



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

*Cichorium intybus* L.

**WITLOOF CHICORY**

UPOV Code: CICHO\_INT

**Adopted on 21/03/2018**

**Entry into force on 01/01/2018**

## **TABLE OF CONTENTS**

### **CPVO-TP/173/2**

1.	SUBJECT OF THE PROTOCOL AND REPORTING.....	3
1.1	Scope of the technical protocol.....	3
1.2	Entry Into Force.....	3
1.3	Reporting between Examination Office and CPVO and Liaison with Applicant.....	3
2.	MATERIAL REQUIRED .....	3
2.1	Plant material requirements .....	3
2.2	Informing the applicant of plant material requirements.....	4
2.3	Informing about problems on the submission of material .....	4
3.	METHOD OF EXAMINATION.....	4
3.1	Number of growing cycles.....	4
3.2	Testing Place .....	4
3.3	Conditions for Conducting the Examination.....	4
3.4	Test design.....	4
3.5	Additional tests .....	4
3.6	Constitution and maintenance of a variety collection .....	4
4.	ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY .....	5
4.1	Distinctness .....	5
4.2	Uniformity .....	6
4.3	Stability.....	6
5.	GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL.....	6
6.	INTRODUCTION TO THE TABLE OF CHARACTERISTICS .....	7
6.1	Characteristics to be used .....	7
6.2	Example Varieties.....	8
6.3	Legend.....	8
7.	TABLE OF CHARACTERISTICS.....	9
8.	EXPLANATIONS ON THE TABLE OF CHARACTERISTICS.....	16
8.1	Explanations covering several characteristics .....	16
8.2	Explanations for individual characteristics.....	16
9.	LITERATURE .....	21
10.	TECHNICAL QUESTIONNAIRE .....	22

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

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

This Technical Protocol applies to all varieties of *Cichorium intybus* L. excluding industrial chicory (CPVO/TP-172/2) and leaf chicory (CPVO/TP-154/1).

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/173/4(proj.6) dated 05/04/2017 (<http://www.upov.int/edocs/tgdocs/en/tg173.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

### **1.2 Entry into Force**

The present protocol enters into force on **01.01.2018**. 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://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 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.

All varieties should be included in one trial, regardless the season of forcing that a variety is bred for.

### **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.

### **3.4 Test design**

Each test should be designed to result in a total of at least 100 plants, which should be divided between at least 2 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/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 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.

#### 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**

4.2.1 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 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:

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

4.2.3 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 100 plants, 3 off-types are allowed. Clearly recognizable inbred plants are excluded from the counting of off-types.

4.2.4 In addition:

- a population standard of 3% with an acceptance probability of at least 95% should be applied to clearly recognizable inbred plants in hybrids where male sterility has been used;
- a population standard of 5% with an acceptance probability of at least 95% should be applied to clearly recognizable inbred plants in hybrids where male sterility has not been used.

## 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 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: length (characteristic 4)
- b) Leaf: colour (characteristic 7)
- c) Leaf: intensity of colour (characteristic 8)
- d) Time of beginning of flowering (characteristic 19)
- e) Male sterility (characteristic 25)

**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 (only for certain vegetable species)
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	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 harmonisation of variety descriptions.
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For column "stage, method":

MG, MS, VG, VS	– see Chapter 4.1.5
(a)-(c)	See Explanations on the Table of Characteristics in Chapter 8.1



## 7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note	
<b>1.</b> <b>(+)</b>  <b>QN</b>	<b>1.</b>	<b>VG</b>	<b>Cotyledon: shape</b>			
			circular	Bea, Flash, Magnum	1	
			broad elliptic		2	
			elliptic	Takine, Zoom	3	
<b>2.</b> <b>(+)</b>  <b>QN</b>	<b>2.</b> <b>(*)</b>	<b>MS/VG</b>	<b>Plant: height</b>			
			<b>(a)</b>	short	Janus	3
				medium	Ecrine, Selkis	5
			tall	Topmodel, Zilia	7	
<b>3.</b> <b>(+)</b>  <b>QN</b>	<b>3.</b> <b>(*)</b>	<b>VG</b>	<b>Plant: habit</b>			
			<b>(a)</b>	upright		1
				semi-upright	Ecrine, Omblin	3
			spreading	Perfo	5	
<b>4.</b> <b>(+)</b>  <b>QN</b>   <b>G</b>	<b>4.</b> <b>(*)</b>	<b>MS/VG</b>	<b>Leaf: length</b>			
			<b>(a)</b>	short	Janus	3
				medium	Ecrine, Omblin	5
				long	Atlas, Platine	7
			very long	Zilia	9	
<b>5.</b> <b>(+)</b>  <b>QN</b>	<b>5.</b> <b>(*)</b>	<b>MS/VG</b>	<b>Leaf: width</b>			
			<b>(a)</b>	narrow	Monroe, Redoria	3
				medium	Baccara, Bea, Extral, Flash, Zoom	5
			broad	Atlas, Symphonie	7	

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>6.</b> <b>(+)</b>  <b>QN</b>	<b>6.</b>	<b>MS/VG</b>  <b>(a)</b>	<b>Leaf: ratio width/length</b>		
			low	Zilia	3
			medium	Baccara , Bea, Ecrine	5
			high	Selkis	7
<b>7.</b>  <b>QL</b>  <b>G</b>	<b>7.</b> <b>(*)</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: colour</b>		
			only green	Genie	1
			green and red	Festive	2
			only red	Carla, Redoria	3
<b>8.</b>  <b>QN</b>  <b>G</b>	<b>8.</b> <b>(*)</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: intensity of colour</b>		
			light		3
			medium	Excellence, Janus	5
			dark	Focus	7
<b>9.</b>  <b>QN</b>	<b>9.</b> <b>(*)</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: glossiness</b>		
			absent or very weak		1
			weak	Abellis, Flash	2
			medium	Baccara, Fakir	3
			strong	Rikita	4
			very strong		5
<b>10.</b> <b>(+)</b>  <b>QN</b>	<b>10.</b> <b>(*)</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: shape in cross-section</b>		
			concave	Abellis, Crenoline	1
			flat	Excellence, Perfo, Zilia, Zoom	2
			convex		3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>11.</b> <b>QN</b>	<b>11.</b> <b>(*)</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: blistering</b>		
			absent or very weak		1
			weak	Abellis, Flash, Platine	3
			medium	Alliance, Ecrine	5
			strong	Rikita, Zoom	7
<b>12.</b> <b>QN</b>	<b>12.</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: anthocyanin coloration of midrib</b>		
			absent or very weak	Baccara, Excellence	1
			weak	Abellis, Flash, Jocker	3
			medium	Zoom	5
			strong		7
<b>13.</b> <b>QN</b>	<b>13.</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: undulation of margin</b>		
			weak		3
			medium	Atlas, Baccara, Platine	5
			strong	Montblanc	7
<b>14.</b> <b>(+)</b> <b>QN</b>	<b>14.</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: number of incisions of basal part</b>		
			absent of very few		1
			few	Crenoline, Selkis	3
			medium	Alliance, Bea, Topscore	5
			many	Atlas, Zilia	7
<b>15.</b> <b>(+)</b> <b>QN</b>	<b>15.</b>	<b>VG</b>  <b>(a)</b>	<b>Leaf: depth of incisions of basal part</b>		
			shallow	Abellis, Desir, Flash, Zoom	3
			medium	Baccara, Omblin, Symphonie	5
			deep	Rikita	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>16. (+)</b>	<b>16. (*)</b>	<b>VG</b>	<b>Leaf: incisions of margin of upper third</b>		
<b>QN</b>		<b>(a)</b>	absent or very weak	Selkis	1
			weak	Abellis, Flash, Janus, Topscore	3
			medium	Baccara, Jocker, Symphonie, Zoom	5
			strong	Platine	7
<b>17. (+)</b>	<b>17.</b>	<b>VG</b>	<b>Leaf: shape of apex</b>		
<b>QN</b>		<b>(a)</b>	rounded	Abellis, Magnum, Topscore	1
			weakly pointed	Atlas, Fakir, Takine	2
			strongly pointed	Platine	3
<b>18.</b>	<b>18.</b>	<b>VG</b>	<b>Bolting tendency</b>		
<b>QN</b>		<b>(b)</b>	weak	Bea, Montblanc	3
			medium	Flash, Omblin	5
			strong	Topmodel	7
<b>19.</b>	<b>19. (*)</b>	<b>MS/VG</b>	<b>Time of beginning of flowering</b>		
<b>QN</b>		<b>(b)</b>	early	Jadore, Prestance, Takine	3
			medium	Abellis, Bea, Ecrine, Hermès, Omblin	5
<b>G</b>			late	Flexine	7
<b>20. (+)</b>	<b>20.</b>	<b>MS/VG</b>	<b>Flowering stem: height</b>		
<b>QN</b>		<b>(b)</b>	short		3
			medium	Desir, Perfo	5
			tall	Atlas, Festive, Selkis	7
<b>21.</b>	<b>21.</b>	<b>VG</b>	<b>Flowering stem: branching</b>		
<b>QN</b>		<b>(b)</b>	weak		3
			medium	Atlas, Ecrine, Perfo	5
			strong	Abellis	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>22.</b> <b>(+)</b>  <b>QN</b>	<b>22.</b>	<b>MS/VG</b>  <b>(b)</b>	<b>Flowering stem: size of stipule</b>		
			small	Crenoline, Excellence, Magnum	3
			medium	Bea, Desir, Festive, Topmodel,	5
			large	Crenoline, Excellence, Magnum	7
<b>23.</b> <b>(+)</b>  <b>QN</b>	<b>23.</b>	<b>VG</b>  <b>(b)</b>	<b>Flowering stem: dentation of stipule</b>		
			weak	Alliance, Flash, Elegance, Jadore	3
			medium	Abellis, Platine	5
			strong		7
<b>24.</b>  <b>(*)</b>  <b>PQ</b>	<b>24.</b>  <b>(*)</b>	<b>VG</b>  <b>(b)</b>	<b>Flower: colour</b>		
			white		1
			pink	Selkis	2
			blue	Bea, Flash	3
<b>25.</b> <b>(+)</b>  <b>QL</b>  <b>G</b>	<b>25.</b>  <b>(*)</b>	<b>VS</b>  <b>(b)</b>	<b>Male sterility</b>		
			absent	Flash	1
			present	Omblin	9
<b>26.</b>  <b>(*)</b>  <b>QN</b>	<b>26.</b>  <b>(*)</b>	<b>MS/VG</b>  <b>(c)</b>	<b>Head: length</b>		
			very short		1
			short		3
			medium	Bea, Omblin	5
			long	Focus, Perfo, Prestance	7
			very long	Normale	9
<b>27.</b>  <b>(*)</b>  <b>QN</b>	<b>27.</b>  <b>(*)</b>	<b>MS/VG</b>  <b>(c)</b>	<b>Head: diameter</b>		
			small		3
			medium	Bea, Ecrine	5
			large	Zilia	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
<b>28.</b>	<b>28.</b>	<b>MS/VG</b>	<b>Head: ratio diameter/length</b>		
<b>QN</b>		<b>(c)</b>	low	Opale	3
			medium	Bea, Desir, Panache	5
			high	Atlas, Focus	7
<b>29. (+)</b>	<b>29. (*)</b>	<b>VG</b>	<b>Head: shape in longitudinal section</b>		
<b>PQ</b>		<b>(c)</b>	ovate	Abellis, Selkis	1
			broad elliptic	Crenoline, Topmodel	2
			medium elliptic	Excellence, Jocker	3
			narrow elliptic	Symphonie	4
<b>30.</b>	<b>30. (*)</b>	<b>VG</b>	<b>Head: shape of apex</b>		
<b>QN</b>		<b>(c)</b>	rounded	Abellis, Crenoline	1
			weakly pointed	Baccara, Elegance	2
			strongly pointed	Fakir, Symphonie, Zoom	3
<b>31.</b>	<b>31. (*)</b>	<b>VG</b>	<b>Head: colour of leaf blade</b>		
<b>QL</b>		<b>(c)</b>	only yellow	Flexine, Harmonie, Perfo, Takine	1
			yellow and red		2
			only red	Festive, Selkis	3
<b>32.</b>	<b>32. (*)</b>	<b>VG</b>	<b>Head: intensity of colour of leaf blade</b>		
<b>QN</b>		<b>(c)</b>	light	Elegance, Perfo	3
			medium	Baccara, Harmoie, Omblin, Selkis	5
			dark	Abellis, Ecrine, Festive, Takine	7
<b>33.</b>	<b>33.</b>	<b>VG</b>	<b>Head: blistering of leaf blade</b>		
<b>QN</b>		<b>(c)</b>	absent or very weak	Hermès, Topmodel	1
			weak		3
			medium	Baccara, Festive, Zoom	5
			strong		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note		
<b>34. (+)</b>	<b>34.</b>	<b>VG</b>	<b>Head: openness of apex</b>				
			<b>QN</b>	<b>(c)</b>	closed	Baccara, Hermès	1
					half open	Abellis, Zilia	2
					fully open	Sirion	3
<b>35. (+)</b>	<b>35.</b>	<b>VG</b>	<b>Head: length of axis</b>				
			<b>QN</b>	<b>(c)</b>	very short	Selkis	1
					short	Extral	3
					medium	Ecrine, Takine	5
					long	Atlas, Zilia	7
					very long		9

## 8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

### 8.1 Explanations covering several characteristics

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

- a) Observations should be made when leaves are fully developed.
- b) Observations should be made in a special bolting trial in which a flowering stem is formed. Plants should be exposed to cold temperature in order to start bolting. An additional test in early sowing conditions may be established.
- c) Observations should be made after a forcing period before exposure to daylight.

At the end of the growing season, roots are harvested and the leaves are cut at about 3 cm from the attachment to the root. The roots are stored at a temperature which depends on the length of the storage and with a humidity of about 95%, before transplanting to a container in 2 repetitions of 50 roots. The forcing may be performed by hydroculture or in soil. In order not to hide the phenotype of the varieties, the application of calcium chloride should be avoided. The containers are placed in a completely dark forcing room in controlled conditions (temperature, hygrometry, fertilization). The air temperature should be about 17°C and the water temperature of 18-19°C. The water and air temperature must be controlled to allow the complete and normal development of the head. Literature may be consulted (Willcox).

### 8.2 Explanations for individual characteristics

Ad. 1: Cotyledon: shape

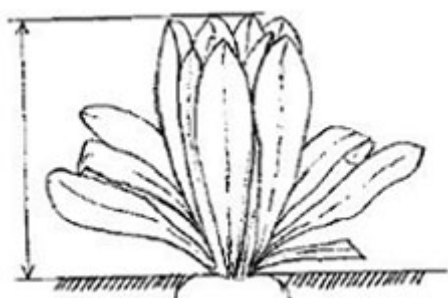


1  
circular



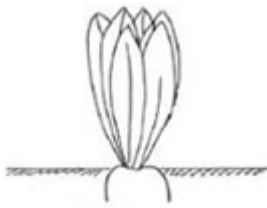
3  
elliptic

Ad. 2: Plant: height

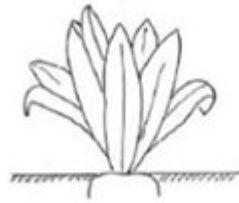




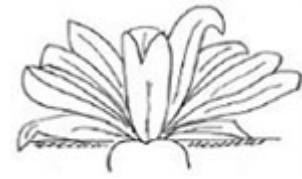
Ad. 3: Plant: habit



1  
upright

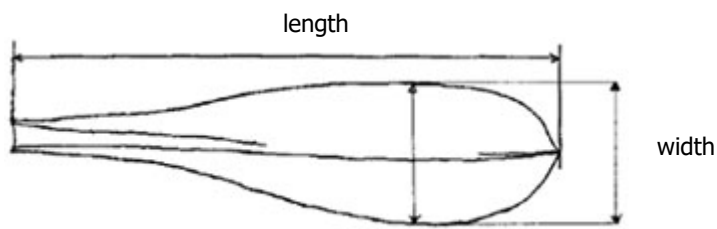


3  
semi-upright



5  
spreading

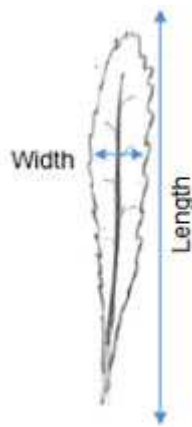
Ad. 4: Leaf: length



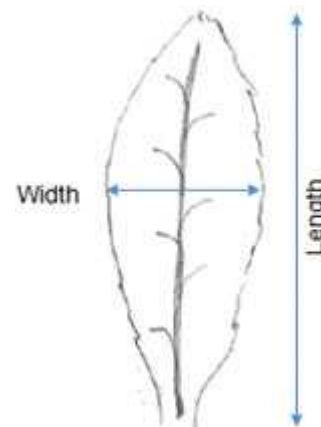
Ad. 5: Leaf: width

See Ad. 4.

Ad. 6: Leaf: ratio width/length



3  
low



7  
high

Ad. 10: Leaf: shape in cross-section



1  
concave

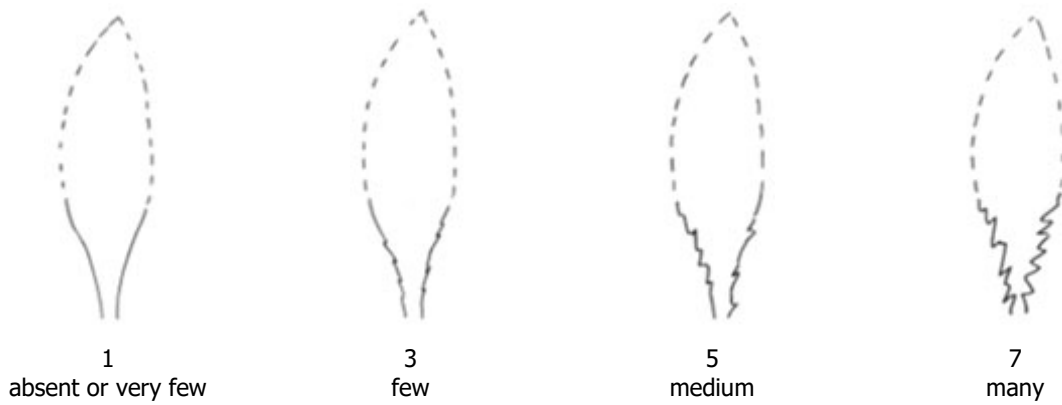


2  
flat



3  
convex

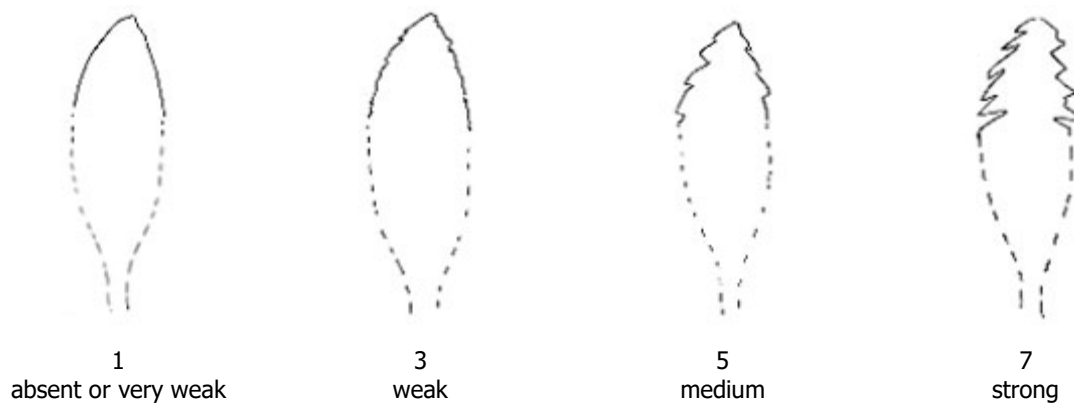
Ad. 14: Leaf: number of incisions of basal part



Ad. 15: Leaf: depth of incisions of basal part



Ad. 16: Leaf: incisions of margin of upper third



Ad. 17: Leaf: shape of apex



Ad. 20: Flowering stem: height

Observations should be made when the first flower opens.

Ad. 22: Flowering stem: size of stipule

Observations should be made on the stipules of the upper third of the flowering stem.

Ad. 23: Flowering stem: dentation of stipule

Observations should be made on the stipules of the upper third of the flowering stem.

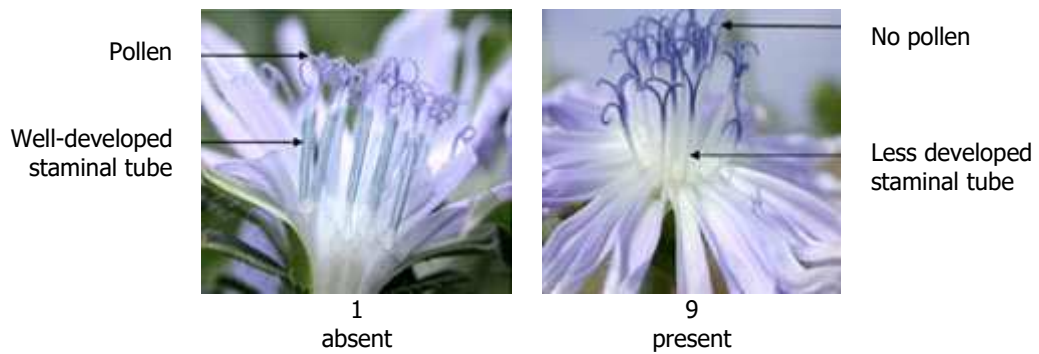


3  
weak

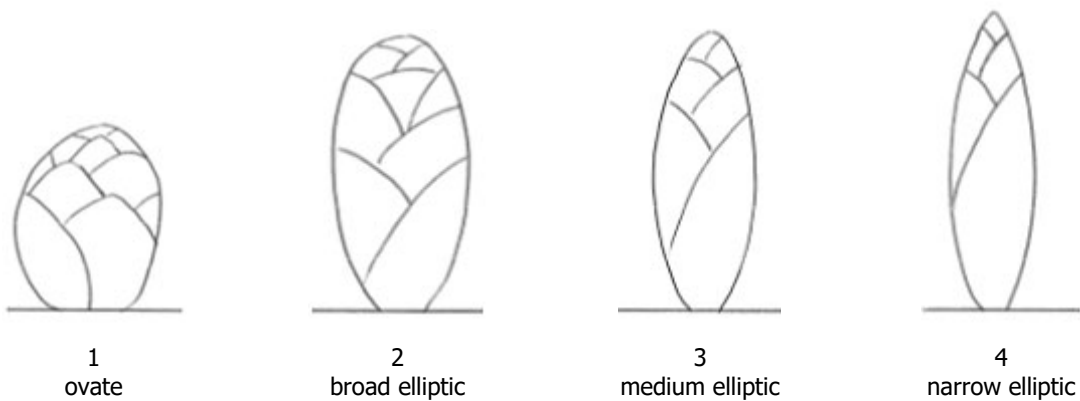


7  
strong

Ad. 25: Male sterility



Ad. 29: Head: shape in longitudinal section



Ad. 34: Head: openness of apex



1  
closed



3  
fully open

Ad. 35: Head: length of axis

At the end of the forcing period, the length of axis is observed disregarding the length of the head (see characteristic 26).



3  
short



5  
medium



7  
long

## 9. LITERATURE

Annon, C. R., 1970: "La chicorée de Bruxelles," Symposium International à Gembloux (B), 17 et 18 février (Eucarpia), Ed. Min. de l'Agriculture, Recherche Agronomique, Bruxelles

Leteinturier, J. E. A., 1983 : "L'endive (chicorée witloof)," 3e ed., CTIFL, Paris, France Ryder, E. J., 1979: Leafy Salad Vegetables, AVI Publishing Company, Westport, Connecticut

Willocx, H. 1993: Witloofteelt, 3e uitgave, Ed. Ministerie van Landbouw, Bestuur voor de Land-en Tuinbouw, Dienst Informatie, Brussel

## **10. TECHNICAL QUESTIONNAIRE**

The Technical Questionnaire is available on the CPVO website under the following reference:  
CPVO-TQ/173/2.