



European Union
Community Plant Variety Office

PROTOCOL FOR DISTINCTNESS, UNIFORMITY AND STABILITY TESTS

Brassica oleracea L. (Broccoli/Calabrese)

BROCCOLI, CALABRESE

UPOV Species Code: BRASS_OLE_GBC

Adopted on 21/03/2007

I SUBJECT OF THE PROTOCOL

The protocol describes the technical procedures to be followed in order to meet the Council Regulation (EC) No. 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on general UPOV Document TG/1/3 and UPOV Guideline TG/151/4 dated 05/04/2006 for the conduct of tests for Distinctness, Uniformity and Stability. This protocol applies for all varieties of *Brassica oleracea* L. – Broccoli/Calabrese [*Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *cymosa* Duch. and *Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *italica*].

II SUBMISSION OF SEED AND OTHER PLANT MATERIAL

1. The Community Plant Variety Office (CPVO) is responsible for informing the applicant of

- the closing date for the receipt of plant material;
- the minimum amount and quality of plant material required;
- the Examination Office to which material is to be sent.

A sub-sample of the material submitted for test will be held in the variety collection as the definitive sample of the candidate variety.

The applicant is responsible for ensuring compliance with any customs and plant health requirements.

2. Final dates for receipt of documentation and material by the Examination Office

The final dates for receipt of requests, technical questionnaires and the final date or submission period for plant material will be decided by the CPVO and each Examination Office chosen.

The Examination Office is responsible for immediately acknowledging the receipt of requests for testing, and technical questionnaires. Immediately after the closing date for the receipt of plant material the Examination Office should inform the CPVO whether acceptable plant material has been received or not. However if unsatisfactory plant material is submitted the CPVO should be informed as soon as possible.

3. Plant material requirements

The current quality and quantity requirements as well as the final dates for submission of the plant material are available on the CPVO website (www.cpvo.europa.eu) and are published in the CPVO gazette 'S2'.

- Quality of seeds: Should not be less than the standards laid down for certified seed in Annex II of Council Directive 2002/55/EC.
- Seed treatment: The plant material must not have undergone any treatment unless the CPVO and the Examination Office allow or request such treatment. If it has been treated, full details of the treatment must be given.
- Special requirement: -
- Labelling of sample: - Species
- File number of the application allocated by the CPVO
- Breeder's reference
- Examination office's reference (if known)
- Name of applicant
- The phrase "On request of the CPVO"

III CONDUCT OF TESTS

1. Variety collection

A variety collection will be maintained for the purpose of establishing distinctness of the candidate varieties in test. A variety collection may contain both living material and descriptive information. A variety will be included in a variety collection only if plant material is available to make a technical examination.

Pursuant to Article 7 of Council Regulation (EC) No. 2100/94, the basis for a collection should be the following:

- varieties listed or protected at the EU level or at least in one of the EEA Member States;
- varieties protected in other UPOV Member States;
- any other variety in common knowledge.

The composition of the variety collection in each Examination Office depends on the environmental conditions in which the Examination Office is located.

Variety collections will be held under conditions which ensure the long term maintenance of each accession. It is the responsibility of Examination Offices to replace reference material which has deteriorated or become depleted. Replacement material can only be introduced if appropriate tests confirm conformity with the existing reference material. If any difficulties arise for the replacement of reference material, Examination Offices must inform the CPVO. If authentic plant material of a variety cannot be supplied to an Examination Office the variety will be removed from the variety collection.

2. Material to be examined

Candidate varieties will be directly compared with other candidates for Community plant variety rights tested at the same Examination Office, and with appropriate varieties in the variety collection. When necessary an Examination Office may also include other candidates and varieties. Examination Offices should therefore make efforts to co-ordinate the work with other Offices involved in DUS testing of broccoli. There should be at least an exchange of technical questionnaires for each candidate variety, and during the test period, Examination Offices should notify each other and the CPVO of candidate varieties which are likely to present problems in establishing distinctness. In order to solve particular problems Examination Offices may exchange plant material.

3. Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the Annex I. 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. In the latter case, the CPVO should be informed. In addition the existence of some other regulation e.g. plant health, may make the observation of the characteristic impossible.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation (EC) No. 1239/95, to insert additional characteristics and their expression in respect of a variety.

4. Grouping of varieties

The varieties and candidates to be compared will be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety and which in their various states of expression are fairly evenly distributed throughout the collection. In the case of continuous grouping characteristics overlapping states of expression between adjacent groups is required to reduce the risks of incorrect allocation of candidates to groups. The characteristics used for grouping could be the following:

- a) Plant: number of stems (characteristic 1)
- b) Head: shape in longitudinal section (characteristic 17)
- c) Head: colour (characteristic 18)
- d) Time of harvest maturity (characteristic 30)
- e) Male sterility (characteristic 32)

5. Trial designs and growing conditions

The minimum duration of tests will normally be two independent growing cycles. Tests will be carried out under conditions ensuring normal growth. The size of the plots will be such that plants or parts of plants may be removed for measuring and counting without prejudice to the observations which must be made up to the end of the growing period.

The test design is as follows

Each test should include 60 plants divided between two or more replicates.

All observations determined by measurement or counting should be made on 40 plants or parts of 40 plants.

6. Special tests

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

Special 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.

7. Standards for decisions

a) **Distinctness**

A candidate variety will be considered to be distinct if it meets the requirements of Article 7 of Council Regulation (EC) No. 2100/94.

b) **Uniformity**

For the assessment of uniformity of open-pollinated varieties, relative uniformity standards should be used.

For the assessment of uniformity of hybrid varieties, a candidate will be considered to be sufficiently uniform if the number of off-types does not exceed the number of plants as indicated in the table below. A population standard of 1% and an acceptance probability of 95% should be applied.

Table of maximum numbers of off-types allowed for uniformity standards.

Number of plants	off-types allowed
36-82	2

In addition a population standard of 3% with the same acceptance probability should be applied to clearly recognizable inbred plants. In the case of a sample size of 60 plants the additional maximum number of clearly recognizable inbred plants allowed would be 4.

c) **Stability**

A candidate will be considered to be sufficiently stable when there is no evidence to indicate that it lacks uniformity.

IV REPORTING OF RESULTS

After each recording season the results will be summarised and reported to the CPVO in the form of a UPOV model interim report in which any problems will be indicated under the headings distinctness, uniformity and stability. Candidates may meet the DUS standards after two growing periods but in some cases three growing periods may be required. When tests are completed the results will be sent by the Examination Office to the CPVO in the form of a UPOV model final report.

If it is considered that the candidate complies with the DUS standards, the final report will be accompanied by a variety description in the format recommended by UPOV. If not the reasons for failure and a summary of the test results will be included with the final report.

The CPVO must receive from the Examination Office interim reports and final reports by the date agreed between the CPVO and the examination office.

Interim reports and final examination reports shall be signed by the responsible member of the staff of the Examination Office and shall expressly acknowledge the exclusive rights of disposal of CPVO.

V LIAISON WITH THE APPLICANT

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 agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

The interim report as well as the final report shall be sent by the Examination Office to the CPVO.

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Legend:

Note: The asterisk (*) in the UPOV numbered characteristics is there for information purposes and denotes those characteristics which should always be observed when utilising a UPOV guideline.

(+) See explanations on the Table of characteristics

(a) – (c) See explanations on the table of characteristics

Types of expression of characteristics:

QL – Qualitative characteristic

QN – Quantitative characteristic

PQ – Pseudo-qualitative characteristic

Type of 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

When a method of observation is attributed to a certain characteristic, the first differentiation is made depending if the action taken is a visual observation (V) or a measurement (M).

The second differentiation deals with the number of observations the expert attributes to each variety, thus the attribution of either G or S.

If a single observation of a group consisting of an undefined number of individual plants is appropriate to assess the expression of a variety, we talk about a visual observation or a measurement made on a group of plants, thus we attribute the letter G (either VG or MG). If the expert makes more than one observation on that group of plants, the decisive part is that we have at the end only one data entry per variety which means that we have to deal with G (e.g. measurement of plant length on a plot – MG, visual observation of green colour of leaves on a plot – VG).

If it is necessary to observe a number of individual plants to assess the expression of a variety, we should attribute the letter S (thus either VS or MS). Single plant data entries are kept per variety for further calculations like the variety mean (e.g. measurement of length of ears – MS, visual observation of growth habit of single plants in grasses – VS). The number of individual plants to be observed in such cases is stated in section III.5.

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Technical Questionnaire

ANNEX I

TABLE OF CHARACTERISTICS TO BE USED IN DUS-TEST AND PREPARATION OF DESCRIPTIONS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1. (+)	1. (+)	QL	Plant: number of stems		
(a)	(*)(a)	VG	one	Ramoso Calabrese, Shogun	1
G			more than one	A Getti di Napoli	2
2.	2.	QN	Plant: height (at harvest maturity)		
(a)	(*)	MS/VG	very short	New Light	1
			short	Packman, Primor	3
			medium	Coaster	5
			tall	Citation	7
			very tall	Bordeaux	9
3.	3.	QN	Leaf: attitude (at beginning of head formation)		
(+)	(+)	VG	semi-erect	Arcadia, Asti, Claudia	3
	(*)		horizontal	Colonel	5
			semi-pendulous	A Getti di Napoli	7
4.	4.	QN	Leaf: length (including petiole)		
(a), (b)	(*)	MS/VG	short	Emperor	3
	(a), (b)		medium	Bordeaux	5
			long	Parthenon	7
5.	5.	QN	Leaf: width		
(a), (b)	(a), (b)	MS/VG	narrow	Arcadia, Bordeaux	3
			medium	Green Belt, Marathon	5
			broad	Claudia, Triathlon	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
6.	6.	QN	Leaf: number of lobes		
(a), (b)	(*)	VG	absent or very few	Violet Queen	1
	(a), (b)		few	Early White Sprouting	3
			medium	Marathon, Topper	5
			many	Prisma, Shogun	7
			very many	Bordeaux	9
7.	7.	PQ	Leaf blade: colour		
(a), (b)	(*)	VG	green	Claudia	1
	(a), (b)		grey green	Marathon, Parthenon	2
			blue green		3
8.	8.	QN	Leaf blade: intensity of colour		
(a), (b)	(a), (b)	VG	light		3
			medium		5
			dark	Parthenon	7
9.	9.	QL	Leaf blade: anthocyanin coloration		
(a), (b)	(a), (b)	VG	absent	Claudia, Montor	1
			present	Parthenon	9
10.	10.	QN	Leaf blade: undulation of margin		
(a), (b)	(a), (b)	VG	absent or very weak		1
			weak	Chevalier	3
			medium	Packman	5
			strong	Marathon, Samurai	7
			very strong	Di Albenga précoce	9
11.	11.	QN	Leaf blade: dentation of margin		
(a), (b)	(a), (b)	VG	weak	Chevalier	3
			medium		5
			strong	Claret	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
12.	12.	QN	Leaf blade: blistering		
(a), (b)	(a), (b)	VG	absent or very weak		1
			weak	Gem, Montop	3
			medium	Ironman, Marathon, Skiff	5
			strong		7
			very strong		9
13.	13.	QL	Petiole: anthocyanin coloration		
(a), (b)	(a), (b)	VG	absent	Claudia, Parthenon	1
			present	Early Purple Sprouting	9
14.	14.	QN	Petiole: length		
(a), (b)	(a), (b)	VG	very short	Violet Queen	1
			short	Bordeaux	3
			medium	Emperor, Ramoso Calabrese	5
			long	Groene Calabrese, Premium Crop	7
			very long		9
15.	15.	QN	Head: length of branching at base (excluding stem)		
(+)	(+)	MS/VG	very short	Claret	1
(c)	(c)		short	Chevalier	3
			medium	Parthenon	5
			long	Bordeaux	7
			very long	A Getti di Napoli	9
16.	16.	QN	Head: size		
(c)	(c)	VG	very small	Early Purple Sprouting	1
			small	Cavalier	3
			medium	Marathon	5
			large	Packman	7
			very large	Violet Queen	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
17.	17.	QN	Head: shape in longitudinal section		
(+)	(+)	VG	circular	Shena	1
(c)	(*)		transverse broad elliptic	Parthenon	2
	(c)		transverse medium elliptic	Claudia	3
G			transverse narrow elliptic	Calabria	4
18.	18.	PQ	Head: colour		
(c)	(*)	VG	cream	Early White Sprouting	1
	(c)		green		2
			grey green	Parthenon	3
			blue green		4
G			violet	Bordeaux, Violet Queen	5
19.	19.	QN	Head: intensity of colour		
(c)	(c)	VG	light		3
			medium		5
			dark		7
20.	20.	QL	Head: anthocyanin coloration		
(c)	(c)	VG	absent	Early White Sprouting	1
			present	Shogun	9
21.	21.	QN	Head: intensity of anthocyanin coloration		
(c)	(c)	VG	very weak	Packman	1
			weak		3
			medium	Shogun	5
			strong		7
			very strong	Bordeaux	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
22. (c)	22. (c)	QN	Head: knobbling		
		VG	fine	Shogun	3
			medium	Southern Comet	5
			coarse	Packman	7
23. (c)	23. (c)	QN	Head: texture		
		VG	very fine	Ginga	1
			fine	Canoe	3
			medium	Parthenon	5
			coarse	A fetti di Napoli	7
			very coarse		9
24. (c)	24. (c)	QN	Head: firmness		
		VG	loose		3
			medium	Packman	5
			firm	Parthenon	7
25. (c)	25. (c)	QL	Head: bracts		
		VG	absent	Gem	1
			present	Ramoso Calabrese	9
26.	26.	QL	Plant: secondary heads (at harvest maturity)		
		VG	absent	Parthenon	1
			present	Marathon, Tribute, Late Purple Sprouting	9
27.	27.	QN	Plant: prominence of secondary heads (at harvest maturity)		
		VG	weak	Parthenon	3
			medium	Samson	5
			strong	Marathon, Tribute	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note	
28.	28.	QL	Flower: colour			
		VG	white	A Getti di Napoli	1	
			yellow	Parthenon	2	
29.	29.	QN	Flower: intensity of yellow colour			
		VG	light	Packman	3	
			medium		5	
			dark		7	
30	30.	QN	Time of harvest maturity (50% of plants)			
		(*)	MG	very early	Primor	1
				early	Packman	3
				medium	Emperor, Violet Queen	5
				late	Ginga	7
G			very late	Late Purple Sprouting	9	
31.	31.	QN	Time of beginning of flowering (50% of plants with at least 10% of flowers)			
		MG	early	Southern Comet	3	
			medium	Emperor	5	
			late	Shogun,	7	
32.	32.	QL	Male sterility			
		VG	absent	Marathon	1	
G			present	Chevalier, Montop	9	

EXPLANATIONS AND METHODS

Explanations covering several characteristics

(a) Plant, leaf, leaf blade: observations on the plant, the leaf and the leaf blade which should be made on fully developed plants just before harvest maturity.

(b) Leaf, leaf blade, petiole: observations on the leaf, the leaf blade and the petiole, which should be made on the largest leaf.

(c) Head: observations on the head which should be made at harvest maturity and should relate to the primary spear.

Explanations for individual characteristics

Ad. 1: Plant: number of stems

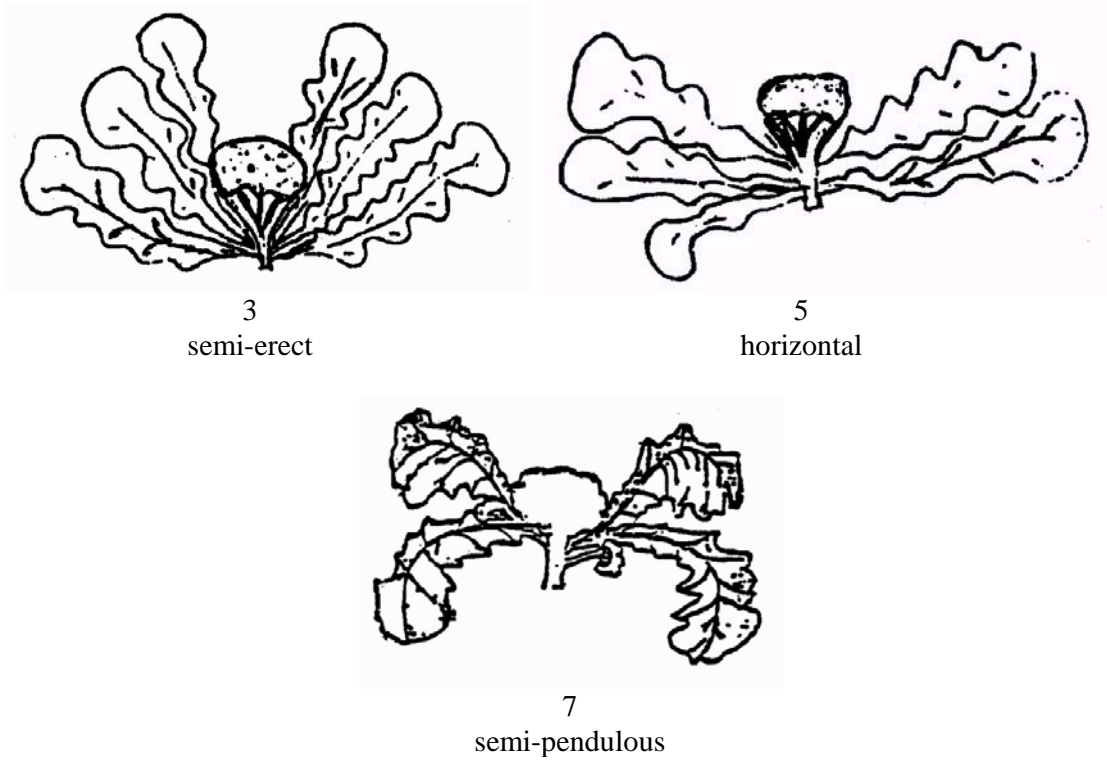


1
one

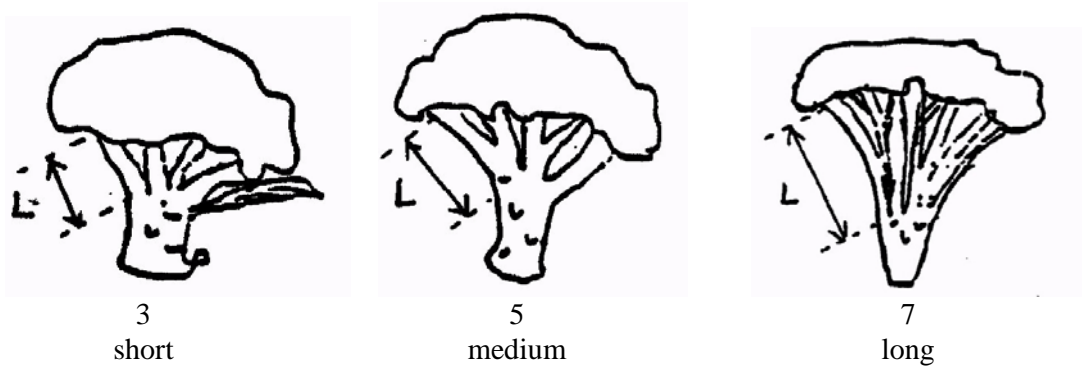


2
more than one

Ad. 3: Leaf: attitude (at beginning of head formation)



Ad. 15: Head: length of branching at base (excluding stem)



Ad. 17: Head: shape in longitudinal section



1
circular



2
transverse broad
elliptic



3
transverse medium
elliptic



4
transverse narrow
elliptic

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" Bailey 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," Hort. Science 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

ANNEX II



European Union
Community Plant Variety Office

TECHNICAL QUESTIONNAIRE

to be completed in connection with an application for Community Plant Variety Rights
Please answer all questions. A question without any answer will lead to a non-attribution
of an application date. In cases where a field / question is not applicable, please state so.

1. **Botanical taxon:** Name of the genus, species or sub-species to which the variety belongs and common name

Brassica oleracea L. (Broccoli/Calabrese)

BROCCOLI, CALABRESE

2. **Applicant(s):** Name(s) and address(es), phone and fax number(s), Email address, and where appropriate name and address of the procedural representative

3. **Variety denomination**

a) Where appropriate proposal for a variety denomination:

b) Provisional designation (breeder's reference):

4. Information on origin, maintenance and reproduction of the variety

4.1 Method of maintenance and reproduction

- a) i) hybrid []
- ii) open-pollinated variety []
- iii) parent line []
- b) (ii) seed propagated []
- (iii) vegetatively propagated..... []
- c) Other information on genetic origin and breeding method

4.3 Geographical origin of the variety: the region and the country in which the variety was bred or discovered and developed

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in the CPVO Protocol; please mark the state of expression which best corresponds).

	Characteristics	Example varieties	Note
5.1 (1)	Plant: number of stems		
	one	Ramoso Calabrese, Shogun	1 []
	more than one	A Getti di Napoli	2 []

Characteristics	Example varieties	Note
5.2 (17) Head: shape in longitudinal section circular transverse broad elliptic transverse medium elliptic transverse narrow elliptic	 Shena Parthenon Claudia Calabria	 1 [] 2 [] 3 [] 4 []
5.3 (18) Head: colour cream green grey green blue green violet	 Early White Sprouting Parthenon Bordeaux, Violet Queen	 1 [] 2 [] 3 [] 4 [] 5 []
5.4 (30) Time of harvest maturity (50% of plants) very early early medium late very late	 Primor Packman Emperor, Violet Queen Ginga Late Purple Sprouting	 1 [] 3 [] 5 [] 7 [] 9 []
5.5 (32) Male sterility absent present	 Marathon Chevalier, Montop	 1 [] 9 []

6. Similar varieties and differences from these varieties:			
Denomination of similar variety	Characteristic in which the similar variety is different ¹⁾	State of expression of similar variety	State of expression of candidate variety
<p>¹⁾ In the case of identical states of expressions of both varieties, please indicate the size of the difference</p>			
7. Additional information which may help to distinguish the variety			
7.1 Resistance to pests and diseases			
7.2 Special conditions for the examination of the variety			
7.2.1 Type of culture			
- annual <input type="checkbox"/>			
- biannual (overwintering) <input type="checkbox"/>			
7.2.2 Other conditions			
<input type="checkbox"/> YES, please specify			
 <input type="checkbox"/> NO			

7.3 Other information

YES, please specify

NO

8. GMO-information required

The variety represents a Genetically Modified Organism within the meaning of Article 2(2) of Council Directive 2001/18/EC of 12/03/2001.

YES NO

If yes, please add a copy of the written attestation of the responsible authorities stating that a technical examination of the variety under Articles 55 and 56 of the Basic Regulation 2100/94 does not pose risks to the environment according to the norms of the above-mentioned Directive.

9. Information on plant material to be examined

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) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (b) Chemical treatment (e.g. growth retardant or pesticide) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (c) Tissue culture | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (d) Other factors | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Please provide details of where you have indicated "Yes":

I/we hereby declare that to the best of my/our knowledge the information given in this form is complete and correct.

Date

Signature

Name

[End of document]