



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

***Raphanus sativus* L. var *oleiformis* Pers.**

### **FODDER RADISH**

UPOV Code: RAPHA\_SAT\_OLE

**Adopted on 15/03/2017**

**Entry into force on 15/03/2017**

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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 *Raphanus sativus* L. var. *oleiformis* Pers.

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/en/publications/intro\\_dus.htm](http://www.upov.int/en/publications/intro_dus.htm)), its associated TGP documents

<http://www.upov.int/en/publications/tgp/>) and the relevant UPOV Test Guideline TG/178/1 dated 04/04/2001 (<http://www.upov.int/edocs/tgdocs/en/tg178.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

### **1.2 Entry into Force**

The present protocol enters into force on **15.03.2017**. Any ongoing 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://www.cpvo.europa.eu/main/en/home/documents-and-publications/s2-gazette> 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 vigour, 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**

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

### **3.2 Testing Place**

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

[http://www.upov.int/export/sites/upov/en/publications/tgp/documents/tgp\\_9\\_1.pdf](http://www.upov.int/export/sites/upov/en/publications/tgp/documents/tgp_9_1.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.

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.

### **3.4 Test design**

Each test should be designed to result in a total of at least 300 plants, which should be divided between at least three or more replicates.

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**

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.

**3.6.2 Living Plant Material**

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

**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**

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.

**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/export/sites/upov/en/publications/tgp/documents/tgp\\_9\\_1.pdf](http://www.upov.int/export/sites/upov/en/publications/tgp/documents/tgp_9_1.pdf)) prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

**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.

**Decision standards**

If distinctness is assessed by the combined over years distinctness analysis (COYD) the difference between two varieties is clear if the respective characteristics are different at the 2% significance level or less ( $p < 0.02$ ) in a test over either two or three years.

If the conditions for the application of the COYD analyses are not fulfilled, distinctness should be assessed using the 2x1% method.

If distinctness is assessed using the 2 x 1% criterion, the varieties need to be significantly different in the same direction at the 1% level in at least two out of three years in one or more measured characteristics. The tests in each year are based on Student's two-tailed-t-test of the difference between variety means with standard errors estimated using the residual mean square from the analysis of the variety x replicate plot means.

If the significance level or statistical methods proposed are not appropriate the method used should be clearly described.

#### 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 60 plants or parts taken from each of 60 plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 1.

#### 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. colour 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**

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/export/sites/upov/en/publications/tgp/documents/tgp\\_10\\_1.pdf](http://www.upov.int/export/sites/upov/en/publications/tgp/documents/tgp_10_1.pdf)) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

If uniformity is assessed by the combined over years uniformity method (COYU) the candidate variety is sufficiently uniform in the respective characteristic if the relative tolerance limit in relation to comparable varieties does not exceed the 0.1% significance level or less ( $p < 0.001$ ) in a test over two or three years.

If the conditions of the COYU analyses are not fulfilled, uniformity should be assessed by the relative variance method for a sample size of 60 plants the threshold level should be 1.6 x variance of the comparable varieties.

For the assessment of uniformity of visually observed characteristics, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 300 plants, 10 off-types are allowed.

### 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/export/sites/upov/en/publications/tgp/documents/tgp\\_11\\_1.pdf](http://www.upov.int/export/sites/upov/en/publications/tgp/documents/tgp_11_1.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 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) Time of flowering (characteristic 11)

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.

#### 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
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	See Explanations on the Table of Characteristics in Chapter 8.1 and 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.
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### For the column "stage, method":

05 – 89	See Explanations on the Table of Characteristics in Chapter 8.3
MG, MS, VG, VS	Method of observation – see Chapter 4.1.5



## 7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>1.</b>	<b>1.</b>	<b>05</b>	<b>Ploidy</b>		
(+)	(*)		diploid	Pegletta	2
<b>QL</b> <b>G</b>			tetraploid	Black Jack, Trident	4
<b>2.</b>	<b>2.</b>	<b>11</b>	<b>Cotyledon: length</b>		
(+)		<b>MS</b>	short		3
<b>QN</b>			medium	Siletina, Toro	5
			long	Valencia	7
<b>3.</b>	<b>3.</b>	<b>11</b>	<b>Cotyledon: width</b>		
(+)		<b>MS</b>	narrow	Dracula	3
<b>QN</b>			medium	Arena, Toro	5
			broad	Trident	7
<b>4.</b>	<b>4.</b>	<b>16-59</b>	<b>Leaf: intensity of green colour</b>		
	(*)	<b>VG</b>	light	Deeptill, Structurator	3
<b>QN</b>			medium	Pegletta, Siletina	5
			dark	Black Jack, Nemaflex	7
<b>5.</b>	<b>5.</b>	<b>16-59</b>	<b>Leaf: lobes</b>		
<b>QL</b>	(*)	<b>VG</b>	absent		1
			present	Pegletta	9
<b>6.</b>	<b>6.</b>	<b>16-59</b>	<b>Leaf: number of lobes</b>		
(+)		<b>MS</b>	few	Splendid	3
<b>QN</b>			medium	Don Quichote, Siletina	5
			many	Black Jack	7
<b>7.</b>	<b>7.</b>	<b>16-59</b>	<b>Leaf: dentation of margin</b>		
(+)		<b>VG</b>	weak	Black Jack	3
<b>QN</b>			medium	Bento, Radical	5
			strong	Xcellent	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>8.</b>	<b>8.</b>	<b>16-59</b>	<b>Leaf: length</b>		
<b>(+)</b>	<b>(*)</b>	<b>MS</b>	very short	Black Jack	1
<b>QN</b>			short	Nemaflex	3
			medium	Compass	5
			long	Bento	7
<b>9.</b>	<b>9.</b>	<b>16-59</b>	<b>Leaf: width</b>		
<b>(+)</b>	<b>(*)</b>	<b>MS</b>	narrow	Black Jack	3
<b>QN</b>			medium	Doublet, Pegletta	5
			broad	Jorba	7
<b>10.</b>	<b>10.</b>	<b>16-59</b>	<b>Leaf: length of petiole</b>		
<b>(+)</b>	<b>(*)</b>	<b>MS</b>	short	Black Jack, Splendid	3
<b>QN</b>			medium	Pegletta, Toro	5
			long	Bento	7
<b>11.</b>	<b>12.</b>		<b>Time of flowering</b>		
<b>(+)</b>	<b>(*)</b>	<b>MS</b>	very early	Litinia	1
<b>QN</b>			early	Octopus, Pegletta	3
			medium	Doublet, Reform	5
			late	Black Jack, Jorba	7
<b>G</b>			very late	Respect	9
<b>12.</b>	<b>13.</b>	<b>65</b>	<b>Plant: height <u>at full flowering</u></b>		
	<b>(*)</b>	<b>MG</b>	low	Dracula	3
<b>QN</b>			medium	Doublet	5
			tall	Jorba, Valencia	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>13.</b>	<b>14.</b>	<b>65</b>	<b>Flower: colour of petals</b>		
<b>(+)</b>	<b>(*)</b>	<b>VG</b>	white	Black Jack, Doublet	1
<b>PQ</b>			violet	Radical, Toro	2
			reddish	Reflex	3
			yellow		4
			yellow orange		5
<b>14.</b>	<b>15.</b>	<b>89</b>	<b>Plant: total length</b>		
	<b>(*)</b>	<b>MS</b>	very short		1
<b>QN</b>			short	Dracula	3
			medium	Compass	5
			Long	Don Quichote, Valencia	7
			very long	Respect	9
<b>15.</b>	<b>16.</b>	<b>89</b>	<b>Siliqua: length</b>		
<b>a</b>	<b>(*)</b>	<b>MS</b>	short	Trident	3
<b>QN</b>			medium	Toro	5
			long	Compass, Valencia	7
<b>16.</b>	<b>17.</b>	<b>89</b>	<b>Siliqua: length of beak</b>		
<b>a</b>	<b>(*)</b>	<b>MS</b>	short	Splendid	3
<b>QN</b>			medium	Lunetta	5
			long	Radical	7
<b>17.</b>	<b>18.</b>	<b>89</b>	<b>Siliqua: width</b>		
<b>a</b>		<b>MS</b>	narrow	Dracula	3
<b>QN</b>			medium	Lunetta	5
			broad	Xcellent	7
<b>18.</b>	<b>19.</b>	<b>89</b>	<b>Siliqua: length of peduncle</b>		
<b>a</b>		<b>MS</b>	short	Don Quichote	3
<b>QN</b>			medium	Jorba	5
			long	Toro, Radical	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>19.</b>	<b>20.</b>	<b>89</b>	<b>Siliqua: number of seeds</b>		
<b>a</b>		<b>MS</b>	low	Don Quichote, Trident	1
<b>QN</b>			medium	Octopus, Radical	3
			high		5
<b>20.</b>	<b>21.</b>	<b>89</b>	<b>Seed: thousand seed weight</b>		
<b>QN</b>		<b>MS</b>	low	Splendid	3
			medium	Bento, Siletina	5
			high	Xcellent	7
<b>21.</b>	<b>22.</b>	<b>VG</b>	<b>Tendency to form inflorescences for late summer sown trials</b>		
<b>(+)</b>			absent or very weak	Black Jack	1
<b>QN</b>			weak	Bento	3
			medium		5
			strong	Siletina	7
			very strong	Splendid	9
<b>22.</b>	<b>23.</b>	<b>VS</b>	<b>Root: colour</b>		
<b>(+)</b>	<b>(*)</b>		white	Pegletta	1
<b>QN</b>			red	Slobolt	2
			violet		3
			blackish brown	Black Jack	4

## 8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

### 8.1 Explanations for individual characteristics

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

- a) All observations on the siliqua should be recorded in the mid-part of the inflorescence of the main stem.

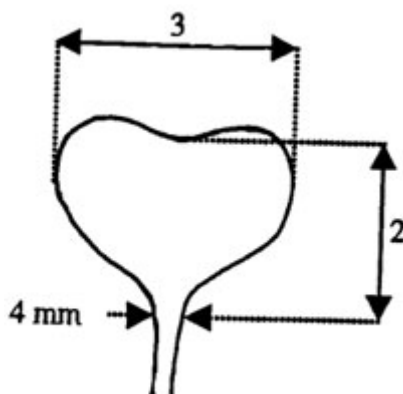
### 8.2 Explanations for individual characteristics

#### Ad. 1: Ploidy

Ploidy should be assessed by standard cytological methods.

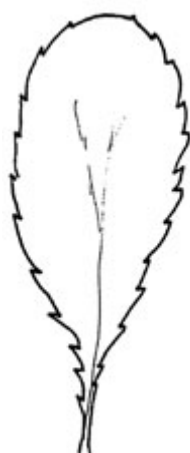
#### Ad. 2 - 3: Cotyledon: length (2) and width (3)

The measurements should be taken in the glasshouse. If the two cotyledons differ in size, the bigger one should be measured. The length is defined as distance between the inclination at top of the cotyledon and the point where the width of the petiole is about 4 mm. The width of the cotyledon should be measured at the widest point of the cotyledons.

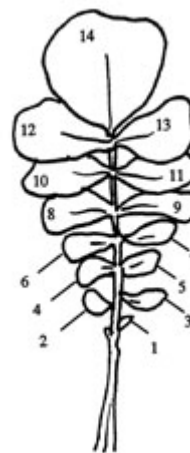


#### Ad. 5 - 6: Leaf: presence (5) and number of lobes (6)

Absence or presence of lobing should be observed on the whole plant. 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. The number of lobes should be observed on fully developed leaves.



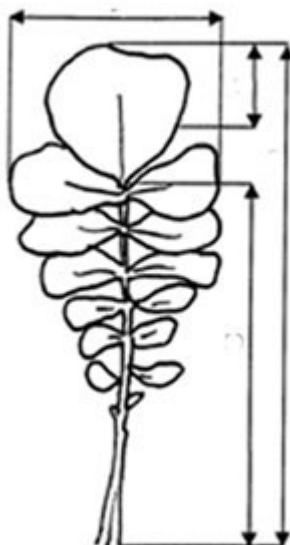
1  
absent



2  
present

Ad. 7 - 10: Leaf: dentation (7), length (8), width (9), length of petiole (10)

7 = part on which the dentation should be recorded (characteristic 7)

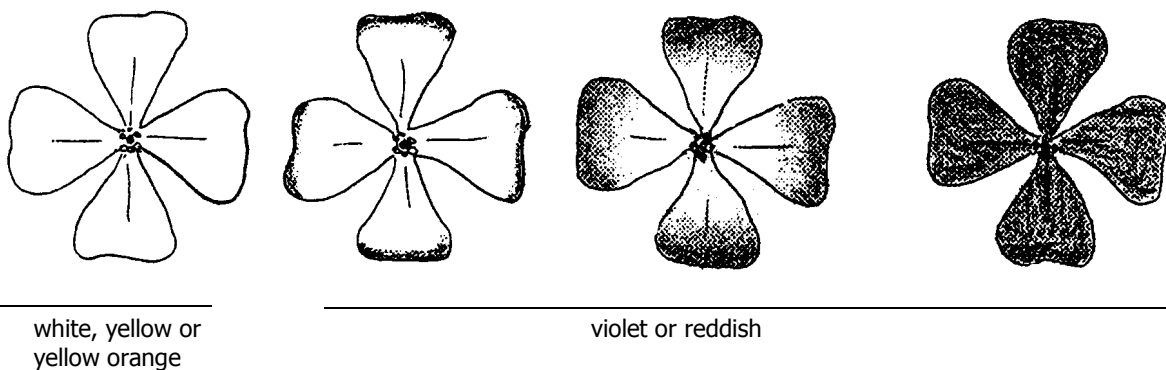


Ad 11: Time of flowering

The observation should be done at least three times per week and more frequently if there is any need to do so. The date should be calculated – if necessary by interpolation – at which 50% of plants show at least one open flower.

Ad. 13: Flower: colour of petals

The violet and reddish colour should be observed independent of its extension on the petal.



For varieties which show a segregation of plants with violet petals and white petals or with reddish petals and white petals the proportions of the states of expression should be recorded. A segregation of plants with three different colours is not tolerated.

Ad. 21: Tendency to form inflorescence for late summer sown trials

In a separate sowing the observation of the growth stage should be made in autumn, when the development stagnates.

Ad. 22: Root: colour

In a separate sowing in late summer with half the density of the normal plots the colour of skin should be recorded when the development in autumn stagnates.

The colour is observed independent of its extension on the root and its intensity, immediately after lifting of the roots.

### 8.3 Phenological growth stages according to the BBCH-identification keys of oilseed rape (Meyer, 1997)

Code	Description
<b>Principal growth stage 0: Germination</b>	
00	Dry seed
01	Beginning of seed imbibition
03	Seed imbibition complete
05	Radicle emerged from seed
07	Hypocotyl with cotyledons emerged from seed
08	Hypocotyl with cotyledons growing towards soil surface
09	Emergence: cotyledons emergence through soil surface
<b>Principal growth stage 1: Leaf development</b>	
10	Cotyledons completely unfolded
11	First leaf unfolded
12	2 leaves unfolded
13	3 leaves unfolded
14	4 leaves unfolded
15	5 leaves unfolded
16	6 leaves unfolded
17	7 leaves unfolded
18	8 leaves unfolded
19	9 or more leaves unfolded
<b>Principal growth stage 2: Formation of side shoots</b>	
20	No side shoots
21	Beginning of side shoot development: first side shoot visible
22	2 side shoots visible
23	3 side shoots visible
24	4 side shoots visible
25	5 side shoots visible
26	6 side shoots visible
27	7 side shoots visible
28	8 side shoots visible
29	End of side shoot development: 9 or more side shoots visible
<b>Principal growth stage 3: Stem elongation</b>	
30	Beginning of stem elongation: no internodes ('rosette')
31	1 visibly extended internodes
32	2 visibly extended internodes
33	3 visibly extended internodes
34	4 visibly extended internodes
35	5 visibly extended internodes
36	6 visibly extended internodes
37	7 visibly extended internodes
38	8 visibly extended internodes
39	9 or more visibly extended internodes
<b>Principal growth stage 4: --</b>	
<b>Principal growth stage 5: Inflorescence emergence</b>	
50	Flower buds present, still enclosed by leaves
51	Flower buds visible from above ("green bud")
52	Flower buds free, level with the youngest leaves
53	Flower buds raised above the youngest leaves
55	Individual flower buds (main inflorescence) visible but still closed
57	Individual flower buds (secondary inflorescences) visible but still closed
59	First petals visible, flower buds still closed ("yellow bud")



Code	Description
<b>Principal growth stage 6: Flowering</b>	
60	First flowers open
61	10 % of flowers on main raceme open, main raceme elongating
62	20 % of flowers on main raceme open
63	30 % of flowers on main raceme open
64	40 % of flowers on main raceme open
65	Full flowering: 50 % flowers on main raceme open, older petals falling
67	Flowering declining: majority of petals fallen
69	End of flowering
<b>Principal growth stage 7: Development of fruit</b>	
71	10 % of pods have reached final size
72	20 % of pods have reached final size
73	30 % of pods have reached final size
74	40 % of pods have reached final size
75	50 % of pods have reached final size
76	60 % of pods have reached final size
77	70 % of pods have reached final size
78	80 % of pods have reached final size
79	Nearly all pods have reached final size
<b>Principal growth stage 8: Ripening</b>	
80	Beginning of ripening: seed green, filling pod cavity
81	10 % of pods ripe, seeds dark and hard
82	20 % of pods ripe, seeds dark and hard
83	30 % of pods ripe, seeds dark and hard
84	40 % of pods ripe, seeds dark and hard
85	50 % of pods ripe, seeds dark and hard
86	60 % of pods ripe, seeds dark and hard
87	70 % of pods ripe, seeds dark and hard
88	80 % of pods ripe, seeds dark and hard
89	Fully ripe: nearly all pods ripe, seeds dark and hard

## 9. LITERATURE

Growth stages of mono- and dicotyledonous plants: BBCH-Monograph. Federal Biological Research Centre of Agriculture and Forestry (ed.) Ed. by Uwe Meier.-Berlin; Wien [u.a.]: Blackwell Wiss.-Verl., 1997

## **10. TECHNICAL QUESTIONNAIRE**

The Technical Questionnaire is available on the CPVO website under the following reference:  
CPVO-TQ/178/1