



**TWV/33/7**

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GENEVA

**TECHNICAL WORKING PARTY FOR VEGETABLES**

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REVISED WORKING PAPER ON TEST GUIDELINES FOR SWEDE  
(*Brassica napus* L. var. *napobrassica* Rchb)

*Document prepared by experts from the United Kingdom*

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I. Subject of these Guidelines

These Test Guidelines apply to all varieties of *Brassica napus* L. var. *napobrassica* Rchb.

II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the seed required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all customs formalities are complied with. As a minimum, the quantity of seed to be supplied by the applicant should be:

500g

The seed should at least meet the minimum requirements for germination capacity, moisture content and purity for marketing certified seed (standard or certified seed in the case of vegetable varieties) in the country in which the application is made. The germination capacity should be as high as possible.

2. The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of Tests

1. The minimum duration of tests should normally be two similar growing periods.

2. The tests should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.

3. The tests should be carried out under conditions ensuring normal growth. The size of the plots should be such that plants or parts of plants may be removed for measurement and counting without prejudice to the observations which must be made up to the end of the growing period. Each test should include a total of 120 plants which should be divided between 2 or more replicates. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.

4. Additional tests for special purposes may be established.

IV. Methods and Observations

1. All observations determined by measurement or counting should be made on 60 plants or parts of 60 plants.

2. Unless otherwise indicated, all observations on the leaves should be made on the largest fully green (non-senescent) leaf.

3. Assessment of leaf color should be made on leaves before powdery mildew infection is established.
4. Observations on root skin colour should be made before cork development obscures the skin.

#### V. Grouping of Varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.
2. It is recommended that the competent authorities use the following characteristics for grouping varieties:
  - (a) Leaf: type (characteristic 3)
  - (b) Root: anthocyanin coloration of skin above soil level (characteristic 17)
  - (c) Root: intensity of anthocyanin coloration of skin above soil (characteristic 18.1)
  - (d) Root: color of pseudostem (neck) surface between leaf scars (characteristic 23)
  - (e) Root: color of flesh (characteristic 25)

#### VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.
2. Notes (numbers) for the purpose of electronic data processing, are given opposite the states of expression for each characteristic.
3. Legend:
  - (\*) Characteristics that should be used on all varieties in every growing period over which the examinations are made and always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible.
  - (+) See Explanations on the Table of Characteristics in chapter VIII.

Example varieties included in the table of characteristics within brackets are no longer available commercially, but small amounts of seed of these varieties can be obtained from:

UK Vegetable Genebank  
Genetic Resources Unit  
Horticulture Research International  
Wellesbourne  
Warwickshire  
CV35 9EF  
UNITED KINGDOM

The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column. The stages of development denoted by each number are described at the end of chapter VIII.

VII. Table of Characteristics/Tableau des caracteres/Merkmalstabelle

<b>Characteristics Caracteres Merkmale</b>	<b>Growth Key</b>	<b>English</b>	<b>français</b>	<b>deutsch</b>	<b>Example Varieties Exemples Beispielssorten</b>	<b>Note</b>
(*) 1. Leaf: green color	100-150	light	clair	hell	Airlie	3
Feuille: couleur verte		medium	moyen	mittel	Marian	5
Blatt: Grünfärbung		dark	foncé	dunkel	Joan	7
2. Leaf: waxiness	100-150	weak	faible	gering	Seefelder	3
Feuillage: glaucescence		medium	moyenne	mittel		5
Blatt: Wachsschicht		strong	forte	stark	(Heinkenborsteler)	7
(*) 3. Leaf: type	80-150	entire			(Niko)	1
(+) : Feuille:		lobed			Magres	2
Blatt					Jaune à Collet Rouge	
(+) 4. Leaf: number of major lobes	100-150	few	petit	gering	Wilhelmsburger	3
Feuille: nombre de grands lobes		medium	moyen	mittel	Ruta Otofte	5
Blatt: Anzahl Hauptlappen		many	grand	groß	Marian	7
(*) 5. Leaf: length of terminal lobe	100-150	short			(Laurentian)	3
(+)		medium			Sator Otofte	5
		long			Kenmore	7
(*) 6. Leaf: width of terminal lobe	100-150	narrow			(Laurentian)	3
(+)		medium			Sator Otofte	5
		broad			Kenmore	7
(*) 7. Leaf: length (including (+) petiole)	100-150	short			(Excelsior)	3
Feuille: longueur (y compris le pétiole)		medium			Ruta Otofte	5
Blätt: Länge (einschliesslich stiel)		long			(Teviotdale)	7

<b>Characteristics Caracteres Merkmale</b>	<b>Growth Key</b>	<b>English</b>	<b>français</b>	<b>deutsch</b>	<b>Example Varieties Exemples Beispielsorten</b>	<b>Note</b>
(*) 8. Leaf: width	100-150	narrow	étroite	schmal	(Dryden)	3
(+) Feuille: largeur		medium	moyenne	mittel	Ruta Otofte	5
Blatt: Breite		broad	large	breit	Kenmore	7
(+) 9. Leaf: distance from widest point to base	100-150	short			Laurentian	3
		medium			Magres, Ruby	5
		long			(Balmoral)	7
(+) 10. Leaf: number of minor lobes between major lobes	100-150	few	petit	gering	Grünkopfige Gelbe Wilhelmsburger	3
Feuille: nombre de petits lobes entre les grands lobes		medium	moyen	mittel	Ruta Otofte	5
Blatt: Anzahl Nebenlappen zwischen den Hauptlappen		many	grand	groß	(Gry)	7
11. Leaf: depth of incision of margin	100-150	weak			Joan	3
		medium			Champion	5
		strong			Sator Otofte	7
12. Leaf: undulation of margin	100-150	absent or very weak			Helena, Lizzy	1
		weak				3
		medium			Champion	5
		strong				7
		very strong			Magres	9
(+) 13. Petiole: number of minor lobes (below lowest major lobe)	100-150	few	petit	gering	Wilhelmsburger	3
Petiole: nombre de petits lobes		medium	moyen	mittel	Doon Major	5
Blattstiel: Anzahl Nebenlappen		many	grand	groß	Merrick	7
(*) 14. Petiole: attitude	100-150	erect				1
(+) Feuille: port		semi-erect			Ruta Otofte	3
Blatt: haltung		horizontal			Helena, Brora	5

Characteristics Caracteres Merkmale	Growth Key	English	français	deutsch	Example Varieties Exemples Beispielssorten	Note
15. Petiole: thickness	100-150	thin	mince	dünn	(Vogesa)	3
Petiole: épaisseur du pétiole		medium	moyen	mittel	Marian	5
Blattstiel: Dicke		thick	épais	dick	(Heinkenborsteler)	7
(*) 16. Root: predominant color of (+) skin above soil	240-270	green			Melfort, Seefelder Jaune à Collet Verte	1
		bronze			(Harrietfield)	2
		reddish purple			Kenmore, Angus Jaune à Collet Rouge	3
(*) 17. Root: anthocyanin (+) coloration of skin above soil	240-270	absent	absente	fehlend	Seefelder	1
Racine: pigmentation anthocyanique de l'épiderme de la partie horsterre		present	présente	vorhanden	Ruta Otofte Jaune à Collet Rouge	9
(*) 18.1 Root: intensity of anthocyanin coloration of skin above soil (for varieties with bronze skin colour)	250-270	weak			Melfort	3
		medium			(Angus)	5
		strong			Kenmore	7
(*) 18.2 Root: intensity of anthocyanin coloration of skin above soil (for varieties with reddish purple skin colour)	250-270	weak	faible	gering	Champion	3
		medium	moyenne	mittel	Doon Major	5
		strong	forte	stark	Ruby	7
19. Root: color of skin below soil level	250-270	white	blanc	weiss	(Niko)	1
Racine: couleur de l'épiderme de la partie enterree		yellow	jaune	gelb	(Mella) Jaune à Collet Verte	2
Rübe: Farbe der Hant des unteriraischen Teiles		salmon	saumonée		Jaune à Collet Rouge	3
		reddish	rougeâtre	rötlich	Marian	4

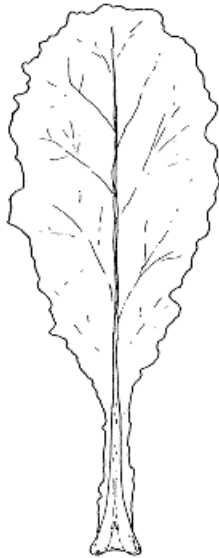


Characteristics Caracteres Merkmale	Growth Key	English	français	deutsch	Example Varieties Exemples Beispielssorten	Note
(*) 20. Root: shape (+)	260-299	transverse elliptic	elliptique transverse	quer elliptisch	Acme, Seefelder	1
Racine: forme		circular	circulaire	rund	Ruby, Jaune à Collet Verte	2
Rübe: form		broad elliptic	elliptique large	breit elliptisch	Kenmore	3
		obovate	obovale	verkehrt eiförmig	Doon Major	4
		narrow elliptic			Blanc Hors Terre	5
(*) 21. Root: length	260-290	short	courte	kurz	Sator Otofte	3
Racine: longueur		medium	moyenne	mittel	Airlie, Ruby	5
Rübe: Länge		long	longue	lang	(Aubigny Green Top)	7
(*) 22. Root: diameter	260-290	small	etroite	klein	(Laurentian)	3
Racine: diamètre		medium	moyen	mittel	Ruta Otofte, Sator Otofte	5
Rübe: Durchmesser		large	large	gross	Kenmore	7
(*) 23. Plant: length of pseudostem (+) (neck)	260-299	short	court	kurz	Melfort, Helena	3
Racine: longueur due collet		medium	moyen	mittel	Ruta Otofte, Sator Otofte	5
Rübe: Länge des Halses		long	long	lang	Vittoria,	7
(*) 24. Plant: anthocyanin coloration (+) of pseudostem between leaf scars	260-299	absent or partial			Seafelder, Melfort, Merrick	1
		entire			Champion, Magres	2
Racine: couleur de la surface du collet entre les cicatrices pétiolaires						
Rube: Farbe der Oberfläche des Halses zwischen den Blattstichausätzen						
(*) 25. Root: color of flesh	260-280	white	blanche	weiss	Merrick Blanc Hors Terre	1
Racine: couleur de la chair		yellow	jaune	gelb	Magres Jaune à Collet Rouge	2

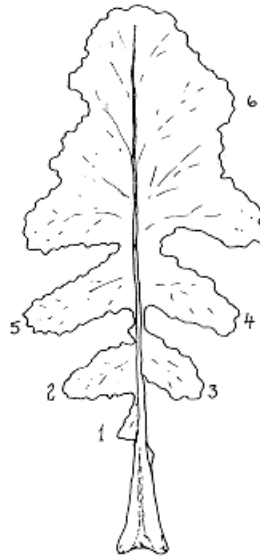
<b>Characteristics Caracteres Merkmale</b>	<b>Growth Key</b>	<b>English</b>	<b>français</b>	<b>deutsch</b>	<b>Example Varieties Exemples Beispielsorten</b>	<b>Note</b>
26. Root: intensity of yellow color of flesh	260-280	weak	faible	gering	Doon Major	3
Raince: intensité de la couleur jaune de la chair		medium	moyenne	mittel	Magres	5
Rübe: Intensität der Gelbtärbung des Fleisches		strong	forte	stark		7
(+) 27. Root:dry matter content (when roots of early maturing varieties are fully developed and mature)	270-280	low	faible	niedrig	Doon Major	3
Racine: teneur en matière sèche (quant les racines des variétés de maturation précoce sont complètement développées et mûres)		medium	moyenne	mittel	Sator Otofte, Magres (Dryden)	5
Rübe: Trockensubstanz-gehalt (wenn die Rüben der trühreifenden Sorten vollentwickelt und reit sind)		high	élevée	hoch		7

VIII. Explanations on the Table of Characteristics

Ad. 3 Leaf type



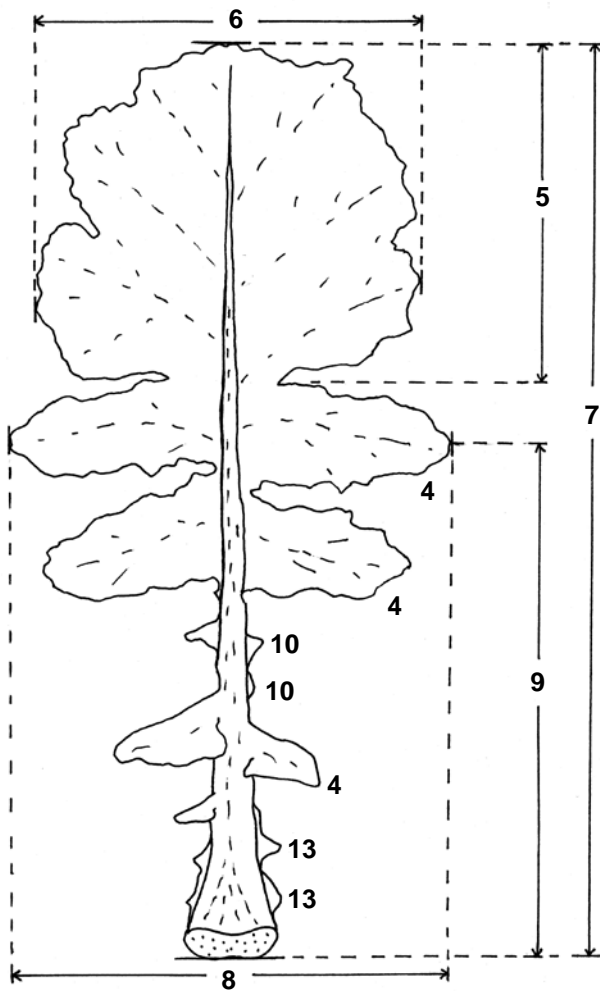
entire



lobed

Parts of the leaf blade are considered as lobes if their length is at least equivalent to the width of the leaf petiole at their point of attachment and if the upper notch of the blade has at least half the length of the lobe itself.

Ad.4-10, 13 Leaf characteristics



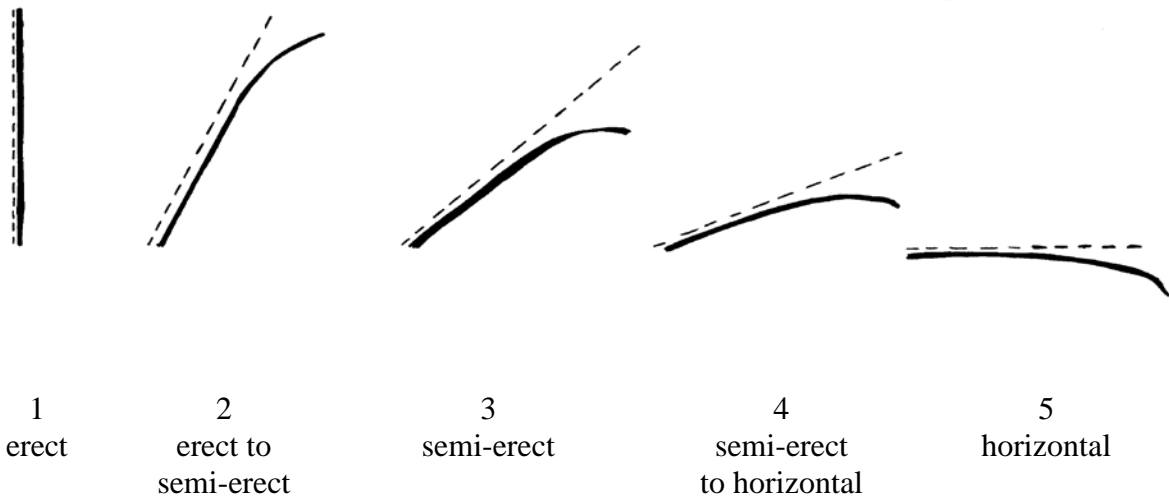
4. Leaf: number of major lobes  
(To be recorded on one side of the midrib only and excluding terminal lobe)

A major lobe is defined as leaf tissue more than 2cm in length which is cut on both sides to at least half the distance towards the midrib.

5. Leaf: length of terminal lobe
6. Leaf: width of terminal lobe
7. Leaf: total length of longest green leaf (including petiole)
8. Leaf: width  
(the widest point may be on the terminal lobe)
9. Leaf: distance from widest point to base
10. Leaf: number of minor lobes between major lobes
13. Petiole: number of minor lobes (below lowest major lobe)

A minor lobe is defined as leaf tissues less than 2cm in length which is cut on both sides, to at least half the distance towards the midrib.

Ad. 14 Petiole: attitude



Petiole attitude should be assessed along the dotted line, ignoring any reflexing at leaf tip.

Ad. 16. Root: predominant color of skin above soil

The characteristic describes the predominant color of the skin above soil over the whole root. Very slight expression of anthocyanin should be ignored on green skinned roots.

Bronze skin color is defined as chlorophyll expression with partial, but clear, expression of anthocyanin.

Ad. 18.1 Root: intensity of anthocyanin coloration of skin above soil

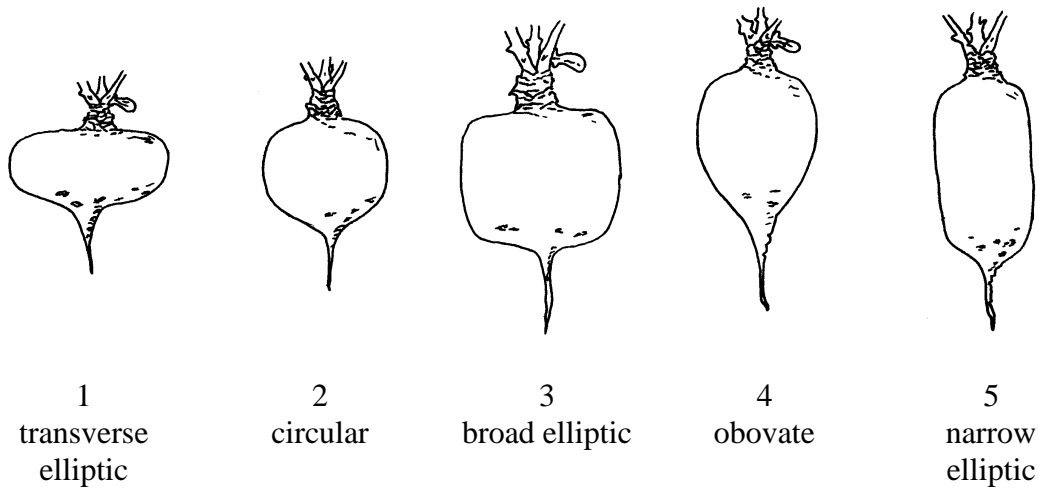
(Green or Bronze skinned varieties only)

The expression of root skin colour in Swede would appear to be simple observation with three clear states of expression: Green, Purple or Bronze.

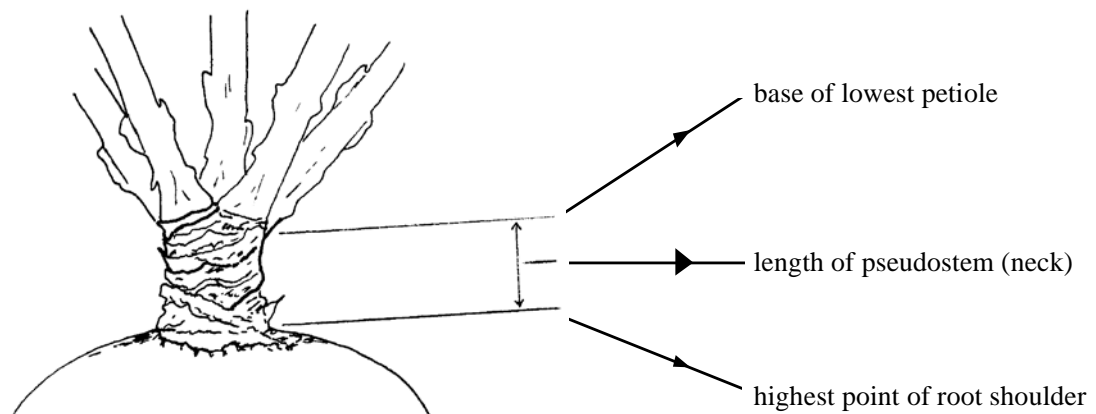
On closer examination some green skinned varieties have very slight anthocyanin expression and should be classified as Bronze skinned.

This characteristic should be recorded before the start of root cork development.

Ad. 20 Root: shape



Ad. 23 Plant: length of pseudostem (neck)



Ad. 24 Plant: anthocyanin coloration of pseudostem between leaf scars

This characteristic in conjunction with characteristic 15.1 are essential for the correct skin color classification. The following key can be used for grouping varieties.

Pseudostem (neck) surface between leaf scars green and root skin colour green	Green skinned Group
Pseudostem (neck) surface between leaf scars green and root skin colour with small expression of anthocyanin	Bronze skinned Group
Pseudostem (neck) surface between leaf scars green mottled with purple and root skin colour with small or extensive expression of anthocyanin	Bronze skinned Group
Pseudostem (neck) surface between leaf scars entirely purple with anthocyanin expressed on root skin	Purple skinned Group

Ad. 27 Root: dry matter content

One core, approximately 15 mm in diameter, is sampled diagonally (45 degrees) through the root entering at the root shoulder. A core sampled diagonally is more representative of the root than a vertical or horizontal core. Roots are sampled randomly from each plot in each replication; malformed or damaged roots are excluded from the sample. The cores are placed in a polythene bag and sealed and labelled with the plot number. If there is a delay between sampling and weighing the cores, storage in a fridge will keep cores in good condition for up to 24 hours.

2 cms are cut off each end of the fifteen cores to remove the root skin and to reduce the harder tissue under the skin surface. The trimmed cores are weighed as a bulk and placed in a drying oven in trays with a mesh base to allow circulation of hot air.

The oven temperature is set at 60 °C with 85 % recirculated air. The temperature should not be set too high, otherwise caramelisation of the tissue will affect the dry matter content. The cores are left in the drying oven for at least 48 hours. The cores should be allowed to cool for one hour after removal from the oven; dry cool cores should snap when bent. The fifteen dry cores are weighed as a bulk. Both wet and dry weights should be measured to two decimal places.

The difference between the wet and dry core weight indicates the amount of water lost in the drying process. The dry matter percentage is calculated by using the formula

$$\frac{\text{Dry Weight}}{\text{Wet Weight}} \times 100.$$

Key to growth stages

00 Dry seed

0 - 10 Germination and emergence through soil

Seedling growth

- 12 Elongation of emerging shoot
- 15 Elongation and opening of cotyledons
- 20 Cotyledons fully opened
- 30 Cotyledons fully opened and full development of first true leaf
- 40 Second leaf fully developed
- 50 Third leaf fully developed and initial senescence of cotyledons
- 60 Fourth leaf fully developed and partial senescence of cotyledons
- 70 Fifth leaf fully developed and advanced senescence/drop of cotyledons

Leaf development

- 80 Sixth leaf fully developed;
- 90 Seventh leaf fully developed; initial senescence of first true leaf in early cultivars
- 100 Eighth leaf fully developed; 30 % senescence of first true leaf
- 110 Ninth leaf fully developed; 60% senescence of first true leaf
- 120 Tenth leaf fully developed; complete senescence and drop of first true leaf
- 130 Eleventh leaf fully developed.
- 140
- 150 Few leaf scars becoming exposed on root 'neck'
- 160
- 170
- 180 Many leaf scars exposed on root 'neck'

Root development

- 200 slight swelling of the root at ground level
- 220 development of a small swollen root above ground level
- 240 swollen root medium
- 260 root fully developed with no cork on skin
- 270 root fully developed with 40% cork development on skin
- 280 root fully developed with 80 - 100% cork development
- 290 root flesh becoming pithy and fibrous
- 299 root flesh fibrous and pithy



IX. Literature

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X. Technical Questionnaire

Reference Number  
(not to be filled in by the applicant)

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TECHNICAL QUESTIONNAIRE  
to be completed in connection with an application for plant breeders' rights

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1. Species Brassica napus L. var. napobrassica (L.) Rchb.

SWEDE, RUTABAGA

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2. Applicant (Name and address)/

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3. Proposed denomination or breeder's reference

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4. Information on origin, maintenance and reproduction of the variety

4.1 Variety Type

(i) Open-pollinated variety [ ]

(ii) Other [ ]

4.2 Other information

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5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in the Test Guidelines; please mark the state of expression which best corresponds).

Caracteres de la variete a indiquer (le chiffre entre parentheses renvoie au caractere correspondant dans les principes directeurs d'examen; priere de marquer d'une croix le niveau d'expression approprie).

Anzugebende Merkmale der Sorte (die in Klammern angegebene Zahl verweist auf das entsprechende Merkmal in den Prüfungsrichtlinien; die Ausprägungsstufe, die der Sorte am nächsten kommt, bitte ankreuzen).

Characteristics Caracteres Merkmale	English	français	deutsch	Example Varieties Exemples Beispielssorten	Note
5.1 Leaf: type (3) Feuille: lobes Blatt: Blattlappen	entire			Mella, Niko	1 [ ]
	lobed			Magres	2 [ ]
5.2 Root: predominant color of skin (16) above soil	green			Melfort, Jaune a Collet Vert	1 [ ]
	bronze			(Harrietfield)	2 [ ]
	reddish purple			Kenmore, Jaune a Collet Rouge	3 [ ]
5.3 Root: anthocyanin coloration (17) of skin above soil level  Racine: pigmentation anthocyanique de l'épigerme de la partie hors terre  Rübe: Anthocyanfärbung der Epidermis des oberirdischen Teiles	absent	absente	fehlend	Seefelder	1 [ ]
	present	présente	vorhanden	Ruta Otofte	9 [ ]
5.4 Root: intensity of anthocyanin coloration of skin above soil level  Racine: intensité de la pigmentation anthocyanique de l'épiderme de la partie hors terre  Rübe: Stärke der Anthocyanfärbung der Epidermis des oberirdischen Teiles	weak	faible	gering	Melfort, Champion	3 [ ]
	medium	moyenne	mittel	Angus, Doon Major	5 [ ]
	strong	forte	stark	Merrick, Ruby	7 [ ]

<b>Characteristics Caracteres Merkmale</b>	<b>English</b>	<b>français</b>	<b>deutsch</b>	<b>Example Varieties Exemples Beispielssorten</b>	<b>Note</b>
5.5 Root: shape (20)	transverse elliptic	elliptique transverse	quer elliptisch	Acme, Seefelder	1 [ ]
Racine: forme	circular	circulaire	rund	Ruby, Jaune a Collet Vert	2 [ ]
Rübe: form	broad elliptic	elliptique large	breit elliptisch	Kenmore	3 [ ]
	obovate	obovale	verkehrt eiförmig	Doon Major	4 [ ]
	narrow elliptic	oblongue	rechteckig	Blanc Hors Terre	5 [ ]
5.6 Plant: length of pseudostem (neck) (23)	short	court	kurz	Melfort, Helena	3 [ ]
Racine: longueur due collet	medium	moyen	mittel	Ruta Otofte, Sator Otofte	5 [ ]
Rube: Länge des Halses	long	long	lang	Vittoria	7 [ ]
5.7 Root: color of flesh (25)	white	bianche	weiss	Merrick, Blanc Hors Terre	1 [ ]
Racine: couleur de la chair	yellow	jaune	gelb	Magres, Jaune a Collet Rouge	2 [ ]
Rübe: Farbe des Fleisches					

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6. Similar varieties and differences from these varieties

Denomination of similar variety	Characteristic in which which the similar variety is different	State of expression of similar variety	State of expression of candidate variety
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7. Additional information which may help to distinguish the variety

7.1 Resistance to pests and diseases

7.2 Main use:

- Agricultural/fodder [ ]
- Vegetable
  - Processing [ ]
  - Supermarket vegetable [ ]
  - Garden [ ]

7.3 Dry Matter content:

- low [ ]
- medium [ ]
- high [ ]

7.4 Other information

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8. Authorisation for release

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

Yes      [   ]                                  No          [   ]

(b) Has such authorisation been obtained?

Yes      [   ]                                  No          [   ]

If the answer to that question is 'yes', please attach a copy of such authorisation.

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[End of document]