

Beyond kungpao chicken: the plants of eastern China[©]

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INTRODUCTION

Sichuan, where the famous Chinese dish, Kungpao chicken, originates, is a popular destination for plant explorers worldwide. However, as diverse as the Chinese cuisine, eastern China has its own unique plant germplasm. From the north to the south, Eastern China includes six provinces (Shangdong, Jiangsu, Anhui, Zhejiang, Jiangxi, and Fujian) and one direct-controlled municipality (Shanghai). In this region, the percentage of mountainous areas of each province increases from the north to the south, which presents a huge source of plant diversity.

Although the hardiness zone map indicates Zone 7-10 for the region, my personal experience of living in China for over 20 years would agree more with Zone 6-9 for the region.

In the June of 2017, I visited horticulture entities with a nurserywoman from Houston, Texas and a nurseryman from Chapel Hill, North Carolina. Our trip stops included Fuzhou (Zone 10), according to the map of 'Hardiness Zones in China' and Wuyishan (Zone 9) in Fujian Province, Ningbo (Zone 9) and Hangzhou (Zone 9) in Zhejiang Province, Nanjing (Zone 8) in Jiangsu Province and Shanghai (Zone 9). Many native plant materials have been adapted, and the current horticulture industry is developing at a rapid speed.

FUJIAN PROVINCE

Fujian Agriculture and Forestry University (FAFU)

On the FAFU campus, there is a "Map of China Garden", where the map of China and each province are featured and plants native from each province are planted. There are many plants that are unique and interesting. *Acer cordatum* with lots of red samaras in June is a small tree native in east and south China. *Lagerstroemia subcostata* has large (~20 cm long) pyramidal panicles of white flowers attracting abundant bees. About 30-50 cm long, pendulous strings of winged fruits hang from branches of *Pterocarya stenoptera*, putting on quite a show. One of the genera that Dr. Donghui Peng works on is *Melastoma*. During the tour of campus, he pointed out *M. dodecandrum*, a low growing procumbent shrub with lavender to purple flowers. Other genera that he incorporates into his breeding program include *Osbeckia*, *Barthea*, *Oxyspora*, and *Bredia*.

Native orchids are another strong research focus at FAFU. During a tour of the local longan and loquat germplasm station, we found a huge diversity of loquats. The shape ranges from oblate, spheroid, high spheroid to obovate and pyriform. The fruit skin colors range from greenish yellow to red. Fall leaf colors include yellow, yellow orange, red and maroon. Some have leaf shapes and texture similar to *Quercus oblongifolia* or *Q. emoryi*. *Syzygium buxifolium* used in the landscape at the germplasm station could be a good alternative for yaupon holly or boxwood in warm climate and is very pruning tolerant.

Fuzhou Botanical Garden

There are many unique and special plants in Fuzhou Botanical Garden. *Chukrasia tabularis* (Indian mahogany) has green shiny leaves and fragrant red flowers and is the subtropical relative of Chinaberry (*Melia azedarach*). A nickname for the city of Fuzhou is 'Ficus City' and there is a 1,000-year-old *Ficus concinna* in the garden. Pinnately compound leaves of *Heteropanax fragrans* concentrate on the upper part of the trunk and form a

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parasol-shape canopy. *Lysidice rhodostegia* has beautiful orchid-like purplish red flowers arranged on large (about 40 cm long) panicles in the summer. This could be an alternative for crapemyrtles as a small summer-flowering tree.

Wuyishan (Wuyi Mountain) area

Wuyishan is known for its Wuyi rock tea (because of its growing environment with rocky soil) and bamboo rafting on the 9-bend River. It is located in the northwest corner of Fujian Province. Agritourism in this area focuses on tea production, processing and appreciation. The two biggest local companies are Wuyixing (focus on tea cultivars and cultivation) and Xiangjiang Mingyuan (focus on tea processing). The best tea is thought to be made from tea plants cultivated in the mountain areas with mineral-rich rocky soils and very high relative humidity. Small tea plantations (1-3 ha) are made by clearing out native vegetation. The tea gardens are kept small so that tea plants are grown in environment conditions as natural as possible. Once established, the only input on the tea plants is annual application of organic fertilizer (often animal manure compost). This tea commands a very high premium price due to the environmentally-conscious practices. Tea plant cutting propagation is found in the rice nursery field. Each cutting, spaced just enough so that the leaves do not overlap, contains one leaf and two nodes. They are propagated under shade (>50%) cloth, supported by bamboo hoops over the cuttings. Many of the plant materials in the rock tea cultivation area are still not used in nursery trade. There are many plants along the roadside that we could not recognize, and our local guide was strictly a tea person, who could not offer much help.

ZHEJIANG PROVINCE

Henghe Yangmei Extension Station

Cixi, Ningbo is known for its yangmei (*Morella rubra* syn. *Myrica rubra*) production, and other names include waxberry or red bayberry. The fruit contains a single seed and its color ranges from crimson to dark purple. The local station has over 20 cultivars, but the most commonly cultivated is 'Biqi' with relatively big fruits and small seeds. Yangmei plants are dioecious and male trees are needed to set fruits. Although not ideal, pollens from waxmyrtle (*Morella cerifera*), native in the USA, could help set fruit on female yangmei plants. Yangmei has a relatively long juvenile stage, about 15-20 years, and cultural practices such as girdling do not shorten it. Grafting is a very common practice in local nurseries. Yangmei production in the Township of Henghe, as in many other yangmei production areas, is in the hilly area - where it is not suitable for agronomic or vegetable crops. Maintenance of the trees is minimal, as the monsoon climate brings plenty of rainfall (>1,200 mm annual precipitation) during the growing season. Weeds may be controlled once per year, and majority of labor is spent on manual harvesting. Yangmei has very short postharvest shelf life, which is comparable to raspberry. Hence, consumption is mainly limited to local markets within the province. However, yangmei is produced from as far north as Jiangsu Province to as far south as Guizhou Province in Southwest China. The species would be a good candidate as a small round evergreen landscape tree.

Hongyue Horticulture Corp. (HHC)

HHC, established in 2000, is a relatively young company, with 20 garden centers in the Yangtze River Delta and an annual sale of \$440 M in 2016. The Yangtze River Delta is one of the most developed and wealthy areas in China, and there is a high percentage of population with large amount of discretionary spending. In provincial capital cities like Nanjing (Jiangsu) and Hangzhou (Zhejiang), it is common that condos are sold around 35,000 RMB m⁻² (~\$490 ft⁻²). For a small condo of 150 m² (1,600 ft²), the sales price is about \$784,000—and the green space available for each condo may be the balcony of about 4 m² (42 ft²). Many products in the HHC garden centers are demanding premium prices. For instance, a 5-gal privet (*Ligustrum* 'Lollypop') (a single stem with canopy pruned in a ball shape) costs around \$120. HHC imports finish container plants (mainly 3-5 gallons) from European and

American companies to be sold directly to consumers. There are also many mature plants imported from Japan and Europe. For example, old olive trees with a trunk diameter around 60 cm (24 in.) are sold hundreds of thousands of dollars. Most of these mature trees are sold to newly established subdivisions to give it an "established" landscape appearance. In addition to the garden centers, HHC also owns container manufacturing facility, an online app store, and 51 subsidiaries. It aims to become the No.1 domestic garden center brand and horticulture supplier in China.

Xiaoshan Nursery Market (XNM)

Xiaoshan is located in the south part of Hangzhou. Arranged in a strip mall format of around 600 stores, XNM was established in 1994. It is an open-air shopping area for wholesale nursery crops and landscape supplies. Many stores feature huge (trunk diameter 20-50 cm) containerized specimens of podocarpus, loropetalum, and *Syzygium buxifolium*. XNM is probably the largest of its kind in China, providing a market platform for the local nurseries. During the 3-day, 2016 Xiaoshan Nursery EXPO held at XNM, contracts of an estimate of RMB 660 M (\$99.5 M) were signed and new registered cultivars were auctioned off for RMB 39M (\$5.9 M). A new *Camellia azalea* cultivar from Zonglv Landscape (fast growing, cold and heat tolerant, and long flowering time which peaks in summer and fall—and reblooms in winter and spring) was sold for RMB 29 M (\$4.4 M). This set a new record in new registered cultivar auction. New, registered cultivar auctions are a unique phenomenon in China—where intellectual property protection may seem to be a problem.

Senhe

Senhe is known for its efforts in bringing new plant materials, especially plants with variegated foliage, to the landscape market. With 17 nurseries (a total of over 1,300 ha of open field and 30 ha of greenhouse) and over 300 variegated plant cultivars, Senhe is one of the top 10 nurseries in China. The garden at Senhe headquarters offers a peek of their numerous plant materials.

JIANGSU PROVINCE

Nanjing Botanic Garden

During my literature search to manage crapemyrtle bark scale, I encountered a golden leaf crapemyrtle (*Lagerstroemia indica*) cultivar, 'Jinhuang'. While in Nanjing, we visited the breeders of 'Jinhuang', Li Ya and Wang Peng, at the Nanjing Botanic Garden. 'Jinhuang' is a mutation found on cultivar 'Fenjing' in 2002. Mature leaves are golden yellow and the young growth is purplish red. Foliage color may be 'bleached' to whitish color under the hot and strong light conditions in July and August - but soon change to golden yellow in cooler September. The original plant is only about 1.5 m in height, after 15 years of growth. The leaf color may be a factor in the relatively weak growth of this cultivar. Just as in the US, crapemyrtle is a very popular landscape plant in China. A very unique way of growing crapemyrtles in China is to weave them in the shape of a flower vase, or Chinese-style pergola.

Fangzhilin Agriculture

Fangzhilin specializes in sweet olive (*Osmanthus fragrans*). Originally the owner intended to produce sweet olive flowers for various food additives. The Chinese have a long tradition of using sweet olive flowers in desserts for their fragrance. Dust issues caused by a local cement factory forced the owner to focus on liner production, rather than selling food-grade flowers. Fangzhiling has probably the largest sweet olive cultivar collection in the region, especially the variegated selections. The owner is interested in exporting bare-root liners to customers worldwide. One interesting feature about sweet olive in China is that they are grown as trees, rather than shrubs in the US. The largest sweet olive tree we saw during this trip has a canopy diameter about 10 m.

The two weeks we spent during the trip went quickly. Before long, we returned to

Shanghai and flew back to the USA. This trip not only opened our eyes to unique plant materials in Eastern China, but also the ornamental horticulture industry and market in the region. Understanding the rapid development of the economy and the ornamental horticulture sector may help connect the world and USA producers to China.