



# Application to Register a Cultivar of *Nelumbo*

International Waterlily and Water Gardening Society

Type \_\_\_\_\_

No. \_\_\_\_\_

Address for Application:

Dr. Daiké Tian

3888 Chenhua Rd, Songjiang Shanghai 201602 China

Chenshan Science Research Center of CAS Center for Excellence in Molecular Plant Sciences, Chenshan Botanical Garden

Phone: 86-21-37792288-932

E-mail: dktian@cemps.ac.cn

Website: <http://www.nelumbolotus.ibiodiversity.net>

## Part I The Name of the Cultivar

Name of Cultivar \_\_\_\_\_ Nominant \_\_\_\_\_ Date \_\_\_\_\_

Address \_\_\_\_\_

Synonym \_\_\_\_\_ Native Name \_\_\_\_\_ Commercial Name \_\_\_\_\_

Discoverer \_\_\_\_\_ Address \_\_\_\_\_

Introducer \_\_\_\_\_ Address \_\_\_\_\_

Breeder \_\_\_\_\_ Address \_\_\_\_\_

Registrant \_\_\_\_\_ Address \_\_\_\_\_

Phone \_\_\_\_\_ E-mail \_\_\_\_\_

Origin and Meaning of Name \_\_\_\_\_

## Part II History of the Cultivar

Genus or Species of Cultivar \_\_\_\_\_

Hybrid \_\_\_\_\_ Seed Parent \_\_\_\_\_ Pollen Parent \_\_\_\_\_

or Tuber/division \_\_\_\_\_ or Seedling \_\_\_\_\_ or Mutant \_\_\_\_\_ Mother Plant \_\_\_\_\_

Other Origin (tissue culture, ion injection, radiation breeding) \_\_\_\_\_ Parent \_\_\_\_\_

Description of Cultivar Breeding \_\_\_\_\_

Date of Discovering, Introducing, or Breeding \_\_\_\_\_ Location \_\_\_\_\_

Year of Beginning to Bloom \_\_\_\_\_ Date of First-time for Distribution or Selling \_\_\_\_\_

By What Name \_\_\_\_\_ Where \_\_\_\_\_

Date of the Earliest Publication \_\_\_\_\_ Name of Publication \_\_\_\_\_

Under Protection of Any Patent, or Brand Name or Commercial Name? Yes \_\_\_\_\_ No \_\_\_\_\_

If Yes, Name of Patent or Brand, etc. \_\_\_\_\_

Participation of Any Show? Yes \_\_\_\_\_ No \_\_\_\_\_ Name of Prize if Obtained \_\_\_\_\_

Name of Show or Competition \_\_\_\_\_

### Part III Description of the Cultivar

1	<b>Plant Size</b>	Super-large   Large   Medium-large   Medium   Small-medium   Small   Micro					
2	<b>Young Root</b>	Color:   White                      Pink                      Red					
3	<b>Emerging Leaf</b>	Shape:   Nearly round   Elliptical Narrow elliptical			Number:            per pot (pot size:            ) Or per square meter (m <sup>2</sup> ) in pond, etc.		
4	<b>Leaf Color</b>	Young Coin Leaf:   Yellow green   Green Purple-tinted green   Purple red			Mature:   Yellow green   Green Dark-green   Green with pink edge		
5	<b>Leaf Height</b>	_            cm	<b>Leaf Blade Size</b>		Length (cm)    _	Width (cm)    _	
6	<b>Leaf Blade Attitude</b>	Greatly concave   Moderately concave   Slightly concave   Middle concave with dropping edge   Flat					
7	<b>Leaf Surface</b>	Strongly rough   Rough   Moderately rough   Weakly rough   Smooth					
8	<b>Leaf Upper Margin</b>	Rounded   Weakly concave   Moderately concave   Strongly concave					
9	<b>Leaf Nose Gap</b>	Absent or very narrow   Narrow   Medium   Broad					
10	<b>Petiole</b>	Length (cm)    _    Thickness (mm)    _		Spines:   Many   Few   Absent or nearly so			
11	<b>Date of the Mature Emerging Leaves Begin to Turn Yellow and Die</b>						
12	<b>Flower Time</b>	Date of Beginning to Bloom:            Flowering Peak:            End of Flowering:					
13	<b>Flower Density</b>	_            flowers per pot (pot size:            ) or            _            flowers/m <sup>2</sup> (if in pond, lake, etc.)					
14	<b>Flower Height and Position Relative to Leaf</b>	Height (cm):            _ Position:   Below   Nearly equal   Slightly above   Above   Greatly above					
15	<b>Flower Bud Color</b>	Green yellow   Green   Green with red edge   Green red   Purple red   Variegated					
16	<b>Flower Bud Shape</b>	Narrow conic   Conic   Narrow ovoid   Ovoid   Ellipsoid   Globose					
17	<b>Flower Color</b>	White   Yellow   Pink   Red (purple-red)   Multicolored   Chimeric					
18	<b>Fading of Flower Color</b>	Absent or very weak   Medium   Strong					
19	<b>Flower Type</b>	Single   Semi-double   Double   Duplicate-layered   Thousand-petalled					
20	<b>Flower Shape</b>	Cup-shaped   Bowl-shaped   Dancing-pose-shaped   Plate-shaped Head-shaped   Nearly unopened					
21	<b>Flower Size</b>	Diameter (cm)            _            (8:00-10:00 am recorded for the 2nd-day flower)					
22	<b>Petal Number</b>	_            (If clearly separated, Outer petals:            _            Inner petals:            _            )					
23	<b>Shape of the Largest Tepal</b>	Spatulate   Obovate   Obovate-lanceolate   Oblanceolate					
24	<b>Size of the Largest Tepal</b>	Length (cm):            _            Width (cm)            _					
25	<b>Coloration of the Largest Tepal (by RHS Colour Chart)</b>	Base:            Middle:            Upper:					
26	<b>Dorsal Veins on Tetal</b>	Clear   Unclear		<b>Color of Dorsal Veins:</b> Whitish   Yellow   Red			
27	<b>Stamen</b>	Number:    _	Normal   Partially petaloid   Fully petaloid			Length (cm):    _	
28	<b>Filament</b>	Color:   White   Light yellow			Length (mm):    _		
29	<b>Anther</b>	Color:   Light yellow   Orange			Length (mm):    _		
30	<b>Stamen Appendage</b>	Color:   White   Light yellow Red-dotted   Red   Dark brown			Length (mm):    _    Width (mm):    _		
31	<b>Color of Upper Surface of Receptacle</b>	Yellow   Green yellow   green					
32	<b>Carpel</b>	Number:    _	Normal   Partially-vesiculated   Fully-vesiculated   Petaloid   Absent				

33	<b>Shape of Mature Seedpod</b>	Trumpet-shaped Obconic Cup-shaped Bowl-shaped Oblate Umbrella-shaped
34	<b>Top-surface of Seedpod</b>	Concave Plate-like concave Flat Convex Strongly convex
35	<b>Mature Seedpod Edge</b>	Entire Shallowly wavy Grooved Deeply grooved
36	<b>Seedpod Size (cm)</b>	Length _ Diameter _
37	<b>Fruit Setting</b>	Normal (very high) Partial Very few None
38	<b>Fruit Position Relative to Seedpod Surface</b>	Below Equal level Slightly above Medium above Greatly above
39	<b>Fruit Shape</b>	Narrow ellipsoid Narrow obovoid Narrow ovoid Obovoid Globose
40	<b>Fruit</b>	<b>Size (mm):</b> Length _ Width _ <b>Waxy Powder:</b> Absent Little Much
41	<b>Underground Rhizome</b>	Greatly expanded (vegetable type) Moderately Weakly Unexpanded
42	<b>Internode of Expanded Rhizome</b>	<b>Shape:</b> Ellipsoid Short-tubular Tubular Long-tubular <b>Diameter (cm):</b> _
43	<b>Number of Rhizome Propagules</b>	Absent or very few Medium Many Very many
44	<b>Color of Rhizome Shoot</b>	White Yellow-brown Red-purple
<b>Additional Description (45 to 48) For A Seed-lotus Cultivar</b>		
45	<b>Node Position of First Flower:</b>	<b>Flower Number per Node:</b> _
46	<b>Color of Mature Seedpod</b>	Yellow green with red edge Red-purple
47	<b>Length to Width Ratio of Fruit:</b> _	<b>Fruit-setting Rate:</b> _ % <b>Weight per 100 Fruits (g):</b> _
48	<b>Veins on Fruit Surface:</b> Clear Unclear	<b>Color of Fresh Endocarp:</b> White Red
<b>Additional Description (49 to 59) For A Vegetable-lotus Cultivar</b>		
49	<b>Maturation Time of Edible Rhizome</b>	Early Average Late
50	<b>Fresh Weight of Entire Rhizomes (g):</b>	_
51	<b>Branching of Edible Rhizome</b>	High Moderate Low
52	<b>Internode of Primary Rhizome</b>	Length (cm): _ Diameter (cm): _
53	<b>Shape of Terminal Internode Apex</b>	Acute Obtuse
54	<b>Shape of Terminal Rhizome-shoot</b>	Short-and-obtuse Long-and-acute
55	<b>Edible Rhizome: Surface Color:</b> White Yellow-white	<b>Surface Texture:</b> Smooth Rough
56	<b>Shape of Cross-section of Primary Rhizome</b>	Round Oblate or elliptic Near rectangular
57	<b>Flesh Color of Primary Rhizome</b>	White Yellow-white Pinkish-white
59	<b>Texture of Rhizome Flesh</b>	Starchy Intermediate Crispy
60	<b>Other Important Description</b>	
61	<b>Major Difference from Parents</b>	
62	<b>Major Difference from a Close Cultivar</b>	

63	<b>Completely Morphological Description of the Cultivar</b>	
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## Part IV Photographs

Code	Object of Photo	Note
<b>1*</b>	<b>Whole Plant at Peak Flowering</b>	<b>The true plant size (usually maximum) of a cultivar can be shown at flowering peak time</b>
2	A full view of a mature leaf	To show leaf size, color and leaf nose (taking close-up shot)
<b>3*</b>	<b>Flower Bud</b>	<b>One shot (several days before flower opening) to show bud shape and color</b>
4	1st-day Flower	One shot from top and side to show color of upper part of petals
<b>5*</b>	<b>2nd-day Flower</b>	Each shot from top, side, and at acute angle to show flower shape, color, other parts
<b>6*</b>	<b>Pistil and stamen (2nd day flower)</b>	<b>Close-up shot of flower to clearly show color of receptacle, number and color of pistils and stamens</b>
7	3rd-day Flower	Each shot from the top and side of flower to show change of flower shape and color compared to day 1–2 flowers
8	4th-day Flower	One shot from top to show change of flower shape and color
<b>9*</b>	<b>Dissection of 2nd Day Flower</b>	<b>A group shot of well-arranged tepals, stamens, pistils, and receptacle to show their shape and color</b>
<b>10*</b>	<b>Mature Seedpod</b>	<b>Each shot from top and side a few days before color change of fruit to show shape, color, and seed-setting</b>
<b>11*</b>	<b>Fruits (if available)</b>	<b>To show size, shape and color of fruits (both fresh and dried)</b>
<b>12*</b>	<b>Rhizome</b>	<b>To show developmental status of rhizome, shape and color of internodes</b>
13	Cross-section of Expanded Rhizome	<b>Must be included for a vegetable cultivar to show the color of rhizome flesh, shape, diameter, arrangement pattern of holes</b>
<b>14</b>	<b>Seed Parent Flower (2nd day)</b>	To help on identification of seed parent and new cultivar
<b>15</b>	<b>Pollen Parent Flower (2nd day)</b>	To help on identification of pollen parent and new cultivar

### Note:

- (1) Item of bold with \* must be included in photos.
- (2) Photos for flowers particularly the 1st to 2nd day flower should be best taken at 8:00–10:00 am (at least one hour earlier in peak summer) on a sunny day. However, the time of photographing should be slightly adjusted as needed based on season and climate of different countries and locations.
- (3) Use of a SLR (Single Lens Reflex) camera or high quality cellphone is suggested to make a high quality photo which should be clear enough with a high resolution.
- (4) Photographing for some special cultivars is not limited to the above-mentioned requirements. It should be a case-by-case consideration. For example, thousand-petalled type of lotus does not open in the same way as other

typical cultivars. Its inner petals keep growing as the outer petals fall off and don't open until many of outer petals are gone. A very small number of cultivars can't normally open at all.

(5) Photos should be a slide filed (see **Example of Photos for Lotus Cultivar Registration**), and the individual photos should also be sent along with the registration form by a folder of files wrapped by WinRAR or other similar software.

## **Important Notes for *Nelumbo* Cultivar Registration Form**

See the following explanation of terminology and requirements for registration. Some of the characteristics asked for may seem technical or cumbersome. Please be as thorough as possible and email if you have questions of the requested data. It is important to be thorough to avoid confusion and assure that your new cultivar can be distinguished among others closely related through the provided data and photos.

*For further instructions, contact the Registrar, Dr. Daike Tian by address above.*

### **Definition of Lotus Type**

Three types of lotus cultivars are traditionally and agriculturally classified. (1) **Vegetable Lotus** (also edible lotus): a cultivar is mainly used to produce expanded underground rhizome for sources of vegetable use or other starchy products. So far, all vegetable lotuses are large-sized type; (2) **Flower Lotus**: a cultivar which is mainly cultivated for ornamental uses due to its beautiful flowers. It includes any types of cultivar with beautiful flowers or foliage, and its plant size ranges from micro to super-large type; (3) **Seed Lotus**: a cultivar which is cultivated for production of seeds used as food or medicine. So far, all seed lotuses are large-sized type. Also, the seed lotus may be considered as **Flower Lotus**.

### **Flower Time**

For *Nelumbo*, the life of one flower typically lasts for only four days. The first-day flower opens in the early morning but is not fully open in most cultivars, then usually closes around noon or in the early afternoon. The flower fully opens in the morning of the second day and will close either at some degree or completely around noon. The third-day flower usually does not close and its petals will possibly start to fall off after noon due to a strong wind or rain. The petals of forth-day flower have less beauty for enjoying and are vulnerable to damage of wind, rain and any other physical movement. However, the flower life may extend to five or more days in two situations, one situation is when temperature is relatively low during blooming. The other occurs in some special cultivars like *N. nucifera* 'Zizhun Qianban' and 'Qianban Lian' (Thousand-petalled type) which don't open as same situation as other typical cultivars. The inner petals are only visible after many of outer petals fall off. The flower opens gradually and may last for one week even longer.

### **General Guide of How to Collect Data and Fill the Form**

The data should be carefully and scientifically collected as much as possible, particularly the most important characteristics extremely valuable for identification and industrial use of a cultivar, as

well as for database construction and scientific research in the future. Plants should be well cultivated and carefully managed to encourage good performance in growth and development. The samples of lotus plants to evaluate should be large enough to make the statistical data more meaningful. For evaluation of a lotus cultivar, six containers or 5 square meters of area when planted in pond, lake, river, etc., are suggested to be a minimum of sample size. For data record of each morphological item, both mean value and variation range are useful to represent the true morphological characteristics of the cultivar. Therefore, the time (early, middle, late season) related to plant growth should be considered when collecting data. It is suggested to record data in different growth seasons (say early, middle, late season). Also, the randomized sampling method should be used along with a consideration of a minimum and maximum value range of a given characteristic.

## **Part I The Name of the Cultivar**

**Nominant** is the person who invented or coined the epithet to be applied to the cultivar.

**Native Name** is a name (not the registered English name) in the native language of the country where a cultivar comes from or is named. For example, beside an official registered name, a cultivar may have a Chinese or Japanese name, too.

**Discoverer** is the person who first discovered a plant, mutant, or seedling, which the new cultivar originates from.

**Introducer** is the person who first introduced or distributed the plant either privately or commercially.

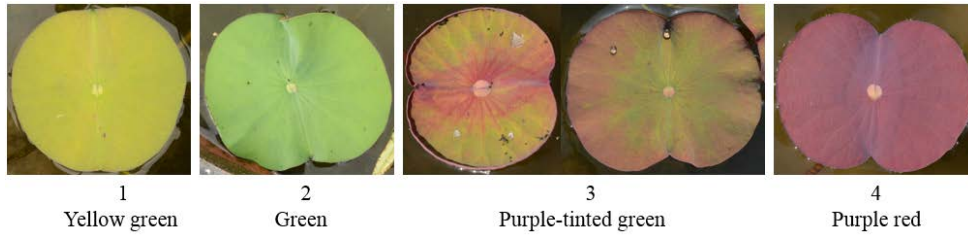
**Registrant** is the person or an institution who wants to register a cultivar.

## **Part II History of the Cultivar**

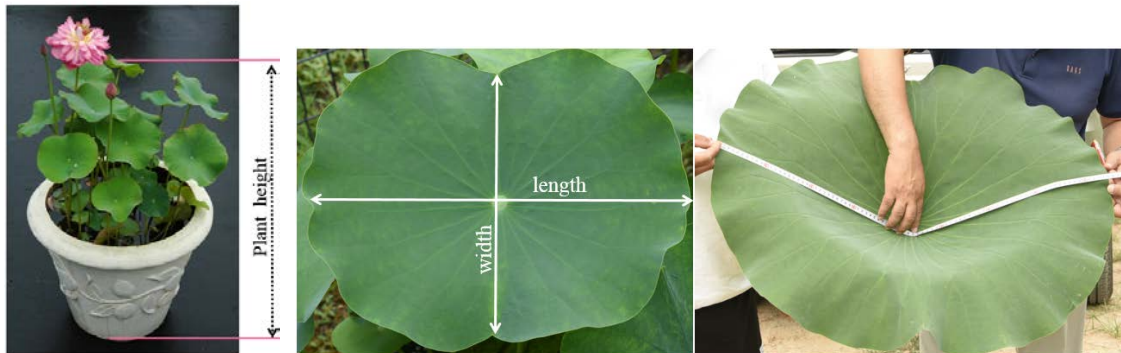
**Genus or Species of Cultivar:** Although many species of *Nelumbo* have been named based on fossil records, only two living species are accepted, *Nelumbo lutea* from northern America to Caribbean Islands and *N. nucifera* from Asia to northern Australia. If a cultivar comes from a cross of these two species, *N. lutea* × *nucifera*, or *N. nucifera* × *lutea* should be recorded here.

## **Part III Description of the Cultivar**

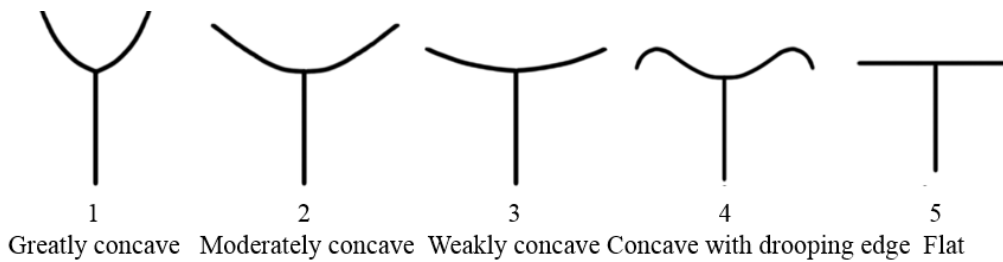
**4. Leaf Color:** The color of young coin leaf must be observed as early as possible when the leaves grow out of water and fully spread during the early spring when the temperature is relatively low. The coin leaf is defined as the small-sized floating leaf like a coin, including both origin of rhizome shoot and seedling.



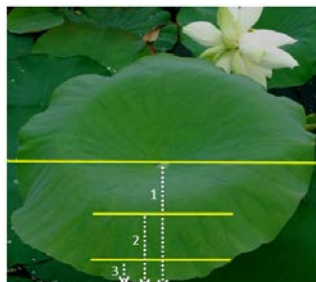
**5. Leaf Height and Size:** To make a standard measurement, leaf height is equal to plant height, and it should be measured from the base of petiole to the highest point of leaf blade. Therefore, it should be measured starting from the bottom of a container or an artificial pond (usually with concrete bottom) under such cultivation situations (left figure). For lotus growing in a lake or a natural pond (without artificial solid bottom), the leaf with petiole can be pulled out for measurement. The similar method is used for measuring petiole length in **10** and flower height in **14**. For the concave leaf, the size should be measured by the way of right photo to represent the true length and width of a leaf blade (right figure).



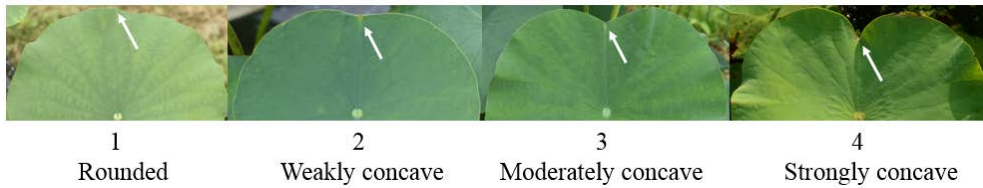
**6. Leaf Blade Attitude:** It could be based on view of entire leaf blade or its longitudinal section.



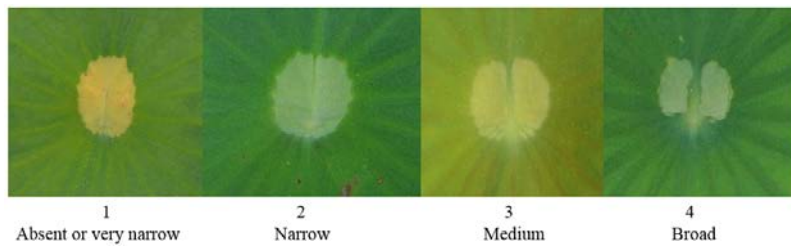
**7. Leaf Surface:** Texture of leaf blade surface could be determined by fingers' touching in the different positions of upper surface of leaf blade. It is based on rough area and position of leaf blade and its rough intensity



**8. Leaf Upper Margin:** The concave degree of leaf upper margin is based on apex of leaf blade.

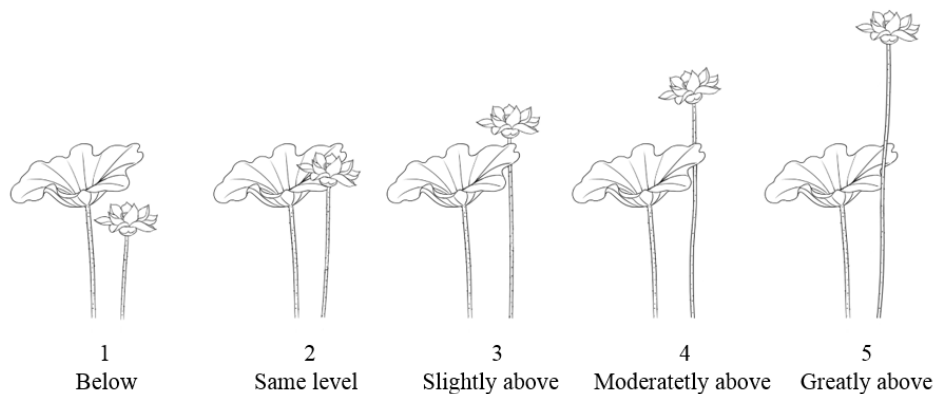


**9. Leaf Nose Gap:** The gap is based on the distance between halves of leaf nose in the center of leaf blade.

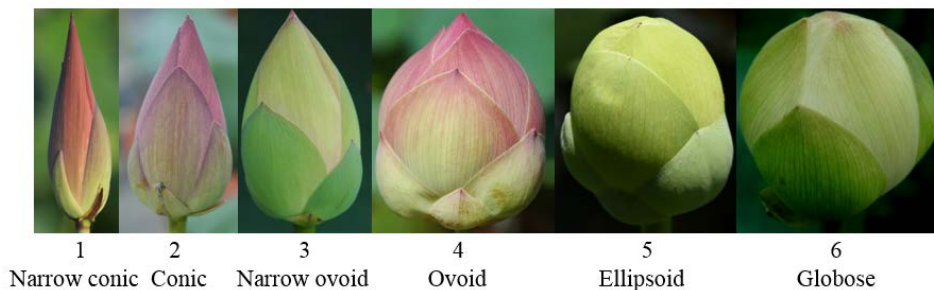


**10. Petiole Thickness:** It should be measured at the middle position of petiole.

**14. Flower Position Relative to Leaf:** It is observed on a flower and its concomitant leaf.



**16. Flower Bud Shape:** The shape of flower buds should be observed several days before opening.



**17. Flower Color:** **Multicolored** is defined as the tepal of a flower with two or more colors on the petals, and the boundary between any two colors is not clear (with a gradual transition). **Chimeric** is defined as the tepal of a flower having at least two types of colors with a distinct boundary



between them, such as *N. nucifera* 'Da Sajin' (see figure below) and *N. nucifera* 'Dang Sajin' which also is known as *N. nucifera* 'Alba Striata' and *N. nucifera* 'Empress'.



**19. Flower Type: Duplicate-layered** is a flower type in which all the carpels become the petaloid structure to form two layers with other normal petals, and the two layers are separated by the stamens between them. **Thousand-petalled** is a flower type in which both stamens and pistils turn into the petals (some are very tiny) and normally consists of more than one thousand even up to seven thousands of petals.



1 Single      2 Semidouble      3 Double      4 Duplicate-layered      5 Thousand-petalled

**20. Flower Shape: Dancing-pose-shaped** is a flower shape in which the cultivar is usually single type and its petals are extended in different direction and angles, and more space between petals, like a dancer's pose at blooming. **Head-shaped** is a flower shape in which the numerous petals are stacked one by one to form a shape nearly like a head.



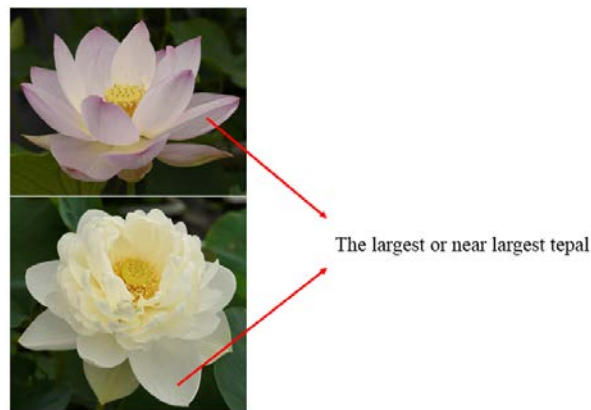
1 Cup-shaped      2 Bowl-shaped      3 Plate-shaped      4 Dancing-pose-shaped      5 Head-shaped      6 Ball-shaped

**21. Flower Size:** As a standard, the measurement of index on any flower parts, particular flower diameter, should be better taken at 8:00–10:00 am (at least one hour earlier in summer peak) to make data comparable and meaningful for regular lotus cultivars.

**22. Tepal Number:** All the tepals of a flower should be counted including the outer sepal-like tepals. For a cultivar of double flower type, the tepals should be separately counted by outer normal tepals and inner petaloid ones.

**23 to 25. The largest tepal:** Only the largest or nearly largest tepal is chosen for comparison in shape, size, coloration, etc. due to a huge variation in many characteristics of tepals from outer to inner whorls. The largest or nearly largest tepal is located at around the position where the half number of the total tepals of a flower is counted for a single flower. For double flower, it is

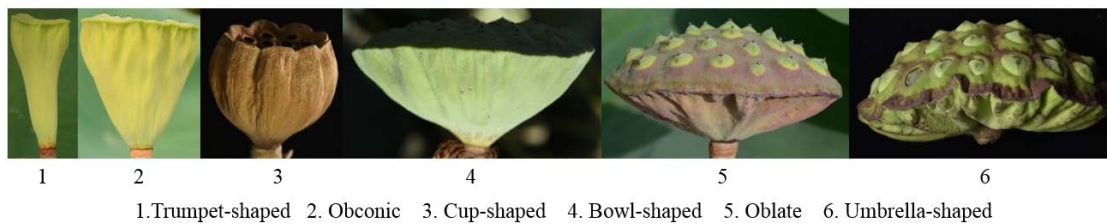
determined by treating as single flower without considering the inner petaloid petals.



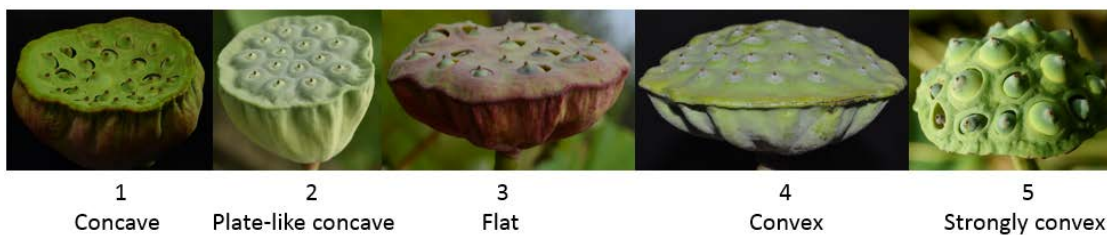
**25. Tepal Coloration:** As the international standard, the RHS Colour Chart published by the Royal Horticultural Society (UK) should be used for color hue calibration. The most updated version of chart is preferable but the older version will also be acceptable.

**31. Color of Upper Surface of Receptacle:** It is based on the receptacle of 1st day flower.

**33. Shape of Mature Seedpod:** It is based on the fresh seedpod matured or nearly so before starting change of fruit color.



**34. Top-surface of Mature Seedpod:** It is observed on the fresh seedpod matured or nearly so before starting change of fruit color. **Plate-like concave** means the upper surface of seedpod looks like a plate with a lower center and higher edge.



**38. Fruit Position Relative to Seedpod Surface:** It is based on the seedpod and fruits when they are matured or nearly so.



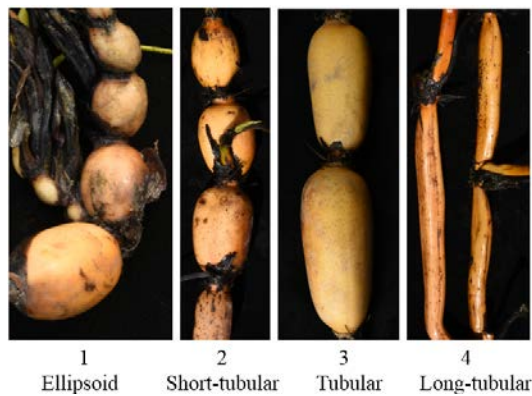
**39. Shape of Dried Mature Fruits**



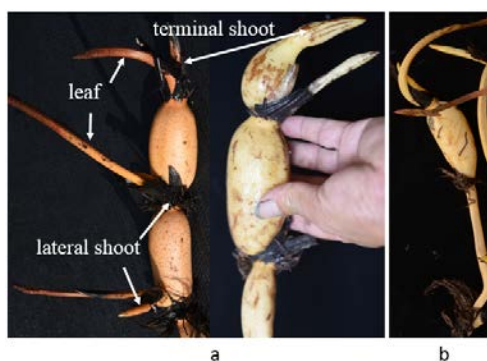
**41. Expansion Degree of Underground Rhizome:** It is mainly based on the primary rhizome.



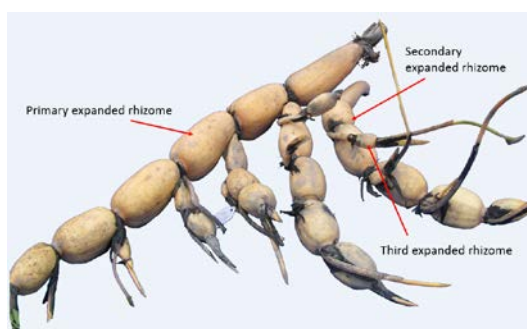
**42. Internode Shape of Primary Expanded Rhizome**



**43. Number of Rhizome Propagules:** One standard rhizome propagule is defined as a propagule with two internodes (usually including at least one expanded internode: figures a, b) and the healthy shoots including terminal and lateral (absent in some cases).



**50. Fresh Weight of Entire Rhizomes:** The entire rhizomes here are defined by the rhizomes consisting of the primary rhizome and any other branches of rhizomes connecting to the primary one.



**51. Branching of Edible Rhizome:** It is only observed on rhizome lotus (see figure in 50)

**53. Shape of Terminal Internode Apex:** It is based on upper end part of terminal internode of primary expanded rhizome.



**54. Shape of Terminal Rhizome-shoot:** The terminal rhizome-shoot is a shoot on the end of expanded rhizome, either primary rhizome or its branches. The shoot may consist of a dormant leaf bud and flower bud (See figure in 53).

**59. Other Important Description:** Some other information is not mentioned above but maybe also important to document and identify the cultivar, such as type and position of secondary color in tepal, flower fragrance, tolerance to deep water, salt-resistance, water depth of pond, lake, where you collect data, etc.. Any other useful information about a new cultivar should be included, too.

## Example of Photo Arrangement for Lotus Cultivar Registration

### *Nelumbo* 'Ken's Dream' (Dr. Daike Tian, 2010)

