E

UPOV

TWF/33/2
ORIGINAL: English
DATE: July 11, 2002

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TECHNICAL WORKING PARTY FOR FRUIT CROPS

Thirty-Third Session
San Carlos de Bariloche, Argentina
November 25 to 29, 2002

WORKING PAPER ON DRAFT TEST GUIDELINES
FOR GRAPEFRUIT AND PUMMELO

(*Citrus* L. – Group 4)

prepared by the Office of the Union

The attached document TG/GRA-PUM(proj.1) already incorporates the standard wording of document TGP/7.2, which was adopted by the Technical Committee at its thirty-eighth session in April 2002, and includes some additional standard wording from document TGP/7.1 Draft 1, also agreed at that session.

[Document TG/GRA-PUM(proj.1) follows]

E

TG/GRA-PUM(proj.1) (TWF/33/2)
ORIGINAL: English
DATE: July 11, 2002

UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

CITRUS L. – Group 4 [*]

(a) **GRAPEFRUIT**

Citrus paradisi Macfad.

(b) **PUMMELO**

Citrus grandis (L.) Osbeck

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:[*]

	Latin	*English*	*French*	*German*	*Spanish*
(a)	*Citrus paradisi* Macfad.	Grapefruit	Grapefruit, Pomelo	Grapefruit, Paradiesapfel	Pomelo, Toronjo
(b)	*Citrus grandis* (L.) Osbeck	Pummelo, Shaddock	Pamplemoussier	Pampelmuse, Riesenorange	Pampelmusa

ASSOCIATED DOCUMENTS

These guidelines should be read in conjunction with document TG/1/3, "General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants" (hereinafter referred to as the "General Introduction") and its associated "TGP" documents.

Other associated documents: *CITRUS* L. – GROUP 1: TG/MANDA(proj.1) - (TWF/33/4)
CITRUS L. – GROUP 2: TG/ORANG(proj.1) - (TWF/33/5)
CITRUS L. – GROUP 3: TG/MANDA(proj.1) - (TWF/33/3)
CITRUS L. – GROUP 5: TG/PONCI(proj.1) - (TWF/33/6)

[*] These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

TABLE OF CONTENTS PAGE

1. Subject of these Guidelines

1.1 The following Test Guidelines have been developed from the standard Citrus Test Guidelines template. In particular, the Table of Characteristics has been selected from the overall set of citrus characteristics presented in the Annex.

1.2 These Test Guidelines apply to all varieties of the following group of the genus *Citrus* L. (Rutaceae), and their hybrids:

Group 4. Grapefruit and Pummelo and their hybrids

Citrus paradisi Macfad. (Grapefruit) – GRA
Citrus grandis (L.) Osbeck (Pummelo) – PUM
Grapefruit x Pummelo Hybrids – HGP

1.3 In the case of hybrids between species within the genus *Citrus* L., the Test Guidelines to be used should be those for which the overall appearance of FRUIT is most suited. However, if the variety cannot be clearly distinguished from ALL varieties covered by another set of Test Guidelines this other set of Test Guidelines should also be used to examine the variety.

1.4 In the case of hybrids between species within the genus *Citrus* L., where the variety is clearly distinguishable from all other varieties covered by other Test Guidelines, it may still be necessary to use additional citrus characteristics to examine the variety. In these circumstances it is appropriate to use characteristics from the Test Guidelines covering the parent species, or to select characteristics from the overall set of citrus characteristics presented in the Annex.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of bud sticks of 6 to 10 mm in diameter (one year old), each cut just behind a typical fruit or, if required by the competent authorities, one-year-old grafted trees. In the case of rootstock varieties, rooted cuttings or polyembryonic seeds may be required in addition.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

10 bud sticks sufficient to establish 10 plants or,
if required by the competent authorities,
10 one-year-old grafted trees.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease. It should preferably not be obtained from *in vitro* propagation. If it has been produced by *in vitro* propagation this fact must be stated by the applicant.

2.5 The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 Duration of Tests

The minimum duration of tests should normally be at least two independent growing cycles and must be sufficient for the trees under test to bear a satisfactory crop of fruit in at least two growing periods.

3.2 Testing Place

The tests should normally be conducted at one place. If any characteristics of the variety, which are relevant for the examination of DUS, cannot be seen at that place, the variety may be tested at an additional place.

3.3 Conditions for Conducting the Examination

3.3.1 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. Where necessary for the examination of fruit varieties, a standard specified rootstock should be used for each group.

3.3.2 All observations should be made on plants of the same age not less than 3 years old. The age of the plants should be specified.

3.3.3 Information on examining particular characteristics:

3.3.3.1 The table of characteristics provides notes which indicate the recommendations for observing characteristics as follows:

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

b Young leaf: All observations on the young leaf should be made on actively growing spring flush.

c Leaf: All 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.

d Flower: Unless otherwise indicated, all 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.

All observations on the open flower should be made on the first day of opening.

e Flower bud: All observations on the flower bud should be made when the petal tips are just visible.

f Fruit: Unless otherwise indicated, all observations on the fruit should be made on the main fruiting of the year. All observations on the fruit should be made at the stage of optimum ripeness. This stage should be determined by the ratio: total soluble solids/acid content of juice. The fruit should be tested weekly and harvested as soon as this stage has been reached.

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.

g Fruit surface and fruit rind: All observations on the fruit surface and on the fruit rind should be made at the middle, between the base and apex of the fruit.

h Fruit flesh: All observations on the flesh of the fruit should be made on a cross section through the middle of the fruit.

i Seed: All observations on the seed should be made on the fresh seed.

3.4 Test Design

3.4.1 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. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.

3.4.2 Each test should be designed to result in a total of, at least, 5 plants.

3.5 Number of Plants / Parts of Plants to be Examined

Unless otherwise indicated, all observations determined by measuring or counting should be made on 5 plants or 2 parts taken from each of 5 plants.

3.6 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.1.2 Consistent Differences

The minimum duration of tests recommended in section 3.1 reflects, in general, the need to ensure that any differences in a characteristic are sufficiently consistent.

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 Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.2 Uniformity

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

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 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 tested, either by growing a further generation, or by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the previous 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 is 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 color (characteristic 50)
(d) Fruit: main color of flesh (characteristic 66)
(e) Time of maturity of fruit for consumption (characteristic 92).

5.5 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

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.

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic. Each example variety is followed by the abbreviation of its group in brackets.

6.5 Legend

(+) See Explanations on the Table of Characteristics in Chapter 8.

(*) Asterisked characteristic – see section 6.1.2
(*F) Asterisked characteristic for fruit varieties
(*R) Asterisked characteristic for rootstock varieties

c#. Corresponding number of characteristic in the citrus overall table of characteristics
[#.] Number of characteristic in document TWF/32/2

(QL) Qualitative characteristic – see section 6.3
(QN) Quantitative characteristic – see section 6.3
(PQ) Pseudo-Qualitative characteristic – see section 6.3

a to i Method of observation – see section 3.3.3.1

6.6 Abbreviations

- GRA: *Citrus paradisi* Macfad. (Grapefruit)
- PUM: *Citrus grandis* (L.) Osbeck (Pummelo)
- HGP: Grapefruit x Pummelo Hybrids

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

	MoE°	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**Ploidy**					
		diploid					2
[new]		triploid					3
c1.		tetraploid					4
2. **(*)**		**Tree: growth habit**					
	a	upright					1
[1.]		spreading					2
c2.		drooping					3
3.		**Tree: density of spines**					
		absent or sparse					1
[2.]		intermediate					2
c3.		dense					3
4.		**Tree: length of spines**					
		short					3
[3.]		medium					5
c4.		long					7
5. **(*)**		**Young leaf: presence of anthocyanin coloration**					
[4.]	**b**	absent					1
c6.		present					9

° MoE = Method of Examination

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.		**Young leaf: intensity of anthocyanin coloration**					
	b	weak					3
[5.]		medium					5
c7.		strong					7
7.		**Leaf blade: length (apical leaflet in case of compound leaf)**					
	c	short					3
[6.]		medium					5
c10.		long					7
8.		**Leaf blade: width (as for 7)**					
	c	narrow					3
[7.]		medium					5
c11.		broad					7
9.		**Leaf blade: ratio length/width (as for 7)**					
	c	small					3
[8.]		medium					5
c12.		large					7
10.		**Leaf blade: shape in cross section (as for 7)**					
	c	straight or weakly concave					1
[9.]		intermediate					2
c17.		strongly concave					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.		**Leaf blade: twisting**					
	c	absent or weak					1
[10.]		intermediate					2
c19.		strong					3
12.		**Leaf blade: blistering**					
	c	absent or weak					1
[11.]		intermediate					2
c20.		strong					3
13.		**Leaf blade: intensity of green color**					
	c	light					3
[12.]		medium					5
c21.		dark					7
14.		**Leaf blade: pubescence on lower side**					
	c	absent or weak					1
[13.]		intermediate					2
c22.		strong					3
15.		**Leaf blade: undulation of margin**					
	c	absent or weak					1
		intermediate					2
c23.		strong					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.		**Leaf blade: incisions of margin**					
	c	entire					1
		crenate					2
c24.		dentate					3
17. (+)		**Leaf blade: shape of apex**					
	c	acuminate					1
		acute					2
		obtuse					3
c25.		rounded					4
18. **(+)**		**Leaf blade: emargination at tip**					
	c	absent					1
c26.		present					9
19.		**Petiole: length**					
	d	short					3
		medium					5
c27.		long					7
20.		**Petiole: presence of wings**					
	d	absent					1
c28.		present					9
21.		**Petiole: width of wings**					
	d	narrow					3
		medium					5
c29.		broad					7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.		**Flower bud: presence of anthocyanin coloration**					
	d	absent				All ZA vars.	1
c30.	**e**	present				Any examples?	9
23.		**Flower bud: intensity of anthocyanin coloration**				**Any examples?**	
	d	weak					3
	e	medium					5
c31.		strong					7
24.		**Flower: diameter of calyx**					
	d	small				Nelruby, Star Ruby	3
		medium				Oroblanco	5
c32.		large				Pomelit	7
25.		**Flower: length of petal**					
	d	short				Marsh, Nelruby, Ruby Henninger	3
		medium					5
c33.		long				Melogold, Pomelit	7
26.		**Flower: width of petal**					
	d	narrow					3
		medium					5
c34.		broad				Melogold, Pomelit	7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27.		**Flower: ratio length/width of petal**					
	d	small					3
		medium					5
c35.		large					7
28.		**Flower: length of stamens**					
	d	short					3
		medium					5
c36.		long					7
29.		**Anther: color**					
	d	white					1
		light yellow					2
c39.		medium yellow					3
30.		**Anther: viable pollen**					
	d	absent					1
c40.		present					9
31.		**Style: length**					
	d	short					3
		medium					5
c41.		long					7
32.		**Infructescence: clustering of fruits**					
		absent					1
c44.		present					9

	MoE°	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33. **(*)**		**Fruit: length**					
	f	short				Oran Red ?	3
		medium				Ray Ruby	5
c45.		long				Pomelit	7
34. **(*)**		**Fruit: diameter**					
	f	small				Oran Red ?	3
		medium				Melogold	5
c46.		large				Chandler	7
35. **(*)**		**Fruit: ratio length/diameter**					
	f	small				Oroblanco	3
		medium				Melogold	5
c47.		large					7
36. **(*)**		**Fruit: position of broadest part**					
	f	towards stalk end					1
		at middle				Marsh	2
c48.		towards distal end				Melogold	3
37. **(*)** **(+)**		**Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)**					
	f	flattened				Oroblanco	1
		slightly rounded				Marsh, Redblush	2
[38.]		strongly rounded					3
c50.		tapered					4

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
38. **(*)** **(+)**		**Fruit: presence of depression at stalk end (excluding necked varieties)**					
[39.]	f	absent					1
c51.		present				Ray Ruby	9
39.		**Fruit: depth of depression at stalk end (excluding necked varieties)**					
	f	shallow				Nelruby, Ruby Henninger	3
[40.]		medium				Ray Ruby	5
c52.		deep					7
40.		**Fruit: number of radial grooves at stalk end**					
	f	absent or few				Pomelit, Rio Red	1
[46.]		intermediate				Oroblanco	2
c58.		many					3
41.		**Fruit: length of radial grooves at stalk end**					
	f	short				Oroblanco, Rio Red	3
[47.]		medium					5
c59.		long					7
42. **(+)**		**Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)**					
	f	flattened				Melogold, Ray Ruby	1
[53.]		slightly rounded				Marsh, Redblush	2
c65.		strongly rounded					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
43. **(+)**		**Fruit: presence of depression at distal end**					
[54.]	f	absent				Oroblanco, Star Ruby	1
c66.		present				Melogold	9
44.		**Fruit: depth of depression at distal end**					
	f	shallow				Melogold	3
[55.]		medium				Oroblanco	5
c67.		deep					7
45.		**Fruit: diameter of depression at distal end**					
	f	small					3
[56.]		medium				Oroblanco	5
c68.		large					7
46.		**Fruit: presence of areola**					
	f	absent				Marsh, Pomelit	1
[59.]		incomplete					2
c71.		complete					3
47. **(+)**		**Fruit: type of areola**					
	f	smooth				Flame, Rio Red	1
[60.]		grooved					2
c72.		ridged					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.		**Fruit: diameter of areola**					
	f	small					3
[63.]		medium					5
c73.		large					7
49.		**Fruit: diameter of stylar scar**					
	f	small					3
[64.]		medium					5
c74.		large					7
50. **(*)**		**Fruit surface: predominant color**					
	f	dark greenish yellow				Tahiti	1
	g	yellow green					2
		light yellow				Melogold, Oroblanco, Pomelit	3
		medium yellow				Marsh	4
		light pink				Ruby Henninger	5
[72.]		medium pink				Oran Red	6
c83.		dark pink				Star Ruby	7
51.		**Fruit surface: glossiness**					
	f	absent or very weak					1
	g	weak					3
		medium					5
[75.]		strong					7
c86.		very strong					9

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
52.		**Fruit surface: roughness**					
	f	smooth				Marsh	3
[76.]	g	medium				Oroblanco	5
c87.		rough				Tahiti	7
53.		**Fruit surface: size of oil glands**					
[77.]	f	all more or less the same size				Melogold	1
c88.	g	larger ones interspersed by smaller ones				Star Ruby	2
54.		**Fruit surface: size of larger oil glands**					
	f	small				Marsh	3
[78.]	g	medium				Ruby Henninger	5
c89.		large				Melogold	7
55.		**Fruit surface: conspicuousness of larger oil glands**					
	f	weak				Marsh	3
[79.]	g	medium				Ray Ruby, Ruby Henninger	5
c90.		strong				Chandler, Star Ruby	7

	MoE°	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
56.		**Fruit surface: presence of pitting and pebbling on oil glands**					
	f	pitting and pebbling absent					1
	g	pitting absent, pebbling present				Tahiti	2
[80.]		pitting present, pebbling absent				Marsh	3
c91.		pitting and pebbling present					4
57.		**Fruit surface: density of pitting on oil glands**					
	f	sparse					3
[81.]	g	medium				Ray Ruby	5
c92.		dense					7
58.		**Fruit surface: depth of pitting on oil glands**					
	f	shallow				Marsh	3
[82.]	g	medium				Ray Ruby	5
c93.		deep					7
59.		**Fruit surface: density of pebbling on oil glands**					
	f	sparse					3
[83.]	g	medium					5
c94.		dense					7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
60.		**Fruit surface: degree of pebbling on oil glands**					
	f	weak				Star Ruby	3
[84.]	g	medium					5
c95.		strong				Tahiti	7
61. (*)		**Fruit rind: thickness**					
	f	thin					3
[85.]	g	medium				Flame	5
c96.		thick				Oroblanco	7
62. (*)		**Fruit rind: adherence to flesh**					
	f	weak					3
[86.]	g	medium					5
c97.		strong					7
63.		**Fruit: color of albedo**					
	f	greenish				Marsh, Melogold, Oroblanco	1
[90.]	h	light pink				Ray Ruby, Red Blush, Ruby Henninger	2
c101.		pink				Star Ruby	3
64.		**Fruit: differently colored specks in flesh**					
[95.]	f	absent				Marsh	1
c106.	h	present					9
65.		**Fruit: bicolored segments**					
[96.]	f	absent				Marsh, Star Ruby	1
c107.		present				Pomelit	9

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
66. **(*)**		**Fruit: main color of flesh**					
	f	whitish				Marsh, Melogold, Oroblanco	1
	h	light green				Tahiti	2
		light pink				Ray Ruby, Red Blush, Ruben, Ruby Henninger	3
		medium pink				Henderson	4
[97.]		dark pink				Star Ruby	5
c108.		whitish and pink				Pomelit	6
67.		**Fruit: bitterness of flesh**					
[new]	f	absent					1
c109.	h	present					2
68.		**Fruit: filling of core**					
	f	absent or very sparse					1
		sparse				Ray Ruby, Ruben	3
		medium				Nelruby, Star Ruby	5
[98.]		dense				Tahiti	7
c110.		very dense					9
69.		**Fruit: diameter of core**					
	f	small					3
[99.]		medium				Henderson, Ray Ruby	5
c111.		large				Chandler	7
70.		**Fruit: rudimentary segments**					
	f	absent or weak					1
[100.]	h	intermediate					2
c112.		strong					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
71.		**Fruit: number of well developed segments**					
	f	few					3
[101.]	**h**	medium					5
c113.		many					7
72.		**Fruit: strength of segment walls**					
	f	weak					3
[103.]	**h**	medium					5
c115.		strong					7
73.		**Fruit: length of juice vesicles**					
	f	short					3
[104.]	**h**	medium					5
c116.		long					7
74.		**Fruit: thickness of juice vesicles**					
	f	thin					3
[105.]	**h**	medium					5
c117.		thick					7
75.		**Fruit: conspicuousness of juice vesicle walls**					
	f	low					3
[106.]	**h**	medium					5
c118.		high					7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
76.		**Fruit: coherence of juice vesicles**					
	f	weak					3
[107.]	**h**	medium					5
c119.		strong					7
77.		**Fruit: juice content**					
	f	low					3
[110.]		medium					5
c122.		high					7
78.		**Fruit juice: total soluble solids**					
	f	low					3
[111.]		medium					5
c123.		high					7
79.		**Fruit juice: acidity**					
	f	low					3
[112.]		medium					5
c124.		high					7
80.		**Fruit: strength of fibre**					
	f	weak					3
[113.]		medium					5
c125.		strong					7

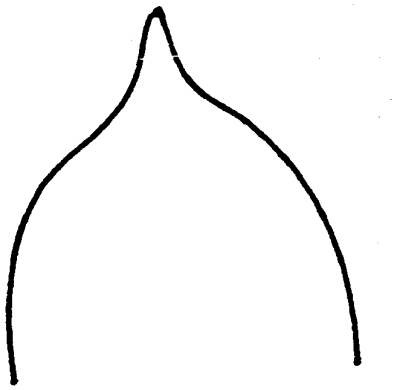
	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
81.		**Fruit: number of seeds (controlled self pollination)**					
	f	absent or very few				Melogold, Oroblanco,	1
		few				Nelruby, Red Blush	3
		medium					5
[114.]		many					7
c126.		very many				Chandler, Tahiti	9
82. **(+)**		**Fruit: number of seeds (open pollination)**					
	f	absent or very few					1
		few					2
[new]		moderate					3
c127.		many					4
83. **(*)**		**Seed: polyembryony**					
[115.]	i	absent					1
c128.		present					9
84.		**Seed: length**					
	i	short				Flame	3
[116.]		medium				Nelruby	5
c129.		long				Chandler, Pomelit, Tahiti	7
85.		**Seed: width**					
	i	narrow					3
[117.]		medium				Henderson	5
c130.		broad					7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
86.		**Seed: surface**					
[118.]	i	smooth					1
c131.		wrinkled					2
87.		**Seed: prominence of wrinkles**					
	i	weak					3
[119.]		medium					5
c132.		strong					7
88.		**Seed: external color**					
	i	greenish					1
		whitish					2
		yellowish					3
[120.]		pinkish					4
c133.		brownish					5
89.		**Seed: color of inner seed coat**					
	i	white					1
		light yellow					2
		light brown					3
		medium brown					4
		dark brown					5
[121.]		red					6
c134.		purple					7

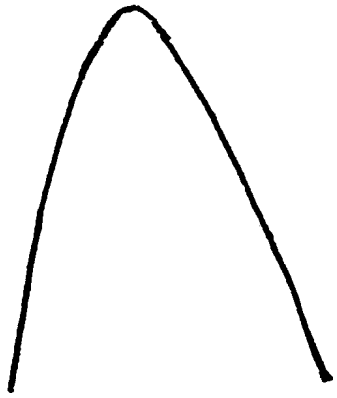
	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
90.		**Seed: color of cotyledons**					
	i	white					1
		cream					2
[122.]		light green					3
c135.		dark green					4
91. **(*)**		**Flowering habit**					
[124.]		flowering once					1
c136.		flowering more than once					2
92. **(*)**		**Time of maturity of fruit for consumption**					
		early					3
[125.]		medium					5
c137.		late					7
93. **(*)**		**Fruit: parthenocarpy**					
[126.]	f	absent					1
c138.		present					9
94. **(+)**		**Plant: self-incompatibility**					
[127.]		absent					1
c139.		present					9

8. Explanations on the Table of Characteristics

Ad. 17 (c25.): Leaf blade: shape of apex



1
acuminate

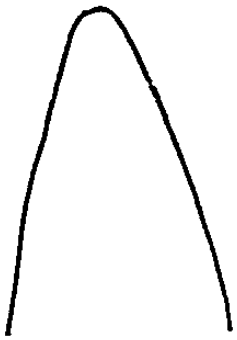


2
acute

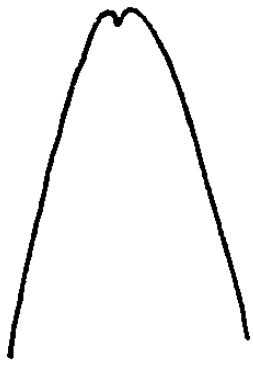
3
obtuse

4
rounded

Ad. 18 (c26.): Leaf blade: emargination at tip

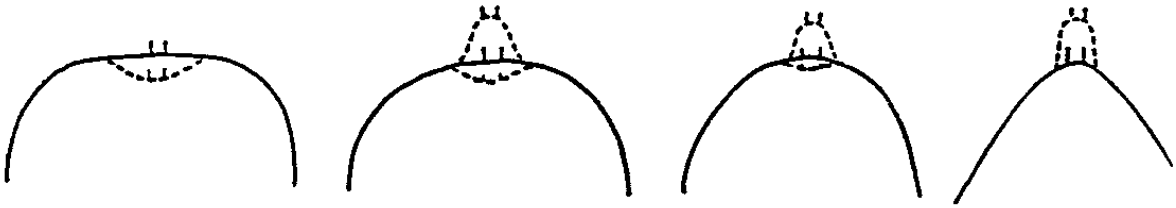


1
absent



9
present

Ad. 37 (c50.): Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)



1	2	3	4
flattened	slightly rounded	strongly rounded	tapered

Ad. 38 (c51.): Fruit: presence of depression at stalk end (excluding necked varieties)

1	9
absent	present

Ad. 42 (c65.): Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)

1	2	3
flattened	slightly rounded	strongly rounded

Ad. 43 (c66.): Fruit: presence of depression at distal end

1
absent

9
present

Ad. 47 (c72.): Fruit: type of areola

1
smooth

2
grooved

3
ridged

Ad. 82 (c127.): Fruit: number of seeds (open pollination)

Ad. 94 (c139.): Plant: self-incompatibility

9. Literature

Alexander D. MCE., 1983: "Some citrus species and varieties in Australia," Commonwealth Scientific and Industrial Research Organization, Australia, 64 pp.

Berzal V., I. Porras, 1989: "Patrones y variedades de Pomelo". Consejería de Agricultura, Ganadería y Pesca de la Comunidad Autónoma de Murcia.

Blondel L., 1978: Botanical classification of species of the genus Citrus, Fruits 33 (11): pp. 695 - 720.

Bono R., Soler, J. Fernandez de Cordova, L. 1986: "Variedades de agrios cultivadas en España". Generalidad Valenciana, 70 pp.

Damigella, P., Tribulato, E., Calabrese, F., Crescimanno, F.G., Continella, G., 1980: "Gli Agrumi," Cultivar. R.E.D.A., Roma, Italy, pp. 9 - 70.

Ortiz Marcide, J.M., 1985: "Nomenclatura botánica de los cítricos". Levante Agrícola nº 259-260, pp. 71-79.

Ortiz J. M., I. Porras, A. García Lidón, 1987: "El pomelo y sus variedades". Levante Agrícola nº 273-274, p. 30.

Ray R., Walheim L., 1980: "Citrus: How to select, grow and enjoy," HP Books, Tucson, USA, pp. 41 - 115.

Reuther W. (Editors), 1973. "The Citrus Industry," Volume Ill, University of California, Division of Agricultural Sciences, 528 pp.

Reuther W., Batchelor L.D., Webber H.J. (Editors), 1968: "The Citrus Industry," Volume 11, University of California, Division of Agricultural Sciences, 398 pp.

Reuther W., Webber H.J., Batchelor L.D. (Editors), 1967: "The Citrus -Industry," Volume 1, University of California, Division of Agricultural Sciences, 611 pp.

Saunt, J. 1990: "Citrus varieties of the world: an illustrated guide," Sinclair International Ltd., Norwich, England, 126 pp.

Soler, J., 1999. Reconocimiento de variedades de cítricos en campo. Generalitat Valenciana. 187 pp.

Spina, P., Russo, F., Geraci, G., Martelli, S., 1980: "Schede per ii registro varietale dei fruttiferi I-ARANCIO e MANDARINO," Ministro Agricoltura e Foreste - S.O.I., Roma, Italy, 92 pp.

Thornton, I.R., El-Zeftawi, B.M., 1983: "Culture of irrigated citrus fruits," Government Printer, State of Victoria, Australia, pp. 12 -25.

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Application date: (not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire

1.1 *Latin Name*

(a)	*Citrus paradisi* Macfad. – GRA	[ ]
(b)	*Citrus grandis* (L.) Osbeck – PUM	[ ]
(c)	Hybrid – HGP:	[ ]

1.2 Common Name

(a)	Grapefruit – GRA	[ ]
(b)	Pummelo – PUM	[ ]
(c)	Hybrid – HGP:	[ ]

2. Applicant: Name

Address

Telephone No.

Fax No.

E-mail address

Breeder (if different from applicant)

3. Proposed denomination and breeder's reference

Proposed denomination (if available)

Breeder's reference

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

4. Information on the breeding scheme and propagation of the variety

4.1 Breeding Scheme

4.1.1 Variety resulting from:

(a) controlled cross [ ]
(please state parent varieties)
(b) partially unknown cross [ ]
(please state known parent variety(ies))
(c) totally unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

4.1.3 Discovery [ ]
(please state where, when and how developed)

4.1.4 Other [ ]
(please provide details)

4.2 Method of Propagating the Variety

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1 (33)	**Fruit: length**		
	short	Oran Red ?	3[ ]
	medium	Ray Ruby	5[ ]
	long	Pomelit	7[ ]
5.2 (34)	**Fruit: diameter**		
	small	Oran Red ?	3[ ]
	medium	Melogold	5[ ]
	large	Chandler	7[ ]
5.3 (50)	**Fruit surface: predominant color**		
	dark greenish yellow	Tahiti	1[ ]
	yellow green		2[ ]
	light yellow	Melogold, Oroblanco, Pomelit	3[ ]
	medium yellow	Marsh	4[ ]
	light pink	Ruby Henninger	5[ ]
	medium pink	Oran Red	6[ ]
	dark pink	Star Ruby	7[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

5.4 (66) Fruit: main color of flesh

whitish	Marsh, Melogold, Oroblanco	1[ ]
light green	Tahiti	2[ ]
light pink	Ray Ruby, Red Blush, Ruben, Ruby Henninger	3[ ]
medium pink	Henderson	4[ ]
dark pink	Star Ruby	5[ ]
whitish and pink	Pomelit	6[ ]

5.5 (92) Time of maturity of fruit for consumption

early	3[ ]
medium	5[ ]
late	7[ ]

5.6 (93) Fruit: parthenocarpy

absent	1[ ]
present	9[ ]

6. Similar varieties and differences from these varieties

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
(Example)	*Plant: height*	*e.g. note 3*	*note 7*
		e.g. short	*tall*
		e.g. 90 cm	*130 cm*

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

7.2 Special conditions for the examination of the variety

7.2.1 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

7.2.2 If yes, please give details:

7.3 Other information

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

9. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name

Signature Date

[Annex follows; see document TWF/33/2 Add.]