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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

PINEAPPLE

UPOV Code: ANANA_COM

Ananas comosus (L.) Merr.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from France

to be considered by the

Technical Working Party for Fruit Crops
at its forty-first session, to be held in Cuernavaca, Morelos State, Mexico,
from September 27 to October 1, 2010

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Ananas comosus (L.) Merr.	Pineapple	Ananas	Ananas	Piña

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

1.1 These Test Guidelines apply to all varieties of *Ananas comosus* (L.) Merr. of the family *Bromeliaceae*.

1.2 The characteristics in These Test Guidelines have been developed to distinguish between edible varieties and additional characteristics may be needed in order to examine ornamental varieties.

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 aerial suckers, or other forms of propagating material if accepted by the authority.

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

20 aerial suckers (or other forms of propagating material if accepted by the 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. Method of Examination

3.1 Number of Growing Cycles

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

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 The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.4.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of 20 plants.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 Additional Tests

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.

4.1.4 Number of Plants / Parts of Plants to be Examined

Unless otherwise indicated, all observations for the purposes of distinctness should be made on 20 plants or parts taken from each of 20 plants, disregarding any off-type plants.

In the case of observations of parts of plants, the number of parts to be taken from each of the plants should be 2.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the second column of the Table of Characteristics (see document TGP/9 "Examining Distinctness", Section 4 "Observation of characteristics"):

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness."

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 Uniformity

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 20 plants, 1 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 further examined by testing a new plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics: (*to review*)

(a) Leaf: spines (characteristic 10)
(b) Leaf: raised margin (piping) (characteristic 11)
(c) Leaf: texture of leaf blade (characteristic 12)
(d) Fruit: shape (excluding neck) (characteristic 39)
(e) Fruit: predominant color when ripe (characteristic 42)
(f) Fruit: eye profile (characteristic 47)
(g) Fruit: color of flesh (characteristic 50)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

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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

6.2.1 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.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	Note
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	Note
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

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

MG, MS, VG, VS – see Chapter 4.1.5

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

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

To provide an explanation of the stages of development (1-T, 2-A, 3-I, 4-M) and to check whether those correspond to the appropriate timing for each characteristic (e.g. Char. 26)

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (*) (+)	**1-T VG**	**Plant: growth habit (before flowering)**					
QN	**(a)**	upright				Perola	1
		semi upright				Smooth Cayenne	3
		spreading				Perolera	5
2. (*) (+)	**1-T**	**Plant: number of leaves (produced from 4 months after planting to floral induction)**					
QN	**(a)**	few				Perola	3
		medium				Smooth Cayenne	5
		many					7
3. (+)	**1-T**	**Reference leaf: length**	**Feuille de référence: longueur**				
QN	**(a)**	short	petit			Queen	3
	(b)	medium	moyen			Smooth Cayenne	5
		long	grand			Perola	7
4. (+)	**1-T**	**Reference leaf: width**	**Feuille de référence: largeur**				
QN	**(a)**	narrow	étroite			Queen	3
	(b)	medium	moyen			Smooth Cayenne	5
		broad	large			Perola	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5. (*)	**1-T**	**Leaf: main color of upper side**	**Feuille: couleur principale de la face supérieure**				
PQ	**(a)**	green	vert			Jupi, Perola, Smooth Cayenne	1
		reddish	rougeâtre			Roxo de tefe	2
		purplish	violacé			**To be provided**	3
		green purple	vert violacé			**To be provided**	4
6.	**1-T**	**Varieties with only green color leaf: Leaf: intensity of green color**	**Variétés avec une couleur de feuille verte: Feuille: intensité de la couleur verte**				
QN	**(a)**	light	faible				3
		medium	moyenne				5
		dark	forte				7
7. (*)	**1-T**	**Leaf: intensity of anthocyanin coloration (on upper side)**	**Feuille: expression des anthocyanes (sur la face supérieure)**				
QN	**(a)**	absent or very weak	absent ou très faible			Selangor Green / Green Spanish, MD2 / Golden Ripe/ Extra sweet	1
		weak	faible			Pot à eau	3
		medium	moyen			Smooth Cayenne	5
		strong	fort			Rondon	7
		very strong	très fort			Roxo de Tefe	9
8.	**1-T**	**Leaf: distribution of anthocyanin**					
QN	**(a)**	predominantly on margins				Singapore Canning/Singapore Spanish	1
		even on margins and in groove					2
		predominantly in the groove				Rondon	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**1-T**	**Leaf: density of trichomes (hairs) on lower side**	**Feuille: densité de trichomes (poils) sur la face inférieure**				
QN	**(a)**	absent or very sparse	absente ou peu dense				1
		intermediate	intermédiaire			Perolera	2
		dense	dense			Smooth Cayenne	3
10. **(*)** **(+)**	**1-T**	**Leaf: spines**	**Feuille: épines**				
QL	**(a)**	absent	absentes			Samba, Singapore Canning / Singapore Spanish	1
		present	présentes			Queen, Ananas bouteille	9
11. **(*)** **(+)**	**1-T**	**Leaf: raised margin (piping)**					
QL	**(a)**	absent				Manzana / Burmanguesa	1
		present				Queen, Singapore Canning / Singapore Spanish, Smooth Cayenne	9
12. **(+)** **(*)**	**1-T** **(a)**	**Leaf: texture of leaf blade**					
QL		smooth				Singapore canning	1
		sand paper like				Samba	2
		visually spiny				Smooth Cayenne, Fina de Hiero, Queen	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.	**1-T**	**Only varieties visually spiny texture: Leaf: position of spines at margin**					
(+)	**(a)**						
PQ		at base only				**needed**	1
		at apex only				Smooth Cayenne	2
		at base and apex				**needed**	3
		along all margins				Queen	4
14.	**1-T**	**Only varieties visually spiny texture: Leaf: color of spine**	**Feuille: couleur de l'épine par rapport au limbe**				
PQ	**(a)**						
		yellowish green		1			
		orange		2			
		red		3			
		purple		4			
15.	**1-T**	**Only varieties visually spiny texture: Leaf : size of the spine**	**Feuille : taille de l'épine**				
	(x)						
QN	**(a)**	small	petite			Perola	3
		medium	moyenne			Singapore Canning / Singapore Spanish	5
		large	grande			Queen	7
16.	**2-A**	**Inflorescence: floral bract size (before fruit development)**	**Inflorescence: taille de la bractée florale**				
(+)							
QN	**(c)**	small	petite			Perola	3
		medium	moyenne			Queen	5
		large	grande			Singapore Canning / Singapore Spanish	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.	**2-A**	**Inflorescence: flowering pattern**	**Inflorescence: type de floraison**				
QL	**(c)**	from bottom to top	acropétale			Smooth Cayenne	1
		random	irrégulièrement			Perola	2
18.	**2-A**	**Petal : color of apex**	**Pétale: couleur de l'apex**				
PQ	**(c)**	whitish	blanchâtre			*To be provided by Brazil or delete*	1
		blue purple	violet bleu			Smooth Cayenne	2
		Red purple	violet rouge			Perola	3
19.	**2-A**	**Petal length**	**Pétale: longueur**				
QN	**(c)**	short	courte			Singapore Canning / Singapore Spanish	3
		medium	moyenne			Smooth Cayenne	5
		Long	longue			Rondon	7
20.	**2-A**	**Stamen: length in relation to style**	**Etamine: longueur en relation avec le style**				
QN	**(c)**	shorter	brévistyle			**needed**	1
		equal	équistyle			Perolera	2
		longer	longistyle			Perola, Smooth Cayenne	3
21.	**2-A**	**Inflorescence: stamen length**	**Inflorescence: étamines: longueur**				
QN	**(c)**	short	courte			Smooth Cayenne	1
		medium	moyenne			Rondon	2
		long	longue			Perolera	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.	**2-A**	**Style: length**	**Style: longueur**				
QN	**(c)**	short	courte			Singapore Canning / Singapore Spanish	1
		medium	moyenne			Red Spanish/ Española Roja	2
		long	longue			Perolera	3
23.	**3-I**	**Immature fruit: color (maximum size before starts to mature)**	**with explanation OF STAGE – ALSO FOR 8.1**				
(+)							
QL	**(d)**	grey					1
		medium green					2
		dark green				Smooth Cayenne	3
		pink					4
		medium red					5
		brownish purple					6
		purple				Roxo de Tefe	7
		dark brown					8
24.	**3-I**	**Immature fruit: density of trichomes**	**Fruit immature: présence de trichomes**				
QN	**(d)**	sparse	peu dense			Perola	3
		medium	moyenne				5
		dense	dense			Smooth Cayenne	7
25.	**4-M**	**Plant: length of foliage**	**CLARIFY IF DIFFERENT FROM Char. 3**			France 2010:… from the ground to the top of foliage	
(+)							
QN	**(e)**	short				Rondon	3
		medium				Queen	5
		long				Perola	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.	**4-M**	**Plant: heigth to fruit base**					
(+)							
QN	**(e)**	short				Queen	3
		medium				Perolera	5
		high				Rondon	7
27.	**2-A**	**Floral peduncle: red coloration of upper side of bract**					
(+)							
PQ	**(e)**	absent or very weak					1
		weak					3
		medium					5
		strong					7
		very strong					9
28.	**4-M**	**Floral Peduncle: length**					
(*)							
(+)							
QN	**(e)**	short				Smooth Cayenne	3
		medium				Singapore Canning / Singapore Spanish	5
		long				Perola	7
29.	**4-M**	**Floral Peduncle: diameter (at middle)**	**Pédoncule: diamètre (à mi longueur)**				
(+)							
QN	**(e)**	small	petite			Singapore Canning / Singapore Spanish	3
		medium	moyenne			Perola, Smooth Cayenne	5
		large	grande				7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30.	**3-I**	**Floral Peduncle: number of bracts**	**Pédoncule : nombre de bractées**				
QN	(e)	few	petit				3
		medium	moyen				5
		many	grand				7
31.	**3-I**	**Floral Peduncle: trichomes**	**Pédoncule : trichomes**			*Brazil will provide example varieties*	
QL	(e)	absent	absent				1
		present	présent				9
32.	**4-M**	**Plant: presence of underground suckers**	**Plante: présence de rejets souterrains**			*To be checked by CIRAD*	
(*)							
QN	**(e)**	absent or very weak	France 2010 :			Manzana/Bumanguesa,	1
		weak	Smooth Cayenne			Perola	2
		medium	Red Spanish/Espanola roja			Smooth Cayenne	3
		strong	Singapore Canning/ Singapore spanish			Queen	4
33.	**4-M**	**Plant: number of aerial suckers on stem**					
(*)			France 2010:				
(+)							
QN	**(e)**	none or very few	Perolera			Smooth Cayenne ?	1
		few	Perola				2
		medium	Cayenne			Smooth Cayenne	3
		many				Perolera, Queen	4
		very many (Br)				*Brazil to provide example varieties:* Perola ?	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
34. (*)	**4-M**	**Plant: size of aerial suckers on stem at fruit harvest**	**Plante: taille des rejets aériens sur tige (cayeux) à la récolte**				
QN	**(e)**	small	petite				3
		medium	moyenne			Smooth Cayenne	5
		large	grande			Fils de Chalvet	7
35. (*) (+)	**4-M**	**Plant: slips**	**Plante : bulbilles**				
QL	**(e)**	absent	absente			Smooth Cayenne	1
		present	présente			Perola, Perolera, Queen	9
36. (*)	**4-M**	**Plant: number of slips**	**Plante : nombre de bulbilles**				
QN	**(e)**	few	petit			**needed**	3
		medium	moyen			Queen, Red Spanish / Española Roja	5
		many	grand			**Perolera, Perola**	7
37.	**4-M**	**Crown: attitude**	**Couronne: port**				
(+)							
QN	**(e)**	Upright	dressé			Perola	1
		semi upright	demi dressé			Smooth Cayenne	2
		Spreading	étalé			**Needed**	3
		Drooping				**Needed**	4
38. (*) (+)	**4-M**	**Crown: size**	**Couronne: taille**				
QN	**(e)**	small	petite			Rondon	3
		medium	moyenne			Queen Perola	5
		large	grande			Smooth Cayenne	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
39. **(*)** **(+)**	**4-M**	**Fruit: shape (excluding neck)**					
PQ	(e)	Conic				Perola	
		Conic to cylindrical				……needed……	
		Cylindric				Perolera	
		Broad elliptic				Smooth Cayenne ?	
		Circular				Red Spanish/ Española Roja	
40. **(*)** **(+)**	**4-M**	**Fruit: Length (excluding neck and crown)**					
QN	**(e)**	short				Singapore Canning / Singapore Spanish	3
		medium				Perolera, Smooth Cayenne	5
		long				Perola	7
41. **(*)**	**4-M**	**Fruit: diameter at broadest part**					
QN	**(e)**	narrow				Perola	1
		medium				Singapore Canning / Singapore Spanish	3
		broad				Perolera, Smooth Cayenne	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42. (*)	**4-M**	**Fruit: predominant color**					
PQ	**(e)**	**white cream**				**Needed**	1
		yellow Green				**needed**	2
		green	TO CHECK			**needed**	3
		grey green (Brazil)				**needed**	4
		light yellow (Brazil)	CHECK IF CREAM			Perola	5
		medium yellow				**needed**	6
		~~**golden yellow**~~	TO PROVIDE RHS NAME= 21A			Smooth Cayenne	7
		orange				**needed**	8
		orange red				**needed**	9
		red				**needed**	10
		purple (Brazil)	TO CHECK			**needed**	11
		brown				**needed**	12
43. (*) (+)	**4-M**	**Fruit: presence of neck**	**provide illustration**				
QN	**(e)**	absent or very short	TO BE REVIEWED AFTER ILLUSTRATIONS PROVIDED			Smooth Cayenne	1
		short				Manzana/Bumanguesa	3
		medium					5
		long				Abacaxi verde	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44. (*)	**4-M**	**Fruit: size**					
QN	**(e)**	very small				Victoria	1
		small				Singapore Canning /Singapore Spanish	3
		medium				Red Spanish/ Española Roja	5
		large				Smooth Cayenne	7
		very large				Cabeza de onca	9
45. (+)	**4-M**	**Fruit: surface of fruitlets**					
QN	**(e)**	flat or slightly raised				Smooth Cayenne	1
		moderately raised				Perola	3
		strongly raised				Imperial	5
46. (*)	**4-M**	**Fruit: size of eye**	**Fruit: taille de l'œil**				
QN	**(e)**	small	petite			Black Antigua	3
		medium	moyen			Smooth Cayenne	5
		large	grande			Red Spanish/ Española Roja	7
47. (*) (+)	**4-M**	**Fruit: eye profile**	**TO ADD (+) AND PROVIDE ILLUSTRATION**				
QN	**(e)**	hollow or concave	REVIEW WITH ILLUSTRATION			Singapore Canning / Singapore Spanish	1
		flat				Perola	2
		slightly prominent				Rondon	3
		prominent				Queen	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48. (+)	**4-M**	**Fruit: evenness of color of eyes**	**provide illustration**				
QN	**(e)**	even or slightly uneven				Queen	1
		moderately uneven					2
		uneven	en gradient			Perola	3
49. (+)	**4-M**	**Fruit: relative size of floral bract compared to eye**	**provide illustration**				
QN	**(e)**	much smaller					1
		moderately smaller					2
		slightly smaller					3
		equal					4
		larger					5
50. (*)	**4-M**	**Fruit: color of flesh**					
PQ	**(e)**	whitish cream				Perola	1
		light yellow				Smooth Cayenne	2
		medium yellow				Perolera	3
		yellowish orange				Queen	4
		orange				Manzana/Bumanguesa	5
51.	**4-M**	**Flesh: evenness color of flesh**					
QL	**(e)**	even or slightly uneven				Queen	1
		moderately uneven					2
		strongly uneven				Smooth Cayenne	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
52.	**4-M**	**Fruit: diameter of central axis**	**RELATIVE OR ABSOLUTE?**				
(+)							
QN	**(e)**	small				Singapore Canning / Singapore Spanish	3
		medium				Queen	5
		large				Smooth Cayenne	7
53.	**4-M**	**Fruit: thickness of eye layer**	**DELETE IF SAME AS EYE DEPTH char 53 ? Brazil ?**			Cirad: not necessary France 2010: it concerns depth	
QN	**(e)**	thin					3
		medium				Smooth Cayenne	5
		thick				Queen	7
54.	**4-M**	**Flesh: density of flesh**					
(*)							
(+)							
QN	**(e)**	loose				Queen	1
		medium				Smooth Cayenne	2
		dense				Perolera	3
55.	**4-M**	**Flesh: firmness of flesh**				**with explanation OF HOW TO OBSERVE**	
(+)							
QN	**(e)**	soft				Perola, Rondon	3
		medium				Smooth Cayenne	5
		firm				Perolera	7
56.	**4-M**	**Fruit: amount of fibre in flesh**				**with explanation**	
(+)							
QN	**(e)**	low				Perola	3
		medium				Smooth Cayenne	5
		high				Singapore Canning / Singapore Spanish	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
57. 4-M		**Fruit: aroma of flesh**				**with explanation**	
(+)							
QN	**(e)**	weak					3
		medium				Perola	5
		strong				Smooth Cayenne	7
58. 4-M		**Fruit: juiciness of flesh**					
(*)							
QN	**(e)**	low				Pomare	3
		medium				Queen, Smooth Cayenne	5
		high				Perola	7
59. 4-M		**Fruit: ascorbic acid content of juice**				**with explanation**	
(+)							
QN	**(e)**	low				Smooth Cayenne	3
		medium				Perola	5
		high				Perolera	7
60. 4-M		**Fruit: free acids content of juice**				**with explanation**	
(+)							
QN	**(e)**	low				Perola	3
		medium				Rondon	5
		high				Red Spanish/ Española Roja	7
61. 4-M		**Fruit: total soluble solids content of juice**				**with explanation**	
(+)							
QN	**(e)**	low				Singapore Canning / Singapore Spanish	3
		medium				Perolera	5
		high				Smooth Cayenne	7

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

The optimum stage of development for the assessment of each characteristic is indicated by a code in the first column of the Table of Characteristics:

- 1-T: At vegetative maturity growth stage, immediately before flower induction (*or before flower emergence*?)
- 2-A: Anthesis stage
- 3-I: Immature fruit stage, before to be physiologically ripe
- 4-M: Maturity stage, when physiologically ripe

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

(a) (Characteristics 1 to 15) All observations related to the vegetative characteristics should be made on 20 plants or parts of them at the time floral induction is provoked (about 8 months after planting—stage 1-T).
"Raised margins" (characteristic 11) is known as 'piping edge' in the industry area.

(b) (Characteristics 3 to 4) The reference *leaf* is the longest at the time floral induction is provoked. Measurements to be taken on 20 leaves.
For reference leaf length (Characteristic 3), proceed with the longer leaf.

(c) (Characteristics 16 to 22): Observations related to flowering, inflorescence and flowers should be made on 20 inflorescences, at the time of anthesis (stage 2-A). Measurements of floral parts to be taken on 10 flowers removed at mid-anthesis.

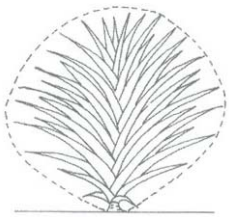
(d) (Characteristics 23 and 24): Observations of fruits before maturity should be made on 20 fruits, 4 months after floral induction is provoked (immature fruit—stage 3-I).

(e) (Characteristics 25 to 61): Qualitative observations related to plant and fruit at harvest should be made in the plot on 20 plants and 20 fruits. It is considered that harvest time is the stage at which the fruit is good to be eaten (actual maturity—stage 4-M). Measures to be made on 10 fruits.

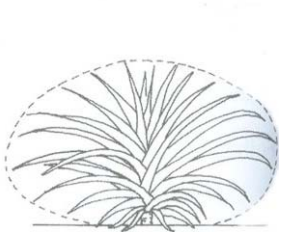
8.2 Explanations for individual characteristics

Ad. 1: Plant: Growth habit (before flowering)

1
upright



3
semi upright



5
spreading

Ad. 2: Plant: number of leaves (produced from 4 months after planting to floral induction)

-	few	40	3
-	medium	50	5
-	many	60	7

Ad. 3: Reference leaf: length

-	short	90 cm	3
-	medium	105 cm	5
-	long	120 cm	7

Ad. 4: Reference leaf: width

-	narrow	6,0 cm	3
-	medium	6,5cm	5
-	broad	7,0 cm	7

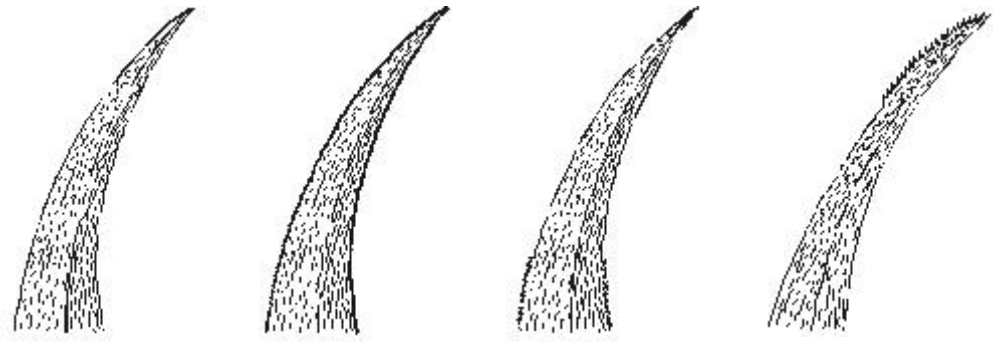
Ad. 10: Leaf: spines

"Conspícuous" are spines, which are visible with the naked eye. *Does it correspond to 'absent'?*
"Inconspícuous" are microscopic spines, which can be detected through the sense of touch. When we touch our hands at the margins of leaves, we feel that it´s like a sandpaper. *Does it correspond to 'present' ?*

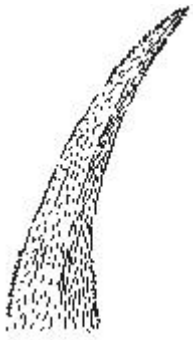
Ad. 11: Leaf: raised margin (piping)
"Piping" as named by Collins and Kerns (1946). The meaning is that the lower epidermis is folded over the leaf edge

Ad. 12: Leaf: texture of leaf blade

Ad. 13: Only varieties visually spiny texture: Leaf: position of spines at margin

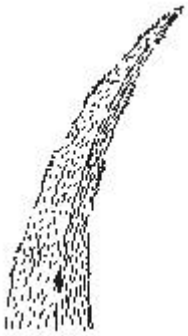


Ad 10 Absent	Ad10 inconspicuous	Ad 13 at base	Ad 13 at apex



Ad 13
at base and apex

Regular : to be deleted



Irregular : to be deleted

Ad. 16: Inflorescence: floral bract size (before fruit development)
Floral bracts are attached to the floral peduncle (between leaves crown and fruits, at the base of the fruits.

Ad. 25: Plant: length of foliage
[to be provided]

Ad. 26: Plant: height to fruit base
[to be provided]

Ad. 27: Floral peduncle: red coloration of upper side of bract

Ad. 28: Floral Peduncle: length

-	short	18 cm	3
-	medium	25 cm	5
-	long	28 cm	7

Ad. 29: Peduncle: diameter (at middle)

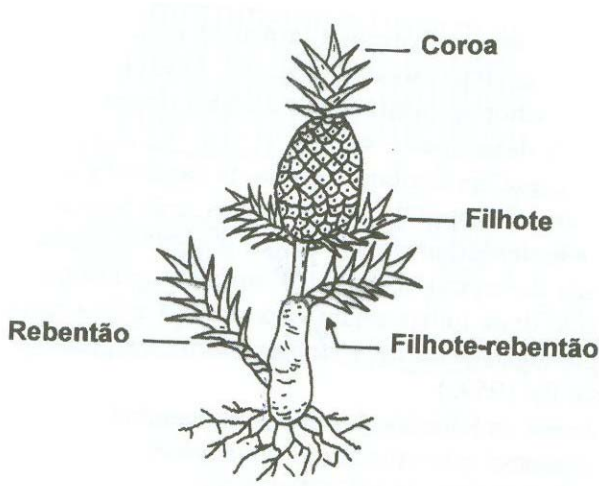
-	small	2.5 cm	3
-	medium	3 cm	5
-	large	3.5 cm	7

Ad. 33: Plant: number of aerial suckers on stem

-	none or very few	generally none	1
-	few	no more than one	2
-	medium	1 to 2	3
-	many	more than two	4
-	very many	?	5

Ad. 36: Plant: number of slips

Ad. 37: Crown: attitude

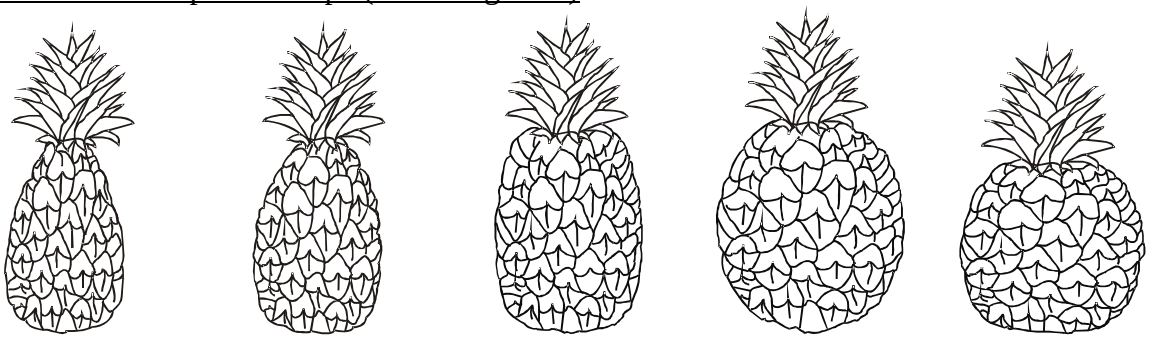


Brazil: Place peduncle, underground and aerial suckers, slips and the two type of bracts, with English translation

Ad. 38: Crown: size

-	small	100 g	3
-	medium	115 g	5
-	large	130 g	7

Ad. 39: Fruit: shape when ripe (excluding neck)



1	2	3	4	5
conic	*conic to cylindrical*	*cylindric*	*Broad elliptic*	*Circular*

Ad. 40: Fruit: length (excluding neck and crown)

-	short	15 cm	3
-	medium	17.5 cm	5
-	high	20 cm	7

Is the variation broader ?

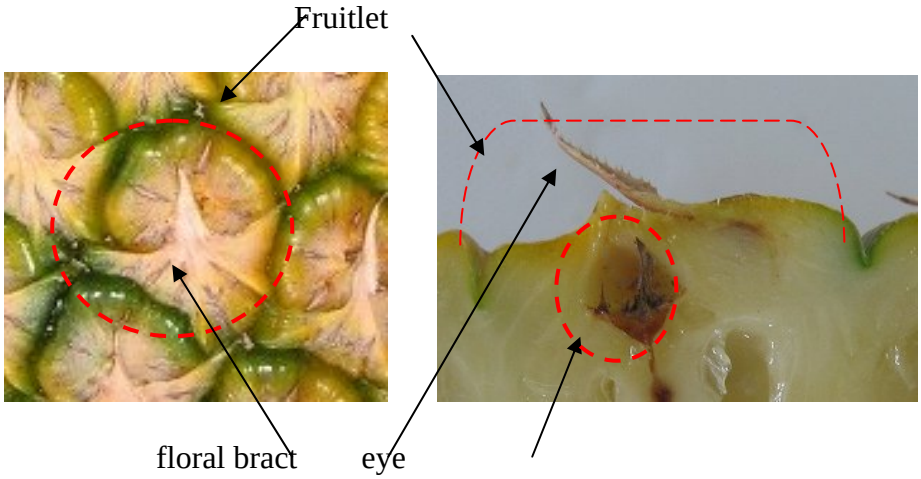
Ad. 41: Fruit: maximum diameter at the broadest part

-	thin	10 cm	3
-	medium	11 cm	5
-	large	12 cm	7

Is the variation broader ?

Ad. 45: Fruit: surface of fruitlets

Ad. 47: Fruit: eye profile
Ad. 48: Fruit: evenness of color of eyes
Ad. 49: Fruit: relative size of floral bract compared to eye



2008 Japan comment:
If these photograph and name of organs are right,
cha.52 : “size of eye” may be “size of fruitlet
cha.47: “eye profile” may be “profile of fruitlet”
cha.49 “relative size of floral bract to eye” may be ”relative size of floral bract to fruitlet”
But I have never seen “larger (status(5))” varieties.

Ad. 52: Fruit: diameter of central axis

- small	1.5 cm	3
- medium	2,25 cm	5
- large	2.5 cm	7

Ad. 54: Flesh: density of flesh: Visually assessed

Ad. 64: Flesh: total soluble content of juice
(Brix degrees)

- low	13	3
- medium	14.5	5
- high	16	7

Ad. 65: Flesh: acidity
(fixed in percentage)

- low	0.5	3
- medium	0.6	5
- high	0.7	7

8.3 Example varieties: List of synonyms

MD2 / Golden Ripe/ Extra sweet
Manzana/Bumanguesa"
Selangor Green / Green Spanish
Singapore Canning/ Singapore Spanish
Red Spanish/ Española Roja

8.4 The stage of development for the assessment

The optimum stage of development for the assessment of each characteristic is indicated by a code in the first column of the Table of Characteristics:

- 1-T: At vegetative maturity growth stage, immediately before flower induction (or before flower emergence?)
- 2-A: Anthesis stage
- 3-I: Immature fruit stage
- 4-M: Maturity stage.

The emergence of inflorescence should be invoked artificially about 36 weeks after plantation, with a variation of two weeks depending of place and varieties

8.5 Methods of measurements (pineapple juice) from France Cirad

Juice
The juice is squeezed out from pineapple flesh and strained through muslin. It can be frozen to be used later.

Total soluble content of juice (characteristic 64)

Sugar content (Brix value) is recorded via refractometer. It is given as a percentage (%Brix).

Ascorbic acid content of fruit (characteristic 59)
Ascorbic acid content is determined by titration with 2,6-dichlorophenol-indophenol (DCPIP). It is compared to a control scale (see below). Measure is brought to 100 ml of juice and is given in mg/100ml.

Reagents

Sol 1: Metaphosphoric acid 2 % / TCA 4 %
Dissolve 2 mg metaphosphoric acid and 4 mg trichloroacetic acid in 100 ml distilled water.

Sol 2: DCPIP 250 mg/l
Dissolve 125 mg 2,6-dichlorophenol-indophenol in 500 ml warm distilled water, then filter
Add 104 mg sodium bicarbonate
Note: Dissolved DCPIP is unstable. Protect from light.

Sol 3: Ascorbic acid control
Dissolve 50 mg ascorbic acid in 100 ml Sol 1 + 100 ml distilled water

Control

Ascorbic acid content (mg):	0	0.25	0.50	0.75	1.0	1.25
Sol 3 (ml)	0	1	2	3	4	5
Sol 1 (ml)	4	3.5	3	2.5	2	1.5
Distilled water (ml)	4	3.5	3	2.5	2	1.5

Titration

Add 4 ml Sol 1 to 4 ml juice. Pour slowly Sol 2 until pink coloration appears. Compare the volume poured to the control scale to determine the ascorbic acid content within 4 ml juice.

Note: if acid ascorbic measurement should be made later, add 4 ml Sol 1 to 4 ml juice immediately after it has been squeezed and strained (e.g. before freezing).

Free acids content of juice (characteristic 61)

Free acid content is determined by titration of 10 ml filtered juice with 0.1 NaOH with phenolphtaleine as indicator. The result is given in meq per 100 ml of juice (meq/100ml).

9. Literature

Bartholomew, D. P., Paul, R. E., and Rohrbach, K. G., eds., 2002: The Pineapple: Botany, Production and Uses; editors., University of Hawaii, Manoa, Honolulu, USA. 320 p.

Py, C., Lacoeuilhe, J.J., Teisson, C. 1984: L'ananas, sa culture, ses produits. Collection techniques agricoles et productions tropicales. Editions Maisonneuve et Larose, Paris, FR, 562 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	*Ananas comosus* (L.) Merr.
1.2 Common name	Pineapple

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)

(……..……..…)	x	(……..……..…)
female parent		male parent

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

(……..……..…)	x	(……..……..…)
female parent		male parent

(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)

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

4.2.1 Vegetative propagation

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) other (state method) [ ]

4.2.2 Other [ ]

(please provide details)

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 (1)	**Plant: growth habit**		
	upright	Perola	1[ ]
	semi upright	Smooth Cayenne	3[ ]
	spreading	Perolera	5[ ]
5.2 (10)	**Leaf: spines**		
	absent	Samba, Singapore Canning/ Singapore Spanish	1[ ]
	present	Queen, Ananas Bouteille	9[ ]
5.3 (11)	**Leaf: raised margin (piping)**		
	absent	Manzana/ Burmanguesa	1[ ]
	present	Queen, Singapore Canning/ Singapore Spanish, Smooth Cayenne	2[ ]
5.4 (12)	**Leaf: texture of leaf blade**		
	smooth	Singapore Canning/Singapore Spanish	[1]
	sand paper like	Samba	[2]
	visually spiny	Smooth Cayenne, Fina de Heiro, Queen	[3]

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

	Characteristics	Example Varieties	Note
5.5 (13)	**Only varieties visually spiny texture: Leaf: aspect of spines at margin**		
	at base only	…	1[ ]
	at apex only	Smooth Cayenne	2[ ]
	at base and apex	…	3[ ]
	along all margins	Queen	4[ ]
5.6 (35)	**Plant slips**		
	absent	Smooth Cayenne	1[ ]
	present	Fils de Chalvet	9[ ]
5.7 (36)	**Plant: number of slips**		
	few	…	3[ ]
	medium	Queen, Red Spanish / Española Roja	5[ ]
	many	Perolera, Perola	7[ ]
5.8 (43)	**Fruit: shape (excluding neck)**		
	conic	Perola	
	conic to cylindrical	…	
	cylindric	Perolera	
	broad elliptic	Smooth Cayenne ?	
	circular	Red Spanish/Espanola Roja	

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

	Characteristics	Example Varieties	Note
5.9 (42)	**Fruit: predominant color**		
	white cream		1[ ]
	yellow Green		2[ ]
	green		3[ ]
	grey green (Brazil)		4[ ]
	light yellow (Brazil)	Perola	5[ ]
	medium yellow		6[ ]
	golden yellow	Smooth Cayenne	7[ ]
	orange		8[ ]
	orange red		9[ ]
	red		10[ ]
	purple (Brazil)		11[ ]
	brown		12[ ]
5.10 (47)	**Fruit: eye profile**		
	hollow or concave	Singapore Canning/ Singapore Spanish	1[ ]
	flat	Perola	2[ ]
	slightly prominent	Rondon	3[ ]
	prominent	Queen	4[ ]
5.11 (50)	**Fruit: color of flesh**		
	whitish cream	Perola	1[ ]
	light yellow	Smooth Cayenne	2[ ]
	medium yellow	Perolera	3[ ]
	yellowish yellow	Queen	4[ ]
	orange	Manzana/ Bumanguesa	5[ ]

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

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	[to be *provided*]		

Comments:

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 image 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.

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”.

……

9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens?

Yes [ ]

(please provide details as specified by the Authority)

No [ ]

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]