



**EUROPEAN UNION**  
**COMMUNITY PLANT VARIETY OFFICE**

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

*Brassica oleracea* L. convar. *acephala* (DC.) Alef. var. *gongylodes* L.;  
*Brassica oleracea* L. *gongylodes* Group

**KOHLRABI**

UPOV Species Code: BRASS\_OLE\_GGO

**Adopted on 25/03/2004**

## **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/65/4 (proj.) dated 29/01/2002 for the conduct of tests for Distinctness, Uniformity and Stability. This protocol applies to all varieties of *Brassica oleracea* L. convar. *acephala* (DC.) Alef. var. *gongylodes* L. (*Brassica oleracea* L. Gongylodes Group).

## **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 final dates for request for technical examination and sending of Technical Questionnaire by the CPVO as well as submission date of plant material by the applicant can be found in the S2 supplement of the CPVO Official Gazette and the CPVO website ([www.cpvo.europa.eu](http://www.cpvo.europa.eu)).

Quality of seed:	Should not be less than the standards laid down for certified seed in Annex 2 of Council Directive 2002/55/EC.
Quality of plants:	Should not be less than the standards laid down for plants in EC Directive 92/33 and implementing measures.
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" - In the case of a split sample, the quantity of seed being submitted.

### **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 kohlrabi. 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 2. 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 overlapping states of expression between adjacent groups is required to reduce the risks of incorrect allocation of candidates to groups. The characteristics which may be used for grouping are the following:

- (a) Seedling: anthocyanin coloration of cotyledons (characteristic 1)
- (b) Harvest maturity (characteristic 24)

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

As a minimum, each test should include a total of 60 plants which should be divided between two or more replicates.

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

All observations on the plant and the leaf should be made before harvest maturity.

All observations on the kohlrabi should be made at harvest maturity.

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 open-pollinated varieties, relative uniformity standards should be used.

For the assessment of uniformity of hybrid varieties a population standard of 2% with an acceptance probability of 95% should be applied to off-types excluding clearly recognisable inbred plants.

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

<u>Number of plants</u>	<u>off-types allowed</u>
19-41	2
42-69	3

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.

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## ANNEXES TO FOLLOW

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### **ANNEX II**

Technical Questionnaire

## ANNEX I

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

CPVO N°	UPOV N°	Characteristics	Examples	Note
1.	1.	<b>Seedling: anthocyanin coloration of cotyledons</b>		
		absent	Express Forcer	1 [ ]
G		present	Azur-Star	9 [ ]
2.	2.	<b>Seedling: intensity of green coloration of cotyledons</b>		
		light	Erko	3 [ ]
		medium	Express Forcer	5 [ ]
		dark	Eder	7 [ ]
3.	3.	<b>Petioles: crossing</b>		
		absent	Express Forcer	1 [ ]
(+)		present	Delikateß blauer	9 [ ]
4.	4.	<b>Petiole: length</b>		
		very short	Primavera weiß	1 [ ]
		short	Quickstar, Spree	3 [ ]
		medium	Patrick, Rolano	5 [ ]
		long	Delikateß blauer	7 [ ]
		very long		9 [ ]
5.	5.	<b>Petiole: thickness (in the middle)</b>		
		thin	Avanti, Kohyro	3 [ ]
		medium	Noriko, Rolano	5 [ ]
		thick	Adriana	7 [ ]



CPVO N°	UPOV N°	Characteristics	Examples	Note
6.	6.	<b>Petiole: attitude</b>		
		erect	Eder	1 [ ]
		semi-erect	Erko, Lanro	3 [ ]
		horizontal		5 [ ]
7.	7.	<b>Leaf blade: attitude</b>		
		erect	Eder	1 [ ]
		semi-erect	Erko, Lanro	3 [ ]
		horizontal		5 [ ]
8.	8.	<b>Leaf blade: length</b>		
		(+) very short		1 [ ]
		short	Kohyro, Primavera weiß	3 [ ]
		medium	Domino, Logo	5 [ ]
		long	Lanro, Noriko	7 [ ]
		very long	Gigant, Superschmelz	9 [ ]
9.	9.	<b>Leaf blade: width</b>		
		(+) very narrow		1 [ ]
		narrow	Knaufs Ideal	3 [ ]
		medium	Express Forcer, Spree	5 [ ]
		broad	Noriko	7 [ ]
		very broad	Gigant, Superschmelz	9 [ ]
10.	10.	<b>Leaf blade: shape of apex</b>		
		(+) acute		1 [ ]
		pointed		2 [ ]
		obtuse	Avanti, Express Forcer	3 [ ]
		rounded	Noriko, Spree	4 [ ]
		broadly rounded	Gigant, Superschmelz	5 [ ]

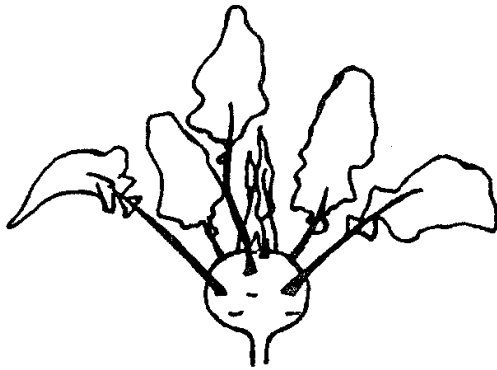
CPVO N°	UPOV N°	Characteristics	Examples	Note	
11.	11.	<b>Leaf blade: divisions to midrib (on lower part of leaf)</b>			
		(+)	absent or very few	1 [ ]	
			few	Azur-Star	3 [ ]
			medium	Noriko	5 [ ]
			many	Avanti, Korist	7 [ ]
			very many	Lanro	9 [ ]
12.	12.	<b>Leaf blade: number of margin incisions (on upper part of leaf)</b>			
		(+)	absent or very few	1 [ ]	
			few	Azur-Star	3 [ ]
			medium	Express Forcer	5 [ ]
			many		7 [ ]
			very many		9 [ ]
13.	13.	<b>Leaf blade: depth of margin incisions (on upper part of leaf)</b>			
		(+)	absent or very shallow	1 [ ]	
			shallow	Oste	3 [ ]
			medium	Express Forcer	5 [ ]
			deep	Soko	7 [ ]
			very deep		9 [ ]
14.	14.	<b>Leaf blade: shape in cross section</b>			
			concave	1 [ ]	
			plane	Express Forcer	2 [ ]
			convex	Azur-Star, Erko	3 [ ]

CPVO N°	UPOV N°	Characteristics	Examples	Note
15.	15.	<b>Leaf blade: blistering</b>		
		weak	Avanti	3 [ ]
		medium	Spree	5 [ ]
		strong	Lanro	7 [ ]
16.	16.	<b>Leaf blade: waxiness</b>		
		weak		3 [ ]
		medium	Express Forcer	5 [ ]
		strong	Blaril	7 [ ]
17.	17.	<b>Leaf blade: hue of green colour</b>		
		absent	Erko, Noriko	1 [ ]
		greyish	Express Forcer, Lanro	2 [ ]
		bluish	Azur-Star	3 [ ]
18.	18.	<b>Leaf blade: intensity of green colour</b>		
		very light		1 [ ]
		light		3 [ ]
		medium	Noriko, Quickstar	5 [ ]
		dark	Avanti, Lanro	7 [ ]
		very dark		9 [ ]
19. (+)	19.	<b>Kohlrabi: number of inner leaves</b>		
		few	Erko	3 [ ]
		medium	Express Forcer	5 [ ]
		many	Lanro	7 [ ]
20.	20.	<b>Kohlrabi: colour of skin</b>		
		white green	Express Forcer, Lanro	1 [ ]
		green	Erko, Noriko	2 [ ]
		pale violet		3 [ ]
		dark violet	Azur-Star	4 [ ]

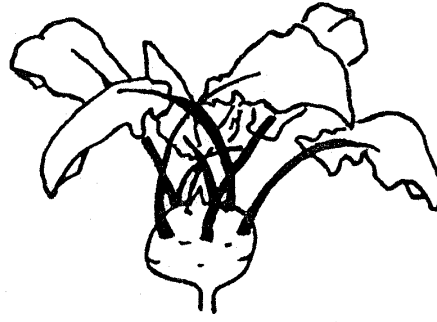
CPVO N°	UPOV N°	Characteristics	Examples	Note
<b>21.</b>	<b>21.</b>	<b>Kohlrabi: shape (in longitudinal section)</b>		
(+)		transverse narrow elliptic	Erko	1 [ ]
		transverse elliptic	Azur-Star, Quickstar	2 [ ]
		transverse broad elliptic	Noriko	3 [ ]
		circular	Blaril	4 [ ]
		broad elliptic		5 [ ]
<b>22.</b>	<b>22.</b>	<b>Kohlrabi: shape of apex</b>		
(+)		indented	Express Forcer	3 [ ]
		level	Avanti, Spree	5 [ ]
		raised	Gigant, Superschmelz	7 [ ]
<b>23.</b>	<b>23.</b>	<b>Harvest maturity</b>		
(+)		very early	Express Forcer	1 [ ]
		early	Azur-Star, Quickstar	3 [ ]
		medium	Lanro	5 [ ]
		late	Delikateß blauer	7 [ ]
<b>G</b>		very late	Blaril	9 [ ]

## EXPLANATIONS AND METHODS

### Ad. 3: Petioles: crossing



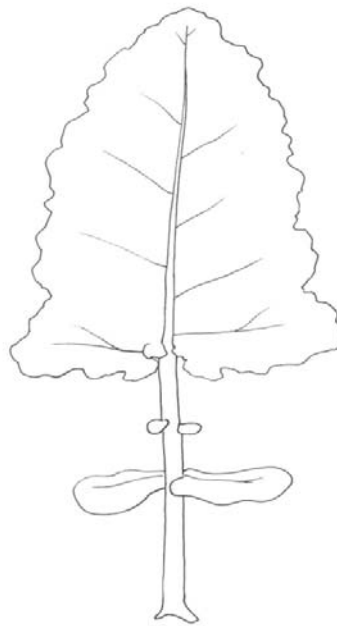
1  
absent



9  
present

### Ad. 4: Petiole: length

### Ad. 8 and 9: Leaf blade: length and width



length of  
leaf blade

length of  
petiole

leaf blade

Ad. 10: Leaf blade: shape of apex



1  
acute



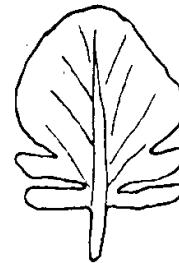
2  
pointed



3  
obtuse

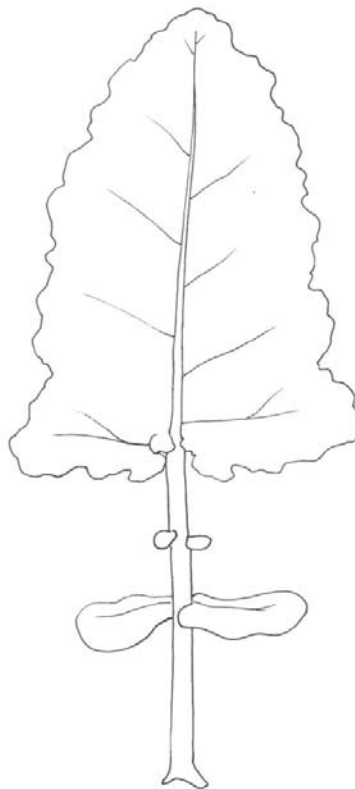


4  
rounded



5  
broadly rounded

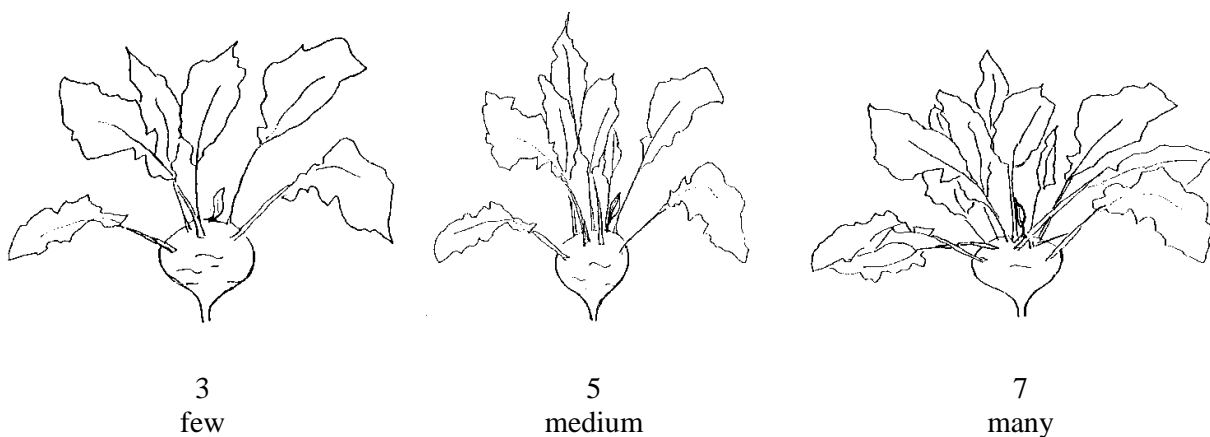
Ad. 11-13: Leaf blade: divisions to midrib, margin incisions



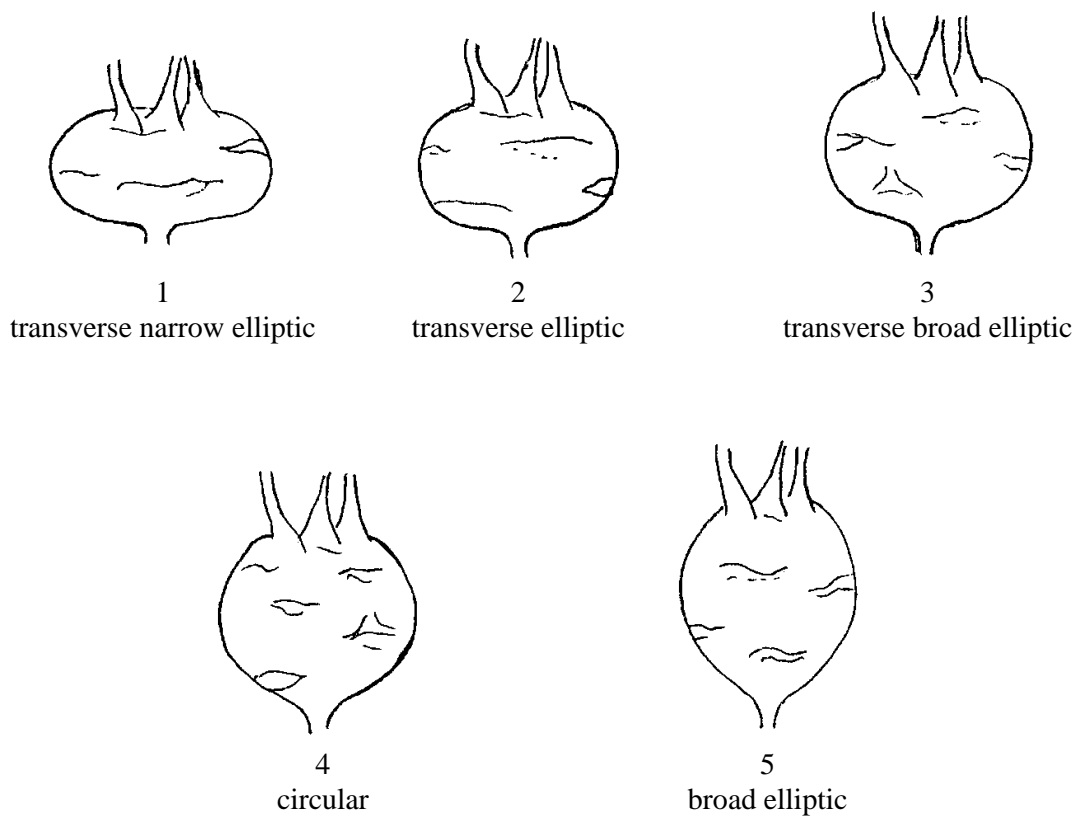
Part on which margin incisions  
should be recorded

Part on which divisions to midrib  
should be recorded

Ad. 19: Kohlrabi: number of inner leaves



Ad. 21: Kohlrabi: shape (in longitudinal section)



Ad. 22: Kohlrabi: shape of apex



3  
indented



5  
level



7  
raised

Ad. 23: Harvest maturity

Harvest maturity is considered as being reached if 50 % of kohlrabis reach 7 cm diameter in the greenhouse or 8 cm diameter in the open field.



## LITERATURE

BECKER, G. (1962): Kohlrabi in: Handbuch der Pflanzenzüchtung, Band VI, 2. Auflage, Paul Parey Verlag, Berlin –Hamburg, 201-203.

BECKER-DILLINGEN, J. (1950): Kohlrabi in: Handbuch des gesamten Gemüsebaues, 5. Auflage, Parey Verlag, Berlin – Hamburg, 331-342.

HAHN, P. und SCHMITT, U. (1951): Kohlrabi in: Kohl- und Wurzelgemüse, Arten- und Sortenkunde, Band 2, 1. Auflage, Deutscher Bauernverlag, Berlin, 108-138.

KAMPE, K.; BASSE, H.; GLASCHKE, B. und SCHREIBER, F. (1956): Kohlrabi in: Gemüsesorten, II. Teil (Kohl-, Blatt- und Wurzelgemüse), 1. Auflage, Parey Verlag, Berlin – Hamburg, 44-51.

WIEBE, H.-J. (1989): Vernalisation von wichtigen Gemüsearten – Ein Überblick. Gartenbauwissenschaft 54 (3), Ulmer Verlag, Stuttgart, 97-104.

VOGEL, G. (1996): Kohlrabi in: Handbuch des speziellen Gemüsebaues. Ulmer Verlag, Stuttgart, 304 – 323.

## 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. convar. *acephala* (DC.) Alef. var. *gongylodes* L.;  
*Brassica oleracea* L. *gongylodes* Group

KOHLRABI

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 Breeding, maintenance and reproduction of the variety**

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

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

**4.3 Shall the information on data relating to components of hybrid varieties including data related to their cultivation be treated as confidential?**

[ ] YES                      [ ] NO

If yes, please give this information on the attached form for confidential information.

If no, please give information on data relating to components of hybrid varieties including data related to their cultivation:

Breeding scheme (indicate female component first)

<b>5. Characteristics of the variety to be indicated</b> (the number in brackets refers to the corresponding characteristic in the CPVO Protocol; please mark the state of expression which best corresponds).		
<b>Characteristics</b>	<b>Example varieties</b>	<b>Note</b>
<b>5.1 (1)</b>	<b>Seedling: anthocyanin coloration of cotyledons</b>	
absent	Express Forcer	1 [ ]
present	Azur-Star	9 [ ]
<b>5.2 (11)</b>	<b>Leaf blade: divisions to midrib (on lower part of leaf)</b>	
absent or very few		1 [ ]
few	Azur-Star	3 [ ]
medium	Noriko	5 [ ]
many	Avanti, Korist	7 [ ]
very many	Lanro	9 [ ]
<b>5.3 (15)</b>	<b>Leaf blade: blistering</b>	
weak	Avanti	3 [ ]
medium	Spree	5 [ ]
strong	Lanro	7 [ ]
<b>5.4 (18)</b>	<b>Leaf blade: intensity of green colour</b>	
very light		1 [ ]
light		3 [ ]
medium	Noriko, Quickstar	5 [ ]
dark	Avanti, Lanro	7 [ ]
very dark		9 [ ]
<b>5.5 (20)</b>	<b>Kohlrabi: colour of skin</b>	
white green	Express Forcer, Lanro	1 [ ]
green	Erko, Noriko	2 [ ]
pale violet		3 [ ]
dark violet	Azur-Star	4 [ ]

Characteristics		Example varieties	Note
<b>5.6</b> <b>(21)</b>	<b>Kohlrabi: shape (in longitudinal section)</b>		
	transverse narrow elliptic	Erko	1 [ ]
	transverse elliptic	Azur-Star, Quickstar	2 [ ]
	transverse broad elliptic	Noriko	3 [ ]
	circular	Blaril	4 [ ]
	broad elliptic		5 [ ]
<b>5.7</b> <b>(23)</b>	<b>Harvest maturity</b>		
	very early	Express Forcer	1 [ ]
	early	Azur-Star, Quickstar	3 [ ]
	medium	Lanro	5 [ ]
	late	Delikateß blauer	7 [ ]
	very late	Blaril	9 [ ]
<b>6. Similar varieties and differences from these varieties:</b>			
Denomination of similar variety	Characteristic in which the similar variety is different <sup>1)</sup>	State of expression of similar variety	State of expression of candidate variety
<p><sup>1)</sup> In the case of identical states of expressions of both varieties, please indicate the size of the difference</p>			
<b>7. Additional information which may help to distinguish the variety</b>			
<b>7.1 Resistance to pests and diseases</b>			

**7.2 Special conditions for the examination of the variety**

- (a) Variety for glasshouse culture [ ]
- (b) Variety for field production at
- (i.) spring [ ]
- (ii.) summer [ ]
- (iii.) autumn [ ]

**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 EC/2001/18 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 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]