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UPOV

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-sixth session, to be held in Kôfu, Japan from September 5 to 9, 2005

Alternative Names:[*]

Botanical name	*English*	*French*	*German*	*Spanish*
Carica papaya L.	Papaya, Papaw	Arbre à melon, Papayer	Melonenbaum, Papaya	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.

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.

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

50 seeds.

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 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”.

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.

3.3.2 Because daylight varies, color determinations made against a color chart should be made either in a suitable cabinet providing artificial daylight or in the middle of the day in a room without direct sunlight. The spectral distribution of the illuminant for artificial daylight

should conform with the CIE Standard of Preferred Daylight D 6500 and should fall within the tolerances set out in the British Standard 950, Part I. These determinations should be made with the plant part placed against a white background.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 25 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 or parts taken from each of 25 hermaphrodite plants. In the case of parts of plants, the number to be taken from each of the plants should be 2.

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, 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.

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: 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. **(*)**		**Tree: height to first fruit**					
QN	**(a)**	short					3
		medium					5
		tall					7
2.		**Stem: number**					
QL	**(a)**	one					1
		multiple					2
3.		**Stem: diameter (to be measured 10 cm above ground)**					
QN	**(a)**	small					3
		medium					5
		large					7
4.		**Stem: number of nodes to first flower**					
QN	**(a)**	few					3
		medium					5
		many					7
5.		**Stem: length of middle internode**					
QN	**(a)**	short					3
		medium					5
		long					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.		**Stem: color**					
PQ	**(a)**	green					1
		greyish brown					2
		green and shades of red purple					3
		red purple					4
7.		**Petiole: length**					
QN	**(b)**	short					3
		medium					5
		long					7
8.		**Petiole: color**					
PQ	**(b)**	light green					1
		medium green					2
		dark green					3
		green and shades of red purple					4
		red purple					5
9.		**Leaf blade: length**					
QN	**(b)**	short					3
		medium					5
		long					7
10.		**Leaf blade: width**					
QN	**(b)**	narrow					3
		medium					5
		broad					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11. **(*)**		**Leaf blade: length/ width ratio**					
QN	**(b)**	small					3
		medium					5
		large					7
12. **(+)**		**Leaf blade: number of secondary lobes in the central lobe**					
QN	**(b)**	few					3
		medium					5
		many					7
13. **(+)**		**Leaf blade: presence of tertiary lobes**					
QL	**(b)**	absent					1
		present					9
14.		**Leaf blade: waxiness**					
QL	**(b)**	absent					1
		present					9
15.		**Leaf: pubescence**					
QL	**(b)** **(c)**	absent					1
		present					9
16.		**Inflorescence: number of flowers**					
QN	**(d)**	few					3
		medium					5
		many					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.		**Inflorescence: length of main axis**					
QN	**(d)**	short					3
		medium					5
		long					7
18.		**Inflorescence: color of axis**					
PQ	**(d)**	green					1
		purple pink					2
		red purple					3
19.		**Flower: type of flowering**					
QL		solitary flowers					1
		inflorescences					2
		solitary flowers and inflorescences					3
20.		**Flower: type of hermaphroditism**					
QL	**(e)**	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
21.		**Hermaphrodite flower: length of corolla**					
QN	**(e)**	short					3
		medium					5
		long					7
22.		**Hermaphrodite flower: color of corolla**					
PQ	**(e)**	white					1
		white yellow					2
		yellow					3
		deep yellow to orange					4
		medium green					5
		dark green					6
		yellow green and red purple shades					7
		red purple					8
		dark red purple					9
23.		**Peduncle: length**					
QN	**(f)**	short					3
		medium					5
		long					7
24.		**Fruit: color at immature stage**					
PQ	**(f)**	yellow					1
		light green					2
		medium green					3
		dark green					4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25.		**Fruit: length**					
QN	**(f)**	short					3
		medium					5
		long					7
26.		**Fruit: width**					
QN	**(f)**	narrow					3
		medium					5
		broad					7
27.		**Fruit: length/width ratio**					
QN	**(f)**	small					3
		medium					5
		large					7
28. **(*)** **(+)**		**Fruit: shape (from hermaphrodite flower)**					
PQ	**(f)**	round					1
		ovoid					2
		ellipsoid					3
		oblong					4
		obovoid					5
		reniform					6
		piriform					7
29. **(+)**		**Fruit: shape of stalk end**					
PQ	**(f)**	depressed					1
		flat					2
		rounded					3
		pointed					4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30.		**Fruit: diameter of stylar end scar**					
QN	**(f)**	small					3
		medium					5
		large					7
31.		**Fruit: principal color**					
PQ	**(f)**	yellow					1
		dark yellow orange					2
		orange					3
		yellow green					4
		green					5
32.		**Fruit: surface**					
QN	**(f)**	smooth					3
		medium					5
		rough					7
33.		**Fruit: ridges**					
QN	**(f)**	weak					3
		medium					5
		strong					7
34.		**Fruit: thickness of peel**					
QN	**(f)**	thin					3
		medium					5
		thick					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35.		**Fruit: flesh color**					
PQ	**(f)**	light yellow					1
		medium yellow					2
		dark yellow					3
		orange					4
		red orange					5
		red					6
36.		**Fruit: presence of fiber**					
QL	**(f)**	present					1
		absent					9
37.		**Fruit: firmness of flesh**					
QN	**(f)**	soft					3
		medium					5
		firm					7
38.		**Fruit: aroma of flesh**					
QN	**(f)**	mild					1
		medium					2
		strong					3
39.		**Fruit: placental tissue**					
QN	**(f)**	scarce					3
		medium					5
		abundant					7

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

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

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 should be made on foliated tress in spring.

(b) Petiole and leaf blade: All observations on the leaf should be made on mature leaves. Leaves should be taken from the middle third of the current season's growth.

(c) Pubescence: All observations on pubescence should be made with the aid of a magnifying glass.

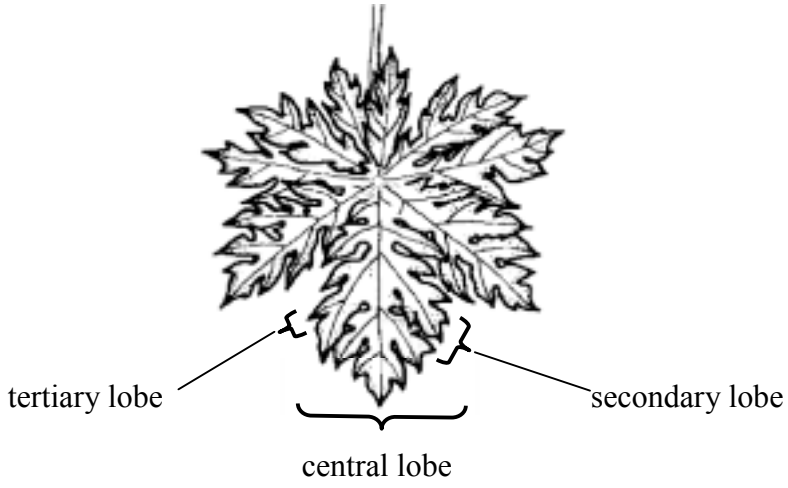
(d) Inflorescence: All observations on inflorescence should be made after the fourth one has appeared.

(e) Flower: All observations on the flower should be made during the first flower opening, at the start of anther dehiscence.

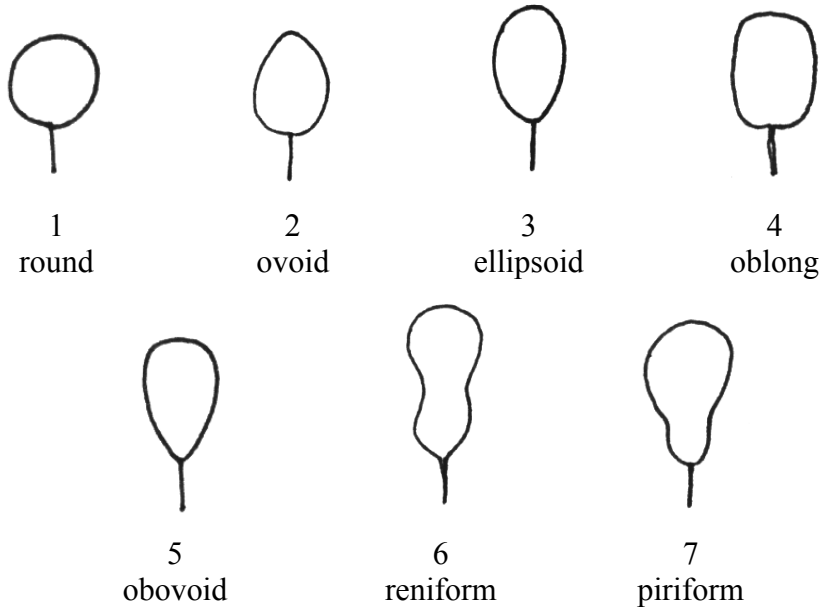
(f) Peduncle, fruit and seed: All observations on the peduncle, fruit and seed should be made on 5 typical fruits taken from a minimum sample of 10 fruits, at the time of maturity for harvest.

8.2 Explanations for individual characteristics

Ad. 12: Leaf blade: number of secondary lobes in the central lobe
Ad. 13: Leaf blade: presence of tertiary lobes

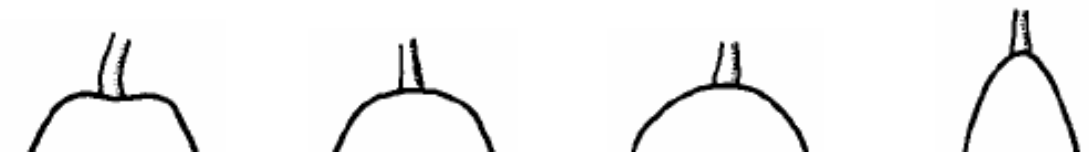


Ad. 28: Fruit: shape (from hermaphrodite flower)



1 round
2 ovoid
3 ellipsoid
4 oblong
5 obovoid
6 reniform
7 piriform

Ad. 29: Fruit: shape of stalk end



1 depressed
2 flat
3 rounded
4 pointed

Ad. 41: 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	*Carica papaya* L.
1.2 Common name	PAPAYA

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

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 (1)	**Tree: height to first fruit**		
	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:

	Characteristics	Example Varieties	Note
5.2 (11)	**Leaf blade: length/width ratio**		
	small		3[ ]
	medium		5[ ]
	large		7[ ]
5.3 (28)	**Fruit: shape (from hermaphrodite flower)**		
	round		1[ ]
	ovoid		2[ ]
	ellipsoid		3[ ]
	oblong		4[ ]
	obovoid		5[ ]
	reniform		6[ ]
	piriform		7[ ]

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
Example	*Stem: number*	*e.g. note 1* *e.g. one*	*note 9* *multiple*

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 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:

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

Signature Date

[End of document]