

PROTOCOL FOR DISTINCTNESS, UNIFORMITY AND STABILITY TESTS

***Beta vulgaris* L., ssp. *vulgaris* var. *conditiva* Alef.**

BEETROOT

UPOV Code: BETAA_VUL_GVC

Adopted on 01/04/2009

Entered into force on 12/03/2009

I - SUBJECT OF THE PROTOCOL

The protocol describes the technical procedures to be followed in order to meet the Council Regulation 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/060/7 dated 09/04/2008 for the conduct of tests for Distinctness, Uniformity and Stability. This protocol applies to varieties of ***Beta vulgaris L. ssp. vulgaris var. conditiva Alef.***

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 seed:.....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 requirements:-

Labelling of sample:.....- Species
- File number of the application allocated by the CPVO
- Breeder's reference
- Examination 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 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 beetroot. 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 1. 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 N° 1239/95, to insert additional characteristics and their expressions 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) Germity (characteristic 1)
- b) Leaf blade: colour (characteristic 9)
- c) Root: shape in longitudinal section (characteristic 17)
- d) Root: external colour (characteristic 23)
- e) Bolting tendency (from early sowing) (characteristic 27)

5. Trial designs and growing conditions

The minimum duration of tests will normally be two independent growing cycles. For vegetatively propagated varieties, the duration of the testing may be reduced to one growing cycle if the results on distinctness and uniformity are conclusive. 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:

As a minimum, each test should include a total of 200 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 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, 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 No. 2100/94.

b) **Uniformity**

For the assessment of uniformity of:

- (i) - cross pollinated varieties: relative uniformity standards should be applied. However, for the characteristics "Root: shape in longitudinal section" (characteristic 17), "Root: external colour" (characteristic 23) and "Root: prominence of rings" (characteristic 26), a population standard of 2 % and an acceptance probability of 95% should be applied. In the case of a sample size of 200 plants, 7 off-types are allowed.

- (ii) - hybrids a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 200 plants, 7 off-types are allowed. In addition a population standard of 2% and an acceptance probability of at least 95% should be applied to clearly recognisable inbred plants. In the case of a sample size of 200 plants, 7 inbred plants are allowed.

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 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.

VI - ENTRY INTO FORCE

The present protocol enters into force on **12 March 2009**. Any ongoing DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the new TP. 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 the submission of plant material for the first growing period.

In cases where the CPVO requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process of being carried out at the moment of the 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.

ANNEXES TO FOLLOW

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Legend:

Note: For the CPVO numbered characteristics, all characteristics in the table are compulsory; notwithstanding, in the case of disease resistance characteristics, only those resistances marked with an asterisk (*) in the CPVO column are compulsory. The asterisks in the UPOV numbered characteristics are there for information purposes and denote those characteristics which should always be observed when a UPOV guideline is utilised.

In general for the assessment of resistance characteristics, the facilities of other Examination Offices or specialised institutions might be used, subject to previous arrangements.

Some characteristics may be discarded: if there are already phytosanitary restrictions.

- (+) See explanations on the Table of characteristics
- (a) – (b) See explanations on the table of characteristics
- G Grouping characteristic

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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ANNEX II

Technical Questionnaire

ANNEX I

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

CPVO No.	UPOV No.	Stage, Method	Characteristics	Examples	Note
1.	1.	VG/MS	Germity		
	(*)				
(+)	(+)	C	monogerm	Monodet, Monopoly	1
QL	QL		multigerm	Crosby, Detroit 2	2
2.	2.	VG	Seedling: red coloration of hypocotyl		
	(*)		absent	Albina Vereduna	1
QL	QL		present	Crosby, Detroit 2	9
3.	3.	VG	Leaf: attitude of petiole		
QN	QN	(a)	erect	Dragon, Forono	1
			semi-erect	Crosby, Detroit 2	3
			horizontal		5
4.	4.	VG	Leaf: attitude of blade		
	(*)	(a)	erect	Dragon	1
QN	QN		semi-erect	Bikores	3
			horizontal	Detroit 5, Forono	5
			semi-pendulous	D'Egypte	7
			pendulous		9
5.	5.	VG/MS	Leaf: length (including petiole)		
	(*)	(a)	short	Babybeat	3
QN	QN		medium	Boltardy	5
			long	Bull's Blood	7
6.	6.	VG/MS	Leaf blade: length		
	(*)	(a)	short	Babybeat	3
QN	QN		medium	Detroit 2	5
			long	Crosby	7

CPVO No.	UPOV No.	Stage, Method	Characteristics	Examples	Note			
7.	7.	VG/MS	Leaf blade: width					
			(*)	(a)	narrow	Bikores	3	
			QN	QN	medium	Detroit 2	5	
			broad	Crosby	7			
8.	8.	VG	Leaf blade: shape					
			(*)	(a)	narrow elliptic	Cheltenham Mono	3	
			QN	QN	medium elliptic	Detroit 2	5	
			broad elliptic	Burpee's Golden	7			
9.	9.	VG	Leaf blade: colour					
			(*)	(a)	mainly green	Albina Vereduna	1	
			QN	QN	green and red	D'Egypte	2	
G			mainly red	Bull's Blood	3			
10.	10.	VG	Leaf blade: intensity of green colour					
			(*)	(a)	light	Solist	3	
			QN	QN	medium	Regala	5	
			dark	Monopoly	7			
11.	11.	VG	Leaf blade: red coloration of veins					
			QN	QN	(a)	absent or very weak	Albina Vereduna	1
						weak	Chioggia	3
						medium	Regala	5
						strong	D'Egypte	7
			very strong	Bull's Blood	9			
12.	12.	VG	Leaf blade: undulation of margin					
			(*)	(a)	absent or very weak	Burpee's Golden	1	
			QN	QN	weak	Trianon	3	
						medium	Regala	5
						strong	D'Egypte	7
			very strong	Detroit 5	9			

CPVO No.	UPOV No.	Stage, Method	Characteristics	Examples	Note			
13.	13.	VG	Leaf blade: blistering					
			(*)	(a)	weak	Crosby	3	
			QN	QN	medium	Bikores	5	
			strong	Burpee's Golden	7			
14.	14.	VG	Petiole: width of base (at root insertion)					
			QN	QN	(a)	narrow	Cylindra	3
						medium	Bikores	5
			broad	Crosby	7			
15.	15.	VG	Petiole: main colour of lower side					
			(*)	(a)	green	Albina Vereduna	1	
			QN	PQ	orange	Burpee's Golden	2	
					red	Crapaudine	3	
			purple	Babybeat, Bull's Blood	4			
16.	16.	VG	Root: position in soil					
			(*)	(b)	very shallow	D'Egypte	1	
			QN	QN	shallow		3	
					medium	Boltardy	5	
					deep	Albina Vereduna	7	
			very deep	Crapaudine	9			
17.	17.	VG	Root: shape in longitudinal section					
			(*)	(b)	transverse narrow elliptic	D'Egypte	1	
			(+)	(+)	transverse medium elliptic	Crosby	2	
			PQ	PQ	circular	Detroit 2	3	
					obovate	Albina Vereduna	4	
					narrow oblong	Cylindra	5	
G			very narrow obovate	Cheltenham Mono	6			

CPVO No.	UPOV No.	Stage, Method	Characteristics	Examples	Note			
18.	18.	VG/MS	Root: length					
			(*)	(b)	short	D'Egypte	3	
			QN	QN	medium	Detroit 2	5	
			long	Forono	7			
19.	19.	VG/MS	Root: width					
			(*)	(b)	narrow	Forono	3	
			QN	QN	medium	Detroit 2	5	
			broad	D'Egypte	7			
20.	20.	MS/VG	Root: ratio length/width					
			QN	QN	(b)	small	D'Egypte	1
						medium	Detroit 2	3
			large	Cylindra	5			
21.	21.	VG	Root: shape of tip					
			(*)	(b)	pointed	Cheltenham Mono, Crapaudine	1	
			(+)	(+)	rounded	Babybeat, Crimson King	2	
			PQ	PQ	flat	D'Egypte	3	
			depressed		4			
22.	22.	VG	Root: corkiness					
			QN	QN	(b)	absent or very weak	1	
						weak	Boltardy	3
						medium	Monami	5
						strong	Crapaudine	7
			very strong		9			
23.	23.	VG	Root: external colour					
			(*)	(b)	white	Albina Vereduna	1	
			PQ	PQ	yellow	Burpee's Golden	2	
G			reddish purple	Detroit 2	3			

CPVO No.	UPOV No.	Stage, Method	Characteristics	Examples	Note			
24.	24.	VG	Root: main colour of flesh					
			(*)	(b)	white	Albina Vereduna	1	
			PQ	PQ	yellow orange	Burpee's Golden	2	
					red	Detroit 2	3	
			purple	Cylindra	4			
25.	25.	VG	Root: intensity of main colour of flesh					
			QN	QN	(b)	light		3
						medium		5
			dark		7			
26.	26.	VG	Root: prominence of rings					
			QN	QN	(b)	absent or very weak	Akela, Larka	1
						weak	Forono	3
						medium	Pacemaker III	5
						strong	Bull's Blood	7
			very strong	Chioggia	9			
27.	27.	MG	Bolting tendency (from an early sowing)					
			(*)					
			(+)	(+)	absent or weak	Boltardy, Dragon	1	
			QN	QN	medium	Pronto	2	
G		strong	Pacemaker III	3				

EXPLANATIONS AND METHODS

Explanations for 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 leaves should be made on fully developed leaves.
- (b) All observations on the root should be made on fully developed roots.

Ad 1: Germity

Germity should be observed on 200 seed clusters. Monogerm varieties are genetically monogerm and at least 90% of seed clusters should lead to single plants. Seed clusters of multigerm varieties lead to less than 90% single plants.

Ad 17: Root: shape in longitudinal section



1
transverse narrow elliptic



2
transverse medium elliptic



3
circular



4
obovate



5
narrow oblong



6
very narrow obovate

Ad. 21: Root: shape of tip



1
pointed



2
rounded



3
flat



4
depressed

Ad 27: Bolting tendency (from an early sowing)

Method of cold treatment

Seed is laid out on a filter paper, which should be kept moist for germination. The minimum germination temperature is 18°C. With emergence of the root the seedlings should be transplanted into modules and subjected to cold treatment in cold storage for four weeks at 3°C without artificial lighting.

After the cold treatment the seedlings should be cultivated under normal conditions, preferably in the greenhouse (2°C minimum temperature, ventilation at 7°C and above). Multigerm varieties with several seedlings emerging from one cluster should not usually be singled. After the development of two true leaves, the young plants should be transplanted into the open field.

The number of bolted plants (with shoot axis elongated by more than 5 cm) should be counted at least once a week.

It is recommended to conduct this test as early as possible in the growing season, because bolting is very strongly influenced by the climatic conditions after cold treatment. Beetroot is very sensitive to devernalization at temperatures above 18°C.

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ANNEX II

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO-TQ/060/1