CPVO · OCVV
Community Plant Variety Office
Office Communautaire des Variétés Végétales

PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

Brassica rapa L. subsp. *pekinensis* (Lour.) Hanelt; hybrids between *Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt and *Brassica rapa* L. subsp. *chinensis* (L.) Hanelt; hybrids between *Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt and *Brassica rapa* L. var. *rapa*; *Brassica* × *turicensis* O. E. Schulz & Thell.

CHINESE CABBAGE

UPOV Code: BRASS_RAP_PEK; BRASS_RAP_PCH;
BRASS_RAP_PRA; BRASS_TUR

Adopted on 23/04/2025

Entry into force on 01/06/2025

CPVO-TP/105/2 based on the version 5 of the CPVO-TP/template

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CPVO-TP/105/2

1. SUBJECT OF THE PROTOCOL AND REPORTING

1.1 Scope of the technical protocol

This Technical Protocol applies to all varieties of ***Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt**, hybrids between ***Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt** and ***Brassica rapa* L. subsp. *chinensis* (L.) Hanelt**, hybrids between ***Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt** and ***Brassica rapa* L. var. rapa; *Brassica* × *turicensis* O. E. Schulz & Thell**.

The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS (UPOV Document TG/1/3 http://www.upov.int/export/sites/upov/resource/en/tg_1_3.pdf), its associated TGP documents (http://www.upov.int/tgp/en/) and the relevant UPOV Test Guideline TG/105/5 dated 09/08/2024 (https://www.upov.int/edocs/tgdocs/en/tg105.pdf) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01.06.2025**. Any ongoing DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the Technical Protocol. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for submitting of plant material for the first growing cycle.

In cases where the Office requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process to be carried out at the moment of this request, such report can only be accepted if the technical examination has been carried out according to the CPVO TP which was in force at the moment when the technical examination started.

1.3 Reporting between Examination Office and CPVO and Liaison with Applicant

1.3.1 Reporting between Examination Office and CPVO

The Examination Office shall deliver to the CPVO a preliminary report ("the preliminary report") no later than four weeks after the date of the request for technical examination by the CPVO and in any case preferably before the submission period of the plant material.

The Examination Office shall also deliver to the CPVO a report relating to each growing period ("the interim report") and, when the Examination Office considers the results of the technical examination to be adequate to evaluate the variety or the CPVO so requests, a report relating to the examination ("the final report").

The final report shall state the opinion of the Examination Office on the distinctness, uniformity and stability of the variety. Where it considers those criteria to be satisfied, or where the CPVO so requests, a description of the variety shall be added to the report.

If a report is negative the Examination Office shall set out the detailed reasons for its findings.

The interim and the final reports shall be delivered to the CPVO as soon as possible and no later than on the deadlines as laid down in the designation agreement.

1.3.2 Informing on problems in the DUS test

In cases where the Examination Office identifies issues during the course of the technical examination that may lead to a negative report, the Examination Office shall inform the CPVO and in urgent cases the applicant/holder as soon as such issues become obvious.

1.3.3 Sample keeping in case of problems

As far as feasible the Examination Office shall keep a representative sample of any relevant testing material of the candidate variety and reference variety(ies) if the technical examination has resulted in a negative report. As soon as possible, the CPVO shall inform the Examination Office when the material can be destroyed.

2. MATERIAL REQUIRED

2.1 Plant material requirements

Information with respect to the agreed closing dates and submission requirements of plant material for the technical examination of varieties can be found on https://public.plantvarieties.eu/publication in the special issue S2/S3 of the Official Gazette of the Office. General requirements on submission of samples are also to be found following the same link.

2.2 Informing the applicant of plant material requirements

The CPVO informs the applicant that:

- he/she is responsible for ensuring compliance with any customs and plant health requirements;
- the plant material supplied should be visibly healthy, not lacking in vigour, nor affected by any important pest or disease;
- the plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

2.3 Informing about problems on the submission of material

The Examination Office shall report to the CPVO immediately in cases where the test material of the candidate variety has not arrived in time or in cases where the material submitted does not fulfil the conditions laid down in the request for submission of plant material issued by the CPVO.

In cases where the examination office encounters difficulties to obtain plant material of reference varieties the CPVO should be informed in writing.

3. METHOD OF EXAMINATION

3.1 Number of growing cycles

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

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

The testing of a variety may be concluded when the entrusted examination office can determine with certainty the outcome of the test.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness" http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf.

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 Special tests for additional characteristics

In accordance with Article 23 of Implementing Rules N° 874/2009 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 characteristics listed in the protocol.

3.6 Constitution and maintenance of a variety collection

The process for the constitution and the maintenance of a variety collection can be summarized as follows:

Step 1: Making an inventory of the varieties of common knowledge.

Step 2: Establishing a collection ("variety collection") of varieties of common knowledge which are relevant for the examination of distinctness of candidate varieties.

Step 3: Selecting the varieties from the variety collection which need to be included in the growing trial or other tests for the examination of distinctness of a particular candidate variety.

3.6.1 Forms of variety collection
The variety collection shall comprise variety descriptions and living plant material, thus a living reference collection. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive and pictorial information produced by the EO shall be held and maintained in a form of a database.

3.6.2 Living Plant Material
The EO shall collect and maintain living plant material of varieties of the species concerned in the variety collection.

3.6.3 Range of the variety collection
The living variety collection shall cover at least those common knowledge varieties that are suitable to grow in the climatic conditions of a respective EO.

3.6.4 Making an inventory of varieties of common knowledge for inclusion in the variety collection
The inventory shall include varieties protected under National and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list and varieties in trade or in commercial registers for those species not covered by a National or the Common Catalogue.

The inventory shall take into account the list of varieties which are the subject of an on-going application for protection or official registration (candidate varieties).

3.6.5 Maintenance and renewal/update of a living variety collection
The EO shall maintain seeds in conditions which will ensure germination and viability, periodical checks, and renewal as required.
Living material in variety collections representing varieties for which a DUS test was carried out at that EO shall be renewed after verification in a side-by-side comparison. In case where no living material is available anymore in the collection, such verification could be done with any other test that has proven to give similar results between the material in the collection and the new material.

4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

The prescribed procedure is to assess distinctness, uniformity and stability in a growing trial.

4.1 Distinctness

4.1.1 General recommendations
It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 9 'Examining Distinctness' (http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf) prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

Further guidance is provided in documents TGP/9 "Examining Distinctness" and TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".

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

4.1.3 Clear differences

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

4.1.4 Number of plants/parts of plants to be examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of observation

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

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

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

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

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

4.2 Uniformity

4.2.1 It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 10 'Examining Uniformity' (http://www.upov.int/edocs/tgpdocs/en/tgp_10.pdf) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

4.2.2 This Technical Protocol has been developed for the examination of seed-propagated varieties including cross-pollinated and hybrid varieties. For varieties with other types of propagation the recommendations in the UPOV-General Introduction to DUS and document TGP/13 "Guidance for new types and species", Section 4.5 "Testing Uniformity" should be followed.

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

4.2.4 For the assessment of uniformity of single cross 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.

4.3 Stability

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pd)

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.

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 ORGANISATION 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 organise the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

a) Plant: height (characteristic 2)

b) Outer leaf: main colour (characteristic 9)

c) Head: shape in longitudinal section (characteristic 24)

d) Head: degree of overlapping of leaves (characteristic 25)

e) Time of harvest maturity (characteristic 32)

5.4 If characteristics other than those mentioned in the list of grouping characteristics and/or from the table of characteristics and/or from the Technical Questionnaire – sections 5 and 7. are used for the selection of varieties to be included into the growing trial, the EO shall inform the CPVO and seek the prior consent of the CPVO before using these characteristics.

5.5 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the UPOV-General Introduction to DUS and document TGP/9 "Examining Distinctness".

6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS

6.1 Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted or by specific legislation on plant health. In the latter case, the CPVO should be informed.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N°874/2009, to insert additional characteristics and their expressions in respect of a variety.

6.2. States of expression and corresponding notes

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. All relevant states of expression are presented in the characteristic.

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

6.3 Example Varieties

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

6.4 Legend

For column 'CPVO N°':

G	Grouping characteristic	-see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	Explanations for individual characteristics	-see Chapter 8.2

For column 'UPOV N°':

The numbering of the characteristics is provided as a reference to the UPOV guideline.

(*)	UPOV Asterisked characteristic	- Characteristics that are important for the international harmonization of variety descriptions.

For column 'Stage, method':

MG, MS, VG, VS		-see Chapter 4.1.5
(a)-(b)	Explanations covering several Characteristics	-see Chapter 8.1

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1. (+)	**1.**	**VG**	**Plant: habit**		
QN		**(a)**	erect	Golden boy, Granaat	1
			semi-erect	Bilko, Daetong, Muso	2
			spreading	Lycofresh Gimjang	3
2.	**2. (*)**	**MS/VG**	**Plant: height**		
QN		**(a)**	very short		1
			very short to short		2
			short	Natsuki, TheHan1ho	3
			short to medium		4
			medium	Bilko, Daetong, Muso	5
			medium to tall		6
			tall	Monument, Shousai, Wonkyo20036ho	7
			tall to very tall		8
G			very tall		9
3.	**3.**	**MS/VG**	**Outer leaf: length**		
QN		**(a)**	very short		1
			very short to short		2
			short	Golden boy, Summer Salad, TheHan1ho	3
			short to medium		4
			medium	Daetong, Muso	5
			medium to long		6
			long	Shousai, Wonkyo20036ho	7
			long to very long		8
			very long		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
4. (+)	**4.**	**MS/VG**	**Outer leaf: width**		
QN		**(a)**	very narrow		1
			very narrow to narrow		2
			narrow	Jinhongssam, Summer Salad	3
			narrow to medium		4
			medium	Daetong, Muso	5
			medium to broad		6
			broad	Bando, Lycofresh Gimjang	7
			broad to very broad		8
			very broad		9
5. (+)	**5. (*)**	**VG**	**Outer leaf: shape**		
PQ		**(a)**	circular	Bingsu, Kenshin	1
			broad obovate	Daetong, Kaho	2
			medium obovate	Muso, Suho	3
			very narrow obovate	Lycofresh Gimjang	4
			elongated obovate	Shousai, Wonkyo20036ho	5
6. (+)	**6.**	**VG**	**Outer leaf: shape of apex**		
PQ		**(a)**	obtuse	Shousai	1
			rounded	Daetong, Muso	2
			truncate	Lycofresh Gimjang, Ousho	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
7.	**7. (*)**	**VG**	**Outer leaf: number of blisters on upper side**		
QN		**(a)**	very few		1
			very few to few		2
			few	Granaat, Kinap, Sprinter	3
			few to medium		4
			medium	Daetong, Muso, Parkin	5
			medium to many		6
			many	Enduro, Jindaebak, Ming	7
			many to very many		8
			very many		9
8. (+)	**8.**	**VG**	**Outer leaf: size of blisters on upper side**		
QN		**(a)**	very small		1
			very small to small		2
			small	Granat	3
			small to medium		4
			medium	Daetong, Parkin	5
			medium to large		6
			large	Bingsu, Enduro	7
			large to very large		8
			very large		9
9.	**9. (*)**	**VG**	**Outer leaf: main colour**		
QL		**(a)**	green	Daetong, EX King santosai, Hayamidori, Kaho, Muso, Parkin, Sprinkin	1
G			purple	Jinhongssam, Kwonnongppalgang, Red Dragon	2

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
10	**10.**	**VG**	**Outer leaf: Intensity of colour**		
QN		**(a)**	very light	EX King santosai	1
			very light to light		2
			light	Kaho, Red Dragon	3
			light to medium		4
			medium	Daetong, Kwonnongppalgang, Muso, Sprinkin	5
			medium to dark		6
			dark	Hayamidori, Jinhongssam, Parkin, TheHan1ho	7
			dark to very dark		8
			very dark		9
11.	**11.**	**VG**	**Outer leaf: glossiness**		
QN		**(a)**	very weak		1
			very weak to weak		2
			weak	Hanko, Kaho, Kinap	3
			weak to medium		4
			medium	Daetong, Muso	5
			medium to strong		6
			strong	Shunjyu	7
			strong to very strong		8
			very strong		9
12. (+)	**12.**	**VG**	**Outer leaf: hairiness**		
QN		**(a)**	absent or very weak	Bingsu, Summer Salad	1
			weak	Cream, Kinap	2
			medium	Daetong, Shunjyu, Tardisto	3
			strong	Jinhongssam, Muso	4
			very strong		5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
13. (+)	**13.**	**VG**	**Outer leaf: profile in longitudinal section**		
QN		**(a)**	concave	Bilko, Parkin	1
			straight	Daetong, Monument	2
			convex	Hanko	3
14. (+)	**14.**	**VG**	**Outer leaf: undulation of margin**		
QN		**(a)**	absent or very weak		1
			weak	Jinhongssam, Kaho, Red Dragon	2
			medium	Hanko, Suho	3
			strong	Monument	4
			very strong	Shin-aduma, Wonkyo20036ho	5
15. (+)	**15.**	**VG**	**Outer leaf: incisions of margin on distal part**		
QN		**(a)**	absent or weak	Hanko, Jinhongssam, Kenshin	1
			medium	Kasumi, Lycofresh Gimjang	2
			strong	Wonkyo20036ho	3
16. (+)	**16.**	**VG**	**Outer leaf: incisions of margin on base part**		
QN		**(a)**	absent or weak	Hanko, Jinhongssam, Kinap	1
			weak		2
			weak to medium	Daetong, Enduro	3
			medium to strong		4
			strong	Sinrok Utgari, Wonkyo20036ho	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
17. (+)	**17.**	**MS/VG**	**Outer leaf: length of midrib**		
QN		**(a)**	very short		1
			very short to short		2
			short	Hamamidori	3
			short to medium		4
			medium	Daetong, Muso	5
			medium to long		6
			long	RCC65, Shousai, Wonkyo20036ho	7
			long to very long		8
			very long		9
18. (+)	**18.**	**MS/VG**	**Outer leaf: width of midrib**		
QN		**(a)**	very narrow		1
			very narrow to narrow		2
			narrow	Shousai, Wonkyo20036ho	3
			narrow to medium		4
			medium	Enduro, Jinhongssam, Red Dragon	5
			medium to broad		6
			broad	Gorki, Harumaki 1 go, Jindaebak	7
			broad to very broad		8
			very broad		9
19. (+)	**19.**	**VG**	**Outer leaf: profile of midrib in cross section**		
QN		**(a)**	flat	Hanko, Kinap, Suho	1
			flat to concave	Lycofresh Gimjang	2
			concave	Bilko, Jinhongssam, Parkin	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
20. (+)	**20.**	**MS/VG**	**Outer leaf: thickness of midrib**		
QN		**(a)**	thin	RCC65	1
			thin to medium		2
			medium	Daetong	3
			medium to thick		4
			thick	Jinhongssam	5
21. (+)	**21.**	**VG**	**Outer leaf: colour of midrib**		
PQ		**(a)**	white	Daetong, Lycofresh Gimjang, Muso	1
			green	Jincai3, Jinlv60	2
			purple	RCC65, Red Dragon	3
22.	**22.**	**MS/VG**	**Head: height**		
QN		**(b)**	very short		1
			very short to short		2
			short	Golden boy	3
			short to medium		4
			medium	Muso, Parkin, Sprinkin, Suho	5
			medium to tall		6
			tall	Jinhongssam, Monument, Shousai	7
			tall to very tall		8
			very tall		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
23. (+)	**23.**	**MS/VG**	**Head: width**		
QN		**(b)**	very narrow		1
			very narrow to narrow		2
			narrow	Granaat, Jinhongssam	3
			narrow to medium		4
			medium	Muso, TheHan1ho	5
			medium to broad		6
			broad	Jindaebak	7
			broad to very broad		8
			very broad		9
24. (+)	**24. (*)**	**VG**	**Head: shape in longitudinal section**		
PQ		**(b)**	ovate	Daetong, Shinjyu	1
			circular	Kenshin	2
			elliptic	Hayamidori, TheHan1ho	3
			broad oblong	Chushu, Golden boy, Hanko	4
			narrow oblong	Granaat, Jinhongssam, Shousai	5
G			obovate	Gorki, Hamamidori	6
25. (+)	**25. (*)**	**VG**	**Head: degree of overlapping of leaves**		
QN		**(b)**	absent or weak	Jinhongssam	1
			weak to medium		2
			medium	Daetong, Spectrum	3
			medium to strong		4
G			strong	Golden boy, Kinap, Muso	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
26.	**26.**	**VG**	**Head: colour of upper part**		
PQ		**(b)**	white	Xinxiashuai	1
			yellow green	Bingsu, Kasumi	2
			medium green	Daetong, Lycofresh Gimjang, Muso	3
			dark green	Jinqing60	4
			purple	Jinhongssam, Red Dragon	5
27. (+)	**27.**	**VG**	**Head: blistering of wrapper leaf**		
QN		**(b)**	absent or very weak		1
			weak	Granaat	2
			medium	Gorki, Jinhongssam	3
			strong	Daetong, Enduro	4
			very strong	TheHan1ho	5
28. (+)	**28. (*)**	**VG**	**Head: internal colour**		
PQ		**(b)**	whitish	Bilko, Parkin	1
			light yellow	Golden boy	2
			medium yellow	Daetong, Enduro, Hanko	3
			dark yellow	TheHan1ho	4
			orange	Orange Queen	5
			purple	Jinhongssam, Red Dragon	6

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
29.	**29.**	**VG**	**Head: firmness**		
QN		**(b)**	very loose	Jinhongssam	1
			very loose to loose		2
			loose	Granaat, RCC65	3
			loose to medium		4
			medium	Gorki, Lycofresh Gimjang	5
			medium to firm		6
			firm	Bazuko, Suho	7
			firm to very firm		8
			very firm	Shunjyu	9
30. (+)	**30.**	**VG**	**Head: shape of apex of internal stem**		
PQ		**(b)**	pointed	Kaho, Wonkyo20036ho	1
			round	Bilko, Muso, Parkin	2
			truncate	Jindaebak, Syunju	3
31. (+)	**31.**	**VG**	**Head: coloration in vascular bundle of internal stem**		
QL		**(b)**	absent	Daetong	1
			present	Betafresh	9
32.	**32. (*)**	**MG/VG**	**Time of harvest maturity**		
QN		**(b)**	very early	Kenshin	1
			very early to early		2
			early	Blues, RCC65, Sprinkin	3
			early to medium		4
			medium	Enduro, Muso, Suho	5
			medium to late		6
			late	Chusyu, Jindaebak, Parkin, Red Dragon	7
			late to very late		8
G			very late		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
33. (+)	**33.**	**MS/VG**	**Male sterility**		
QL			absent	Kasumi, Suho	1
			present	Cheonggwang, Hanko, Red Dragon	9

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

8.1 Explanations covering several characteristics

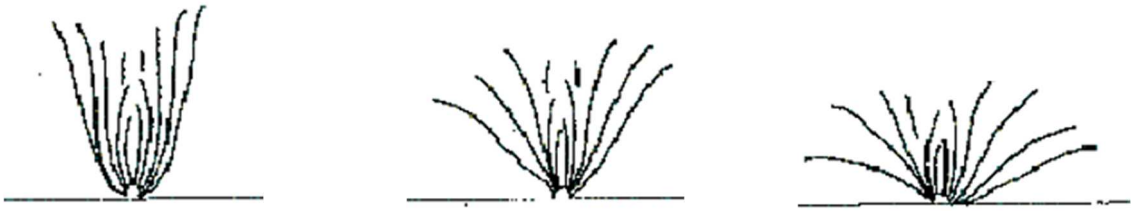
Characteristics containing the following key in the third column of the Table of Characteristics should be examined as indicated below:

(a) Observations should be made at the beginning of head formation, before harvest maturity.

(b) Observations should be made at harvest maturity.

8.2 Explanations for individual characteristics

Ad. 1: Plant: habit



1
erect

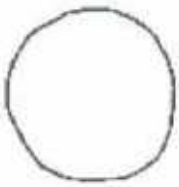
2
semi-erect

3
spreading

Ad. 4: Outer leaf: width

Observation should be made on the broadest part.

Ad. 5: Outer leaf: shape

width (ratio length/width)	← broadest part →	
	at middle	above middle
narrow (high)		 5 elongated obovate
medium (medium)		 4 very narrow obovate
		 3 medium obovate
broad (low)	 1 circular	 2 broad obovate

Ad. 6: Outer leaf: shape of apex


1
obtuse


2
rounded


3
truncate

Ad. 8: Outer leaf: size of blisters on upper side

3
small

5
medium

7
large

Ad. 12: Outer leaf: hairiness

Observations should be made on the lower side.

Ad. 13: Outer leaf: profile in longitudinal section

Observations should be made excluding the leaf base.

Ad. 14: Outer Leaf: undulation of margin

2
weak

3
medium

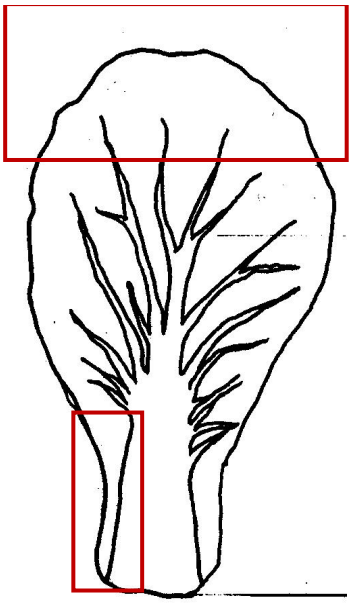
4
strong

5
very strong

Ad. 15: Outer leaf: incisions of margin on distal part

Observations should be made on the distal part of the leaf.

Incisions of margin



1
absent or weak

2
medium

3
strong

Ad. 16: Outer leaf: incisions of margin on basal part

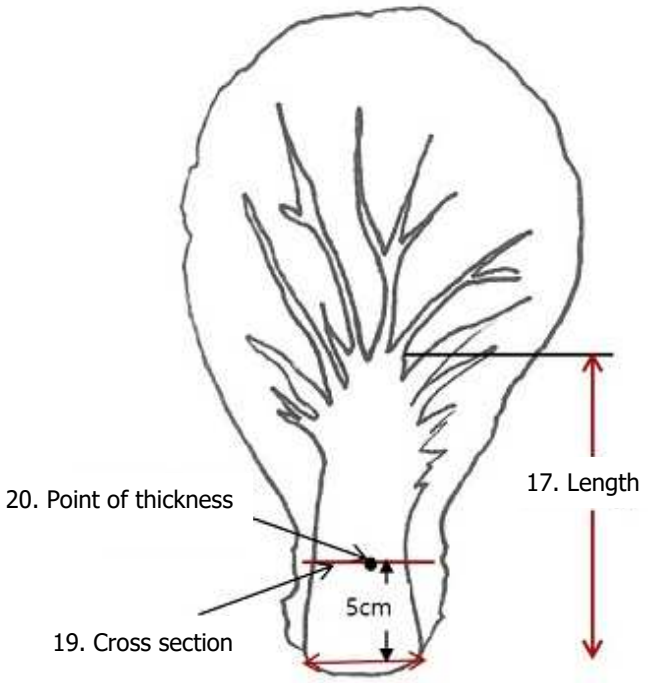
See Ad. 15
Observations should be made on the basal part of the leaf.

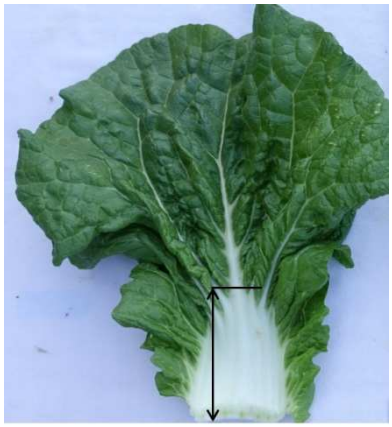
1
absent or weak

3
medium

5
strong

Ad. 17: Outer leaf: length of midrib
Ad. 18: Outer leaf: width of midrib





3
short

5
medium

7
long

Ad. 19: Outer leaf: profile of midrib in cross section

See Ad. 17
Observation should be made at 4~6cm from leaf base.

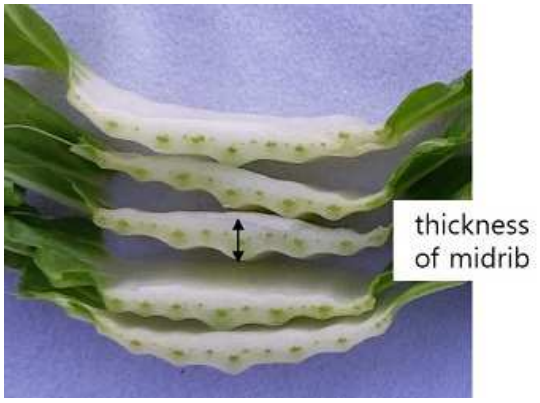
1
flat

2
flat to concave

3
concave

Ad. 20: Outer leaf: thickness of midrib

Observations should be made at the midpoint of the midrib where the characteristic 19 is observed.



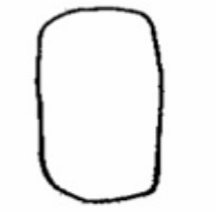
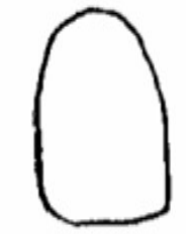
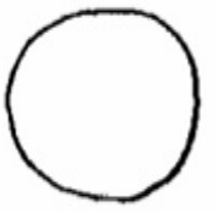
Ad. 21: Outer leaf: colour of midrib

Observations should be made on the inner side of the leaf.

Ad. 23: Head: width

Observations should be made on the broadest part.

Ad. 24: Head: shape in longitudinal section

relative width		← broadest part →		
		below middle	at middle	above middle
↑	narrow ↑		 5 narrow oblong	
			 4 broad oblong	
↓		 1 ovate	 3 elliptic	 6 obovate
	↓ broad		 2 circular	

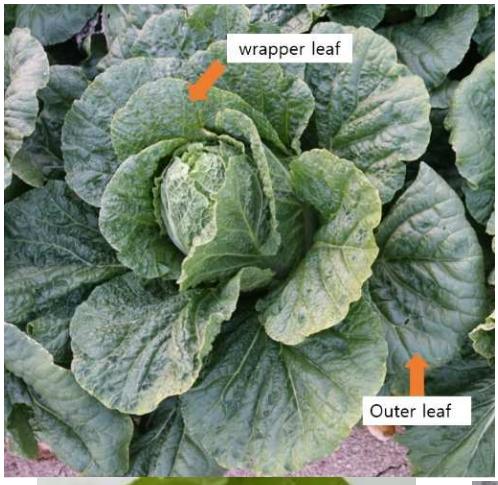
Ad. 25: Head: degree of overlapping of leaves

1
absent or weak

3
medium

5
strong

Ad. 27: Head: blistering of wrapper leaf



1
absent or very weak

2
weak

3
medium

4
strong

5
very strong

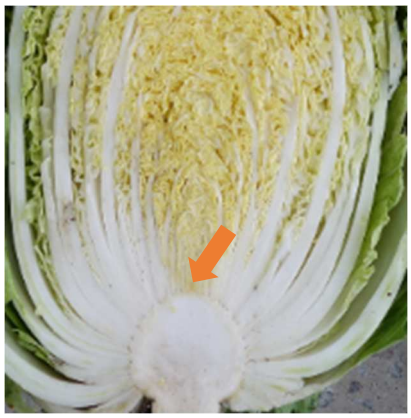
Ad. 28: Head: internal colour

Observations should be made on upper part in longitudinal section.

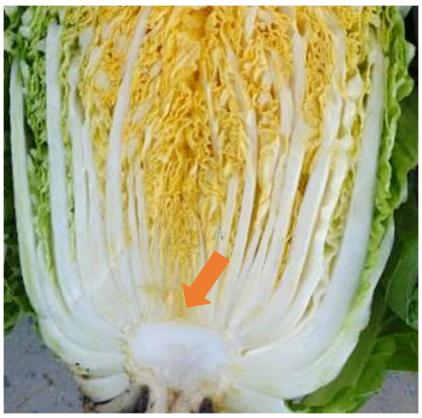
Ad. 30: Head: shape of apex of internal stem

Observations should be made from heads that are cut in longitudinal section.

1
pointed



2
rounded

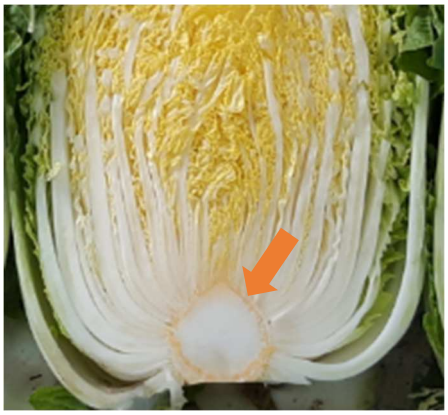


3
truncate

Ad. 31: Head: coloration in vascular bundle of internal stem

Observations should be made from heads that are cut in longitudinal section.

1
absent



9
present

Ad. 33: Male sterility

To be tested in a field trial and/or in a DNA marker test[1].

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

[1] 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.

Field trial:

Observations should be made on fully opened flowers. Tapping or shaking the flowering stem will release pollen, which, if present, can be observed on dark coloured paper or card. The absence of pollen production is an indication of male sterility. The presence of pollen production is an indication of male fertility.

male fertile (pollen present)

male sterile (pollen absent)

DNA marker test:

If the cytoplasmic male sterility (CMS) marker is absent, the variety is expected to have male fertile flowers. If the CMS marker is present, the variety is expected to have male sterile flowers.

In cases where the DNA marker test result does not confirm the declaration in the TQ, a field trial should be performed to observe whether the variety has male fertile or male sterile flowers due to another mechanism.

9. LITERATURE

Shogakukan, 1991: The Grand Dictionary of Horticuluture. pp. 560-563

Tsunoda, S., Hinata, K., and Gommez-Campo, C., 1980: Brassica Crops and Wild Allies - Biology and Breeding. Japan Scientific Press, Tokyo, JP

10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO/TQ-105/2 – *Brassica rapa* L. var. *pekinensis* (Lour.) Kitam. – Chinese cabbage