

TG/PAPAYA(proj.5) ORIGINAL: English DATE: 2009-07-21

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

PAPAYA

UPOV Code: CARIC_PAP

Carica papaya L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Mexico

to be considered by the Technical Working Party for Fruit Crops at its fortieth session, to be held in Angers, France, from September 21 to 25, 2009

Alternative Names:*

Botanical name	English	French	German	Spanish
Carica papaya L.	Papaya, Papaw	Papayer	Melonenbaum, Papaya	Papayo, Lechosa

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

^{*} 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.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Carica papaya* L. of the family *Caricaceae*.

2. <u>Material Required</u>

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 seed or plants.

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

200 seeds in the case of seed-propagated varieties, or 6 plants in the case of vegetatively propagated varieties.

In the case of seed, the seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 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.

3. <u>Method of Examination</u>

3.1 Number of Growing Cycles

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

3.1.2 The growing cycle is considered to be the duration of a single growing season, beginning with vegetative growth, followed by flowering and fruit harvest.

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".

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.

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

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 25 hermaphrodite plants in the case of seed-propagated plants or, in the case of vegetatively propagated varieties, in a total of at least 6 plants or plant parts.

3.4.2 The design of the tests should be such that hermaphrodite 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 Number of Plants / Parts of Plants to be Examined

Unless otherwise indicated, all observations should be made on 25 hermaphrodite plants parts in the case of seed-propagated varieties or, in the case of vegetatively propagated varieties, on 6 plants or plant parts.

3.6 Additional Tests

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

4. <u>Assessment of Distinctness, Uniformity and Stability</u>

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 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 Test Guidelines are familiar with the

recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.2 Uniformity

4.2.1 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:

4.2.2 For the assessment of uniformity for seed-propagated varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 25 hermaphrodite plants, one off-type is allowed.

4.2.3. For the assessment of uniformity for vegetatively propagated varieties, a population standard of 1% and an acceptance probability of 95% should be applied. In the case of a sample size of 6 hermaphrodite plants, one off-type is 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 plant stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

5. <u>Grouping of Varieties and Organization of the Growing Trial</u>

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) Plant: height to first flower (characteristic 2)
- (b) Leaf blade: ratio length/width (characteristic 9)
- (c) Fruit: ratio length/diameter at broadest part (characteristic 24)
- (d) Fruit: shape (characteristic 25)

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

6. <u>Introduction to the Table of Characteristics</u>

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.

6.5 Legend

- (*) Asterisked characteristic see Chapter 6.1.2
- QL Qualitative characteristic see Chapter 6.3
- QN Quantitative characteristic see Chapter 6.3
- PQ Pseudo-qualitative characteristic see Chapter 6.3
- (a)-(g) See Explanations on the Table of Characteristics in Chapter 8.1
- (+) See Explanations on the Table of Characteristics in Chapter 8.2

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (+)		Young plant: color of stem					
PQ		only green				Ishigaki Sango	1
		yellowish green				Tainung Nº 1	2
		brown					3
		green and purple				Sunrise	4
		only purple					5
2. (*)		Plant: height to firs flower	t				
QN	(a)	low				Ishigaki Sango	3
		medium				Sunrise, Tainung Nº 1	5
		high				Cera	7
3.		Plant: branching					
(+)							
QL		absent				Ishigaki Sango, Maradol, Sunrise	1
		present					9
4.		Stem: maximum diameter					
QN	(a)	small					3
		medium				Ishigaki Sango, Sunrise, Tainung N° 1	5
		large					7
5.		Stem: number of nodes from ground to first flower					
QN	(a)	few				Ishigaki Sango	3
		medium				Sunrise, Tainung Nº 1	5
		many					7

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.		Stem: length of internode half-way between ground and first flower	l				
QN	(a)	short				Ishigaki Sango	3
		medium				Sunrise, Tainung Nº 1	5
		long					7
7.		Leaf blade: length					
<mark>(+)</mark>							
QN	(b)	short					3
		medium				Ishigaki Sango, Sunrise, Tainung N°1	5
		long					7
8.		Leaf blade: width					
<mark>(+)</mark>							
QN	(b)	narrow					3
		medium				Surise, Tainung Nº 1	5
		broad					7
9. (*)		Leaf blade: ratio length/ width					
QN	(b)	small					3
		medium				Ishigaki Sango, Sunrise, Tainung N° 1	5
		large					7
10. (+)		Leaf blade: presence of tertiary lobes					
QL	(b)	absent					1
		present				Ishigaki Sango, Sunrise, Tainung N° 1	9

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.		Leaf blade: waxiness					
QL	(b)	absent				Ishigaki Sango, Sunrise, Tainung N° 1	1
		present					9
12.		Leaf blade: pubescence on lower side					
QL	(b)	absent				Ishigaki Sango, Sunrise, Tainung N° 1	1
	(c)	present					9
13.		Petiole: length					
QN	(b)	short					3
		medium				Ishigaki Sango, Sunrise, Tainung N° 1	5
		long					7
14.		Petiole: anthocyanin coloration	l				
QL	(b)	absent				Ishigaki Sango	1
		present				Sunrise, Tainung Nº 1	9
15.		Petiole: intensity of anthocyanin coloration					
QN	(b)	weak					1
		medium				Sunrise, Tainung Nº 1	2
		strong					3
16.		Inflorescence (excluding solitary flowers): number of flowers					
QN	(d)	few				Ishigaki Sango	3
		medium				Sunrise	5
		many				Tainung Nº 1	7

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.		Inflorescence: length of main axis					
QN	(d)	short				Ishigaki Sango, Sunrise	3
		medium					5
		long				Tainung Nº 1	7
18.		Inflorescence: color of axis					
PQ	(d)	green				Ishigaki Sango, Sunrise, Tainung Nº 1	1
		light purple					2
		dark purple					3
19.		Flower: length of corolla					
QN	(e)	short					3
		medium				Sunrise	5
		long				Tainung Nº 1	7
20.		Flower: color of corolla					
PQ	(e)	white					1
		cream				Sunrise, Tainung Nº 1	2
		medium yellow					3
		dark yellow to orange					4
		medium green					5
		dark green					6
		yellow green and purple					7
		medium purple					8
		dark purple					9

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.		Peduncle: length					
QN	(f)	short				Ishigaki Sango, Sunrise	3
		medium					5
		long				Tainung Nº 1	7
22.		Fruit: length					
QN	(f)	short				Du Roi Solo, Sunrise	3
		medium				Ishigaki Sango	5
		long				Cera	7
23.		Fruit: diameter at the broadest part					
QN	(f)	small				Du Roi Solo, Sunrise	3
		medium				Ishigaki Sango	5
		large				Cera	7
24. (*)		Fruit: ratio length/ diameter at broadest part					
QN	(f)	small				Cera	3
		medium				Ishigaki Sango	5
		large				Sunrise	7
25. (*) (+)		Fruit: shape					
PQ	(f)	ovoid					1
		ellipsoid				Ishigaki Sango	2
		obovoid				Du Roi Solo, Red Lady	3
		piriform				Kapoho, Rainbow	4
		oblong				Amarela	5

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.		Fruit: shape of sta end	lk				
(+)							
PQ	(f)	pointed					1
		rounded					2
		truncate				Sun Rice Solo	3
		depressed				Du Roi Solo, Ishigaki Sango	4
27.		Fruit: shape at distal end					
PQ	(f)	rounded				Tainung Nº 1	1
		weakly pointed				Ishigaki Sango, Sunrise	2
		strongly pointed				Du Roi Solo	3
28.		Ripe fruit: main color					
PQ	(g)	green					1
		yellow green					2
		yellow				Amarela, Kapoho, Tainung № 1	3
		medium orange				Ishigaki Sango, Maradol, Mulata	4
		dark orange				Mamey	5
29.		Ripe fruit: ridges					
QL	(g)	absent				Sunrise, Tainung Nº 1	1
		present				Ishigaki Sango	9
30.		Ripe fruit: prominence of ridges					
QN	(g)	weakly expressed				Ishigaki Sango, Surise, Tainung № 1	1
		medium					2
		strongly expressed					3

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.		Ripe fruit: thicknes of skin	S				
QN	(g)	thin					1
		medium				Sunrise	2
		thick				Tainung Nº 1	3
32.		Ripe fruit: color of flesh					
PQ	(g)	yellow				Amarela, Cera, Kapoho	1
		orange				Sunrise, Tainung N 1	2
		red orange				Ishigaki Sango, Maradol	3
33.		Ripe fruit: firmness of flesh	8				
QN	(g)	soft				Cera, Mamey	3
		medium				Maradol	5
		firm				Sunrise, Tainung N 1	7
34.		Ripe fruit: sweetness					
(+)		Sweetness					
QN	(g)	low				Cera	3
		medium				Maradol, Tainung Nº 1	5
		high				Ishigaki Sango, Sunrise	7
35.		Ripe fruit: aroma o flesh	f				
QN	(g)	weak				Maradol	1
		moderate				Ishigaki Sango, Sunrise	2
		strong				Caera	3

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36.		Ripe fruit: placenta tissue	1				
QN	(g)	scarce				Mamey	3
		medium				Sunrise, Tainung Nº 1	5
		abundant				Cera	7
37.		Ripe fruit: maximum width of central cavity					
QN	(g)	narrow				Sunrise	3
		medium				Ishigaki Sango, Tainung N° 1	5
		broad					7
38. (+)		Ripe fruit: predominant shape of central cavity					
PQ	(g)	circular					1
		angular				Tainung Nº 1	2
		star-shaped				Du Roi Solo, Ishigaki Sango, Sunrise	3
		irregular					4
39. (*)		Ripe fruit: seeds					
QN	(g)	absent or very few				Ishigaki Sango	1
		few				Du Roi Solo	3
		many				Sunrise	7
		very many				Cera, Tainung Nº 1	9

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		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40.		Seed: color (only normal seeds)					
PQ	(f)	grey yellow					1
		grey					2
		medium brown				Tainung Nº 1	3
		dark brown				Sunrise	4
		black				Maradol	5
41.		Seed: length					
QN (f)	(f)	short					3
		medium				Sunrise, Tainung Nº 1	5
		long				Cera	7
42.		Seed: width					
QN	(f)	narrow					3
		medium				Sunrise, Tainung N 1	5
		broad					7
43.		Seed: ratio length/width					
QN	(f)	small					3
		medium				Sunrise, Tainung Nº 1	5
		large					7
44.		Seed: shape					
PQ	(f)	globose				Sunrise	1
		ellipsoid				Tainung Nº 1	2
		ovoid					3
45.		Seed: amount of mucilage					
QN	(f)	low					1
		intermediate				Sunrise, Tainung N 1	2
		high				Cera	3

8. <u>Explanations on the Table of Characteristics</u>

8.1 Explanations covering several characteristics

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

- (a) <u>Plant and stem</u>: All observations on the plant and stem should be made at the beginning of fruit maturity.
- (b) <u>Leaf blade and petiole</u>: All observations on the leaf blade and petiole should be made on mature leaves. Leaves should be taken from the middle third of the current season's growth at the beginning of fruit maturity.
- (c) <u>Pubescence</u>: All observations on pubescence should be made with the aid of a magnifying glass.
- (d) <u>Inflorescence</u>: All observations on inflorescence should be taken after the fourth one has appeared, when it has reached its full length.
- (e) <u>Flower</u>: All observations on the flower should be made during the first flower opening, at the start of anther dehiscence, only in hermaphrodite and female flowers.
- (f) <u>Peduncle, fruit and seed</u>: All observations on the peduncle, fruit and seed should be made on 5 typical fruits, taken from the middle part of the fruiting region with a minimum sample of 10 fruits, at the time of harvest maturity.
- (g) <u>Ripe fruit</u>: Observations on the ripe fruit should be made when the raw fruit is ready for eating.

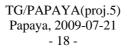
8.2 *Explanations for individual characteristics*

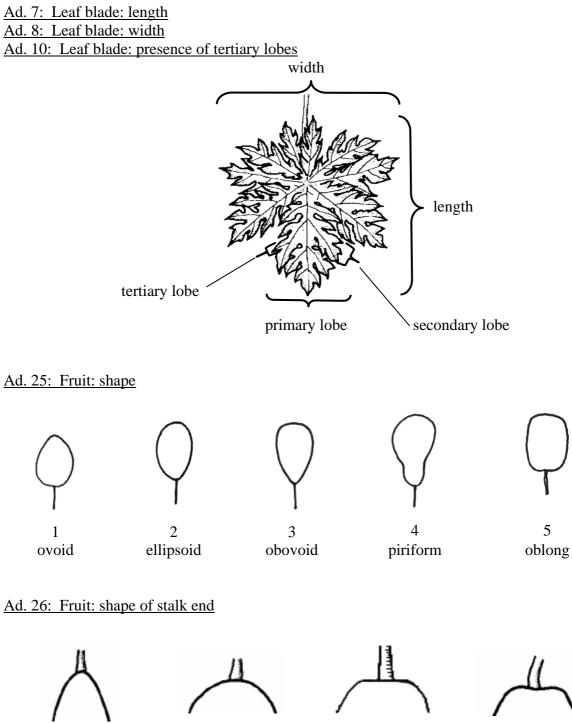
Ad. 1: Young plant: color of stem

To be observed when the first bud appears.

Ad. 3: Plant: branching

To be observed at the beginning of flowering.





1 pointed

2 rounded

3 truncate

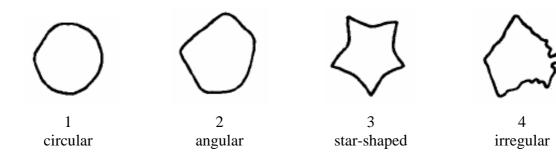
4 depressed

Ad. 34: Ripe fruit: sweetness

To be determined by tasting the fruit.

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Ad. 38: Fruit: predominant shape of central cavity



9. <u>Literature</u>

IBPGR, 1988: Descriptors for Papaya. International Board for Plant Genetic Resources. Rome, Italy, 34 p.

Loyola, J. L. D., Pinto, R. M. de S., Lima, J. F. de, Ferreira, F. R. 2000: Catálogo de germoplasma de mamão (*Carica papaya* L.). Embrapa Mandioca e Fruticultura, Cruz das Almas, Bahia, Brasil, 40 p.

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10. <u>Technical Questionnaire</u>

TEC	HNICAL QUESTIONNAIR	E	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.	1. Subject of the Technical Questionnaire								
1.1	Botanical name	Ca	rica papaya L.						
1.2	Common name Papaya								
2.	Applicant								
	Name								
	Address								
	Telephone No.								
	Fax No.								
	E-mail address								
	Breeder (if different from	appl	icant)						
3.	Proposed denomination and	l bre	eder's reference						
	Proposed denomination (if available)								
	Breeder's reference								

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TEC	CHNI	CAL QI	JESTIONNAIRE P	Page $\{x\}$ of $\{y\}$	Reference Number:			
#4.	[#] 4. Information on the breeding scheme and propagation of the variety							
	4.1	Breedi	ng Scheme					
		Variet	y resulting from:					
		4.1.1	Crossing					
			(a) controlled cross			[]	
			(please state par(b) partially known(please state known)			[]	
			(c) unknown cross	own parent variety(i	es))	[]	
		4.1.2	Mutation (please state parent va	ariety)		[]	
		4.1.3	Discovery and develo (please state where an		and how developed)	[]	
		4.1.4	Other (please provide details	s)		[]	
	4.2	Metho	d of propagating the va	ariety				

#

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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	haracteristics of the variety to be indicated (the ponding characteristic in Test Guidelines; please mar		
	Characteristics	Example Varieties	١
5.1 (2)	Plant: height to first flower		
	short	Ishigaki Sango	
	medium	Sunrise, Tainung Nº 1	-
	tall	Cera	
5.2 (9)	Leaf blade: ratio length/width		
	small		
	medium	Ishigaki Sango, Sunrise, Tainung N ^o 1	-
	large		
5.3 (24)	Fruit: ratio length/maximum diameter		
	small	Cera	
	medium	Ishigaki Sango	4
	large	Sunrise	
5.4 (25)	Fruit: shape		
	ovoid		1
	ellipsoid	Ishigaki Sango	4
	obovoid	Du Roi Solo, Red Lady	
	piriform	Kapoho, Rainbow	2
	oblong	Amarela	5

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TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:			
6. Similar varieties and differences from these varieties <i>Please use the following table and box for comments to provide information on how your candidate</i> <i>variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most</i> <i>similar. This information may help the examination authority to conduct its examination of</i> <i>distinctness in a more efficient way.</i>					

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 your candidate variety
Example	Petiole: anthocyanin coloration	e.g. note l <mark>e.g. absent</mark>	note 9 present
Comments:			
Comments.			

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[#] 7.	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	Are there any special conditions for growing the variety or conducting the examination?						
	Yes [] No []						
	(If yes, please provide details)						
7.3	3 Other information						
	A representative color photograph of the variety should accompany the Technical Questionnaire						
8.	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.						

#

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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9. Information on plant material to be examined or submitted for examination.

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

	(a) N	Aicroorganisms (e.g. virus, bacteria, phytoplasma)	Ye	s []	No []			
	(b) C	Chemical treatment (e.g. growth retardant, pesticide)	Ye	s []	No []			
	(c) T	issue culture	Ye	s []	No []			
	(d) C	Other factors	Ye	s []	No []			
Please provide details for where you have indicated "yes".								
10.		by declare that, to the best of my knowledge, the inform	mation _I	provided	in this form	ı is		
1	Applica	ant's name						
2	Signatu	Date Date	e					

[End of document]