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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-second session, to be held in Hiroshima, Japan, from November 14 to 18, 2011

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

These Test Guidelines apply to all varieties of *Ananas comosus* (L.) Merr. 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 at least 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

to clear: 20 plants required/15 plants examined…how to split 15 by 2 ?

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 15 plants or parts taken from each of 15 plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of

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

4.1.5 Method of observations

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 15 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: raised margin (characteristic 9)
(b) Leaf: expression of spines (characteristic 10)
(d) Fruit: shape (characteristic 33)
(e) Fruit: predominant color (characteristic 36)
(f) Fruit: eye profile (characteristic 41)
(g) Fruit: color of flesh (characteristic 44)

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 “Examing Distinctness”.

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

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. **(*)** **(+)**	**VG** **1-T**	**Plant: growth habit**			
QN	**(a)**	upright		Perola	1
		semi upright		Smooth Cayenne	3
		spreading		Perolera	5
2. **(*)** **(+)**	**MS** **1-T**	**Plant: number of leaves**			
QN	**(a)**	few		Perola	3
		medium		BRS Imperial, Gold, Smooth Cayenne	5
		many		Gomo de Mel	7
3.	**MS** **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.	**MS** **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
5. **(*)**	**VG** **1-T**	**Leaf: green color of upper side**	**Feuille: couleur verte de la face supérieure**		
QN	**(a)**	light	claire	BRS Vitoria	3
		medium	moyen	Smooth Cayenne	5
		dark	foncée	Jupi, Perola	7

		English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6. **(*)**	**VG** **1-T**	**Leaf: anthocyanin coloration**	**Feuille: expression des anthocyanes (sur la face supérieure)**			
QN	**(a)**	absent or very weak	absent ou très faible		BRS Vitoria, MD2, Selangor Green	1
		weak	faible		Pot à eau	3
		medium	moyen		Smooth Cayenne	5
		strong	fort		Rondon	7
		very strong	très fort		Roxo de Tefe	9
7. **(+)**	**VG** **1-T**	**Leaf: distribution of anthocyanin**			**Drawing from Brazil. Is it necessary ?**	
QN	**(a)**	predominantly on margins			Singapore Canning	1
		even on margins and in groove			BRS Imperial	2
		predominantly in the groove			Rondon	3
8. **(+)**	**VG** **1-T**	**Leaf: density of trichomes on lower side**	**Feuille: densité de trichomes sur la face inférieure**			
QN		absent or very sparse	absente ou peu dense		???	1
		intermediate	intermédiaire		Perolera	2
		dense	dense		Smooth Cayenne	3
9. **(*)** **(+)**	**VG** **1-T**	**Leaf: raised margin**	**Feuille:**			
	(a)	absent	absent		Samba	1
		present	present		Perolera, Queen, Singapore Canning	9

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. **VG** **(+)** **1-T**		**Leaf: expression of spines**	**Feuille: épines**	Example varieties and photos from Brazil. Where to place spiny type as Queen, Ananas bouteille, Pérola, Jupi ?	
QN	**(a)**	absent or very weak	absente ou très faible	Perolera, Samba, Singapore Canning	1
		weak	faible	???	3
		medium	moyenne	???	5
		strong	forte		7
11. **VG** **(+)** **1-T**		**Only varieties visually spiny texture: Leaf: position of spines at margin**			
PQ	**(a)**	at base only		???	1
		at apex only		???	2
		at base and apex		Smooth Cayenne	3
		along all margins		Queen	4
12. **VG** **1-T**		**Leaf: color of spine**	**Feuille: couleur de l'épine**		
PQ	**(a)**				
		yellowish green	vert jaunâtre	Gold	1
		orange	orange	???	2
		red	rouge	Gomo de Mel	3
		purple	violet	???	4
13. **VG** **1-T**		**Leaf : size of the spine**	**Feuille : taille de l'épine**		
QN	**(a)**	small	petite	Gold, Perola, Smooth Cayenne	1
		medium	moyenne	Singapore Canning	3
		large	grande	Gomo de Mel, Queen	5

			English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**VG**	**Inflorescence: floral bract size**	**Inflorescence: taille de la bractée florale**				
(+)	**2-A**						
QN	**(c)**	small	petite			Perola	1
		medium	moyenne			Queen	2
		large	grande			Singapore Canning	3
15.	**…**	**Petal : color of apex**	**Pétale: couleur de l'apex**				
	2-A						
QL	**(c)**	blue purple	violet bleu			Perola	1
		red purple	violet rouge			Smooth Cayenne	2
16.	**VG/ MS**	**Petal length**	**Pétale: longueur**				
	2-A						
QN	**(c)**	short	courte			Singapore Canning	1
		medium	moyenne			Smooth Cayenne	2
		long	longue			Rondon	3
17.	**VG**	**Stamen: length in relation to style**	**Etamine: longueur en relation avec le style**				
	2-A						
QN	**(c)**	shorter	brévistyle			???	1
		equal	équistyle			Perolera	2
		longer	longistyle			Perola, Smooth Cayenne	3
18.	**VG**	**Inflorescence: stamen length**	**Inflorescence: étamines: longueur**				
	2-A						
QN	**(c)**	short	courte			Smooth Cayenne	1
		medium	moyenne			Rondon	2
		long	longue			Perolera	3

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19.	**VG** **2-A**	**Style: length**	**Style: longueur**		
QN	**(c)**	short	courte	Singapore Canning	1
		medium	moyenne	Red Spanish	2
		long	longue	Perolera	3
20.	**VG**	**Immature fruit: color**			
(+)	**3-I**				
PQ	**(d)**	grey			1
		medium green			2
		dark green		Smooth Cayenne	3
		pink		???	4
		medium red		???	5
		purple		Roxo de Tefe	6
		brownish purple		???	7
		dark brown		???	8
21.	**VG** **3-I**	**Immature fruit: density of trichomes**	**Fruit immature: présence de trichomes**		
QN	**(d)**	sparse	peu dense	Perola	1
		medium	moyenne	???	2
		dense	dense	Smooth Cayenne	3
22.	**VG** **4-M**	**Plant: height to fruit base**			
QN	**(e)**	short		Queen, Rondon	3
		medium		BRS Imperial, Perolera, Smooth Cayenne	5
		tall		???	7

			English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23. (*)	**MS 4-M**	**Floral Peduncle: length**					
QN	**(e)**	short				BRS Victoria, Smooth Cayenne	3
		medium				BRS Imperial, Singapore Canning	5
		long				Perola	7
24. (+)	**MS 4-M**	**Floral Peduncle: diameter**	**Pédoncule: diamètre**				
QN	**(e)**	small	petite			Singapore Canning	1
		medium	moyenne			Perola	2
		large	grande			Smooth Cayenne	3
25.	**VG 3-I**	**Floral Peduncle: number of bracts**	**Pédoncule : nombre de bractées**				
QN	**(e)**	few	petit			???	3
		medium	moyen			???	5
		many	grand			???	7
26. (*)	**VG 4-M**	**Plant: presence of underground suckers**	**Plante: présence de rejets souterrains**				
QN	**(e)**	absent or very weak	absente ou très faible			Manzana	1
		weak	faible			Perola	2
		medium	moyenne			Red Spanish, Smooth Cayenne	3
		strong	forte			Queen, Singapore Canning	4

			English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27. **(*)** **(+)**	**VG** **4-M**	**Plant: number of aerial suckers on stem**		**Varieties to clear** France 2010:			
QN	**(e)**		none or very few	Perolera		Smooth Cayenne ?	1
			few	Perola			2
			medium	Smooth Cayenne		Smooth Cayenne	3
			many			Perolera, Queen	4
28. **(*)**	 **4-M**	**Plant: size of aerial suckers on stem**		**Plante: taille des rejets aériens sur tige (caïeux)**			
QN	**(e)**		small	petite		???	1
			medium	moyenne		Smooth Cayenne	2
			large	grande		Fils de Chalvet	3
29. **(*)**	**VG** **4-M**	**Plant: slips**		**Plante : bulbilles**			
QL	**(e)**		absent or very few	absente		Smooth Cayenne	1
			present	présente		Fils de Chalvet, Perola, Queen	9
30. **(*)**	**VG** **4-M**	**Plant: number of slips**		**Plante : nombre de bulbilles**			
QN	**(e)**		few	petit		Gold, Smooth Cayenne	3
			medium	moyen		Queen, Red Spanish	5
			many	grand		BRS Imperial, Perola, Perolera	7
31. **(+)**	**VG** **4-M**	**Crown: attitude**		**Couronne: port**			
QN	**(e)**		upright	dressé		Perola	1
			semi upright	demi dressé		BRS Vitoria, Gold	2
2			spreading	étalé			3

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32. (*)	**VG 4-M**	**Crown: size**	**Couronne: taille**		
QN	**(e)**	small	petite	Rondon	3
		medium	moyenne	Perola, Queen	5
		large	grande	Smooth Cayenne	7
33. (*) (+)	**VG 4-M**	**Fruit: shape**			
PQ	(e)	narrow ovate	narrow ovate	Perola	1
		medium ovate	medium ovate	BRS Imperial, BRS Vitoria	2
		oblong	oblong	MD2, Perolera	3
		elliptic	elliptique	Smooth Cayenne	4
		circular	circulaire	Red Spanish	5
34. (*) (+)	**VG 4-M**	**Fruit: length**			
QN	**(e)**	short		Singapore Canning	3
		medium		BRS Imperial, Perolera, Smooth Cayenne	5
		long		Perola	7
35. (*)	**VG/ MS 4-M**	**Fruit: diameter**			
QN	**(e)**	narrow		Perola	1
		medium		BRS Imperial, Singapore Canning	3
		broad		Perolera, Smooth Cayenne	5

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. **(*)**	**VG** **4-M**	**Fruit: predominant color**		*Check order with TWF 41/23 an 1 p3 et TGP 14*	
PQ	**(e)**	white cream		???	1
		yellow green		???	2
		green		Perola	3
		grey green		???	4
		light yellow		BRS Vitoria	5
		medium yellow		Smooth Cayenne	6
		orange		Gold	7
		orange red		Manzana, Roxo de Tefe	8
		red		???	9
		brown		???	10
37. **(*)** **(+)**	**4-M**	**Fruit: neck**		**provide illustration by Brazil**	
QN	**(e)**	absent or very short		BRS Imperial, BRS Vitoria, Smooth Cayenne	1
		short		Manzana	3
		medium		Gomo de Mel	5
		long		Abacaxi verde	7

		English	français	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
38. **(*)**	**MS/ VG** **4-M**	**Fruit: size**			
QN	**(e)**	very small		Victoria	1
		small		Singapore Canning	3
		medium		Red Spanish	5
		large		Smooth Cayenne	7
		very large		Cabeza de Onca, Pouco conhecida, Sugiro Cabezona	9
39. **(+)**	**VG** **4-M**	**Fruit: surface of fruitlets**			
QN	**(e)**	flat or slightly raised		BRS Vitoria, Perola, Smooth Cayenne	1
		moderately raised		???	3
		strongly raised		BRS Imperial, Queen	5
40. **(*)**	**VG** **4-M**	**Fruit: size of eye**	**Fruit: taille de l'œil**		
QN	**(e)**	small	petite	Black Antigua	3
		medium	moyen	Perola, Smooth Cayenne	5
		large	grande	Red Spanish	7
41. **(*)** **(+)**	 **4-M**	**Fruit: eye profile**			
QN	**(e)**	sunken		Singapore Canning	1
		flat		Perola, Smooth Cayenne	2
		slightly prominent		Rondon	3
		prominent		BRS Imperial, Queen	4

			English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42.	**VG**	**Fruit: evenness of color of eyes**					
(+)	**4-M**						
QN	**(e)**		even or slightly uneven			Queen	1
			moderately uneven			???	2
			strongly uneven	en gradient		BRS Imperial, Perola	3
43.		**Fruit: size of floral bract relative to size of eye**					
(+)	**4-M**						
QN	**(e)**		much smaller			???	1
			moderately smaller			???	2
			slightly smaller			???	3
			the same			???	4
			larger			???	5
44.	**VG**	**Fruit: color of flesh**					
(*)	**4-M**						
PQ	**(e)**		whitish cream			Perola	1
			light yellow			Smooth Cayenne	2
			medium yellow			Perolera	3
			yellowish orange			Queen	4
			orange				5
45.		**Flesh: evenness color of flesh**	**Brazil propose to delete**				
	4-M						
QL	**(e)**		even or slightly uneven			Queen	1
			moderately uneven			???	2
			strongly uneven			Smooth Cayenne	3

			English	français		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
46.		**4-M**	**Fruit: diameter of central axis**				
QN	**(e)**		small			Singapore Canning	3
			medium			Queen	5
			large			Smooth Cayenne	7
47.	**(*)**	**4-M**	**Flesh: density of flesh**				
QN	**(e)**		loose			Queen	1
			medium			Smooth Cayenne	2
			dense			Perolera	3
48.		**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
49.		**4-M**	**Fruit: amount of fiber in flesh**			**with explanation**	
QN	**(e)**		low			Perola	3
			medium			Smooth Cayenne	5
			high			BRS Imperial, Gold, Singapore Canning	7
50.		**4-M**	**Fruit: aroma of flesh**			**with explanation**	
QN	**(e)**		weak			???	3
			medium			Perola	5
			strong			Smooth Cayenne	7

			English	français			Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
51. **(*)**		**4-M**	**Fruit: juiciness of flesh**					
QN	**(e)**		low				BRS Imperial, Pomare	3
			medium				Queen, Smooth Cayenne	5
			high				Perola	7
52. **(+)**		**4-M**	**Fruit: ascorbic acid content of juice**					
QN	**(e)**		low				Smooth Cayenne	3
			medium				Perola (Brazil ?)	5
			high				Perolera	7
53. **(+)**		**4-M**	**Fruit: free acids content of juice**					
QN	**(e)**		low				Perola	3
			medium				Rondon	5
			high				Red Spanish, Smooth Cayenne	7
54. **(+)**		**4-M**	**Fruit: total soluble solids content of juice**					
QN	**(e)**		low				Singapore Canning	3
			medium				Perolera	5
			high				BRS Imperial, 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 13) All observations related to the vegetative characters 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 9) 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 14 to 19): 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 20 and 21): Observations of fruits before maturity should be made on 20 fruits, 4 months after floral induction is provoked (immature fruit—stage 3-I), at maximum size before the fruits starts to mature.

(e) (Characteristics 22 to 54): 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.

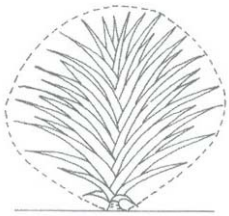
8.2 Explanations for individual characteristics

Example varieties : List of synonyms
Queen/Mc Gregor
Smooth Cayenne/ Champaka/Cayenne
MD2 / Golden Ripe/ Extra sweet
Manzana/Bumanguesa"
Selangor Green / Green Spanish
Singapore Canning/ Singapore Spanish
Red Spanish/ Española Roja

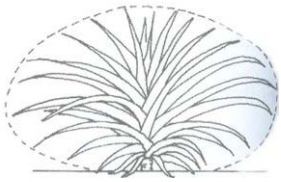
Ad. 1: Growth habit

To be observed before flowering.

1
upright



3
semi upright



5
spreading

Ad. 2: Plant: number of leaves

produced from 4 months after planting to floral induction

Ad.7: Leaf: distribution of anthocyanin
[to be provided]

Ad. 8: Leaf: density of trichomes on lower side

Trichomes must be considered as hairs, located on the lower side of the leaf.

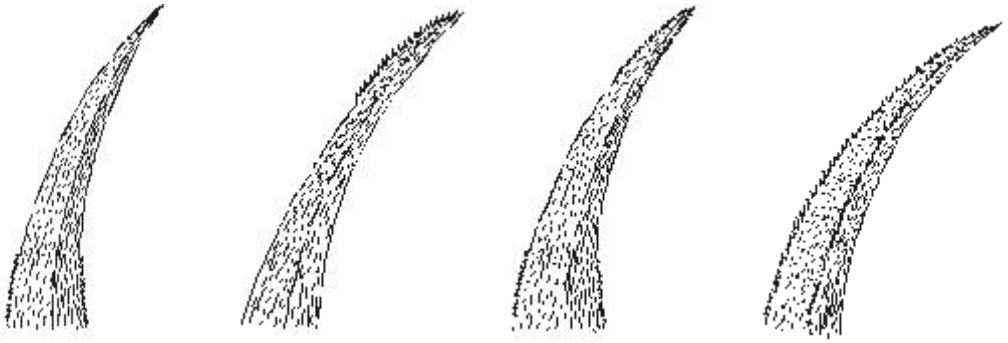
Ad. 9: Leaf: raised margin

“Piping” as named by Collins and Kerns (1946). The meaning is that the lower epidermis is folded over the leaf edge and extended over the upper surface, so producing a narrow silvery stripe.
+ photos from Brazil

Ad. 10: Leaf: expression of spines

Spines can be visible with the naked eye or not visible (microscopic spines which can be detected through the sense of touch; when we touch our hands at the margins of such leaves, we feel that it´s like a sandpaper).

Ad. 11: Only varieties visually spiny texture: Leaf: position of spines at margin



1	2	3	4
at base only	at apex only	at base and apex	along all margins

Ad. 14: Inflorescence: floral bract size

To be observed, before fruit development. Floral bracts are attached to the floral peduncle (between leaves crown and fruits, at the base of the fruits).

Ad. 24: Floral Peduncle: diameter

To be observed, before fruit development, at middle.

Ad. 28: Plant: size of aerial suckers on stem

To be observed at fruit harvest.

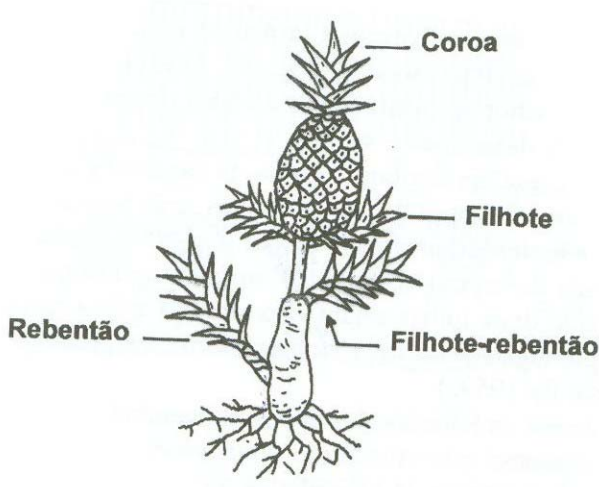
Ad 33: Fuit: shape

To be observed excluding neck.

Ad 34: Fuit: length

To be observed excluding neck and crown.

Ad. 23: Floral peduncle: length
Ad. 27: Plant: number of aerial suckers on stem
Ad. 30: Plant: number of slips
Ad. 31: Crown: attitude



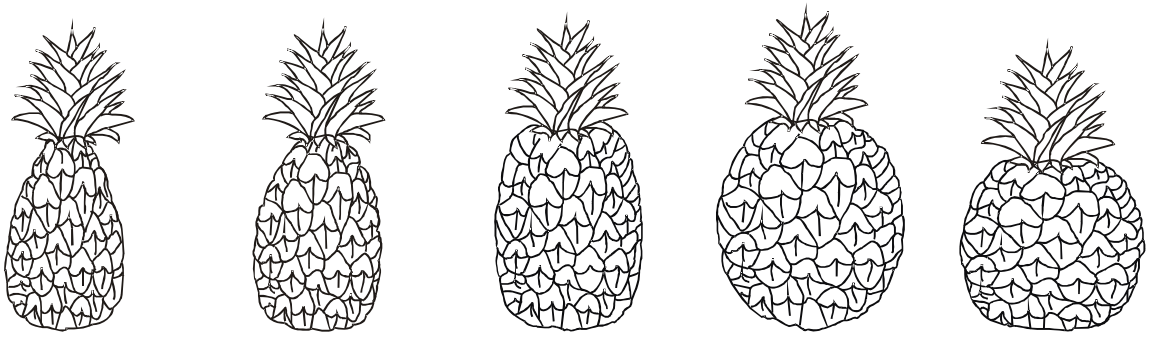
crown

aerial suckers

pedoncule floral

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

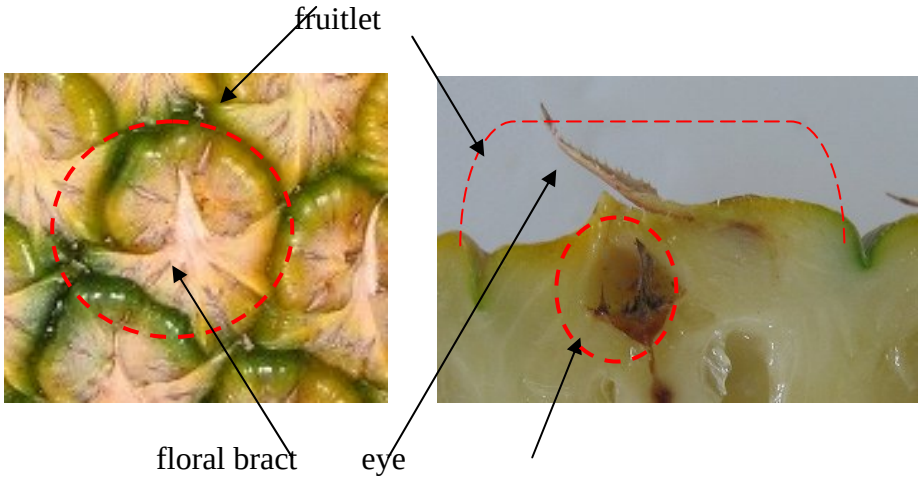
Ad. 33: Fruit: shape
when ripe (excluding neck)



1	2	3	4	5
narrow ovate	medium ovate	oblong	elliptic	Circular

Ad. 37: Fruit: neck
Brazil to provide photo and drawing

Ad. 39: Fruit: surface of fruitlets or eye ?
Ad. 41: Fruit: eye profile
Ad. 42: Fruit: evenness of color of eyes
Ad. 43: Fruit: size of floral bract relative to size of eye



2008 Japan comment:
If these photograph and name of organs are right,
cha.40 : “size of eye” may be “size of fruitlet
cha.41: “eye profile” may be “profile of fruitlet”
cha.43 “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. 47: Flesh: density of flesh: visually assessed

Ad. 48: Flesh: firmness of flesh
[to be provided]

Ad. 49: Flesh: amount of fiber in flesh
[to be provided]

Ad. 50: Fruit: aroma of flesh
[to be provided]

8.3 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

8.4 APPENDIX: 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.

-Ascorbic acid content of fruit (characteristic 52)

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).

-	low	….	3
-	medium	….	5
-	high	….	7

-Free acids content of juice (characteristic 53)

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).

		Fixed in percentage	
-	low	0.5	3
-	medium	0.6	5
-	high	0.7	7

-Total soluble content of juice(characteristic 54)

Sugar content (Brix value) is recorded via refractometer.

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

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, 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)

[#] 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:

4.2 Method of propagating the variety

4.2.1 Vegetative propagation

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) other (state method) [ ]

4.2.2 Seed [ ]

4.2.3 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[ ]
	upright to semi upright		2[ ]
	semi upright	Smooth Cayenne	3[ ]
	semi upright to spreading		4[ ]
	spreading	Perolera	5[ ]
5.2 (9)	**Leaf: raised margin**		
	absent	Samba	1[ ]
	present	Perolera, Queen, Singapore Canning	9[ ]
5.3 (10)	**Leaf: expression of spines**		
	absent or very weak	Perolera, Samba, Singapore Canning	1[ ]
	very weak to weak		2[ ]
	weak		3[ ]
	weak to medium		4[ ]
	medium		5[ ]
	medium to strong		6[ ]
	strong		7[ ]
	strong to very strong		8[ ]
	very strong		9[ ]

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

	Characteristics	Example Varieties	Note
5.4 (11)	**Only varieties visually spiny texture: Leaf: position of spines at margin**		
	at base only		1[ ]
	at apex only		2[ ]
	at base and apex	Smooth Cayenne	3[ ]
	along all margins	Queen	4[ ]
5.5 (29)	**Plant: slips**		
	absent or very few	Smooth Cayenne	1[ ]
	present	Fils de Chalvet, Perola, Queen	9[ ]
5.6 (30)	**Plant: number of slips**		
	very few		1[ ]
	very few to few		2[ ]
	few	Gold, Smooth Cayenne	3[ ]
	few to medium		4[ ]
	medium	Queen, Red Spanish	5[ ]
	medium to many		6[ ]
	many	BRS Imperial, Perola, Perolera	7[ ]
	many to very many		8[ ]
	very many		9[ ]

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

	Characteristics	Example Varieties	Note
5.5 (33)	**Fruit: shape**		
	narrow ovate	Perola	1[ ]
	medium ovate	BRS Imperial, BRS Vitoria	2[ ]
	oblong	MD2, Perolera	3[ ]
	elliptic	Smooth Cayenne	4[ ]
	circular	Red Spanish	5[ ]
5.6 (36)	**Fruit: predominant color**		
	white cream		1[ ]
	yellow green		2[ ]
	green	Perola	3[ ]
	grey green		4[ ]
	light yellow	BRS Vitoria	5[ ]
	medium yellow	Smooth Cayenne	6[ ]
	orange	Gold	7[ ]
	orange red	Manzana, Roxo de Tefe	8[ ]
	red		9[ ]
	brown		10[ ]
5.7 (41)	**Fruit: eye profile**		
	sunken	Singapore Canning	1[ ]
	flat	Perola, Smooth Cayenne	2[ ]
	slightly prominent	Rondon	3[ ]
	prominent	BRS Imperial, Queen	4[ ]

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

	Characteristics	Example Varieties	Note
5.8 (44)	**Fruit: color of flesh**		
	whitish cream	Perola	1[ ]
	light yellow	Smooth Cayenne	2[ ]
	medium yellow	Perolera	3[ ]
	yellowish yellow	Queen	4[ ]
	orange		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 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”.

……

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]