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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

LOTUS

UPOV Code(s): NELUM

Nelumbo Adans.

including *Nelumbo nucifera* Gaertn., *Nelumbo lutea* Willd. and the hybrids of them

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from China
to be considered by the
Technical Working Party for Ornamental Plants and Forest Trees
at its fifty-fifth session, to be held in virtually
from 2023-06-12 to 2023-06-16

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Nelumbo Adans.	Lotus		Lotus	

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 *Nelumbo* Adans. including *Nelumbo nucifera* Gaertn., *Nelumbo lutea* Willd. and the hybrids of them.

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.

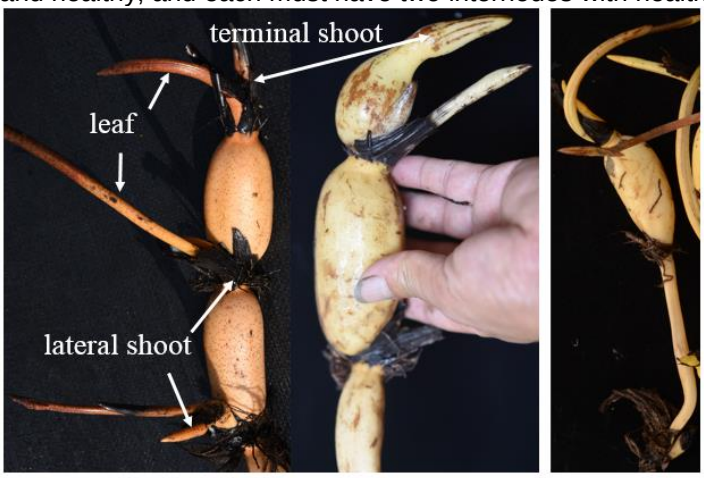
2.2 The material is to be supplied in the form of rhizome propagules or seed.

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

12 rhizome propagules to meet at least 10 survivals after planting.
15 seeds to meet at least 10 survivals after germination and planting.

In the case of seed, the seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should, be stated by the applicant.

In the case of rhizome propagule, a standard propagule (meeting market requirement) should be fresh and healthy, and each must have two internodes with healthy shoots.



1 Propagule with two expanded internodes

2 Propagule with only one expanded internode

In the case of seed, the seeds should be only collected from varieties of wild type lotus or pure line, which must be planted alone by separating from other lotus varieties to avoid crossing by insects. The applicant should guarantee the seeds to meet the requirement for purity, maturity and high germination capacity.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 Number of Growing Cycles

3.1.1 The minimum duration of tests should normally be a single growing cycle.

3.1.2 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

3.3 Conditions for Conducting the Examination

3.3.1 The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.3.2 The optimum stage of development for the assessment of each characteristic is indicated by a number in the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

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

3.3.4 Based on its main use, the lotus is usually divided into three types, namely rhizome lotus (producing underground expanded rhizome for vegetable), seed lotus (producing seeds for food or medicine), and ornamental lotus (also called flower lotus for ornamental plant).

Except the characteristics shared by these three types of lotus, there are some specified characteristics for each type of them. The seed lotus can also be treated as ornamental plant because it produce numerous flowers which are usually used in wetland landscape.

3.4 Test Design

3.4.1 In the case of rhizome propagated varieties, each test should be designed to result in a total of at least 10 plants.

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

3.4.3 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.4.4 During growth season, some of the flowers and mature fruits will he collected for counting or measurement, but it has no influence on plant development and growth. At the end of growth cycle, the underground rhizomes will be harvested for observation of shoot shape, measurement of expanded rhizome diameter and counting of propagule number during dormancy or before planting.

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.

To assess distinctness of hybrids, the parent lines and the formula may be used according to the following recommendations:

(i) description of parent lines according to the Test Guidelines;

(ii) check of the originality of the parent lines in comparison with the variety collection, based on the characteristics in Chapter 7, in order to identify similar parent lines;

(iii) check of the originality of the hybrid formula in relation to the hybrids in the variety collection, taking into account the most similar lines; and

(iv) assessment of the distinctness at the hybrid level for varieties with a similar formula.

Further guidance is provided in documents TGP/9 "Examining Distinctness" and TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".
These Test Guidelines cover hybrid varieties of *N. nucifera* and *N. lutea* or hybrid between two different species or two varieties.

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 vegetatively propagated varieties, 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.

In the case of seed-propagated varieties, 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 The assessment of uniformity for seed-propagated varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction.

4.2.4 The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.

4.2.5 The Test Guidelines cover hybrid varieties of *N. nucifera* and *N. lutea,* and varieties of different genotypes from the same species.

4.2.6 For the assessment of uniformity of seed-propagated varieties, a population standard of 5% and an acceptance probability of at least 5% 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 seed or plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

(a) Emerging leaf: blade texture (characteristic 10)
(b) Flower position comparing to leaf (characteristic 21)
(c) Flower type (characteristic 24)
(d) Flower shape (characteristic 25)
(e) Anther color (characteristic 36)
(f) Color of stamen appendage (characteristic 37)
(g) Development status of carpel (characteristic 41)
(i) Color of receptacle top surface (characteristic 43)
(j) Expansion degree of rhizome (characteristic 58)
(k) Internode shape of main expanded rhizome (characteristic 60)
(l) Shape of expanded rhizome cross-section (for rhizome lotus only) (characteristic 68)
(m) Texture of expanded rhizome (for rhizome lotus only) (characteristic 69)

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)-(b) See Explanations on the Table of Characteristics in Chapter 8.1

7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8.3

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	**QL VG**	**(+)**	**10**			
	Color of young root					
	white				Nelumbo lutea	1
	pink				Nelumbo nucifera 'Fen Bawang'	2
	red				Nelumbo 'Cai Xia'	3
2.	**PQ VG**	**(+)**	**10**			
	Color of young leaf					
	yellow				Nelumbo lutea	1
	green				Nelumbo nucifera 'Baiyangdian Bai'	2
	red center with green edge				Nelumbo nucifera 'Zhuo Yue'	3
	green center with red edge				Nelumbo nucifera 'Qian Ban'	4
	purple red				Nelumbo 'Gui Li'	5
3. **(*)**	**QN MS|A**	**(+)**	**30**			
	Plant: height					
	very short				Nelumbo 'Chuzi Luo'	1
	short				Nelumbo 'Xing Huo'	2
	medium				Nelumbo 'Yijian Lian'	3
	tall				Nelumbo lutea	4
	very tall				Nelumbo nucifera 'Fen Bawang'	5
4.	**QN MG**	**(+)**	**30**			
	Emerging leaf: number					
	absent				Nelumbo 'Ai Xiangsi Hong'	1
	very few				Nelumbo 'Jin Fuwa'	2
	few				Nelumbo nucifera 'Zhongshan Hongtai'	3
	medium				Nelumbo nucifera 'Honghu Hong'	4
	many					5
	very many					6

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	**(*)**	**QN MS**	**(+)**	**30**			
		Emerging leaf: blade size					
		very small				Nelumbo 'Chuzi Luo'	1
		small				Nelumbo 'Yanzhi Wan'	2
		medium				Nelumbo 'Jiuhua Haoyue'	3
		large				Nelumbo lutea	4
		very large				Nelumbo nucifera 'Fen Bawang'	5
6.	**(*)**	**QL VG**	**(+)**	**20-30**			
		Emerging leaf: variegation on blade					
		absent				Nelumbo 'Cai Xia'	1
		present				Nelumbo 'Yin Sajin'	2
7.	**(*)**	**PQ VG|A**	**(+)**	**20-30**			
		Emerging leaf: blade color					
		yellow green				Nelumbo nucifera 'Baiyangdian Bai'	1
		green				Nelumbo nucifera 'Honghu Hong'	2
		dark green				Nelumbo lutea	3
8.	**(*)**	**PQ VG**	**(+)**	**20-30**			
		Emerging leaf: blade shape					
		rounded or nearly rounded					1
		elliptic					2
		long elliptic					3
9.	**(*)**	**PQ VG**	**(+)**	**20-30**			
		Emerging leaf: shape of longitudinal blade section					
		strongly concave					1
		medium concave				Nelumbo nucifera 'Dan Sajin'	2
		weakly concave				Nelumbo lutea	3
		flat				Nelumbo 'Jia Jingying'	4
		concave center with dropping edge				Nelumbo nucifera 'Elian 1'	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. (*)	**QN VG**	**(+)**	**20-30**			
	Emerging leaf: blade texture					
	very rough				Nelumbo nucifera 'Daye Chi'	1
	medium rough				Nelumbo nucifera 'Honghu Hong'	2
	weakly rough					3
	medium smooth				Nelumbo nucifera 'Fenhong Lingxiao'	4
	very smooth				Nelumbo lutea	5
11.	**PQ VG**	**(+)**	**20-30**			
	Emerging leaf: upper blade margin					
	rounded or nearly so				Nelumbo lutea	1
	weakly concave				Nelumbo 'Honghe Zhanchi'	2
	medium concave				Nelumbo 'Danban Jinxia'	3
	strongly concave				Nelumbo nucifera 'Wuchang Wild'	4
12. (*)	**QL VG**	**(+)**	**20-30**			
	Emerging leaf: red line of leaf margin					
	absent					1
	present					9
13.	**QN MG/VG**	**(+)**	**20-40**			
	Leaf nose gap					
	absent or very narrow				Nelumbo 'Jia Jingying'	1
	narrow				Nelumbo nucifera 'Honghu Hong'	2
	medium				Nelumbo 'Yijian Lian'	3
	broad				Nelumbo lutea	4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**QN MG**	**(+)**	**30**			
	Petiole: thickness					
	very thin				Nelumbo 'Chuzi Luo'	1
	thin				Nelumbo 'Hong Sijuan'	2
	medium				Nelumbo lutea	3
	thick				Nelumbo nucifera 'Honghu Hong'	4
	very thick				Nelumbo nucifera 'Fen Bawang'	5
15.	**QN VG**	**(+)**	**20-40**			
	Petiole: spine density					
	absent or very sparse				Nelumbo lutea	1
	sparse				Nelumbo 'Bian Lian'	2
	medium				Nelumbo nucifera 'Honghu Hong'	3
	dense				Nelumbo 'Jia Jingying'	4
16. **(*)**	**PQ VG**	**(+)**	**20-30**			
	Shape of flower bud					
	globose				Nelumbo 'Xiao Hongqiu'	1
	ellipsoid				Nelumbo 'Jin Fuwa'	2
	ovoid					3
	ovoid-conic				Nelumbo nucifera 'Dan Sajin'	4
	conic				Nelumbo 'Xing Huo'	5
17. **(*)**	**PQ VG**	**(+)**	**20-30**			
	Flower bud: color					
	green yellow				Nelumbo lutea	1
	green				Nelumbo nucifera 'Baiyangdian Bai'	2
	green with purple-red edge				Nelumbo 'Furong Qipa'	3
	green red				Nelumbo 'Jiangnan Mingzhu'	4
	purple red				Nelumbo nucifera 'Zhongshan Hongtai'	5
	gray purple				Nelumbo 'Yinxiang Xihu'	6
	variegated				Nelumbo nucifera 'Dan Sajin'	7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18. (*) QN VG		**(+) (a)**	**30**			
	Starting blooming time					
	early				Nelumbo 'Jiuhua Haoyue'	1
	medium				Nelumbo nucifera 'Honghu Hong'	2
	late				Nelumbo nucifera 'Fenhong Lingxiao'	3
19. (*) QN MG		**(+)**	**30**			
	Flowering time of group plants					
	very short					1
	short					2
	medium				Nelumbo 'Yijian Lian'	3
	long				Nelumbo 'Bian Lian'	4
	very long				Nelumbo nucifera 'Fenhong Lingxiao'	5
20. (*) QN MG		**(+)**	**30**			
	Flower number					
	absent or very few				Nelumbo nucifera 'Elian 1'	1
	few				Nelumbo 'Bo Ai'	2
	medium				Nelumbo nucifera 'Zhongshan Hongtai'	3
	many				Nelumbo 'Hong Sijuan'	4
	very many				Nelumbo 'Xing Huo'	5
21. (*) QN VG		**(+)**	**30**			
	Flower position comparing to leaf					
	below					1
	same					2
	slightly above				Nelumbo 'Hong Sijuan'	3
	medium				Nelumbo nucifera 'Honghu Hong'	4
	far above				Nelumbo 'Chenshan Baihe'	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.	**(*) QN MG**	**(+)**	**30**			
	Flower height					
	very short				Nelumbo 'Chuzi Luo'	1
	short				Nelumbo 'Yanzhi Wan'	2
	medium				Nelumbo 'Bo Ai'	3
	tall				Nelumbo nucifera 'Zhizun Qianban'	4
	very tall				Nelumbo nucifera 'Fen Bawang'	5
23.	**(*) QN MS**	**(+)**	**30**			
	Flower size					
	very small				Nelumbo 'Chuzi Luo'	1
	small				Nelumbo 'Hong Sijuan'	2
	medium				Nelumbo 'Yijian Lian'	3
	large				Nelumbo nucifera 'Honghu Hong'	4
	very large				Nelumbo nucifera 'Fen Bawang'	5
24.	**(*) QN MG/VG**	**(+)**	**30**			
	Flower type					
	single				Nelumbo nucifera 'Honghu Hong'	1
	semi-double				Nelumbo 'Cai Xia'	2
	double				Nelumbo nucifera 'Dan Sajin'	3
	dual-layered				Nelumbo nucifera 'Hongtai Lian'	4
	fully double				Nelumbo nucifera 'Zhizun Qianban'	5
	thousand-petalled				Nelumbo nucifera 'Qian Ban'	6

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25. (*)	**PQ VG**	**(+)**	**30**			
	Flower shape					
	cup-shaped				Nelumbo 'Furong Qipa'	1
	bowl-shaped				Nelumbo nucifera 'Honghu Hong'	2
	plate-shaped				Nelumbo 'Jin Se',	3
	dancing-shaped				Nelumbo nucifera 'Chenshan Feiyan'	4
	head-shaped				Nelumbo nucifera 'Zhizun Qianban'	5
	ball-shaped				Nelumbo 'Xiao Hongqiu'	6
26. (*)	**PQ VG**	**(+)**	**30**			
	Color type of flower					
	white				Nelumbo nucifera 'Baiyangdian Bai'	1
	pink				Nelumbo nucifera 'Hongtai Lian'	2
	red				Nelumbo 'Zhongguohong Beijing'	3
	yellow				Nelumbo lutea	4
	orange				Nelumbo 'Xingse Chunshan'	5
	green					6
	variegated				Nelumbo nucifera 'Dan Sajin'	7
	multicolored				Nelumbo 'Perry's Giant Sunburst'	8
27. (*)	**QN VG**	**(+)**	**30**			
	Changeability of flower color					
	none or very weak				Nelumbo 'Yijian Lian'	1
	medium				Nelumbo 'Yi Xian'	2
	strong				Nelumbo 'Bian Lian'	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28.	**QN MG/VG**	**(+)**	**30**			
	Tepal number					
	very few				Nelumbo 'Xianxian Yuzhi'	1
	few				Nelumbo nucifera 'Honghu Hong'	2
	medium				Nelumbo nucifera 'Zhongshan Hongtai'	3
	many				Nelumbo 'Youyi Mudan'	4
	very many				Nelumbo nucifera 'Qian Ban'	5
29. **(*)**	**QN MS**	**(+)**	**30**			
	The size of the largest tepal					
	very small				Nelumbo 'Chuzi Luo'	1
	small					2
	medium				Nelumbo 'Yanzhi Wan'	3
	large				Nelumbo 'Yijian Lian'	4
	very large				Nelumbo nucifera 'Fen Bawang'	5
30. **(*)**	**PQ VG**	**(+)**	**30**			
	Shape of the largest tepal					
	obovate				Nelumbo 'Toshihiros Friendship'	1
	long-obovate					2
	obovate-lanceolate				Nelumbo 'Yijian Lian'	3
	oblanceolate					4
	clawed				Nelumbo 'Jiangnan Mingzhu'	5
	long-oblanceolate				Nelumbo 'Tan Kong'	6
31. **(*)**	**PQ VG**	**(+)**	**30**			
	Apex of the largest tepal					
	acute					1
	acuminate				Nelumbo 'Xianxian Yuzhi'	2
	abtuse					3
	rounded				Nelumbo 'Toshihiros Friendship'	4
	retuse				Nelumbo 'Jingshui Guanyin'	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32.	**(*) QN MG**	**(+)**	**30**			
	Color of the largest tepal					
	upper position					1
	middle position					2
	base position					3
33.	**(*) PQ VG**	**(+)**	**30**			
	Distribution of tepal color					
	even				Nelumbo 'Yijian Lian'	1
	gradually transitioned				Nelumbo 'Toshihiro's Friendship'	2
	alternatedly colored				Nelumbo 'Jiangnan Mingzhu'	3
	apex colorationed					4
	longitudinally white-stripped				Nelumbo 'Cangqian Hong'	5
	variegated				Nelumbo nucifera 'Dan Sajin'	6
34.	**QN VG**	**(+)**	**30**			
	Abaxial veins of tepal					
	absent or very weak				Nelumbo nucifera 'Zhongri Youyi'	1
	medium				Nelumbo nucifera 'Honghu Hong'	2
	strong				Nelumbo nucifera 'Taikong 36'	3
35.	**(*) QN MG/VG**		**30**			
	Stamen number					
	absent				Nelumbo nucifera 'Zhizun Qianban'	1
	very few				Nelumbo 'Piaocheng Fanying'	2
	few				Nelumbo nucifera 'Zhongshan Hongtai'	3
	medium				Nelumbo 'Hong Sijuan'	4
	many				Nelumbo 'Yijian Lian'	5
	very many				Nelumbo nucifera 'Jianxuan 17'	6

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. (*)	**PQ VG**		**30**			
	Anther color					
	yellow				Nelumbo lutea	1
	orange					2
37. (*)	**PQ VG**	**(+)**	**30**			
	Color of stamen appendage					
	light-yellow				Nelumbo lutea	1
	white				Nelumbo nucifera 'Baiyangdian Bai'	2
	white with purple-pink spotted apex				Nelumbo 'Hong Mudan'	3
	purple-pink				Nelumbo 'Yijian Lian'	4
	purple-red				Nelumbo 'Gudu Jiangfang'	5
	dark-brown				Nelumbo nucifera 'Yuhuo Niepan'	6
38.	**PQ VG**		**30**			
	Shape of stamen appendage					
	nearly globose					1
	elliptical					2
	clavate				Nelumbo lutea	3
	auriculiform				Nelumbo 'Jiangnan Mingzhu'	4
39. (*)	**QN MG**	**(+)**	**20-40**			
	Carpel number					
	absent				Nelumbo nucifera 'Zhizun Qianban'	1
	very few				Nelumbo nucifera 'Qian Ban'	2
	few				Nelumbo 'Chuzi Luo'	3
	medium				Nelumbo 'Hong Sijuan'	4
	many				Nelumbo lutea	5
	very many				Nelumbo nucifera 'Jianxuan 17'	6

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40. (*)	**QN MS**	**(+)**	**30**			
	Length of stamen appendaxage					
	very short					1
	short				Nelumbo nucifera 'Fenhong Lingxiao'	2
	medium				Nelumbo nucifera 'Honghu Hong'	3
	long				Nelumbo 'Ms. Perry D. Slocum'	4
	very long				Nelumbo lutea	5
41. (*)	**QN VG**	**(+)**	**20-30**			
	Development status of carpel					
	normal				Nelumbo nucifera 'Honghu Hong'	1
	partially bubbled				Nelumbo 'Lv Kongque'	2
	completely bubbled				Nelumbo 'Qinhuai Yueye'	3
	partially petaloid				Nelumbo 'Huang Lingyang'	4
	completely petaloid				Nelumbo nucifera 'Zhizun Qianban'	5
42. (*)	**QN VG**	**(+)**	**20-30**			
	Development status of receptacle					
	normal				Nelumbo lutea	1
	partially degenerated				Nelumbo nucifera 'Hongtai Lian'	2
	absent				Nelumbo nucifera 'Zhizun Qianban'	3
43.	**PQ VG**	**(+)**	**30**			
	Color of receptacle top surface					
	yellow				Nelumbo lutea	1
	yellow-green					2
	green				Nelumbo 'Cuixin Xiangyang'	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44.	**PQ VG**	**(+)**	**30-40**			
	Shape of mature seedpod					
	trumpet-shaped				Nelumbo 'Hong Sijuan'	1
	obconical				Nelumbo nucifera 'Jin Furong 2'	2
	cup-shaped				Nelumbo 'Jin Fuwa'	3
	bowl-shaped				Nelumbo 'Perry's Giant Sunburst'	4
	oblate				Nelumbo lutea	5
	umbrella-shaped				Nelumbo nucifera 'Thai Red'	6
45. (*)	**PQ VG**	**(+)**	**30-40**			
	Shape of top surface of mature seedpod					
	concave				Nelumbo nucifera 'Jin Furong 2'	1
	plate-like concave				Nelumbo 'Sino-American Friendship'	2
	flat				Nelumbo lutea 'Missouri'	3
	slightly convex				Nelumbo lutea 'Maryland'	4
	convex					5
46. (*)	**PQ VG**	**(+)**	**30-40**			
	Margin of mature seedpod					
	entire or nearly so				Nelumbo nucifera 'Jianxuan 17'	1
	weakly concave				Nelumbo lutea	2
	medium concave				Nelumbo 'Jiuhua Haoyue'	3
	strongly concave					4
47.	**PQ VG**	**(+)**	**30-40**			
	Color of mature seedpod top surface					
	greyed-green				Nelumbo 'Cuixin Xiangyang'	1
	green				Nelumbo nucifera 'Honghu Hong'	2
	green-yellow				Nelumbo lutea	3
	purple-red				Nelumbo 'Cai Xia'	4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48. (*) QN VG		**(+)**	**30-40**			
	Fruit-setting rate					
	absent				Nelumbo nucifera 'Zhizun Qianban'	1
	very low				Nelumbo 'Perry's Giant Sunburst'	2
	low				Nelumbo 'Moling Qiuse'	3
	medium				Nelumbo 'Jiuhua Haoyue'	4
	high				Nelumbo nucifera 'Jin Furong 2'	5
	very high				Nelumbo nucifera 'Honghu Hong'	6
49. (*) QN MG		**(+)**	**30-40**			
	Position of fruit comparing to seedpod					
	low or nearly low				Nelumbo lutea	1
	same				Nelumbo 'China-Japan Friendship'	2
	weakly above				Nelumbo 'Hongyun Lai'	3
	strong above				Nelumbo 'Zhongshan Honglan'	4
50. (*) PQ VG		**(+)**	**30-40**			
	Fruit shape					
	narrow obovate					1
	narrow ovate					2
	narrow elliptic					3
	globose				Nelumbo 'Jiuhua Haoyue'	4
	ovate					5
	obovate					6
	elliptic				Nelumbo nucifera 'Honghu Hong'	7
51. (*) PQ VG		**(+)**	**30-40**			
	Endocarp color					
	white				Nelumbo lutea	1
	purple-pink				Nelumbo nucifera 'Dan Sajin'	2
	light purple-red				Nelumbo nucifera 'Honghu Hong'	3
	purple-red				Nelumbo 'Yijian Lian'	4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
52. (*)	**QN MG**	**(+)**	**30-40**			
	Size of dried mature fruit					
	very small				Nelumbo 'Chuzi Luo'	1
	small				Nelumbo lutea	2
	medium				Nelumbo nucifera 'Honghu Hong'	3
	large				Nelumbo 'Jiuhua Haoyue'	4
	very large				Nelumbo nucifera 'Jianxuan 17'	5
53. (*)	**QN VG**	**(+)**	**40**			
	Mature time of expanded rhizome (for rhizome lotus only)					
	early				Nelumbo nucifera 'Elian 7'	1
	medium				Nelumbo nucifera 'Elian 6'	2
	late				Nelumbo nucifera 'Elian 8'	3
54. (*)	**PQ VG**	**(+)**	**30-40**			
	Color of dried mature fruit					
	brown				Nelumbo lutea	1
	greyed-brown				Nelumbo 'Ms. Perry D. Slocum'	2
	gray				Nelumbo nucifera 'Honghu Hong'	3
	black or dark brown				Nelumbo 'Jiuhua Haoyue'	4
55. (*)	**QN VG**	**(+)**	**30-40**			
	White waxy powder on surface of dried mature fruit					
	absent				Nelumbo nucifera 'Honghu Hong'	1
	little				Nelumbo 'Yanzhi Wan'	2
	much				Nelumbo 'Perry's Giant Sunburst'	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
56.		**QN**	**VG**	**(+)**		**30-40**			
		Glossiness of dried fruit							
		absent						Nelumbo nucifera 'Yingquan Xike'	1
		weak						Nelumbo 'Jiuhua Haoyue'	2
		strong							3
57.	**(*)**	**QN**	**VG**	**(+)**		**30-40**			
		Longitudinal stripes on fruit							
		absent						Nelumbo nucifera 'Honghu Hong'	1
		weak						Nelumbo 'Jiuhua Haoyue'	2
		strong						Nelumbo 'Perry's Giant Sunburst'	3
58.	**(*)**	**QN**	**MG**	**(+)**		**40-50**			
		Expansion degree of rhizome							
		absent or very weak						Nelumbo nucifera 'Fenhong Lingxiao'	1
		weak						Nelumbo 'Bian Lian'	2
		medium						Nelumbo 'Hong Sijuan'	3
		strong						Nelumbo 'Wu Fei'	4
		very strong						Nelumbo nucifera 'Elian 1'	5
59.	**(*)**	**QN**	**MG/VG**	**(+)**	**(b)**	**40-50**			
		Internode number of main expanded rhizome							
		absent or nearly so						Nelumbo nucifera 'Fenhong Lingxiao'	1
		few						Nelumbo lutea	2
		medium							3
		many						Nelumbo nucifera 'Elian 1'	4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
60. (*)	**PQ VG**	**(+)**	**40-50**			
	Internode shape of main expanded rhizome					
	nearly globose				Nelumbo nucifera 'Jin Taiyang'	1
	short tubed				Nelumbo nucifera 'Elian 3'	2
	tubed				Nelumbo nucifera 'Elian 1'	3
	long tubed				Nelumbo nucifera 'Zhongshan Hongtai'	4
61. (*)	**PQ VG**	**(+)**	**30-40**			
	Color of expanded rhizome					
	white				Nelumbo nucifera 'Elian 1'	1
	yellow-brown				Nelumbo lutea	2
	yellow-red					3
62. (*)	**QL VG**	**(+)**	**40-50**			
	Spots on surface of expanded rhizhome					
	absent				Nelumbo nucifera 'Elian 5'	1
	present				Nelumbo lutea	2
63. (*)	**PQ VG**		**40-50**			
	Color of terminal rhizome shoot					
	white				Nelumbo nucifera 'Anhui Piaohua'	1
	light-yellow				Nelumbo 'China-Japan Friendship'	2
	purple-red				Nelumbo nucifera 'Da Zihong'	3
	light-brown				Nelumbo nucifera 'Jinghua Dabai'	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
64.	**(*)**	**QN MG/VG**	**(+)**	**40-50**			
		Number of rhizome propagule					
		absent or very few				Nelumbo nucifera 'Fenhong Lingxiao'	1
		few				Nelumbo nucifera 'Zhongshan Hongtai'	2
		medium				Nelumbo lutea	3
		many				Nelumbo nucifera ‘Qian Ban’	4
		very many					5
65.	**(*)**	**QN VG**	**(+)**	**40-50**			
		Branch number of expanded rhizome (for rhizome lotus only)					
		few					1
		medium					2
		many					3
66.	**(*)**	**PQ VG**	**(+)**	**40-50**			
		Apex shape of terminal internode (for rhizome lotus only)					
		acute					1
		obtuse					2
67.		**QL VG**		**40-50**			
		Surface texture of expanded rhizome (for rhizome lotus only)					
		smooth				Nelumbo nucifera 'Anhui Piaohua'	1
		rough				Nelumbo nucifera 'Da Zihong'	2
68.	**(*)**	**PQ VG**	**(+)**	**40-50**			
		Shape of expanded rhizome cross-section (for rhizome lotus only)					
		circular				Nelumbo nucifera 'Elian 5'	1
		elliptic				Nelumbo nucifera 'Elian 6'	2
		rectangular					3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
69.	**(*)**	**QL**	**VG**	**(+)**		**40-50**			
		Texture of expanded rhizome (for rhizome lotus only)							
		crispy						Nelumbo nucifera 'Elian 1'	1
		intermediate						Nelumbo nucifera 'Elian 4'	2
		starchy						Nelumbo nucifera 'Elian 5'	3
70.		**PQ**	**VG**	**(+)**		**20-30**			
		Tolerance to disease: leaf rot							
		low							1
		medium							2
		high							3
71.		**PQ**	**VG**			**30-50**			
		Tolerance to disease: rhizome rot							
		absent							1
		medium							2
		strong							3

8. Explanations on the Table of Characteristics

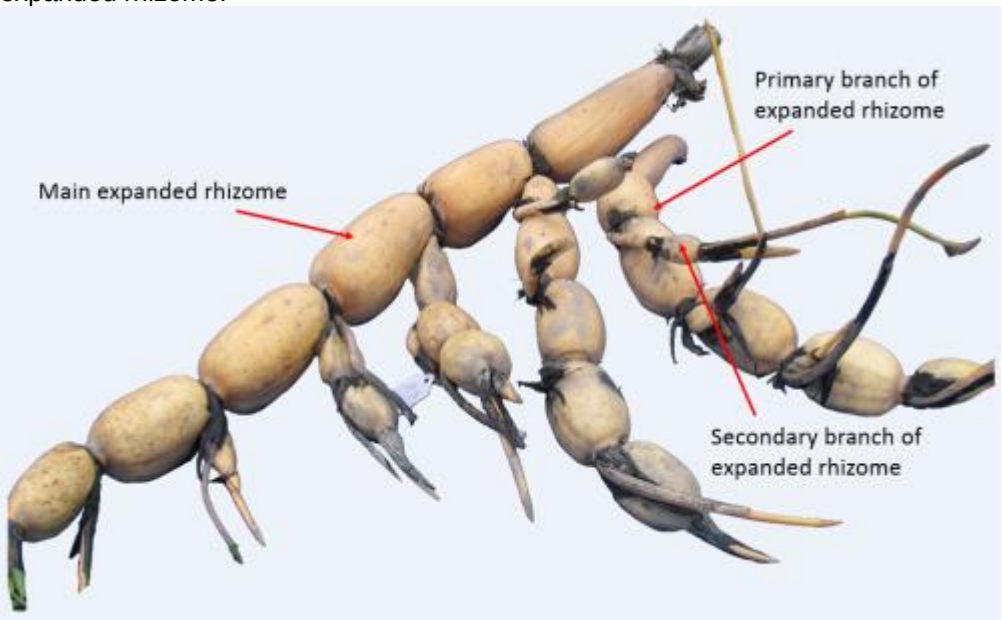
8.1 Explanations covering several characteristics

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

(a) For flower, all characteristics are observed and measured on day 2 flower around 8:00–10:00 am (7:00–9:00 am in hot summer) except a few of special varieties, because a flower, particularly single and semi double flower types, starts to open in the early morning and completely closes afternoon from day 1 to day 3. One flower usually lasts for only four days and then its tepals fall off on the 5th day or afternoon of the 4th day. For most of varieties, the second day flower has the best appearance.

Flowering time of a flower

(b) The underground expanded rhizome can be classified into three categories: Main (primary) expanded rhizome, primary branch of (secondary) expanded rhizome, secondary branch of (third) expanded rhizome.



8.2 Explanations for individual characteristics

Ad. 1: Color of young root

The color of young roots could be checked on seedling or a rhizome propagule during planting season.

1	2	3
white	pink	red

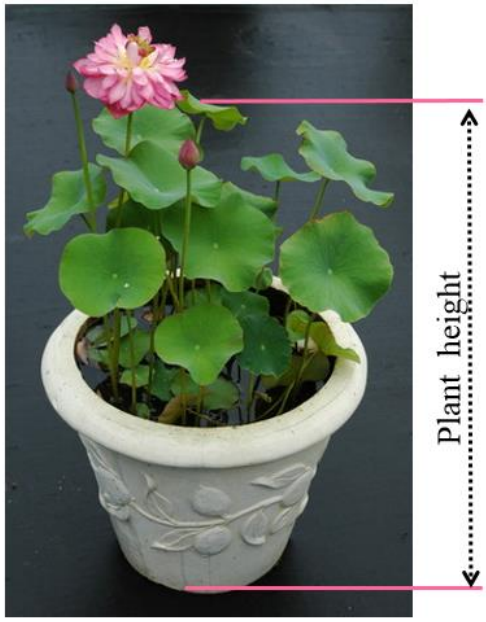
Ad. 2: Color of young leaf

The color of young leaves should be observed in the early spring when temperature is still relatively low and one to several coin leaves grow out of water. This characteristic will change or be unstable when temperature increases much in late spring or other seasons.

1	2	3	4	5
yellow	green	red center with green edge	green center with red edge	purple red

Ad. 3: Plant: height

Lotus plant can not reach the tallest before flowering peak, therefore the plant height must be measured right after flowering peak. Plant height must be measured from the bottom of pot or artificial pond meeting DUS test requirement, because leaf grows nearly from inner bottom of container or artificial pond.



1 2 3 4 5

1. Very short: –20 cm
2. Short: 21–90 cm
3. Medium: 91–160 cm
4. Tall: 161–260 cm
5. Very tall: 261 cm –

Ad. 4: Emerging leaf: number

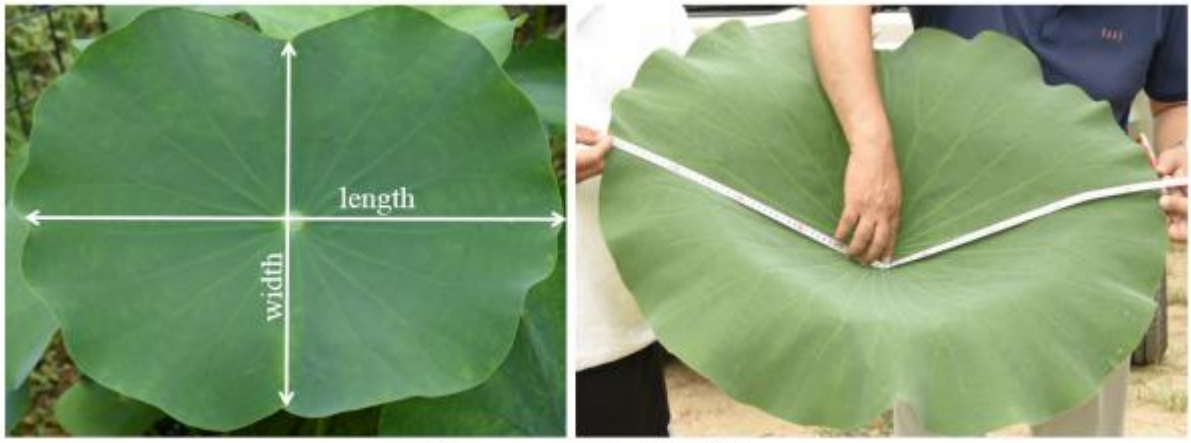
Lotus has both floating leaves and emerging leaves, and only the emerging leaves will be counted for leaf number per square meter of a container or pond.

1. Absent
2. Very few: 1–5
3. Few: 6–20
4. Medium: 21–40
5. Many: 41–60
6. Very many: 61–

The images of example cultivars will be uploaded later.

Ad. 5: Emerging leaf: blade size

The leaf blade size is calculated by (length + width)/2. For the concave leaf, its size should be measured by the way of right photo showing to represent the true length and width of leaf.



Measurement of leaf size

1. Very small: –10 cm
2. Small: 11–20 cm
3. Medium: 21–40 cm
4. Large: 41–80 cm
5. Very large: 81 cm –

Ad. 6: Emerging leaf: variegation on blade

1 absent

2 present

Ad. 7: Emerging leaf: blade color

Leaf color is based on observing adaxial surface of mature emerging leaves.

1 yellow-green

2 green

3 dark-green

Ad. 8: Emerging leaf: blade shape

1	2	3
round or nearly rounded	elliptic	long elliptic

Ad. 9: Emerging leaf: shape of longitudinal blade section

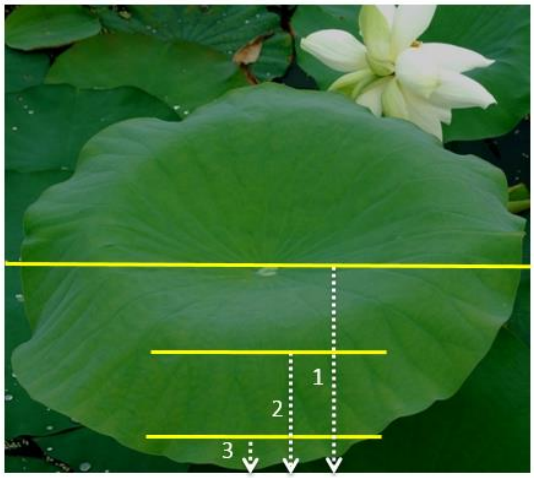
The leaf blade shape of longitudinal section should be based on observation of mature emerging leaves.

1	2	3	4	5
strongly concave	medium concave	weakly concave	flat	concave center with dropping edge

Ad. 10: Emerging leaf: blade texture

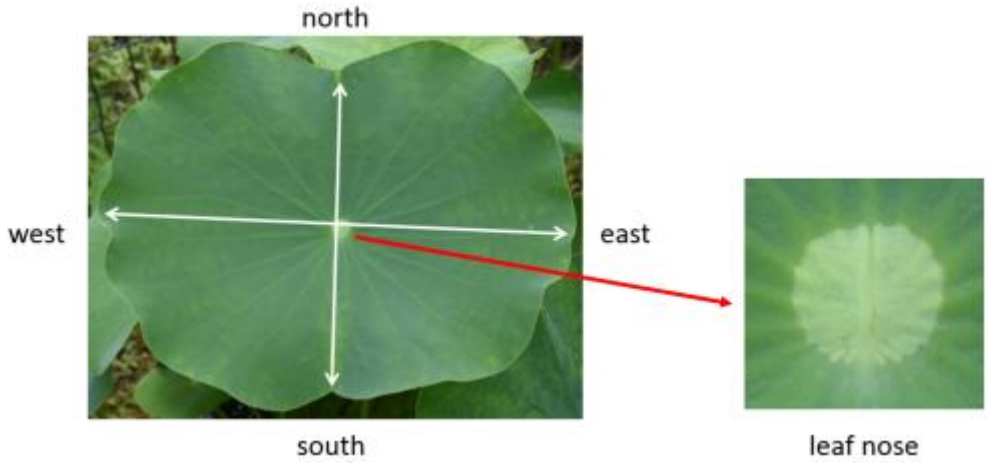
The upper surface texture of mature leaf can be identified by finger touch based on rough area and degree of roughness. However, for a few of cultivars, both weakly rough and smooth leaves could be found.

1. Very rough: fully rough
2. Medium: half leaf area is rough
3. Weakly rough: ¼ leaf area to edge is rough
4. Medium smooth: not rough
5. Very smooth: much smoother than 4



Ad. 11: Emerging leaf: upper blade margin

Definition on direction of leaf blade: actually the lotus leaf is bilaterally symmetric considering shape of both blade and its nose (leaf center). It is convenient for describing leaf apex by defining direction of blade side like photo showing below. For leaf edge, usually the middle position of north side (upper side) is more concave than that of south side (lower side). Therefore, for shape of leaf apex, only northern side is observed for comparison.



1	2	3	4
rounded or nearly so	weakly concave	medium concave	strongly concave

Ad. 12: Emerging leaf: red line of leaf margin

The color of leaf margin should be better observed before leaf becoming mature and aged.

1	2
absent	present

Ad. 13: Leaf nose gap

Definition: leaf nose is the nose-shaped structure located at the center of leaf. The distance between two halves of nose is defined as nose gap. The wild American lotus and some hybrid of American-Asian lotus have the widest gap and Asian lotus have the narrowest gap, and most of Asian-American hybrids have intermediate gap.

1 2 3 4

absent or very narrow medium broad

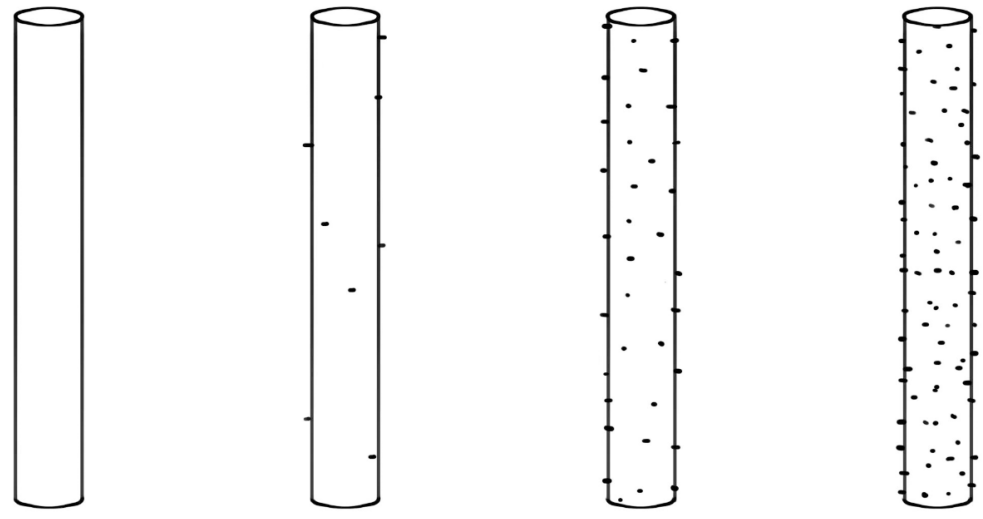
Ad. 14: Petiole: thickness

The diameter of petiole should be measured from the middle position of petiole for mature leaf.

1. Very thin: 0–3 mm
2. Thin: 3–5 mm
3. Medium: 5–10 mm
4. Thick: 10–20 mm
5. Very thick: 20 mm

Ad. 15: Petiole: spine density

Spine density is observed based on the middle position of petiole since it is not evenly distributed from bottom to top of petiole.



1 absent or very sparse

2 sparse

3 medium

4 dense

Ad. 16: Shape of flower bud

The shape of flower bud should be observed about two days before flower opening.

1	2	3	4	5
globose	ellipsoid	ovoid	ovoid-conic	conic

Ad. 17: Flower bud: color

The color of flower bud should be observed about two days before flower opening.

1	2	3	4	5	6	7
green yellow	green	green with purple-red edge	green red	purple red	gray purple	variegated

Ad. 18: Starting blooming time

The time of starting blooming for lotus is not highly dependent on genotype and also depending on regional climate particularly temperature. Tropical lotus blooms later than temperate lotus when they are planted in temperate region. Also the time of starting blooming is very different in different places of a country like China, and the lotus planted in the south blooms much earlier than that planted in the north.

Therefore, the time of starting blooming must be recorded and compared at the same location.

Ad. 19: Flowering time of group plants

The flowering time of group plants is observed from the first flower to the end of flowering, and it is highly depending on the ecological type of lotus and where they are cultivated. For all types of lotus, the aboveground parts of plants will die usually in fall when temperatures drop enough and can not bloom in cold weather. For tropical and subtropical lotus, the flower time may last half year even nearly across an entire year when planted in tropical region.

1. Very short: 1 month (very few temperate lotus)
2. Short: 2 months (few temperate lotus)
3. Medium: 3 months (most temperate lotus)
4. Long: 4 months (subtropical lotus)
5. Very long: 5 months and above (subtropical and tropical lotus in tropical region

Ad. 20: Flower number

Flower number should be counted based on the number of flowers per square meter and it should include all flowers seen in a container or pond during the entire growth season,

1. Absent or very few: 0–3 flowers
2. Few: 4–10 flowers
3. Medium: 11–20 flowers
4. Many: 21–40 flowers
5. Very many: 41– flowers

Ad. 21: Flower position comparing to leaf

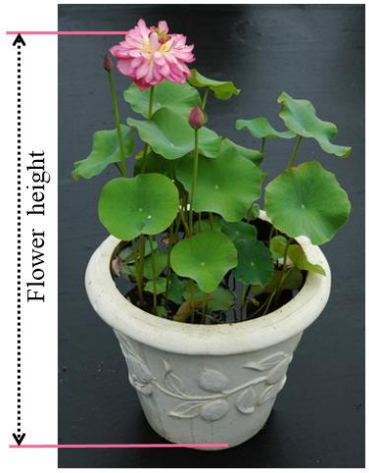
The position of flower comparing to leaf is based on the relative height of a flower and its accompanying leaf only for comparability.

1 below | 2 same | 3 slightly above | 4 medium above | 5 far above

Ad. 22: Flower height

The flower height here include height of flower itself and its stalk length. Lotus flower usually can not reach the tallest before flowering peak, therefore the flower height must be measured at least at flowering peak. It must be measured from the bottom of container or artificially pond, because flower grows nearly from inner bottom of container or artificial pond.

1. Very short: –20 cm
2. Short: 21–90 cm
3. Medium: 91–160 cm
4. Tall: 161–260 cm
5. Very tall: 261 cm –



Ad. 23: Flower size

The flower size is measured by the diameter of lotus flower and it should be measured between 8:00-10:00 am (7:00-9:00 am in peak summer), otherwise the flower will start to close near noon and most of day 2 flowers will completely closed after noon.

1. Very small: −5 cm
2. Small: 6−10 cm
3. Medium: 11−24 cm
4. Large: 25−38 cm
5. Very large: 39 cm

Measurement of flower size (diameter)

Ad. 24: Flower type

Since lotus has no stably basic number of flower tepals, and the tepal number of single flower has large variation and ranges from 20 to 34 observed in wild lotus population. Therefore, it is not reasonable to classify flower type based on a determined tepal number. The classification on flower type of lotus must consider both tepal number and development status of tepals.

Definition and classification on lotus flower type.

1. Single type: tepal number below 34 without petaloidity of stamens.
2. Semidouble type: tepal number around 21 to 60 with petaloidity of partial stamens.
3. Double type: tepal number usually over 40 with petaloidity of partial or all stamens.
4. Dual-layered type: a special type of double flower, its petaloid carpels form another layer of flower tepals which is separated from normal tepal layer by stamens.
5. Fully double type: a special type of double flower, in which both stamens and carpels are completely petaloid.
6. Thousand-petalled type: a very unique type of double flower, in which, both stamens and carpels are not only completely petaloid, but also the petaloid tissue continues developing into numerous petals during flower opening. The total number of tepals (petals) is at least more than one thousand.

1 2 3 4 5 6

Ad. 25: Flower shape

Definition and classification on flower shape

1. Cup-shaped: for the first day flower of most lotus cultivars, it can not fully open and looks like a cup. For a very few of cultivars, the second day flower also can not fully open.
2. Bowl-shaped: the second day flower can be usually fully open like a bowl.
3. Plate-shaped: the fully open flower looks like a plate, with nearly horizontally arranged petals.
4. Dancing-shaped: a special flower shape of usually single flower, its irregularly arranged petals look like a dance gesture.
5. Head-shaped: the head-shaped and fully double flower with numerous petals, most of which come from petaloid stamens and carpels.
6. Ball-shaped: for a very few cultivar, some or most of the flower buds can not open and remain a ball shape.

1 2 3 4 5 6

Ad. 26: Color type of flower

Definition and classification on color of lotus flower.

The color of lotus flower has large variation between different genotypes. The flower color is mainly based on main color of tepals (excluding small ones of outer layer).

The white flower type includes pure white and white tepal with pink tips. Lotus have no pure pink and red flower, and actually pink and red flowers have purple element. The variegated type has clear boundary between main color and secondary color, while the multicolored flower has no clear boundary between different colors.

1 white | 2 pink | 3 red | 4 yellow

5 orange | 6 green | 7 variegated | 8 multicolored

Ad. 27: Changeability of flower color

For some varieties, the flower color may change (or discolorate) much from the first day to the end of flowering, particularly between day 1 and day 2, or/and between day 2 and day 3. The following figures show quick change of flower color of *Nelumbo* 'Bian Lian'.

1
day 1

2
day 2

3
day 3

Ad. 28: Tepal number

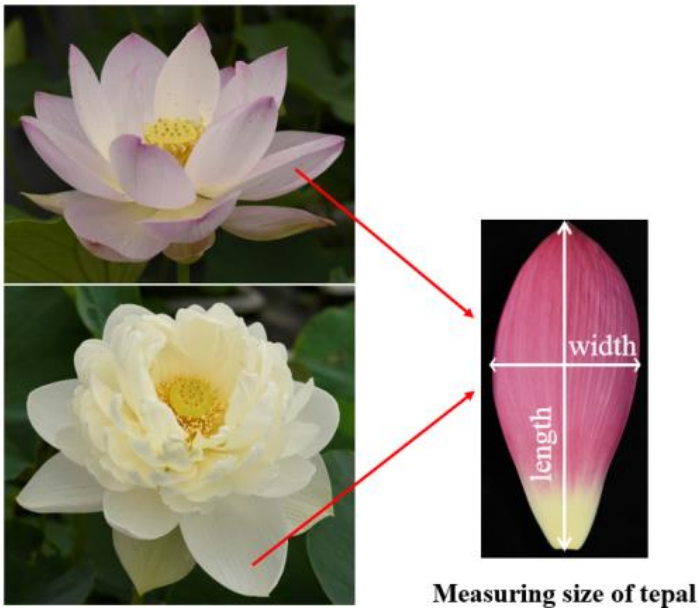
The number of tepals includes the outermost four sepal-like tepals and all of petaloid structure for non-single flower varieties.

1. Very few: −20
2. Few: 21−35
3. Medium: 36−100
4. Many: 101−500
5. Very many: 501−

Ad. 29: The size of the largest tepal

Since the shape and size change much from outer to inner layers of tepals, therefore, only the largest or nearly largest tepal is used for comparison in tepal shape and size. The largest or nearly largest tepal is located at around the position where the half number of total tepals of a flower is counted for a single form flower. For double form flower, it is treated as single form flower without considering petaloid petals for measuring.

The tepal size is calculated by (length + width)/2.

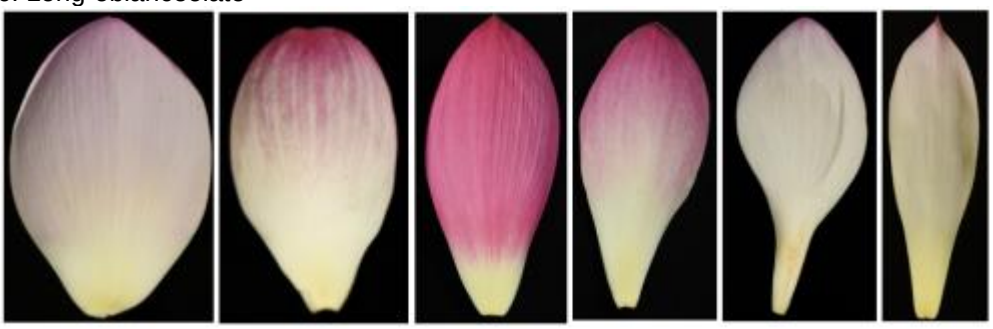


Measuring size of tepal

Ad. 30: Shape of the largest tepal

The tepal shape of lotus changes so much from outer layers to inner ones, therefore this character should be compared only for the largest (or nearly so) tepal.

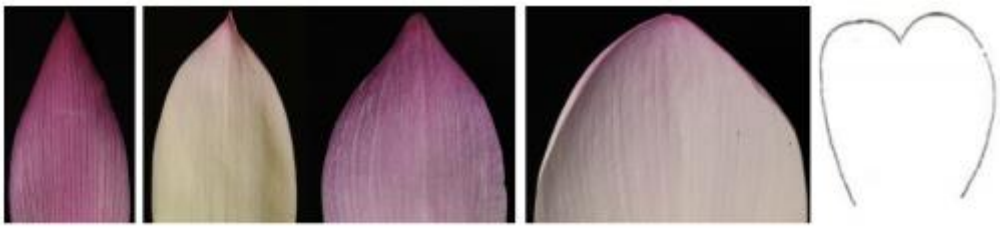
1. Obovate
2. Long-obovate
3. Obovate-lanceolate
4. Oblanceolate
5. Clawed
6. Long-oblanceolate



1 2 3 4 5 6

Ad. 31: Apex of the largest tepal

Shape of tepal apex is based on the largest (or nearly so) tepal for comparability.



1 acute | 2 acuminate | 3 obtuse | 4 rounded | 5 retuse

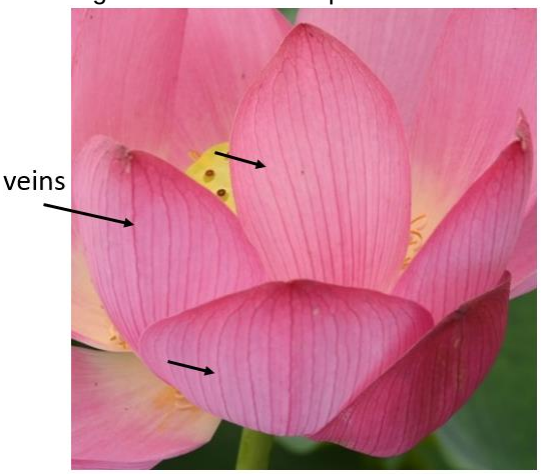
Ad. 33: Distribution of tepal color

This characteristic is based on the largest (or nearly so) tepal for comparability.

1 even | 2 gradually transitioned | 3 alternatedly colorationed | 4 apex colorationed | 5 longitudinally white-stripped | 6 variegated

Ad. 34: Abaxial veins of tepal

The longitudinal veins on tepal should be observed on abaxial surface of tepal (largest one or nearly so).



Ad. 37: Color of stamen appendage

The color of stamen appendage should be usually observed for the day 1 or day two flower. For dark-brown stamen appendage, only part and not all of stamens present this characteristic in the currently known varieties.

1 light-yellow

2 white

3 white with purple-pink spotted apex

4 purple-pink

5 purple red

6 dark-brown

Ad. 39: Carpel number

0. Absent: 0
1. Very few: 1–6
2. Few: 7–15
3. Medium: 16–30
4. Many: 31–45
5. Very many: 46–

Ad. 40: Length of stamen appendage

The length of stamen appendage is measured based on day-2 flower.

Very short: –2 mm
Short: 2–3 mm
Medium 3–4 mm
Long: 4–5 mm
Very long: 5 mm –

Ad. 41: Development status of carpel

1. normal: all carpels develop normally;
2. partially bubbled: part of carpels become bubbled (degenerated) and could not develop into the fruits;
3. completely bubbled: all carpels become bubbled and could not develop into the fruits;
4. partially petaloid: part of carpels become petaloid;
5. completely petaloid: all carpels become petaloid.

Ad. 42: Development status of receptacle

1	2	3
Normal	partially degenerated	absent

Ad. 43: Color of receptacle top surface

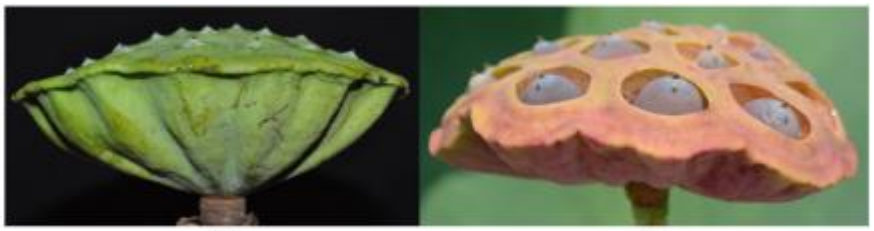
Observation color of young receptacle top surface should be based on day 2 flower only.

1	2	3
yellow	yellow-green	green

Ad. 44: Shape of mature seedpod

The shape of mature seedpod should be observed when seedpod approaching mature and before color change.

1 trumpet-shaped | 2 obconical | 3 cup-shaped | 4 bowl-shaped



5 oblate | 6 umbrella-shaped

Ad. 45: Shape of top surface of mature seedpod

1 concave | 2 plate-like concave | 3 flat | 4 slightly convex | 5 convex

Ad. 46: Margin of mature seedpod

1 entire or nearly so | 2 weakly concave | 3 medium | 4 strongly concave

Ad. 47: Color of mature seedpod top surface

1 greyed-green | 2 green | 3 green-yellow | 4 purple-red

Ad. 48: Fruit-setting rate

The fruit-setting rate is basically calculated or visually estimated by the ratio of fruit number in total embryo number for each seedpod. The fruit-setting rate is largely different between selfing and crossing for a variety. Here it is only based on the case of open pollination.

1 2 3 4 5 6

1. Absent: totally sterile
2. Very low: 1% to 10% fruit-setting
3. Low: 10% to 40% fruit-setting
4. Medium: 40% to 60% fruit-setting
5. High: 60% to 80% fruit-setting
6. Very high: 80% to 100% fruit-setting

Ad. 49: Position of fruit comparing to seedpod

1 low or nearly so | 2 same | 3 weakly above | 4 strong above

Ad. 50: Fruit shape

1 globose | 2 ovoid | 3 long-ovoid | 4 obovoid | 5 long-obovoid | 6 narrow-elliptic | 7 elliptic

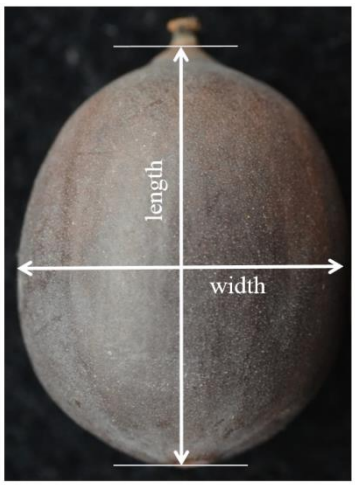
Ad. 51: Endocarp color

For some varieties, the color may be different in two halves of endocarp, and in such case, the characteristic should be based on the half endocarp with deeper color.

1	2	3	4
white	purple-pink	light purple-red	purple-red

Ad. 52: Size of dried mature fruit

The size of dried fruit is calculated by (length and width)/2, and its length should not include residual style and stigma which can be removed by rubbing fruit tip on a rough brick.



Measurement of dried fruit size

According to width (diameter) of fruits.

1. Very small: –5 mm
2. Small: 6–10 mm
3. Medium: 11–15 mm
4. Large: 16–20 mm
5. Very large: 21 mm –

Ad. 53: Mature time of expanded rhizome (for rhizome lotus only)

Explanation will be added later.

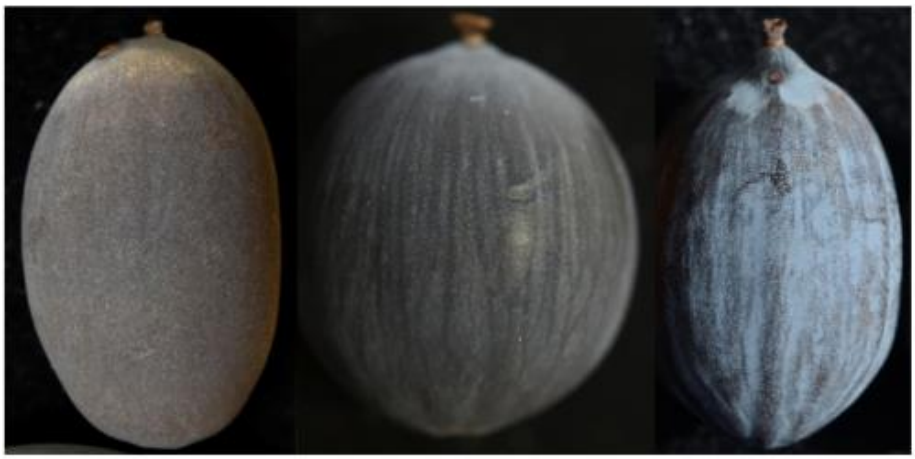
Ad. 54: Color of dried mature fruit

For the same variety, the color of dried mature fruits may be different depending on collection time. Therefore, the fruits should be collected as soon as possible when they become dried in seedpod. Or, they can be collected when fruit color starts to change into brown and then be dried in room temperature or outside in sunny day.

The fruits of American lotus show different colors depending on collection time

1	2	3	4
brown	greyed-brown	gray	black or dark-brown

Ad. 55: White waxy powder on surface of dried mature fruit



1	2	3
absent	little	much

Ad. 56: Glossiness of dried fruit

Glossiness of dried fruit should be observed on mature fruits, in which the waxy powder should be wiped off by hand for check.

1	2	3
absent	weak	strong

Ad. 57: Longitudinal stripes on fruit

1	2	3
absent	weak	strong

Ad. 58: Expansion degree of rhizome

Expansion degree of rhizome is based on measurement of diameter of thickest rhizome for a variety. The tropical lotus has unexpanded rhizome or weakly expanded rhizome, while rhizome lotus (for vegetable production) has the thickest expanded rhizome.

1. Absent to very weak: –2 cm
2. Weak: 2–3 cm
3. Medium: 3–4 cm
4. Strong: 4–5 cm
5. Very strong: 5 cm –

Ad. 59: Internode number of main expanded rhizome

This characteristic is a very important trait for rhizome lotus.

Ad. 60: Internode shape of main expanded rhizome

1
nearly globose

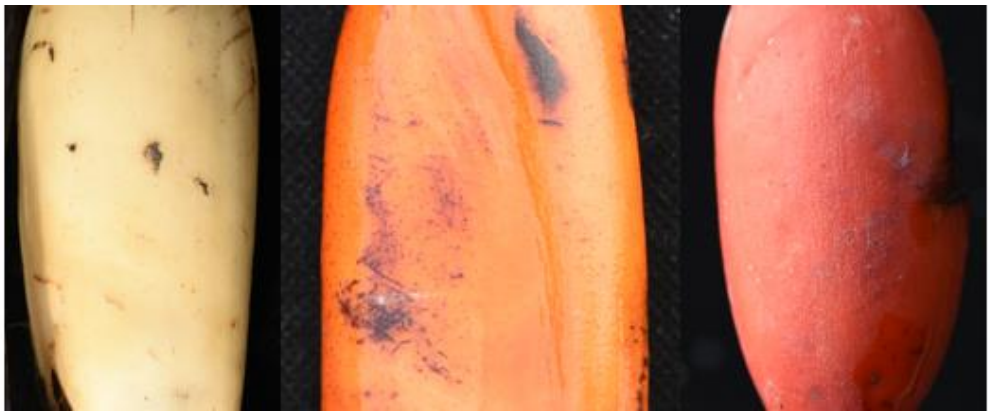
2
short tubed

3
tubed

4
long tubed

Ad. 61: Color of expanded rhizome

Since the color of expanded rhizome may be different between early developing stage and late mature stage, it should be observed after lotus entered into dormancy in the fall.



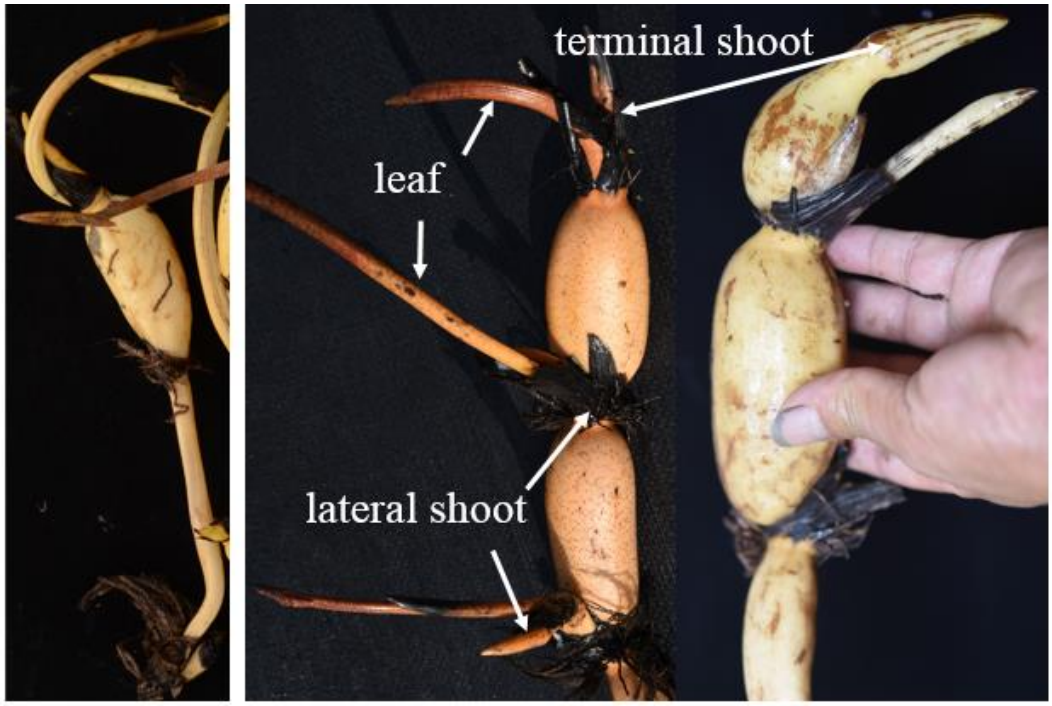
1	2	3
white	yellow-brown	yellow-red

Ad. 62: Spots on surface of expanded rhizome

1	2
absent	present

Ad. 64: Number of rhizome propagule

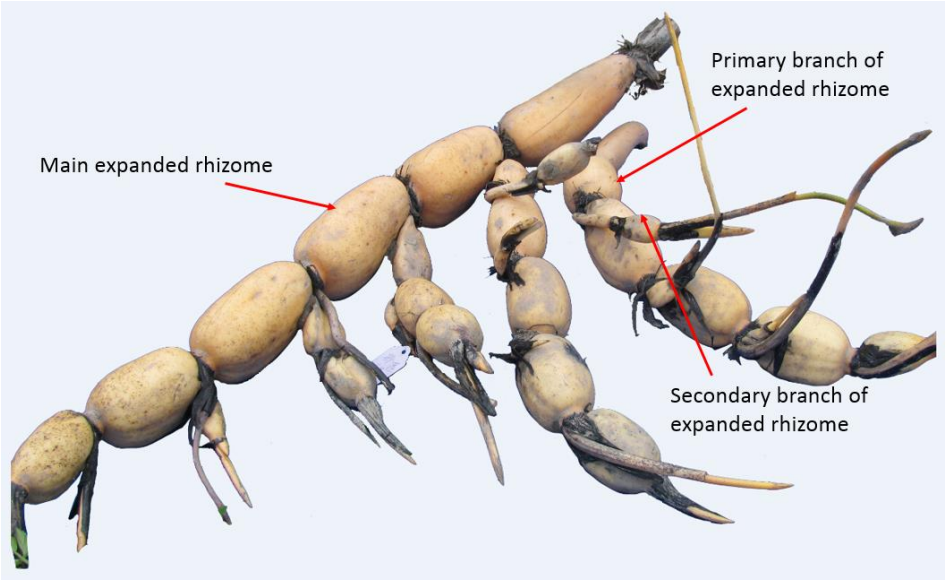
The number of rhizome propagules is based on count of the standard rhizome propagule each of which consists of two internodes with terminal shoot at least (figure A). Of course, the propagule with both terminal shoot and lateral shoot (figure B) has higher survival rate.



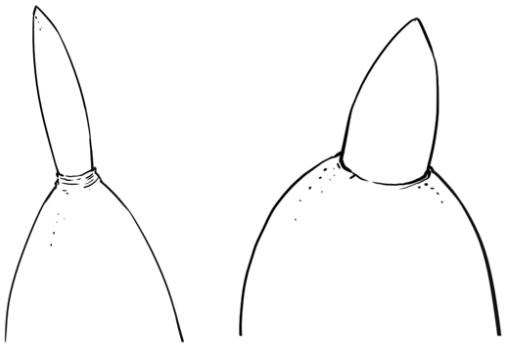
A B

1. Absent or very few: 0–5
2. Few: 6–10
3. Medium: 11–20
4. Many: 21–30
5. Very many: 31–

Ad. 65: Branch number of expanded rhizome (for rhizome lotus only)



Ad. 66: Apex shape of terminal internode (for rhizome lotus only)



1
acute

2
obtuse

Ad. 68: Shape of expanded rhizome cross-section (for rhizome lotus only)

1
circular

2
elliptical

3
rectangular

Ad. 69: Texture of expanded rhizome (for rhizome lotus only)

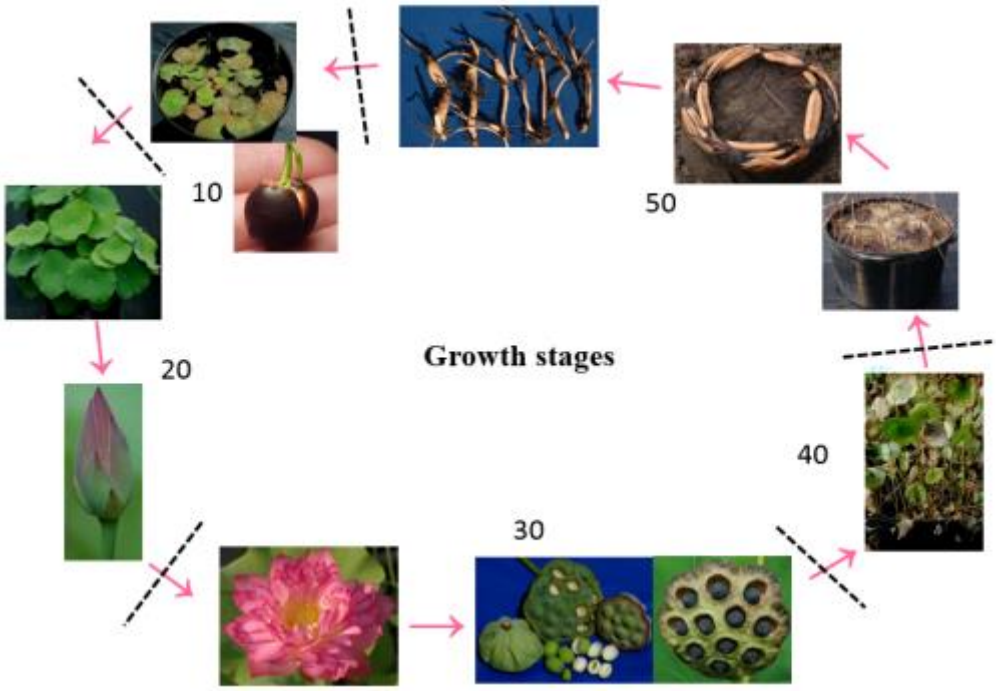
This characteristic is only applied for rhizome lotus. The texture of expanded rhizome can be tested by eating either fresh rhizomes or cooked ones.

Ad. 70: Tolerance to disease: leaf rot

The disease mainly attacks the emerging leaves and underground rhizomes.

8.3 Growth stages

10 Growth of shoots, coin leaves and floating leaves after planting in spring
20 Growth of emerging leaves and flower buds before flowering in early summer
30 Flowering, fruit setting, fruit maturation and rhizome expansion between summer and fall
40 Leaf aging, yellowing, and then died after end of flowering in fall.
50 Plant dormancy in winter



9. Literature

Agricultural Department of China. 2015. Guidelines for The Conduct of Tests for Distinctness, Uniformity and Stability——Lotus (*Nelumbo* Adans.), Standards of Agricultural Industry of China (NY/T 2756—2015. China Agriculture Press, Beijing, China, 15pp.

Agricultural Department of China. 2016. Descriptor for Lotus Germplasm Resources. Standards of Agricultural Industry of China (NY/T 2937—2016). China Agriculture Press, Beijing, China, 17pp.

Ke WD, Li F, et al. 2005. Descriptors and Data Standard for Lotus (*Nelumbo nucifera* Gaertn.). China Agriculture Press, Beijing, China, 85pp.

Tian DK. 2020. Application to Register a Cultivar of *Nelumbo*. 8pp. https://iwgs.org/nymphaea-and-nelumbo-registration/ (2023-2-26 accessed).

Wang QC, Zhang XY. 2005. Colored Illustration of Lotus Cultivars in China. China Forestry Press, Beijing, China, 306pp.

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

In the case of hybrid varieties which are the subject of an application for plant breeders' rights, and where the parent lines are to be submitted as a part of the examination of the hybrid variety, this Technical Questionnaire should be completed for each of the parent lines, in addition to being completed for the hybrid variety.

1. Subject of the Technical Questionnaire

1.1	Botanical name	*Nelumbo* Adans.
1.2	Common name	Lotus

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 Seed-propagated varieties

(a)	Cross-pollination	[ ]
(b)	Hybrid	[ ]
(i)	Single hybrid	[ ]
(c)	Inbred line	[ ]
(i)	Male sterile line	[ ]
(ii)	Male fertile line	[ ]
(d)	Apomictic Variety	[ ]
(e)	Other (please provide details)	[ ]

4.2.2 Vegetative propagation

(a)	*In vitro* propagation	[ ]
(b)	Division	[ ]
(c)	Rhizomes	[ ]
(d)	Other (state method)	[ ]

4.2.3 Other [ ]
(Please provide details)

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

Single Hybrid

(……..……..…) x (……..……..…)

female parent male parent

Three-Way Hybrid

(……..……..…) x (……..……..…)

female line male line

(……..……..…) x (……..……..…)

single hybrid used as female parent male parent

and should identify in particular:

(a) any male sterile lines

(b) maintenance system of male sterile lines.

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

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 (1)	**Color of young root**		
	white	Nelumbo lutea	1 [ ]
	pink	Nelumbo nucifera 'Fen Bawang'	2 [ ]
	red	Nelumbo 'Cai Xia'	3 [ ]
5.2 (2)	**Color of young leaf**		
	yellow	Nelumbo lutea	1 [ ]
	green	Nelumbo nucifera 'Baiyangdian Bai'	2 [ ]
	red center with green edge	Nelumbo nucifera 'Zhuo Yue'	3 [ ]
	green center with red edge	Nelumbo nucifera 'Qian Ban'	4 [ ]
	purple red	Nelumbo 'Gui Li'	5 [ ]
5.3 (3)	**Plant: height**		
	very short	Nelumbo 'Chuzi Luo'	1 [ ]
	short	Nelumbo 'Xing Huo'	2 [ ]
	medium	Nelumbo 'Yijian Lian'	3 [ ]
	tall	Nelumbo lutea	4 [ ]
	very tall	Nelumbo nucifera 'Fen Bawang'	5 [ ]
5.4 (4)	**Emerging leaf: number**		
	absent	Nelumbo 'Ai Xiangsi Hong'	1 [ ]
	very few	Nelumbo 'Jin Fuwa'	2 [ ]
	few	Nelumbo nucifera 'Zhongshan Hongtai'	3 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	4 [ ]
	many		5 [ ]
	very many		6 [ ]
5.5 (5)	**Emerging leaf: blade size**		
	very small	Nelumbo 'Chuzi Luo'	1 [ ]
	small	Nelumbo 'Yanzhi Wan'	2 [ ]
	medium	Nelumbo 'Jiuhua Haoyue'	3 [ ]
	large	Nelumbo lutea	4 [ ]
	very large	Nelumbo nucifera 'Fen Bawang'	5 [ ]

	Characteristics	Example Varieties	Note
5.6 (9)	**Emerging leaf: shape of longitudinal blade section**		
	strongly concave		1 [ ]
	medium	Nelumbo nucifera 'Dan Sajin'	2 [ ]
	weakly concave	Nelumbo lutea	3 [ ]
	flat	Nelumbo 'Jia Jingying'	4 [ ]
	concave center with dropping edge	Nelumbo nucifera 'Elian 1'	5 [ ]
5.7 (10)	**Emerging leaf: blade texture**		
	very rough	Nelumbo nucifera 'Daye Chi'	1 [ ]
	medium rough	Nelumbo nucifera 'Honghu Hong'	2 [ ]
	weakly rough		3 [ ]
	medium smooth	Nelumbo nucifera 'Fenhong Lingxiao'	4 [ ]
	very smooth	Nelumbo lutea	5 [ ]
5.8 (11)	**Emerging leaf: upper blade margin**		
	rounded or nearly so	Nelumbo lutea	1 [ ]
	weakly concave	Nelumbo 'Honghe Zhanchi'	2 [ ]
	medium concave	Nelumbo 'Danban Jinxia'	3 [ ]
	strongly concave	Nelumbo nucifera 'Wuchang Wild'	4 [ ]
5.9 (12)	**Emerging leaf: red line of blade edge**		
	absent		1 [ ]
	present		9 [ ]
5.10 (13)	**Leaf nose gap**		
	absent or very narrow	Nelumbo 'Jia Jingying'	1 [ ]
	narrow	Nelumbo nucifera 'Honghu Hong'	2 [ ]
	medium	Nelumbo 'Yijian Lian'	3 [ ]
	broad	Nelumbo lutea	4 [ ]
5.11 (14)	**Petiole: thickness**		
	very thin	Nelumbo 'Chuzi Luo'	1 [ ]
	thin	Nelumbo 'Hong Sijuan'	2 [ ]
	medium	Nelumbo lutea	3 [ ]
	thick	Nelumbo nucifera 'Honghu Hong'	4 [ ]
	very thick	Nelumbo nucifera 'Fen Bawang'	5 [ ]

	Characteristics	Example Varieties	Note
5.12 (15)	**Petiole: spine density**		
	absent or very sparse	Nelumbo lutea	1 [ ]
	sparse	Nelumbo 'Bian Lian'	2 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	3 [ ]
	dense	Nelumbo 'Jia Jingying'	4 [ ]
5.13 (16)	**Shape of flower bud**		
	globose	Nelumbo 'Xiao Hongqiu'	1 [ ]
	ellipsoid	Nelumbo 'Jin Fuwa'	2 [ ]
	ovoid	Nelumbo lutea 'Yellow Bird'	3 [ ]
	ovoid-conic	Nelumbo nucifera 'Dan Sajin'	4 [ ]
	conic	Nelumbo 'Tan Kong'	5 [ ]
5.14 (17)	**Flower bud: color**		
	green yellow	Nelumbo lutea	1 [ ]
	green	Nelumbo nucifera 'Baiyangdian Bai'	2 [ ]
	green with purple-red edge	Nelumbo 'Furong Qipa'	3 [ ]
	green red	Nelumbo 'Jiangnan Mingzhu'	4 [ ]
	purple red	Nelumbo nucifera 'Zhongshan Hongtai'	5 [ ]
	gray purple	Nelumbo 'Yinxiang Xihu'	6 [ ]
	variegated	Nelumbo nucifera 'Dan Sajin'	7 [ ]
5.15 (18)	**Starting blooming time**		
	early	Nelumbo 'Jiuhua Haoyue'	1 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	2 [ ]
	very late	Nelumbo nucifera 'Fenhong Lingxiao'	3 [ ]
5.16 (19)	**Flowering time of group plants**		
	very short		1 [ ]
	short		2 [ ]
	medium	Nelumbo 'Yijian Lian'	3 [ ]
	long	Nelumbo 'Bian Lian'	4 [ ]
	very long	Nelumbo nucifera 'Fenhong Lingxiao'	5 [ ]

	Characteristics	Example Varieties	Note
5.17 (20)	**Flower number**		
	absent or very few	Nelumbo nucifera 'Elian 1'	1 [ ]
	few	Nelumbo 'Bo Ai'	2 [ ]
	medium	Nelumbo nucifera 'Zhongshan Hongtai'	3 [ ]
	many	Nelumbo 'Hong Sijuan‘	4 [ ]
	very many	Nelumbo 'Xing Huo'	5 [ ]
5.18 (21)	**Flower position comparing to leaf**		
	below		1 [ ]
	same		2 [ ]
	slightly above	Nelumbo 'Hong Sijuan'	3 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	4 [ ]
	far above	Nelumbo 'Chenshan Baihe'	5 [ ]
5.19 (22)	**Flower height**		
	very short	Nelumbo 'Chuzi Luo'	1 [ ]
	short	Nelumbo 'Yanzhi Wan'	2 [ ]
	medium	Nelumbo 'Bo Ai'	3 [ ]
	tall	Nelumbo nucifera 'Zhizun Qianban'	4 [ ]
	very tall	Nelumbo nucifera 'Fen Bawang'	5 [ ]
5.20 (23)	**Flower size**		
	very small	Nelumbo 'Chuzi Luo'	1 [ ]
	small	Nelumbo 'Hong Sijuan'	2 [ ]
	medium	Nelumbo 'Yijian Lian'	3 [ ]
	large	Nelumbo nucifera 'Honghu Hong'	4 [ ]
	very large	Nelumbo nucifera 'Fen Bawang'	5 [ ]
5.21 (24)	**Flower type**		
	single	Nelumbo nucifera 'Honghu Hong'	1 [ ]
	semi-double	Nelumbo 'Cai Xia'	2 [ ]
	double	Nelumbo nucifera 'Dan Sajin'	3 [ ]
	dual-layered	Nelumbo nucifera 'Hongtai Lian'	4 [ ]
	fully double	Nelumbo nucifera 'Zhizun Qianban'	5 [ ]
	thousand-petalled	Nelumbo nucifera 'Qian Ban'	6 [ ]

	Characteristics	Example Varieties	Note
5.22 (25)	**Flower shape**		
	cup-shaped	Nelumbo 'Furong Qipa'	1 [ ]
	bowl-shaped	Nelumbo nucifera 'Honghu Red'	2 [ ]
	plate-shaped	Nelumbo 'Jin Se'	3 [ ]
	dancing-shaped		4 [ ]
	head-shaped	Nelumbo nucifera 'Zhizun Qianban'	5 [ ]
	ball-shaped	Nelumbo 'Xiao Hongqiu'	6 [ ]
5.23 (26)	**Color type of flower**		
	white	Nelumbo nucifera 'Baiyangdian Bai'	1 [ ]
	pink	Nelumbo nucifera 'Hongtai Lian'	2 [ ]
	red	Nelumbo 'Zhongguohong Beijing'	3 [ ]
	yellow	Nelumbo lutea	4 [ ]
	orange	Nelumbo 'Xingse Chunshan'	5 [ ]
	green		6 [ ]
	variegated	Nelumbo nucifera 'Dan Sajin'	7 [ ]
	multicolored	Nelumbo 'Perry's Giant Sunburst'	8 [ ]
5.24 (27)	**Changeability of flower color**		
	none or very weak	Nelumbo 'Yijian Lian'	1 [ ]
	medium	Nelumbo 'Yi Xian'	2 [ ]
	strong	Nelumbo 'Bian Lian'	3 [ ]
5.25 (28)	**Tepal number**		
	very few	Nelumbo 'Xianxian Yuzhi'	1 [ ]
	few	Nelumbo nucifera 'Honghu Hong'	2 [ ]
	medium	Nelumbo nucifera 'Zhongshan Hongtai'	3 [ ]
	many	Nelumbo 'Youyi Mudan'	4 [ ]
	very many	Nelumbo nucifera 'Qian Ban'	5 [ ]
5.26 (29)	**The size of the largest tepal**		
	very small	Nelumbo 'Chuzi Luo'	1 [ ]
	small		2 [ ]
	medium	Nelumbo 'Yanzhi Wan'	3 [ ]
	large	Nelumbo 'Yijian Lian'	4 [ ]
	very large	Nelumbo nucifera 'Fen Bawang'	5 [ ]

	Characteristics	Example Varieties	Note
5.27 (30)	**Shape of the largest tepal**		
	obovate	Nelumbo 'Toshihiro's Friendship'	1 [ ]
	long-obovate		2 [ ]
	obovate-lanceolate	Nelumbo 'Yijian Lian'	3 [ ]
	oblanceolate		4 [ ]
	clawed	Nelumbo 'Jiangnan Mingzhu'	5 [ ]
	long-oblanceolate	Nelumbo 'Tan Kong'	6 [ ]
5.28 (31)	**Apex of the largest tepal**		
	acute		1 [ ]
	acuminate	Nelumbo 'Xianxian Yuzhi'	2 [ ]
	obtuse		3 [ ]
	rounded	Nelumbo 'Toshihiro's Friendship'	4 [ ]
	retuse	Nelumbo 'Jingshui Guanyin'	5 [ ]
5.29 (32)	**Color of the largest tepal**		
	upper position		1 [ ]
	middle position		2 [ ]
	base position		3 [ ]
5.30 (33)	**Distribution of tepal color**		
	even	Nelumbo 'Yijian Lian'	1 [ ]
	gradually transitioned	Nelumbo 'Toshihiro's Friendship'	2 [ ]
	alternatedly colored	Nelumbo 'Jiangnan Mingzhu'	3 [ ]
	apex colorationed		4 [ ]
	longitudinally white-stripped	Nelumbo 'Cangqian Hong'	5 [ ]
	variegated	Nelumbo nucifera 'Dan Sajin'	6 [ ]
5.31 (34)	**Abaxial veins of tepal**		
	absent or very weak	Nelumbo nucifera 'Zhongri Youyi'	1 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	2 [ ]
	strong	Nelumbo nucifera 'Taikong 36'	3 [ ]

	Characteristics	Example Varieties	Note
5.32 (37)	**Color of stamen appendage**		
	light-yellow	Nelumbo lutea	1 [ ]
	white	Nelumbo nucifera 'Baiyangdian Bai'	2 [ ]
	white with purple-pink spotted apex	Nelumbo 'Hong Mudan'	3 [ ]
	purple-pink	Nelumbo 'Yijian Lian'	4 [ ]
	purple-red	Nelumbo 'Gudu Jiangfang'	5 [ ]
	dark-brown	Nelumbo nucifera 'Yuhuo Niepan'	6 [ ]
5.33 (38)	**Shape of stamen appendage**		
	nearly globose		1 [ ]
	elliptical		2 [ ]
	clavate	Nelumbo lutea	3 [ ]
	auriculiform	Nelumbo 'Jiangnan Mingzhu'	4 [ ]
5.34 (40)	**Length of stamen appendaxage**		
	very short		1 [ ]
	short	Nelumbo nucifera 'Fenhong Lingxiao'	2 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	3 [ ]
	long	Nelumbo 'Ms. Perry D. Slocum'	4 [ ]
	very long	Nelumbo lutea	5 [ ]
5.35 (41)	**Development status of carpel**		
	normal	Nelumbo nucifera 'Honghu Hong'	1 [ ]
	partially bubbled	Nelumbo 'Lv Kongque'	2 [ ]
	completely bubbled	Nelumbo 'Qinhuai Yueye'	3 [ ]
	partially petaloid	Nelumbo 'Huang Lingyang'	4 [ ]
	completely petaloid	Nelumbo nucifera 'Zhizun Qianban'	5 [ ]
5.36 (42)	**Development status of receptacle**		
	normal	Nelumbo lutea	1 [ ]
	partially degenerated	Nelumbo nucifera 'Hongtai Lian'	2 [ ]
	absent	Nelumbo nucifera 'Zhizun Qianban'	3 [ ]

	Characteristics	Example Varieties	Note
5.37 (44)	**Shape of mature seedpod**		
	trumpet-shaped	Nelumbo 'Hong Sijuan'	1 [ ]
	obconical	Nelumbo nucifera 'Jin Furong 2'	2 [ ]
	cup-shaped	Nelumbo 'Jin Fuwa'	3 [ ]
	bowl-shaped	Nelumbo 'Perry's Giant Sunburst'	4 [ ]
	oblate	Nelumbo lutea	5 [ ]
	umbrella-shaped	Nelumbo nucifera 'Thai Red'	6 [ ]
5.38 (45)	**Shape of top surface of mature seedpod**		
	concave	Nelumbo nucifera 'Jin Furong 2'	1 [ ]
	plate-like concave	Nelumbo 'Sino-American Friendship'	2 [ ]
	flat	Nelumbo lutea 'Missouri'	3 [ ]
	slightly convex	Nelumbo lutea 'Maryland'	4 [ ]
	convex		5 [ ]
5.39 (48)	**Fruit-setting rate**		
	absent	Nelumbo nucifera 'Zhizun Qianban'	1 [ ]
	very low	Nelumbo 'Perry’s Giant Sunburst'	2 [ ]
	low	Nelumbo 'Moling Qiuse'	3 [ ]
	medium	Nelumbo 'Jiuhua Haoyue'	4 [ ]
	high	Nelumbo nucifera 'Jin Furong 2'	5 [ ]
	very high	Nelumbo nucifera 'Honghu Hong'	6 [ ]
5.40 (49)	**Position of fruit comparing to seedpod**		
	low or nearly low	Nelumbo lutea	1 [ ]
	same	Nelumbo 'China-Japan Friendship'	2 [ ]
	weakly above	Nelumbo 'Hongyun Lai'	3 [ ]
	strong above	Nelumbo 'Zhongshan Honglan'	4 [ ]
5.41 (50)	**Fruit shape**		
	narrow obovate		1 [ ]
	narrow ovate		2 [ ]
	narrow elliptic		3 [ ]
	globose	Nelumbo 'Jiuhua Haoyue'	4 [ ]
	ovate		5 [ ]
	obovate		6 [ ]
	elliptic	Nelumbo nucifera 'Honghu Hong'	7 [ ]

	Characteristics	Example Varieties	Note
5.42 (52)	**Size of dried mature fruit**		
	very small	Nelumbo 'Chuzi Luo'	1 [ ]
	small	Nelumbo lutea	2 [ ]
	medium	Nelumbo nucifera 'Honghu Hong'	3 [ ]
	large	Nelumbo 'Jiuhua Haoyue'	4 [ ]
	very large	Nelumbo nucifera 'Jianxuan 17'	5 [ ]
5.43 (54)	**Color of dried mature fruit**		
	brown	Nelumbo lutea	1 [ ]
	greyed-brown	Nelumbo 'Ms. Perry D. Slocum'	2 [ ]
	gray	Nelumbo nucifera 'Honghu Hong'	3 [ ]
	black or dark brown	Nelumbo 'Jiuhua Haoyue'	4 [ ]
5.44 (56)	**Glossiness of dried fruit**		
	absent	Nelumbo nucifera 'Yingquan Xike'	1 [ ]
	weak	Nelumbo 'Jiuhua Haoyue'	2 [ ]
	strong		3 [ ]
5.45 (57)	**Longitudinal stripes on fruit**		
	absent	Nelumbo nucifera 'Honghu Hong'	1 [ ]
	weak	Nelumbo 'Jiuhua Haoyue'	2 [ ]
	strong	Nelumbo 'Perry's Giant Sunburst'	3 [ ]
5.46 (59)	**Internode number of main expanded rhizome**		
	absent or nearly so	Nelumbo nucifera 'Fenhong Lingxiao'	1 [ ]
	few	Nelumbo lutea	2 [ ]
	medium		3 [ ]
	many	Nelumbo nucifera 'Elian 1'	4 [ ]
5.47 (61)	**Color of expanded rhizome**		
	white	Nelumbo nucifera 'Elian 1'	1 [ ]
	yellow-brown	Nelumbo lutea	2 [ ]
	yellow-red		3 [ ]

	Characteristics	Example Varieties	Note
5.48 (64)	**Number of rhizome propagule**		
	absent to very few	Nelumbo nucifera 'Fenhong Lingxiao'	1 [ ]
	few	Nelumbo nucifera 'Zhongshan Hongtai'	2 [ ]
	medium	Nelumbo lutea	3 [ ]
	many	IIII	4 [ ]
	very many		5 [ ]
5.49 (65)	**Branch number of expanded rhizome (for rhizome lotus only)**		
	few		1 [ ]
	medium		2 [ ]
	many		3 [ ]
5.50 (69)	**Texture of expanded rhizome (for rhizome lotus only)**		
	crispy	Nelumbo nucifera 'Elian 1'	1 [ ]
	intermediate	Nelumbo nucifera 'Elian 4'	2 [ ]
	starchy	Nelumbo nucifera 'Elian 5'	3 [ ]
5.51 (70)	**Tolerance to disease: leaf rot**		
	low		1 [ ]
	medium		2 [ ]
	high		3 [ ]
5.52 (71)	**Tolerance to disease: rhizome rot**		
	absent		1 [ ]
	medium		2 [ ]
	strong		3 [ ]

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			

Comments:

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

[#]7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

Please provide details for where you have indicated “yes”.

.....

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant’s name

Signature Date

[End of document]