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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

MULBERRY

UPOV Code(s): MORUS

Morus L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Japan
to be considered by the
Technical Working Party for Fruit Crops
at its fifty-second session, to be held in Zhengzhou, China,
from 2021-07-12 to 2021-07-16

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Morus L.	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

In the case of varieties resulting from crossing, unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 5 plants or parts taken from each of 5 plants and any other observation made on all plants in the test, disregarding any off-type plants.

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

In the case of varieties resulting from mutation, unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 10 plants or parts taken from each of 10 plants and any other observation made on all plants in the test, disregarding any off-type plants.

In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 1.

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 5 plants, no off-types are allowed. 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: phyllotaxis (characteristic 12)
(b) Inflorescence: sex expression (characteristic 30)
(c) Infructescence: color (characteristic 37)

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					
	weak				Sekizaiso	1
	medium				Ichinose	2
	strong				Kenmochi, Oyutaka, Senshin	3
2.	**PQ VG**	**(+)**				
	Tree: growth habit					
	upright				Mitsuminami, Piramidale, Tokiyutaka	1
	semi-upright				Ichinose, Kenmochi	2
	spreading				Ayanobori, Hayatesakari, Platanoide, Yukishinogi	3
	drooping				Sekizaiso	4
	weeping				Pendula, Shidareguwa	5
3.	**QN MS/VG**	**(a)**				
	Shoot: number					
	few				Shin-Ichinose	1
	few to medium					2
	medium				Ichinose, Kenmochi	3
	medium to many					4
	many				Kairyo-Nezumigaeshi Yukishinogi	5
4.	**QN MS/VG**	**(a)**				
	Shoot: number of lateral shoots					
	absent or few				Ichinose, Kenmochi, Tokiyutaka	1
	medium				Kairyo-Nezumigaeshi	2
	many				Jumonji, Keikanso	3
5.	**QN MS/VG**	**(a)**				
	Shoot: length					
	short				Negoyatakasuke	1
	short to medium					2
	medium				Ichinose, Kenmochi	3
	medium to long					4
	long				Shin-Ichinose	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.		**QN MS/VG**	**(a)**				
		Shoot: thickness					
		thin				Mitsuminami, Nezumigaeshi	1
		medium				Ichinose, Kenmochi	2
		thick				Hayatesakari, Shinso 1	3
7.		**PQ VG**	**(a)**				
		Shoot: color					
		light grey				Ichinose	1
		greyish brown				Mizusawaguwa	2
		greenish brown				Shin-Ichinose	3
		yellowish brown				Fukushimaoha	4
		reddish brown				Ichibei	5
		medium brown				Rohachi	6
		dark brown				Kenmochi	7
8.	**(*)**	**QN MS/VG**	**(+) (a)**				
		Shoot: length of internode					
		short				Sinuense, Tokiyutaka	1
		medium				Ichinose, Kenmochi	2
		long				Ichibei	3
9.	**(*)**	**QN VG**	**(a)**				
		Bud: size					
		small				Shin-Ichinose	1
		medium				Ichinose, Kenmochi	2
		large				Yukishinogi	3
10	**(*)**	**PQ VG**	**(+) (a)**				
		Bud : shape					
		obtuse triangular				Atsubamidori, Filippine, Shin-Ichinose	1
		triangular				Cattaneo fem., Florio, Ichinose, Kenmochi, Morettiana	2
		acute triangular				Wasemidori	3
		spindle shaped				Negoyatakasuke	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11	**(*)**	**PQ VG**	**(a)**				
		Bud: color					
		light grey				Shin-Ichinose, Shiromeroso	1
		greyish brown				Atsubamidori	2
		yellowish brown				Kokuso 27	3
		reddish brown				Ichibei	4
		medium brown				Ichinose	5
		dark brown				Kenmochi	6
12		**QL VG**	**(+) (b)**				
		Leaf: phyllotaxis					
		one half				Chijimiguwa, Filippine, Negoyatakasuke	1
		one third					2
		two fifth				Cattaneo fem., Florio, Ichinose, Kenmochi	3
		three eighth				Morettiana, Wasemidori	4
		five thirteenth					5
13	**(*)**	**QN VG**	**(+) (b)**				
		Leaf: attitude					
		upwards				Jikunashi	1
		outwards				Ichinose, Kenmochi	2
		downwards				Asayuki, Shin-Ichinose	3
14	**(*)**	**QN MS/VG**	**(+) (b)**				
		Leaf blade: length					
		very short					1
		very short to short					2
		short				Kibajumonji, Romana rabelaire	3
		short to medium					4
		medium				Ichinose, Restelli	5
		medium to long					6
		long				Indiana, Platanoide, Popberry	7
		long to very long					8
		very long					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15	**(*)**	**QN** **MS/VG**	**(+)** **(b)**				
		Leaf blade: width					
		very narrow				Nervosa	1
		very narrow to narrow					2
		narrow				Indiana, Kibajumonji	3
		narrow to medium					4
		medium				Ichinose	5
		medium to broad					6
		broad				Popberry	7
		broad to very broad					8
		very broad				Platanoide	9
16		**QN** **MS/VG**	**(b)**				
		Leaf blade: length/width					
		low					1
		medium				Ichinose, Kenmochi	2
		high					3
17	**(*)**	**QN** **MS/VG**	**(+)** **(b)**				
		Leaf blade: thickness					
		thin				Kokuso 27, Shiwasuguwa, Yukishinogi	1
		medium				Ichinose, Kenmochi	2
		thick				Atsubamidori, Ayanobori, Shin-Kenmochi	3
18		**PQ** **VG**	**(+)** **(b)**				
		Leaf blade: tip					
		absent				Romana rabelaire, Rougetto	1
		caudate				Ascolana, Florio, Fukayuki, Takinokawa	2
		acuminate				Indiana, Kenmochi, Limoncina	3
19		**PQ** **VG**	**(+)** **(b)**				
		Leaf blade: shape of apex					
		acute				Ichinose	1
		obtuse				Jikunashi	2
		obcordate				Niken	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20		**PQ VG**	**(b)**				
		Leaf blade: shape(proposed by Italy, to check whether to be deleted)					
		triangular				Florio	1
		cordate					2
		ovate					3
		circular					4
		pentagonal					5
21	**(*)**	**PQ VG**	**(+) (b)**				
		Leaf blade: shape of base					
		cuneate				Nervosa, Popberry	1
		truncate				Goshoerami, Jumonji, Kokuso 70, Negoyatakasuke	2
		retuse				Kenmochi, Restelli, Rosa di Lombardia	3
		cordate				Arancina, Ichinose, Romana rabelaire	4
22	**(*)**	**QN VG**	**(+) (b)**				
		Leaf blade: depth of sinus					
		absent or very shallow				Arancina, Florio, Rohachi, Takinokawa	1
		Shallow				Akagi, Shimanouchi, Shin-Ichinose	2
		medium				Ichinose	3
		deep				Indiana, Kenmochi	4
		very deep				Platanoide	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23	**PQ VG**	**(+) (b)**				
	Leaf blade: incisions of margin					
	repand				Ichinose	1
	crenate				Kairyo-Roso, Kanmasari, Limoncina, Rougetto, Shin-Ichinose	2
	dentate				Ascolana, Fukushimaoha, Restelli	3
	serrulate				Kenmochi, Oshimaso, Planifolia	4
	biserrate				Florio	5
	serrate				Akameroso, Hicks Fancy	6
	aristate				Nervosa	7
24	**QN VG**	**(b)**				
	Leaf blade: texture					
	smooth				Florio, Indiana, Kairyo-Roso, Muki	1
	medium				Kokuso 27	2
	rough				Ichibei, Korin	3
25	**QN VG**	**(b)**				
	Leaf blade: blistering of surface					
	absent or weak				Arancina, Illinois Everbearing	1
	medium				Cattaneo fem., Florio	2
	strong				Platanoide	3
26	**PQ VG**	**(b)**				
	Leaf blade: color of upper side					
	yellow					1
	yellowish green				Goshoerami, Kibajumonji, Planifolia	2
	light green				Hicks Fancy, Kairyo-Roso, Romana rabelaire	3
	medium green				Ichinose, Illinois Everbearing	4
	dark green				Florio, Indiana, Kenmochi, Shin-Kenmochi, Yukiasahi	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27	**QN** **VG**	**(b)**				
	Leaf blade: glossiness of upper side					
	absent or very weak				Keguwa	1
	weak				Ichibei	2
	medium				Ichinose, Kenmochi	3
	strong				Shin-Kenmochi	4
28	**QN** **MS/VG**	**(b)**				
	Petiole: length					
	absent or very short				Jikunashi	1
	very short to short					2
	short				Queensland Black, Rougetto, Sanchutakasuke	3
	short to medium					4
	medium				Arancina, Ascolana, Ichinose, Kenmochi	5
	medium to long					6
	long				Indiana, Kokka, Shiromekeiso	7
	long to very long					8
	very long				Nervosa	9
29	**PQ** **VG**					
	Flower bud: color					
	light brown				Indiana	1
	medium brown				Florio	2
	dark brown				Cattaneo male	3
	reddish brown				Kokuso 21, Kokuso 27, Muki	4
30	**QL** **VG**	**(c)**				
	Inflorescence: sex expression					
	staminate				Akameroso, Cattaneo male, Shimanouchi	1
	hermaphrodite				Akagi, Filippine, Oshimaso	2
	pistillate				Cattaneo fem., Ichinose, Kenmochi	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31	**(*)**	**QN** **VG**	**(c)**				
		<u>Excluding varieties with sex expression: staminate:</u> **Infleorescence: number of pistillate clusters**					
		few				Ichibei	1
		medium				Ichinose	2
		many				Kenmochi	3
32		**PQ** **VG**	**(+)** **(d)**				
		Infructescence: shape					
		globose				Piramidale	1
		ellipsoid				Ascolana, Florio, Lalaberry	2
		cylindric				Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoide	3
33		**QN** **MS/VG**	**(d)**				
		Infructescence: length					
		short				Piramidale	1
		short to medium				Akagi, Lhou	2
		medium				Ichinose, Kenmochi, Morettiana	3
		medium to long				Kokka, Muki	4
		long				Lalaberry, Planifolia, Popberry, Restelli	5
34		**QN** **MS/VG**	**(d)**				
		Infructescence: width					
		narrow				Planifolia, Platanoide	1
		medium				Filippine, Florio, Ichinose, Kenmochi	2
		broad				Ascolana, Lalaberry, Piramidale, Popberry	3
35		**QN** **MS/VG**	**(d)**	**(e)**			
		Infructescence: ratio length/width					
		low					1
		medium				Ichinose, Kenmochi	2
		high					3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36	**(*)**	**QN** **MS**	**(d)**				
		Infructescence: weight					
		low					1
		medium				Ichinose, Kenmochi	2
		high				Lalaberry	3
37		**PQ** **VG**	**(d)**				
		Infructescence: color					
		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
38	**(*)**	**QN** **MS/VG**	**(d)**				
		Infructescence: length of peduncle					
		short				Ascolana, Giazzola, Lalaberry	1
		short to medium				Kokka	2
		medium				Cattaneo fem., Ichinose, Kenmochi	3
		medium to long				Filippine	4
		long				Kozaemon, Platanoide	5
39	**(*)**	**QN** **MG**	**(+)** **(d)**				
		Infructescence: sweet ness					
		low				Lalaberry, Popberry	1
		low to medium					2
		medium				Ichinose, Kenmochi	3
		medium to high					4
		high				Kozaemon, Tagowase	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40		**QN MG**	**(+) (d)**				
		Infructescence: acidity					
		low				Kozaemon, Tagowase	1
		low to medium					2
		medium				Ichinose, Kenmochi, Popberry	3
		medium to high					4
		high				Lalaberry	5
41	**(*)**	**QN MG/VG**					
		Time of bud burst					
		early				Ichibei, Wasemidori	1
		early to medium					2
		medium				Ichinose, Kenmochi	3
		medium to late					4
		late				Akagi, Shinjiro	5
42		**QN MG/VG**					
		Time of flowering					
		early					1
		early to medium					2
		medium				Ichinose, Kenmochi, Lalaberry	3
		medium to late					4
		late					5
43	**(*)**	**QN MG/VG**					
		Time of fruit ripening					
		early					1
		early to medium					2
		medium				Ichinose, Kenmochi, Lalaberry	3
		medium to late					4
		late					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 shoot and the bud should be made during winter dormancy.

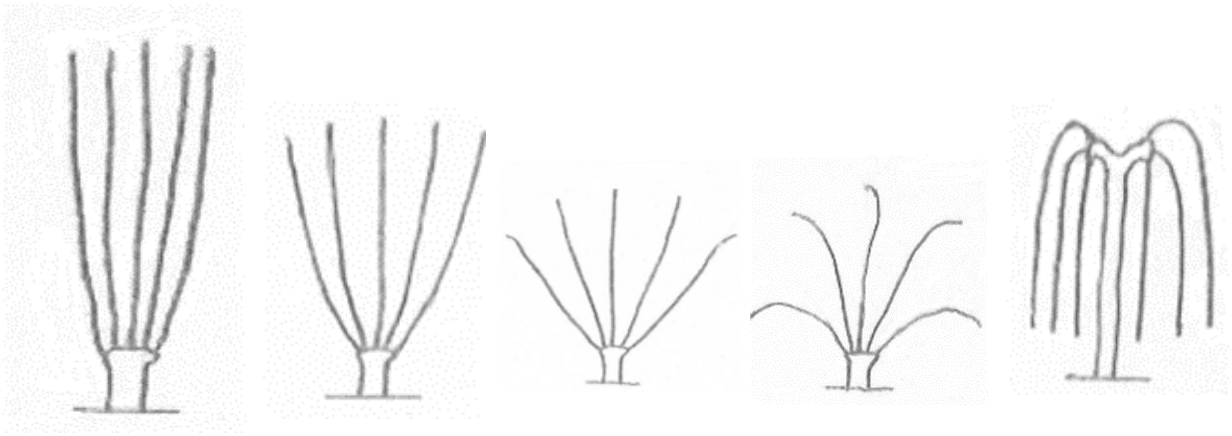
(b) Observations on the leaf should be made on the largest leaf on the upper third of the shoot in harvest time.

(c) Observations on the inflorescence should be made at the time of full flowering.

(d) Observations on the infructescence should be made at the peak of the harvest.

8.2 Explanations for individual characteristics

Ad. 2: Tree: growth habit

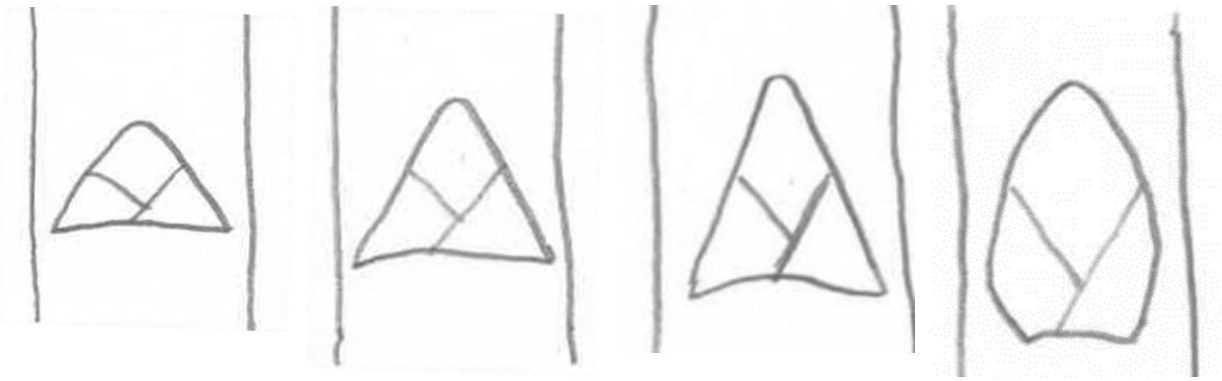


1	2	3	4	5
upright	semi-upright	spreading	drooping	weeping

Ad. 8: Shoot: length of internode

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

Ad. 10: Bud : shape



1
obtuse triangular

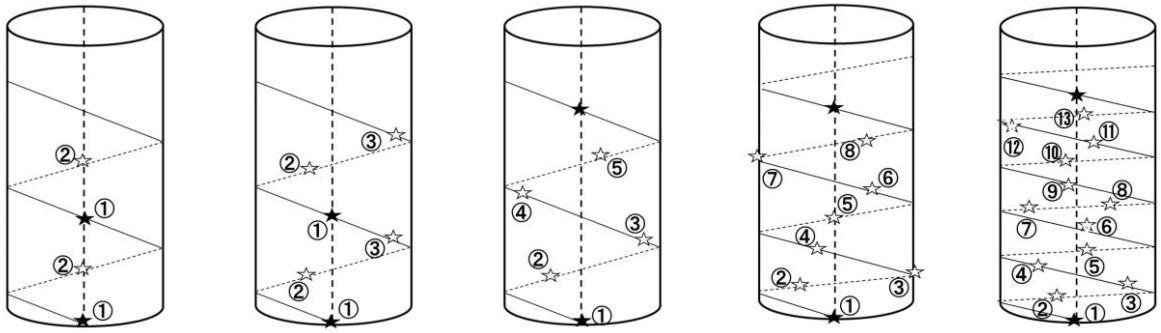
2
triangular

3
acute triangular

4
spindle shaped

Ad. 12: Leaf: phyllotaxis

Observation 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.



1
one half

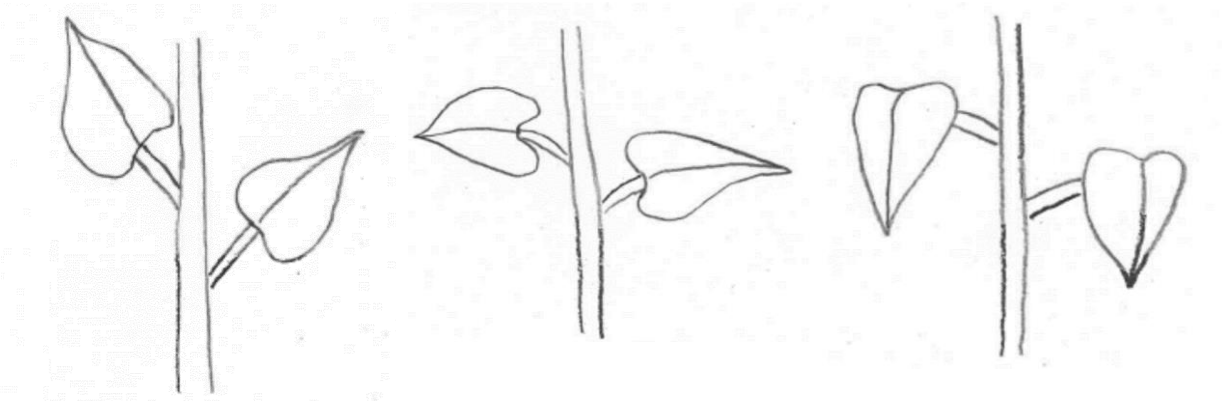
2
one third

3
two fifth

4
three eighth

5
five thirteenth

Ad. 13: Leaf: attitude

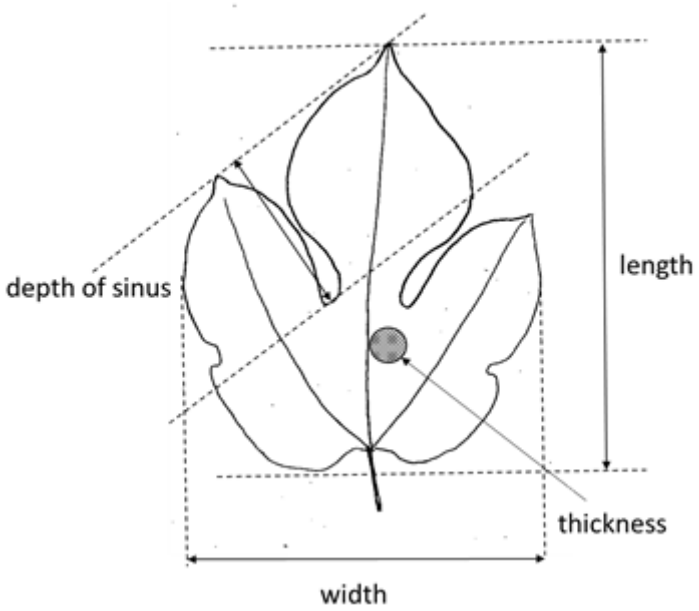


1
upwards

2
outwards

3
downwards

Ad. 14: Leaf blade: length



Ad. 15: Leaf blade: width

See Ad. 15

Ad. 17: Leaf blade: thickness

See Ad. 15

Ad. 18: Leaf blade: tip

1
absent

2
caudate

3
acuminate

Ad. 19: Leaf blade: shape of apex

1
acute

2
obtuse

3
obcordate

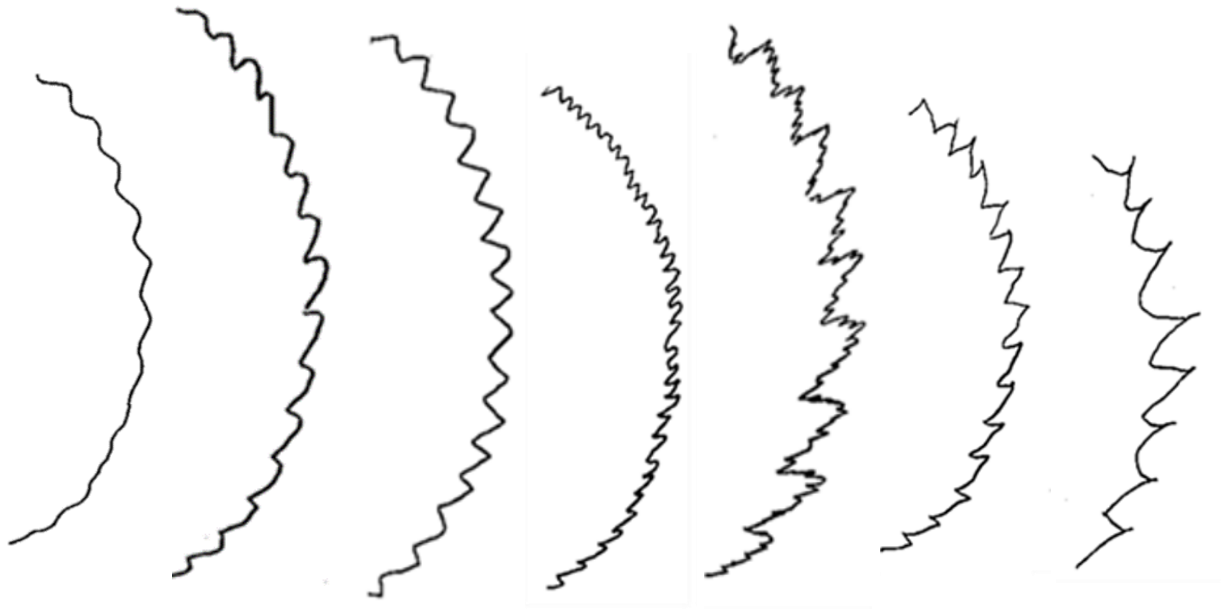
Ad. 21: Leaf blade: shape of base

1 cuneate | 2 truncate | 3 retuse | 4 cordate

Ad. 22: Leaf blade: depth of sinus

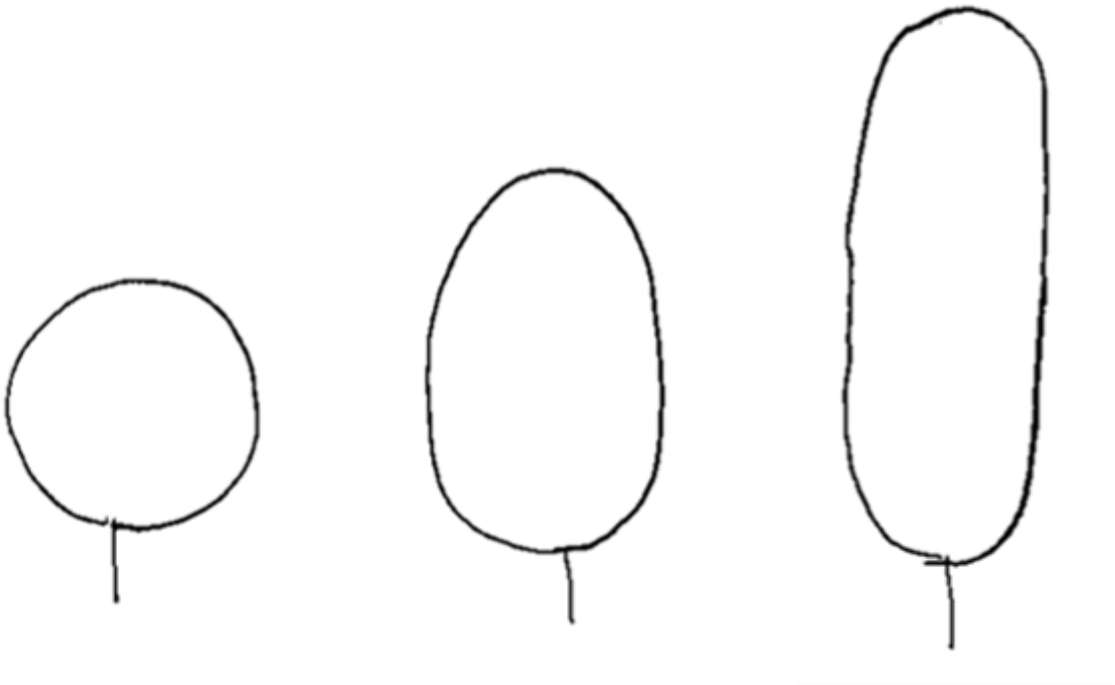
See Ad. 15

Ad. 23: Leaf blade: incisions of margin



1 repand | 2 crenate | 3 dentate | 4 serrulate | 5 biserrate | 6 serrate | 7 aristate

Ad. 32: Infructescence: shape



1	2	3
globose	ellipsoid	cylindric

Ad. 39: Infructescence: sweetness

Sweetness should be assessed in degree Brix with a refractometer.

Ad. 40: Infructescence: acidity

Acidity should be assessed by determination of titratable acids.

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):257 270.

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): p59-p66

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. pp. 63-71. (FAO, Rome).

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 sericology 77(2), p95-p108

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	*Morus* L.
1.2	Common name	Mulberry

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) Budding or grafting [ ]
(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)	**Tree: growth habit**		
	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 (10)	**Bud : shape**		
	obtuse triangular	Atsubamidori, Filippine, Shin-Ichinose	1 [ ]
	triangular	Cattaneo fem., Florio, Ichinose, Kenmochi, Morettiana	2 [ ]
	acute triangular	Wasemidori	3 [ ]
	spindle shaped	Negoyatakasuke	4 [ ]
5.3 (12)	**Leaf: phyllotaxis**		
	one half	Chijimiguwa, Filippine, Negoyatakasuke	1 [ ]
	one third		2 [ ]
	two fifth	Cattaneo fem., Florio, Ichinose, Kenmochi	3 [ ]
	three eighth	Morettiana, Wasemidori	4 [ ]
	five thirteenth		5 [ ]
5.4 (18)	**Leaf blade: tip**		
	absent	Romana rabelaire, Rougetto	1 [ ]
	caudate	Ascolana, Florio, Fukayuki, Takinokawa	2 [ ]
	acuminate	Indiana, Kenmochi, Limoncina	3 [ ]
5.5 (26)	**Leaf blade: color of upper side**		
	yellow		1 [ ]
	yellowish green	Goshoerami, Kibajumonji, Planifolia	2 [ ]
	light green	Hicks Fancy, Kairyo-Roso, Romana rabelaire	3 [ ]
	medium green	Ichinose, Illinois Everbearing	4 [ ]
	dark green	Florio, Indiana, Kenmochi, Shin-Kenmochi, Yukiasahi	5 [ ]

	Characteristics	Example Varieties	Note
5.6 (30)	**Inflorescence: sex expression**		
	staminate	Akameroso, Cattaneo male, Shimanouchi	1 [ ]
	hermaphrodite	Akagi, Filippine, Oshimaso	2 [ ]
	pistillate	Cattaneo fem., Ichinose, Kenmochi	3 [ ]
5.7 (32)	**Infructescence: shape**		
	globose	Piramidale	1 [ ]
	ellipsoid	Ascolana, Florio, Lalaberry	2 [ ]
	cylindric	Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoide	3 [ ]
5.8 (36)	**Infructescence: weight**		
	low		1 [ ]
	medium	Ichinose, Kenmochi	2 [ ]
	high	Lalaberry	3 [ ]
5.9 (37)	**Infructescence: color**		
	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 (41)	**Time of bud burst**		
	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:

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	*Tree: vigor*	*weak*	*strong*

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

Main use

(a) Fruit [ ]
(b) Ornamental [ ]
(c) other [ ]

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]