



PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

Dianthus L.

DIANTHUS

UPOV Code: DIANT

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1. SUBJECT OF THE PROTOCOL AND REPORTING

1.1 Scope of the technical protocol

This Technical Protocol applies to all varieties of *Dianthus* L.

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/25/9 dated 25/03/2015 (<http://www.upov.int/edocs/tgdocs/en/tg025.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01.10.2015**. 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 test period.

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 two weeks after the date of the request for technical examination by the CPVO.

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

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

1.3.3 Sample keeping in case of problems

If the technical examination has resulted in a negative report, the CPVO shall inform the Examination Office as soon as possible in case that a representative sample of any relevant testing material shall be kept.

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 <http://cpvo.europa.eu/applications-and-examinations/technical-examinations/submission-of-plant-material-s2-publication> in the special issue S2 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 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 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.

3. METHOD OF EXAMINATION

3.1 Number of growing cycles

Single growing cycle

The minimum duration of tests should normally be a single growing cycle.

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.

In particular, it may be necessary for separate growing trials to be established for cut flower types, garden types and pot types in order to ensure the satisfactory growth of varieties of those types (see Chapter 8.3). This Technical Protocol provide information to cover such a situation.

Because daylight varies, colour determinations made against a colour chart should be made either in a suitable cabinet providing artificial daylight or in the middle of the day in a room without direct sunlight. The spectral distribution of the illuminant for artificial daylight should conform with the CIE Standard of Preferred Daylight D 6500 and should fall within the tolerances set out in the British Standard 950, Part I. These determinations should be made with the plant part placed against a white background. The colour chart and version used should be specified in the variety description.

3.4 Test design

Single plots

3.4.1 Each test should be designed to result in a total of at least 20 plants.

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

3.5 Additional tests

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, an additional test may be undertaken providing that a technically acceptable test procedure can be devised.

Additional 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.

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 may comprise living plant material. 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 obtain living plant material of reference varieties as and when those varieties need to be included in growing trials or other tests.

3.6.3 Making an inventory of varieties of common knowledge for inclusion in the variety collection

The inventory shall take into account the list of protected varieties and the official, or other, registers of varieties, in particular:

In addition to the above, the inventory shall be extended to the appropriate to

- any commercial document in which varieties are marketed as propagating or harvested material, especially when there is no official registration system;
- any list including varieties which are publicly available within plant collections (varieties included in genetic resource collections, collection of old varieties, etc.);
- information provided by relevant plant experts;
- relevant example varieties referred to in the technical protocols for the examination of distinctness.

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.

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 10 plants or parts taken from each of 10 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**

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:

For the assessment of uniformity, a population standard of 1 % and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 20 plants, 1 off-type is allowed.

4.3 **Stability**

4.3.1 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 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pdf).

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

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

5. **GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL**

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

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

5.3 The following have been agreed as useful grouping characteristics:

Only for pot and garden types:

- a) Plant: height (characteristic 2)
- b) Flower: position (characteristic 4)

For all types (including pot and garden types):

- c) Flower: type (characteristic 37)
- d) Petal: main colour (characteristic 50) with the following groups:

- Gr. 1: white or near white
- Gr. 2: green
- Gr. 3: yellow
- Gr. 4: orange
- Gr. 5: pink
- Gr. 6: medium red
- Gr. 7: dark red
- Gr. 8: violet red
- Gr. 9: purple
- Gr. 10: pink purple
- Gr. 11: purple violet
- Gr. 12: violet
- Gr. 13: brownish

- e) Petal: secondary colour (characteristic 51), with the following groups:

- Gr. 1: none
- Gr. 2: white or near white
- Gr. 3: green
- Gr. 4: yellow
- Gr. 5: orange
- Gr. 6: pink
- Gr. 7: medium red
- Gr. 8: dark red
- Gr. 9: violet red
- Gr. 10: purple
- Gr. 11: pink purple
- Gr. 12: purple violet
- Gr. 13: violet
- Gr. 14: brownish

- f) Petal: colour of pattern of secondary colour, if present, with the following groups (combination of Characteristics 52 to 56):

- 1: marginated
- 2: striped
- 3: speckled
- 4: flushed
- 5: maculated

5.4 If other characteristics than those from the TP 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.

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

5.5 Where separate growing trials are used for cut flower types (C), garden types (G) and pot types (P) (see Section 3.3.2), it may be necessary to include individual varieties in different growing trial(s) in order to ensure an effective examination of distinctness. In particular, it may be necessary to include a variety in both the garden type trial and the pot type trial.

Furthermore, in cut flower types (C) three sub-types can be distinguished which could be useful for grouping:

- one flower per stem (Co)
- spray (Cs)
- umbrella – *D. barbatus* (Cu)

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.

States of expression and corresponding notes

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

State	Note
small	3
medium	5
large	7

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

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

6.2 Example Varieties

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

(C) cut flower type:

- (Co): one flower per stem
- (Cs): spray
- (Cu): umbrella (*D. barbatus*)

(G) garden type

(P) pot type

6.3 Legend

- G Grouping characteristic – see Chapter 5
(* UPOV Asterisked characteristic – Characteristics that are important for the international harmonization of variety descriptions
- MG, MS, VG, VS – see Chapter 4.1.5
QL Qualitative characteristic
QN Quantitative characteristic
PQ Pseudo-qualitative characteristic
- (a)-(d) See Explanations on the Table of Characteristics in Chapter 8.1
(+) See Explanations on the Table of Characteristics in Chapter 8.2
- [C] to be examined in cut flower types
[Cs] to be examined in cut flower 'spray' types
[G] to be examined in garden types
[P] to be examined in pot types
- (C) cut flower type:
- (Co): one flower per stem
- (Cs): spray
- (Cu): umbrella (*D. barbatus*)
- (G) garden type
(P) pot type

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1.	1.	[C]	Plant: length of stem		
(+)	(*)	VG/MS	short	Barmalyn (Cs), Hilbrequeen (Cu)	3
QN			medium	Fire Queen (Cs), Hilbacer (Cs)	5
			long	Fransesco (Co), White Giant (Co)	7
2.	2.	[G] [P]	Plant: height		
(+)	(*)	VG/MS	short	Hiljoli (P), Shooting Star (G)	3
QN			medium	Houndspool Cheryl (G), WPO8 IAN04 (G)	5
G			tall	Devon Wizard (G)	7
3.	3.	[G] [P]	Plant: density		
(+)		VG	sparse	Devon Wizard (G), Fontaine Darkred (P)	1
QN			medium	Koviol (P), Waterloo Sunset (G)	2
			dense	Coral Reef (G), Hiljoli (P)	3
4.	4.	[G] [P]	Plant: position of flowers compared to foliage		
(+)	(*)	VG	same level or slightly above	Coral Reef (G), Hiljoli (P)	1
QN			moderately above	Houndspool Cheryl (G), Koviol (P)	2
G			far above	Waterloo Sunset (G)	3
5.	5.	[Cs]	Plant: laterals without flower buds or flowers		
(+)		VG	absent	Hilboska (Cs)	1
QL			present	Martina (Cs)	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
6.	6.	[Cs]	Plant: laterals with flower buds or flowers of second order		
(+)	(*)	VG	absent or very few	Barnita (Cs)	1
QN			few	KLEDM10631 (Cs)	3
			medium	Barocior (Cs), Weslupe (Cs)	5
			many	KLEDM10629 (Cs)	7
7.	7.	[Cs]	Plant: flower clustering on lateral branches		
(+)	(*)	VG	none	Barnita (Cs), Lekprewi (Cs)	1
QN			in some lateral branches	Beam Cherry (Cs), Martina (Cs)	2
			in all lateral branches	Westcherry (Cs)	3
8.	8.	[Cs]	Stem: number of internodes		
(+)	(*)	VG/MS	four	KLEDM06005 (Cs)	1
QN			five	Hilboska (Cs), Martina (Cs)	2
			six	Barocior (Cs), Hilqueen (Cs)	3
			more than six	Hilbacer (Cs)	4
9.	9.	VG/MS	Stem: length of internode		
QN	(*)	(a)	short	Devon Wizard (G)	3
			medium	Komari (Co), Lonaveiro (Cs)	5
			long	KLEDS06013 (Co)	7
10.	10.	VG/MS	Stem: thickness of internode		
QN	(*)	(a)	very thin	Hiljoli (P)	1
			short	Devon Glow (G)	3
			medium	Komari (Co), Lekprewi (Cs)	5
			thick	Hilbrequeen (Cu), Tico Tico (Co)	7
			very thick	Westcrystal (Cs)	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
11.	11.	VG	Stem: shape in cross section		
(+)	(*)	(a)	circular	Hilbreking (Cu)	1
PQ			slightly angular	KLEDP07089 (P)	2
			strongly angular	Komari (Co), Martina (Cs), SUNRRB126 (P)	3
12.	12.	VG	Stem: hollowness		
(+)	(*)	(a)	absent	Komari (Co), Martina (Cs), SUNRRB126 (P)	1
QL			present	Hilbreking (Cu)	9
13.	13.	VG	Leaf: shape		
(+)	(*)	(b)	ovate	Tico Tico (Co)	1
PQ			elliptic	Komari (Co), Martina (Cs)	2
			linear		3
			obovate	Shooting Star (G)	4
14.	14.	VG/MS	Leaf: length		
QN	(*)	(b)	short	Shooting Star (G)	3
			medium	Hilbrebar (Cu), Martina (Cs)	5
			long	KLEDS06542 (Co), Komari (Co)	7
15.	15.	VG/MS	Leaf: width		
QN	(*)	(b)	narrow	Lonaveiro (Cs), SUNRWB135 (P)	3
			medium	Hyslam (Co), Komari (Co)	5
			broad	Hilbreking (Cu)	7
16.	16.	VG	Leaf: curvature		
(+)	(*)	(b)	absent or very weakly recurved	Devon Wizard (G), Komari (Co), SUNRWB135 (P)	1
QN			weakly recurved	Shooting Star (G)	2
			moderately recurved	Hilbrebar (Cu), Martina (Cs)	3
			strongly recurved	Prado Pino (Co)	4
			very strongly recurved	Raspberry Ripple (G)	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
17.	17.	VG	Leaf: cross section		
(+)	(*)	(b)	flat or very weakly concave	Beam Cherry (Cs), KLEDP09102 (P)	1
QN			weakly concave	Leila (Co), Martina (Cs), Tico Tico (Co)	2
			moderately concave	Hilbreking (Cu), Lonkiro (Co), SUNRRB126 (P)	3
			strongly concave	Barabril (Cs), Wesroman (Cs)	4
18.	18.	VG	Leaf: colour		
PQ	(*)	(b)	medium green	Leila (Co), Hilbreking (Cu), SUNRRB126 (P)	1
			dark green	Hilmoose (Co), KLET04064 (P), Starburst (G)	2
			grey green	Barcoquette (Cs), Devon Winnie (G), White Liberty (Co)	3
19.	19.	VG	Leaf: glaucosity		
QN	(*)	(b)	weak	Hilbreking (Cu), SUNRRB126 (P)	1
			medium	Hyslam (Co), Tico Tico (Co)	2
			strong	Komari (Co), Lekprewi (Cs)	3
20.	20.	VG	Leaf: spiny ciliation of margin		
(+)	(*)	(b)	absent	Komari (Co), Martina (Cs)	1
QL			present	Hilbreking (Cu), Whatfield Can Can (G)	9
21.	21.	[Cs]	Inflorescence: form		
(+)		VG	flat or slightly domed		1
QN			moderately domed	Martina (Cs)	2
			strongly domed	Hilopta (Cs)	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
22.	22.	VG	Bud: shape		
(+)	(*)		ovate	KLEDCS05045 (Co)	1
PQ			circular	Baryetar (Co)	2
			elliptic	Fontaine Darkred (P), Hiltespret (Cs)	3
			oblong	Lonkiro (Co)	4
			obovate	Komari (Co), Leila (Co), Martina (Cs)	5
23.	23.	VG	Bud: extrusion of styles		
(+)	(*)		absent	Komari (Co), Leila (Co), Martina (Cs)	1
QL			present	Hilvulca (P), KLEDS07504 (Co)	9
24.	24.	VG	Epicalyx: position of outer lobes in relation to calyx		
(+)			adpressed	Komari (Co), Martina (Cs), Tico Tico (Co)	1
QN			adpressed and free		2
			free	Leila (Co), KLEDC05008 (Cs)	3
25.	25.	VG	Epicalyx: apex of outer lobes		
(+)			acute	Komari (Co), Martina (Cs), Tico Tico (Co)	1
QN			short acuminate		2
			medium acuminate	Lonkiro (Co)	3
26.	26.	VG/MS	Epicalyx: length of tip of outer lobes		
(+)			absent or very short		1
QN			short	Komari (Co), Martina (Cs), Tico Tico (Co)	2
			medium	Devon Glow (G), Leila (Co)	3
			long	SUNRRB126 (P), Westcrystal (Cs)	4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
27.	27.	VG	Epicalyx: apex of inner lobes		
(+)			acute	Komari (Co), Martina (Cs), Tico Tico (Co)	1
QN			short acuminate		2
			medium acuminate	Lonkiro (Co)	3
28.	28.	VG/MS	Epicalyx: length of tip of inner lobes		
(+)			absent or very short		1
QN			short	Komari (Co), Martina (Cs)	2
			medium	SUNRRB126 (P)	3
			long	Westcrystal (Cs)	4
29.	29.	VG/MS	Calyx: length		
(+)	(*)		short	Hilbreking (Cu), Whatfield Can Can (G)	3
QN			medium	Komari (Co), Leila (Co), Martina (Cs)	5
			long	KLEDS10624 (Co), Princess (P)	7
30.	30.	VG/MS	Calyx: width		
(+)	(*)		narrow	SUNRRB126 (P)	3
QN			medium	Komari (Co)	5
			broad	KLEDS10624 (Co)	7
31.	31.	VG	Calyx: shape		
(+)	(*)		funnel-shaped	Lonkiro (Co), Tico Tico (Co)	1
PQ			cylindrical	Hilbreking (Cu), Martina (Cs), SUNRRB126 (P)	2
			campanulate	Gaudina (Co), Komari (Co), Leila (Co)	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
32.	32.	VG	Calyx: longitudinal axis of lobes		
(+)	(*)		straight	SUNRRB126 (P), Whatfield Can Can (G)	1
PQ			concave	Martina (Cs), Tico Tico (Co)	2
			angled	Hilopta (Cs)	3
			convex	Gaudina (Co), Komari (Co), Leila (Co)	4
33.	33.	VG	Calyx: intensity of anthocyanin coloration		
QN	(*)		absent or very weak		1
			weak	Lonaveiro (Cs)	2
			medium	Shooting Star (G)	3
			strong	Simba (P), SUNRE130 (P)	4
34.	34.	VG	Calyx: distribution of anthocyanin coloration		
PQ	(*)		margin of lobe	Lonaveiro (Cs), SUNRRB126 (P)	1
			whole lobe	Hilbrebar (Cu), Houndspool Cheryl (G)	2
			whole calyx	Calypso Star (G)	3
35.	35.	VG	Calyx: shape of apex of lobe		
(+)			acute	Komari (Co), Lonaveiro (Cs), Lonkiro (Co), SUNRRB126 (P)	1
QN			acute to acuminate		2
			acuminate	Barfenix (Co)	3
36.	36.	VG	Calyx: length of lobe		
QN	(*)		short	Komari (Co), Lonkiro (Co), Tico Tico (Co)	3
			medium	Leila (Co), Lonaveiro (Cs)	5
			long	Hilbreking (Cu)	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
37.	37.	VG	Flower: type		
(+) QL	(*)		single	Calypso Star (G), Hilbreking (Cu)	1
G			double	Sam's Pride (Cs), William Sim (Co)	2
38.	38.	VG/MS	Flower: diameter		
QN	(*)		small	Hilbrebar (Cu), Shooting Star (G), SUNRWB135 (P)	3
			medium	Devon Wizard (G)	5
			large	Farida (Co), Komari (Co), Leila (Co)	7
39.	39.	VG/MS	<u>Only varieties with flower type:</u> <u>double:</u> Flower: number of petals		
QN	(*)		few	Lekclaudia (Cs), SUNRRB126 (P)	3
			medium	Komari (Co), Martina (Cs)	5
			many	Hyslam (Co), Tico Tico (Co)	7
40.	40.	VG/MS	Corolla: height		
(+)	(*)		short	SUNRWB135 (P), Whatfield Can Can (G)	3
QN			medium	Farida (Co)	5
			tall	KLEDS13A01 (Co)	7
41.	41.	VG	Corolla: profile of upper part in lateral view		
(+)	(*)		concave	Night Star (G)	1
PQ			flat	Hilbrequeen (Cu), Shooting Star (G)	2
			flat convex	Komari (Co), Lonkiro (Co), SUNRRB126 (P)	3
			convex	Leila (Co), Martina (Cs), Tico Tico (Co)	4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
42.	42.	VG	Corolla: profile of lower part in lateral view		
(+)	(*)		concave	Komari (Co), Martina (Cs), SUNRRB126 (P)	1
PQ			flat	Hilbrequeen (Cu), Whatfield Can Can (G)	2
			flat convex	Leila (Co), Night Star (G)	3
			convex	Coral Reef (G), Waterloo Sunset (G)	4
43.	43.	VG	Petal: predominant shape		
(+)		(c)	type 1	Martina (Cs), Tico Tico (Co)	1
PQ			type 2	Baltico (Co)	2
			type 3	Hilbreking (Cu), SUNRWB135 (P)	3
			type 4	Nobroc (Co), SUNRRB126 (P)	4
			type 5	Barlgraa (Co), WP08 IAN04 (G)	5
			type 6	Gaudina (Co)	6
			type 7	Hilstertes (Cs), Minitiar Pink (Cs)	7
44.	44.	VG	Petal: undulation		
(+)		(c)	absent or weak	Hilbrequeen (Cu), Hilstertes (Cs)	1
QN			medium	Calypso Star (G), Komari (Co)	2
			strong		3
45.	45.	VG	Petal: number of incisions of margin		
(+)	(*)	(c)	absent or few	Barmalyn (Cs), Koyevi (Co)	1
QN			medium	Barlitar (Co)	2
			many	Komari (Co), Martina (Cs), Wesroman (Cs)	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
46.	46.	VG	Petal: type of incisions of margin		
(+)		(c)	sinuate	Farida (Co)	1
PQ			crenate	Hyslam (Co)	2
			spinose-dentate	Leila (Co)	3
			dentate	Hilbrebar (Cu), SUNRWB135 (P)	4
			crenate-dentate	Komari (Co), Martina (Cs)	5
47.	47.	VG	Petal: depth of incisions of margin		
(+)	(*)	(c)	very shallow	Fleurette (Cs), Leila (Co)	1
QN			shallow	Intermezzo (Cs)	3
			medium	Hilbrebar (Cu)	5
			deep	Pop Star (G)	7
			very deep	CFPC Unforgettable (P)	9
48.	48.	VG/MS	Petal: length		
QN	(*)	(c)	short	Whatfield Can Can (G)	3
			medium	Barcandela (Cs)	5
			long	Gaudina (Co), Komari (Co)	7
49.	49.	VG/MS	Petal: width		
QN	(*)	(c)	narrow	Hilbrebar (Cu), Whatfield Can Can (G)	3
			medium	Leila (Co), Lonkiro (Co), Tico Tico (Co)	5
			broad	Bartorbel (Co), KLEDS10625 (Co)	7
50.	50.	VG	Petal: main colour		
PQ G	(*)	(c) (d)	RHS Colour Chart (indicate reference number)		
51.	51.	VG	Petal: secondary colour		
PQ G	(*)	(c) (d)	RHS Colour Chart (indicate reference number)		

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
52.	52.	VG	Petal: width of differently coloured margin		
(+)	(*)	(c)	absent	Fleurette (Cs), Pop Star (G)	1
QN			narrow	Komari (Co), Rodin (P)	2
			medium	Hilbreking (Cu)	3
G			broad	Barlaxiaga (Cs), Hilqueen (Cs)	4
53.	53.	VG	Petal: number of stripes		
(+)	(*)	(c)	none	SUNRE130 (P)	1
QN			few	Konali (Co), Martina (Cs)	2
			medium	Barmarie (Co), Bartaina (Cs)	3
G			many	Komonte (Co), Navidad (Co)	4
54.	54.	VG	Petal: number of speckles		
(+)	(*)	(c)	none	Westcrystal (Cs)	1
QN			few	Barlitar (Co), CFPC Aztec (P)	2
			medium	Devon Winnie (G), KLEN03037 (P), WS05-402 (Cu)	3
G			many	Whatfield Gem (G)	4
55.	55.	VG	Petal: area of flush		
(+)	(*)	(c)	absent	KLEDS06013 (Co)	1
QN			small	WP07 OPR04 (G)	2
			medium	Hilnotre (Co), Sidra (Co)	3
G			large	Antigua (Co), KLEDS06513 (Co)	4
56.	56.	VG	Petal: size of macule		
(+)	(*)	(c)	absent	Lonaveiro (Cs)	1
QN			small	DICZ0003 (G), KLEDP11109 (P)	2
			medium	Hilbreye (P), WP10 HEL01 (G)	3
G			large	Hilmetal (P), WP08 UNI02 (G)	4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
57.	57.	VG	Petal: colour pattern of tertiary colour		
(+)	(*)	(c)	absent		1
PQ		(d)	marginated	Margarita (P), SUNRWB135 (P)	2
			striped		3
			speckled	DICZ0001 (G)	4
			flushed	Starlette (G)	5
			maculated	Rodin (P)	6
58.	58.	VG	Petal: tertiary colour		
PQ	(*)	(c)	RHS Colour Chart (indicate reference number)		
59.	59.	VG	Ovary: shape		
(+)	(*)		ovate	Lekprewi (Cs)	1
PQ			rhombic	Martina (Cs)	2
			elliptic	Hilbreking (Cu)	3
			oblong	Shooting Star (G)	4
			obovate	Komari (Co), Leila (Co), SUNRWB135 (P)	5
60.	60.	VG	Ovary: colour of base		
(+)			whitish	Komari (Co), Lekprewi (Cs)	1
PQ			yellowish	KLEDG10119 (G), Koviol (P)	2
			green	Leila (Co), Shooting Star (G)	3
61.	61.	VG	Ovary: surface		
QN	(*)		smooth	Leila (Co), Lekclaudia (Cs)	1
			slightly ribbed	SUNRRB126 (P)	2
			strongly ribbed	Komari (Co), Martina (Cs)	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
62.	62.	VG/MG	Style: number		
PQ	(*)		only two	Hilbreking (Cu), SUNRWB135 (P), Tico Tico (Co)	1
			two and three	Komari (Co), Lonaveiro (Cs)	2
			only three	Barjine (Co), Wesroman (Cs)	3
			three and four	KLEDS07504 (Co)	4
			only four	Baruqedu (Co), KLEDS10624 (Co)	5
			two, three, four and five	Gaudina (Co)	6
63.	63.	VG/MS	Style: length		
QN	(*)		short	Hilbreking (Cu), Shooting Star (G)	1
			medium	Lonaveiro (Cs), SUNRWB135 (P), Tico Tico (Co)	2
			long	Liberty (Co)	3
64.	64.	VG	Style: shoulder		
(+)	(*)		absent	Martina (Cs), SUNRWB135 (P)	1
QL			present	Komari (Co), Lonaveiro (Cs), Tico Tico (Co)	9
65.	65.	VG	Stigma: colour		
(+)	(*)		white	Komari (Co), Martina (Cs), Tico Tico (Co)	1
PQ			white with red flush	Lonaveiro (Cs)	2
			white with purple flush	Shooting Star (G)	3
			yellow	Leila (Co)	4
			pink	Barhugo (Co)	5
			red	Hilbrebar (Cu), Hyslam (Co)	6
			purple	Burnob (Co), SUNRRB126 (P)	7

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

8.1 Explanations covering several characteristics

8.1 Explanations covering several characteristics

Unless otherwise indicated below, all characteristics should be recorded at the time of full flowering.

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

- (a) The main stem is the most direct line from the top-flower to the base. In cut flower varieties, the fifth internode directly below the flower should be observed. In pot and garden carnations, the third internode directly below the flower should be observed. Except for length, observations should be made half way between nodes.
- (b) In cut flowers varieties, to be observed on leaves of the fifth node directly below the flower. In pot and garden carnations to be observed on leaves of the third node directly below the flower.
- (c) For double flowers the observations should be made on a petal of the 3rd outer whorl.
- (d) The main colour is the colour with the largest surface area. The secondary colour is the colour with the second largest area. In cases where the areas of the main and secondary colour are too similar to reliably decide which colour has the largest area, the darkest colour is considered to be the main colour. In cases where the areas of the secondary and tertiary colour are approximately the same, the darkest colour will be the secondary colour.

8.2 Explanations for individual characteristics

Ad 1: Plant: length of stem

Length of stem should be observed from soil level to the top of the plant, excluding the flowers.

Ad 2: Plant: height

Plant height should be observed from soil level to the top of the plant, including the flowers.

Ad 3: Plant: density

Plant density is a combination of the amount of branching and the number of leaves.



1
sparse



2
medium



3
dense

Ad 4: Plant: position of flowers compared to foliage



1
same level or slightly above



2
moderately above



3
far above

Ad 5: Plant: laterals without flowers buds or flowers

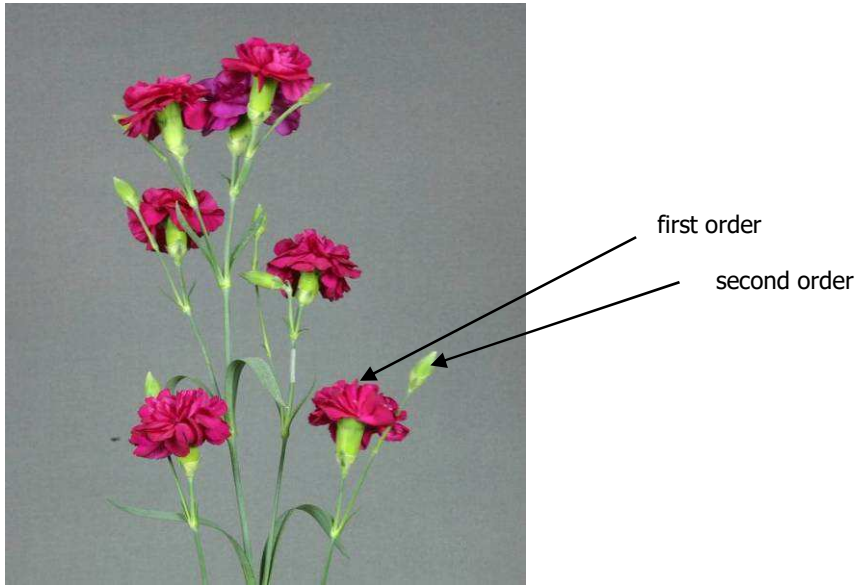
Ad 8: Stem: number of internodes

The number of internodes should be observed between the epicalyx and the lowest node with a lateral with flower buds or flowers.

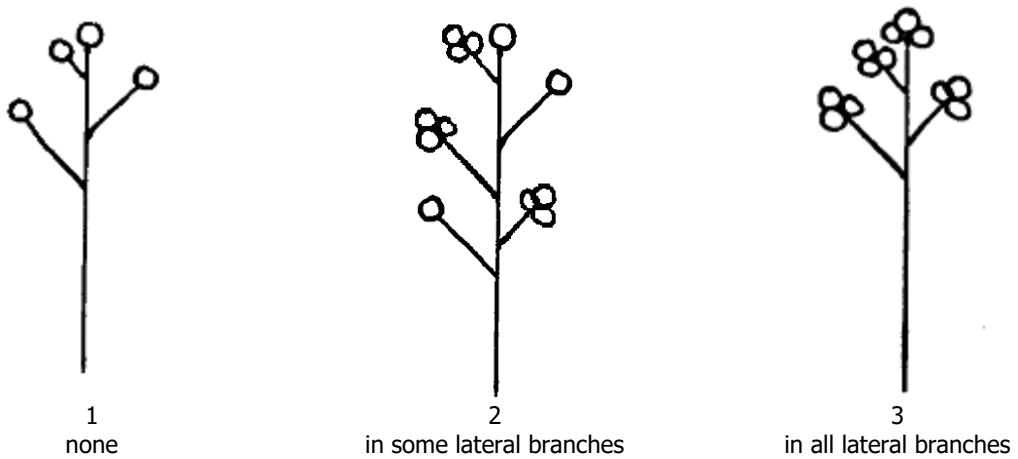


Lateral without flower buds or flowers

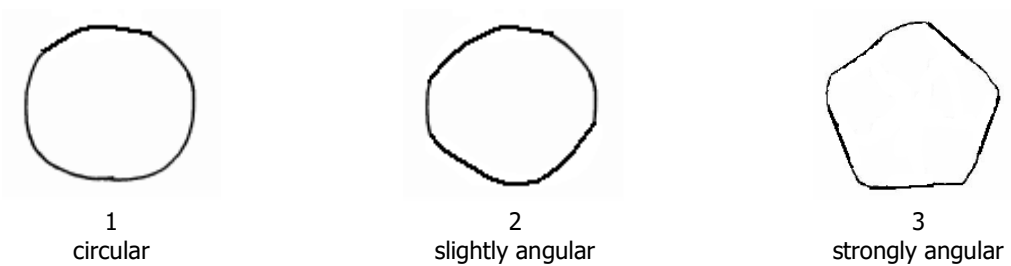
Ad 6: Plant: laterals with flower buds or flowers of second order



Ad 7: Plant: flower clustering on lateral branches



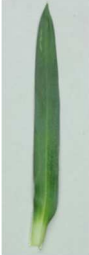



Ad 11: Stem: shape in cross section



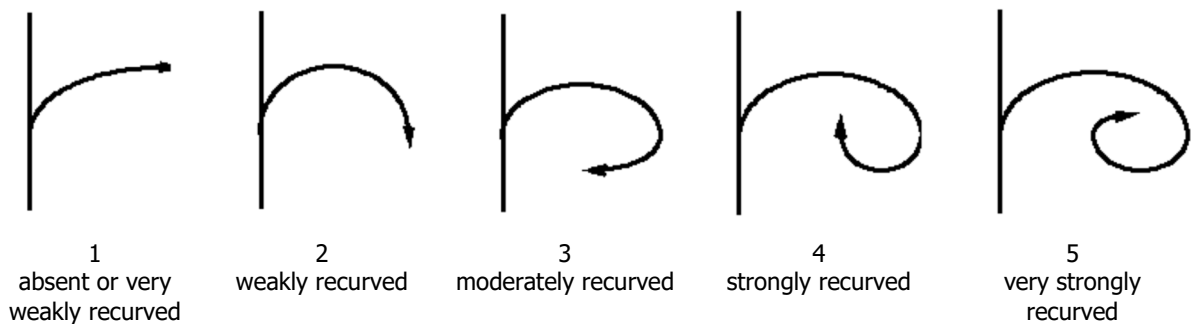
Ad 12: Stem: hollowness



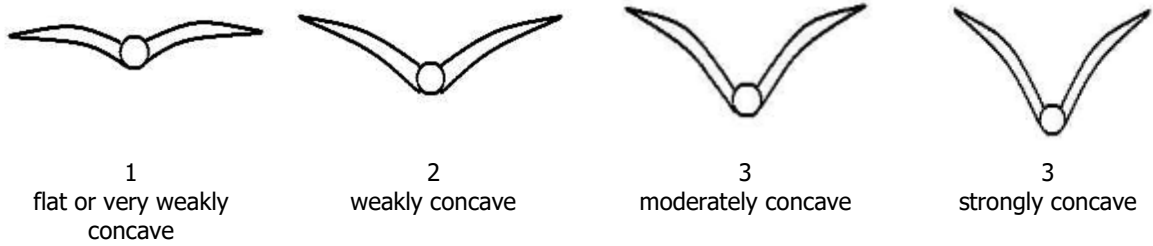
Ad 13: Leaf: shape

		← broadest part →		
		below middle	at middle	above middle
broad (<i>low</i>) ← width (ratio length/width) → narrow (<i>high</i>)			 3 linear	
		 1 ovate	 2 elliptic	 4 obovate

Ad 16: Leaf: curvature



Ad 17: Leaf: cross section

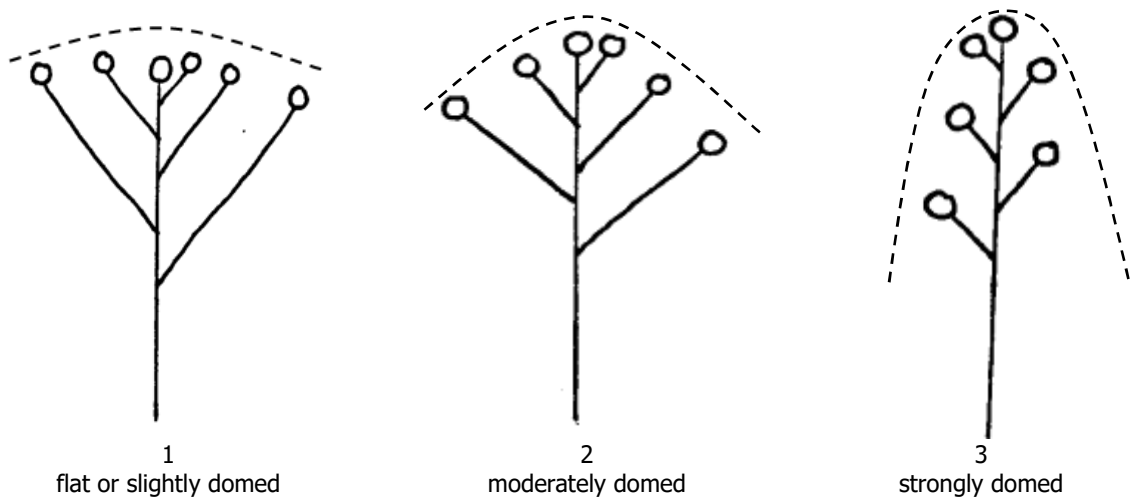


Ad 20: Upper petal: main colour of margin

To be observed by gently rubbing to and from with finger along the margin of the leaf.








Ad 21: Inflorescence: form



Ad 22: Bud: shape

To be observed immediately before colour appears.

		← broadest part →		
		below middle	at middle	above middle
narrow (<i>high</i>) → width (ratio length/width) ← broad (<i>low</i>)			 4 oblong	
	 1 ovate	 3 elliptic	 5 obovate	
		 2 circular		

Ad 23: Bud: extrusion of styles

To be observed immediately before colour appears.

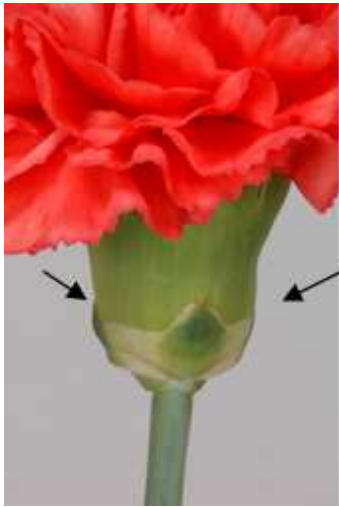


1
absent

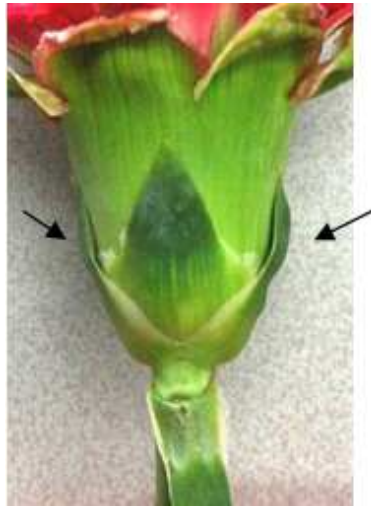


9
present

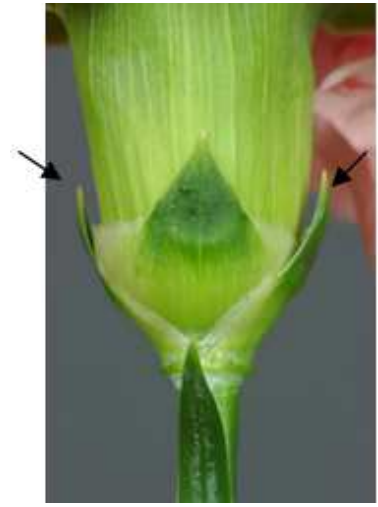
Ad 24: Epicalyx: position of outer lobes in relation to calyx



1
adpressed



2
adpressed and free



3
free

Ad 25: Epicalyx: apex of outer lobes

Ad 27: Epicalyx: apex of inner lobes



1
acute



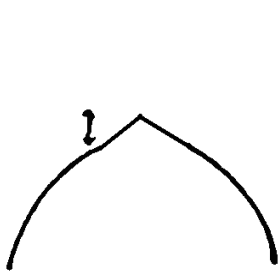
2
short acuminate



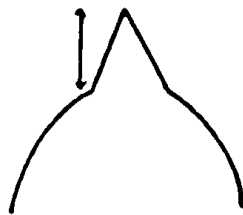
3
medium acuminate

Ad 26: Epicalyx: length of tip of outer lobes

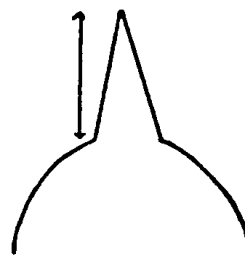
Ad 28: Epicalyx: length of tip of inner lobes



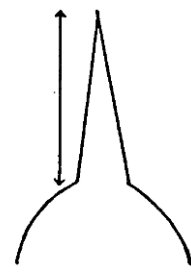
1
absent or very short



2
short



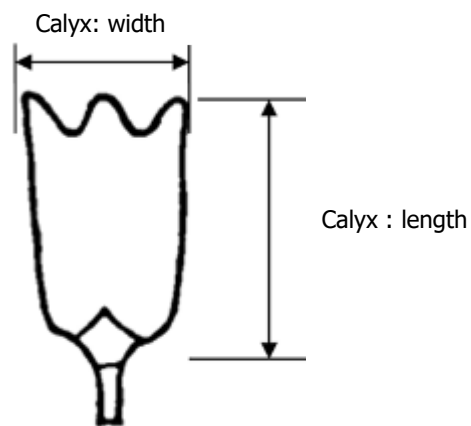
3
medium



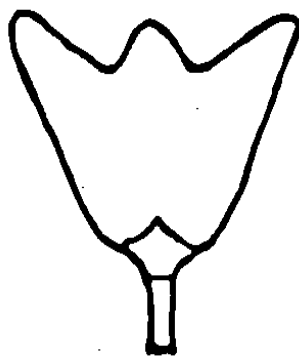
3
long

Ad 29: Calyx: length

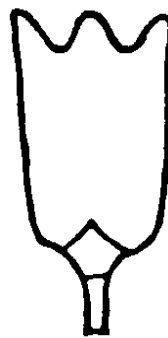
Ad 30: Calyx: width



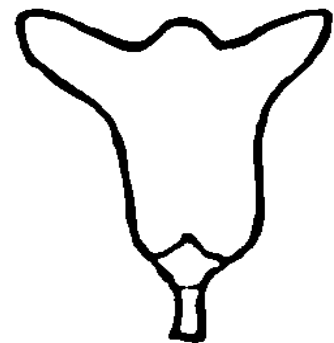
Ad 31: Calyx: shape



1
funnel-shaped

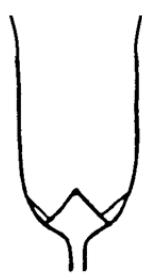


2
cylindrical

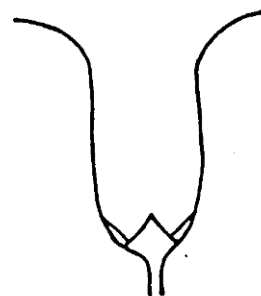


3
campanulate

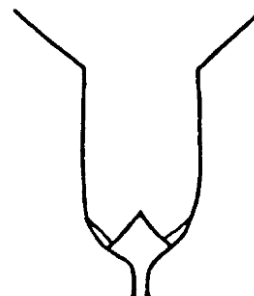
Ad 32: Calyx: longitudinal axis of lobes



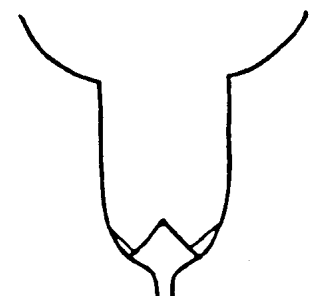
1
straight



2
concave



3
angled



4
convex

Ad 35: Calyx: shape of apex of lobe



1
acute



2
acute to acuminate

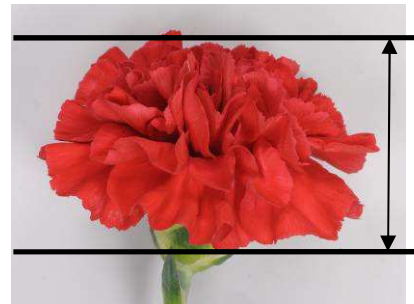


3
acuminate

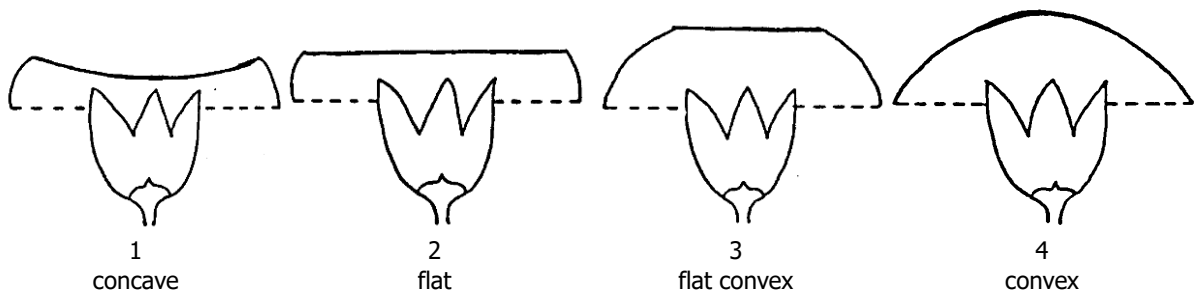
Ad 37: Flower: type

Double flowers have more than 5 petals.

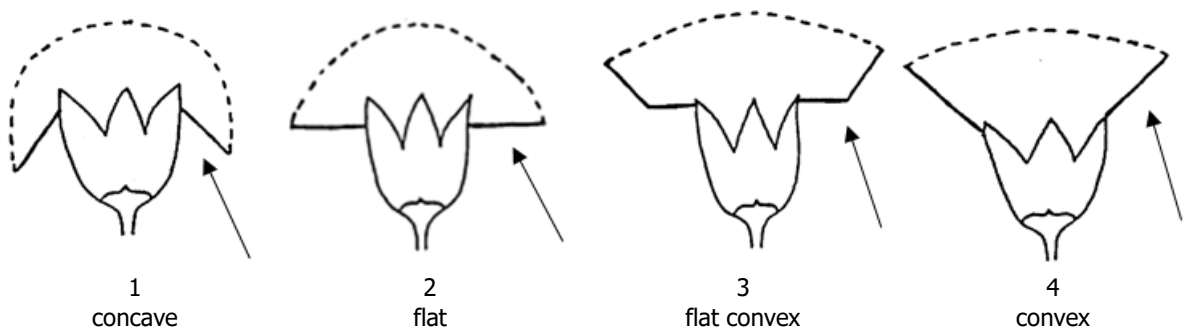
Ad 40: Corolla: height



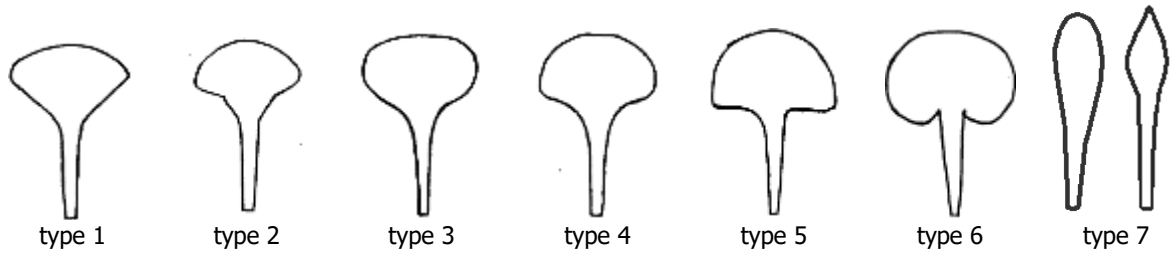
Ad 41: Corolla: profile of upper part in lateral view



Ad 42: Corolla: profile of lower part in lateral view



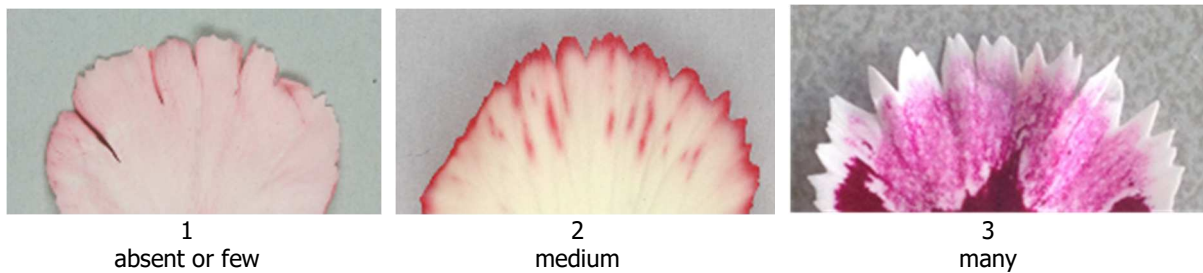
Ad 43: Petal: predominant shape



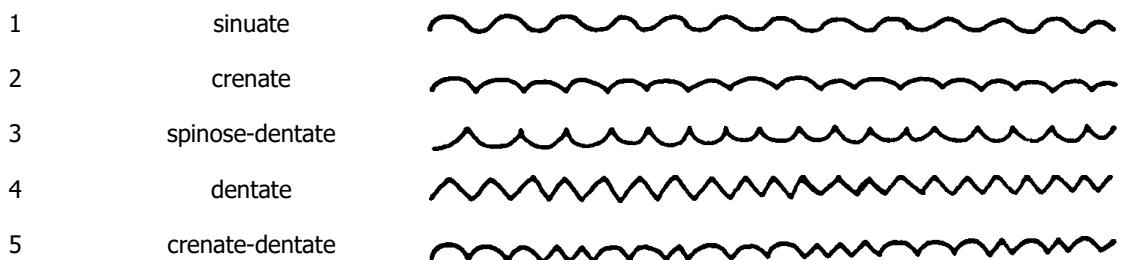
Ad 44: Petal: undulation



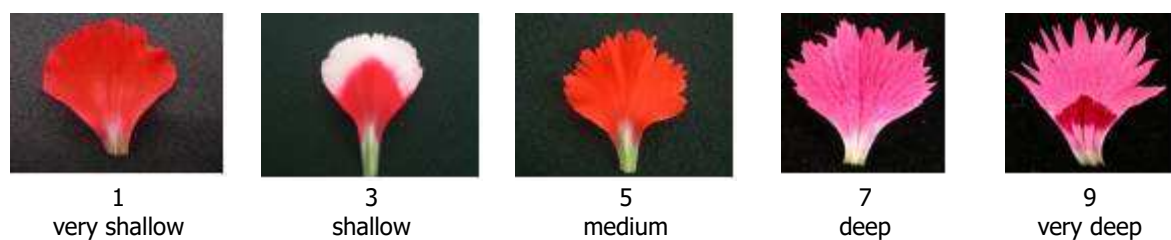
Ad 45: Petal: number of incisions of margin



Ad 46: Petal: type of incisions of margin



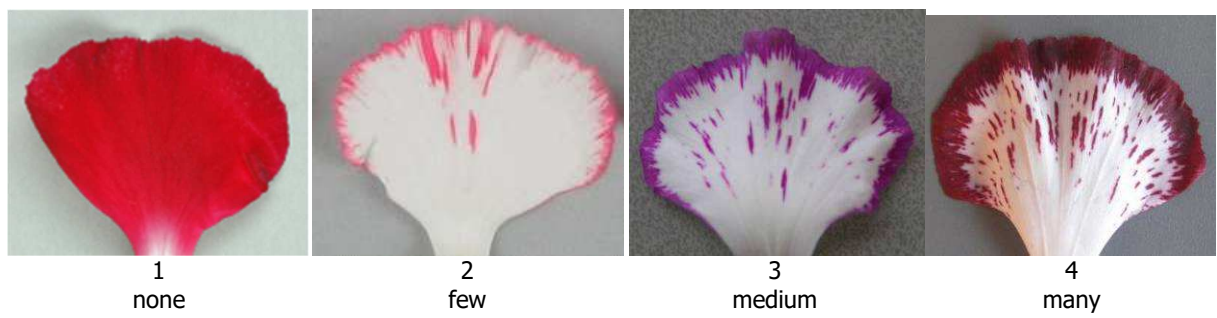
Ad 47: Petal: depth of incisions of margin



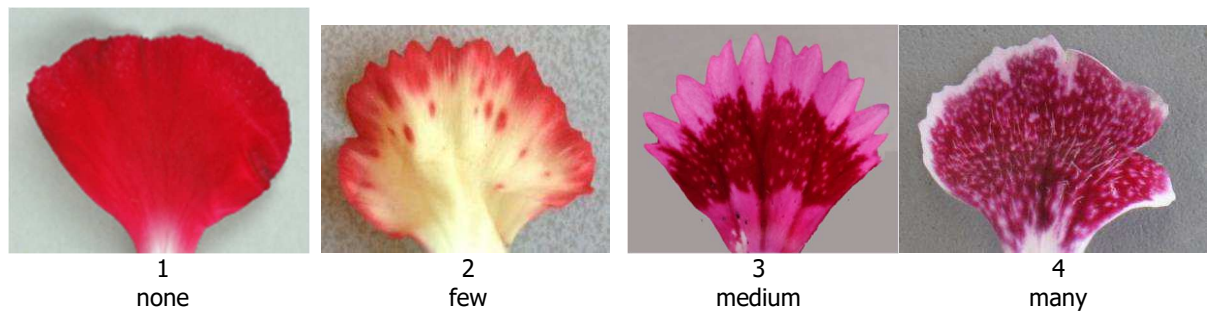
Ad 52: Petal: width of differently coloured margin



Ad 53: Petal: number of stripes



Ad 54: Petal: number of speckles



Ad 55: Petal: area of flush



Ad 56: Petal: size of macule



1
absent



2
small



3
medium



4
large

Ad 57: Petal: colour pattern of tertiary colour



2
marginated



3
striped



4
speckled


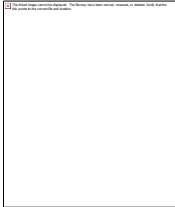





5
flushed

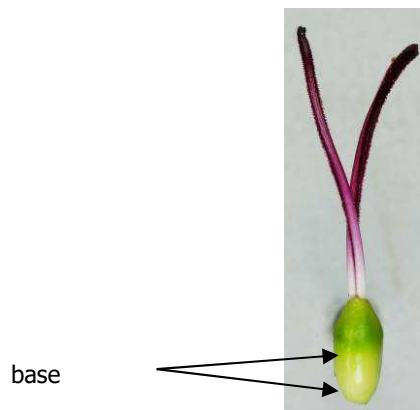


6
maculated

Ad 59: Ovary: shape

		← broadest part →		
		below middle	at middle	above middle
narrow (<i>high</i>) → width (ratio length/width) ←			 4 oblong	
	 1 ovate	 3 elliptic	 5 obovate	
		 2 rhombic		

Ad 60: Ovary: colour at base



Ad 64: Style: shoulder



1
absent



shoulder

9
present

Ad 64: Stigma: colour



stigma



8.3 Growing types

As explained in Chapter 3.4.2, it may be necessary for separate growing trials to be established for cut flower types, garden types and pot types in order to ensure the satisfactory growth of varieties of those types. The following information is provided with regard to growing conditions for different types of varieties and information which may help in deciding on the type of trial(s) which may be appropriate for a variety:

Cut flower types (C)

In general varieties bred as cut flower have the following features:

- not very tolerant to low temperatures: heated greenhouses required for good crop development in temperate zones;
- to grow the varieties properly, sufficient support (horizontal nets) need to be provided

spray (Cs) and one flower per stem (Co)

- Breeding is done in a limited gene pool. In general, such types of variety belong to *D. caryophyllus*
- in varieties bred to be grown as one flower per stem carnation, the lateral flower heads or lateral shoots (if existing) are removed at an early stage to leave just the terminal flower head
- most varieties have double flowers

umbrella (D. barbatus) (Cu)

- All types of varieties belong to *D. barbatus*
- produce clusters of flowers
- most varieties have single flowers

Garden types (G)

Breeding is done in a rather large gene pool, in most cases much broader and different from other types. Varieties mainly come from *D. plumarius*, *D. x allwoodii* and related species. In general, such types of variety have the following features:

- tolerant to lower temperatures in general;
- plants with limited plant height;
- all flower types (single and double) can be seen in garden types;

Pot types (P)

Breeding is mainly done in a gene pool which is different from garden types. In general, such types of variety belong to *D. caryophyllus* and have the following features:

- not very tolerant to low temperatures: heated greenhouses required for good crop development in temperate zones;
- concern only types produced in greenhouses or other sheltered conditions;
- plants with limited plant height;
- nearly always have double flowers.

9. LITERATURE

Galbally, J., Galbally, E., 1997: Carnations and Pinks. Timber Press Inc., Portland, Oregon, ISBN 0-88192-382-6

10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO-TQ/025/2