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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 experts from Australia
to be considered by the
Technical Working Party for Agricultural Crops
at its fifty-second session, to be held virtually
from 2023-05-22 to 2023-05-26

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

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 All characteristics should be observed on plants aged between 10 to 12 months, in the first vegetative cycle of the crop (from planting to the first harvest).

3.4 Test Design

Each test should be designed to result in a total of at least 24 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, all observations for qualitative characteristics should be made on 6 culms or parts taken from 6 culms.

Unless otherwise indicated, all observations for quantitative characteristics should be made on 23 culms or parts taken from each of 23 culms.

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.

4.2 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 24 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)-(e) See Explanations on the Table of Characteristics in Chapter 8.1

7 Not applicable

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**QN VG**	**(+)**				
		Plant: growth habit					
		erect				Q 121, Q186	1
		erect to semi-erect					2
		semi-erect				Q96, RB72-454	3
		semi-erect to intermediate					4
		intermediate				Q168	5
		intermediate to semi-prostrate					6
		semi-prostrate				H56-752	7
		semi-prostrate to prostrate					8
		prostrate					9
2.	**(*)**	**QN VG**	**(+)**				
		Plant: adherence of leaf sheath					
		very weak					1
		very weak to weak					2
		weak				H56-752, Q96	3
		weak to medium					4
		medium				Q124, Q186	5
		medium to strong					6
		strong				NCo310, Q120, Q201	7
		strong to very strong					8
		very strong					9
3.		**QN VG**					
		Plant: number of tillers					
		very few					1
		very few to few					2
		few				Q124	3
		few to medium					4
		medium				RB72-454	5
		medium to many					6
		many				Q138	7
		many to very many					8
		very many					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4.	**(*)**	**QN MS**	**(+)**				
		Culm: length					
		very short					1
		very short to short					2
		short				Q117	3
		short to medium					4
		medium				Q124, Q138, Q170	5
		medium to long					6
		long				Q136, RB72-454	7
		long to very long					8
		very long					9
5.		**QN MS**	**(a)**				
		Internode: length on the bud side					
		very short					1
		very short to short					2
		short				Q117	3
		short to medium					4
		medium				Q138, Q170	5
		medium to long					6
		long				Q124	7
		long to very long					8
		very long					9
6.	**(*)**	**QN MS**	**(+) (a)**				
		Internode: diameter					
		very small					1
		very thin to thin					2
		thin				Q136	3
		thin to medium					4
		medium				H56-752, Q124, Q170	5
		medium to thick					6
		thick				Q117	7
		thick to very thick					8
		very thick					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
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				Q 121, RB72-454	1
		circular to ovate					2
		ovate				Q152, Q186, Q96	3
9.	**(*)**	**PQ VG**	**(+) (a)**				
		Internode: color where <u>exposed</u> to sun					
		yellow				Q230	1
		yellow green				SRA24, SRA25	2
		grey yellow				SRA10	3
		grey orange				Q165	4
		grey red					5
		grey purple				RB72-454	6
		purple					7
10.	**(*)**	**PQ VG**	**(+) (a)**				
		Internode: color where <u>not exposed</u> to sun					
		yellow					1
		yellow green				SRA24, SRA25	2
		grey yellow				QS01-1078	3
		grey orange				Q220	4
		grey red					5
		grey purple				SRA9	6
		purple					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.		**QN MS/VS**	**(+)**				
		Internode: number of growth cracks					
		absent or very few				H56-752, RB72-454	1
		very few to few					2
		few				Q124	3
		few to medium					4
		medium				Q121	5
		medium to many					6
		many				Q179	7
		many to very many					8
		very many					9
12.	**(*)**	**QN VG**	**(+)**				
		Internode: degree of zigzag					
		absent or weak				Q124	1
		medium				Q135, Q152	2
		strong				H56-752	3
13.		**QN VS**	**(a)**				
		Internode: waxiness					
		absent or very weak				Q179	1
		very weak to weak					2
		weak				Q138	3
		weak to medium					4
		medium				Q121, RB72-454	5
		medium to strong					6
		strong				H56-752, Q117	7
		strong to very strong					8
		very strong					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**QN VG**	**(a)**				
	Internode: depth of bud groove					
	absent or very shallow				Q117, Q121, Q186	1
	very shallow to shallow					2
	shallow				Q138, Q170, RB72-454	3
	shallow to medium					4
	medium				Q179	5
	medium to deep					6
	deep				Q174	7
	deep to very deep					8
	very deep					9
15.	**QN VS**	**(+)**				
	Internode: depth of growth cracks					
	absent or very shallow				RB72-454	1
	shallow				Q124	2
	medium				Q121	3
	deep				Q179	4
	very deep					5
16.	**QN MS/VG**	**(a)**				
	Node: width of root band					
	narrow					
	very narrow					
	very narrow to narrow					
	narrow to medium				SRA6	5
	medium					6
	medium to broad				Q202	7
	broad to very broad					8
	very broad					9
17.	**PQ VG**	**(+)**	**(a)**			
	Node: shape of root band					
	constricted					2
	conoidal					3
	obconoidal					4

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18.		**QN**	**VS**		**(a)**				
		Node: width of wax ring							
		absent or very narrow						Q179	1
		very narrow to narrow							2
		narrow						Q180	3
		narrow to medium							4
		medium						Q113, Q96, RB72-454	5
		medium to broad							6
		broad						Q115, Q138	7
		broad to very broad							8
		very broad						Q195	9
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
		oval						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), (e)**				
		Node: length of bud					
		very short					1
		very short to short					2
		short					3
		short to medium					4
		medium					5
		medium to long					6
		long					7
		long to very long					8
		very long					9
22.		**QN MS**	**(+) (a), (e)**				
		Node: width of bud					
		very narrow				Q186	1
		very narrow to narrow					2
		narrow				Q138	3
		narrow to medium					4
		medium				Q178	5
		medium to broad					6
		broad					7
		broad to very broad					8
		very broad					9
23.	**(*)**	**QN VS**	**(+)**				
		Node: bud prominence					
		very weak				Q152	1
		very weak to weak					2
		weak				RB72-454	3
		weak to medium					4
		medium				H56-752, Q121	5
		medium to strong					6
		strong				Q136	7
		strong to very strong					8
		very strong					9

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

	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 and green					1
	yellow and green					2
	yellow and purple					3
	green					4
	green and purple					5
	purple					6
29.	**QN MS**	**(+)**	**(b)**			
	Leaf sheath: length					
	very short					1
	very short to short					2
	short				Q117	3
	short to medium					4
	medium				Q136, Q170	5
	medium to long					6
	long				Q121, Q124	7
	long to very long					8
	very long					9
30.	**QN VG**		**(b), (c)**			
	Leaf sheath: number of hairs					
	absent or very few				Q186, RB72-454	1
	very few to few					2
	few				Q170	3
	few to medium					4
	medium				Q117, Q179	5
	medium to many					6
	many				Q124	7
	many to very many					8
	very many				Q169	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.	**QN VG**	**(b), (c)**				
	Leaf sheath: length of hairs					
	very short					1
	very short to short					2
	short				Q186	3
	short to medium					4
	medium				Q117, Q138, Q179	5
	medium to long					6
	long				Q121	7
	long to very long					8
	very long					9
32.	**PQ VG**	**(b), (c)**				
	Leaf sheath: distribution of hairs					
	only lateral				Q138, Q170	1
	lateral and dorsal				SRA5	2
	only dorsal				SRA19	3
33.	**QN VS**	**(b), (c)**				
	Leaf sheath: length of ligule hairs					
	very short					1
	very short to short					2
	short				Q152, Q170, Q96	3
	short to medium					4
	medium				Q179, RB72-454	5
	medium to long					6
	long				BN81-1394, Q124	7
	long to very long					8
	very long					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
34.	**PQ VS**	**(+)**	**(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 VS**		**(b), (c)**			
	Leaf sheath: density of ligule hairs					
	absent or very sparse				SRA6	1
	very sparse to sparse					2
	sparse				SRA25	3
	sparse to medium					4
	medium				Q152	5
	medium to dense					6
	dense				Q121, RB72-454	7
	dense to very dense					8
	very dense				Q179	9
36.	**QN VS**	**(+)**	**(b)**			
	Leaf sheath: width of ligule					
	narrow				SRAW17	1
	medium				Q115, Q179, Q186	2
	broad				H56-752, Q170	3
37.	**QL VS**		**(b)**			
	Leaf sheath: underlapping auricle					
	absent					1
	present				Q186	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
38.	**(*)**	**PQ**	**VS**	**(+)**	**(b)**				
		Leaf sheath: 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**	**VS**		**(b)**				
		Leaf sheath: size of underlapping auricle							
		very small							1
		small						Q96	2
		medium						Q201	3
		large						Q135	4
		very large							5
40.		**QL**	**VS**		**(b)**				
		Leaf sheath: overlapping auricle							
		absent							1
		present						SRA24	9
41.	**(*)**	**PQ**	**VS**	**(+)**	**(b)**				
		Leaf sheath: shape of overlapping auricle							
		deltoid						Q117, RB72-454	1
		dentoid							2
		unciform							3
		calcariform							4
		lanceolate						Q138	5
		falcate							6

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42.		**QN MS/VS**	**(b)**				
		Leaf sheath: size of overlapping auricle					
		very small					1
		very small to small					2
		small				SRA20, SRA25	3
		small to medium					4
		medium				Q251, SRA11	5
		medium to large					6
		large				Q198, Q215	7
		large to very large					8
		very large					9
43.		**QN MS**	**(b)**				
		Leaf blade: length					
		very short					1
		very short to short					2
		short				Q124	3
		short to medium					4
		medium				Q136	5
		medium to long					6
		long				Q170	7
		long to very long					8
		very long					9
44.	**(*)**	**QN MS**	**(b)**				
		Leaf blade: width at longitudinal mid-point					
		very narrow					1
		very narrow to narrow					2
		narrow				Q113, Q186	3
		narrow to medium					4
		medium				Q121, Q124	5
		medium to broad					6
		broad				Q138, Q179	7
		broad to very broad					8
		very broad					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
45.	**QN MS**	**(b)**				
	Leaf: midrib width at longitudinal mid-point					
	very narrow				Q203	1
	very narrow to narrow					2
	narrow				Q121	3
	narrow to medium					4
	medium				Q124, Q170	5
	medium to wide					6
	wide				Q202, SRA5	7
	wide to very wide					8
	very wide				Q138	9
46.	**QN MS**	**(b)**				
	Leaf: ratio leaf blade width/midrib width					
	very low					1
	very low to low					2
	low				SRA5, SRA6	3
	low to medium					4
	medium				H56-752, Q124	5
	medium to high					6
	high				Q215, SRA11	7
	high to very high					8
	very high					9
47.	**QN MS/VG**	**(d)**				
	Cane top: length					
	very short					1
	very short to short					2
	short					3
	short to medium					4
	medium					5
	medium to long					6
	long					7
	long to very long					8
	very long					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.	**QL VG**	**(d)**				
	Cane top: shape of cross-section					
	circular					1
	ovate					2
49.	**QN VG**	**(d)**				
	Cane top: waxiness					
	absent or very weak					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

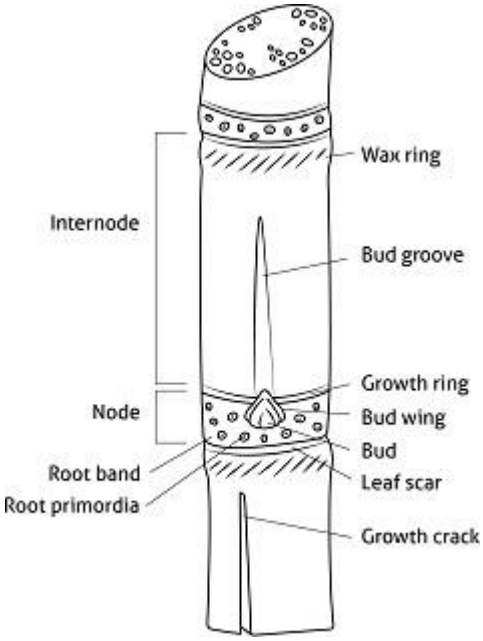
8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

Unless otherwise indicated, observations should be made at time of maturity.

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

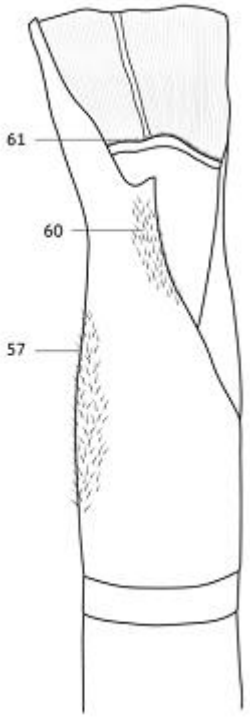
(a) Observations should be made on the longest internode of a representative culm.



(b) Observations should be made on the top visible dewlap (TVD) leaf.

(c) Leaf sheath hairs to be observed on hair groups 57 and 60.
Distribution of hairs is dorsal when only hair group 57 is present. Distribution of hairs is lateral and dorsal when both hair groups 57 and 60 are present.
Distribution of hairs is lateral when only hair group 60 is present.

Leaf sheath ligule hairs to be observed on hair group 61.

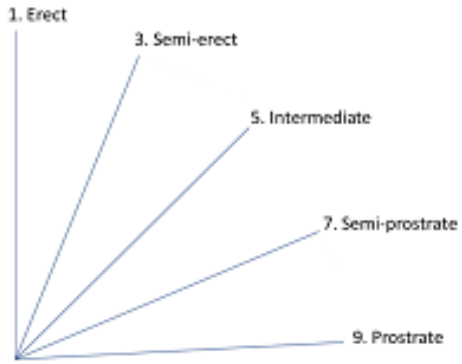


(d) The cane top is the region between the youngest exposed visible dewlap and the insertion of the fourth youngest fully extended leaf (leaf + 4) in the culm.

(e) Observations should be made excluding the bud wings.

8.2 Explanations for individual characteristics

Ad. 1: Plant: growth habit



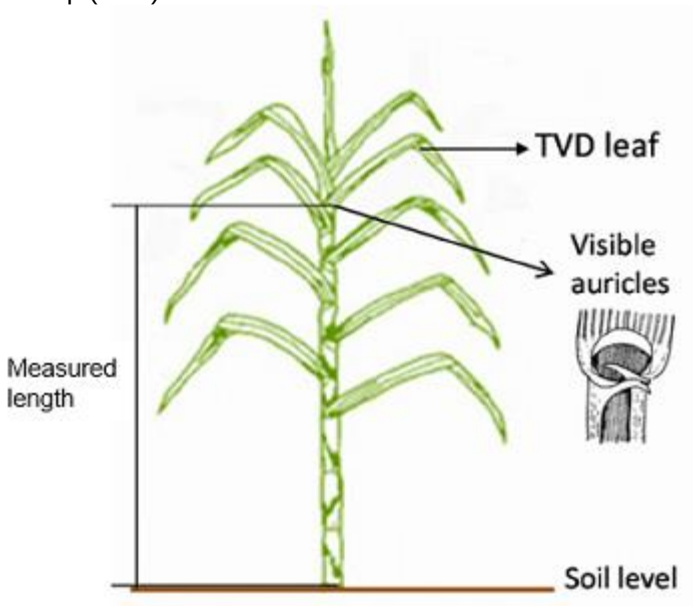
Observations should be made 2-3 months after planting.

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

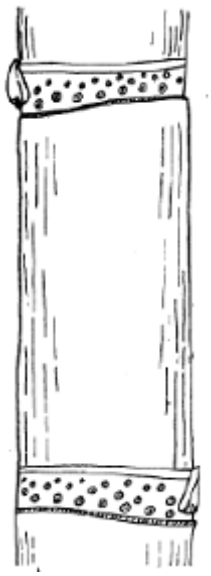
Measurements should be made from the base of the culm at soil level to the base of the Top Visible Dewlap (TVD) leaf.



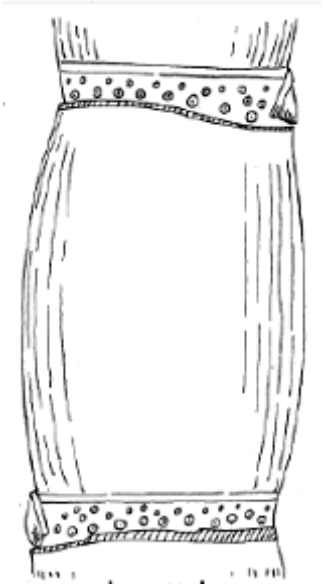
Ad. 6: Internode: diameter

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

The color covering the largest area should be observed.

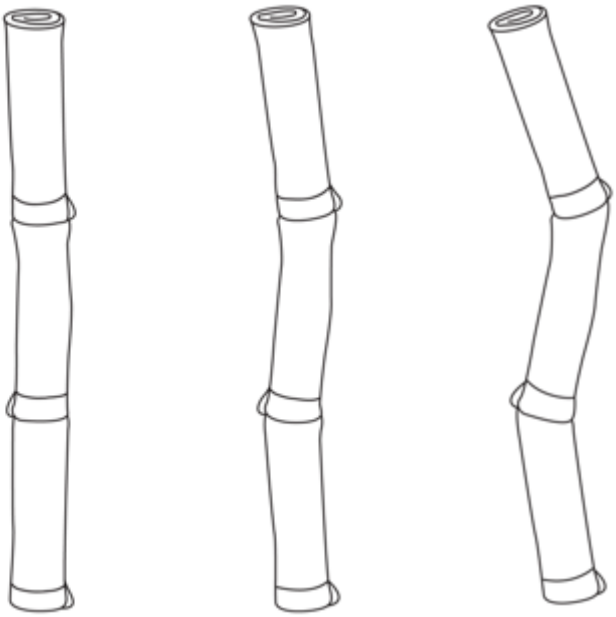
Ad. 10: Internode: color where not exposed to sun

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: degree of zigzag

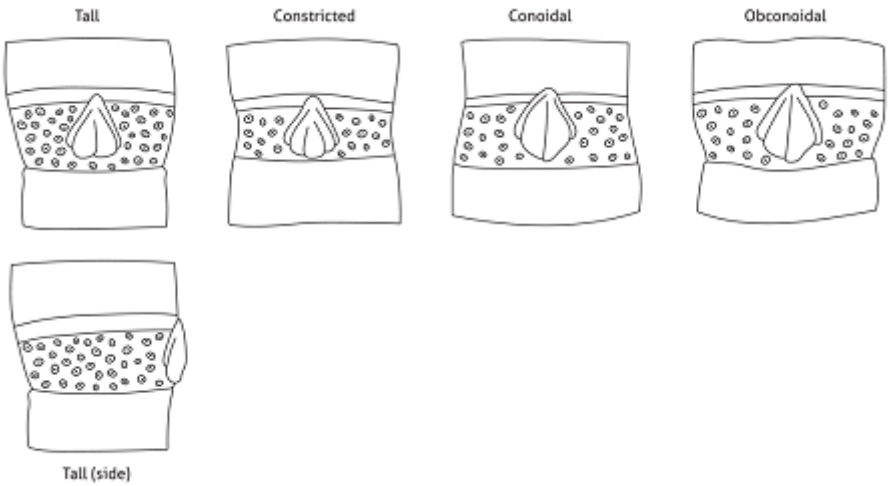


1	2	3
absent or weak	medium	strong

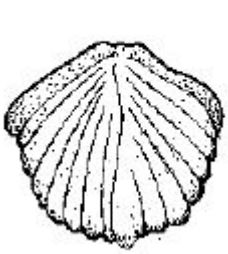
Ad. 15: Internode: depth of growth cracks

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

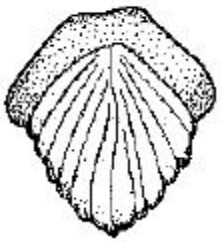
Ad. 17: Node: shape of root band



Ad. 20: Node: shape of bud

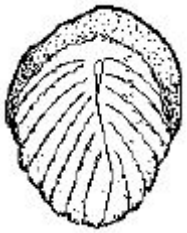


2
oval

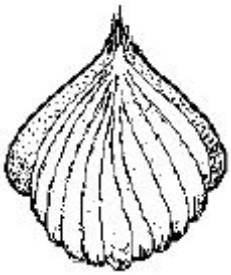


3
obovate

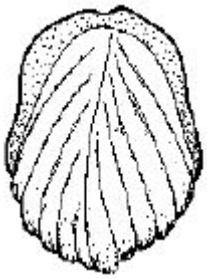
5
rhomboid



6
round



7
ovate



8
rectangular

Ad. 21: Node: length of bud

Observations should be made vertically through the bud.

Ad. 22: Node: width of bud

Measurements should be taken horizontally through 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: color of root band where not exposed to sun

The color covering the largest area should be observed.

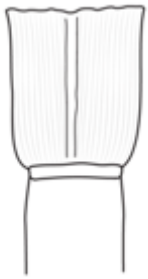
Ad. 28: Node: color of growth ring where not exposed to sun

The color covering the largest area should be observed.

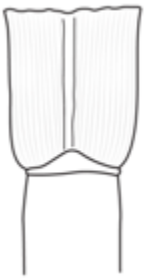
Ad. 29: Leaf sheath: length

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).

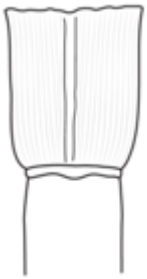
Ad. 34: Leaf sheath: shape of ligule



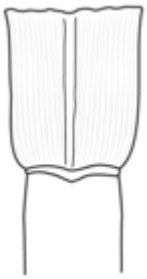
1
strap-shaped



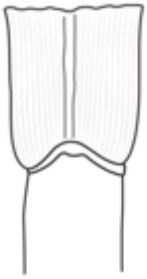
2
deltoid



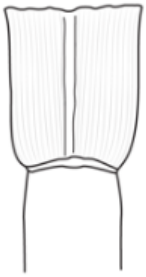
3
crescent-shaped



4
bow-shaped



5
asymmetrical,
steeply sloping



6
asymmetrical,
horizontal

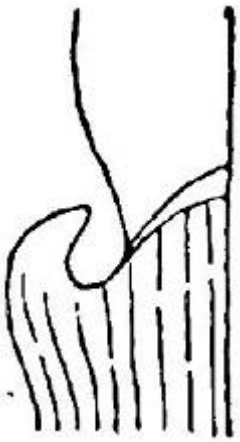
Ad. 36: Leaf sheath: width of ligule

Observations should be made at the broadest part of the ligule, vertically.

Ad. 38: Leaf sheath: shape of underlapping auricle

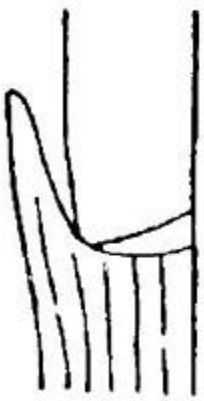
1
deltoid

2
dentoid

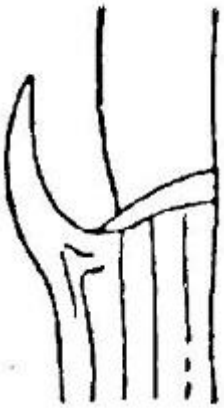


3
unciform

4
calcariform



5
lanceolate



6
falcate

Ad. 41: Leaf sheath: shape of overlapping auricle

See Ad. 38

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	Botanical name	*Saccharum* L.
1.2	Common name	Sugarcane

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 variety)

(……..……..…) 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) 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 (2)	**Plant: adherence of leaf sheath**		
	very weak		1 [ ]
	very weak to weak		2 [ ]
	weak	H56-752, Q96	3 [ ]
	weak to medium		4 [ ]
	medium	Q124, Q186	5 [ ]
	medium to strong		6 [ ]
	strong	NCo310, Q120, Q201	7 [ ]
	strong to very strong		8 [ ]
	very strong		9 [ ]
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	Q 121, RB72-454	1 [ ]
	circular to ovate		2 [ ]
	ovate	Q152, Q186, Q96	3 [ ]
5.4 (9)	**Internode: color where <u>exposed</u> to sun**		
	yellow	Q230	1 [ ]
	yellow green	SRA24, SRA25	2 [ ]
	grey yellow	SRA10	3 [ ]
	grey orange	Q165	4 [ ]
	grey red		5 [ ]
	grey purple	RB72-454	6 [ ]
	purple		7 [ ]

	Characteristics	Example Varieties	Note
5.5 (10)	**Internode: color where <u>not exposed</u> to sun**		
	yellow		1 [ ]
	yellow green	SRA24, SRA25	2 [ ]
	grey yellow	QS01-1078	3 [ ]
	grey orange	Q220	4 [ ]
	grey red		5 [ ]
	grey purple	SRA9	6 [ ]
	purple		7 [ ]
5.6 (12)	**Internode: degree of zigzag**		
	absent or weak	Q124	1 [ ]
	medium	Q135, Q152	2 [ ]
	strong	H56-752	3 [ ]
5.7 (20)	**Node: shape of bud**		
	triangular-pointed	RB72-454	1 [ ]
	oval	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 at longitudinal mid-point**		
	very narrow		1 [ ]
	very narrow to narrow		2 [ ]
	narrow	Q113, Q186	3 [ ]
	narrow to medium		4 [ ]
	medium	Q121, Q124	5 [ ]
	medium to broad		6 [ ]
	broad	Q138, Q179	7 [ ]
	broad to very broad		8 [ ]
	very broad		9 [ ]

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”.

.....

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]