

Golden Camellias from Guangxi, China

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Significance to Industry: New plants are new blood for the ornamental nursery industry. With each trip to China, I am amazed by the new plant materials she can offer. Although golden camellias are not new to our ornamental world, the diversity of plant materials, especially new species discovered in recent years, is phenomenal. These plants are distributed in a narrow basin of the upper Rongjiang River in Guangxi, China. After the first golden camellia was discovered in 1948, only two more species were collected in next 30 years. From 1979 to 2001, a total of 40 new species had been identified. Today, taxonomists do not agree with each other on the legitimacy of each species. For horticultural professionals, these variations are worth being explored as new cultivars. Detailed investigations with a focus on potential cold tolerant clones and possible hybrids should be conducted. Future collaboration on plant exploration, introduction, breeding, and better management of golden camellias with our Chinese colleagues in the field of ornamentals is highly recommended.

Nature of Work: *Camellia japonica* and *C. sansanqua* are well-known ornamental plants for formal and informal gardens. Since so many professional and amateur gardeners have collected, bred, selected, and introduced new cultivars, more than 2,000 cultivars derived from these two species are on the market today (4). In recent years, new species with great ornamental potential, such as *C. azalea* and *C. tamdaoensis*, have brought a lot of attention to this genus (5, 9). Also, breeding of cold hardy germplasm has yielded many new cultivars and extended Camellia cultivation areas to USDA zone 6 (2). The U.S. National Arboretum (8) used *C. oleifera* 'Lu Shan Snow' as a parent and introduced more than a dozen ornamental camellia cultivars with improved cold tolerance. Golden camellias (yellow camellias) are beautiful ornamental plants with great market potential. After the first species was published in 1948, only two more species were collected in the next 40 years. In the last 20 years, however, more than 40 new golden camellia taxa were documented (Table 1). The driving force to study golden camellias is their great ornamental market potential and medicinal applications.

Camellia naturally occurs only in southeastern Asia countries. However, wild golden camellias could only be found in China and Vietnam. In addition to one isolated species in Yunnan (China) and two disjunct species in Guizhou (China), all of the other species are in the upper Rongjiang river ranges (Table 2). The geographical location is latitude 21°30'– 22°55'N, longitude 107°36'– 108°33'E, and elevation from 100 to 450 (1,100) meters. The climate is a tropical monsoon type with dry and snow-free winters and wet and hot summers. The annual mean temperature is 22.3°C (72.2°F). The highest average temperature is 32.7°C (90.8°F) in July and the lowest average temperature is 17.2°C (63.0°F) in January. The annual precipitation is 1326.0 mm (52.2"). From April to September, the monthly precipitation is more than 100 mm (4"). The annual relative humidity is 79%. The main soil type is acidic red clay with a pH of 4.5-5.5. Golden camellias can also grow with slightly basic soil with a pH of 6.5-7.5. In the past ten years, we have investigated both wild and cultivated golden camellias in Guangxi and adjacent provinces in China. The objective of this paper is to share the preliminary results of these natural species, which should be helpful in plant introduction and breeding.

Results and Discussion: One of the natural species delineation criteria is its geographic location. Gao et al. (5) accepted 34 species and one cultivar. Among them, 32 species are distributed in the upper Rongjiang river ranges, including China (Guangxi) and Vietnam. This portion of Rongjiang River occupies about 600 km (378 miles) long and 300 km (190 miles) wide. It is hard to understand that more than 90% of golden camellias occurred in this area. The legitimacy of these golden camellia species should be further investigated.

Taxonomic confusion of golden camellias is reflected in Table 1. Three well-known taxonomists have only agreed upon eight species and one variety. The other 30 or more taxa are still in question! Authors had reviewed some publications of new golden camellia plants and learned that the nomenclature did not follow the "International Code of Botanical Nomenclature" and "International Code of Nomenclature for Cultivated Plants". Secondly, morphological variations under different niche climates contributed to the taxonomic confusion. It is possible that some published species may actually be variants within a species. For horticultural professionals, these natural variations may be evaluated in our research plots and gardens, and may lead to development of new cultivars. Although only one cultivar and two hybrid cultivars were documented, there is tremendous potential to explore selected new cultivars of golden camellias from their natural habitats.

Breeding of new golden camellias was initiated more than 20 years ago. The focus of the breeding work is to transfer the intense yellow pigmentation to some cold hardy Camellia species and cultivars (1). Huang and Zhang (6) reported that they successfully crossbred *C. nitidissima* with *C. japonica* and *C. sansanqua* and obtained two cultivars, 'Multiply' and 'Xinzi'. In the future, breeding work should focus on cold hardiness of golden camellias to bring these beautiful plants from controlled environments to outdoor landscapes.

Production of golden camellias is very successful. From seed germination and rooting of cuttings, to grafting (on young and old stock plants), thousands of new plants were generated each year in Guangxi. We visited some camellia collection sites and found species, such as *C. nitidissima*, that could overwinter in Zhejiang and Hunan provinces (USDA zone 7-8) with minor winter damage. With some winter protection, we can probably grow some golden camellias along the US southeastern coast.

Germplasm collection, breeding, and conservation of golden camellias are underway. If you have the chance to visit Guangxi, China in late March to early May, be sure to visit Collection of Golden Camellia in Guangxi Academy of Forestry (Nanning, Guangxi), Golden Camellia Park (Nanning, Guangxi), and Golden Camellia Natural Reserves (Fangcheng, Guangxi). The bright golden flowers are breathtaking. After careful examination, you would find that the diversity of flower texture, sizes, and floral structures are phenomenal. It is possible that we will crossbreed these plants with some other species and produce some new desirable cultivars for our landscapes. Further plant exploration, collection, and molecular-aided studies will ensure our success. We look forward to collaborating with you and bringing better golden camellias to our daily gardens.

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Supporting Online Material:

<http://www.umaine.edu/mainepplants/TalkDZ/SNA08GoldTea.pdf>
Slide presentation for the 53rd SNA Research Conference.

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Table 1: Taxonomic treatments of golden camellias from Gao et al. (5), Ming (7), and Chang (3).

No.	Gao et al. (2005)	Ming (2000)	Chang (1998)
01	<i>C. achrysantha</i>	= <i>C. petelotii</i>	<i>C. achrysantha</i>
02	C. aurea	C. aurea	C. aurea
03	(<i>C. chrysantha</i>)	= <i>C. petelotii</i>	= <i>C. nitidissima</i>
04	(<i>C. c. var. longistyla</i>)	= <i>C. petelotii</i>	
05	C. chrysanthoides	C. chrysanthoides	C. chrysanthoides
06	<i>C. crassiphylla</i>	(Vietnam)	(Vietnam)
07	<i>C. cucphuongensis</i>	(Vietnam)	(Vietnam)
08	C. euphlebia	C. euphlebia	C. euphlebia
09	(<i>C. e. var. yunnanensis</i>)	= <i>C. fascicularis</i>	
10	C. fascicularis	C. fascicularis	C. fascicularis
11	<i>C. flava</i>	(Vietnam)	(Vietnam)
12	<i>C. flava</i> f. <i>polypetala</i>	= <i>C. flava</i>	
13	C. flavida	C. flavida	C. flavida
14	n/a	<i>C. f. var. patens</i>	
15	<i>C. grandis</i>	n/a	<i>C. grandis</i>
16	<i>C. huana</i>	<i>C. huana</i>	<i>C. liberofilamenta</i>
17	<i>C. hulungensis</i>	(Vietnam)	(Vietnam)
18	C. impressinervis	C. impressinervis	C. impressinervis
19	<i>C. 'innominata'</i>	n/a	n/a
20	<i>C. leptopetala</i>	n/a	<i>C. leptopetala</i>
21	<i>C. liberofilamenta</i>	= <i>C. huana</i>	<i>C. liberofilamenta</i>
22	<i>C. limonia</i>	= <i>C. indochinensis</i>	
23	<i>C. l. f. obovata</i>	= <i>C. indochinensis</i>	
24	n/a	<i>C. i. var. tunghinensis</i>	<i>C. tunghinensis</i>
25	(<i>C. longganensis</i>)	= <i>C. flavida</i>	<i>C. longganensis</i>
26	(<i>C. l. var. grandis</i>)	= <i>C. flavida</i>	<i>C. longganensis</i>
27	<i>C. l. var. patens</i>)	= <i>C. f. var. patens</i>	
28	<i>C. longruiensis</i>	= <i>C. flavida</i>	
29	<i>C. longzhouensis</i>	= <i>C. chrysanthoides</i>	
30	C. micrantha	C. micrantha	C. micrantha
31	<i>C. multipetala</i>	= <i>C. f. var. patens</i>	n/a
32	<i>C. nitidissima</i>	= <i>C. petelotii</i>	<i>C. nitidissima</i>
33	C. n. var. microcarpa	C. n. var. microcarpa	C. n. var. microcarpa
34	(<i>C. n. var. phaeopubisperma</i>)	= <i>C. petelotii</i>	<i>C. nitidissima</i>
35	<i>C. parvifolia</i>	n/a	n/a
36	<i>C. parvipetala</i>	= <i>C. micrantha</i>	<i>C. micrantha</i>
37	<i>C. petelotii</i>	<i>C. petelotii</i>	n/a
38	<i>C. pingguoensis</i>	<i>C. pingguoensis</i>	n/a
39	<i>C. p. var. terminalis</i>	<i>C. p. var. terminalis</i>	= <i>C. terminalis</i>
40	<i>C. ptilosperma</i>	= <i>C. flavida</i>	
41	C. pubipetala	C. pubipetala	C. pubipetala
42	(<i>C. quinqueloculosa</i>)	= <i>C. f. var. patens</i>	
43	<i>C. rosmannii</i>	(Vietnam)	(Vietnam)
44	<i>C. tamdaoensis</i>	(Vietnam)	(Vietnam)
45	<i>C. tianeensis</i>	= <i>C. huana</i>	n/a
46	<i>C. tunghinensis</i>	= <i>C. i. var. tunghinensis</i>	<i>C. tunghinensis</i>
47	<i>C. wumingensis</i>	= <i>C. f. var. patens</i>	
48	<i>C. xiashiensis</i>	= <i>C. chrysanthoides</i>	= <i>C. parvipetala</i>

Table 2: Distribution of golden camellias in the world (5).

Country	Province	Number of taxa	Percentage (%)
China	Guangxi	22	62.8
China	Yunnan	1	2.9
China	Guizhou	2	5.7
Vietnam	Vinh Phuc	4	11.4
Vietnam	Ninh Binh	1	2.9
Vietnam	Quang Ninh	1	2.9
Vietnam	Lang Son	2	5.7
China/Vietnam	Guangxi/Lang Son	2	5.7
Total		35	100