



TG/MORUS(proj.5)

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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-fourth session, to be held in Nîmes, France,  
from 2023-07-03 to 2023-07-07*

*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](http://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.

#### 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
<b>1.</b>	<b>QN</b>	<b>VG</b>				
	<b>Tree: vigor</b>					
	weak				Sekizaiso	1
	medium				Ichinose	2
	strong				Kenmochi, Oyutaka, Senshin	3
<b>2. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(+)</b>			
	<b>Tree: growth habit</b>					
	upright				Mitsuminami, Piramidale, Tokiyutaka	1
	semi-upright				Ichinose, Kenmochi	2
	spreading				Ayanobori, Hayatesakari, Platanoide, Yukishinogi	3
	drooping				Sekizaiso	4
	weeping				Pendula, Shidareguwa	5
<b>3.</b>	<b>QN</b>	<b>VG</b>	<b>(a)</b>			
	<b>Current year's shoot: number</b>					
	few				Shin-Ichinose	1
	few to medium					2
	medium				Ichinose, Kenmochi	3
	medium to many					4
	many				Kairyo-Nezumigaeshi Yukishinogi	5
<b>4.</b>	<b>QN</b>	<b>VG</b>	<b>(a)</b>			
	<b>Current year's shoot: number of lateral shoots</b>					
	absent or few				Ichinose, Kenmochi, Tokiyutaka	1
	medium				Kairyo-Nezumigaeshi	2
	many				Jumonji, Keikanso	3



	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>5.</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(a)</b>			
	<b>Current year's shoot: length</b>					
	short				Negoyatakasuke	1
	short to medium					2
	medium				Ichinose, Kenmochi	3
	medium to long					4
	long				Shin-Ichinose	5
<b>6. (*)</b>	<b>QN</b>	<b>VG</b>	<b>(+)</b>	<b>(a)</b>		
	<b>Current year's shoot: zigzag</b>					
	absent or weak				Ichinose, Yue Shen Da 10	1
	medium				He Ye Bai	2
	strong				Hu Bei Wan Tiao, Unryu	3
<b>7.</b>	<b>QL</b>	<b>VG</b>	<b>(a)</b>			
	<b>Current year's shoot: twisting(suppose to delete)</b>					
	absent					1
	present				Sinuense	9
<b>8.</b>	<b>PQ</b>	<b>VG</b>	<b>(a)</b>			
	<b>Current year's shoot: color</b>					
	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
<b>9. (*)</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(+)</b>	<b>(a)</b>		
	<b>Current year's shoot: length of internode</b>					
	short				Sinuense, Tokiyutaka	1
	medium				Ichinose, Kenmochi	2
	long				Ichibei	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>10. (*)</b>	<b>QN</b>	<b>VG</b>	<b>(a)</b>			
	<b>Leaf bud: size</b>					
	small				Shin-Ichinose	1
	medium				Ichinose, Kenmochi	2
	large				Yukishinogi	3
<b>11. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(+)</b>	<b>(a)</b>		
	<b>Leaf bud: shape</b>					
	broad triangular				Atsubamidori, Philippine, Shin-Ichinose	1
	medium triangular				Cattaneo fem., Florio, Ichinose, Kenmochi, Morettiana	2
	narrow triangular				Wasemidori	3
	ovate				Negoyatakasuke	4
<b>12. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(a)</b>			
	<b>Leaf bud: color</b>					
	greyish brown				Atsubamidori	1
	yellowish brown				Kokuso 27	2
	reddish brown				Ichibei	3
	medium brown				Ichinose	4
	dark brown				Kenmochi	5
	light grey				Shin-Ichinose, Shiromeroso	6
<b>13. (*)</b>	<b>QL</b>	<b>VG</b>	<b>(+)</b>			
	<b>Leaf: phyllotaxis</b>					
	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
<b>14. (*)</b>	<b>QN</b>	<b>VG</b>	<b>(+)</b>			
	<b>Leaf: attitude</b>					
	upwards				Jikunashi	1
	outwards				Ichinose, Kenmochi	2
	downwards				Asayuki, Shin-Ichinose	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>15. (*)</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(+)</b>	<b>(b)</b>		
	<b>Leaf blade: length</b>					
	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
<b>16.</b>	<b>QN</b>	<b>MG/MS/VG</b>		<b>(b)</b>		
	<b>Leaf blade: ratio length/width</b>					
	low					1
	medium				Ichinose, Kenmochi	2
	high					3
<b>17. (*)</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(+)</b>	<b>(b)</b>		
	<b>Leaf blade: width</b>					
	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
<b>18. (*)</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(+)</b>	<b>(b)</b>		
	<b>Leaf blade: thickness</b>					
	thin				Kokuso 27, Shiwasuguwa, Yukishinogi	1
	medium				Ichinose, Kenmochi	2
	thick				Atsubamidori, Ayanobori, Shin-Kenmochi	3

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19. (*)	PQ	VG	(+)	(b)				
	<b>Leaf blade: tip</b>							
	none						Romana rabelaire, Rougetto	1
	caudate						Ascolana, Florio, Fukayuki, Takinokawa	2
	acuminate						Indiana, Kenmochi, Limoncina	3
20.	PQ	VG	(+)	(b)				
	<b>Leaf blade: shape of apex</b>							
	acute						Ichinose	1
	obtuse						Jikunashi	2
	obcordate						Niken	3
21.	PQ	VG		(b)				
	<b>Leaf blade: shape</b>							
	triangular						Florio	1
	cordate						Arancina, Ascolana	2
	ovate						Illinois Everbearing, Nervosa, Planifolia	3
	circular						Kokka	4
	pentagonal						Ichinose	5
22. (*)	PQ	VG	(+)	(b)				
	<b>Leaf blade: shape of base</b>							
	cuneate						Nervosa, Popberry	1
	truncate						Goshoerami, Jumonji, Kokuso 70, Negoyatakasuke	2
	retuse						Kenmochi, Restelli, Rosa di Lombardia	3
	cordate						Arancina, Ichinose, Romana rabelaire	4
23. (*)	QL	VG		(b)				
	<b>Leaf blade: presence of lobes</b>							
	absent						Arancina, Florio	1
	present							9

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>24. (*)</b>	<b>QN</b>	<b>VG</b>	<b>(+)</b>	<b>(b)</b>				
	<b>Only varieties with lobes present: Leaf blade: depth of sinus</b>							
		very shallow					Florio, Limoncina, Rohachi, Takinokawa	1
		shallow					Akagi, Shimanouchi, Shin-Ichinose	2
		medium					Ichinose	3
		deep					Indiana, Kenmochi	4
		very deep					Platanoide	5
<b>25.</b>	<b>PQ</b>	<b>VG</b>	<b>(+)</b>	<b>(b)</b>				
	<b>Leaf blade: margin</b>							
		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
<b>26.</b>	<b>QN</b>	<b>VG</b>		<b>(b)</b>				
	<b>Leaf blade: texture</b>							
		smooth					Florio, Indiana, Kairyo-Roso, Muki	1
		medium					Kokuso 27	2
		rough					Ichibei, Korin	3
<b>27.</b>	<b>QN</b>	<b>VG</b>		<b>(b)</b>				
	<b>Leaf blade: blistering of surface</b>							
		absent or weak					Arancina, Illinois Everbearing	1
		medium					Cattaneo fem., Florio	2
		strong					Platanoide	3

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>28. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(b)</b>				
	<b>Leaf blade: color of upper side</b>						
	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
<b>29.</b>	<b>QN</b>	<b>VG</b>	<b>(b)</b>				
	<b>Leaf blade: glossiness of upper side</b>						
	absent or very weak					Keguwa	1
	weak					Ichibei	2
	medium					Ichinose, Kenmochi	3
	strong					Shin-Kenmochi	4
<b>30.</b>	<b>QN</b>	<b>VG</b>	<b>(+)</b>	<b>(b)</b>			
	<b>Leaf blade: shape in cross section</b>						
	concave					Lun Jian 109	1
	flat					Yue Shen Da 10	2
	convex					Wan Nian Sang	3
<b>31.</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(b)</b>				
	<b>Petiole: length</b>						
	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

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>32.</b>	<b>PQ</b>	<b>VG</b>					
	<b>Flower bud: color</b>						
	light brown					Indiana	1
	medium brown					Florio	2
	dark brown					Cattaneo male	3
	reddish brown					Kokuso 21, Kokuso 27, Muki	4
<b>33. (*)</b>	<b>QL</b>	<b>VG</b>	<b>(c)</b>				
	<b>Inflorescence: sex expression</b>						
	staminate					Akameroso, Cattaneo male, Shimanouchi	1
	hermaphrodite					Akagi, Philippine, Oshimaso	2
	pistillate					Cattaneo fem., Ichinose, Kenmochi	3
<b>34. (*)</b>	<b>QN</b>	<b>VG</b>	<b>(c)</b>				
	<b>Excluding staminate varieties: Inflorescence: number of pistillate clusters</b>						
	few					Ichibei	1
	medium					Ichinose	2
	many					Kenmochi	3
<b>35. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(+)</b>	<b>(d)</b>			
	<b>Infructescence: shape</b>						
	globose					Piramidale	1
	ellipsoid					Ascolana, Florio, Lalaberry	2
	cylindric					Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoide	3
<b>36.</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(d)</b>				
	<b>Infructescence: length</b>						
	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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>37.</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(d)</b>			
	<b>Infructescence: width</b>					
	narrow				Planifolia, Platanoide	1
	medium				Filippine, Florio, Ichinose, Kenmochi	2
	broad				Ascolana, Lalaberry, Piramidale, Popberry	3
<b>38.</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(d)</b>	<b>(e)</b>		
	<b>Infructescence: ratio length/width</b>					
	low					1
	medium				Ichinose, Kenmochi	2
	high					3
<b>39. (*)</b>	<b>QN</b>	<b>MG/MS</b>	<b>(d)</b>			
	<b>Infructescence: weight</b>					
	low				Piramidale	1
	medium				Ichinose, Kenmochi	2
	high				Lalaberry	3
<b>40. (*)</b>	<b>PQ</b>	<b>VG</b>	<b>(d)</b>			
	<b>Infructescence: color</b>					
	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
<b>41. (*)</b>	<b>QN</b>	<b>MG/MS/VG</b>	<b>(d)</b>			
	<b>Infructescence: length of peduncle</b>					
	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



	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>42. (*)</b>	<b>QN</b>	<b>MG/VG</b>	<b>(+)</b>			
	<b>Time of leaf bud burst</b>					
	early				Ichibei, Wasemidori	1
	early to medium					2
	medium				Ichinose, Kenmochi	3
	medium to late					4
	late				Akagi, Shinjiro	5
<b>43. (*)</b>	<b>QN</b>	<b>MG/VG</b>	<b>(+)</b>			
	<b>Time of flowering</b>					
	early					1
	early to medium					2
	medium				Ichinose, Kenmochi, Lalaberry	3
	medium to late					4
	late					5
<b>44. (*)</b>	<b>QN</b>	<b>MG/VG</b>	<b>(+)</b>			
	<b>Time of fruit ripening</b>					
	early					1
	early to medium					2
	medium				Ichinose, Kenmochi, Lalaberry	3
	medium to late					4
	late					5

8. Explanations on the Table of Characteristics

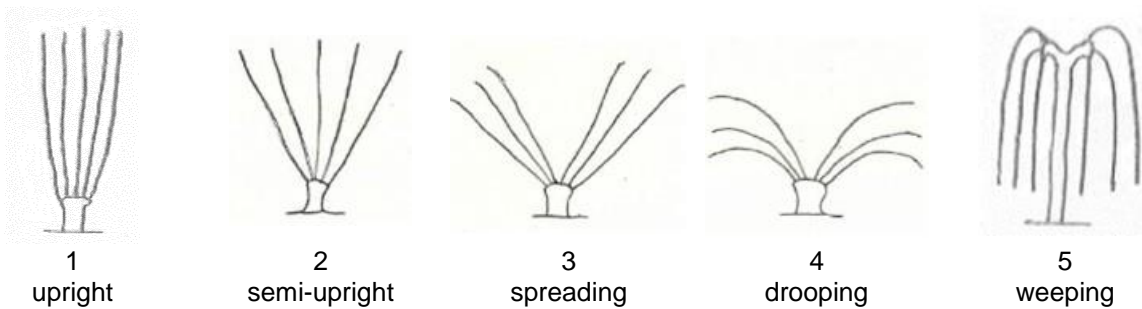
8.1 *Explanations covering several characteristics*

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

- (a) Observations 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

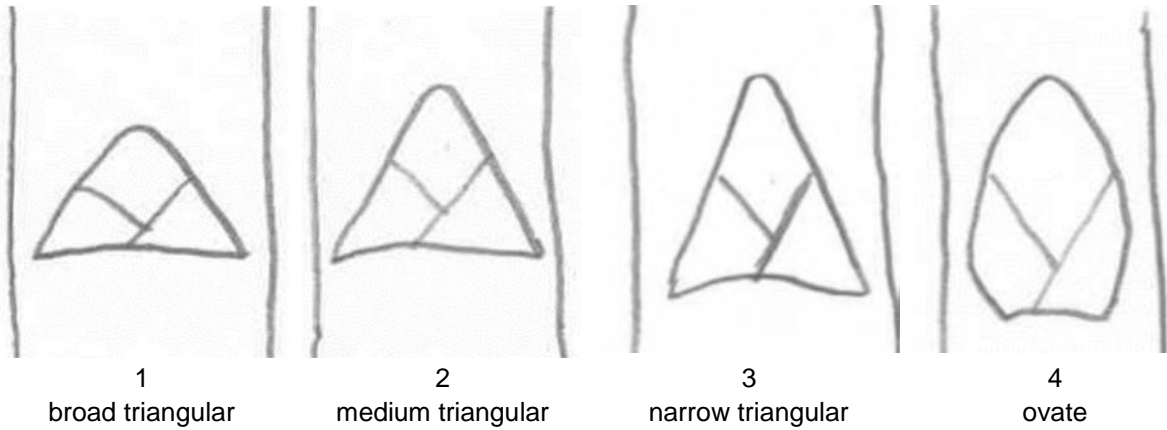


Ad. 9: Current year's shoot: length of internode



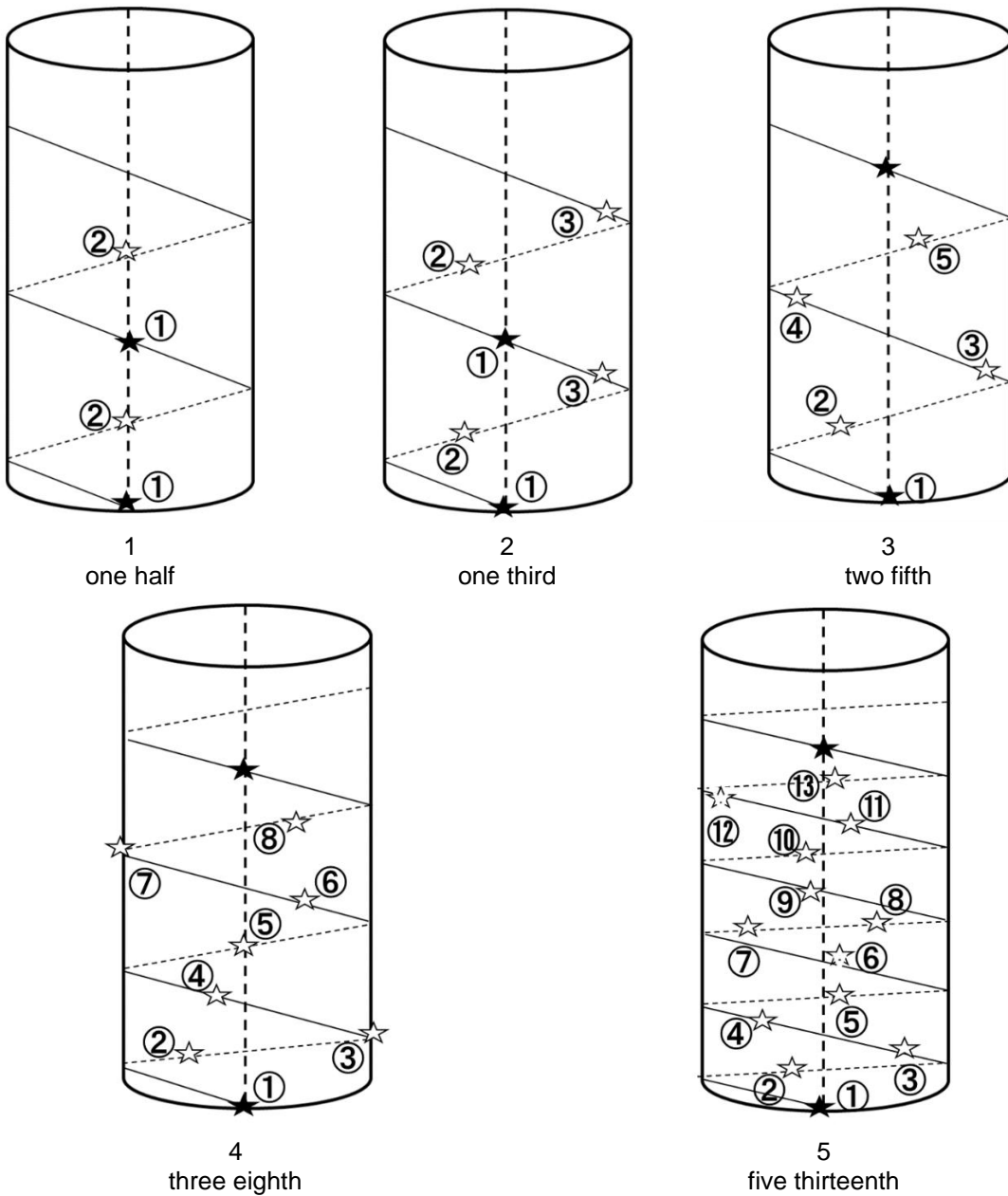
Observation should be made on the middle part between the middle third and the upper third of the branch.

Ad. 11: Leaf bud: shape

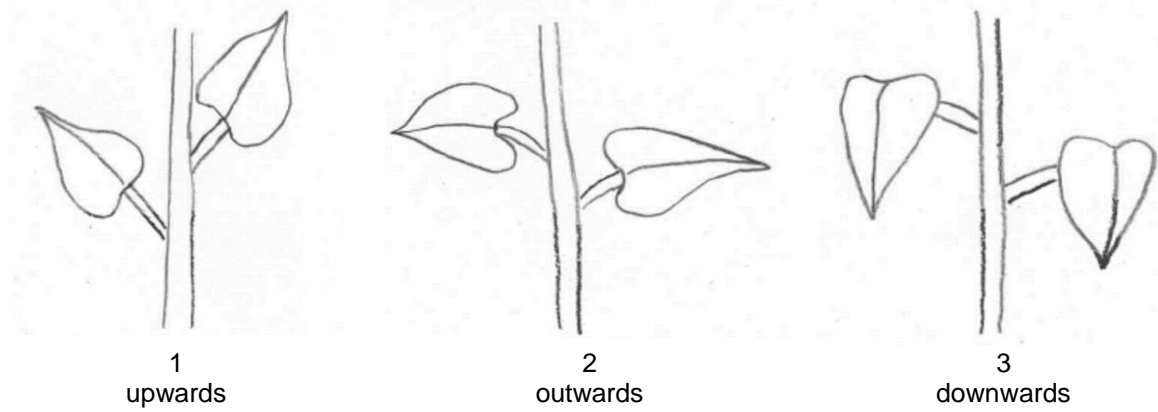


Ad. 13: Leaf: phyllotaxis

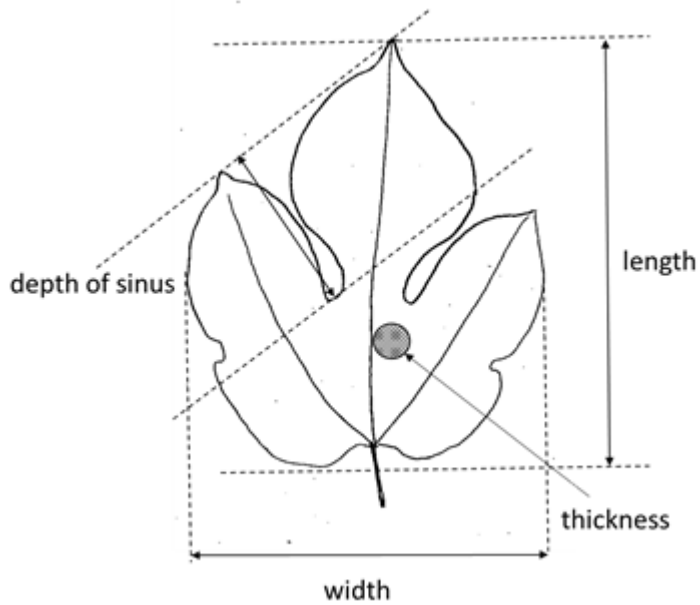
Observation should be made on the upper third of the branch. It is expressed by the number of rotations/number of leaves until two different leaves are located on the same vertical line.



Ad. 14: Leaf: attitude



Ad. 15: Leaf blade: length



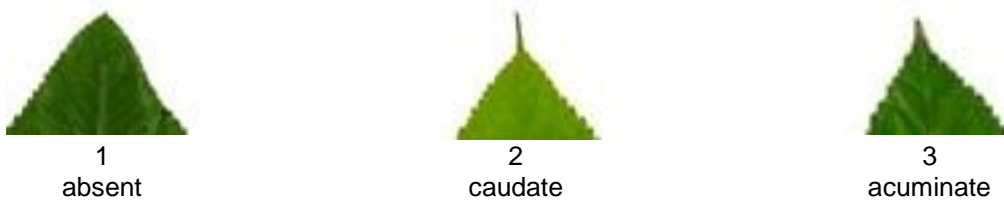
Ad. 17: Leaf blade: width

See Ad. 18

Ad. 18: Leaf blade: thickness

See Ad. 18

Ad. 19: Leaf blade: 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

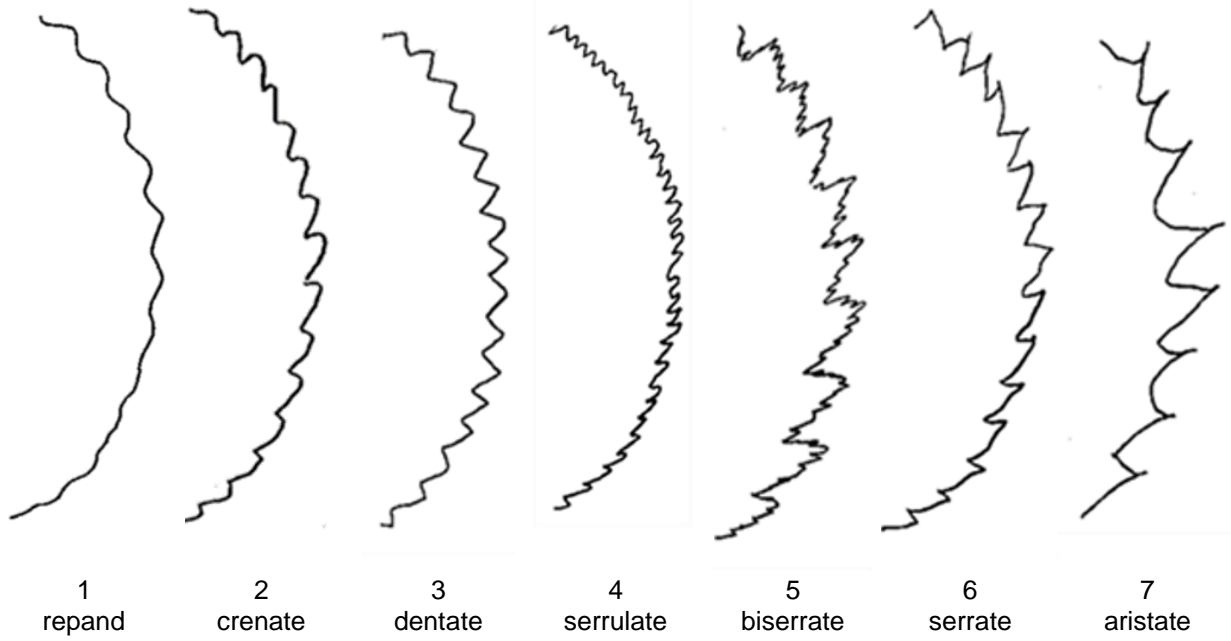


4  
cordate

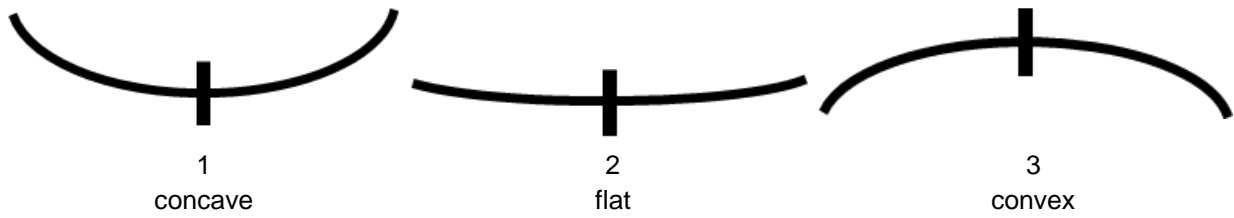
Ad. 24: Only varieties with lobes present: Leaf blade: depth of sinus

See Ad. 18

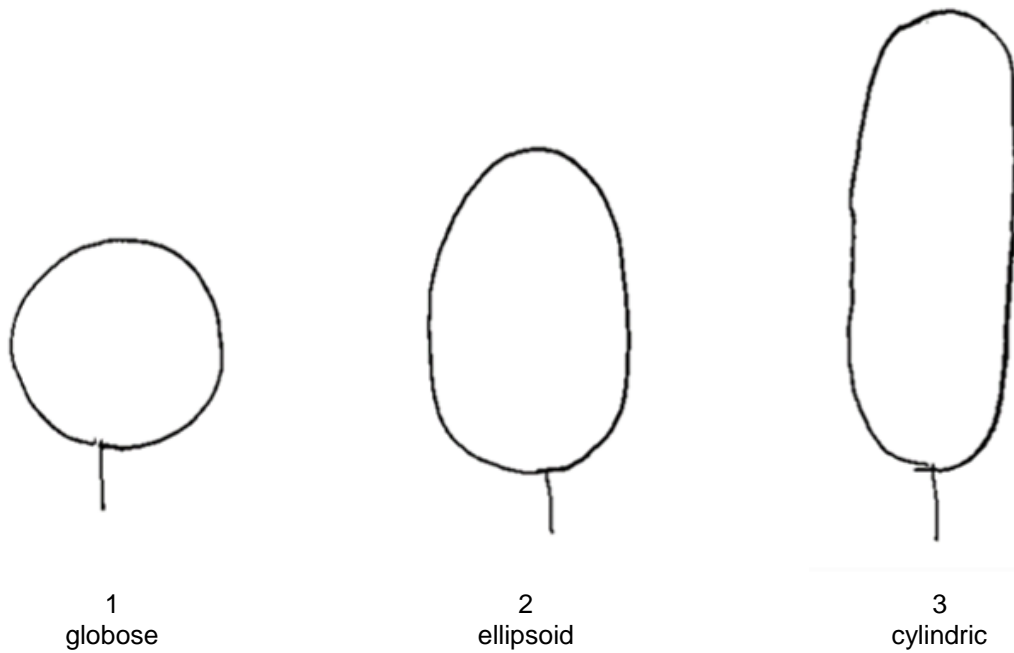
Ad. 25: Leaf blade: margin



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):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	<input type="text" value="Morus L."/>
1.2	Common name	<input type="text" value="Mulberry"/>
1.3	Species name	<input type="text"/>
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
<b>5.1 Tree: growth habit (2)</b>		
upright	Mitsuminami, Piramidale, Tokiyutaka	1 [ ]
semi-upright	Ichinose, Kenmochi	2 [ ]
spreading	Ayanobori, Hayatesakari, Platanoide, Yukishinogi	3 [ ]
drooping	Sekizaiso	4 [ ]
weeping	Pendula, Shidareguwa	5 [ ]
<b>5.2 Leaf: phyllotaxis (13)</b>		
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 [ ]
<b>5.3 Leaf blade: tip (19)</b>		
none	Romana rabelaire, Rougetto	1 [ ]
caudate	Ascolana, Florio, Fukayuki, Takinokawa	2 [ ]
acuminate	Indiana, Kenmochi, Limoncina	3 [ ]
<b>5.4 Leaf blade: presence of lobes (23)</b>		
absent	Arancina, Florio	1 [ ]
present		9 [ ]
<b>5.5 Leaf blade: color of upper side (28)</b>		
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 [ ]

Characteristics	Example Varieties	Note
<b>5.6 Inflorescence: sex expression</b> <b>(33)</b>		
staminate	Akameroso, Cattaneo male, Shimanouchi	1 [ ]
hermaphrodite	Akagi, Philippine, Oshimaso	2 [ ]
pistillate	Cattaneo fem., Ichinose, Kenmochi	3 [ ]
<b>5.7 Infructescence: shape</b> <b>(35)</b>		
globose	Piramidale	1 [ ]
ellipsoid	Ascolana, Florio, Lalaberry	2 [ ]
cylindric	Cattaneo fem., Ichinose, Kenmochi, Kokka, Platanoide	3 [ ]
<b>5.8 Infructescence: weight</b> <b>(39)</b>		
low	Piramidale	1 [ ]
medium	Ichinose, Kenmochi	2 [ ]
high	Lalaberry	3 [ ]
<b>5.9 Infructescence: color</b> <b>(40)</b>		
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 [ ]
<b>5.10 Time of leaf bud burst</b> <b>(42)</b>		
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 <b>similar</b> variety(ies)	Describe the expression of the characteristic(s) for <b>your</b> candidate variety
<i>Example</i>	<i>Tree: vigor</i>	<i>weak</i>	<i>strong</i>

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

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]