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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

SUGARCANE *

UPOV Code(s): SACCH

Saccharum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Australia

to be considered by the

Technical Working Party for Agricultural Crops at its fifty-fourth session,
to be held in Arusha, United Republic of Tanzania, from 2025-05-19 to 2025-05-22

Disclaimer: this document does not represent UPOV policies or guidance

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Saccharum L.	Sugarcane	Canne à sucre	Zuckerrohr	Caña de azúcar

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 *Saccharum* 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 vegetative cuttings which are about 6 to 12 months old.

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

12 segments of culm with 3 buds each.

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 a single growing cycle.

3.1.2 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

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

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.

3.4 Test Design

Each test should be designed to result in a total of at least 12 plants which should be divided between at least 2 replicates.

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 or Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 6 plants or parts of plants taken from each of 6 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.

Unless otherwise indicated, all observations on single culms should be made on 6 culms or parts taken from each of 6 culms.

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 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.
4.1.6 Unless otherwise indicated, all observations on single culms should be made on 6 culms or parts taken from each of 6 culms.

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 These Test Guidelines have been developed for the examination of vegetatively propagated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.

4.2.3 For the assessment of uniformity of vegetatively propagated varieties a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 12 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 seed or 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:

(a) Internode: shape in cross section (characteristic 8)
(b) Internode: color where not exposed to sun (characteristic 10)
(c) Node: presence of wing on bud (characteristic 19)
(d) Node: shape of bud (characteristic 20)

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”.

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 All relevant states of expression are presented in the characteristic.

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

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1	**2**	**3**	**4**	**5**	**6**	**7**			
		Name of characteristics in English		**Nom du caractère en français**		**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
		states of expression		types d’expression		Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

5 (+) See Explanations on the Table of Characteristics in Chapter 8.2

6 (a)-(x) See Explanations on the Table of Characteristics in Chapter 8.1

7 Growth stage key (if applicable) See Explanations on the Table of Characteristics in Chapter 8.3

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

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**QN**	**VG**	**(+)**					
		Plant: growth habit							
		erect						Q121, Q186	1
		semi-erect						Q96, RB72-454	2
		intermediate						Q168	3
		semi-prostate						H56-752	4
		prostate							5
2.	**(*)**	**QN**	**VG**	**(+)**					
		Plant: adherence of leaf sheath							
		very weak							1
		weak						H56-752, Q96	2
		medium						Q124, Q186	3
		strong						NCo310, Q120, Q201	4
		very strong							5
3.		**QN**	**VG**						
		Plant: number of tillers							
		very few							1
		few						Q124	2
		medium						RB72-454	3
		many						Q138	4
		very many							5
4.	**(*)**	**QN**	**MS**	**(+)**					
		Culm: length							
		very short							1
		short						Q117	2
		medium						Q124, Q138, Q170	3
		long						Q136, RB72-454	4
		very long							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.		**QN**	**MS/VG**		**(a)**				
		Internode: length on bud side							
		very short							1
		short						Q117	2
		medium						Q138, Q170	3
		long						Q124	4
		very long							5
6.	**(*)**	**QN**	**MS/VG**	**(+)**					
		Internode: diameter							
		very small							1
		small						Q136	2
		medium						H56-752, Q124, Q170	3
		large						Q117	4
		very large							5
7.	**(*)**	**PQ**	**VG**	**(+)**	**(a)**				
		Internode: shape							
		cylindrical						Q169, RB72-454	1
		tumescent						Q205	2
		bobbin-shaped						H56-752	3
		conoidal						Q177, Q178	4
		obconoidal						H60-3802	5
		concave-convex						Q115	6
8.	**(*)**	**QN**	**VG**	**(+)**	**(a)**				
		Internode: shape in cross section							
		circular						Q121, RB72-454	1
		circular to ovate							2
		ovate						Q152, Q186, Q96	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**(*)**	**PQ**	**VG**	**(+)**	**(a)**				
		Internode: color where <u>exposed</u> to sun							
		white						Q230	1
		green						SRA24, SRA25	2
		yellow green						SRA10	3
		yellow						Q165	4
		orange						AKOKI	5
		red						Hawaii Original	6
		purple medium						RB72-454	7
		purple dark						Badila	8
		brown							9
		greyed brown							10
10.	**(*)**	**PQ**	**VG**	**(+)**	**(a)**				
		Internode: color where <u>not exposed</u> to sun							
		white							1
		yellow green						QS01-1078	3
		green						SRA24, SRA25, Sweet Florida Green	4
		orange						Q220	5
		red							6
		purple medium							7
		purple dark						SRA9	8
		brown							9
		greyed brown							10
11.		**QN**	**MS/VG**	**(+)**	**(a)**				
		Internode: number of growth cracks							
		absent or very few						H56-752, RB72-454	1
		few						Q124	2
		medium						Q121	3
		many						Q179	4
		very many							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12.		**QN**	**VG**	**(+)**	**(a)**				
		Internode: depth of growth cracks							
		very shallow						RB72-454	1
		shallow						Q124	2
		medium						Q121	3
		deep						Q179	4
		very deep							5
13.	**(*)**	**QN**	**VG**	**(+)**	**(a)**				
		Internode: degree of zigzag							
		absent or weak						Q124	1
		medium						Q135, Q152	2
		strong						Q117	3
14.		**QN**	**VG**		**(a)**				
		Internode: waxiness							
		absent or very weak						Q179	1
		weak						Q138	2
		medium						Q121, RB72-454	3
		strong						H56-752, Q117	4
		very strong							5
15.		**QN**	**VG**		**(a)**				
		Node: depth of bud groove							
		absent or very shallow						Q117, Q121, Q186	1
		shallow						Q138, Q170, RB72-454	2
		medium						Q179	3
		deep						Q174	4
		very deep							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.		**QN**	**MS/VG**		**(a)**				
		Node: width of root band							
		very narrow							1
		narrow						SRA6	2
		medium							3
		broad						Q202	4
		very broad							5
17.		**PQ**	**VG**	**(+)**	**(a)**				
		Node: shape of root band							
		constricted							1
		conoidal							2
		obconoidal							3
18.		**QN**	**MS/VG**		**(a)**				
		Node: width of wax ring							
		absent or very narrow						Q179	1
		narrow						Q180	2
		medium						Q113, Q96, RB72-454	3
		broad						Q115, Q138	4
		very broad						Q195	5
19.	**(*)**	**QL**	**VG**		**(a)**				
		Node: presence of wing on bud							
		absent							1
		present							9
20.	**(*)**	**PQ**	**VG**	**(+)**	**(a)**				
		Node: shape of bud							
		triangular-pointed						RB72-454	1
		elliptic						Q138	2
		obovate						Q202	3
		pentagonal						Q182	4
		rhomboid						Q217	5
		round						Q124, Q179	6
		ovate						Q115, Q170, Q186	7
		rectangular						Q215	8

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.		**QN**	**MS/VG**	**(+)**	**(a)**				
		Node: length of bud							
		very short						Q178	1
		short							2
		medium						Q186	3
		long							4
		very long						Q138	5
22.		**QN**	**MS/VG**	**(+)**	**(a)**				
		Node: width of bud							
		very narrow						Q186	1
		narrow						Q138	2
		medium						Q178	3
		broad							4
		very broad							5
23.	**(*)**	**QN**	**VG**	**(+)**	**(a)**				
		Node: bud prominence							
		very weak						Q152	1
		weak						RB72-454	2
		medium						H56-752, Q121	3
		strong						Q136	4
		very strong							5
24.		**QN**	**VG**		**(a)**				
		Node: position of bud tip in relation to growth ring							
		clearly below						Q171, SRAW18	1
		same level						Q179, RB72-454	2
		clearly above						Q172, SRA9	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25.	**QN** **VG**	**(+)** **(a)**					
	Node: bud cushion						
	absent or very narrow					Q121, Q186	1
	narrow					Q96	2
	medium					Q181, RB72-454	3
	broad					Q170	4
	very broad						5
26.	**QN** **VG**	**(+)** **(a)**					
	Node: width of bud wing						
	very narrow					RB72-454	1
	narrow						2
	medium					Q121	3
	broad						4
	very broad					BN81-1394	5
27.	**PQ** **VG**	**(+)** **(a)**					
	Node: main color of root band where <u>not exposed</u> to sun						
	white						1
	green						2
	yellow green						3
	yellow						4
	orange						5
	red						6
	purple medium						7
	purple dark						8
	brown						9
	greyed brown						10

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28.		**PQ**	**VG**	**(+)**	**(a)**				
		Node: color of growth ring where <u>not exposed</u> to sun							
		white							1
		green							2
		yellow green							3
		yellow							4
		orange							5
		red							6
		purple medium							7
		purple dark							8
		brown							9
		greyed brown							10
29.		**QN**	**MS/VG**	**(+)**	**(b)**				
		Leaf sheath: length							
		very short							1
		short						Q117	2
		medium						Q136, Q170	3
		long						Q121, Q124	4
		very long							5
30.		**QN**	**VG**	**(+)**	**(b)**				
		Leaf sheath: density of hairs							
		absent or very sparse						Q186, RB72-454	1
		sparse						Q170	2
		medium						Q117, Q179	3
		dense						Q124	4
		very dense						Q169	5
31.		**QN**	**VG**	**(+)**	**(b)**				
		Leaf sheath: length of hairs							
		very short							1
		short						Q186	2
		medium						Q117, Q138, Q179	3
		long						Q121	4
		very long							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32.		**PQ**	**VG**	**(+)**	**(b)**				
		Leaf sheath: distribution of hairs							
		only lateral						Q138, Q170	1
		lateral and dorsal						SRA5	2
		only dorsal						SRA19	3
33.		**QN**	**VG**	**(+)**	**(b)**				
		Leaf sheath: length of ligule hairs							
		very short							1
		short						Q152, Q170, Q96	2
		medium						Q179, RB72-454	3
		long						BN81-1394, Q124	4
		very long							5
34.		**PQ**	**VG**	**(+)**	**(b)**				
		Leaf sheath: shape of ligule							
		strap-shaped						Argos	1
		deltoid						H56-752, Q170	2
		crescent-shaped						Q121, Q179, Q96	3
		bow-shaped							4
		asymmetrical, steeply sloping						Vertix 1 Vertix 7	5
		asymmetrical, horizontal						IACSP942094, RB72-454	6
35.		**QN**	**VG**	**(+)**	**(b)**				
		Leaf sheath: density of ligule hairs							
		absent or very sparse						SRA6	1
		sparse						SRA25	2
		medium						Q152	3
		dense						Q121, RB72-454	4
		very dense						Q179	5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36.		**QN**	**VG**	**(+)**	**(b)**				
		Leaf sheath: width of ligule							
		narrow						SRAW17	1
		medium						Q115, Q179, Q186	2
		broad						H56-752, Q170	3
37.		**QL**	**VG**	**(+)**	**(b)**				
		Leaf sheath: underlapping auricle							
		absent							1
		present						Q186	9
38.	**(*)**	**PQ**	**VG**	**(+)**	**(b)**				
		Only varieties with Leaf sheath: underlapping auricle present: shape of underlapping auricle							
		deltoid						Q186	1
		dentoid						SRA1, SRA2	2
		unciform							3
		calcarifom						Q196	4
		lanceolate						H56-752, RB72-454	5
		falcate						SRA16	6
39.		**QN**	**VG**		**(b)**				
		Only varieties with leaf sheath: underlapping auricle: present: size of size of underlapping auricle							
		very small							1
		small						Q96	2
		medium						Q201	3
		large						Q135	4
		very large							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40.		**QL**	**VG**	**(+)**	**(b)**				
		Leaf sheath: overlapping auricle							
		absent							1
		present						SRA24	9
41.	**(*)**	**PQ**	**VG**	**(+)**	**(b)**				
		Only varieties with Leaf sheath: overlapping auricles: shape of overlapping auricle							
		deltoid						Q117, RB72-454	1
		dentoid							2
		unciform							3
		calcariform							4
		lanceolate						Q138	5
		falcate							6
42.		**QN**	**VG**		**(b)**				
		Leaf sheath: size of overlapping auricle							
		very small							1
		small						SRA20, SRA25	2
		medium						Q251, SRA11	3
		large						Q198, Q215	4
		very large							5
43.		**QN**	**MS**		**(b)**				
		Leaf blade: length							
		very short							1
		short						Q124	2
		medium						Q136	3
		long						Q170	4
		very long							5

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44.	**(*)**	**QN**	**MS**	**(+)**	**(b)**				
		Leaf blade: width							
		very narrow							1
		narrow						Q113, Q186	2
		medium						Q121, Q124	3
		broad						Q138, Q179	4
		very broad							5
45.		**QN**	**MS**	**(+)**	**(b)**				
		Leaf: blade: midrib width							
		very narrow						Q203	1
		narrow						Q121	2
		medium						Q124, Q170	3
		wide						Q202, SRA5	4
		very wide						Q138	5
46.		**QN**	**MS**		**(b)**				
		Leaf:blade ratio leaf blade width/midrib width							
		very low							1
		low						SRA5, SRA6	2
		medium						H56-752, Q124	3
		high						Q215, SRA11	4
		very high							5
47.		**QL**	**VG**	**(+)**	**(c)**				
		Cane top: shape in cross-section							
		circular							1
		ovate							9
48.		**QN**	**MS/VG**		**(c)**				
		Cane top: length							
		very short							1
		short							2
		medium							3
		long							4
		very long							5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
49.	**QN** **VG**	**(+)** **(c)**				
	Cane top: waxiness					
	absent or very weak					1
	weak					2
	medium					3
	strong					4
	very strong					5

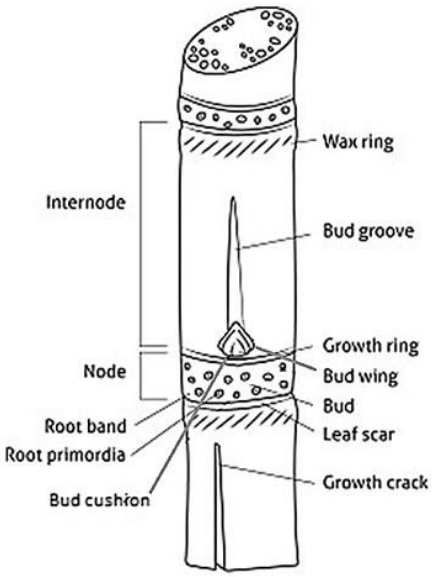
8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

Unless otherwise indicated, observations should be made at time of maturity on the middle third of plants aged between 10 to 12 months, in the first vegetative cycle of the crop (from planting to the first harvest).

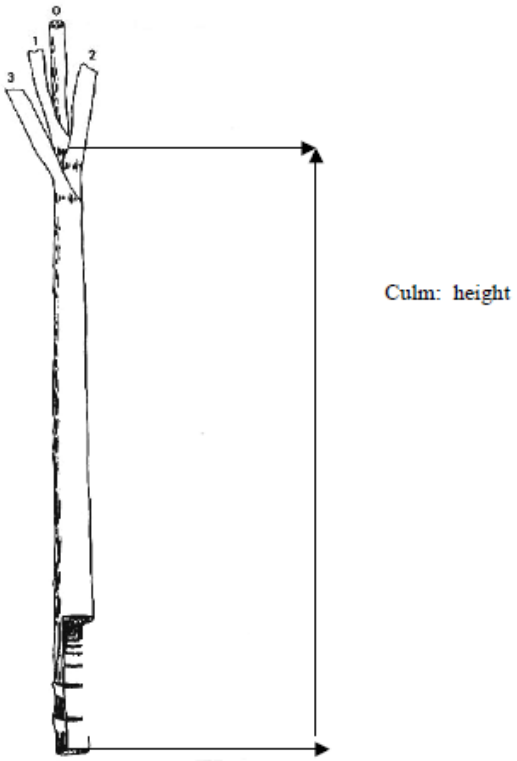
Characteristics containing the following key in the Table of Characteristics should be examined as indicated below:

(a) Observations on the node and internode should be made on the longest internode in the middle third of the primary or representative culm. Observation or measurements should be made in the opposite side to the bud,



(b) Observations on the leaf blade and leaf sheath should be made on the leaf + 3. See 8.1, (a)

(c) The cane top is the region between the youngest exposed visible dewlap and the insertion of the fourth youngest fully extended leave (leaf + 4) in the culm.

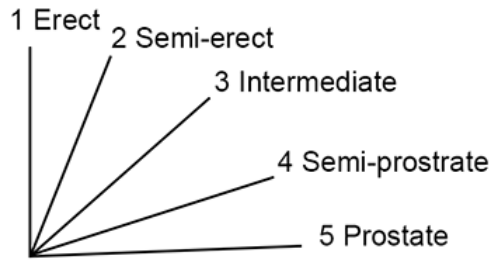


(d) The main color is the color with the largest surface area. In cases where the areas of the main and secondary color are too similar to reliably decide which color has the largest surface area, the darker color is considered to be the main color. Observations should be made removing the wax.

(e) The dewlaps are two symmetrical patches at the junction of the leaf blade and the leaf sheath that are different in color and structure from the rest of the leaf.

8.2 Explanations for individual characteristics

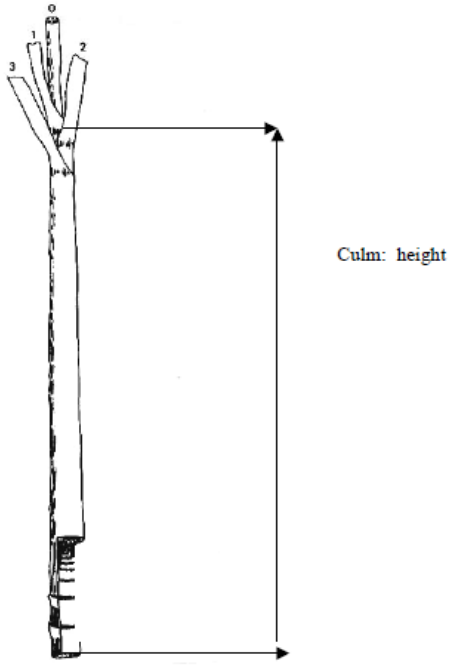
Ad. 1: Plant: growth habit



Ad. 2: Plant: adherence of leaf sheath

Observations should be made on the lower half of the stool on the senescing leaves.

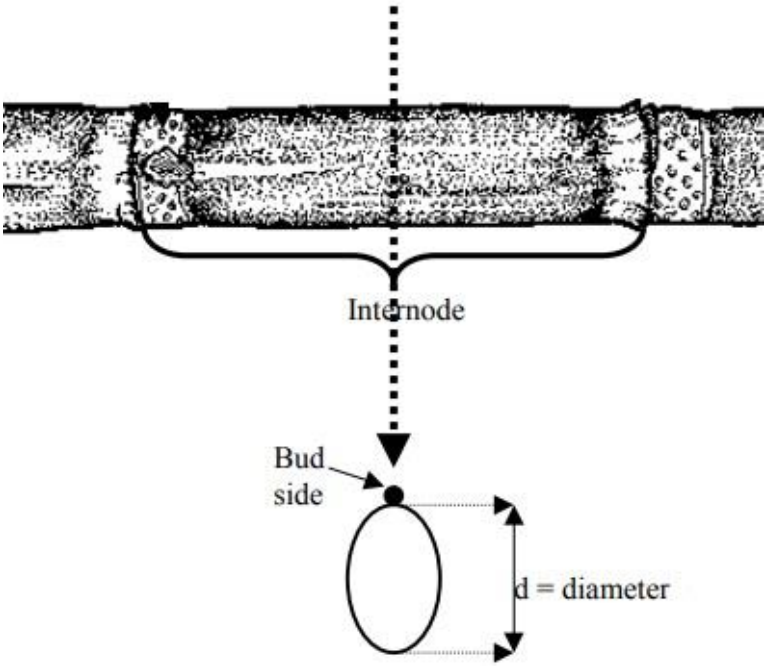
Ad. 4: Culm: length



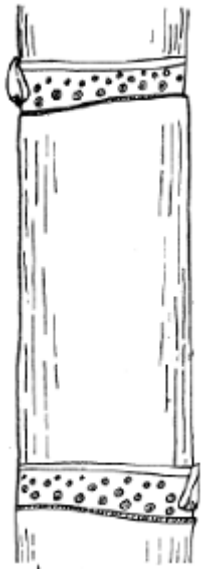
'Measurements should be made from the base of the culm at soil level to the base of the Top Visible Dewlap (TVD) leaf. The TVD is the leaf with the highest insertion, fully opened and with the first auricle visible, leaf + 1.'

Ad. 6: Internode: diameter

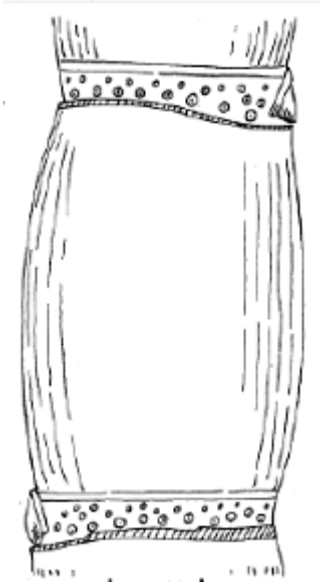
Observations should be made at central part of the internode on the axis going through the bud.



Ad. 7: Internode: shape



1
cylindrical



2
tumescent

3
bobbin-shaped

4
conoidal

5
obconoidal

6
concave-convex

Ad. 8: Internode: shape in cross section

Observations should be made in the central part of the internode.

Ad. 9: Internode: color where exposed to sun

Observations should be made after three days of exposure to the sun on a culm on which the wax has been removed. The color covering the largest area should be observed.

Ad. 10: Internode: color where not exposed to sun

Observations should be made on the color covering the largest area and on a culm protected from the sun, from which the wax has been removed.

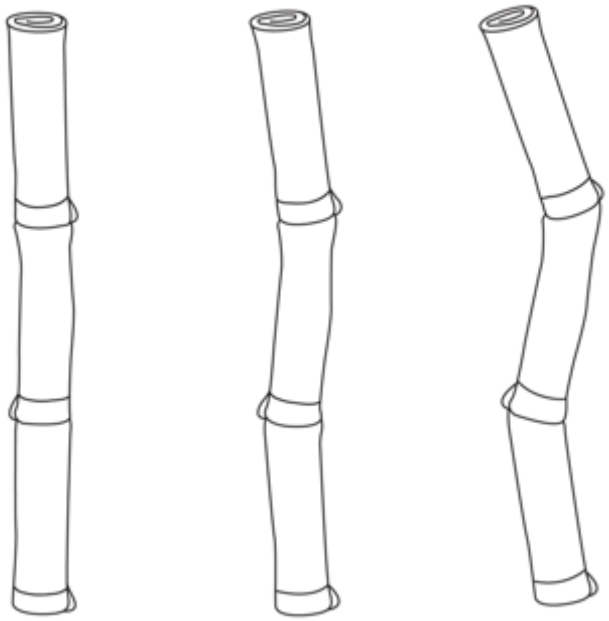
Ad. 11: Internode: number of growth cracks

Observations should be made across the entire length of the culm.

Ad. 12: Internode: depth of growth cracks

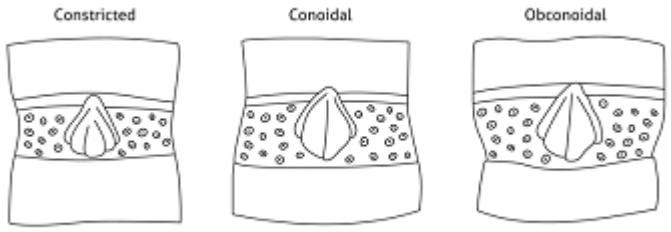
Observations should be made along the whole length of the culm.

Ad. 13: Internode: degree of zigzag



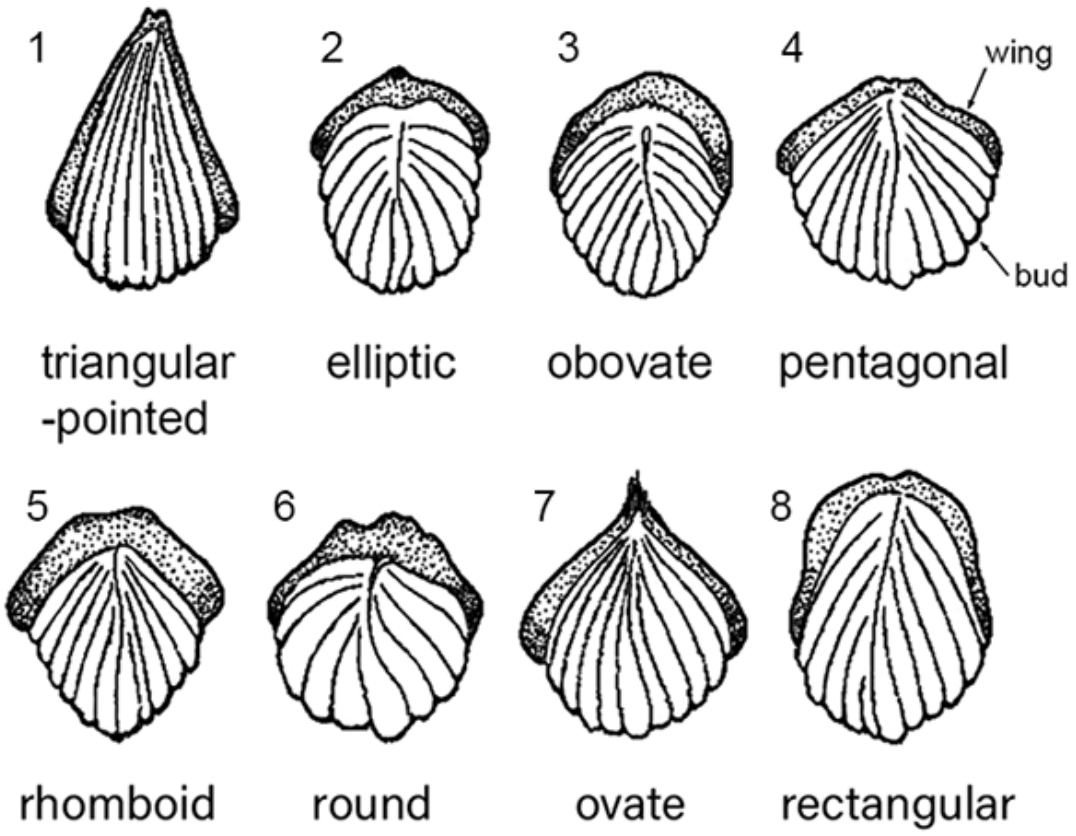
1	2	3
absent or weak	medium	strong

Ad. 17: Node: shape of root band



Ad. 20: Node: shape of bud

The bud wings are considered as part of the shape of the bud.



Ad. 21: Node: length of bud

Observations should be made in the longest part of the bud.

Ad. 22: Node: width of bud

Observations should be made in the broadest part of the bud.

Ad. 23: Node: bud prominence

Observations should be made below the node to which the second senescent leaf from the top was attached.

Ad. 25: Node: bud cushion

To be observed as the space between base of bud and leaf scar.

Ad. 26: Node: width of bud wing

Observations should be made at the broadest part of the wing.

Ad. 27: Node: main color of root band where not exposed to sun

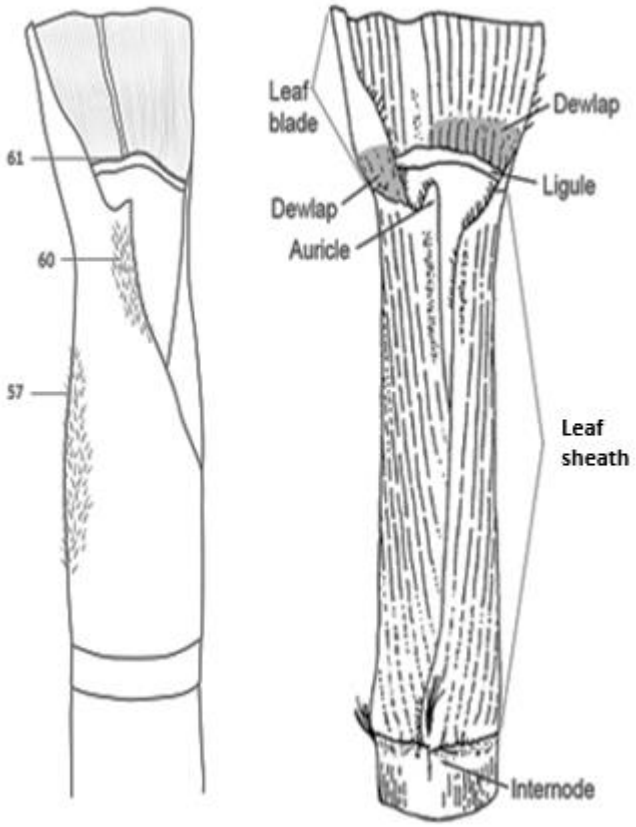
The color covering the largest area should be observed.

Ad. 28: Node: color of growth ring where not exposed to sun

The color covering the largest area should be observed.

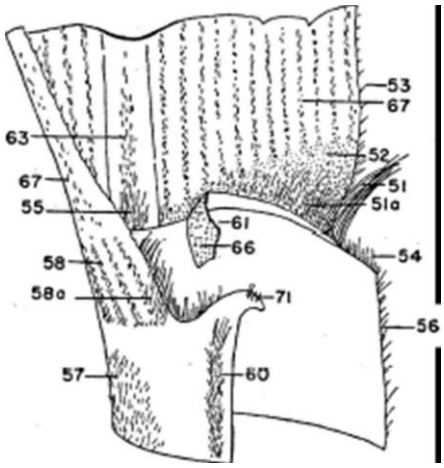
Ad. 29: Leaf sheath: length

Measurements should be made from the leaf sheath base (point of attachment to the culm) to the dewlap (the junction between the leaf blade and the leaf sheath).



Ad. 30: Leaf sheath: density of hairs

Observations should be made on hair groups 57 and 60.



Ad. 31: Leaf sheath: length of hairs

See Ad. 30

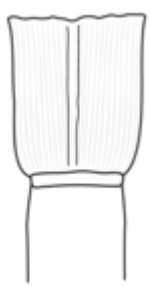
Ad. 32: Leaf sheath: distribution of hairs

See Ad. 29 by See Ad. 30

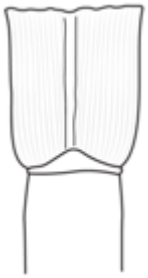
Ad. 33: Leaf sheath: length of ligule hairs

Observations should be made on hair group 61. See Ad. 30.

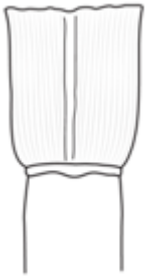
Ad. 34: Leaf sheath: shape of ligule



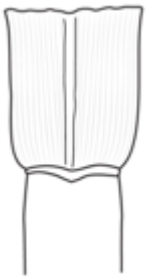
1
strap-shaped



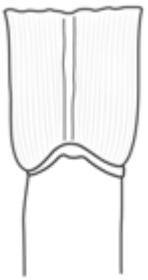
2
deltoid



3
crescent-shaped



4
bow-shaped



5
asymmetrical, steeply sloping

6
asymmetrical, horizontal

Ad. 35: Leaf sheath: density of ligule hairs

Observations should be made on hair group 61. See Ad. 30.

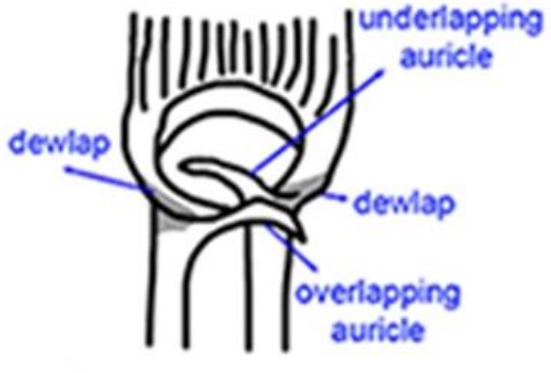
Ad. 36: Leaf sheath: width of ligule

Ligule width is the distance from the point of attachment at the junction of the leaf blade and the leaf sheath and the upper margin of the ligule at the widest point (middle of ligule). Observations should be made at the broadest part of the ligule, vertically.

narrow: < 3 mm
medium: 3 – 5 mm
broad: > 5 mm

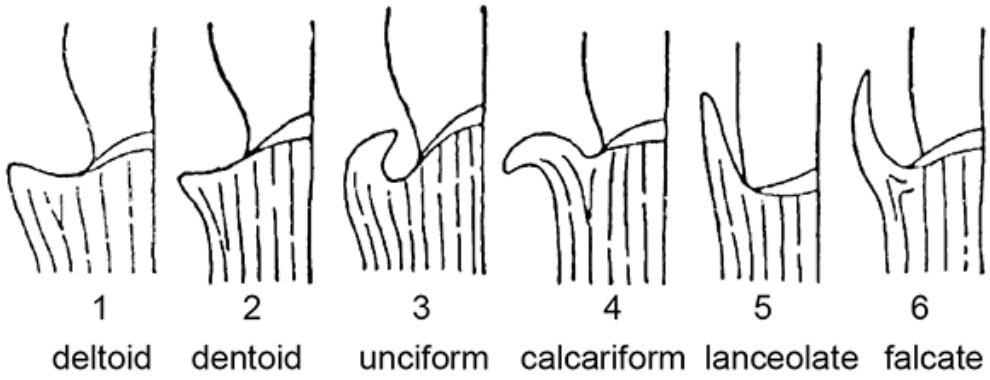
Ad. 37: Leaf sheath: underlapping auricle

See Ad. 4 and Ad. 38. If auricles are not in one of the described shapes, of Ad. 38, they are to be considered absent.



Ad. 38: Only varieties with Leaf sheath: underlapping auricle present: shape of underlapping auricle

See Ad. 37



Ad. 40: Leaf sheath: overlapping auricle

See Ad.37 and Ad. 38.

Ad. 41: Only varieties with Leaf sheath: overlappinf auricles: shape of overlapping auricle

See Ad. 4 and Ad. 38. Only when overlapping auricles are present (Ad. 40).

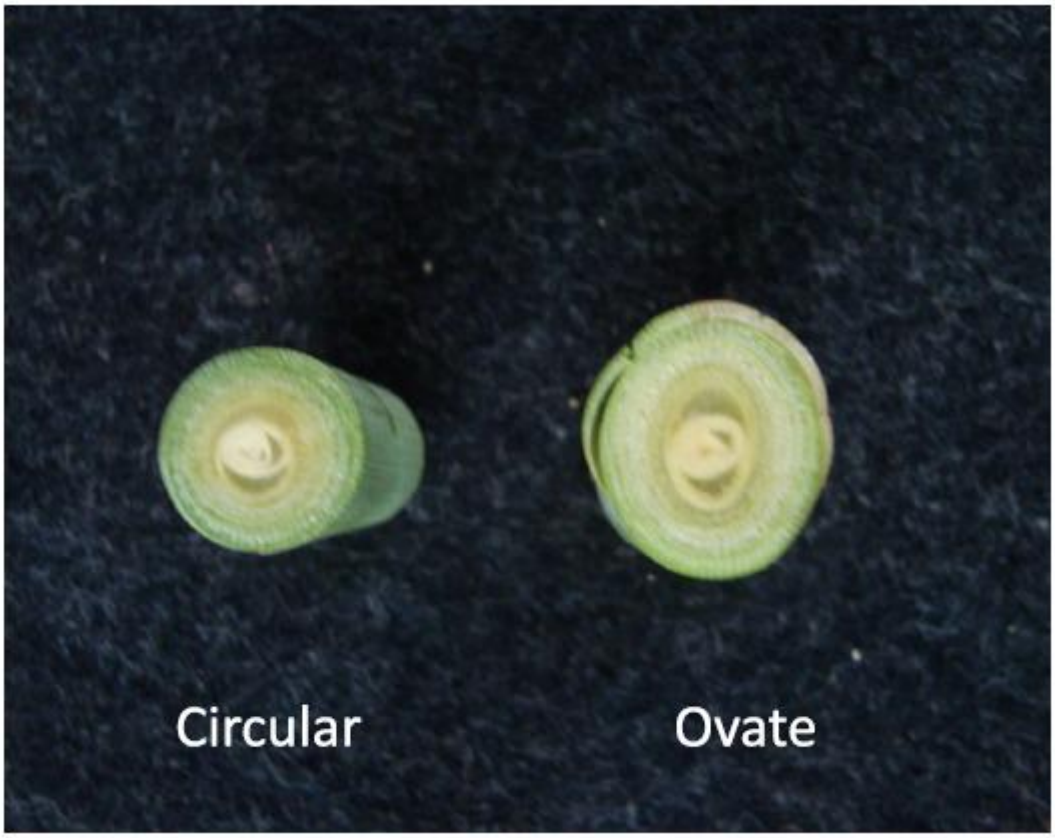
Ad. 44: Leaf blade: width

Observations should be made at the longitudinal mid-point.

Ad. 45: Leaf: blade: midrib width

Observations should be made at the longitudinal mid-point.

Ad. 47: Cane top: shape in cross-section



Ad. 49: Cane top: waxiness

The waxiness needs to be observed on the leaf sheaths in the cane top.

8.3 Additional Explanations on the Table of Characteristics

Unless otherwise indicated, observations should be made at time of maturity on plants aged between 10 to 12 months, characteristics containing the following key in the Table of Characteristics should be examined as indicated below:

9. Literature

Artschwager, E., 1940: Journal of Agricultural Research, v. 60, n. 8, pp. 503-508.

Artschwager, E. 1940: Morphology of the vegetative organs of sugarcane. Journal of Agricultural Research, 60 (8): 503-549.

Artschwager, E. and Brandes, E.W. 1958: Sugarcane (*Saccharum officinarum* L.). Origin, classification, characteristics and descriptions of representative clones. US Department of Agriculture, Agriculture Handbook. 122: 1-307.

Gallacher, D.J., 1994: Development of a minimum descriptor set for individuals of *Saccharum* spp. Hybrid germplasm. Thesis submitted for Ph.D., Department of Botany and Tropical Agriculture, James Cook University of North Queensland, AU.

Gallacher, D.J. and Berding, N. 1997: Purpose selection and application of descriptors for sugarcane germplasm. *Aust. J. Agric. Res* 48: 759-67.

Gallacher, D.J., 1997: Evaluation of sugarcane morphological descriptors using variance components analysis. *Aust. J. Agric. Res* 48: 769-73.

Gallacher, D.J., 1997: Optimised descriptors recommended for Australian sugarcane germplasm (*Saccharum* spp. hybrid) *Aust. J. Agric. Res* 48: 775-79.

Portz G., do Amaral, L.R. and Molin, J.P. 2012: Measuring sugarcane height in complement to biomass sensor for nitrogen management. 11th International Conference on Precision Agriculture.

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

1.1.1	Botanical name	*Saccharum* L.	☐
1.1.2	Common name	Sugarcane	

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

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

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 variety)

(……..……..…) x (……..……..…)

female parent male parent

(b) partially known cross [ ]

(please state 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 Seed-propagated varieties

(a) Other (please provide details) [ ]

4.2.2 Vegetative propagation

(a) Cuttings [ ]
(b) Other (state method) [ ]

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 (2)	**Plant: adherence of leaf sheath**		
	very weak		1 [ ]
	weak	H56-752, Q96	2 [ ]
	medium	Q124, Q186	3 [ ]
	strong	NCo310, Q120, Q201	4 [ ]
	very strong		5 [ ]
5.2 (7)	**Internode: shape**		
	cylindrical	Q169, RB72-454	1 [ ]
	tumescent	Q205	2 [ ]
	bobbin-shaped	H56-752	3 [ ]
	conoidal	Q177, Q178	4 [ ]
	obconoidal	H60-3802	5 [ ]
	concave-convex	Q115	6 [ ]
5.3 (8)	**Internode: shape in cross section**		
	circular	Q121, RB72-454	1 [ ]
	circular to ovate		2 [ ]
	ovate	Q152, Q186, Q96	3 [ ]
5.4 (9)	**Internode: color where <u>exposed</u> to sun**		
	white	Q230	1 [ ]
	green	SRA24, SRA25	2 [ ]
	yellow green	SRA10	3 [ ]
	yellow	Q165	4 [ ]
	orange	AKOKI	5 [ ]
	red	Hawaii Original	6 [ ]
	purple medium	RB72-454	7 [ ]
	purple dark	Badila	8 [ ]
	brown		9 [ ]
	greyed brown		10 [ ]

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

	Characteristics	Example Varieties	Note
5.5 (10)	**Internode: color where <u>not exposed</u> to sun**		
	white		1 [ ]
	green	SRA24, SRA25	2 [ ]
	yellow green	QS01-1078	3 [ ]
	green	Sweet Florida Green	4 [ ]
	orange	Q220	5 [ ]
	red		6 [ ]
	purple medium		7 [ ]
	purple dark	SRA9	8 [ ]
	brown		9 [ ]
	greyed brown		10 [ ]
5.6 (13)	**Internode: degree of zigzag**		
	absent or weak	Q124	1 [ ]
	medium	Q135, Q152	2 [ ]
	strong	Q117	3 [ ]
5.7 (20)	**Node: shape of bud**		
	triangular-pointed	RB72-454	1 [ ]
	elliptic	Q138	2 [ ]
	obovate	Q202	3 [ ]
	pentagonal	Q182	4 [ ]
	rhomboid	Q217	5 [ ]
	round	Q124, Q179	6 [ ]
	ovate	Q115, Q170, Q186	7 [ ]
	rectangular	Q215	8 [ ]
5.8 (44)	**Leaf blade: width**		
	very narrow		1 [ ]
	narrow	Q113, Q186	2 [ ]
	medium	Q121, Q124	3 [ ]
	broad	Q138, Q179	4 [ ]
	very broad		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	*Node: shape of bud*	*round*	*oval*

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

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:

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.

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]