



## **PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY**

***Brassica napus* L. var. *napobrassica* (L.) Rchb.**

**SWEDE, RUTABAGA**

UPOV Code: BRASS\_NAP\_NBR

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## **1. SUBJECT OF THE PROTOCOL AND REPORTING**

### **1.1 Scope of the technical protocol**

This Technical Protocol applies to all varieties of *Brassica napus* L. var. *napobrassica* (L.) Rchb..

The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS (UPOV Document TG/1/3 [http://www.upov.int/export/sites/upov/resource/en/tg\\_1\\_3.pdf](http://www.upov.int/export/sites/upov/resource/en/tg_1_3.pdf)), its associated TGP documents (<http://www.upov.int/tgp/en/>) and the relevant UPOV Test Guideline TG/89/6 Rev. dated 04/04/2001 + 01/04/2009 (<http://www.upov.int/edocs/tgdocs/en/tg089.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

### **1.2 Entry into Force**

The present protocol enters into force on **01.03.2015**. Any on-going DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the Technical Protocol. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for submitting of plant material for the first test period.

In cases where the Office requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process to be carried out at the moment of this request, such report can only be accepted if the technical examination has been carried out according to the CPVO TP which was in force at the moment when the technical examination started.

### **1.3 Reporting between Examination Office and CPVO and Liaison with Applicant**

#### 1.3.1 Reporting between Examination Office and CPVO

The Examination Office shall deliver to the CPVO a preliminary report ("the preliminary report") no later than two weeks after the date of the request for technical examination by the CPVO.

The Examination Office shall also deliver to the CPVO a report relating to each growing period ("the interim report") and, when the Examination Office considers the results of the technical examination to be adequate to evaluate the variety or the CPVO so requests, a report relating to the examination ("the final report").

The final report shall state the opinion of the Examination Office on the distinctness, uniformity and stability of the variety. Where it considers those criteria to be satisfied, or where the CPVO so requests, a description of the variety shall be added to the report. If a report is negative the Examination Office shall set out the detailed reasons for its findings.

The interim and the final reports shall be delivered to the CPVO as soon as possible and no later than on the deadlines as laid down in the designation agreement.

#### 1.3.2 Informing on problems in the DUS test

If problems arise during the course of the test the CPVO should be informed immediately so that the information can be passed on to the applicant. Subject to prior permanent agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

#### 1.3.3 Sample keeping in case of problems

If the technical examination has resulted in a negative report, the CPVO shall inform the Examination Office as soon as possible in case that a representative sample of any relevant testing material shall be kept.

## **2. MATERIAL REQUIRED**

### **2.1 Plant material requirements**

Information with respect to the agreed closing dates and submission requirements of plant material for the technical examination of varieties can be found on <http://cpvo.europa.eu/applications-and-examinations/technical-examinations/submission-of-plant-material-s2-publication> in the special issue S2 of the Official Gazette of the Office. General requirements on submission of samples are also to be found following the same link.

## **2.2 Informing the applicant of plant material requirements**

The CPVO informs the applicant that

- he is responsible for ensuring compliance with any customs and plant health requirements.
- the plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.
- 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.

## **2.3 Informing about problems on the submission of material**

The Examination Office shall report to the CPVO immediately in cases where the test material of the candidate variety has not arrived in time or in cases where the material submitted does not fulfil the conditions laid down in the request for material issued by the CPVO.

In cases where the examination office encounters difficulties to obtain plant material of reference varieties the CPVO should be informed.

## **3. METHOD OF EXAMINATION**

### **3.1 Number of growing cycles**

#### **Two independent growing cycles**

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

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" [http://www.upov.int/edocs/tgpdocs/en/tgp\\_9.pdf](http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf).

### **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.

#### **Stage of development for the assessment**

The optimum stage of development for the assessment of each characteristic is indicated by a number in the third column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

### **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 two 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**

In accordance with Article 83(3) of Council Regulation No. 2100/94 an applicant may claim either in the Technical Questionnaire or during the test that a candidate has a characteristic which would be helpful in establishing distinctness. If such a claim is made and is supported by reliable technical data, an additional test may be undertaken providing that a technically acceptable test procedure can be devised.

Additional tests will be undertaken, with the agreement of the President of CPVO, where distinctness is unlikely to be shown using the characters listed in the protocol.

### **3.6 Constitution and maintenance of a variety collection**

The process for the constitution and the maintenance of a variety collection can be summarized as follows:

Step 1: Making an inventory of the varieties of common knowledge

Step 2: Establishing a collection ("variety collection") of varieties of common knowledge which are relevant for the examination of distinctness of candidate varieties

Step 3: Selecting the varieties from the variety collection which need to be included in the growing trial or other tests for the examination of distinctness of a particular candidate variety.

#### 3.6.1 Forms of variety collection

##### **(a) Fruit species and seed propagated agricultural and vegetable species**

The variety collection shall comprise variety descriptions and living plant material, thus a living reference collection. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive and pictorial information produced by the EO shall be held and maintained in a form of a database.

##### **(b) Vegetatively propagated agricultural and vegetable species**

The variety collection shall comprise variety descriptions; no living reference collection is required. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive and pictorial information produced by the EO shall be held and maintained in a form of a database.

#### 3.6.2 Living Plant Material

##### **(a) Fruit species and seed propagated agricultural and vegetable species**

The EO shall collect and maintain living plant material of varieties of the species concerned in the variety collection.

##### **(b) Vegetatively propagated agricultural and vegetable species and ornamental species**

The EO shall obtain living plant material of reference varieties as and when those varieties need to be included in growing trials or other tests.

#### 3.6.3 Range of the variety collection

The living variety collection shall cover at least those varieties that are suitable to climatic conditions of a respective EO.

#### 3.6.4 Making an inventory of varieties of common knowledge for inclusion in the variety collection

The inventory shall take into account the list of protected varieties and the official, or other, registers of varieties, in particular:

The inventory shall include varieties protected under National PBR (UPOV contracting parties) and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list and varieties in trade or in commercial registers for those species not covered by a National or the Common Catalogue.

#### 3.6.5 Maintenance and renewal/update of a living variety collection

##### **(a) Seed propagated species**

The EO shall maintain seeds in conditions which will ensure germination and viability, periodical checks, and renewal as required. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons between the material in the collection and the new material.

##### **(b) Vegetatively propagated species**

The EO shall maintain the variety collection under appropriate growing conditions (e.g. glasshouse, orchard, in vitro), where it shall be ensured that the plants are adequately irrigated, fertilised, pruned and protected from harmful pests and diseases. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons between the material in the collection and the new material or by checking the identity of the new material against the variety description.

## 4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

The prescribed procedure is to assess distinctness, uniformity and stability in a growing trial.

### 4.1 Distinctness

#### 4.1.1 General recommendations

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 9 'Examining Distinctness' ([http://www.upov.int/edocs/tgpdocs/en/tgp\\_9.pdf](http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf)) prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

Further guidance is provided in documents TGP/9 "Examining Distinctness" and TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".

#### 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 Technical Protocols are familiar with the recommendations contained in the UPOV-General Introduction to DUS prior to making decisions regarding distinctness.

#### 4.1.4 Number of plants/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 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 third 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.

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**

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 10 'Examining Uniformity' ([http://www.upov.int/edocs/tgpdocs/en/tgp\\_10.pdf](http://www.upov.int/edocs/tgpdocs/en/tgp_10.pdf)) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

### **(a) Cross-pollinated varieties**

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

### **(b) Hybrid varieties**

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 UPOV-General Introduction to DUS.

## **4.3 Stability**

4.3.1 It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 11 'Examining Stability' ([http://www.upov.int/edocs/tgpdocs/en/tgp\\_11.pdf](http://www.upov.int/edocs/tgpdocs/en/tgp_11.pdf)).

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 or plant 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) Leaf: type (characteristic 3)
- (b) Root: anthocyanin coloration of skin above soil (characteristic 13)
- (c) Root: intensity of anthocyanin coloration of skin above soil (characteristic 14.1 and 14.2)
- (d) Pseudostem: anthocyanin coloration between leaf scars (characteristic 20)
- (e) Root: colour of flesh (characteristic 21)

**5.4** If other characteristics than those from the TP are used for the selection of varieties to be included into the growing trial, the EO shall inform the CPVO and seek the prior consent of the CPVO before using these characteristics.

## 6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS

### 6.1 Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted or by specific legislation on plant health. In the latter case, the CPVO should be informed.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N°874/2009, to insert additional characteristics and their expressions in respect of a variety.

#### Technical Protocols with asterisked characteristics (only for certain vegetable species)

In the case of disease resistance characteristics, only those resistances marked with an asterisk (\*) in the CPVO column are compulsory.

#### States of expression and corresponding notes

In the case of qualitative and pseudo-qualitative characteristics, 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 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

### 6.3 Legend

For the CPVO N° column:

G Grouping characteristic – see Chapter 5  
(\*) Asterisked characteristic – see Chapter 6.1.2

MG, MS, VG, VS – see Chapter 4.1.5  
QL Qualitative characteristic  
QN Quantitative characteristic  
PQ Pseudo-qualitative characteristic

(a) See Explanations on the Table of Characteristics in Chapter 8.1  
(+) See Explanations on the Table of Characteristics in Chapter 8.2

For the UPOV N° column:

The numbering of the characteristics is provided as a reference to the ad hoc UPOV guideline.

(\*) UPOV Asterisked characteristic – Characteristics that are important for the international harmonization of variety descriptions.



## 7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>1.</b>	<b>1.</b> (* )	<b>VG</b>	<b>Leaf: intensity of green colour</b>		
<b>QN</b>		<b>100-150</b>	light	Airlie	3
		<b>(a)</b>	medium	Marian	5
		<b>(b)</b>	dark	Joan	7
<b>2.</b>	<b>2.</b>	<b>VG</b>	<b>Leaf: intensity of waxiness</b>		
<b>QN</b>		<b>100-150</b>	weak	Seefeldler	3
		<b>(a)</b>	medium		5
			strong	Heinkenborsteler	7
<b>3.</b>	<b>3.</b> (* )	<b>VG</b>	<b>Leaf: type</b>		
<b>QL</b>					
<b>(+)</b>		<b>80-150</b>	entire	Niko	1
<b>G</b>		<b>(a)</b>	lobed	Jaune à Collet Rouge, Magres	2
<b>4.</b>	<b>4.</b>	<b>VG/MS</b>	<b><u>Only lobed-leaf varieties:</u> Leaf: number of lobes</b>		
<b>QN</b>		<b>100-150</b>	few	Wilhelmsburger	3
<b>(+)</b>		<b>(a)</b>	medium	Ruta Otofte	5
			many	Marian	7
<b>5.</b>	<b>5.</b> (* )	<b>VG/MS</b>	<b><u>Only lobed-leaf varieties:</u> Leaf: length of terminal lobe</b>		
<b>QN</b>		<b>100-150</b>	short	Laurentian	3
<b>(+)</b>		<b>(a)</b>	medium	Sator Otofte	5
			long	Kenmore	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>6.</b>	<b>6. (*)</b>	<b>VG/MS</b>	<b>Only lobed-leaf varieties: Leaf: width of terminal lobe</b>		
<b>QN</b>		<b>100-150</b>	narrow	Laurentian	3
<b>(+)</b>		<b>(a)</b>	medium	Sator Otofte	5
			broad	Kenmore	7
<b>7.</b>	<b>7. (*)</b>	<b>VG/MS</b>	<b>Leaf: length</b>		
<b>QN</b>		<b>100-150</b>	short	Excelsior	3
<b>(+)</b>		<b>(a)</b>	medium	Ruta Otofte	5
			long	Teviotdale	7
<b>8.</b>	<b>8. (*)</b>	<b>VG/MS</b>	<b>Leaf: width</b>		
<b>QN</b>		<b>100-150</b>	narrow	Dryden	3
<b>(+)</b>		<b>(a)</b>	medium	Ruta Otofte	5
			broad	Kenmore	7
<b>9.</b>	<b>9.</b>	<b>VG</b>	<b>Leaf: undulation of margin</b>		
<b>QN</b>		<b>100-150</b>	absent or very weak	Helena, Lizzy	1
		<b>(a)</b>	weak		3
			medium	Champion	5
			strong		7
			very strong	Magres	9
<b>10.</b>	<b>10. (*)</b>	<b>VG</b>	<b>Petiole: attitude</b>		
<b>QN</b>		<b>100-150</b>	erect		1
<b>(+)</b>			semi-erect	Ruta Otofte	3
			horizontal	Brora, Helena	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>11.</b>	<b>11.</b>	<b>VG</b>	<b>Petiole: thickness</b>		
<b>QN</b>		<b>100-150</b>	thin	Vogesa	3
			medium	Marian	5
			thick	Heinkenborsteler	7
<b>12.</b>	<b>12. (*)</b>	<b>VG</b>	<b>Root: predominant colour of skin above soil</b>		
<b>PQ</b>		<b>240-270</b>	green	Jaune à Collet Verte, Melfort, Seefeldler	1
<b>(+)</b>	<b>(c)</b>		bronze	Frise Gele, Harrietfield	2
			reddish purple	Angus, Jaune à Collet Rouge, Kenmore	3
<b>13.</b>	<b>13. (*)</b>	<b>VG</b>	<b>Root: anthocyanin coloration of skin above soil</b>		
<b>QL</b>		<b>240-270</b>	absent	Seefeldler	1
<b>G</b>	<b>(c)</b>		present	Jaune à Collet Rouge, Ruta Otofte	9
<b>14.1</b>	<b>14.1 (*)</b>	<b>VG</b>	<b><u>Only varieties with green or bronze skin colour:</u> Root: intensity of anthocyanin coloration of skin above soil</b>		
<b>QN</b>		<b>250-270</b>	weak	Melfort	3
<b>(+)</b>	<b>(c)</b>		medium	Angus	5
<b>G</b>			strong	Kenmore	7
<b>14.2</b>	<b>14.2 (*)</b>	<b>VG</b>	<b><u>Only varieties with reddish purple skin colour:</u> Root: intensity of anthocyanin coloration of skin above soil</b>		
<b>QN</b>		<b>250-270</b>	weak	Champion	3
	<b>(c)</b>		medium	Doon Major	5
<b>G</b>			strong	Ruby	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>15.</b>	<b>15.</b>	<b>VG</b>	<b>Root: predominant colour of skin below soil level</b>		
<b>PQ</b>		<b>250-270</b>	white	Niko	1
		<b>(c)</b>	yellow	Jaune à Collet Verte, Mella	2
			orange pink	Jaune à Collet Rouge	3
			reddish	Marian	4
<b>16.</b>	<b>16. (*)</b>	<b>VG</b>	<b>Root: shape in longitudinal section</b>		
<b>PQ</b>		<b>260-299</b>	transverse elliptic	Acme, Seefelder	1
<b>(+)</b>			circular	Jaune à Collet Verte, Ruby	2
			obovate	Doon Major	3
			square	Kenmore	4
			oblong	Blanc Hors Terre	5
<b>17.</b>	<b>17. (*)</b>	<b>VG/MS</b>	<b>Root: length</b>		
<b>QN</b>		<b>260-290</b>	short	Sator Otofte	3
			medium	Airlie, Ruby	5
			long	Aubigny Green Top	7
<b>18.</b>	<b>18. (*)</b>	<b>VG/MS</b>	<b>Root: diameter</b>		
<b>QN</b>		<b>260-290</b>	small	Laurentian	3
			medium	Ruta Otofte, Sator Otofte	5
			large	Kenmore	7
<b>19.</b>	<b>19. (*)</b>	<b>VG/MS</b>	<b>Pseudostem: length</b>		
<b>QN</b>		<b>260-299</b>	short	Helena, Melfort	3
<b>(+)</b>			medium	Ruta Otofte, Sator Otofte	5
			long	Vittoria	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>20.</b>	<b>20. (*)</b>	<b>VG</b>	<b>Pseudostem: anthocyanin coloration between leaf scars</b>		
<b>QL</b>		<b>260-299</b>	absent or partial	Melfort, Merrick, Seefelder	1
<b>G</b>			solid	Champion, Magres	2
<b>21.</b>	<b>21. (*)</b>	<b>VG</b>	<b>Root: colour of flesh</b>		
<b>PQ</b>		<b>260-280</b>	white	Blanc Hors Terre, Merrick	1
<b>G</b>			yellow	Jaune à Collet Rouge, Magres	2
<b>22.</b>	<b>22.</b>	<b>VG</b>	<b>Root: intensity of yellow colour of flesh</b>		
<b>QN</b>		<b>260-280</b>	light	Doon Major	3
			medium	Magres	5
			dark		7
<b>23.</b>	<b>23. (*)</b>	<b>VG</b>	<b>Flower: production of pollen</b>		
<b>QL</b>		<b>410-470</b>	absent	Tweed	1
<b>(+)</b>			present	Magres	9

## 8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

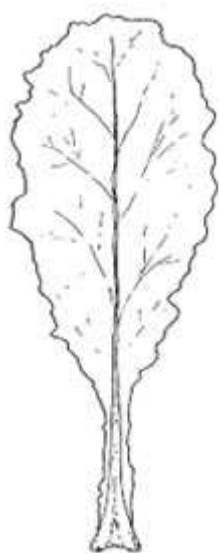
### 8.1 Explanations covering several characteristics

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

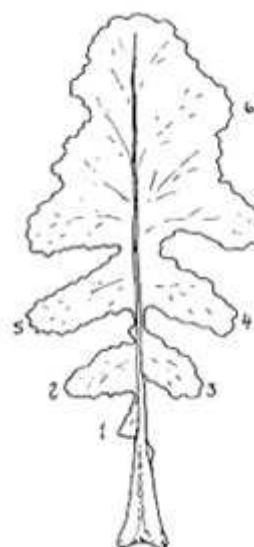
- (a) Unless otherwise indicated, all observations on the leaves should be made on the largest fully developed (non-senescent leaf).
- (b) Unless otherwise indicated, assessment of leaf colour should be made on leaves before powdery mildew infection is established.
- (c) Unless otherwise indicated, all observations on the root skin colour should be made before cork development obscures the skin.

### 8.2 Explanations for individual characteristics

Ad. 3: Leaf: type



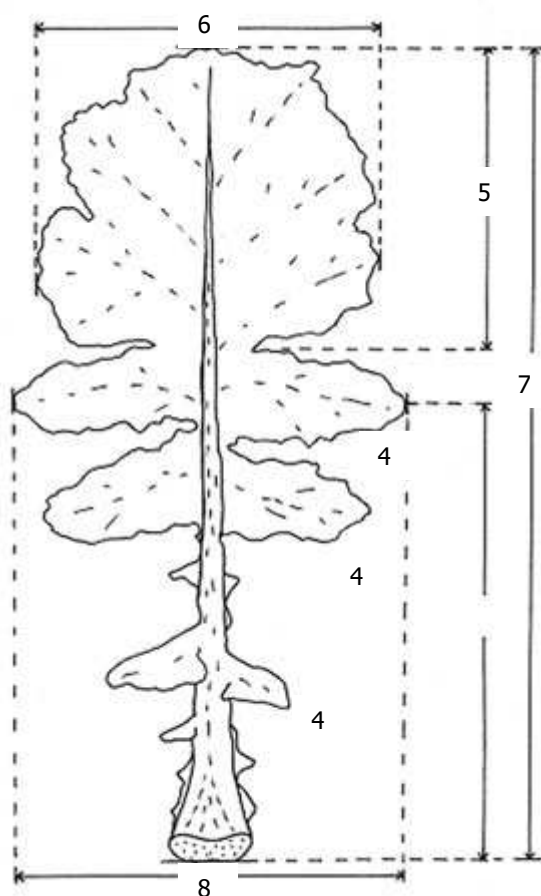
1  
entire



2  
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. 4-8: Leaf characteristics



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

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

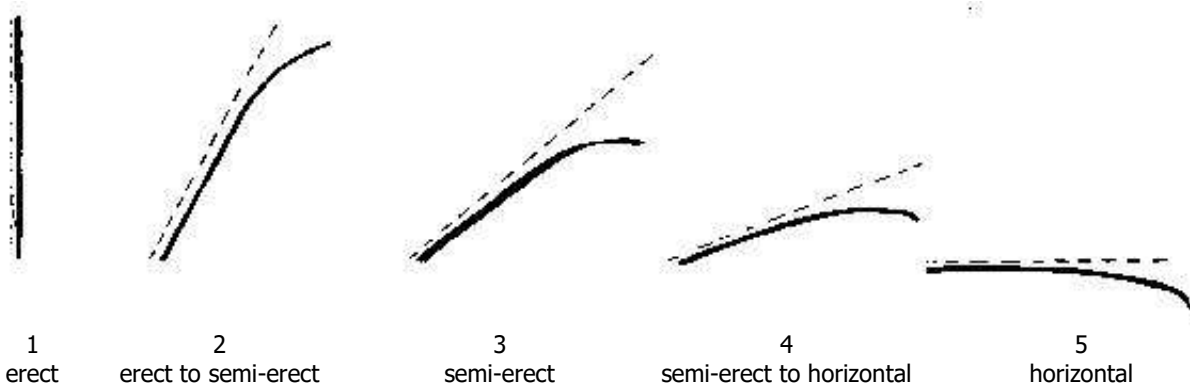
5. Leaf: length of terminal lobe

6. Leaf: width of terminal lobe

7. Leaf: length

8. Leaf: width

Ad. 10: Petiole: attitude



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

Ad. 12: Root: predominant colour of skin above soil

Bronze roots may be characterised by the gradual transition from a predominantly green colour to predominantly bronze. This can be observed on the mature root before cork reduces the clarity of the skin colour. Bronze skin colour should be confirmed by comparison with the example varieties.

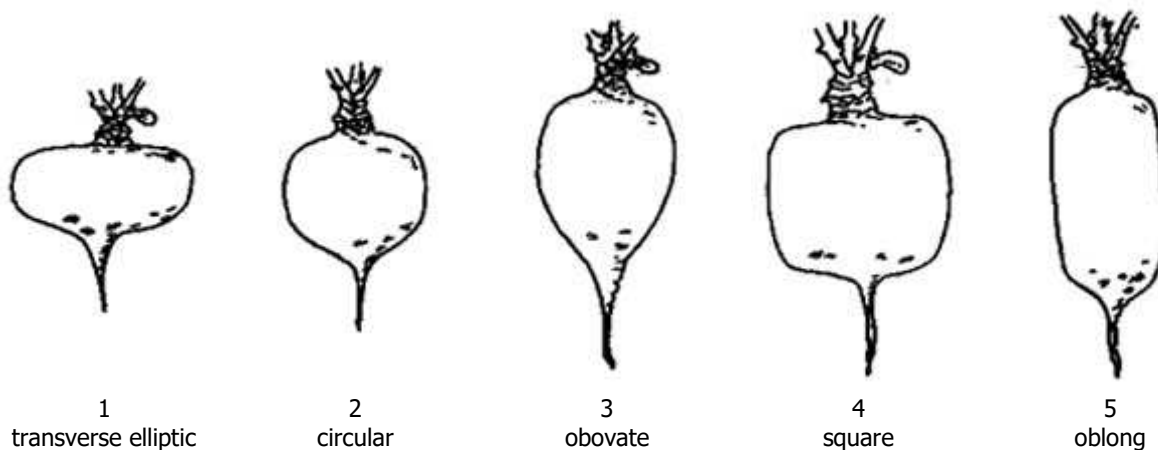
Ad. 14.1: Root: intensity of anthocyanin coloration of skin above soil (green or bronze skinned varieties only)

The expression of the root skin color in Swede would appear to be a simple observation with three clear states of expression: green, purple or bronze.

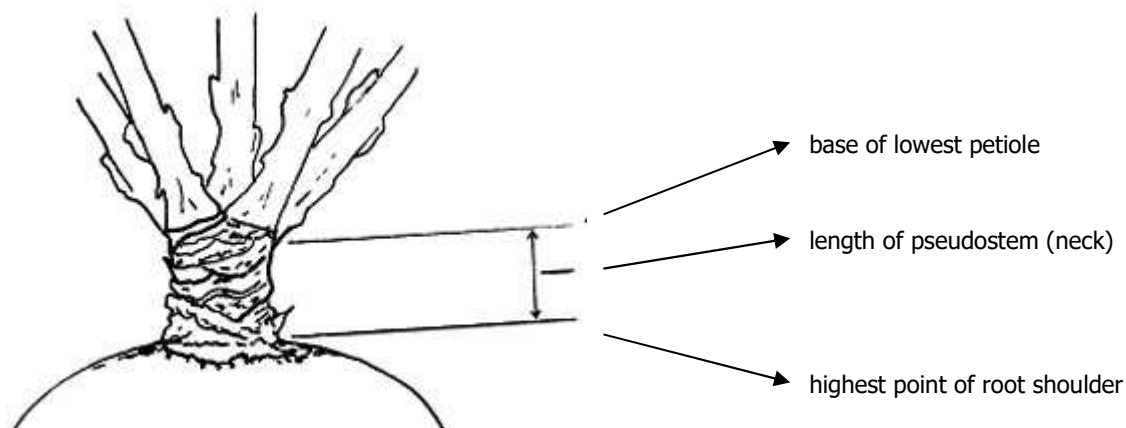
On closer examination some green skinned varieties have light anthocyanin, uniformly expressed, and should be classified as bronze skinned roots.

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

Ad. 16: Root: shape in longitudinal section



Ad. 19: Pseudostem: length



Ad. 23: Flower: production of pollen

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



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

Flowering

400     First flower open on terminal raceme  
410     Few flowers are open on terminal raceme  
420     Full flowering; lower siliques are elongating  
450     Lower siliques are starting to fill, less than 5% of flower buds are not yet open  
470     Seeds in lower siliques are enlarging, all buds have opened

## **9. LITERATURE**

No specific literature.

## **10. TECHNICAL QUESTIONNAIRE**

The Technical Questionnaire is available on the CPVO website under the following reference: CPVO-TQ/089/1