR DISTINCTNESS, UNIFORMITY AND STABILITY**

*to be considered by the  
Technical Working Party for Vegetables at its thirty-seventh session,  
to be held in Roelofarendsveen, Netherlands, from June 23 to 27, 2003*

Alternative Names: \*

<i>Latin</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Daucus carota L</i>	Carrot	Carotte	Möhre	Zanahoria

**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](http://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:

25 g or 30.000 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. [In cases where the seed is to be stored, the germination capacity should be as high as possible and should, be stated by the applicant.]

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

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

## 3. Method of Examination

### 3.1 *Duration of Tests*

The minimum duration of tests should normally be two independent [similar] 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 – visual or measurement

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

MG: single measurement of a group of plants or parts of plants

MS: measurement of a number of individual plants or parts of plants

VG: visual assessment by a single observation of a group of plants or parts of plants

VS: visual assessment by observation of individual plants or parts of plants]

## 3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 200 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 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 minimum duration of tests recommended in section 3.1 reflects, in general, the need to ensure that any differences in a characteristic are sufficiently consistent.

#### 4.1.3 Clear Differences

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

recommendations contained in the General Introduction prior to making decisions regarding distinctness.

## 4.2 Uniformity

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

[4.2.x] **ASW 8** [The assessment of uniformity [for cross-pollinated varieties] should be according to the recommendations for cross-pollinated varieties in the General Introduction.]

[4.2.x] [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.]

[4.2.x] [For the assessment of uniformity of seed-propagated varieties, the recommendations in the General Introduction for / [cross-pollinated] / [hybrid] varieties should be followed, as appropriate.]

[4.2.x] [For the assessment of uniformity, a population standard of 2 % and an acceptance probability of at least 95% should be applied. In the case of a sample size of 200 plants, 7 off-types are allowed.]

*Different standards for inbred lines? How to deal with this category?*

## 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 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) Leaf: length (including petiole) (characteristic 3)
- (b) Carrot: length (characteristic 7)
- (c) Carrot: width (characteristic 8)
- (d) Carrot: shape of longitudinal section (characteristic 10)
- (e) Carrot: tip (characteristic 13)
- (f) Carrot: external color (characteristic 14)
- (g) Time of maturity (characteristic 30)

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

(a) – (b) See Explanations on the Table of Characteristics in Chapter 8, Section 8.1]

(+) See Explanations on the Table of Characteristics in Chapter 8, Section 8.2

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

*Germany proposes to delete a number of example varieties, which are not listed anymore. See marked deletions*

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>1. VG</b>	<b>Foliage: width of crown</b>	<b>Feuillage: largeur de l'insertion</b>	<b>Laub: Breite des Blattansatzes</b>			
(+)	(a)	narrow	étroite	schmal	Amsterdam 2,	3
		medium	moyenne	mittel	Nantaise améliorée 2, Rothild	5
		broad	large	breit	Chantenay à coeur rouge 2	7
<b>2. VG</b>	<b>Leaf: attitude</b>	<b>Feuille: port</b>	<b>Blatt: Stellung</b>			
	(a)	erect	dressé	aufrecht	Touchon	1
		semi-erect	demi-dressé	halbaufrecht	Nantaise améliorée 2	2
		horizontal	horizontal	waagrecht		3
<b>3. VG</b>	<b>Leaf: length (including petiole)</b>	<b>Feuille: longueur (pétiole compris)</b>	<b>Blatt: Länge (einschliesslich Stiel)</b>			
(*)	(a)	very short	très courte	sehr kurz		1
		short	courte	kurz	Amsterdam 2, Amsterdam 3	3
		medium	moyenne	mittel	Juwarot, Nantaise améliorée 2	5
		long	longue	lang	Chantenay, Chantenay à coeur rouge 2	7
		very long	très longue	sehr lang	De Colmar à coeur rouge 2, Rothild	9
<b>4. VG</b>	<b>Leaf: division</b>	<b>Feuille: division</b>	<b>Blatt: Fiederung</b>			
(*)	(a)	very fine	très fine	sehr fein		1
		fine	fine	fein	Amsterdam 2, Amsterdam 3	3
		medium	moyenne	mittel	Nantaise améliorée 2, Nantaise améliorée 3	5
		coarse	grossière	grob	Hytop	7
		very coarse	très grossière	sehr grob		9



	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>5. VG (*)</b>	<b>Leaf: intensity of green color</b>	<b>Feuille: intensité de la couleur verte</b>	<b>Blatt: Intensität der Grünfärbung</b>			
(a)	light	claire	hell			3
	medium	moyenne	mittel		Amsterdam 2, Amsterdam 3	5
	dark	foncée	dunkel		Rothild	7
<b>6. VG (*)</b>	<b>Leaf: anthocyanin coloration of petiole</b>	<b>Feuille: pigmentation anthocyanique du pétiole</b>	<b>Blatt: Anthocyan- färbung des Blattstiels</b>			
(a)	absent	absente	fehlend			1
	present	présente	vorhanden			9
<b>7. VG or MS (*)</b>	<b>Carrot: length</b>	<b>Racine: longueur</b>	<b>Wurzel: Länge</b>			
(b)	very short	très courte	sehr kurz		Parijse Markt 2, Parijse Markt 3	1
	short	courte	kurz		Chantenay	3
	medium	moyenne	mittel		Nantaise améliorée 2, Nantaise améliorée 3	5
	long	longue	lang		Berlikumer 2, Berlikumer 3	7
	very long	très longue	sehr lang		Lange Stompe Winter	9
<b>8. VG or MS (*)</b>	<b>Carrot: width</b>	<b>Racine: largeur</b>	<b>Wurzel: Breite</b>			
(b)	narrow	étroite	schmal		Amsterdam 2, Amsterdam 3	3
	medium	moyenne	mittel		Nantaise améliorée 2, Nantaise améliorée 2 (3?)	5
	broad	large	breit		De Colmar à coeur rouge 2, Parijse Markt 2, Parijse Markt 3	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>9. Delete (*)</b>	<b>Carrot: ratio width/ length</b>	<b>Racine: rapport largeur/longueur</b>	<b>Wurzel: Verhältnis Breite/Länge</b>			
(b)	very small	très petit	sehr klein		Amsterdam 2,	
	small	petit	klein		Nantaise améliorée 2, Nantaise améliorée 3	
	medium	moyen	mittel		Chantenay	
	large	grand	gross		Courte améliorée à forcer	
	very large	très grand	sehr gross		Parijse Markt 2, Parijse Markt 3, Parmex	

Proposal: ratio length/width instead of width/length and replace example varieties accordingly

UK, Germany agree.

Poland proposes to keep it and to add ratio length/width as additional characteristic describing slenderness of root. Furthermore they measure width (1 cm above tip) and ratio width/width (1 cm above tip), which is an index of tapering of root.

France uses on national level a composed characteristic which characterizes how cylindrical the carrot is. It is based on the relation between volume and weight:  $\text{Volume} \times \text{density} = \text{weight}$ .

$\text{Length} \times (\pi \times \text{diameter}/2) / \text{weight} = \text{density} = \text{constant}$ . The more cylindrical the carrot, the closer to 1; the closer to 0.5 the more conical.

NL: We would like to stick to our original proposal and not to keep ratio width/length. The other proposed characteristics can only be observed by measuring, which costs much effort. Furthermore the shape, as a combination of the characteristics 7, 8, 9, 10, can thus be described without measuring.

<b>10. VG (*)</b>	<b>Carrot: shape of longitudinal section</b>	<b>Racine: forme de la section longitudinale</b>	<b>Wurzel: Form des Längsschnitts</b>			
(+ (b)	circular	arrondie	rund		Parijse Markt 2, Parijse Markt 3	1
	obovate	obovale	verkehrt eiförmig			2
	obtriangular	obtriangulaire	verkehrt dreieckig		Chantenay, De Colmar à coeur rouge 2	3
	narrowly obtriangular				Imperator, De Colmar à coeur rouge 2	4
	narrowly obtriangular to narrowly oblong				Maestro	5
	narrowly oblong	rectangulaire étroite	schmal rechteckig		Amsterdam 2, Berlikumer 2, Berlikumer 3, Nantaise améliorée 5, Touchon	6

Proposal to add : narrowly obtriangular with note 4 and example varieties Imperator and De Colmar à coeur rouge 2 as example varieties from 3; add narrowly obtriangular to narrowly oblong with note 5 and example variety Maestro, give narrowly oblong note 6

UK agrees and would like drawings, Germany agrees, France no comments, Poland suggests to make a distinction between varieties with circular roots with shapes: almost circular, circular ovate, broad ovate, ovate, obtriangular; and varieties with elongated roots with shapes: fusiform, cylindrical, slightly cylindrical, conical, strongly conical

NL: We would like to stick to the original proposal with explanatory drawings, which are already provided.

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>11. VG</b> <b>(*)</b>	<b>Carrot: shape of shoulder</b>	<b>Racine: forme de l'épaulement</b>	<b>Wurzel: Form des Kopfes</b>			
(+)	(b) flat	plan	flach		De Colmar à coeur rouge 2	1
	flat to rounded	plan à arrondi	flach bis rundlich		Parijse Markt 2	2
	rounded	arrondi	rundlich			3
	rounded to conical	arrondi à conique	rundlich bis konisch			4
	conical	conique	konisch		Touchon	5

*UK: the drawing for state 1 is confusing: it would be better if only the top part is shown*

<b>12. VG</b>	<b>Carrot: insertion of crown</b>	<b>Racine: insertion du feuillage</b>	<b>Wurzel: Blattansatz</b>			
(b)	raised	surélevée	vorgewölbt		Touchon	3
	flat	plane	flach		Nantaise améliorée 2, Nantaise améliorée 3	5
	depressed	en creux	eingesunken		De Colmar à coeur rouge 2	7

*UK proposes to change the wording into: shape of crown with the above states*

*NL: Taking into account that the wording is not clear and the UK proposal might be confusing with regard to characteristic 11, proposal to amend it into: Carrot: position of crown in relation to shoulder; with the above states.*

<b>13. VG</b> <b>(*)</b>	<b>Carrot: tip</b>	<b>Racine: extrémité</b>	<b>Wurzel: Ende</b>			
(b)	blunt	arrondie	stumpf		Berlikumer 3	1
	slightly pointed	légèrement pointue	leicht spitz			2
	pointed	pointue	spitz			3
<b>14. VG</b> <b>(*)</b>	<b>Carrot: external color</b>	<b>Racine: couleur externe</b>	<b>Wurzel: äussere Farbe</b>			
(b)	white	blanche	weiss			1
	yellow	jaune	gelb			2
	orange	orange	orange		Touchon	3
	red	rouge	rot			4

*Proposal: to add purple, note 5 with example variety Purple Haze*

*Germany agrees, France no comments, UK asks whether Purple Haze is completely purple. NL: Yes*

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>15. VG</b> <b>(*)</b>	<b>Carrot: intensity of external color</b>	<b>Racine: intensité de la couleur externe</b>	<b>Wurzel: Intensität der äusseren Farbe</b>			
<b>(b)</b>	light	claire	hell			3
	medium	moyenne	mittel			5
	dark	foncée	dunkel			7

*Proposal: to add very light, note 1 and very dark, note 9*

*Germany agrees, France no comments, Uk asks whether there is sufficient variability to justify extending the range.*

*NL: At the moment there are NL applications for listing and PBR that justify the proposal to extend the range. Example varieties however are not needed for intensity of colour.*

<b>16. VG</b>	<b>Carrot: anthocyanin coloration of skin of shoulder</b>	<b>Racine: pigmentation anthocyanique de la peau du collet</b>	<b>Wurzel: Anthocyanfärbung der Haut des Kopfes</b>			
<b>(b)</b>	absent	absente	fehlend		Buror	1
	present	présente	vorhanden		Touchon, Purple Haze	9

*UK states that if Purple Haze is entirely purple, it will have purple shoulders indeed, so this is not a good example variety.*

*NL: We agree not to add Purple Haze as an example variety.*

<b>17. VG</b> <b>(*)</b>	<b>Carrot: extent of green color of skin of shoulder</b>	<b>Racine: extension de la coloration verte de la peau du collet</b>	<b>Wurzel: Ausdehnung der Grünfärbung der Haut des Kopfes</b>			
<b>(+)</b> <b>(b)</b>	absent or very small	nulle ou très petite	fehlend oder sehr klein		Karotan	1
	small	petite	klein		Scarla	3
	medium	moyenne	mittel		De Colmar à coeur rouge 2	5
	large	grande	gross		Touchon	7
	very large	très grande	sehr gross		Lange Stompe Winter	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>18. VG</b>	<b>Carrot: ridging of surface</b>	<b>Racine: annelure de la surface</b>	<b>Wurzel: Ringelung der Oberfläche</b>			
<b>(b)</b>	absent or very weak	absente ou très faible	fehlend oder sehr gering		Favor, Sytan	1
	weak	faible	gering		Major	3
	medium	moyenne	mittel		Chantenay	5
	strong	forte	stark		De Colmar à coeur rouge 2	7
	very strong	très forte	sehr stark			9
<b>19. VG (*)</b>	<b>Carrot: diameter of core relative to total diameter</b>	<b>Racine: diamètre du coeur par rapport au diamètre total</b>	<b>Wurzel: Durchmesser des Herzens im Verhältnis zum gesamten Durchmesser</b>			
<b>(b)</b>	very small	très petit	sehr klein		Amsterdam 2, Amsterdam 3, Tourino	1
	small	petit	klein		Nantaise améliorée 2, Nantaise améliorée 3	3
	medium	moyen	mittel		Berlikumer 2, Berlikumer 3	5
	large	grand	gross		De Colmar à coeur rouge 2	7
	very large	très grand	sehr gross		Giganta	9
<b>20. VG (*)</b>	<b>Carrot: color of core</b>	<b>Racine: couleur du coeur</b>	<b>Wurzel: Farbe des Herzens</b>			
<b>(b)</b>	white	blanc	weiss			1
	yellow	jaune	gelb		Jaune de Lobberich, Pariser Markt	2
	orange	orange	orange		Nantaise améliorée 2, Nantaise améliorée 3	3
	red	rouge	rot			4

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>21. VG</b> <b>(*)</b>	<b>Carrot: intensity of color of core</b>	<b>Racine: intensité de la couleur du coeur</b>	<b>Wurzel: Intensität der Farbe des Herzens</b>			
<b>(b)</b>	light	claire	hell			3
	medium	moyenne	mittel			5
	dark	foncée	dunkel			7
<b>22. VG</b> <b>(*)</b>	<b>Carrot: color of cortex</b>	<b>Racine: couleur du cortex</b>	<b>Wurzel: Farbe des Rindenteils</b>			
<b>(b)</b>	white	blanc	weiss			1
	yellow	jaune	gelb			2
	orange	orange	orange			3
	red	rouge	rot			4
<i>UK asks whether there are varieties with purple pigment in the cortex, or does it stay limited to the skin? Germany proposes to add state purple with note 5</i>						
<i>NL: The purple is pigment in the skin, with sometimes some extension in the cortex, that varies in the carrot itself. Proposal not to add this state.</i>						
<b>23. VG</b> <b>(*)</b>	<b>Carrot: intensity of color of cortex</b>	<b>Racine: intensité de la couleur du cortex</b>	<b>Wurzel: Intensität der Farbe des Rindenteils</b>			
<b>(b)</b>	light	claire	hell			3
	medium	moyenne	mittel			5
	dark	foncée	dunkel			7
<i>Germany proposes to add state 1 and 9</i>						
<i>NL: If there are varieties with state 1 or 9, we agree</i>						
<b>24. VG</b> <b>(*)</b>	<b>Carrot: color of core compared to color of cortex</b>	<b>Racine: couleur du coeur par rapport à la couleur du cortex</b>	<b>Wurzel: Farbe des Herzens im Verhältnis zum Rindenteil</b>			
<b>(b)</b>	lighter	plus claire	heller			1
	same	même couleur	gleichfarbig			2
	darker	plus foncée	dunkler			3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>25. VG</b> <b>(*)</b>	<b>Carrot: green coloration of interior of top (in longitudinal section)</b>	<b>Racine: coloration verte de l'intérieur du collet (en section longitudinale)</b>	<b>Wurzel: Grünverfärbung im Inneren des oberen Endes (im Längsschnitt)</b>			
<b>(b)</b>	absent or very weak	absente ou très faible	fehlend oder sehr gering		Major	1
	weak	faible	gering		Meaux	3
	medium	moyenne	mittel		Chantenay à coeur rouge 2, De Colmar à coeur rouge 3	5
	strong	forte	stark		Touchon	7
	very strong	très forte	sehr stark		Muscade	9

*Proposal: to change the wording into: Carrot: extent of internal green coloration, with expressions absent or very shallow (1), etc., to very deep (9)*

*Germany agrees, , France no comments, UK rejects, because the proposed characteristic is different: A new characteristic as proposed, could be accepted.*

*NL: proposal to replace the old characteristic by the new one.*

<b>26. VG</b>	<b>Carrot: protrusion above soil</b>	<b>Racine: partie hors-terre</b>	<b>Wurzel: Sitz über dem Boden</b>			
<b>(b)</b>	absent or very little	nulle ou très petite	fehlend oder sehr flach		Karotan, Parijse Markt 3	1
	little	petite	flach		Amsterdam 2, Amsterdam 3, Nantaise améliorée 2, Nantaise améliorée 3	3
	medium	moyenne	mittel		Tancar, Toudo	5
	strong	grande	hoch		Lange Stompe Winter, Touchon	7
	very strong	très grande	sehr hoch			9

*Proposal: to change the wording of the expressions into: absent or very small (1), etc., to very large (9)*

*Germany proposes to change Sitz in Anteil, UK proposes the wording of the states as slight – much.*

*NL: we agree with both proposals.*

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>27.</b>	<b>Carrot: weight</b>	<b>Racine: poids</b>	<b>Wurzel: Gewicht</b>			
<b>(b)</b>	small	petit	gering			
	medium	moyen	mittel		Nantaise améliorée <sup>2</sup> , Nantaise améliorée 3	
	high	élevé	hoch		Giganta	

*Proposal: to delete characteristic 27, as this is a combination of 7, 8 and 10*

*Germany and UK agree, France no comments, Poland would like to keep it.*

*NL: we would like to stick to our original proposal.*

<b>28.</b>	<b><u>Varieties with blunt tip only:</u> Carrot: time of development of rounded tip</b>	<b><u>Variétés avec extrémité arrondie seulement:</u> Racine: époque de boutage</b>	<b><u>Nur Sorten mit stumpfem Ende:</u> Wurzel: Zeitpunkt der Bildung eines runden Endes</b>			
<b>(b)</b>	early	précoce	früh		Touchon	
	medium	moyenne	mittel			
	late	tardive	spät		Bureau, Tancar	

*Proposal: to delete this characteristic*

*UK, Germany, Poland agree. France states that the problem is to define when a carrot is mature and that the situation is not clear.*

*NL: we would like to keep our proposal.*

<b>29.</b>	<b>Carrot: time of coloration of tip</b>	<b>Racine: époque de coloration de l'extrémité</b>	<b>Wurzel: Zeitpunkt der Färbung der Spitze</b>			
<b>(b)</b>	early	précoce	früh		Amsterdam 2, Amsterdam 3	3
	medium	moyenne	mittel		Nantaise améliorée 2, Nantaise améliorée 3	5
	late	tardive	spät		De Colmar à coeur rouge 2	7

*Proposal: to delete this characteristic*

*See characteristic 28, we would like to keep our proposal*



	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>30. VG</b> <b>(*)</b>	<b>Time of maturity</b>	<b>Epoque de maturité</b>	<b>Zeitpunkt der Reife</b>			
(+)	very early	très précoce	sehr früh		Parijse Markt 3	1
	early	précoce	früh		Amsterdam 2, Amsterdam 3	3
	medium	moyenne	mittel		Nantaise améliorée 2, Nantaise améliorée 3	5
	late	tardive	spät		Berlikumer 2, Berlikumer 3	7
	very late	très tardive	sehr spät		De Colmar à coeur rouge 2	9

*Germany asks for an explanation of this characteristic*

*See characteristic 28 and 29, we propose to keep this characteristic with the existing explanation.*

<b>31.</b>	<b>Carrot: content of carotin</b>	<b>Racine: teneur en carotène</b>	<b>Wurzel: Carotingehalt</b>			
(+)	<b>(b)</b> low	faible	gering		Parijse Markt 2	3
	medium	moyenne	mittel		Rothild	5
	high	forte	hoch		Juwarot	7

*Proposal: to delete this characteristic*

*Germany, Poland, UK agree, France no comments*

<b>32.</b>	<b>Carrot: total content of sugar</b>	<b>Racine: teneur totale en sucres</b>	<b>Wurzel: Gesamtzucker-gehalt</b>			
(+)	<b>(b)</b> low	faible	gering			3
	medium	moyenne	mittel		Berlikumer 2, Berlikumer 3	5
	high	forte	hoch		Rothild	7

*Proposal: to delete this characteristic*

*Germany, Poland, UK agree, France no comments*

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>32.</b>	<b>Carrot: proportion of monosaccharides to total sugar content</b>	<b>Racine: proportion des monosaccharides par rapport à la teneur totale en sucre</b>	<b>Wurzel: Anteil der Mono-saccharide am Gesamtzucker-gehalt</b>			
(+) (b)	low	faible	niedrig			3
	medium	moyenne	mittel		Berlikumer 2, Berlikumer 3	5
	high	forte	hoch		Nantaise améliorée 2	7

*Proposal: to delete this characteristic*

*Germany, Poland, UK agree, France no comments*

<b>34.</b>	<b>Carrot: dry matter content</b>	<b>Racine: teneur en matière sèche</b>	<b>Wurzel: Trockensubstanz-gehalt</b>			
(+) (b)	low	faible	gering		Berlikumer 2, Berlikumer 3	3
	medium	moyenne	mittel			5
	high	forte	hoch			7

*Proposal: to delete this characteristic*

*Germany, Poland, UK agree, France no comments*

<b>35.</b>	<b>Plant: tendency to bolting</b>	<b>Plante: tendance à la montaison</b>	<b>Pflanze: Neigung zum Schossen</b>			
	weak	faible	gering		Molene, Tancar	3
	medium	moyenne	mittel		Nantaise améliorée 2, Nantaise améliorée 3	5
	strong	forte	stark		Touchon	7

*Proposal: to delete this characteristic*

*Germany agrees, Poland does not agree. France finds this characteristic useful to divide varieties meant for autumn sowing and spring sowing, and proposes new example varieties. UK finds it a useful characteristic for discriminating varieties suitable for different environments.*

*NL: we only agree to keep this characteristic when a method to record is provided in an explanation*

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>36. VG</b>	<b>Plant: height at flowering (first umbel opened)</b>	<b>Plante: hauteur à la floraison (première ombelle ouverte)</b>	<b>Pflanze: Höhe zur Zeit der Blüte (erste Bolde geöffnet)</b>			
	short	basse	niedrig			3
	medium	moyenne	mittel			5
	high	haute	hoch			7

*UK: for hybrids only? Flowering characteristics are expensive to record and are not always necessary for Distinctness. UK asks whether first umbel should be replaced with primary umbel.*

*NL: we studied this characteristic in vivo and come to the conclusion that it is most clear to amend this characteristic into: Plant: height of primary umbel at time of its flowering, because this is the most reliable.*

<b>37. VS</b>	<b>Plants: proportion of male sterile plants</b>	<b>Plantes: proportion de plantes mâles stériles</b>	<b>Pflanzen: Anteil männlich steriler Pflanzen</b>			
	absent or very low	nulle ou très faible	fehlend oder sehr gering		Nantaise améliorée 2, Touchon	1
	low	faible	gering			3
	medium	moyenne	mittel		Nanco, Tino	5
	high	forte	hoch		Nandor, Tancar	7
	very high	très forte	sehrhoch			9

*UK: for hybrids only? Flowering characteristics are expensive to record and are not always necessary for Distinctness*

<b>38. VS</b>	<b>Plant: type of male sterility</b>	<b>Plante: type de stérilité mâle</b>	<b>Pflanze: Typ der männlichen Sterilität</b>			
	brown anthers	anthères brunes	braune Antheren		Nanco	1
	petaloid anthers	anthères pétaloïdes	petaloide Antheren		Tino	2

*UK: for hybrids only? Flowering characteristics are expensive to record and are not always necessary for Distinctness. Amend states as type is singular.*

*NL: we agree*

8. Explanations on the Table of Characteristics

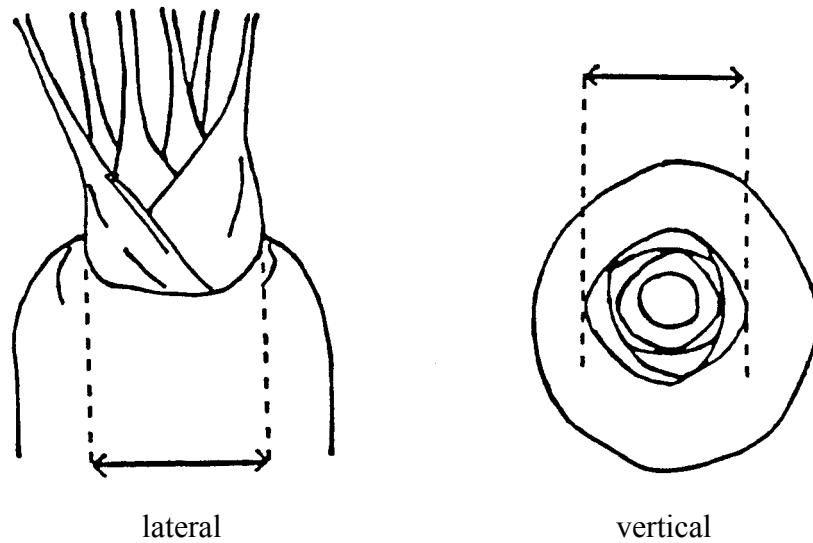
8.1 *Explanations covering several characteristics*

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

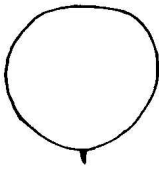
- (a) Foliage and leaf: All observations on the foliage and the leaf should be made at the time of full development of the foliage.
- (b) Carrot: All observations on the carrot should be made at carrot maturity. Carrot maturity is reached when the carrot is fully developed and color is no more changing

8.2 *Explanations for individual characteristics*

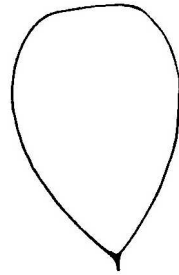
Ad. 1 Foliage: width of crown



Ad. 10: Carrot: shape of longitudinal section



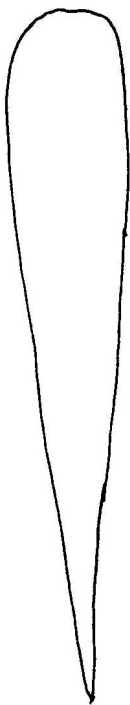
1  
circular



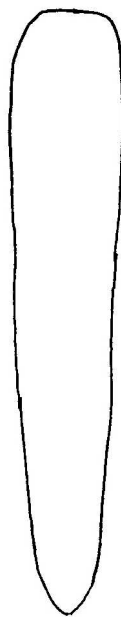
2  
obovate



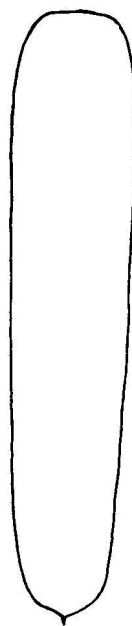
3  
obtriangular



4  
narrowly obtriangular

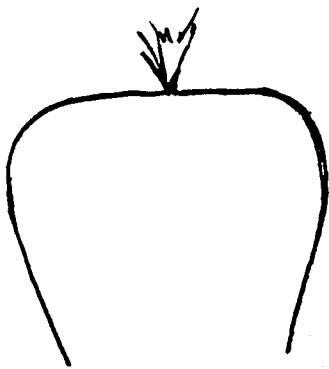


5  
narrowly obtriangular to  
narrowly oblong

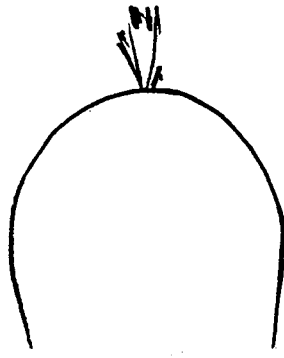


6  
narrowly oblong

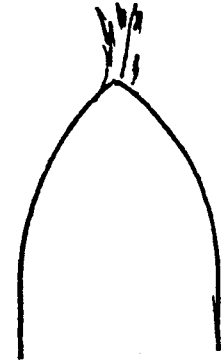
Ad. 11: Carrot: shape of shoulder



1  
flat

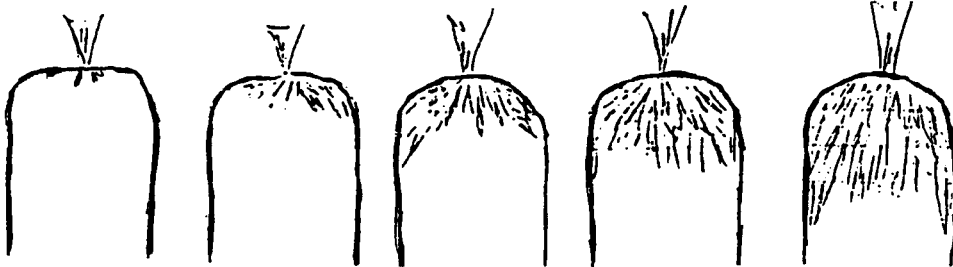


3  
rounded



5  
conical

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



1  
absent  
or very small

3  
small

5  
medium

7  
large

9  
very large

Ad. 30: Time of maturity

Time of maturity is reached when tips of the carrot are full grown and full colored.

9. Literature

Anonymous, 1940: "Description of Types of Principal American Varieties of Orange-fleshed Carrots," USDA Misc. Public. No. 361, Washington, US, (48 pp.)

Atherton, J.G. & Basher, E.A., 1984: "The Effects of Photoperiod on Flowering in Carrot," *Journal of Horticultural Science*, 59(2), 213-215

Babb, M.F., Kraus, J.E., Magruder, R., 1950: "Synonymy of Orange-fleshed Varieties of Carrots," USDA Circular No. 833, Washington, US, (100 pp.)

Banga, O., 1962: "Main Types of the Western Carotene Carrot and Their Origin," Tjeenk Willink, Zwolle, NL, (153 pp.)

Banga, O.; Petiet, J. & Van Bennekom, J.L., 1964: "Genetical Analysis of Male Sterility in Carrots," *Euphytica*, 13, 75-93.

Bleasdale, J.K.A. & Thompson, R., 1963: "An Objective Method of Recording and Comparing the Shapes of Carrot Roots," *Journal of Horticultural Sciences*, 38, 232-41

Buishand, J.G. & Gabelman, W.H., 1979: "Investigations on the Inheritance of Colour and Carotenoid Content in Phloem and Xylem of Carrot Roots (*Daucus carota* L.)," *Euphytica*, 28(3), 611-632

Buishand, J.G. & Gabelman, W.H., 1980: "Studies on the Inheritance of Root Colour and Carotenoid Content in Red x Yellow and Red x White Crosses of Carrot (*Daucus carota* L.)," *Euphytica*, 29(2), 241-260

Dowker, B.D. & Jackson, J.C., 1975: "Bolting in Some Carrot Populations," *Annals of Applied Botany*, 79(3), 361-365

Eisa, H.M. & Wallace, D.H., 1969: "Morphological and Anatomical Aspects of Petaloidy in the Carrot (*Daucus carota* L.)," *Proceedings of the American Society of Horticultural Science*, 94, 545-548

Freeman, R.E. & Simon, P.W., 1983: "Evidence for Simple Genetic Control of Sugar Type in Carrot (*Daucus carota* L.)," *Journal of the American Society for Horticultural Science*, 108(1), 50-54

Fritz, D. & Habben, J., 1975: "Determination of Ripeness of Carrots (*Daucus carota* L.)," *Acta Horticulturae*, 52, 231-235

Magruder, R. et al, 1940: "Description of Types of Principal American Varieties of Orange Fleshed Carrots," *Miscellaneous Publications of the US Department of Agriculture*, No. 361, 1-48

Small, E., 1978: "A Numerical Taxonomic Analysis of the *Daucus Carota* Complex," *Canadian Journal of Botany*, 56(3), 248-276

Welch, J.E. & Grimball, E.L., 1947: "Male Sterility in the Carrot," *Science*, 106, 594

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
<p>TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights</p> <p><b>ASW 13</b> [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.]</p>		
1. Subject of the Technical Questionnaire		
1.1 Latin 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 **ASW 15**

[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) totally unknown cross [ ]

4.1.2 Mutation [ ]  
(please state parent variety)

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

4.1.4 Other [ ]  
(please provide details)]

4.2 Method of propagating the variety

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
<b>5.1 Leaf: length (including petiole)</b> <b>(3)</b>		
very short		1 [ ]
short	Amsterdam 2, Amsterdam 3	3 [ ]
medium	Juwarot, Nantaise améliorée 2	5 [ ]
long	Chantenay, Chantenay à coeur rouge 2	7 [ ]
very long	De Colmar à coeur rouge 2, Rothild	9 [ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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<b>5.2</b>	<b>Leaf: intensity of green color</b>	
<b>(5)</b>		
	light	3[ ]
	medium	Amsterdam 2, Amsterdam 3 5[ ]
	dark	Rothild 7[ ]
<b>5.3</b>	<b>Carrot: length</b>	
<b>(7)</b>		
	very short	Parijse Markt 2, Parijse Markt 3 1[ ]
	short	Chantenay 3[ ]
	medium	Nantaise améliorée 2, Nantaise améliorée 3 5[ ]
	long	Berlikumer 2, Berlikumer 3 7[ ]
	very long	Lange Stompe Winter 9[ ]
<b>5.4</b>	<b>Carrot: width</b>	
<b>(8)</b>		
	narrow	Amsterdam 2, Amsterdam 3 3[ ]
	medium	Nantaise améliorée 2, Nantaise améliorée 2 (3?) 5[ ]
	broad	De Colmar à coeur rouge 2, Parijse Markt 2, Parijse Markt 3 7[ ]
<b>5.5</b>	<b>Carrot: shape of longitudinal section</b>	
<b>(10)</b>		
	circular	Parijse Markt 2, Parijse Markt 3 1[ ]
	obovate	2[ ]
	obtriangular	Chantenay, De Colmar à coeur rouge 2 3[ ]
	narrowly obtriangular	Imperator, De Colmar à coeur rouge 2 4[ ]
	narrowly obtriangular to narrowly oblong	Maestro 5[ ]
	narrowly oblong	Amsterdam 2, Berlikumer 2, Berlikumer 3, Nantaise améliorée 5, Touchon 6[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<b>5.6 Carrot: shape of shoulder</b>		
<b>(11)</b>		
flat		De Colmar à coeur rouge 2 1[ ]
flat to rounded		Parijse Markt 2 2[ ]
rounded		3[ ]
rounded to conical		4[ ]
conical		Touchon 5[ ]
<b>5.7 Carrot: tip</b>		
<b>(13)</b>		
blunt		Berlikumer 3 1[ ]
slightly pointed		2[ ]
pointed		3[ ]
<b>5.8 Carrot: external color</b>		
<b>(14)</b>		
white		1[ ]
yellow		2[ ]
orange		Touchon 3[ ]
red		4[ ]
<b>5.9 Carrot: intensity of external color</b>		
<b>(15)</b>		
light		3[ ]
medium		5[ ]
dark		7[ ]
<b>5.10 Carrot: color of core</b>		
<b>(20)</b>		
white		1[ ]
yellow		Jaune de Lobberich, Pariser Markt 2[ ]
orange		Nantaise améliorée 2, Nantaise améliorée 3 3[ ]
red		4[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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<b>5.11 Time of maturity (30)</b>			
very early		Parijse Markt 3	1[ ]
early		Amsterdam 2, Amsterdam 3	3[ ]
medium		Nantaise améliorée 2, Nantaise améliorée 3	5[ ]
late		Berlikumer 2, Berlikumer 3	7[ ]
very late		De Colmar à coeur rouge 2	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 <b>similar</b> variety(ies)	Describe the expression of the characteristic(s) for <b>your</b> candidate variety
<i>Example</i>			
		<i>(example to be inserted) (example to be inserted)</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

**ASW 16** A representative color photograph of the variety should accompany the Technical Questionnaire.

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]