

UPOV

TG/PAPAYA(proj.2)

ORIGINAL: English

DATE: 2006-07-17

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 thirty-seventh session,
to be held in Salvador, Bahia State, Brazil, from August 21 to 25, 2006*

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Carica papaya</i> L.	Papaya, Papaw	Arbre à melon, 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 seed-propagated and vegetative propagated varieties of *Carica papaya* L.

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 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
10 plants in the case of vegetatively propagated varieties.

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. Method of Examination

3.1 *Number of Growing Cycles*

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

3.1.2 The growing cycle is considered to be the duration of a single growing season, beginning with vegetative growth, 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. 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 10 hermaphrodite 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 *Number of Plants / Parts of Plants to be Examined*

Unless otherwise indicated, all observations should be made on 25 hermaphrodite plants in the case of seed-propagated varieties or, in the case of vegetatively propagated varieties, on 10 hermaphrodite 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 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, three off-types are allowed. **(MX: The test for uniformity is underway in the field).**

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 10 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. 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) Tree: height to first fruit (characteristic 1)
- (b) Leaf blade: length/width ratio (characteristic 11)
- (c) Fruit: length/width ratio ((characteristic 27).
- (d) Fruit: shape (from hermaphrodite flower) (characteristic 28).

5.4 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.

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

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

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (a) Young tree: color of stem						
(+)						
PQ	only green					1
	brown					2
	green and purple					3
	only purple					4
2. (a) Tree: height to first fruit						
(*)						
QN	short					3
	medium					5
	tall					7
3. (a) Tree: number of stems						
QL	one					1
	multiple					2
4. (a) Stem: base diameter						
(+)						
QN	small					3
	medium					5
	large					7
5. (a) Stem: diameter halfway between ground and first flower						
		(MX: a (+) is not needed)				
QN	small					3
	medium					5
	large					7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.	(a) Stem: number of nodes from ground to first fruit					
QN	few					3
	medium					5
	many					7
7.	(a) Stem: length of internode halfway between ground and first flower					
QN	short					3
	medium					5
	long					7
8.	(b) Leaf blade: length					
QN	short					3
	medium					5
	long					7
9.	(b) Leaf blade: width					
QN	narrow					3
	medium					5
	broad					7
10.	(b) Leaf blade: ratio length/ width					
(*)						
QN	small					3
	medium					5
	large					7
11.	(b) Leaf blade: number of secondary lobes in the central lobe					
(+)						
QN	few					3
	medium					5
	many					7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12. (b) Leaf blade: presence of tertiary lobes						
(+)						
QL	absent					1
	present					9
13. (b) Leaf blade: waxiness						
QL	absent					1
	present					9
14. (b) Leaf blade: (c) pubescence						
QL	absent					1
	present					9
15. (b) Petiole: length						
QN	short					3
	medium					5
	long					7
16. (b) Petiole: green color						
PQ	light					3
	medium					5
	dark					7
17. (b) Petiole: anthocyanin coloration						
QL	absent					1
	present					9
18. Flower: type of flowering						
(+)						
QL	solitary flowers					1
	inflorescences					2
	solitary flowers and inflorescences					3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19.	(d) Inflorescence: number of flowers					
QN	few					1
	moderate					2
	many					3
20.	(d) Inflorescence: length of main axis					
QN	short					3
	medium					5
	long					7
21.	(d) Inflorescence: color of axis					
PQ	green					1
	purple pink					2
	red purple					3
22.	(e) Tree: type of hermaphrodite					
QL	predominantly staminate with a few hermaphrodite					1
	predominantly hermaphrodites with a few staminate					2
	predominantly hermaphrodites with a few staminate and pistillate					3
	hermaphrodites only					4
	predominantly hermaphrodites with a few pistillate					5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23. (e) Hermaphrodite flower: length of corolla						
QN	short					3
	medium					5
	long					7
24. (e) Hermaphrodite flower: color of corolla						
PQ	white					1
	cream					2
	medium yellow					3
	dark yellow to orange					4
	medium green					5
	dark green					6
	yellow green and purple					7
	purple					8
	dark purple					9
25. (f) Peduncle: length						
QN	short					3
	medium					5
	long					7
26. (f) Fruit: color at immature stage						
PQ	yellow					1
	light green					2
	medium green					3
	dark green					4

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27. (f) Fruit: length					
QN	short				3
	medium				5
	long				7
28. (f) Fruit: width					
QN	narrow				3
	medium				5
	broad				7
29. (f) Fruit: length/width ratio					
QN	small				3
	medium				5
	large				7
30. (f) Fruit: shape					
(*)					
(+)					
PQ	ovoid				1
	ellipsoid				2
	globose				3
	obovoid				4
	piriform				5
	oblong				6
	constricted at middle				7
31. (f) Fruit: shape of stalk end					
(+)					
PQ	pointed				1
	rounded				2
	truncate				3
	depressed				4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32. (f) Fruit: shape at distal end						
PQ	rounded					1
	weekly pointed					2
	strongly pointed					3
33. (f) Fruit: diameter of stylar scar						
		(MX: to consider to delete)				
QN	small					3
	medium					5
	large					7
34. (g) Ripe fruit: main color						
PQ	yellow					1
	dark yellow orange					2
	orange					3
	yellow green					4
	green					5
35. (g) Ripe fruit: surface						
QN	smooth					1
	medium					2
	rough					3
36. (g) Ripe fruit: prominence of ridges						
QN	weak					1
	medium					2
	strong					3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
37. (g) Ripe fruit: thickness of skin						
QN	thin					1
	medium					2
	thick					3
38. (g) Ripe fruit: flesh color						
PQ	light yellow					1
	medium yellow					2
	dark yellow					3
	orange					4
	red orange					5
	red					6
39. (g) Ripe fruit: presence of fiber						
QL	present					1
	absent					9
40. (g) Ripe fruit: firmness of flesh						
QN	soft					3
	medium					5
	firm					7
41. (g) Ripe fruit: aroma of flesh						
QN	weak					1
	moderate					2
	strong					3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42. (f) Fruit: placental tissue						
QN	scarce					3
	medium					5
	abundant					7
43. (f) Fruit: central cavity: maximum width						
QN	narrow					3
	medium					5
	broad					7
44. (f) Fruit: central cavity predominant shape (+)						
PQ	circular					1
	angular					2
	star					3
	irregular					4
45. (f) Seed: germination on fruit						
QL	absent					1
	present					9
46. (f) Seed: color						
PQ	grey yellow					1
	grey					2
	brown					3
	brown black					4
	black					5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
47. (f) Seed: length					
QN	short				3
	medium				5
	long				7
48. (f) Seed: width					
QN	narrow				3
	medium				5
	broad				7
49. (f) Seed: length/width ratio					
QN	small				3
	medium				5
	large				7
50. (f) Seed: shape					
PQ	round				1
	ellipsoid				2
	ovoid				3
51. (f) Seed: surface transparency					
QL	absent				1
	present				9
52. (f) Seed: surface brightness					
QN	dull				1
	intermediate				2
	glossy				3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
53. (f) Seed: amount of mucilage						
QN	small					1
	intermediate					2
	large					3

8. Explanations on the Table of Characteristics

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) Tree and stem: All observations on the tree and stem should be made at the beginning of fruit maturity.
- (b) Leaf blade and petiole: 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) Pubescence: All observations on pubescence should be made with the aid of a magnifying glass.
- (d) Inflorescence: All observations on inflorescence should be made after the fourth one has appeared.
- (e) Flower: All observations on the flower should be made during the first flower opening, at the start of anther dehiscence.
- (f) Peduncle, fruit and seed: All observations on the peduncle, fruit and seed should be made on 5 typical fruits from hermaphrodite flowers, taken from a minimum sample of 10 fruits, at the time of maturity for harvest.
- (g) Ripe fruit: Observations on the ripe fruit should be made when the fruit is ready for eating.

8.2 *Explanations for individual characteristics*

Ad. 1. Young tree: stem color

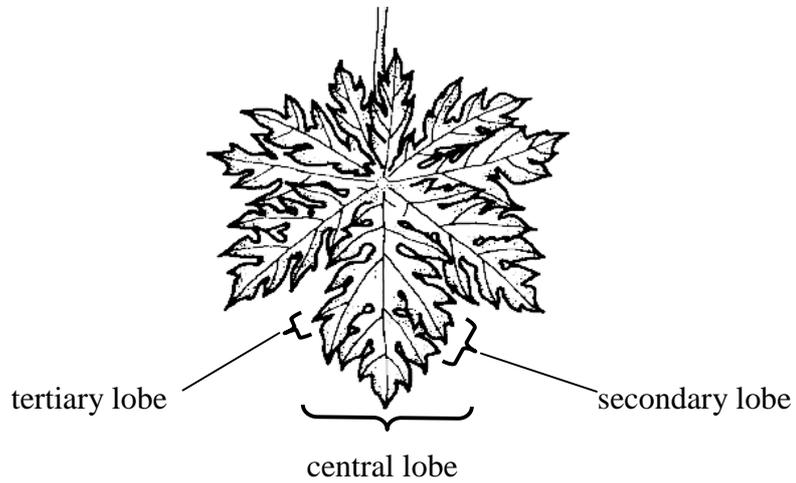
To be observed when the first bud appears.

Ad. 4. Stem: base diameter

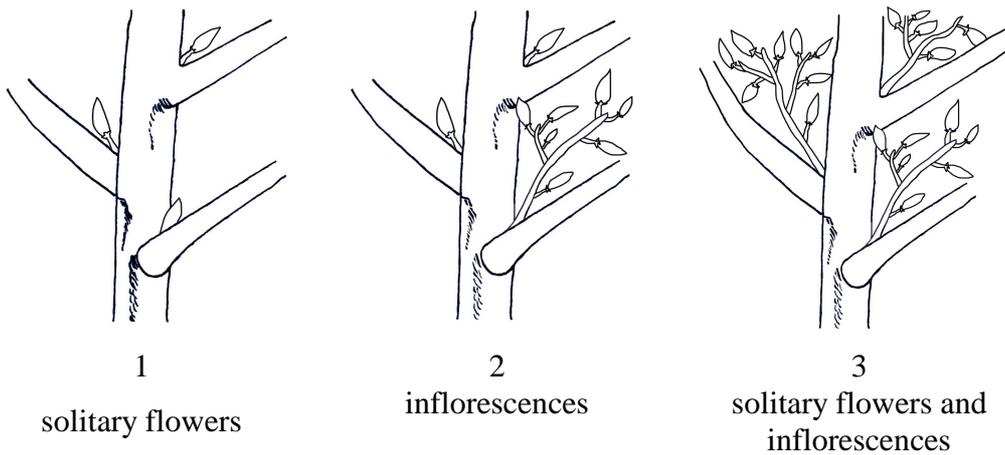
To be measured 10 cm above ground.

Ad. 11: Leaf blade: number of secondary lobes in the central lobe

Ad. 12: Leaf blade: presence of tertiary lobes



Ad. 18. Flower: type of flowering



Ad. 30: Fruit: shape

To be observed from hermaphrodite flower.



1
ovoid



2
ellipsoid



3
globose



4
obovoid



5
piriform



6
oblong



7
Constricted at
middle

Ad. 31: Fruit: shape of stalk end



1
pointed



2
rounded

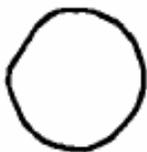


3
flat



4
depressed

Ad. 44: Fruit: central cavity predominant shape



1
circular



2
angular



3
star



4
irregular

9. Literature

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

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 Botanical name	<input type="text" value="Carica papaya L."/>	
1.2 Common name	<input type="text" value="PAPAYA"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	
Fax No.	<input type="text"/>	
E-mail address	<input type="text"/>	
Breeder (if different from applicant)	<input type="text"/>	
3. Proposed denomination and breeder's reference		
Proposed denomination (if available)	<input type="text"/>	
Breeder's reference	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding Scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross []
 (please state parent varieties)

(b) partially known cross []
 (please state known parent variety(ies))

(c) unknown cross []

4.1.2 Mutation []
 (please state parent variety)

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

4.1.4 Other []
 (please provide details)

4.2 Method of propagating the variety

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 Tree: height to first fruit (2)		
short		3[]
medium		5[]
tall		7[]

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

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.2 Leaf blade: ratio length/width (10)		
small		3[]
medium		5[]
large		7[]
5.3 Fruit: ratio length/width (29)		
small		3[]
medium		5[]
large		7[]
5.4 Fruit: shape (30)		
ovoid		1[]
ellipsoid		2[]
globose		3[]
obovoid		4[]
piriform		5[]
oblong		6[]
constricted at middle		7[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

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
<i>Example</i>	<i>Petiole: anthocyanin coloration</i>	<i>e.g. note 1 e.g. absent</i>	<i>note 9 present</i>

Comments

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TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#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 Other information

A representative color photograph of the variety should accompany the Technical Questionnaire

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.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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) Microorganisms (e.g. virus, bacteria, phytoplasma) | Yes [] | No [] |
| (b) Chemical treatment (e.g. growth retardant, pesticide) | Yes [] | No [] |
| (c) Tissue culture | Yes [] | No [] |
| (d) Other factors | Yes [] | No [] |

Please provide details for where you have indicated “yes”.

.....

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

Applicant's name	<input type="text"/>		
Signature	<input type="text"/>	Date	<input type="text"/>

[End of document]