E

TG/37/11(proj.3)
ORIGINAL: English
DATE: 2017-05-22

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

TURNIP

UPOV Code(s): BRASS_RAP_RAP

Brassica rapa L. var. *rapa* (L.) Thell.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from France
to be considered by the
Technical Working Party for Vegetables
at its fifty-first session, to be held in Roelofarendsveen, Netherlands,
from 2017-07-03 to 2017-07-07

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Brassica rapa L. var. *rapa* (L.) Thell., *Brassica rapa* L. ssp. *rapa*; var. *rapifera* Metzg.	Turnip	Navet	Herbstrübe, Mairübe	Nabo

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

ASSOCIATED DOCUMENTS

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

Other associated UPOV documents: TG 185 Turnip rape

* 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.]

TABLE OF CONTENTS PAGE

1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Brassica rapa* L. var. *rapa* (L.) Thell.

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:

20 g or 10,000 seeds

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.

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

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

3. Method of Examination

3.1 Number of Growing Cycles

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.2 Testing Place

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

3.3 Conditions for Conducting the Examination

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 60 Plants, which should be divided between at least 2 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 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.

4.1.4 Number of plants or parts of plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 40 plants or parts of plants taken from each of 40 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the second column of the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation 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

Type of observation: visual (V) or measurement (M)

“Visual” observation (V) is an observation made on the basis of the expert’s judgment. For the purposes of this document, “visual” observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, “G” provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

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

4.2.3 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.

4.2.4 For the assessment of uniformity of hybrid varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, 2 off-types are allowed.

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 further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

(a) Ploidy (characteristic 1)
(b) Petiole : anthocyanin coloration (characteristic 2)
(c) Leaf: type (characteristic 6)
(d) Swollen root (characteristic 16)
(e) Root: color of skin above soil (characteristic 18)
(f) Root: color of skin below soil (characteristic 20)
(g) Root: color of flesh (characteristic 21)
(h) Root: shape in longitudinal section (characteristic 23)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

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

6.2.1 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.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	*Note*
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	*Note*
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1 2	**3 4**	**5 6**	**7**			
	Name of characteristics in English	**Nom du caractère en français**	**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
	states of expression	types d'expression	Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

5 (+) See Explanations on the Table of Characteristics in Chapter 8.1

6 Not applicable

7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	**(*)**	**QL VS**	**(+)**	**12-70**			
		Ploidy					
		diploid				Milan White	2
		tetraploid				Taronda	4
2.	**(*)**	**QL VG**		**30-90**			
		Petiole : anthocyanin coloration	**Tige: pigmentation anthocyanique**	**Trieb: Anthocyanfärbung**	**Tallo: pigmentación antociánica**		
		absent	absente	fehlend	ausente	De Nancy à feuille entière	1
		present	présente	vorhanden	presente	Scarlet Queen Red Stem, Blanc globe à collet violet, Hinona, Onobeni	9
3.		**QN VG**	**(+)**	**70-130**			
		Leaf: attitude	**Feuille: port du pétiole**	**Blatt: Haltung des Stieles**	**Hoja: porte del peciolo**		
		erect	dressé	aufrecht	erecto	Samson, Hinona	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Agressa	3
		horizontal	horizontal	waagerecht	horizontal	Teltower Kleine	5
4.		**QN VG**	**(+)**	**100-130**			
		Leaf: degree of recurving of the top					
		absent or very weak					1
		weak				Fuku Komachi	3
		medium				Delilah	5
		strong				Noir long	7
		very strong					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	**(*)**	**QN VG**		**100-130**			
		Leaf: intensity of green color					
		very light					1
		light				Leielander	3
		medium				Civasto R	5
		dark				Frisia	7
		very dark				Aberdeen Green Top Yellow	9
6.	**(*)**	**QL VG**	**(+)**	**100-130**			
		Leaf: type	**Feuille: type**	**Blatt: Typ**	**Hoja: tipo**		
		entire				Polybra	1
		lobed				Samson	2
7.		**QN MS/VG**	**(+)**	**100-130**			
		<u>Lobed-leaf varieties only</u>: Leaf: number of lobes					
		few				Tokyo Top	3
		medium				De Montesson	5
		many				Aberdeen Green Top Yellow	7
8.		**QN VG**	**(+)**	**100-130**			
		<u>Entire-leaf varieties only</u> : Leaf : depth of incisions of margin					
		very shallow					1
		shallow				Milan White	3
		medium				Delilah	5
		deep				Tokyo Market	7
		very deep				Polybra	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**QN VG**		**100-130**			
	Leaf: undulation of margin	**Feuille : ondulation du bord**	**Blatt: Randwellung**	**Hoja: ondulación del borde**		
	absent or very weak				Tokyo Cross	1
	weak				Tokyo Top	3
	medium				Frisia	5
	strong					7
	very strong				Imperial Green Globe	9
10.	**QN VG**	**(+)**	**100-130**			
	Leaf: dentation of margin on the distal part	**Feuille: denture du bord**	**Blatt: Randzähnung**	**Hoja: dentado del borde**		
	absent or very weak					1
	weak				Milan White	3
	medium				Polybra	5
	strong				Taronda	7
	very strong				Appin	9
11. **(*)**	**QN MS/VG**	**(+)**	**100-130**			
	Leaf: length	**Feuille: longueur**	**Blatt: Länge**	**Hoja: longitud**		
	short				Milan White	3
	medium				Tokyo Cross	5
	long				Tyfon	7
12.	**QN MS/VG**	**(+)**	**100-130**			
	Leaf: width	**Feuille : largeur**	**Blatt: Breite**	**Hoja: anchura**		
	narrow				De Milan rouge extra hâtif à chassis	3
	medium				Barkant	5
	broad				Tyfon	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.		**QN MS/VG**	**(+)**	**100-130**			
		<u>Lobed-leaf varieties only</u> : Leaf: length of terminal lobe					
		short				Platte Witte Mei	3
		medium				Snowball	5
		long				D'Auvergne hâtive	7
14.		**QN MS/VG**	**(+)**	**100-130**			
		<u>Lobed-leaf varieties only</u> : Leaf: width of terminal lobe	**Feuille : largeur de la foliole terminale**	**Blatt: Breite der Endfieder**	**Hoja: anchura del foliolo terminal**		
		narrow				Platte Witte Mei	3
		medium				Civasto R	5
		broad				Massif	7
15.		**QN VG**		**100-130**			
		Leaf: hairiness of upper side					
		absent or very weak				Appin	1
		weak				Tokyo Market	3
		medium				De Milan rouge extra hâtif à chassis	5
		strong				Blanc dur d'hiver	7
		very strong					9
16.	**(*)**	**QL VG**		**200**			
		Swollen root					
		weakly expressed					1
		strongly expressed				Noir long, De Croissy, Jaune boule d'or, Blanc globe à collet violet	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.	**(*)**	**QN VG**	**(+)**	**260-290**			
		Root: position in soil	**Racine: position dans le sol**	**Rübe: Sitz im Boden**	**Raíz: posición en el suelo**		
		very shallow				Milan White Forcing	1
		shallow				Oasis	3
		medium				Agressa	5
		deep				Noir long	7
		very deep				Teltower Kleine	9
18.	**(*)**	**PQ VG**		**240-260**			
		Root: color of skin above soil					
		white				Tokyo Cross	1
		green				Leielander, Rondo	2
		yellow-orange				Jaune boule d'or	3
		red				Scarlet Queen Red Stem	4
		reddish purple				Falko, Hinona	5
		bluish purple				Barkant	6
		black				Noir long	7
19.		**QN VG**		**240-260**			
		Root: intensity of coloration of skin above soil	**Racine: intensité de la couleur principale de la chair**	**Rübe: Intensität der Hauptfarbe des Fleisches**	**Raíz: intensidad del color principal de la pulpa**		
		light	claire	hell	claro		3
		medium	moyenne	mittel	medio		5
		dark	foncée	dunkel	oscuro		7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20.	**(*)**	**PQ VG**		**240-260**			
		Root: color of skin below soil					
		white				Taronda	1
		yellow				Goldana, Jaune boule d'or	2
		red				Scarlet Queen Red Stem	3
		purple					4
		black				Noir long	5
21.	**(*)**	**PQ VG**		**240-280**			
		Root: color of flesh					
		white				Agressa	1
		light yellow				Goldana	2
		dark yellow				Jaune boule d'or	3
22.		**QL VG**		**240-280**			
		Root: anthocyanin coloration of flesh					
		absent				Marteau	1
		present				Scarlet Queen Red Stem	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23.	**(*)**	**PQ VG**		**260-280**			
		Root: shape in longitudinal section					
		oblate narrow elliptic				Platte Witte Mei	1
		oblate elliptic				Milan White	2
		circular				Rondo	3
		square				Champion Green Top, Yellow	4
		broad oblong				Delilah, Barkant	5
		narrow oblong				Long d'Alsace	6
		ovate					7
		narrow triangular				Grelos de Santiago	8
		obtriangular					9
24.	**(*)**	**QN MS/VG**		**260-280**			
		Root: length	**Racine: longueur**	**Rübe: Länge**	**Raíz: longitud**		
		very short				Milan White	1
		short				The Wallace	3
		medium				Dynamo	5
		long				Taronda	7
		very long					9
25.		**QL VG**	**(+)**	**260-280**			
		Root: curvature of vertical axis					
		absent				Taronda	1
		present				De Croissy	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.	**(*)**	**QN VG**		**260-280**			
		<u>Swollen root varieties only</u> :Root: position of widest point					
		above middle				Marteau	1
		at middle				Jaune boule d'or	2
		below middle				Blanc dur d'hiver	3
27.	**(*)**	**QN MS/VG**	**(+)**	**260-280**			
		<u>Swollen root varieties only</u> :Root: diameter					
		small				Hakutaka	3
		medium				Rondo	5
		large				Massif	7
28.	**(*)**	**QN VG**	**(+)**	**260-280**			
		<u>Swollen root varieties only</u> :Root: shape of collar					
		strongly depressed					1
		depressed				Milan White Forcing	3
		flat				Milan White	5
		raised				Taronda	7
		strongly raised				Agressa	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
29.	**(*)**	**PQ VG**		**260-280**			
		<u>Swollen root varieties only</u> :Root: shape of apex					
		depressed				Milan White Forcing	1
		truncate				Milan White	3
		rounded				Frisia	5
		broad acute				Kranjska Podolgovata	7
		narrow acute				Noir long, Hinona	9
30.		**QN MG/VG**		**260**			
		<u>Swollen root varieties only</u> :Root: time of harvest maturity					
		early				Oasis	3
		medium					5
		late				Aberdeen Green Top Yellow	7
31.		**QN VG**	**(+)**	**310**			
		Plant : number of sprouts on the top of the root					
		one or very few				Taronda	1
		few				Largo de Alsacia	3
		medium				Saô Cosme	5
		many				Globo blanco de Lugo	7
		very many				Grelos de Santiago	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32.	**QN MG/VG**		**370**			
	Plant : Time of flowering					
	very early				Greleiro Temporâo	1
	early				Tyfon, Grelos de Santiago	3
	medium				Marteau, Globo blanco de Lugo	5
	late				Bola de nieve, Jaune boule d'or	7
	very late				Platte Witte Mei, Golden Ball, Ordes	9
33.	**QN VG**		**370-400**			
	Flower : intensity of yellow colour of petal					
	weak				Taronda	3
	medium					5
	strong				Jaune boule d'or	7

8. Explanations on the Table of Characteristics

8.1 Explanations for individual characteristics

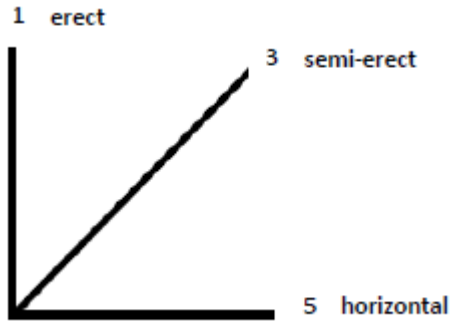
Ad. 1: Ploidy

The ploidy status of the plant can be checked by different methods as determination of the number :

- of chromosomes of the non-thickened root meristem (which is the most reliable method)
- and length of stomata on the lower side of the cotyledon (tetraploid varieties have more and longer stomata than diploid varieties)
- of chloroplasts of the guard cells on the lower side of the cotyledon (the guard cells of tetraploid varieties are bigger and contain more chloroplasts (> 20) than those of diploid varieties (> 10).

Another efficient method to determine the ploidy status is the flow cytometry (DNA quantification method).

Ad. 3: Leaf: attitude



Ad. 4: Leaf: degree of recurving of the top

The black line represents the profile of the whole leaf.

1	3	5	7	9
absent or very weak	weak	medium	strong	very strong

Ad. 6: Leaf: type

1
entire

2
lobed

Ad. 7: Lobed-leaf varieties only: Leaf: number of lobes

Parts of the leaf blade are considered to be lobes if:
1. They have a minimum length of 1 cm and
2. When folded back to the midrib as shown in Figs 1 and 2, the folded tissue meets the midrib

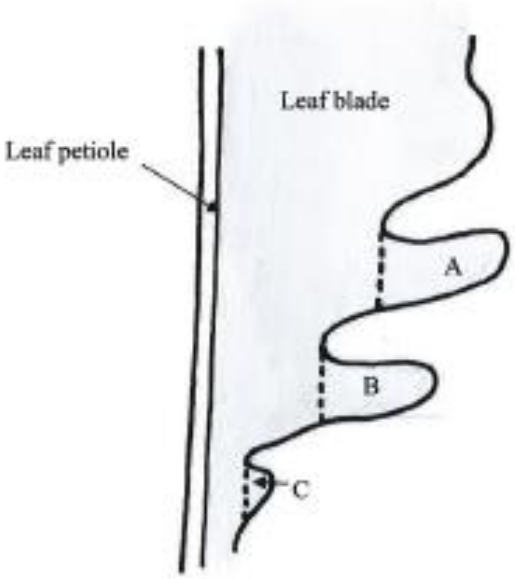


Figure 1

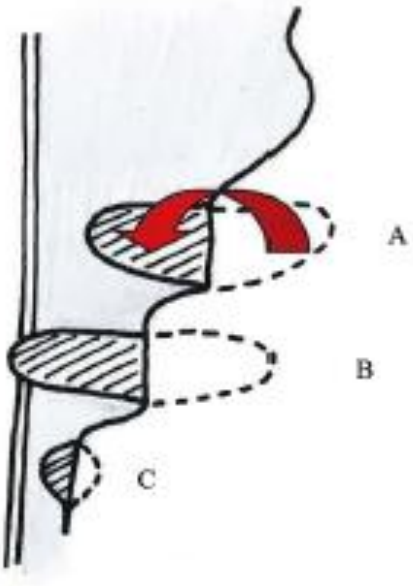
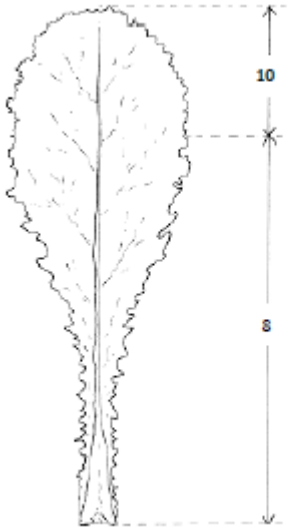


Figure 2

A is not a lobe as it does not meet the midrib when folded
B is a lobe as it meets the midrib when folded
C is too small to be a lobe as it is less than 1 cm in length and does not meet the midrib when folded

Ad. 8: Entire-leaf varieties only : Leaf : depth of incisions of margin

The broadest part of the leaf is the separation between characterics 8 and 10



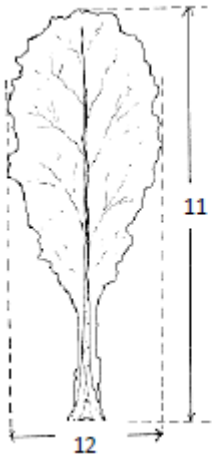
part on which the dentation of margin should be recorded (characteristic 10)

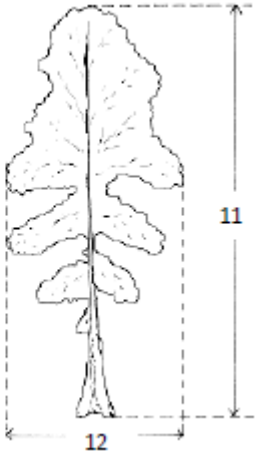
part on which the depth of incisions of margin should be recorded (characteristic 8)

Ad. 10: Leaf: dentation of margin on the distal part

See Ad. 8

Ad. 11: Leaf: length

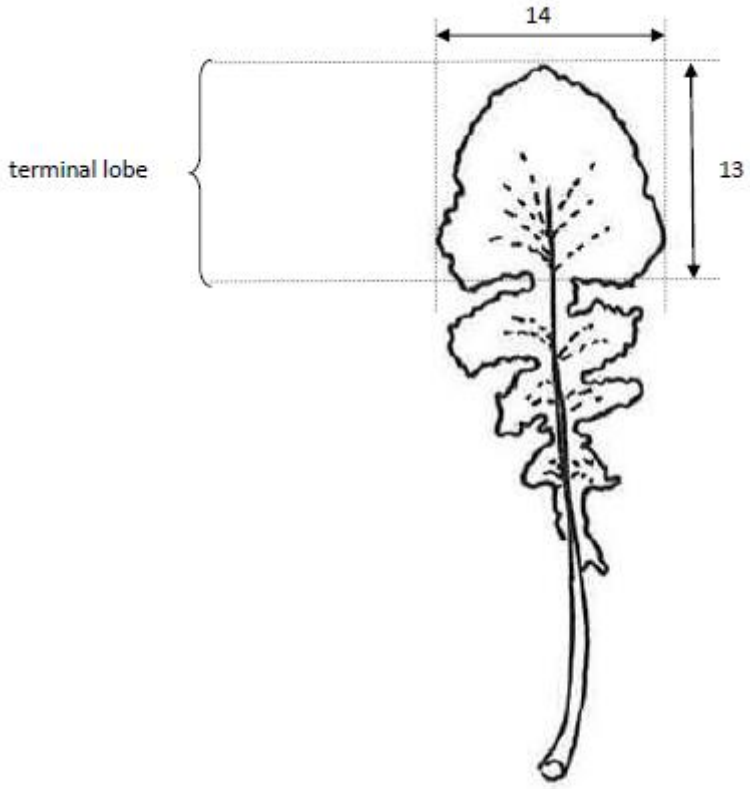




Ad. 12: Leaf: width

See Ad. 11

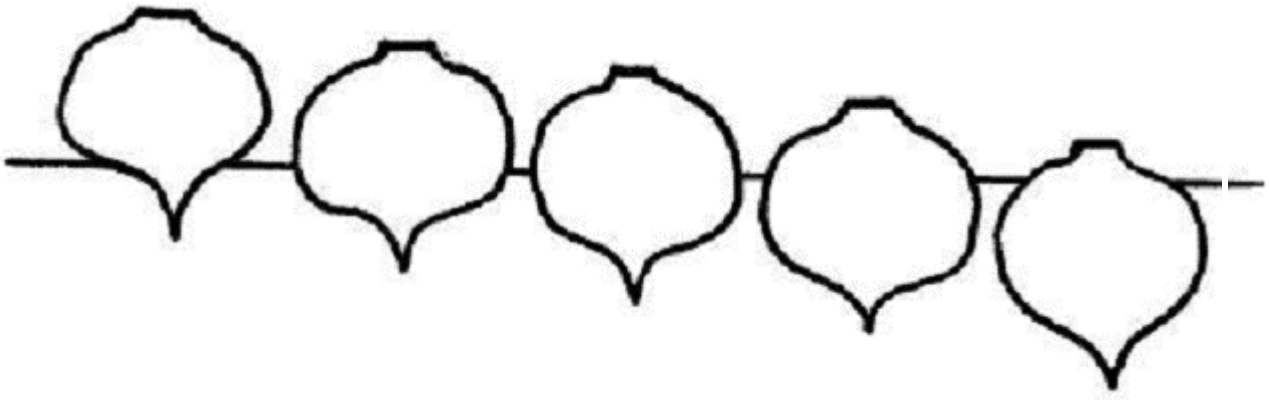
Ad. 13: Lobed-leaf varieties only : Leaf: length of terminal lobe



Ad. 14: Lobed-leaf varieties only : Leaf: width of terminal lobe

See Ad. 13

Ad. 17: Root: position in soil



1	3	5	7	9
very shallow	shallow	medium	deep	very deep

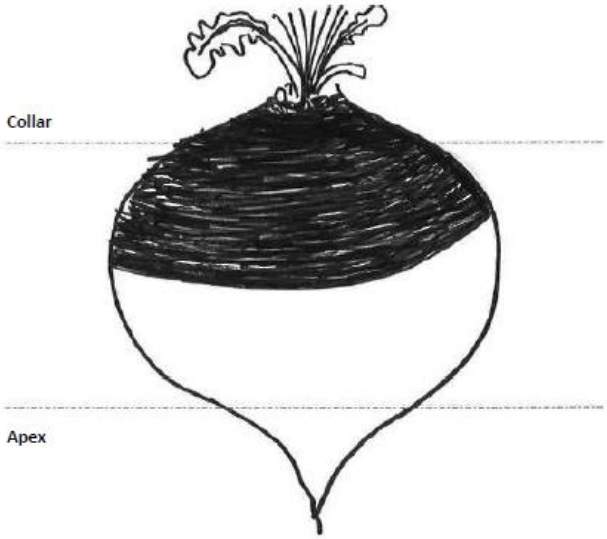
Ad. 25: Root: curvature of vertical axis

This characteristic refers to the curvature of the vertical axis for roots that are taller than they are wide.

Ad. 27: Swollen root varieties only :Root: diameter

The diameter of the root should be measured the widest point of the root

Ad. 28: Swollen root varieties only :Root: shape of collar



Ad. 31: Plant : number of sprouts on the top of the root

1
one or very few

9
very many

8.2

Key to Growth Stages

00	Dry seed
1-10	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.
	Root development
200	Slight swelling of the root at ground level
220	Development of a small swollen root above ground level
240	Swollen root increasing in size but not fully developed
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
300	Root flesh pithy and fibrous
	Flowering and seed production on main stem
310	Initial formation and elongation of the flowering stem
330	Elongation of the flowering stem with clear space between leaves
350	First bud formation and further elongation of stem
360	Terminal inflorescence in bud

370 Terminal inflorescence with first open flower

380 Terminal inflorescence partially flowering

400 Terminal inflorescence fully flowering

420 Development of siliqua with elongation of flowering stem

430 Lowest fully developed siliqua green

450 Lowest fully developed siliqua senescing and going brown

475 Lowest fully developed siliqua dry with seed beginning to dry

500 Lowest fully developed siliqua dry with mature dry seed

9. Literature

Aoba, T., 1970: Inheritance of Seed Coat Color in Turnip, Jap. Journ. Breeding 20 (3): 173-197.

Baltjes, H. J., Klein Geltink, D. J. A., Nienhuis, K. H. and Luesink, B., 1985: Linking Distinctness and Description of Varieties, Journal National Institute Agricultural Botany. 17. p. 9-19.

Green, F. N. and Winfield, P. J., 1984: The Development of Distinctness, Uniformity and Stability tests for Turnip, Turnip Rape and Swede in the United Kingdom. Procedures of Better Brassicas ’84 Conference. St. Andrews. Eds. W. H. Macfarlane Smith, T. Hodgkin and A. B. Wills. 96-107.

Scottish Crop Research Institute, Dundee. Kajanus, B., 1913: Über die Vererbungsweise gewisser Merkmale der Beta- und Brassica-Rüben. II Brassica. Zeitschrift für Pflanzenzüchtung, Band I (4): 419-466.

Klein Geltink, D. J. A., 1983: Inheritance of Leaf Shape in Turnip (Brassica rapa L. partim) and Rape (Brassica napus L.). Euphytica 32 (2): 361-365.

McMaster Davey, V., 1931: Color Inheritance in Swedes and Turnips and its Bearing on the Identification of Commercial Stocks. Nat. Journ. Agric. XIV (3): 1-13.

Padilla, G., Cartea, M.E., Rodríguez, V., Ordás, A. 2005: Genetic diversity in a germplasm collection of Brassica rapa subsp. rapa L. from northwestern Spain. Euphytica 145 171-180

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Application date: (not to be filled in by the applicant)

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

1. Subject of the Technical Questionnaire

1.1	Botanical name	*Brassica rapa* L. var. *rapa* (L.) Thell.
1.2	Common name	Turnip

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

#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 [ ]

(b) partially known cross [ ]

(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)

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:

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Cross-pollination [ ]
(b) Hybrid [ ]
(c) Other (please provide details) [ ]

4.2.2 Other [ ]
(Please provide details)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

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

	Characteristics	Example Varieties	Note
5.1 (1)	**Ploidy**		
	diploid	Milan White	2 [ ]
	tetraploid	Taronda	4 [ ]
5.2 (2)	**Petiole : anthocyanin coloration**		
	absent	De Nancy à feuille entière	1 [ ]
	present	Blanc globe à collet violet, Hinona, Onobeni, Scarlet Queen Red Stem	9 [ ]
5.3 (5)	**Leaf: intensity of green color**		
	very light		1 [ ]
	very light to light		2 [ ]
	light	Leielander	3 [ ]
	light to medium		4 [ ]
	medium	Civasto R	5 [ ]
	medium to dark		6 [ ]
	dark	Frisia	7 [ ]
	dark to very dark		8 [ ]
	very dark	Aberdeen Green Top Yellow	9 [ ]
5.4 (6)	**Leaf: type**		
	entire	Polybra	1 [ ]
	lobed	Samson	2 [ ]
5.5 (16)	**Swollen root**		
	weakly expressed		1 [ ]
	strongly expressed	Blanc globe à collet violet, De Croissy, Jaune boule d'or, Noir long	9 [ ]

	Characteristics	Example Varieties	Note
5.6 (18)	**Root: color of skin above soil**		
	white	Tokyo Cross	1 [ ]
	green	Leielander, Rondo	2 [ ]
	yellow-orange	Jaune boule d'or	3 [ ]
	red	Scarlet Queen Red Stem	4 [ ]
	reddish purple	Falko, Hinona	5 [ ]
	bluish purple	Barkant	6 [ ]
	black	Noir long	7 [ ]
5.7 (20)	**Root: color of skin below soil**		
	white	Taronda	1 [ ]
	yellow	Goldana, Jaune boule d'or	2 [ ]
	red	Scarlet Queen Red Stem	3 [ ]
	purple		4 [ ]
	black	Noir long	5 [ ]
5.8 (21)	**Root: color of flesh**		
	white	Agressa	1 [ ]
	light yellow	Goldana	2 [ ]
	dark yellow	Jaune boule d'or	3 [ ]
5.9 (23)	**Root: shape in longitudinal section**		
	oblate narrow elliptic	Platte Witte Mei	1 [ ]
	oblate elliptic	Milan White	2 [ ]
	circular	Rondo	3 [ ]
	square	Champion Green Top, Yellow	4 [ ]
	broad oblong	Barkant, Delilah	5 [ ]
	narrow oblong	Long d'Alsace	6 [ ]
	ovate		7 [ ]
	narrow triangular	Grelos de Santiago	8 [ ]
	obtriangular		9 [ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

6. Similar varieties and differences from these varieties

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

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

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

#7. Additional information which may help in the examination of the variety

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

Yes [ ] No [ ]

(If yes, please provide details)

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

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

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:

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.

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]