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DRAFT

MULBERRY

UPOV Code(s): MORUS

Morus L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by an expert from Japan**to be considered by**the Technical Committee at its fifty-ninth session
to be held in Geneva on October 23 and 24, 2023**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>Morus L.</i>	Mulberry	Mûrier	Maulbeerbaum	Moro

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 *Morus* 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 plants on their own roots or on a rootstock specified by the competent authority.

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

5 plants for varieties resulting from crossing
10 plants for varieties resulting from mutation

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 may be observed from a single planting, examined in two separate growing cycles.

3.1.3 In particular, it is essential that the plants produce a satisfactory crop of fruit in each of the two growing cycles. In the case of male varieties, it is essential that the plants produce a satisfactory number of flowers in each of the two growing cycles.

3.1.4 The growing cycle is considered to be the duration of a single growing season, beginning with bud burst (flowering and/or vegetative), flowering and fruit harvest and concluding when the following dormant period ends with the swelling of new season buds.

3.1.5 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 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.

3.4 *Test Design*

3.4.1 In the case of varieties resulting from crossing, each test should be designed to result in a total of at least 5 plants.

3.4.2 In the case of varieties resulting from mutation, each test should be designed to result in a total of at least 10 plants.

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 3 plants or parts of plants taken from each of 3 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 at least be 2.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the 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 varieties resulting from crossing, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 5 plants, no off-types are allowed.

4.2.4 For the assessment of uniformity of varieties resulting from mutation, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 10 plants, 1 off-type is allowed.

4.3 *Stability*

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial
- 5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.
- 5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.
- 5.3 The following have been agreed as useful grouping characteristics:
 - (a) Leaf bud: shape (characteristic 11)
 - (b) Leaf: phyllotaxis (characteristic 13)
 - (c) Leaf blade: presence of lobes (characteristic 23)
 - (d) Inflorescence: sex expression (characteristic 33)
 - (e) Infructescence: color (characteristic 40)
- 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)-(d) 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					
	Tree: vigor	Arbre : vigueur	Baum: Wuchsstärke	Árbol: vigor		
	weak	faible	gering	débil	Sekizaiso	1
	medium	moyenne	mittel	medio	Ichinose	2
	strong	forte	stark	fuerte	Kenmochi, Oyutaka, Senshin	3
2. (*)	PQ VG	(+)				
	Tree: growth habit	Arbre : port	Baum: Wuchsform	Árbol: hábito de crecimiento		
	upright	dressé	aufrecht	erguido	Mitsuminami, Piramidale, Tokiyutaka	1
	semi-upright	demi-dressé	halbaufrecht	semierguido	Ichinose, Kenmochi	2
	spreading	étalé	breitwüchsig	extendido	Ayanobori, Hayatesakari, Platanoide, Yukishinogi	3
	drooping	pendant	überhängend	colgante	Sekizaiso	4
	weeping	pleureur	lang überhängend	llorón	Pendula, Shidareguwa	5
3.	QN VG	(a)				
	Current year's shoot: number	Rameau de l'année en cours : nombre	Diesjähriger Trieb: Anzahl	Rama del año en curso: número		
	few	petit	gering	bajo	Shin-Ichinose	1
	few to medium	petit à moyen	gering bis mittel	bajo a medio		2
	medium	moyen	mittel	medio	Ichinose, Kenmochi	3
	medium to many	moyen à élevé	mittel bis hoch	medio a alto		4
	many	élevé	hoch	alto	Kairyo-Nezumigaeshi Yukishinogi	5
4.	QN VG	(a)				
	Current year's shoot: number of lateral shoots	Rameau de l'année en cours : nombre de rameaux latéraux	Diesjähriger Trieb: Anzahl Seitentriebe	Rama del año en curso: número de ramas laterales		
	absent or few	absent ou petit	fehlend oder gering	ausente o bajo	Ichinose, Kenmochi, Tokiyutaka	1
	medium	moyen	mittel	medio	Kairyo-Nezumigaeshi	2
	many	élevé	hoch	alto	Jumonji, Keikanso	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	QN	MG/MS/VG	(a)			
	Current year's shoot: length	Rameau de l'année en cours : longueur	Diesjähriger Trieb: Länge	Rama del año en curso: longitud		
	short	courte	kurz	corta	Negoyatakasuke	1
	short to medium	courte à moyenne	kurz bis mittel	corta a media		2
	medium	moyenne	mittel	media	Ichinose, Kenmochi	3
	medium to long	moyenne à longue	mittel bis lang	media a larga		4
	long	longue	lang	larga	Shin-Ichinose	5
6. (*)	QN	VG	(+)	(a)		
	Current year's shoot: zigzag habit	Rameau de l'année en cours : port du zigzag	Diesjähriger Trieb: Zickzack-Haltung	Rama del año en curso: hábito de zigzag		
	absent or weak	absent ou faible	fehlend oder gering	ausente o débil	Ichinose, Yue Shen Da 10	1
	medium	moyen	mittel	medio	He Ye Bai	2
	strong	fort	stark	fuerte	Hu Bei Wan Tiao, Unryu	3
7.	QL	VG	(+)	(a)		
	Current year's shoot: twisting	Rameau de l'année en cours : torsion	Diesjähriger Trieb: Drehung	Rama del año en curso: torsión		
	absent	absente	fehlend	ausente		1
	present	présente	vorhanden	presente	Sinuense	9
8.	PQ	VG	(a)			
	Current year's shoot: color	Rameau de l'année en cours : couleur	Diesjähriger Trieb: Farbe	Rama del año en curso: color		
	greyish brown	brun grisâtre	gräulichbraun	marrón grisáceo	Mizusawaguwa	1
	greenish brown	brun verdâtre	grünlichbraun	marrón verdoso	Shin-Ichinose	2
	yellowish brown	brun jaunâtre	gelblichbraun	marrón amarillento	Fukushimaoha	3
	reddish brown	brun rougeâtre	rötlichbraun	marrón rojizo	Ichibei	4
	medium brown	brun moyen	mittelbraun	marrón medio	Rohachi	5
	dark brown	brun foncé	dunkelbraun	marrón oscuro	Kenmochi	6
	light grey	gris clair	hellgrau	gris claro	Ichinose	7
9. (*)	QN	MG/MS/VG	(+)	(a)		
	Current year's shoot: length of internode	Rameau de l'année en cours : longueur de l'entre-nœud	Diesjähriger Trieb: Länge des Internodiums	Rama del año en curso: longitud del entrenudo		
	short	courte	kurz	corta	Sinuense, Tokiyutaka	1
	medium	moyenne	mittel	media	Ichinose, Kenmochi	2
	long	longue	lang	larga	Ichibei	3

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. (*)	QN	VG	(a)				
	Leaf bud: size	Bourgeon à feuilles : taille	Blattknospe: Größe	Yema foliar: tamaño			
	small	petite	klein	pequeño	Shin-Ichinose	1	
	medium	moyenne	mittel	medio	Ichinose, Kenmochi	2	
	large	grande	groß	grande	Yukishinogi	3	
11. (*)	PQ	VG	(+)	(a)			
	Leaf bud: shape	Bourgeon à feuilles : forme	Blattknospe: Form	Yema foliar: forma			
	broad triangular	triangulaire large	breit dreieckig	triangular ancha	Atsubamidori, Filippine, Shin-Ichinose	1	
	medium triangular	triangulaire moyenne	mittel dreieckig	triangular media	Cattaneo fem., Florio, Ichinose, Kenmochi, Morettiana	2	
	narrow triangular	triangulaire étroite	schmal dreieckig	triangular estrecha	Wasemidori	3	
	ovate	ovale	eiförmig	oval	Negoyatakasuke	4	
12. (*)	PQ	VG	(a)				
	Leaf bud: color	Bourgeon à feuilles : couleur	Blattknospe: Farbe	Yema foliar: color			
	greyish brown	brun grisâtre	gräulichbraun	marrón grisáceo	Atsubamidori	1	
	yellowish brown	brun jaunâtre	gelblichbraun	marrón amarillento	Kokuso 27	2	
	reddish brown	brun rougeâtre	rötlichbraun	marrón rojizo	Ichibei	3	
	medium brown	brun moyen	mittelbraun	marrón medio	Ichinose	4	
	dark brown	brun foncé	dunkelbraun	marrón oscuro	Kenmochi	5	
	light grey	gris clair	hellgrau	gris claro	Shin-Ichinose, Shiromeroso	6	
13. (*)	QL	VG	(+)				
	Leaf: phyllotaxis	Feuille : phyllotaxie	Blatt: Blattstellung	Hoja: filotaxis			
	one half	une moitié	ein Halb	una mitad	Chijimiguwa, Filippine, Negoyatakasuke	1	
	one third	un tiers	ein Drittel	un tercio		2	
	two fifth	deux cinquièmes	zwei Fünftel	dos quintos	Cattaneo fem., Florio, Ichinose, Kenmochi	3	
	three eighth	trois huitièmes	drei Achtel	tres octavos	Morettiana, Wasemidori	4	
	five thirteenth	cinq treizième	fünf Dreizehntel	cinco treceavos		5	

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14. (*)	QN	VG	(+)				
	Leaf: attitude		Feuille : port	Blatt: Haltung	Hoja: porte		
	upwards		vers le haut	aufwärts gerichtet	ascendente	Jikunashi	1
	outwards		vers l'extérieur	abstehend	orientado hacia el exterior	Ichinose, Kenmochi	2
	downwards		vers le bas	abwärts gerichtet	orientado hacia abajo	Asayuki, Shin-Ichinose	3
15. (*)	QN	MG/MS/VG	(+)	(b)			
	Leaf blade: length		Limbe : longueur	Blattspreite: Länge	Limbo: longitud		
	very short		très courte	sehr kurz	muy corta		1
	very short to short		très courte à courte	sehr kurz bis kurz	muy corta a corta		2
	short		courte	kurz	corta	Kibajumonji, Romana rabelaire	3
	short to medium		courte à moyenne	kurz bis mittel	corta a media		4
	medium		moyenne	mittel	media	Ichinose, Restelli	5
	medium to long		moyenne à longue	mittel bis lang	media a larga		6
	long		longue	lang	larga	Indiana, Platanoide, Popberry	7
	long to very long		longue à très longue	lang bis sehr lang	larga a muy larga		8
	very long		très longue	sehr lang	muy larga		9
16. (*)	QN	MG/MS/VG	(+)	(b)			
	Leaf blade: width		Limbe : largeur	Blattspreite: Breite	Limbo: anchura		
	very narrow		très étroite	sehr schmal	muy estrecha	Nervosa	1
	very narrow to narrow		très étroite à étroite	sehr schmal bis schmal	muy estrecha a estrecha		2
	narrow		étroite	schmal	estrecha	Indiana, Kibajumonji	3
	narrow to medium		étroite à moyenne	schmal bis mittel	estrecha a media		4
	medium		moyenne	mittel	media	Ichinose	5
	medium to broad		moyenne à large	mittel bis breit	media a ancha		6
	broad		large	breit	ancha	Popberry	7
	broad to very broad		large à très large	breit bis sehr breit	ancha a muy ancha		8
	very broad		très large	sehr breit	muy ancha	Platanoide	9
17.	QN	MG/MS/VG		(b)			
	Leaf blade: ratio length/width		Limbe : rapport longueur/largeur	Blattspreite: Verhältnis Länge/Breite	Limbo: relación longitud/anchura		
	low		bas	klein	baja		1
	medium		moyen	mittel	media	Ichinose, Kenmochi	2
	high		élevé	groß	alta		3

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18. (*)	QN	MG/MS/VG	(+)	(b)				
	Leaf blade: thickness	Limbe : épaisseur	Blattspreite: Dicke	Limbo: grosor				
	thin	mince	dünn	delgado	Kokuso 27, Shiwasuguwa, Yukishinogi		1	
	medium	moyenne	mittel	medio	Ichinose, Kenmochi		2	
	thick	épaisse	dick	grueso	Atsubamidori, Ayanobori, Shin-Kenmochi		3	
19. (*)	PQ	VG	(+)	(b)				
	Leaf blade: length of tip	Limbe : longueur de l'extrémité	Blattklinge: Länge der Spitze	Limbo: longitud de la punta				
	absent or short	absente ou courte	fehlend oder kurz	ausente o corta	Romana rabelaire, Rougetto		1	
	medium	moyenne	mittel	media	Indiana, Kenmochi, Limoncina		2	
	long	longue	lang	larga	Ascolana, Florio, Fukayuki, Takinokawa		3	
20.	PQ	VG	(+)	(b)				
	Leaf blade: shape of apex	Limbe : forme de l'apex	Blattspreite: Form des Apex	Limbo: forma del ápice				
	acute	aigue	spitz	aguda	Ichinose		1	
	obtuse	obtuse	stumpf	obtusa	Jikunashi		2	
	obcordate	obcordée	verkehrt herzförmig	obcordada	Niken		3	
21.	PQ	VG		(b)				
	Leaf blade: shape	Limbe : forme	Blattspreite: Form	Limbo: forma				
	triangular	triangulaire	dreieckig	triangular	Florio		1	
	cordate	cordiforme	herzförmig	cordada	Arancina, Ascolana		2	
	ovate	ovale	eiförmig	oval	Illinois Everbearing, Nervosa, Planifolia		3	
	circular	circulaire	kreisförmig	circular	Kokka		4	
	pentagonal	pentagonale	fünfeckig	pentagonal	Ichinose		5	
22. (*)	PQ	VG	(+)	(b)				
	Leaf blade: shape of base	Limbe : forme de la base	Blattspreite: Form der Basis	Limbo: forma de la base				
	cuneate	cunée	keilförmig	cuneada	Nervosa, Popberry		1	
	truncate	tronquée	gerade	truncada	Goshoerami, Jumonji, Kokuso 70, Negoyatakasuke		2	
	retuse	rétuse	eingedrückt	retusa	Kenmochi, Restelli, Rosa di Lombardia		3	
	cordate	cordiforme	herzförmig	cordada	Arancina, Ichinose, Romana rabelaire		4	

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23. (*)	QL	VG	(b)				
	Leaf blade: presence of lobes		Limbe : présence de lobes	Blattspreite: Vorhandensein von Lappen	Limbo: presencia de lóbulos		
	absent		absente	fehlend	ausente	Arancina, Florio	1
	present		présente	vorhanden	presente		9
24. (*)	QN	VG	(+)	(b)			
	Only varieties with lobes present: Leaf blade: depth of sinus		Seulement variétés avec lobes présents : Limbe : profondeur du sinus	Nur Sorten mit vorhandenen Lappen: Blattspreite: Tiefe der Einbuchtung	Solo variedades con lóbulos presentes: Limbo: profundidad del seno		
	shallow		peu profonde	flach	poco profunda	Florio, Limoncina, Rohachi, Takinokawa	1
	shallow to medium		peu profonde à moyenne	flach bis mittel	poco profunda a media	Akagi, Shimanouchi, Shin-Ichinose	2
	medium		moyenne	mittel	media	Ichinose	3
	medium to deep		moyenne à profonde	mittel bis tief	media a profunda	Indiana, Kenmochi	4
	deep		profonde	tief	profunda	Platanoide	5
25.	PQ	VG	(+)	(b)			
	Leaf blade: margin		Limbe : bord	Blattspreite: Rand	Limbo: borde		
	repand		onduleux	ausgeschweift	repando	Ichinose	1
	crenate		crénelé	gekerbt	crenado	Kairyo-Roso, Kanmasari, Limoncina, Rougetto, Shin-Ichinose	2
	dentate		denté	gezähnt	dentado	Ascolana, Fukushimaoha, Restelli	3
	serrulate		serrulé	fein gesägt	serrulado	Kenmochi, Oshimaso, Planifolia	4
	serrate		dentelé	gesägt	serrado	Akameroso, Hicks Fancy	5
	biserrate		bidentelé	doppelt gesägt	biserrado	Florio	6
	aristate		aristé	begrannt	aristado	Nervosa	7
26.	QN	VG	(b)				
	Leaf blade: texture		Limbe : texture	Blattspreite: Textur	Limbo: textura		
	smooth		lisse	glatt	lisa	Florio, Indiana, Kairyo-Roso, Muki	1
	medium		moyenne	mittel	media	Kokuso 27	2
	rough		rugueuse	rauh	rugosa	Ichibeï, Korin	3

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27.	QN	VG	(b)				
	Leaf blade: blistering of surface	Limbe : cloûre de la surface	Blattspreite: Blasigkeit der Oberfläche	Limbo: abullonado de la superficie			
	absent or weak	absente ou faible	fehlend oder gering	ausente o débil	Arancina, Illinois Everbearing	1	
	medium	moyenne	mittel	medio	Cattaneo fem., Florio	2	
	strong	forte	stark	fuerte	Platanoide	3	
28. (*)	PQ	VG	(b)				
	Leaf blade: color of upper side	Limbe : couleur de la face supérieure	Blattspreite: Farbe der Oberseite	Limbo: color del haz			
	light green	vert clair	hellgrün	verde claro	Hicks Fancy, Kairyo-Roso, Romana rabelaire	1	
	medium green	vert moyen	mittelgrün	verde medio	Ichinose, Illinois Everbearing	2	
	dark green	vert foncé	dunkelgrün	verde oscuro	Florio, Indiana, Kenmochi, Shin-Kenmochi, Yukiasahi	3	
	yellowish green	vert jaunâtre	gelblichgrün	verde amarillento	Goshoerami, Kibajumonji, Planifolia	4	
29.	QN	VG	(b)				
	Leaf blade: glossiness of upper side	Limbe : brillance de la face supérieure	Blattspreite: Glanz der Oberseite	Limbo: brillo del haz			
	absent or weak	absente ou faible	fehlend oder gering	ausente o débil	Ichibei, Keguwa	1	
	medium	moyenne	mittel	medio	Ichinose, Kenmochi	2	
	strong	forte	stark	fuerte	Shin-Kenmochi	3	
30.	QN	VG	(+)	(b)			
	Leaf blade: shape in cross section	Limbe : forme en section transversale	Blattspreite: Form im Querschnitt	Limbo: forma en sección transversal			
	concave	concave	konkav	cóncava	Lun Jian 109	1	
	flat	plate	flach	plana	Yue Shen Da 10	2	
	convex	convexe	konvex	convexa	Wan Nian Sang	3	

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.	QN	MG/MS/VG	(b)			
	Petiole: length	Pétirole : longueur	Blattstiel: Länge	Pecíolo: longitud		
	absent or very short	absente ou très courte	fehlend oder sehr kurz	ausente o muy corta	Jikunashi	1
	very short to short	très courte à courte	sehr kurz bis kurz	muy corta a corta		2
	short	courte	kurz	corta	Queensland Black, Rougetto, Sanchutakasuke	3
	short to medium	courte à moyenne	kurz bis mittel	corta a media		4
	medium	moyenne	mittel	media	Arancina, Ascolana, Ichinose, Kenmochi	5
	medium to long	moyenne à longue	mittel bis lang	media a larga		6
	long	longue	lang	larga	Indiana, Kokka, Shiromekeiso	7
	long to very long	longue à très longue	lang bis sehr lang	larga a muy larga		8
	very long	très longue	sehr lang	muy larga	Nervosa	9
32.	PQ	VG	(c)			
	Flower bud: color	Bouton floral : couleur	Blütenknospe: Farbe	Yema floral: color		
	light brown	brun clair	hellbraun	marrón claro	Indiana	1
	medium brown	brun moyen	mittelbraun	marrón medio	Florio	2
	dark brown	brun foncé	dunkelbraun	marrón oscuro	Cattaneo male	3
	reddish brown	brun rougeâtre	rötlichbraun	marrón rojizo	Kokuso 21, Kokuso 27, Muki	4
33. (*)	QL	VG	(c)			
	Inflorescence: sex expression	Inflorescence : expression du sexe	Blütenstand: Geschlechtsverteilung	Inflorescencia: expresión del sexo		
	male	mâle	männlich	masculina	Akameroso, Cattaneo male, Shimanouchi	1
	hermaphrodite	hermaphrodite	zwitterig	hermafrodita	Akagi, Philippine, Oshimaso	2
	female	femelle	weiblich	femenina	Cattaneo fem., Ichinose, Kenmochi	3
34. (*)	QN	VG	(c)			
	Excluding staminate varieties: Inflorescence: number of pistillate clusters	À l'exclusion des variétés staminées : Inflorescence : nombre de bouquets pistillés	Ohne staminate Sorten: Blütenstand: Anzahl pistillater Dolden	Excluidas las variedades estaminadas: Inflorescencia: número de racimos pistilados		
	few	petit	gering	bajo	Ichibei	1
	medium	moyen	mittel	medio	Ichinose	2
	many	élevé	groß	alto	Kenmochi	3

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35. (*)	PQ	VG	(+)	(d)				
	Infructescence: shape	Infructescence : forme	Fruchtstand: Form	Infructescencia: forma				
	globose	globuleuse	kugelförmig	globosa	Piramidale		1	
	ellipsoid	ellipsoïde	ellipsoid	elipsoide	Ascolana, Florio, Lalaberry		2	
	cylindric	cylindrique	zylindrisch	cilíndrica	Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoïde		3	
36.	QN	MG/MS/VG	(d)					
	Infructescence: length	Infructescence : longueur	Fruchtstand: Länge	Infructescencia: longitud				
	short	courte	kurz	corta	Piramidale		1	
	short to medium	courte à moyenne	kurz bis mittel	corta a media	Akagi, Lhou		2	
	medium	moyenne	mittel	media	Ichinose, Kenmochi, Morettiana		3	
	medium to long	moyenne à longue	mittel bis lang	media a larga	Kokka, Muki		4	
	long	longue	lang	larga	Lalaberry, Planifolia, Popberry, Restelli		5	
37.	QN	MG/MS/VG	(d)					
	Infructescence: width	Infructescence : largeur	Fruchtstand: Breite	Infructescencia: anchura				
	narrow	étroite	schmal	estrecha	Planifolia, Platanoïde		1	
	medium	moyenne	mittel	media	Filippine, Florio, Ichinose, Kenmochi		2	
	broad	large	breit	ancha	Ascolana, Lalaberry, Piramidale, Popberry		3	
38.	QN	MG/MS/VG	(d)	(e)				
	Infructescence: ratio length/width	Infructescence : rapport longueur/largeur	Fruchtstand: Verhältnis Länge/Breite	Infructescencia: relación longitud/anchura				
	low	bas	klein	baja			1	
	medium	moyen	mittel	media	Ichinose, Kenmochi		2	
	high	élevé	groß	alta			3	
39. (*)	QN	MG/MS	(d)					
	Infructescence: weight	Infructescence : poids	Fruchtstand: Gewicht	Infructescencia: peso				
	low	bas	gering	bajo	Piramidale		1	
	medium	moyen	mittel	medio	Ichinose, Kenmochi		2	
	high	élevé	hoch	alto	Lalaberry		3	

	English		français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
40. (*)	PQ	VG	(d)				
	Infructescence: color	Infructescence : couleur	Fruchtstand: Farbe	Infructescencia: color			
	white	blanc	weiß	blanco	Ege Beyaz, Giazzola, Morettiana	1	
	yellowish white	blanc jaunâtre	gelblichweiß	blanco amarillento	Ascolana	2	
	pink	rose	rosa	rosa	Kokka, Muki, Piramidale	3	
	reddish purple	pourpre rougeâtre	rötlichpurpurn	púrpura rojizo	Kozaemon, Restelli	4	
	light purple	pourpre clair	hellpurpurn	púrpura claro	Tagowase	5	
	dark purple	pourpre foncé	dunkelpurpurn	púrpura oscuro	Florio, Lhou	6	
	black purple	pourpre noirâtre	schwarzpurn	negro púrpura	Cattaneo fem., Ichinose, Indiana, Kenmochi, Lalaberry	7	
41. (*)	QN	MG/MS/VG	(d)				
	Infructescence: length of peduncle	Infructescence : longueur du pédoncule	Fruchtstand: Länge des Blütenstandsstiels	Infrutescencia: longitud del pedúnculo			
	short	courte	kurz	corta	Ascolana, Giazzola, Lalaberry	1	
	short to medium	courte à moyenne	kurz bis mittel	corta a media	Kokka	2	
	medium	moyenne	mittel	media	Cattaneo fem., Ichinose, Kenmochi	3	
	medium to long	moyenne à longue	mittel bis lang	media a larga	Filippine	4	
	long	longue	lang	larga	Kozaemon, Platanoide	5	
42. (*)	QN	MG/VG	(+)				
	Time of leaf bud burst	Époque du débourrement foliaire	Zeitpunkt des Öffnens der Blattknopse	Época de brotación de la yema foliar			
	early	précoce	früh	temprana	Ichibei, Wasemidori	1	
	early to medium	précoce à moyenne	früh bis mittel	temprana a media		2	
	medium	moyenne	mittel	media	Ichinose, Kenmochi	3	
	medium to late	moyenne à tardive	mittel bis spät	media a tardía		4	
	late	tardive	spät	tardía	Akagi, Shinjiro	5	
43.	QN	MG/VG	(+)				
	Time of flowering	Époque de floraison	Zeitpunkt der Blüte	Época de floración			
	early	précoce	früh	temprana		1	
	early to medium	précoce à moyenne	früh bis mittel	temprana a media		2	
	medium	moyenne	mittel	media	Ichinose, Kenmochi, Lalaberry	3	
	medium to late	moyenne à tardive	mittel bis spät	media a tardía		4	
	late	tardive	spät	tardía		5	

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44. (*)	QN	MG/VG	(+)			
	Time of fruit ripening	Époque de maturité des fruits	Zeitpunkt der Fruchtreife	Época de la madurez del fruto		
	early	précoce	früh	temprana		1
	early to medium	précoce à moyenne	früh bis mittel	temprana a media		2
	medium	moyenne	mittel	media	Ichinose, Kenmochi, Lalaberry	3
	medium to late	moyenne à tardive	mittel bis spät	media a tardía		4
	late	tardive	spät	tardía		5

8. Explanations on the Table of Characteristics

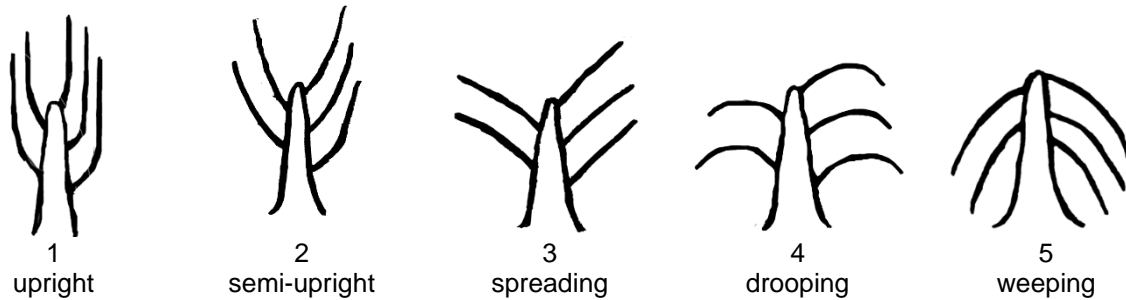
8.1 *Explanations covering several characteristics*

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

- (a) Observations should be made during winter dormancy.
- (b) Observations should be made on the largest leaf on the upper third of the shoot in harvest time.
- (c) Observations should be made at the time of full flowering.
- (d) Observations should be made at the time of full maturity.

8.2 *Explanations for individual characteristics*

Ad. 2: Tree: growth habit



Ad. 6: Current year's shoot: zigzag habit



Ad. 7: Current year's shoot: twisting

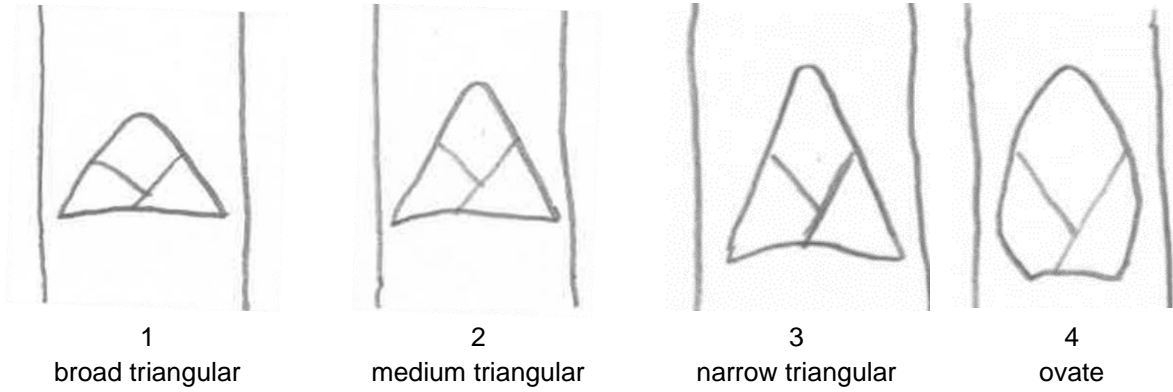
Twisting is a three-dimensional characteristic.

Ad. 9: Current year's shoot: length of internode



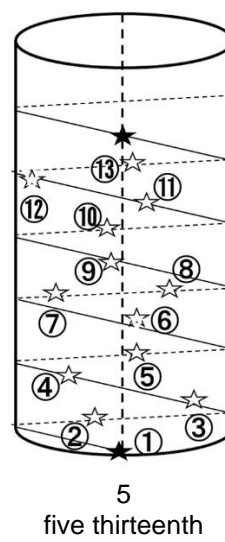
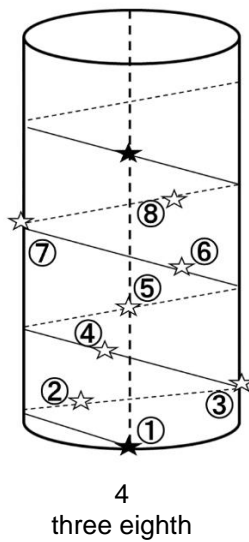
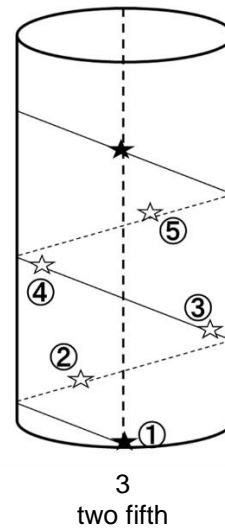
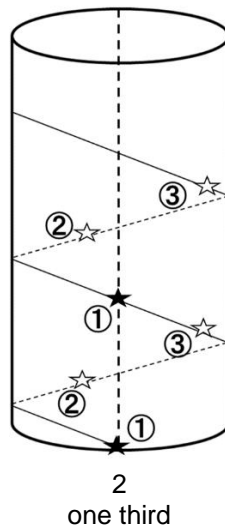
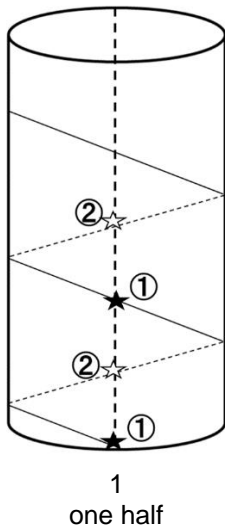
Observation should be made on the middle part between the middle third and the upper third of the branch.

Ad. 11: Leaf bud: shape

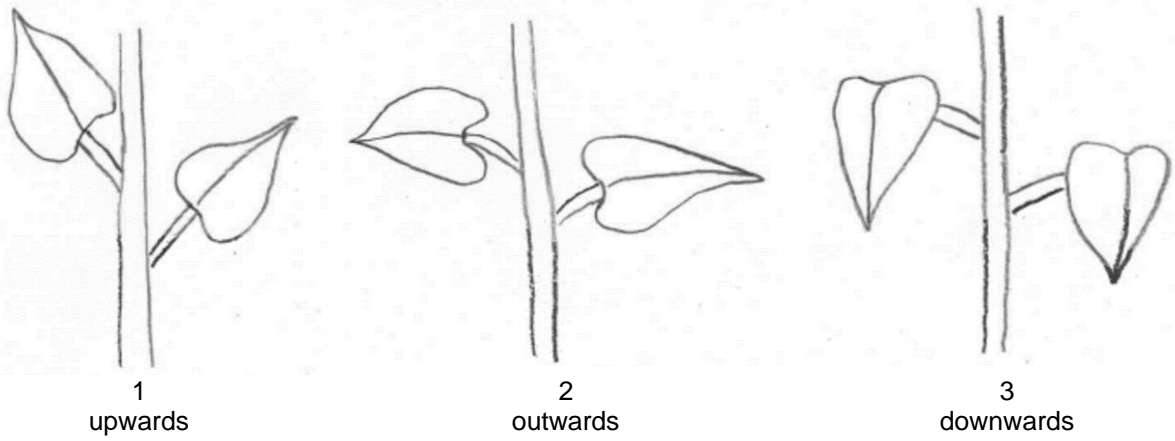


Ad. 13: Leaf: phyllotaxis

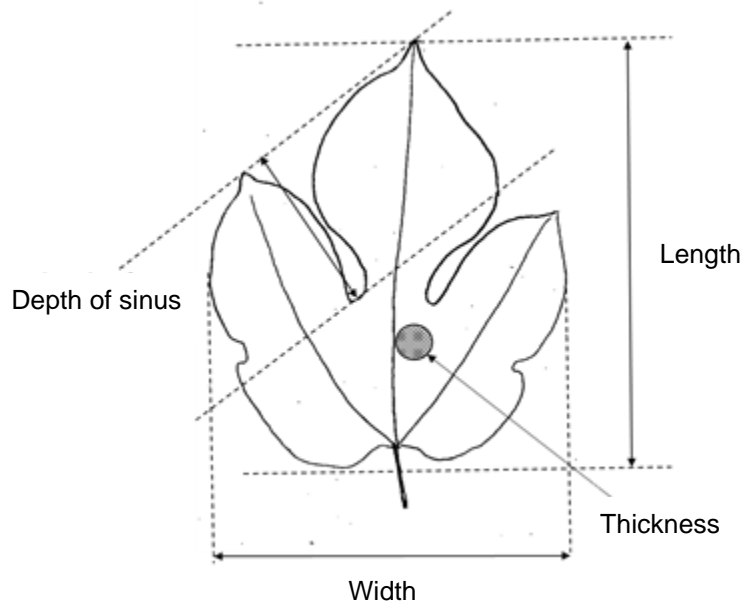
Observations should be made on the upper third of the branch. It is expressed by the number of rotations/number of leaves until two different leaves are located on the same vertical line.



Ad. 14: Leaf: attitude



Ad. 15: Leaf blade: length



Ad. 16: Leaf blade: width

See Ad. 18

Ad. 18: Leaf blade: thickness

See Ad. 18

Ad. 19: Leaf blade: length of tip



Ad. 20: Leaf blade: shape of apex



1
acute



2
obtuse



3
obcordate

Ad. 22: Leaf blade: shape of base



1
cuneate



2
truncate



3
retuse



4
cordate

Ad. 24: Only varieties with lobes present: Leaf blade: depth of sinus

See Ad. 18

Ad. 25: Leaf blade: margin



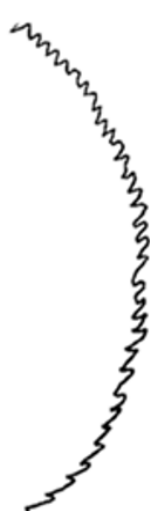
1
repand



2
crenate



3
dentate



4
serrulate



5
serrate

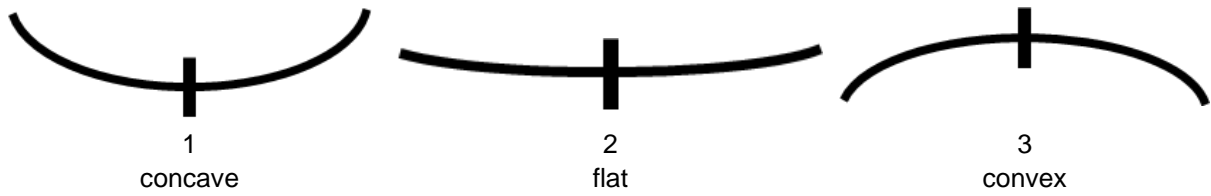


6
biserrate

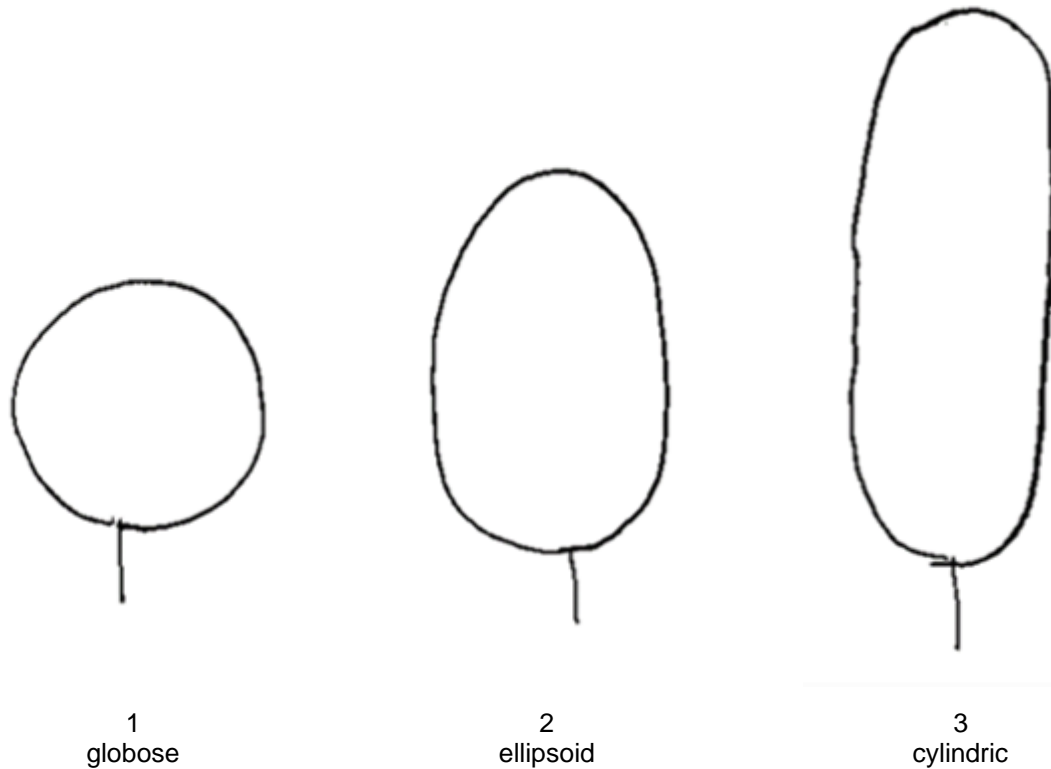


7
aristate

Ad. 30: Leaf blade: shape in cross section



Ad. 35: Infructescence: shape



Ad. 42: Time of leaf bud burst

The time of bud burst is when 10% of the buds show green points.

Ad. 43: Time of flowering

The time of flowering is when 50% of the flowers are fully open.

Ad. 44: Time of fruit ripening

Time of fruit ripening is when 50 % of the infructescences have reached suitable condition of consumption.

9. Literature

Cappellozza, L., Corradazzi, A. T., Tornadore, N., 1995: Studies on the phenotypic variability of seven cvs of *Morus alba* L. and three of *Morus multicaulis* P. (*Moraceae*). Part I. *Sericologia*, 35 (2). Padova, IT, pp. 257 to 270.

Koyama, A., Yamanouchi, H. and Machii, H., 2001: Screening of mulberry genotypes suitable for fruit production and development of high-yielding strains with large fruits JARQ 35 (1). Ibaraki, JP, pp. 59 to 66

Machii, H., Koyama, A., and Yamanouchi, H., 2002: Mulberry Breeding, Cultivation and Utilization in Japan. In: Sánchez, M.D. (ed.) 2002. *Mulberry for Animal Production*. Animal Production and Health Paper 147. FAO, Rome, IT, pp. 63 to 71.

Yamanouchi, H., Koyama, A., Takyu, T., and Yoshioka, T., 2008: Flow cytometric analysis of various organs and cytochimeras of mulberry (*Morus* spp.) *Journal of insect biotechnology and sericulture* 77(2). Ibaraki, JP, pp. 95 to 108

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	<input type="text" value="Morus L."/>
1.2	Common name	<input type="text" value="Mulberry"/>
2. Applicant		
	Name	<input type="text"/>
	Address	<input type="text"/>
	Telephone No.	<input type="text"/>
	Fax No.	<input type="text"/>
	E-mail address	<input type="text"/>
	Breeder (if different from applicant)	<input type="text"/>
3. Proposed denomination and breeder's reference		
	Proposed denomination (if available)	<input type="text"/>
	Breeder's reference	<input type="text"/>

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 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:
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4.2	Method of propagating the variety	
4.2.1	Vegetative propagation	
(a)	Budding or grafting	[]
(b)	Other (state method)	[]
	<input type="text"/>	
4.2.2	Other (Please provide details)	[]
	<input type="text"/>	

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 Tree: growth habit (2)		
upright	Mitsuminami, Piramidale, Tokiyutaka	1 []
semi-upright	Ichinose, Kenmochi	2 []
spreading	Ayanobori, Hayatesakari, Platanoide, Yukishinogi	3 []
drooping	Sekizaiso	4 []
weeping	Pendula, Shidareguwa	5 []
5.2 Leaf: phyllotaxis (13)		
one half	Chijimiguwa, Philippine, Negoyatakasuke	1 []
one third		2 []
two fifth	Cattaneo fem., Florio, Ichinose, Kenmochi	3 []
three eighth	Morettiana, Wasemidori	4 []
five thirteenth		5 []
5.3 Leaf blade: length of tip (19)		
absent or short	Romana rabelaire, Rougetto	1 []
medium	Indiana, Kenmochi, Limoncina	2 []
long	Ascolana, Florio, Fukayuki, Takinokawa	3 []
5.4 Leaf blade: presence of lobes (23)		
absent	Arancina, Florio	1 []
present		9 []
5.5 Leaf blade: color of upper side (28)		
light green	Hicks Fancy, Kairyo-Roso, Romana rabelaire	1 []
medium green	Ichinose, Illinois Everbearing	2 []
dark green	Florio, Indiana, Kenmochi, Shin-Kenmochi, Yukiasahi	3 []
yellowish green	Goshoerami, Kibajumonji, Planifolia	4 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.6 Inflorescence: sex expression (33)		
male	Akameroso, Cattaneo male, Shimanouchi	1 []
hermaphrodite	Akagi, Philippine, Oshimaso	2 []
female	Cattaneo fem., Ichinose, Kenmochi	3 []
5.7 Infructescence: shape (35)		
globose	Piramidale	1 []
ellipsoid	Ascolana, Florio, Lalaberry	2 []
cylindric	Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoide	3 []
5.8 Infructescence: weight (39)		
low	Piramidale	1 []
medium	Ichinose, Kenmochi	2 []
high	Lalaberry	3 []
5.9 Infructescence: color (40)		
white	Ege Beyaz, Giazzola, Morettiana	1 []
yellowish white	Ascolana	2 []
pink	Kokka, Muki, Piramidale	3 []
reddish purple	Kozaemon, Restelli	4 []
light purple	Tagowase	5 []
dark purple	Florio, Lhou	6 []
black purple	Cattaneo fem., Ichinose, Indiana, Kenmochi, Lalaberry	7 []
5.10 Time of leaf bud burst (42)		
early	Ichibei, Wasemidori	1 []
early to medium		2 []
medium	Ichinose, Kenmochi	3 []
medium to late		4 []
late	Akagi, Shinjiro	5 []

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>Tree: vigor</i>	<i>weak</i>	<i>strong</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 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

7.3.1 Main use

(a) Fruit

(b) Ornamental

(c) Silk worm feed

(c) Other

7.3.2 Please indicate the rootstock used:

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:
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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".

.....

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]