

West Meets East on Ornamentals[©]

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INTRODUCTION

When talking about ornamentals, we did introduce the *Magnolia grandiflora* to Asian countries (East) more than 120 years ago and the plant has been widely cultivated in Asian gardens and landscape. But, until today, only two cultivars were developed in China, while we (USA) had at least 85 cultivars on the market. If comparing the natural species of *Magnolia* (narrow-sense), China has 38 species while only eight are native to the USA (Wu and Raven, 1994). *Nandina domestica* was introduced to the West in 1804 and more than 36 cultivars have been developed and marketed in USA (Dirr, 2009). In China, all *N. domestica* have been marketed as the species, with no cultivar development (Table 1). Obviously, the natural resource of ornamental plants is much richer in East, than the West. In term of new plant breeding, we are more advanced than that of the East. The marriage of East and West is imperative in the field of ornamental horticulture. We can fully utilize natural ornamental plant resource (East) and traditional and advanced plant breeding technology (West) for breeding better ornamental plants for our nursery industry and gardens.

Table 1. Taxa of common woody ornamental genera, species, and cultivars in USA and China.

Taxa	China	USA
	Number of indigenous genera	
<i>Magnoliaceae</i>	13	2
<i>Theaceae</i>	12	3
	Number of indigenous species	
<i>Callicarpa</i>	42	1
<i>Ilex</i>	210	16
<i>Magnolia</i> (narrow-sense)	38	8
<i>Magnolia</i>	105	8
<i>Rhododendron</i>	571	25
<i>Viburnum</i>	74	15
	Number of released cultivars	
<i>Lagerstroemia indica</i>	4	88
<i>Magnolia grandiflora</i>	2	85
<i>Nandina domestica</i>	0	36
<i>Osmanthus fragrans</i>	38	0

PLANT INTRODUCTION

Ornamental plants from Asian countries were introduced to the USA indirectly from Europe until the direct collection trips of E.H. Wilson of the Harvard University Arnold Arboretum in the late 1800s (Cox, 1986; Foley, 1969). Although the Arnold Arboretum grew and distributed a lot of E.H. Wilson's plants, we still do not know the fate of plants that were not hardy in Boston and adjacent areas (Zhang et al., 1998). In 1940s, special collections (such as for fiber and food, as well as the live fossil plant *Metasequoia glyptostroboides*) also brought a lot of ornamental plants back to the USA (Janick and Simon, 1993). Plant hunters from botanical gardens and arboreta and nursery growers have since made many trips to China and enriched the diversity of ornamental plants

tremendously, i.e., *Loropetalum* and *Distylium* were the results of these trips and plant exchange programs (Dirr, 2011). With the awareness of invasive plant species, we hope to bring back plants with greater ornamental potential for our gardens and landscapes.

FLORAL SIMILARITY

The East and the West once joined based on “continental drift” by Alfred Wegener (1922) and proved by many similar plant and animal fossils around different continents. Fossil of dawn redwood was reported from all continents and today it is successfully cultivated on all continents. Climatic and floristic similarities between West and East could be easily understood by comparing meteorological data and disjunctive distribution of plant species, such as *Liriodendron chinense* (East) and *L. tulipifera* (West). Both species, as well as their hybrids, grow well in both regions. Actually, more than half of our USA ornamental plants are from the East. Some common climatic and environmental conditions allow us to successfully introduce many ornamental plants between the East and the West. Plant explorers are constantly seeking more plants with greater ornamental potential; there are more than 14,000 Chinese woody species — 3-fold more species than in the USA.

PLANT COLLECTION

The challenges of collecting plants from the East and bringing them back to the West should be shared by all plant collectors. After collaborating with Chinese, Japanese, and Korean horticultural professionals for the last 12 years, I was finally able to bring a few plants back this year. For plant collecting in the East, you must be prepared for:

Eating and Drinking

Regardless of your plant knowledge, you have to learn the local culture. How to eat and drink is very important to the people in the East. If you know how to eat and drink in China (with many dishes on a Lazy Susan and moutai), Japan (sushi, tempura, and sake), Korea (gogigui, kimchi, and soju), and other eastern countries, your trip to collect plants is much more enjoyable. Compared with the USA, eating and drinking customs are more complicated in the East. You have to learn the eating and drinking culture and be sure to present your collection trip details at the dinner table.

Culture on Ornamental Plants

Because of limited living space, ornamentals such as grafted cacti are used as balcony decorations in majority of Asian countries. Only a few government nurseries produce ornamental plants for public gardens and landscapes. However, in the past 15 years, the private nursery industry in both China and Korea has developed rapidly and commercially introduced new and exciting ornamental plants. However, the natural germplasm of potential ornamental plants is rich and one has to make collections from remote mountains. If you collect in Japan, you should be able to get a lot of usual ornamental plants from the nursery trade.

Ornamental Plant Solution

To prioritize plants you want to collect from the East, you should determine your need and/or nursery industry demand. Recently, boxwood blight caused significant damage to our boxwood cultivars. We needed to collect new boxwood clones with better disease resistance, and boxwood substitutes such as *Syzygium buxifolium*. If you like purple leaves of *Vitex trifolia* there are opportunities to collect new *Vitex* germplasm from the East. New plant selections of evergreen *Viburnum*, *Anneslea fragrans*, *Symplocos tetragona*, and *Phoebe zhennan* should be collected for further evaluation. While exploring for wild tulips in Xijiang, China, I was overwhelming impressed by natural ornamental plant resources. The success of tulip breeding and the diversity of tulip cultivars in today’s market should encourage us to explore and collect more new plants from the East for our nursery markets and breeding lines.

Edible Landscape Plants

Many fruit plants from the East are also beautiful landscape plants. One of my Ph.D. students collected 51 ornamental peach cultivars from around the world, especially discarded selections from fruit peach breeding programs (Hu et al., 2005). Other species such as *Diospyros cathayensis*, *D. lotus*, *Hovenia acerba*, *Lycium chinense*, *Myrica rubra*, and *Ziziphus jujuba* should be further trialed and selected for both edible fruits and desirable landscape features. Potential ornamental plants should be targeted for other benefits such as medicinal uses, fragrance, and beverage characteristics.

Targeted Groups

Everyone knows *Camellia*, but not too many people know the new species (*C. azalea*) with bright red flowers and rhododendron-like leaves which was discovered in 1986 (Wei, 1986). Ma et al. (2008) listed 35 golden camellia species in the world and many breeding work had been done, especially crossing them with much more cold hardy species. When I visited Hunan Academy of Forestry last year, their collection of 450 cultivars of *C. oleifera* was very impressive. We have a long way to go in introducing new and better camellias to our gardens. *Hydrangea* — do we need more? Yes, we do need double flowered *H. paniculata* and other interspecific hybrids. Obviously, we do need to actively collect plants with greater ornamental potential for breeding lines and nursery markets.

PRESERVATION AND RETURN OF ORNAMENTAL PLANT RESOURCE

Training Ornamental Horticulturalists

The development of ornamental plant industries is highly associated with the economic development. With rapid economic development in the East, especially China, the demand for better ornamental plants is much higher. We should not just collect plants from the East, but also collaborate with them on ornamental research and plant exploration. The training of ornamental horticulturists for the East is a very important step to better utilize natural plant resources and we should actively support this mission.

Preservation of Ornamental Germplasm

Plant collection is not just for profit, but also for plant conservation. No wild Ginkgo trees can be found in China today. But it is a popular ornamental plant and widely cultivated around the world. *Davidia* (dove tree) has a limited wild population. However, you can cultivate it in majority of USA gardens. One Japanese nursery collected seven cultivars of *Davidia*, which extended its diversity way beyond its native gene pool. Ornamental plants beautify our landscapes and preserve our natural plant resources.

Exchange and Return of Ornamental Germplasm

Collection of ornamental plants is not a one way street from the East to West. Many native plants from the USA, such as *Chamaecyparis thyoides*, *Cornus florida*, *Hydrangea quercifolia*, *Ilex verticillata*, *Kalmia latifolia*, and *M. grandiflora*, are doing well in the East. When I found *Lagerstroemia* 'Black Magic' in the Chinese nursery trade, I was sure it was the same plant that was bred in USA and returned to China; *L. indica* is native to China and I do not know how this cultivar was introduced. Recently, several ornamental cultivars developed in Japan were lost. Fortunately, Japan shared them with USA horticulturists so plant material was shipped back to Japan. There are many cultivars developed in USA from introduced plants from the East that have been introduced to the Asian nursery trade (Table 1).

MODERN TECHNOLOGY

The development of DNA technology has significant impact on all fields of science, including ornamental horticulture. Based on traditional hybridization, we can employ modern DNA technique and embryo rescue/embryogenesis and develop a rapid woody

plant breeding system (Fig. 1). Seeds of *Ilex* usually take 2-3 years to germinate and some cross-hybrid embryos may not be able to produce viable seeds. However, we can take the embryos after the cross hybridization and germinate them in the culture room (embryo rescue). We worked on *I. crenata* last July and the seedling could be transplanted in October (only 3-4 months). We are working on the trait-associated markers now and hope to screen the hybrid seedlings with these markers. If we can rescue hybrid embryos in 3-4 months and check their seedling DNA with identified trait-associated markers, we can shorten our woody plant breeding cycle.

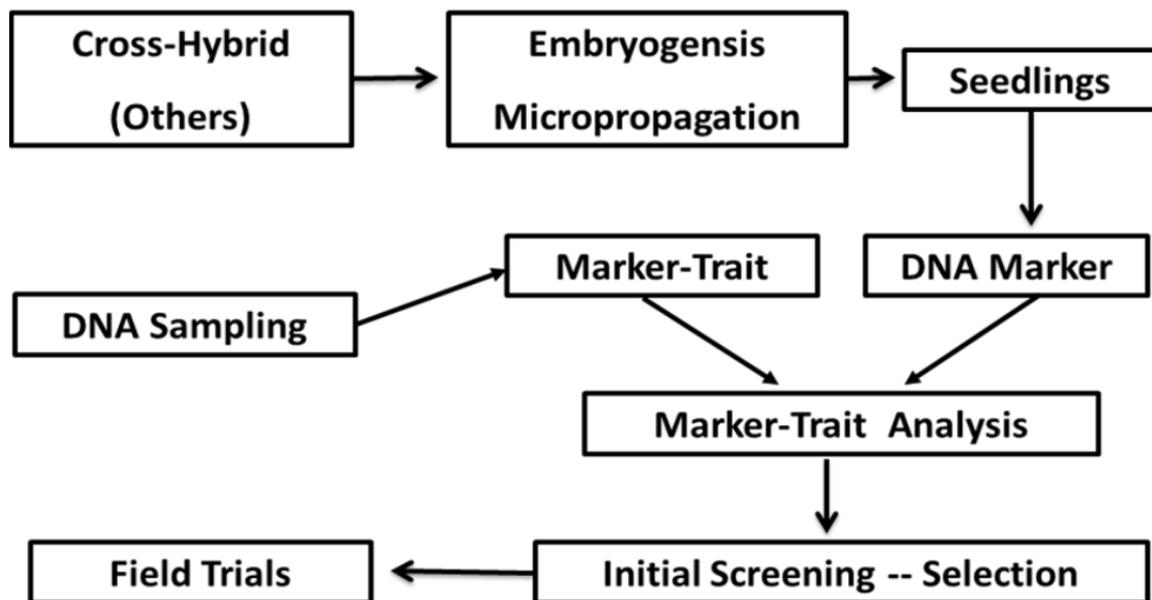


Fig. 1. Rapid woody plant breeding system.

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