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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

CASTOR BEAN

UPOV Code(s): RICIN_COM

Ricinus communis L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by experts from South Africa
 to be considered by the
 Technical Working Party for Agricultural Crops
 at its forty-seventh session, to be held in Naivasha, Kenya,
 from 2018-05-21 to 2018-05-25*

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Ricinus communis</i> L.	Castorbean, Palmi-christi	Ricin	Palma Christi, Rizinus, Wunderbaum	Higuerilla, Ricino

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 *Ricinus communis* L..

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed.

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

500 seeds

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent 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*

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

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 Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

3.3.3 Because daylight varies, color determinations made against a color chart should be made either in a suitable cabinet providing artificial daylight or in the middle of the day in a room without direct sunlight. The spectral distribution of the illuminant for artificial daylight should conform with the CIE Standard of Preferred Daylight D 6500 and should fall within the tolerances set out in the British Standard 950, Part I. These determinations should be made with the plant part placed against a white background. The color chart and version used should be specified in the variety description.

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 40 plants, which should be divided between at least 2 replicates.

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 or Parts of Plants to be Examined

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

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 seed-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 The assessment of uniformity should be according to the recommendations for cross-pollinated varieties in the General Introduction.
- 4.2.4 The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.
- 4.2.5 For the assessment of uniformity of inbred line varieties, a population standard of 5% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 40 plants, 4 off-types are allowed.

4.3 *Stability*

- 4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.
- 4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed 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) Plant: height (characteristic 5)
- (b) Petiole: length (characteristic 10)
- (c) Petiole: anthocyanin coloration (characteristic 13)
- (d) Leaf blade: main color of veins (characteristic 22)
- (e) Plant: type of inflorescence (characteristic 24)
- (f) Inflorescence: shape (characteristic 28)
- (g) Capsule: spines (characteristic 35)
- (h) Capsule: dehiscence (characteristic 37)
- (i) Seed: main color (characteristic 42)

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 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*

		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)-(f) See Explanations on the Table of Characteristics in Chapter 8.1
- 7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8

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

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	QN	VG					15
	Hypocotyl: anthocyanin coloration						
	absent or weak					Tamar	1
	medium						2
	strong					Shira	3
2. (*)	QN	VG	(a)				55
	Immature leaf: anthocyanin coloration						
	absent or very weak					Dalia	1
	weak					Galit, Tamar	3
	medium						5
	strong					Limor	7
	very strong						9
3.	QL	VG	(a)				55
	Immature leaf: waxiness on upper side						
	absent					Kika, Kizzy, Shira, Suzan	1
	present					IAC 2028	9
4. (*)	QN	MG	(+)				61
	Time of beginning of flowering						
	early						3
	medium					Galit	5
	late					Tamar	7
5. (*)	QN	MG/MS	(+)				61-69
	Plant: height						
	short					Tamar	3
	medium					Reyna	5
	tall					Galit	7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.	QN	MG/MS			61-69	
	Plant: width					
	very narrow					1
	narrow					2
	medium				Tamar	3
	broad				Galit	4
	very broad					5
7.	QN	MS			61-69	
	Main stem: number of internodes					
	few				Kika, Shira, Tamar	3
	medium					5
	many				IAC 2028	7
8.	QN	MS/VG	(b)		61-69	
	Main stem: length of internode					
	very short					1
	short				Tamar	3
	medium					5
	long				Galit	7
	very long					9
9.	QN	MS/VG	(b)		61-69	
	Main stem: width of internode					
	narrow					1
	medium				Galit, Tamar	3
	broad					5
10. (*)	QN	MS/VG	(+)	(c)	61-69	
	Petiole: length					
	short				IBEA 17	1
	medium				Tamar	2
	long				Galit	3

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.	QN	MS/VG	(+)	(c)	61-69			
	Petiole: width							
	narrow							1
	medium					Galit		2
	broad					Tamar		3
12. (*)	QN	VG		(c)	61-69			
	Petiole: waxiness							
	absent or weak					16-OAX, Limor		1
	medium					IBEA 240		2
	strong					La Verde		3
13. (*)	QN	VG	(+)	(c)	61-69			
	Petiole: anthocyanin coloration							
	absent or very weak					Dalia		1
	weak					Galit		3
	medium					Tamar		5
	strong					Limor		7
	very strong							9
14. (*)	QN	MS/VG	(+)	(c)	61-69			
	Leaf blade: length							
	very short							1
	short					IBEA 330		3
	medium					Tamar		5
	long					Galit		7
	very long							9
15. (*)	QN	MS/VG	(+)	(c)	61-69			
	Leaf blade: width							
	very narrow					Colima		1
	narrow					IBEA 330		3
	medium					IBEA 205		5
	broad					Galit, Tamar		7
	very broad					La Roja		9

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16. (*)	QN	VG	(+)	(c)	61-69			
	Leaf blade: depth of sinus							
	shallow						HM 1	1
	medium						Galit, Tamar	3
	deep						Reyna	5
17.	QN	VG	(+)	(c)	61-69			
	Leaf blade: undulation							
	absent or weak						Galit	1
	medium						Tamar	2
	strong							3
18.	QN	VG		(c)	61-69			
	Leaf blade: blistering							
	absent or weak						Galit	1
	medium							2
	strong						Tamar	3
19. (*)	QN	VG		(c)	61-69			
	Leaf blade: dentation							
	fine						Galit	1
	medium						Tamar	2
	coarse						Reyna	3
20.	QN	VG	(+)	(c)	61-69			
	Leaf blade: ratio length/width of terminal lobe							
	low							1
	medium						Tamar	2
	high						Galit	3
21. (*)	PQ	VG	(+)	(c), (d)	61-69			
	Leaf blade: main color							
	light green						IBEA 303	1
	medium green						Galit	2
	dark green						Tamar	3
	purple green						IBEA 209	4
	green purple						IBEA 249	5
	purple						IBEA 350	6

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.	(*)	PQ	VG	(+)	(c), (d)	61-69		
		Leaf blade: main color of veins						
		green					Dalia	1
		yellow					Lagos	2
		orange					Shira	3
		red					Limor	4
23.		QN	VG	(+)	(c)	61-69		
		Leaf blade: anthocyanin coloration along veins						
		absent or very weak					Dalia	1
		weak					Galit	3
		medium					Tamar	5
		strong					IBEA 350	7
		very strong						9
24.	(*)	QL	VG		(e)	65		
		Plant: type of inflorescence						
		female and male flowers on separate inflorescences					Durango	1
		female and male flowers on the same inflorescence					IBEA 385	2
		female and hermaphrodite flowers on the same inflorescence					IBEA 328	3
25.	(*)	QN	VG	(+)	(e)	65		
		Inflorescence: density of male flowers						
		absent or very sparse					Dalia	1
		sparse						2
		medium						3
		dense						4
		very dense						5

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.	QN	VG		(e)	65			
	Inflorescence: position in relation to foliage							
	above							1
	same level							2
	below					Galit, Tamar		3
27.	QN	MG/MS	(+)	(e)	65			
	Inflorescence: length							
	very short							1
	short					Suzan		3
	medium					Kika, Tamar		5
	long					IAC 2028, Shira		7
	very long							9
28. (*)	PQ	VG	(+)	(e)	65			
	Inflorescence: shape							
	conical					IBEA 184		1
	globose					IBEA 180		2
	ellipsoid					Lagos		3
	cylindrical					Kika, Kizzy		4
	obconical					Suzan		5
29.	QN	VG		(e)	65			
	Anther: intensity of yellow color							
	light							1
	medium					Galit, Tamar		2
	dark							3
30. (*)	PQ	VG	(+)	(e)	65			
	Female flower: color of stigma							
	yellowish					Rincon		1
	orange					IBEA 385		2
	pink					Galit		3
	reddish					Tamar		4

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.	QN	VG		(e)	78			
	Infructescence: density of capsules							
	sparse						Destripasola	1
	medium						Galit, Tamar	2
	dense						IBEA 120	3
32.	QN	MS/VG	(+)	(f)	78			
	Capsule: length of pedicel							
	short						Destripasola	1
	medium						Galit, Tamar	2
	long						IBEA 120	3
33. (*)	QN	VG		(f)	78			
	Capsule: size							
	small						Lagos	1
	medium						Galit, Tamar	2
	large						Pelona	3
34. (*)	PQ	VG		(f)	78			
	Capsule: color							
	green						IBEA 27	1
	yellow green						IBEA 196	2
	reddish green						Limor	3
	blue green						Galit, Tamar	4
	orange						IBEA 385	5
	pink						IBEA 197	6
	purple						IBEA 350	7
35. (*)	QN	VG		(f)	78			
	Capsule: spines							
	absent or short						Pelona	1
	absent or short to medium						IBEA 120	2
	medium						Galit, Tamar	3
	medium to long							4
	long						Durango	5

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36.	QN	VG	(f)	78			
	Capsule: density of spines						
	sparse					Lagos	1
	medium					Ceniza	2
	dense					Destripasola	3
37. (*)	QL	VG	(f)	78-99			
	Capsule: dehiscence						
	absent					Durango	1
	present					Destripasola	9
38.	QL	VG		95			
	Capsule: abscission						
	absent					Cedaso	1
	present					Durango	9
39. (*)	QN	MS/VG		99			
	Seed: length						
	short					Cedaso	1
	medium					Lagos	3
	long					La Negra	5
40. (*)	QN	MS/VG		99			
	Seed: width						
	narrow					Cedaso	1
	medium					Lagos	3
	broad					La Negra	5
41. (*)	QN	MS/VG	(+)	99			
	Seed: ratio length/width						
	low					Cedaso	3
	medium					Lagos	5
	high					La Negra	7

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42.	(*)	PQ	VG	(d)	99		
		Seed: main color					
			white			IBEA 298	1
			light brown			IBEA 352	2
			medium brown			IBEA 95	3
			dark brown			IBEA 155	4
			reddish brown			La Roja	5
			light grey			Puesto	6
			dark grey			IBEA 401	7
			black			La Negra	8
43.		PQ	VG	(d)	99		
		Seed: secondary color					
			none			La Negra	1
			white			IBEA 007	2
			medium brown			IBEA 004	3
			dark brown			IBEA 009	4
44.	(*)	QN	VG	(+)	99		
		Seed: caruncle					
			absent or small			Rincon	1
			medium			IBEA 203	3
			large			IBEA 98	5

8. Explanations on the Table of Characteristics

8.1 *Explanations covering several characteristics*

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

- (a) Observations on the immature leaves should be made on leaves that have just finished unfolding.
- (b) Observations on the main stem should be made on the internode directly above the first attached leaf from the bottom of the plant.
- (c) Observations on the leaf and leaf parts should be made on a mature leaf from the middle third of the plant.
- (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.
- (e) Observations on the inflorescence and infructescence should be made on the terminal inflorescence/infructescence.
- (f) Observations should be made on mature capsules.

8.2 *Explanations for individual characteristics*

Ad. 4: Time of beginning of flowering

The time of beginning of flowering is when 50% of the plants have at least one open female flower.

Ad. 5: Plant: height

Observations should be made including the inflorescence.

Ad. 10: Petiole: length



Ad. 11: Petiole: width

To be observed at the middle third of the petiole.

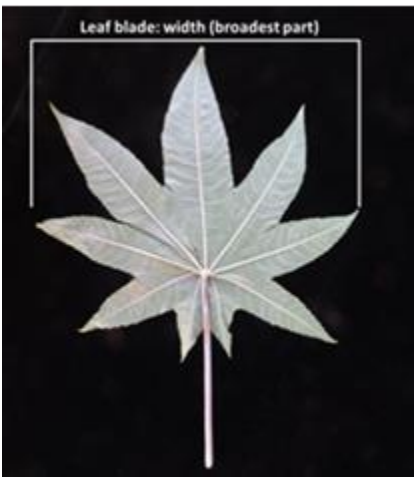
Ad. 13: Petiole: anthocyanin coloration

To be observed after wax has been removed by softly rubbing with fingers.

Ad. 14: Leaf blade: length



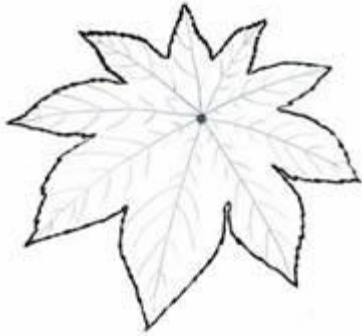
Ad. 15: Leaf blade: width



Ad. 16: Leaf blade: depth of sinus



Ad. 17: Leaf blade: undulation

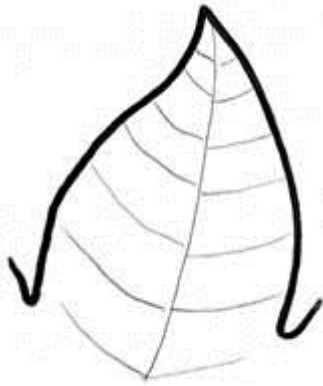


absent or weak
1

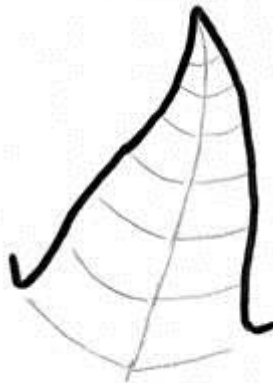


strong
3

Ad. 20: Leaf blade: ratio length/width of terminal lobe



low
1



medium
2



high
3

Ad. 21: Leaf blade: main color

To be observed on the upper/adaxial side of the leaf blade.

Ad. 22: Leaf blade: main color of veins

To be observed on the lower/abaxial side of the leaf blade.

Ad. 23: Leaf blade: anthocyanin coloration along veins

To be observed on the lower/abaxial side of the leaf blade.

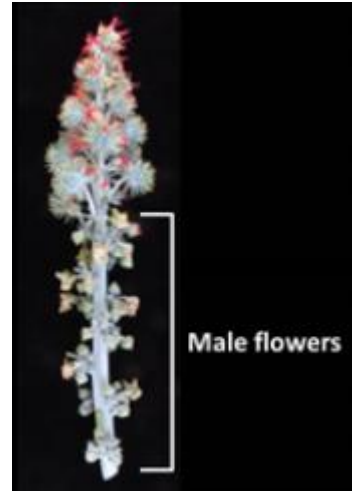
Ad. 25: Inflorescence: density of male flowers



absent or very sparse
1

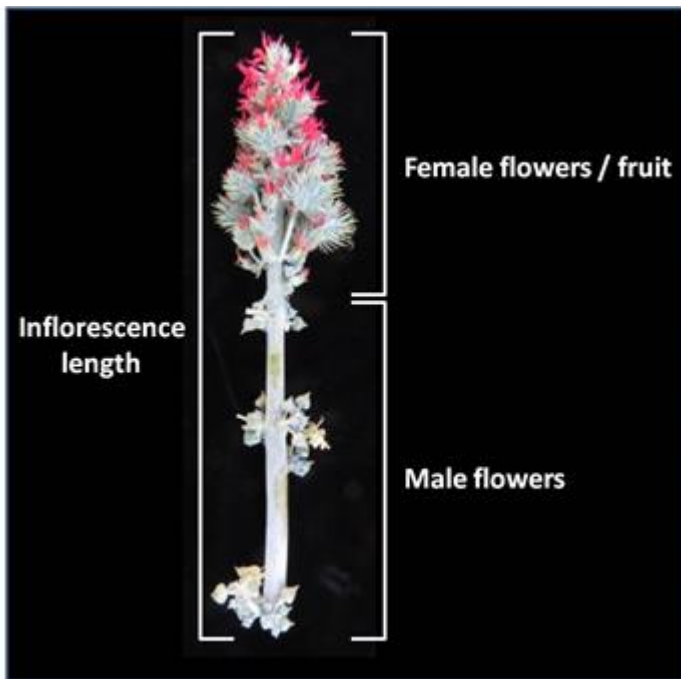


medium
3








dense
4

Ad. 27: Inflorescence: length



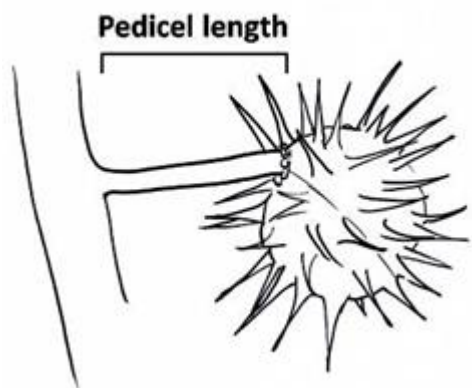
Ad. 28: Inflorescence: shape

width (ratio length/width)	← broadest part →		
	below middle	at middle	above middle
narrow (high)		 4 cylindrical	
medium (medium)	 1 conical	 3 ellipsoid	 5 obconical
broad (low)		 2 globose	

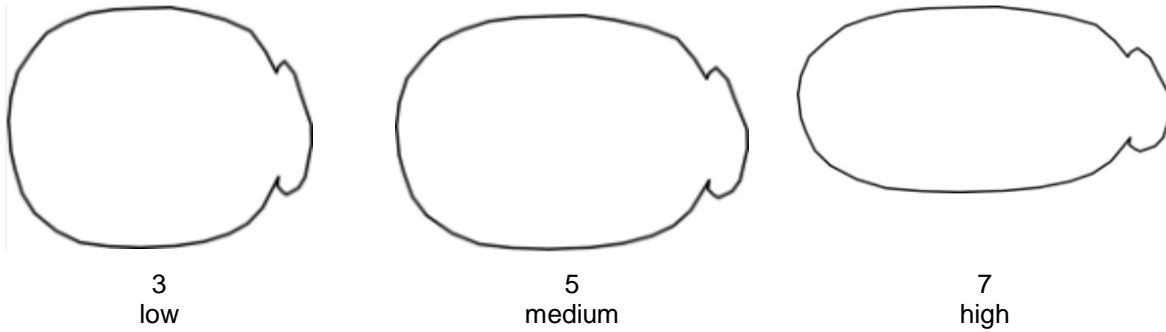
Ad. 30: Female flower: color of stigma

To be observed before pollination occurs.

Ad. 32: Capsule: length of pedicel

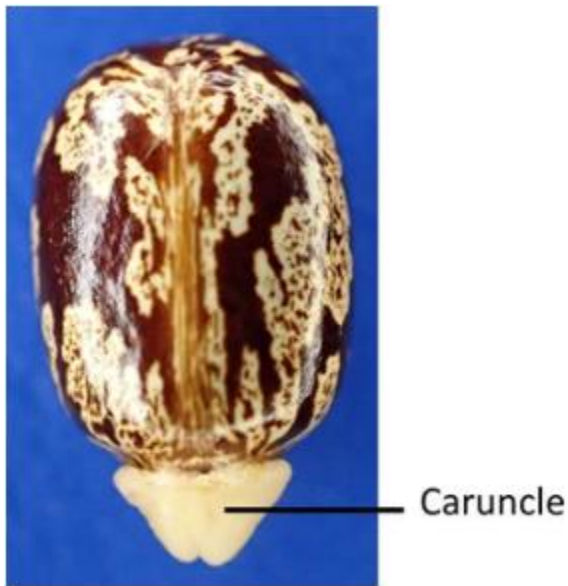


Ad. 41: Seed: ratio length/width



Ad. 44: Seed: caruncle

The caruncle is a spongelike growth on the seed.



8.3

Growth Stage	Code	Description
1. Emergence	15	Cotyledons completely unfolded
5. Inflorescence emergence	55	First flower bud visible
6. Flowering	61	Beginning of flowering
	65	Full flowering
	69	End of flowering
7. Development of fruit	78	80% of fruits mature
	95	50% of fruits are dry
9. Senescence	99	Harvested product

9. Literature

Goytia J, M.A., Gallegos G, R. Gallegos C, R., Barrales D, S., Zarate B, R., Macias C, U.A., Jiménez R, E., Benigno C, P., Vázquez R, J., Garcia G, O., Méndez F, E.I., Nolasco J, U., 2015: Paquete tecnológico para la producción de Higuierilla (*Ricinus communis* L.) en Valles Centrales de Oaxaca. Universidad Autónoma Chapingo. Texcoco, MX, p. 120.

Goytia J, M.A., Gallegos G, R. Sánchez H, R.F., Ramirez, M.E., 2013: Manual Gráfico para la Descripción Varietal de la Higuierilla (*Ricinus communis* L.). Universidad Autónoma Chapingo. Texcoco, MX, p. 78.

Goytia J, M.A., Ramirez, M.E., Gallegos G, R., Ruíz T, J.D., Carballo C, A., 2014: Guía técnica para la descripción varietal de higuierilla (*Ricinus communis* L.). Sagarpa & Snics. Tlalnepantla, MX, p. 29.

Henderson, M., Anderson, J.G., 1966: Common Weeds in South Africa. Botanical Survey, Memoir No. 37, Botanical Research Institute. ZA, pp. 206 to 207.

Kellerman, T.S., Coetzer, J.A.W., Naude, T.W., 1988: Plant Poisonings and Mycotoxicoses of Livestock in Southern Africa. Oxford University Press. Cape Town, ZA, pp. 144 to 145.

Purseglove, J.W., 1968: Tropical Crops. Dicotyledons 1. Longmans, Green & Co. Ltd. London, GB, pp. 180 to 185.

Thiselton-Dyer, W.T., 1925: XXXII. Ricinus, Linn. Flora Capensis, Volume V, Section 2. L. Reeve & Co. Ltd. Covent Garden, GB, p. 487.

Van Wyk, B-E., Van Heerden, F., Van Oudtshoorn, B., 2002: Poisonous plants of South Africa. Briza Publications. Pretoria, ZA, p. 180.

Watt, J.M., Breyer-Brandwijk, M.G., 1962: The Medicinal and Poisonous Plants of Southern and Eastern Africa. E. & S. Livingstone Ltd. Edinburgh & London, GB, pp. 428 to 435.

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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	Application date: (not to be filled in by the applicant)
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TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire

1.1 Botanical name

1.2 Common name

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:
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#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 Discovery and development
(please state where and when discovered and how developed)

4.1.3 Mutation
(please state parent variety)

4.1.4 Other
(Please provide details)

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

- (a) Cross-pollination []
- (b) Hybrid []
- (c) Other (please provide details) []

4.2.2 Other []
(Please provide details)

In the case of hybrid varieties the production scheme for the hybrid should be provided on a separate sheet. This should provide details of all the parent lines required for propagating the hybrid e.g.

Single Hybrid

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

Three-Way Hybrid

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

(.....) x (.....)
single hybrid used as female parent male parent

and should identify in particular:

- (a) any male sterile lines
- (b) maintenance system of male sterile lines.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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 Plant: height (5)		
very short		1 []
very short to short		2 []
short	Tamar	3 []
short to medium		4 []
medium	Reyna	5 []
medium to tall		6 []
tall	Galit	7 []
tall to very tall		8 []
very tall		9 []
5.2 Petiole: length (10)		
short	IBEA 17	1 []
medium	Tamar	2 []
long	Galit	3 []
5.3 Petiole: anthocyanin coloration (13)		
absent or very weak	Dalia	1 []
absent or very weak to weak		2 []
weak	Galit	3 []
weak to medium		4 []
medium	Tamar	5 []
medium to strong		6 []
strong	Limor	7 []
strong to very strong		8 []
very strong		9 []
5.4 Leaf blade: main color of veins (22)		
green	Dalia	1 []
yellow	Lagos	2 []
orange	Shira	3 []
red	Limor	4 []

Characteristics	Example Varieties	Note
5.5 Plant: type of inflorescence (24)		
female and male flowers on separate inflorescences	Durango	1 []
female and male flowers on the same inflorescence	IBEA 385	2 []
female and hermaphrodite flowers on the same inflorescence	IBEA 328	3 []
5.6 Inflorescence: shape (28)		
conical	IBEA 184	1 []
globose	IBEA 180	2 []
ellipsoid	Lagos	3 []
cylindrical	Kika, Kizzy	4 []
obconical	Suzan	5 []
5.7 Capsule: spines (35)		
absent or short	Pelona	1 []
absent or short to medium	IBEA 120	2 []
medium	Galit, Tamar	3 []
medium to long		4 []
long	Durango	5 []
5.8 Capsule: dehiscence (37)		
absent	Durango	1 []
present	Destripasola	9 []
5.9 Seed: main color (42)		
white	IBEA 298	1 []
light brown	IBEA 352	2 []
medium brown	IBEA 95	3 []
dark brown	IBEA 155	4 []
reddish brown	La Roja	5 []
light grey	Puesto	6 []
dark grey	IBEA 401	7 []
black	La Negra	8 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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
<i>Example</i>	<i>Leaf blade: undulation</i>	<i>weak</i>	<i>medium</i>
Comments:			

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#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	<input type="checkbox"/>	No <input type="checkbox"/>
	(If yes, please provide details)		
7.2	Are there any special conditions for growing the variety or conducting the examination?		
	Yes	<input type="checkbox"/>	No <input type="checkbox"/>
	(If yes, please provide details)		
7.3	Other information		

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