



PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

***Citrus* L. – Group 4**

GRAPEFRUIT and PUMMELO

UPOV Code: CITRU, CITRU_PAR, CITRU_MAX

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CPVO-TP/204/1

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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 the genus *Citrus* L (Rutaceae) and their hybrids: GRAPEFRUIT and PUMMELO. See below for the list of species and their subgroups:

GROUP 4 – ALTERNATIVE NAMES AND CORRESPONDING SUBGROUPS

<i>Botanical taxon</i>	<i>Subgroup</i>	<i>English</i>
<i>Citrus ampullacea</i> hort. ex Tan.	GRA	
<i>Citrus anonyma</i> hort. ex Yu. Tan.	GRA	
<i>Citrus asahikan</i> hort. ex Tanaka	GRA	
<i>Citrus aurantiaca</i> hort. ex Tanaka	GRA	
<i>Citrus flavicarpa</i> hort. ex Tanaka	GRA	
<i>Citrus glaberrima</i> hort. ex Tanaka	GRA	
<i>Citrus grandis</i> Osbeck	PUM	Pummelo, Shaddock
<i>Citrus hassaku</i> hort. ex Tanaka	GRA	
<i>Citrus himekitsu</i> Hort. ex Yu. Tan.	GRA	
<i>Citrus hirosimana</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus intermedia</i> hort. ex Tanaka	GRA	
<i>Citrus iwaikan</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus kotokan</i> Hayata	GRA	
<i>Citrus maxima</i> (Burm.) Merr.	PUM	
<i>Citrus medioglobosa</i> hort. ex Tanaka	GRA	
<i>Citrus miaray</i> Wester	GRA	
<i>Citrus mitsuharu</i> Hort. ex Yu. Tanaka	GRA	
<i>Citrus natsudaikai</i> Hayata	GRA	
<i>Citrus obovoidea</i> hort. ex I. Takah	GRA	
<i>Citrus omikanto</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus otachibana</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus panuban</i> (Wester) Tanaka	PUM	
<i>Citrus x paradisi</i> Macfad.	GRA	Grapefruit
<i>Citrus paradisi</i> Macfad. x <i>C. grandis</i> (L.) Osbeck	HGP	
<i>Citrus pseudograndis</i> hort. ex Shirai	PUM	
<i>Citrus pseudogulgul</i> hort. ex Shirai	PUM	
<i>Citrus pseudoparadisi</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus rugulosa</i> hort. ex Tanaka	GRA	
<i>Citrus suizabon</i> Tan.	PUM	
<i>Citrus sulcata</i> hort. ex Tak.	GRA	
<i>Citrus tengu</i> hort. ex Tanaka	GRA	
<i>Citrus tosa-asahi</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus truncata</i> hort. ex Tanaka	PUM	
<i>Citrus yamabuki</i> hort. ex Yu. Tanaka	GRA	
<i>Citrus yuge-hyokan</i> hort. ex Yu. Tanaka	GRA	

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/en/publications/intro_dus.htm), its associated TGP documents (<http://www.upov.int/en/publications/tgp/>) and the relevant UPOV Test Guideline TG/204/1 dated 09/04/2003 (<http://www.upov.int/edocs/tgdocs/en/tg204.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **19.03.2014**. 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://www.cpvo.europa.eu/main/en/home/documents-and-publications/s2-gazette> 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

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

In particular, it is essential that the plants produce a satisfactory crop of fruit in each of the two growing cycles.

3.1.2 The growing cycle is considered to be the duration of a single growing season, beginning with bud burst (flowering and/or vegetative), flowering and fruit harvest and concluding when the following dormant period ends with the swelling of new season buds.

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/export/sites/upov/en/publications/tgp/documents/tgp_9_1.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.

The optimum stage of development for the assessment of each characteristic is indicated by a number in the third column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.1.

3.4 Test design

3.4.1 Each test should be designed to result in a total of at least 5 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 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 varieties that are suitable to 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 take into account the list of protected varieties and the official, or other, registers of varieties, in particular:

The inventory shall include varieties protected under National and Community PBR, varieties of National Catalogues for fruit species) and varieties in trade or in commercial registers. 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.

3.6.5 Maintenance and renewal/update of a living variety collection

The EO shall maintain the variety collection under appropriate growing conditions (e.g. glasshouse, orchard, in vitro), where it shall be ensured that the plants are adequately irrigated, fertilised, pruned and protected from harmful pests and diseases. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons between the material in the collection and the new material or by checking the identity of the new material against the variety description.

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/export/sites/upov/en/publications/tgp/documents/tgp_9_1.pdf) prior to making decisions regarding distinctness.

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 5 plants or parts taken from each of 5 plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 2.

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/export/sites/upov/en/publications/tgp/documents/tgp_10_1.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 5 plants, no off-types are 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/export/sites/upov/en/publications/tgp/documents/tgp_11_1.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 seed or 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.

- a) Fruit: length (characteristic 33)
- b) Fruit: diameter (characteristic 34)
- c) Fruit surface: predominant colour(s) (characteristic 50)
- d) Fruit: main colour of flesh (characteristic 66)
- e) Time of maturity of fruit for consumption (characteristic 92)

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.

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.

6.3 Legend

For the CPVO N° Column

G	Grouping characteristic	– see Chapter 5
MG, MS, VG, VS	– see Chapter 4.1.5	
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	

- (a)-(e) See Explanations on the Table of Characteristics in Chapter 8.1
(+) See Explanations on the Table of Characteristics in Chapter 8.2

For the UPOV N° column:

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

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

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1.	1.	VG	Ploidy		
QL			diploid		2
			triploid		3
[201]			tetraploid		4
2.	2. (*)	VG	Tree: growth habit		
(+)			upright		1
PQ			spreading	Marsh (GRA)	2
[202]			drooping	Oroblanco (HGP)	3
3.	3.	VG	Tree: density of spines		
QN			absent or sparse		1
			intermediate		2
[203]			dense		3
4.	4.	VG	Tree: length of spines		
QN			short		3
			medium		5
[204]			long		7
5.	5. (*)	VG	Young leaf: presence of anthocyanin coloration		
QL		(a)	absent		1
[206]			present		9
6.	6.	VG	Young leaf: intensity of anthocyanin coloration		
QN		(b)	weak		3
			medium		5
[207]			strong		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
7.	7.	VG/MS	Leaf blade: length (apical leaflet in case of compound leaf)		
QN		(b)	short		3
			medium		5
[210]			long		7
8.	8.	VG/MS	Leaf blade: width (apical leaflet in case of compound leaf)		
QN		(b)	narrow		3
			medium		5
[211]			broad		7
9.	9.	VG/MS	Leaf blade: ratio length/width (apical leaflet in case of compound leaf)		
QN		(b)	small		3
			medium		5
[212]			large		7
10.	10.	VG	Leaf blade: shape in cross section (apical leaflet in case of compound leaf)		
QN		(b)	straight or weakly concave		1
			intermediate		2
[217]			strongly concave		3
11.	11.	VG	Leaf blade: twisting		
QN		(b)	absent or weak		1
			intermediate		2
[218]			strong		3
12.	12.	VG	Leaf blade: blistering		
QN		(b)	absent or weak		1
			intermediate		2
[219]			strong		3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
13.	13.	VG	Leaf blade: green colour		
QN		(b)	light		3
			medium		5
[220]			dark		7
14.	14.	VG	Leaf blade: pubescence on lower side		
QN		(b)	absent or weak		1
			intermediate		2
[221]			strong		3
15.	15.	VG	Leaf blade: undulation of margin		
QN		(b)	absent or weak		1
			intermediate		2
[221]			strong		3
16.	16.	VG	Leaf blade: incisions of margin		
PQ		(b)	absent		1
			crenate		2
[223]			dentate		3
17.	17.	VG	Leaf blade: shape of apex		
(+)		(b)	acuminate		1
PQ			acute		2
			obtuse		3
[224]			rounded		4
18.	18.	VG	Leaf blade: emargination at tip		
(+)					
QL		(b)	absent		1
[225]			present		9
19.	19.	VG	Petal: length		
QN		(b)	short		3
			medium		5
[226]			long		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
20.	20.	VG	Petiole: presence of wings		
QL		(b)	absent		1
[227]			present		9
21.	21.	VG	<u>Varieties with petiole wings present only:</u> Petiole: width of wings		
QN		(b)	narrow		3
			medium		5
[228]			broad		7
22.	22.	VG	Flower bud: presence of anthocyanin coloration		
QL		(b)	absent		1
[229]		(d)	present		9
23.	23.	VG/MS	Flower bud: intensity of anthocyanin coloration		
QN		(c)	weak		3
		(d)	medium		5
[230]			strong		7
24.	24.	VG/MS	Flower: diameter of calyx		
QN		(c)	narrow	Nelruby (GRA), Star Ruby (GRA)	3
			medium	Oroblanco (HGP)	5
[231]			broad	Pomelit (PUM)	7
25.	25.	VG/MS	Flower: length of petal		
QN		(c)	short	Marsh (GRA), Nelruby (GRA), Ruby Henninger (GRA)	3
			medium		5
[232]			long	Melogold (HGP), Pomelit (PUM)	7
26.	26.	VG/MS	Flower: width of petal		
QN		(c)	narrow		3
			medium		5
[233]			broad		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
27.	27.	VG/MS	Flower: ratio length/width of petal		
QN		(c)	small		3
			medium		5
[234]			large		7
28.	28. (*)	VG	Flower: length of stamens		
QN		(c)	short		3
			medium		5
[235]			long		7
29.	29.	VG	Anther: colour		
PQ		(c)	white		1
			light yellow		2
[238]			medium yellow		3
30.	30.	VG	Anther: viable pollen		
QL		(c)	absent		1
[239]			present		9
31.	31.	VG	Style: length		
QN		(c)	short		3
			medium		5
[240]			long		7
32.	32.	VG	Infructescence: clustering of fruits		
QL			absent		1
[243]			present		9
33.	33. (*)	VG/MS	Fruit: length		
QN		(e)	short		3
[244]			medium	Ray Ruby (GRA)	5
G			long	Pomelit (PUM)	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
34.	34. (*)	VG/MS	Fruit: diameter		
QN		(e)	small		3
[245]			medium	Melogold (HGP)	5
G			large	Chandler (PUM)	7
35.	35. (*)	VG/MS	Fruit: ratio length/diameter		
QN		(e)	small	Oroblanco (HGP)	3
			medium	Melogold (HGP)	5
[246]			large		7
36.	36.	VG	Fruit: position of broadest part		
QN		(e)	towards stalk end		1
			at middle	Marsh (GRA)	2
[247]			towards distal end	Melogold (HGP)	3
37.	37.	VG	Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)		
PQ		(e)	flattened	Oroblanco (HGP)	1
			slightly rounded	Marsh (GRA), Redblush (GRA)	2
			strongly rounded		3
[249]			tapered		4
38. (+)	38. (*)	VG	<u>Only varieties without fruit neck:</u> Fruit: presence of depression at stalk end		
QL		(e)	absent		1
[253]			present	Ray Ruby (GRA)	9
39.	39.	VG	<u>Only varieties without fruit neck:</u> Fruit: depth of depression at stalk end		
QN		(e)	shallow	Nelruby (GRA), Ruby Henninger (GRA)	3
			medium	Ray Ruby (GRA)	5
[254]			deep		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
40.	40.	VG	Fruit: number of radial grooves at stalk end		
QN	(e)	absent or few	Pomelit (PUM), Rio Red (GRA)	1	
		intermediate	Oroblanco (HGP)	2	
[257]		many		3	
41.	41.	VG	Fruit: length of radial grooves at stalk end		
QN	(e)	short	Oroblanco (HGP), Rio Red (GRA)	3	
		medium		5	
[258]		long		7	
42. (+)	42.	VG	Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)		
QN	(e)	flattened	Melogold (HGP), Ray Ruby (GRA)	1	
		slightly rounded	Marsh (GRA), Redblush (GRA)	2	
[264]		strongly rounded		3	
43. (+)	43.	VG	Fruit: presence of depression at distal end		
QL	(e)	absent	Oroblanco (HGP), Star Ruby (GRA)	1	
[265]		present	Melogold (HGP)	9	
44.	44.	VG	Fruit: depth of depression at distal end		
QN	(e)	shallow	Melogold (HGP)	3	
		medium	Oroblanco (HGP)	5	
[266]		deep		7	
45.	45.	VG	Fruit: diameter of depression at distal end		
QN	(e)	small		3	
		medium	Oroblanco (HGP)	5	
[267]		large		7	

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
46.	46.	VG	Fruit: presence of areola		
QL		(e)	absent	Marsh (GRA), Pomelit (PUM)	1
			incomplete		2
[270]			complete		3
47. (+)	47.	VG	Fruit: type of areola		
QL		(e)	smooth	Flame (GRA), Rio Red (GRA)	1
			grooved		2
[271]			ridged		3
48.	48.	VG	Fruit: diameter of areola		
QN		(e)	small		3
			medium		5
[272]			large		7
49.	49.	VG	Fruit: diameter of stylar scar		
QN		(e)	small		3
			medium		5
[273]			large		7
50.	50. (*)	VG	Fruit surface: predominant color(s)		
PQ		(e)	yellow green		1
		(f)	greenish yellow	Tahiti (PUM)	2
			light yellow	Melogold (HGP), Oroblanco (HGP), Pomelit (PUM)	3
			medium yellow	Marsh (GRA)	4
			light pink	Ruby Henninger (GRA)	5
[282]			medium pink	Oran Red (GRA)	6
G			dark pink	Star Ruby (GRA)	7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
51. QN [285]	51.	VG (e) (f)	Fruit surface: glossiness		
			absent or very weak		1
			weak		3
			medium		5
			strong		7
			very strong		9
52. QN [286]	52.	VG (e) (f)	Fruit surface: roughness		
			smooth	Marsh (GRA)	3
			medium	Oroblanco (HGP)	5
			rough	Tahiti (PUM)	7
53. PQ [287]	53.	VG (e) (f)	Fruit surface: size of oil glands		
			all more or less the same size	Melogold (HGP)	1
			larger ones interspersed by smaller ones	Star Ruby (GRA)	2
54. QN [288]	54.	VG (e) (f)	Fruit surface: size of larger oil glands		
			small	Marsh (GRA)	3
			medium	Ruby Henninger (GRA)	5
			large	Melogold (HGP)	7
55. QN [289]	55.	VG (e) (f)	Fruit surface: conspicuousness of larger oil glands		
			weak	Marsh (GRA)	3
			medium	Ray Ruby (GRA), Ruby Henninger (GRA)	5
			strong	Chandler (PUM), Star Ruby (GRA)	7
56. PQ [290]	56.	VG (e) (f)	Fruit surface: presence of pitting and pebbling on oil glands		
			pitting and pebbling absent		1
			pitting absent, pebbling present	Tahiti (PUM)	2
			pitting present, pebbling absent	Marsh (GRA)	3
			pitting and pebbling present		4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
57.	57.	VG	<u>Varieties with fruit surface: pitting on oil glands present only:</u> Fruit surface: density of pitting		
QN		(e)	sparse		3
		(f)	medium	Ray Ruby (GRA)	5
[291]			dense		7
58.	58.	VG	<u>Varieties with fruit surface: pitting on oil glands present only:</u> Fruit surface: depth of pitting		
QN		(e)	shallow	Marsh (GRA)	3
		(f)	medium	Ray Ruby (GRA)	5
[292]			deep		7
59.	59.	VG	<u>Varieties with fruit surface: pebbling on oil glands present only:</u> Fruit surface: density of pebbling		
QN		(e)	sparse		3
		(f)	medium		5
[293]			dense		7
60.	60.	VG	<u>Varieties with fruit surface: pebbling on oil glands present only:</u> Fruit surface: degree of pebbling		
QN		(e)	weak	Star Ruby (GRA)	3
		(f)	medium		5
[294]			strong	Tahiti (PUM)	7
61.	61. (*)	VG	Fruit rind: thickness		
QN		(e)	thin		3
		(f)	medium	Flame (GRA)	5
[295]			thick	Oroblanco (HGP)	7
62.	62. (*)	VG	Fruit rind: adherence to flesh		
QN		(e)	weak		3
		(f)	medium		5
[296]			strong		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
63.	63.	VG	Fruit: color of albedo		
PQ		(e)	greenish	Marsh (GRA), Melogold (HGP), Oroblanco (HGP)	1
			light pink	Ray Ruby (GRA), Redblush (GRA), Ruby Henninger (GRA)	2
[300]			pink	Star Ruby (GRA)	3
64.	64.	VG	Fruit: differently colored specks in flesh	Marsh (GRA)	
QL		(e)	absent		1
[305]		(g)	present		9
65.	65.	VG	Fruit: bicolored segments	Marsh (GRA), Star Ruby (GRA)	
QL		(e)	absent	Pomelit (PUM)	1
[306]			present		9
66.	66. (*)	VG	Fruit: main color of flesh		
PQ		(e)	whitish	Marsh (GRA), Melogold (HGP), Oroblanco (HGP)	1
		(g)	light green	Tahiti (PUM)	2
			light pink	Ray Ruby (GRA), Redblush (GRA), Ruben (GRA), Ruby Henninger (GRA)	3
			medium pink	Henderson (GRA)	4
[307]			dark pink	Star Ruby (GRA)	5
G			whitish and pink	Pomelit (PUM)	6
67.	67.	VG	Fruit: bitterness of flesh		
QL		(e)	absent		1
[308]		(g)	present		9
68.	68.	VG	Fruit: filling of core		
QN		(e)	absent or very sparse		1
		(g)	sparse	Ray Ruby (GRA), Ruben (GRA)	3
			medium	Nelruby (GRA), Star Ruby (GRA)	5
			dense	Tahiti (PUM)	7
[309]			very dense		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
69.	69.	VG	Fruit: diameter of core		
QN		(e)	small		3
		(g)	medium	Henderson (GRA), Ray Ruby (GRA)	5
[310]			large	Chandler (PUM)	7
70.	70.	VG	Fruit: presence of rudimentary segments		
QN		(e)	absent or weak		1
		(g)	intermediate		2
[311]			strong		3
71.	71.	VG	Fruit: number of well developed segments		
QN		(e)	few		3
		(g)	medium		5
[312]			many		7
72.	72.	VG	Fruit: strength of segment walls		
QN		(e)	weak		3
		(g)	medium		5
[314]			strong		7
73.	73.	VG	Fruit: length of juice vesicles		
QN		(e)	short		3
		(g)	medium		5
[315]			long		7
74.	74.	VG	Fruit: thickness of juice vesicles		
QN		(e)	thin		3
		(g)	medium		5
[316]			thick		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
75.	75.	VG	Fruit: conspicuousness of juice vesicle walls		
QN		(e)	low		3
		(g)	medium		5
[317]			high		7
76.	76.	VG	Fruit: coherence of juice vesicles		
QN		(e)	weak		3
		(g)	medium		5
[318]			strong		7
77.	77.	VG	Fruit: juiciness		
QN		(e)	low		3
			medium		5
[321]			high		7
78.	78.	VG	Fruit juice: total soluble solids		
QN		(e)	low		3
			medium		5
[322]			high		7
79.	79.	VG	Fruit juice: acidity		
QN		(e)	low		3
			medium		5
[323]			high		7
80.	80.	VG	Fruit: strength of fibre		
QN		(e)	weak		3
			medium		5
[324]			strong		7

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
81. (+)	81.	VG	Fruit: number of seeds (controlled manual self-pollination)		
QN		(e)	absent or very few	Melogold (HGP), Oroblanco (HGP)	1
			few	Nelruby (GRA), Redblush (GRA)	3
			medium		5
			many		7
[325]			very many	Chandler (PUM), Tahiti (PUM)	9
82. (+)	82.	VG	Fruit: number of seeds (open pollination)		
QN		(e)	absent or very few		1
			few		3
			medium		5
[326]			many		7
83.	83. (*)	VG	Seed: polyembryony		
QL		(h)	absent		1
[327]			present		9
84.	84.	VG	Seed: length		
QN		(h)	short	Flame (GRA)	3
			medium	Nelruby (GRA)	5
[328]			long	Chandler (PUM), Pomelit (PUM), Tahiti (PUM)	7
85.	85.	VG	Seed: width		
QN		(h)	narrow		3
			medium	Henderson (GRA)	5
[329]			broad		7
86.	86	VG	Seed: surface		
QL		(h)	smooth		1
[330]			wrinkled		2

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
87.	87.	VG	<u>Varieties with seeds: surface wrinkled only: Seed: prominence of wrinkles</u>		
QN		(h)	weak		3
			medium		5
[331]			strong		7
88.	88	VG	Seed: external colour		
PQ		(h)	greenish		1
			whitish		2
			yellowish		3
			pinkish		4
[332]			brownish		5
89.	89.	VG	Seed: color of inner seed coat		
PQ		(h)	white		1
			light yellow		2
			light brown		3
			medium brown		4
			dark brown		5
			red		6
[333]			purple		7
90.	90.	VG	<u>Only varieties with seeds: polyembryony present: Seed: color of cotyledons</u>		
PQ		(h)	white		1
			cream		2
			light green		3
[334]			dark green		4
91.	91. (*)	VG	Flowering habit		
QL			flowering once		1
[335]			flowering more than once		2

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
92.	92. (*)	VG/MS	Time of maturity of fruit for consumption		
QN			early	Marsh (GRA)	3
[336]			medium		5
G			late		7
93.	93. (*)	VG	Fruit: parthenocarpy		
QL			absent		1
[337]			present		9
94. (+)	94.	VG	Plant: self-incompatibility		
QL			absent		1
[338]			present		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) Young leaf: Observations on the young leaf should be made on actively growing spring flush.
- (b) Leaf: Observations on the leaf should be made on fully developed leaves on the middle third of the youngest spring flush branch sections not showing signs of active growth.
- (c) Flower: Observations on the flower bud and the flower should be made on the terminal flower bud and flower, at the time of full flowering of the variety.
 - i. Observations on the open flower should be made on the first day of opening.
- (d) Flower bud: Observations on the flower bud should be made when the petal tips are visible just before the opening of the bud.
- (e) Fruit: Observations on the fruit should be made at the stage of optimum ripeness. The fruit should be tested weekly and harvested as soon as this stage has been reached.
 - ii. All fruits for observation should be taken from the periphery of the tree and fruit misformed as a result of clustering should not be sampled.
- (f) Fruit surface and fruit rind: Observations on the fruit surface and on the fruit rind should be made at the middle, between the base and apex of the fruit.
- (g) Fruit flesh: Observations on the flesh of the fruit should be made on a cross section through the middle of the fruit.
- (h) Seed: Observations on the seed should be made on the fresh seed.

LIST OF EXAMPLE VARIETIES FOR GRAPEFRUIT AND PUMMELO

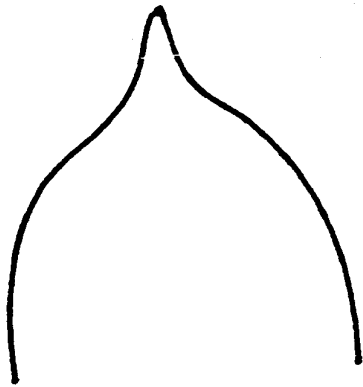
Variety denomination	Subgroup
Chandler	PUM
Flame	GRA
Henderson	GRA
Marsh	GRA
Melogold	HGP
Nelruby	GRA
Oran Red	GRA
Oroblanco	HGP
Pomelit	PUM
Ray Ruby	GRA
Redblush	GRA
Rio Red	GRA
Ruben	GRA
Ruby Henninger	GRA
Star Ruby	GRA
Tahiti	PUM

8.2 Explanations for individual characteristics

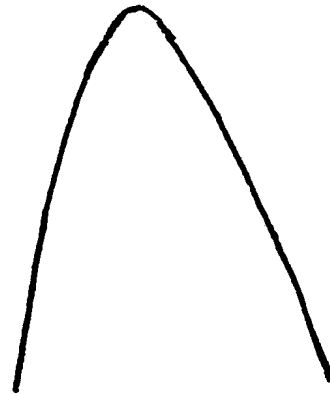
Ad. 2 ([202]): Tree: Growth habit

The observation on the growth habit of the tree should be made immediately after harvest.

Ad. 17 ([224]): Leaf blade: shape of apex



1
acuminate



2
acute

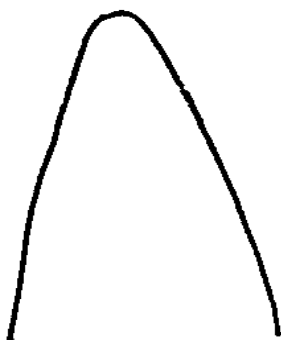


3
obtuse

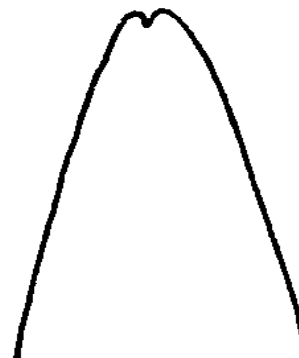


4
rounded

Ad. 18 ([225]): Leaf blade: emargination at tip

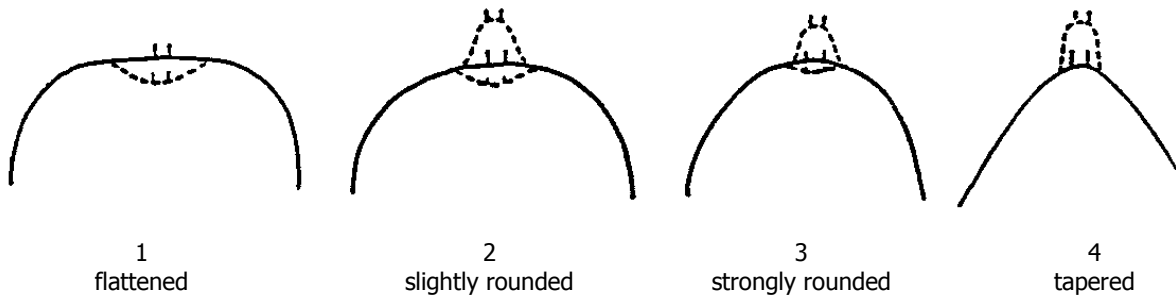


1
absent

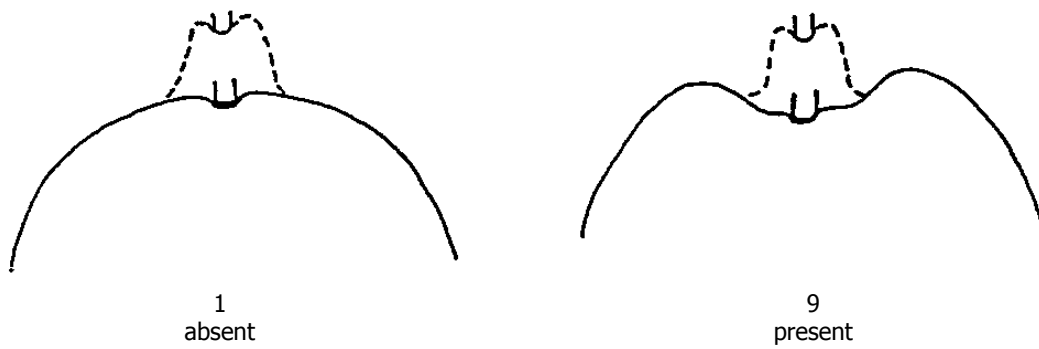


9
present

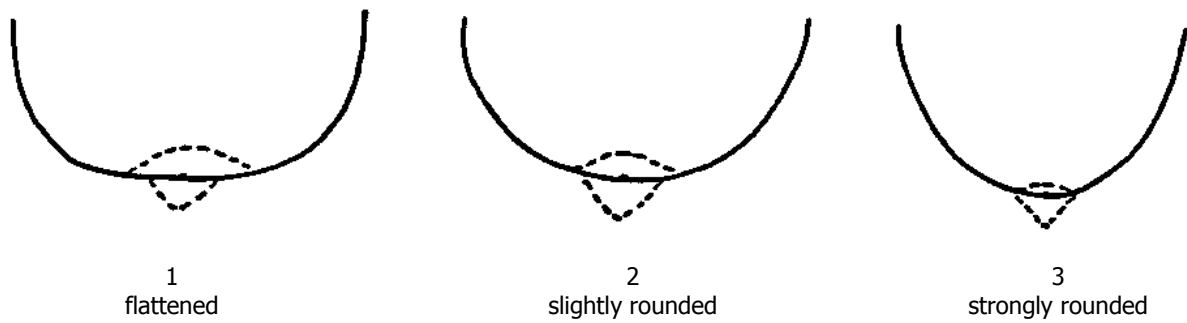
Ad. 37 ([249]): Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)



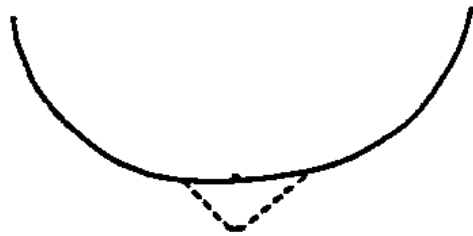
Ad. 38 ([253]): Only varieties without fruit neck: Fruit: presence of depression at stalk end



Ad. 42 ([264]): Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)



Ad. 43 ([265]): Fruit: presence of depression at distal end



1
absent



9
present

Ad. 47 ([271]): Fruit: type of areola



1
smooth



2
grooved



3
ridged

Ad. 81 ([325]): Fruit: number of seeds (controlled manual self-pollination)

Manual self-pollination is necessary to ensure a consistent production of seed.

Ad. 82 ([326]): Fruit: number of seeds (open pollination)

Open pollination means natural pollination between trees of the same variety.

Ad. 94 ([338]): Plant: self-incompatibility

A variety is self-incompatible when the fertile pollen of its own flower or of other flowers of the same variety is not able to fertilize the ovary.

9. LITERATURE

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10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference: CPVO-TQ/204/1