E

TG/151/5(proj.2)
ORIGINAL: English
DATE: 2017-05-19

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

BROCCOLI

UPOV Code(s): BRASS_OLE_GBC

Brassica oleracea L. convar. *botrytis* (L.) Alef. var. *cymosa* Duch.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

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

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Brassica oleracea L. convar. *botrytis* (L.) Alef. var. *cymosa* Duch., *Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *italica* Plenck, *Brassica oleracea* L. var. *botrytis* (L.) Alef. var. *botrytis* Duch., *Brassica oleracea* L. var. *italica* Plenck, *Brassica oleracea* var. *cymosa* Duch	Calabrese, Sprouting Broccoli, Winter broccoli	Brocoli (à jets), Chou brocoli	Brokkoli	Brécol, Brecolera, Brócoli, Bróculi

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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

ASSOCIATED DOCUMENTS

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

Other associated UPOV documents: TG/45/7 Cauliflower

TABLE OF CONTENTS PAGE

1. Subject of these Test Guidelines

1.1 These Test Guidelines apply to all varieties of *Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *cymosa* Duch.

1.2 Varieties of *Brassica oleracea* L. convar. *botrytris* (L.) Alef.var. *botrytis* Duch. are excluded as subject from this guideline.

The botanical difference between broccoli and cauliflower is that broccoli produces heads bearing clusters of developed flower buds, whereas cauliflower produces curds consisting of a tightly-packed mass of undifferentiated tissue which in an advanced stage will develop into flower buds.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

20 g or 5000 seeds

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

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

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

3. Method of Examination

3.1 Number of Growing Cycles

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

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

3.2 Testing Place

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

3.3 Conditions for Conducting the Examination

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

3.4 Test Design

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

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of plants or parts of plants to be Examined

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

4.1.5 Method of Observation

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

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants

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

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

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

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

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

4.2 Uniformity

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

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

4.2.3 For the assessment of uniformity of inbred lines and hybrid varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, 2 off-types are allowed. In addition, for hybrids, a population standard of 3% and an acceptance probability of at least 95% should be applied for inbred plants obviously resulting from the selfing of a parent line. In the case of a sample size of 60 plants, 4 inbred plants are allowed

4.3 Stability

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

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

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

5.3 The following have been agreed as useful grouping characteristics:

(a) Only Calabrese type varieties: Head: level of main head in relation to plant height (characteristic 13)
(b) Head: color (characteristic 17)
(c) Time of harvest maturity for summer and autumn varieties (characteristic 23)
(d) Time of harvest maturity for overwinter varieties (characteristic 24)
(e) Male sterility (characteristic 25)

Firstly, the collection should be divided according to the two growth types in 8.3: Explanations covering several characteristics: Calabrese type and Sprouting type. In case of doubt to which growth type a variety belongs, it should be tested in both growth types.

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

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

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

State	*Note*
small	3
medium	5
large	7

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

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

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

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

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

6.5 Legend

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

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

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

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

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

6 (a)-(d) See Explanations on the Table of Characteristics in Chapter 8.1

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

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	**(*)**	**QN MG/VG**	**(a)**				
		Plant: height					
		very short					1
		short				Packman, Chronos	3
		medium				Forester, Capitano, Jeremy, Monty	5
		tall				Heraklion, Poseidon	7
		very tall				Burbank, Blaze	9
2.		**QN VG**	**(+) (a)**				
		Leaf: attitude					
		erect				Poseidon	1
		semi-erect				Arcadia, Chronos, Capitano	3
		horizontal				Monflor	5
3.	**(*)**	**QN MS/VG**	**(+) (a)**				
		Leaf: length					
		short				Kanga, Kechua, Emperor, Getti e foglie	3
		medium				Cresta	5
		long				Monrello, Monclano, Cardinal	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4.		**QN MS/VG**	**(+) (a)**				
		Leaf: width					
		very narrow					1
		narrow				Arcadia	3
		medium				Green Belt, Marathon, Cresta	5
		broad				Monrello, Esquire, Cardinal	7
5.	**(*)**	**QN VG**	**(+) (a)**				
		Leaf: number of lobes					
		absent or very few				Violet Queen	1
		few				Early White Sprouting, Koros	3
		medium				Chronos, Tinman	5
		many				Burbank, Red Fire	7
		very many				Bordeaux	9
6.	**(*)**	**PQ VG**	**(a)**				
		Leaf blade: color					
		green				Claret, Inspiration	1
		grey green				Capitano	2
		blue green				Bordeaux, Ironman	3
7.		**QN VG**	**(a)**				
		Leaf blade: intensity of color					
		light					3
		medium					5
		dark					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8.	**(*)**	**QN VG**	**(+) (a)**				
		Leaf blade: undulation of margin					
		absent or very weak					1
		weak				Kanga	3
		medium				Marathon	5
		strong				Blaze	7
		very strong				Di Albenga précoce, Bonarda, Claret, Rudolph	9
9.		**QN VG**	**(+) (a)**				
		Leaf blade: dentation of margin					
		weak				Violet Queen	3
		medium				Cresta	5
		strong				Claret	7
10.		**QN VG**	**(a)**				
		Leaf blade: blistering					
		absent or very weak				Capitano	1
		weak				Blaze	3
		medium				Cumbal, Red Arrow	5
		strong				Bonarda, Cardinal	7
		very strong					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.		**QN VG**	**(a)**				
		Petiole: anthocyanin coloration					
		absent or very weak				Capitano, Jeremy, Kanga	1
		medium				Early Purple Sprouting, Monarda	3
		very strong				Mendocino, Red Fire	5
12.		**QN MS/VG**	**(+) (a)**				
		Petiole: length					
		very short				Violet Queen	1
		short				Kanga	3
		medium				Ramoso Calabrese	5
		long				Groene Calabrese, Monflor	7
		very long					9
13.	**(*)**	**PQ VG**	**(+) (b)**				
		Only Calabrese type varieties: Head: level of main head in relation to plant height					
		low				Marathon	1
		medium					2
		high				Sibsey, SV0097BL	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.		**QN MS/VG**	**(+) (b)**				
		Only Calabrese type varieties: Head: length of branching at base of main head					
		very short				Violet Queen	1
		short				Chronos, Kanga	3
		medium				Lord	5
		long				Monflor	7
		very long					9
15.	**(*)**	**QN MS/VG**	**(+) (b)**				
		Head: diameter					
		very small				Early Purple Sprouting, Getti e foglie, Broccolo di Natale	1
		small					3
		medium				Marathon	5
		large				Packman	7
		very large				Violet Queen	9
16.	**(*)**	**QN VG**	**(+) (b)**				
		Only Calabrese type varieties: Head: shape in longitudinal section					
		circular				Forester	1
		transverse broad elliptic					2
		transverse medium elliptic				Sibsey	3
		transverse narrow elliptic				Calabria	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.	**(*)**	**PQ VG**	**(b)**				
		Head: color					
		whitish				Early White Sprouting, Burbank, Cresta	1
		green				Forester	2
		grey green				Marathon	3
		blue green				Ironman, Tirreno	4
		violet				Bordeaux, Early Purple Sprouting	5
18.		**QN VG**	**(+) (b)**				
		Head: intensity of color					
		light					3
		medium					5
		dark					7
19.		**QN VG**	**(b)**				
		Only varieties with Head: color: whitish, green, grey green or blue green: Head: intensity of anthocyanin coloration					
		absent or very weak				Early White Sprouting	1
		weak					2
		medium				Steel	3
		strong					4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20.	**QN VG**	**(+) (b)**				
	Only Calabrese type varieties: Head: knobbling					
	weak				Sibsey	3
	medium				Ironman, Marathon, Cumbal	5
	strong				Monflor	7
21.	**QN VG**	**(b)**				
	Head: diameter of flower bud					
	very small					1
	small				SV0097BL	3
	medium				Kechua	5
	large				Kanga, Calabria	7
	very large					9
22.	**QN VG**					
	Only Calabrese type varieties: Plant: development of secondary heads					
	absent or very weak				Montop, Lord	1
	weak				Chronos	3
	medium				Giotto	5
	strong				Marathon, Cresta	7

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23.	**(*)**	**QN**	**MG**	**(+)**	**(c), (d)**				
		Time of harvest maturity for summer and autumn varieties							
		very early							1
		early						Packman, Sibsey	3
		medium						Poseidon	5
		late						Marathon, Parthenon	7
		very late						Santee, Hallmark	9
24.	**(*)**	**QN**	**MG**	**(+)**	**(c), (d)**				
		Time of harvest maturity for overwinter varieties							
		very early						Ember	1
		early							3
		medium						Mendocino	5
		late						Burbank, Claret	7
		very late							9
25.	**(*)**	**QL**	**MS/VG**	**(+)**					
		Male sterility							
		absent						Marathon	1
		present						Parthenon, Chevalier	9
26.		**PQ**	**VG**						
		Flower: color							
		white							1
		whitish							2
		light yellow						Serydan	3
		medium yellow						Monflor	4
		dark yellow						Sibsey, Alletta	5
27.		**QL**	**VG**						
		Flower: purple spot on anther							
		absent							1
		present							9

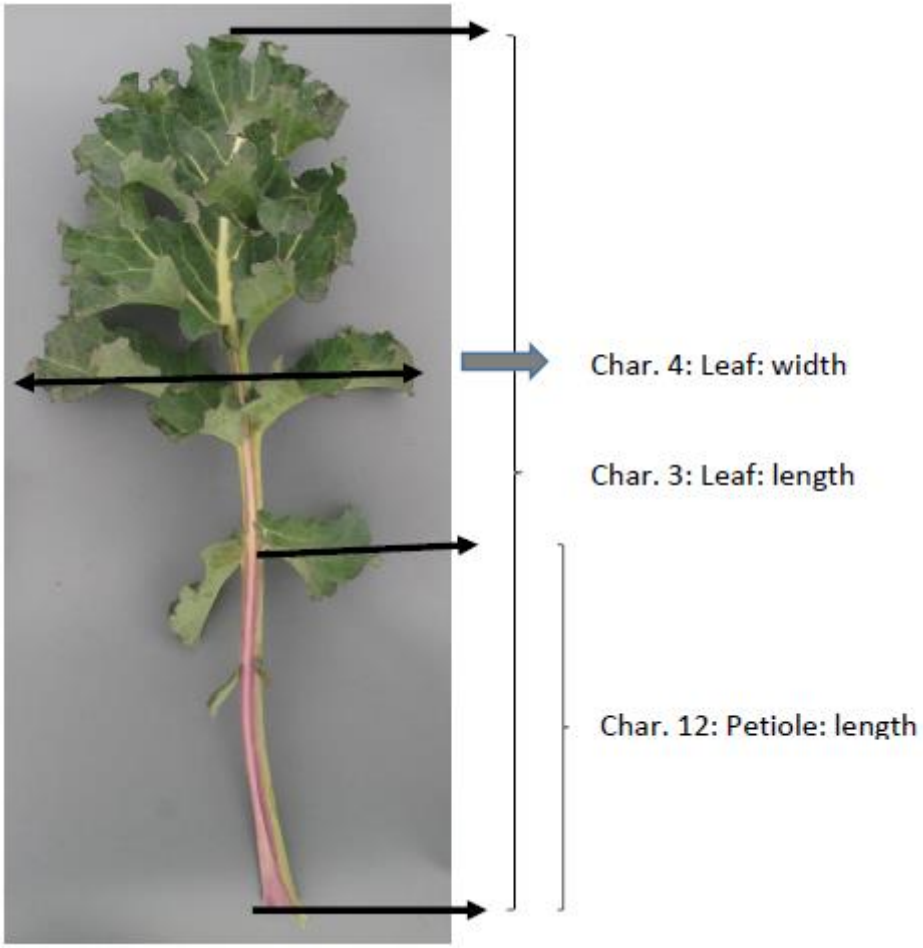
8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a)

All observations on the plant, leaf, leaf blade and petiole should be made just before harvest maturity. Furthermore all observations on leaf, leaf blade and petiole should be made on fully developed leaves at the middle level of the plant.



(b) All observations on the head should be made at harvest maturity.

(c) Time of harvest maturity is when 50% of the plants have a head (Calabrese type)/ multiple heads (Sprouting type) ready for harvest.

(d) The varieties are divided into two harvest maturity characteristics because the varieties for summer and autumn are never included in the same trial with the overwinter varieties: The overwinter varieties need a much larger amount of cold to develop a head (which is in fact the start of flowering), usually a winter period, whereas the summer and autumn varieties start to develop a head after a little amount of cold. This mechanism is called vernalisation: The induction of flowering by exposure to a certain amount of time of cold temperatures.

8.2 Explanations for individual characteristics

Ad. 2: Leaf: attitude

3
semi-erect

5
horizontal

7
Semi-pendulous

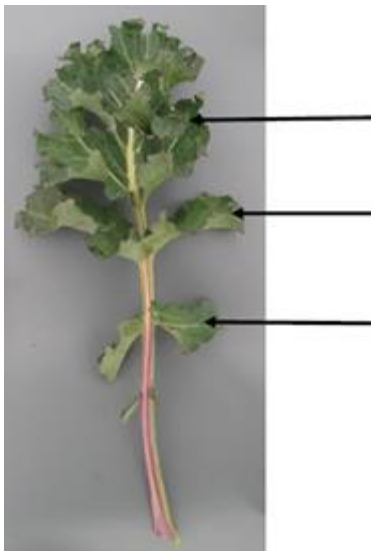
Ad. 3: Leaf: length

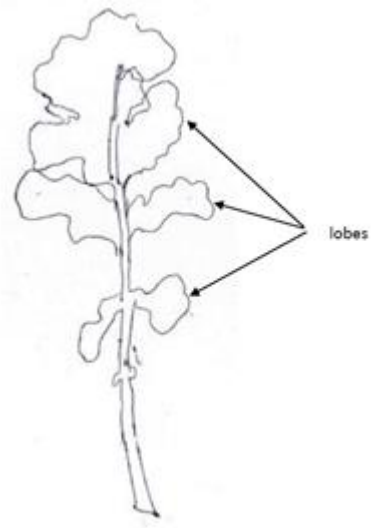
See *8.1* (a) *Explanations covering several characteristics*

Ad. 4: Leaf: width

See *8.1* (a) *Explanations covering several characteristics*

Ad. 5: Leaf: number of lobes





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 both notches of the blade have at least half the length of the lobe itself.

Ad. 8: Leaf blade: undulation of margin

3
weak

5
medium

7
strong

Ad. 9: Leaf blade: dentation of margin

3
weak

5
medium

7
strong

Ad. 12: Petiole: length

See *8.1* (a) *Explanations covering several characteristics*

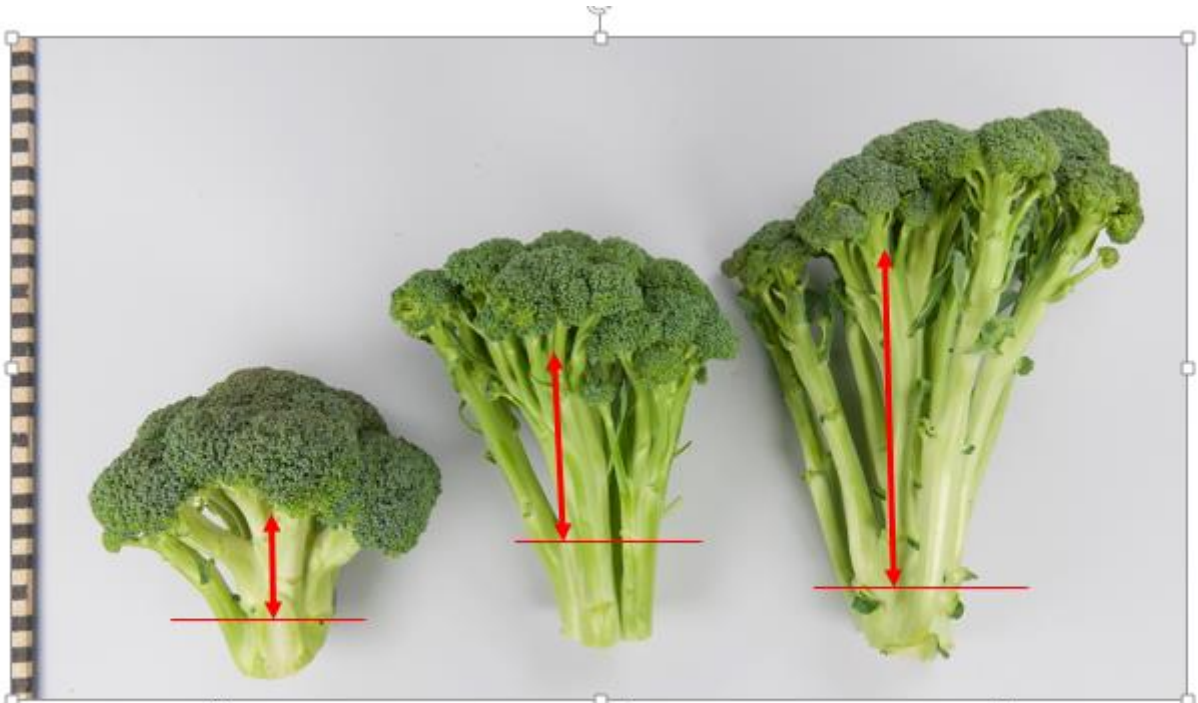
Ad. 13: Only Calabrese type varieties: Head: level of main head in relation to plant height

1
low

2
medium

3
high

Ad. 14: Only Calabrese type varieties: Head: length of branching at base of main head



3
short

5
medium

7
long

Ad. 15: Head: diameter

The observation of the diameter of heads of a sprouting type should be made by estimation or measurement of the average diameter of the heads of a plant.

Ad. 16: Only Calabrese type varieties: Head: shape in longitudinal section

broadest part			
Width (ratio length/width)	below middle	at middle	above middle
Medium (medium)		 1 circular	
medium to broad (medium to low)		 2 transverse broad elliptic	
broad (low)		 3 transverse medium elliptic	
very broad (very low)		 4 transverse narrow elliptic	

Ad. 18: Head: intensity of color

Observations should be made on green, grey green, blue green and violet heads, excluding whitish heads.

Ad. 20: Only Calabrese type varieties: Head: knobbling

3 weak | 5 medium | 7 strong

Observations to be made on the prominence of protuberances of the surface of the head.

Ad. 23: Time of harvest maturity for summer and autumn varieties

To be observed for varieties that develop a head (Calabrese type)/multiple heads (Sprouting type) in summer or autumn of the year of sowing.

Ad. 24: Time of harvest maturity for overwinter varieties

To be observed for varieties that develop a head (Calabrese type)/multiple heads (Sprouting type) next winter or spring after the year of sowing.

Ad. 25: Male sterility

To be tested in a field trial and/or in a DNA marker test.

Field trial:
Check presence of pollen on stamen: if pollen on stamen is present then male sterility is absent; if pollen on stamen is absent then male sterility is present. The observation on the presence of pollen should be made when the flower is not moist in order to prevent that pollen stay sticked to the stamen, so preferably on a dry day.

DNA marker test and/or field trial:
All varieties declared male sterile in the TQ can be examined in a field trial or in a DNA marker test. In the case of a DNA marker test, if the CMS marker appears to be not present, a field trial should be performed to observe whether the variety is male sterile (on another mechanism) or fertile. All varieties declared fertile are to be tested in a field trial.

In case of a field trial, type of observation is VG. In case of a DNA marker test, type of observation is MS.

N.B. The description of the method to test male sterility for *Brassica* (CMS marker) is covered by a trade secret. The owner of the trade secret, Syngenta Seeds B.V., has given its consent for the use of the CMS marker solely for the purposes of examination of Distinctness, Uniformity and Stability (DUS) and for the development of variety descriptions by UPOV and authorities of UPOV members. Syngenta Seeds B.V. declares that neither UPOV, nor authorities of UPOV members that use the CMS marker for the above purposes will be held accountable for possible (mis)use of the CMS marker by third parties. Please contact Naktuinbouw, Netherlands, to obtain the method and information on the CMS marker for the purposes mentioned above.

8.3

Calabrese type: One main head and no or small secondary heads that develop in the axils, usually later than the main head

Sprouting type: Only multiple small heads, the main head is of the same size as the heads in the axils and all develop at the same time

9. Literature

Gray, 1982: Taxonomy and Evolution of Broccoli (*Brassica oleracea* var. *italica*). Economic Botany 36, pp. 397-410

Gray, 1989: Taxonomy and Evolution of Broccoli and Cauliflower. Baileya 23(1), pp. 28-46.

Helm, J., 1960: Brokkoli und Spargelkohl. Der Züchter 30, pp. 223-241

Marshall, B., Thompson, R., 1987: A Model of the Influence of Air Temperature and Solar Radiation on the Time of Maturity of Calabrese Brassica oleracea var. italica. Annals of Botany 60, pp. 513-519

Miller, C.H., Konster, T.R., and Lamont, W.J., 1985: Cold Stress Influence on Premature Flowering of Broccoli. HortScience 20(2), pp. 193-195

Wiebe, H.J., 1975: The morphological development of cauliflower and broccoli cultivars depending on temperature. Sci. Hort. 3, pp. 95-101

10. Technical Questionnaire

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

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

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

1. Subject of the Technical Questionnaire

1.1	Botanical name	*Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *cymosa* Duch.
1.2	Common name	Calabrese, Sprouting Broccoli, Winter broccoli

2. Applicant

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

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(b) partially known cross [ ]

(c) unknown cross [ ]

4.1.2 Mutation [ ]

(please state parent variety)

4.1.3 Discovery and development [ ]

(please state where and when discovered and how developed)

4.1.4 Other [ ]

(please provide details)

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Cross-pollination [ ]
(i) Synthetic variety [ ]
(ii) Population [ ]
(c) Hybrid [ ]
(d) [ ]
(e) Other (please provide details) [ ]

4.2.2 [ ]

4.2.3 Other [ ]
(Please provide details)

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

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

	Characteristics	Example Varieties	Note
5.1 (1)	**Plant: height**		
	very short		1 [ ]
	very short to short		2 [ ]
	short	Chronos, Packman	3 [ ]
	short to medium		4 [ ]
	medium	Capitano, Forester, Jeremy, Monty	5 [ ]
	medium to tall		6 [ ]
	tall	Heraklion, Poseidon	7 [ ]
	tall to very tall		8 [ ]
	very tall	Blaze, Burbank	9 [ ]
5.2 (5)	**Leaf: number of lobes**		
	absent or very few	Violet Queen	1 [ ]
	very few to few		2 [ ]
	few	Early White Sprouting, Koros	3 [ ]
	few to medium		4 [ ]
	medium	Chronos, Tinman	5 [ ]
	medium to many		6 [ ]
	many	Burbank, Red Fire	7 [ ]
	many to very many		8 [ ]
	very many	Bordeaux	9 [ ]
5.3 (6)	**Leaf blade: color**		
	green	Claret, Inspiration	1 [ ]
	grey green	Capitano	2 [ ]
	blue green	Bordeaux, Ironman	3 [ ]
5.4 (8)	**Leaf blade: undulation of margin**		
	absent or very weak		1 [ ]
	weak	Kanga	3 [ ]
	medium	Marathon	5 [ ]
	strong	Blaze	7 [ ]
	very strong	Bonarda, Claret, Di Albenga précoce, Rudolph	9 [ ]

	Characteristics	Example Varieties	Note
5.5 (13)	**Only Calabrese type varieties: Head: level of main head in relation to plant height**		
	low	Marathon	1 [ ]
	medium		2 [ ]
	high	Sibsey, SV0097BL	3 [ ]
5.6 (15)	**Head: diameter**		
	very small	Broccolo di Natale, Early Purple Sprouting, Getti e foglie	1 [ ]
	very small to small		2 [ ]
	small		3 [ ]
	small to medium		4 [ ]
	medium	Marathon	5 [ ]
	medium to large		6 [ ]
	large	Packman	7 [ ]
	large to very large		8 [ ]
	very large	Violet Queen	9 [ ]
5.7 (16)	**Only Calabrese type varieties: Head: shape in longitudinal section**		
	circular	Forester	1 [ ]
	transverse broad elliptic		2 [ ]
	transverse medium elliptic	Sibsey	3 [ ]
	transverse narrow elliptic	Calabria	4 [ ]
5.8 (17)	**Head: color**		
	whitish	Burbank, Cresta, Early White Sprouting	1 [ ]
	green	Forester	2 [ ]
	grey green	Marathon	3 [ ]
	blue green	Ironman, Tirreno	4 [ ]
	violet	Bordeaux, Early Purple Sprouting	5 [ ]
5.9 (23)	**Time of harvest maturity for summer and autumn varieties**		
	very early		1 [ ]
	early	Packman, Sibsey	3 [ ]
	medium	Poseidon	5 [ ]
	late	Marathon, Parthenon	7 [ ]
	very late	Hallmark, Santee	9 [ ]

	Characteristics	Example Varieties	Note
5.10 (24)	**Time of harvest maturity for overwinter varieties**		
	very early	Ember	1 [ ]
	early		3 [ ]
	medium	Mendocino	5 [ ]
	late	Burbank, Claret	7 [ ]
	very late		9 [ ]
5.11 (25)	**Male sterility**		
	absent	Marathon	1 [ ]
	present	Chevalier, Parthenon	9 [ ]

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

6. Similar varieties and differences from these varieties

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

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

Comments:

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

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

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

Yes [ ] No [ ]

(If yes, please provide details)

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

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

7.3.1 Growth type

1. Calabrese type [ ]
2. Sprouting type [ ]

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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

8. Authorization for release

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

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

Please provide details for where you have indicated “yes”.

.....

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant’s name

Signature Date

[End of document]