

## Magnolia Improvement

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For the purpose of this article I have divided the improvement of magnolias into three phases.

### First Phase

The first phase begins with the introduction into Great Britain in 1790 of two magnolia species from Asia by Sir Joseph Banks, the botanist on Captain Cook's trip around the world, namely, *M. liliiflora* and *M. denudata*. Other species of major importance were not available for hybridizers until nearly half a century later. These two were the essential species for the next phase and their introduction was of great historic importance for the beginning of magnolia improvement.

### Second Phase

The second phase occurred in France soon after 1800 with the hybridization of *M. denudata* and *M. liliiflora* by E. Soulange-Bodin to start the long era of soulangeana hybrids. The first soulangeana hybrids soon spread to all parts of the world and even today are the dominant kind available from average nurserymen and horticulturists. They must be given their



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**Top:** 'Daybreak.' Flowers are 8-9 inches across, glowing rose-pink in color, extremely fragrant; tree very columnar; flowers late after frosts.

**Bottom:** 'Sunburst.' Flowers very deep yellow of moderate size; tree floriferous and open in growth.

credit because it is certain they popularized magnolias to the gardening public.

It was not until about 50 years later that hybrids of other species, such as *M. stellata*, began to appear. It was nearly 100 years later that other Asian species became commonly used as parental material. From the first appearance of the *soulangeana* hybrids until the 1940s many fine hybrids were developed, all by the use of additional Asian species. In brief, the second phase could be called the 'Phase of the Asian Species,' including *M. stellata* (and its closely related types), *M. sieboldii*, *M. hypoleuca*, and *M. campbellii* all introduced shortly after 1860. Thus, the second phase was dominated by the Asian species, especially *M. liliiflora* and *M. denudata*.

### Third Phase

The third phase, which is still underway, began with the use of North American species in magnolia improvement. Prior to about 1940 all the North American species were grown for their ornamental value, not for use in hybridizing. This third phase began with the use of *M. acuminata* and its closely related species, *M. cordata*, as a parent. For the purposes of this article, the latter will be considered as a valid species, although it is far less important than *M. acuminata*. Once again, *M. liliiflora* and *M. denudata*, from the second phase, are essential to this phase.

*Magnolia acuminata* is a pyramidal tree up to 100ft (30m) tall. It is native from southern Ontario to the Florida panhandle, and west to Illinois and Arkansas. It was first introduced to culture in 1736 by John Bartram, who sent seed to his friend, Peter Collinson, in London. It often has a trunk of over 2ft (60cm) in diameter. The flowers are commonly small in size and an insignificant green to greenish yellow; an occasional tree has yellow flowers. Trees with bluish flowers are also known. Some clones, such as 'Klassen', produce offspring that are highly fastigate, a character that will appear over and over again in the plants developed in this phase, as does the size, especially the height. Persons planting hybrids of this species must realize that their ultimate height can reach proportions close to the parental dimensions. To date, few of the hybrids have reached their eventual dimensions, but there are some that are nearly 40ft (12m) high and are still extending skyward at the rate of 1-3ft (30-90cm) per year. Hybrids of *M. cordata* extend to far more modest heights.

Callaway (1994) describes 17 cultivars of *M. acuminata*. Perhaps the clone with the greatest intensity of yellow color is 'Golden Glow' found by Dr. Frank Galyon in the Smoky Mountains of Sevier County, Tennessee and registered in 1975. This clone was temporarily lost in the US as a result of road construction. Fortunately, it had been propagated in New Zealand and



returned to the US. More recently an additional four clones have been registered by Richard Figlar—'Mister Yellowjacket,' 'Crowley's Ridge,' 'Ontario,' and 'Syracuse.'

The same author describes four clones of *M. cordata*, of which the most famous and best is 'Miss Honeybee' registered about 1970 by James Merrill Nurseries of Painesville, Ohio. I grew out a sizable population of seed of the cross 'Golden Glow' × 'Miss Honeybee,' from which I selected tree number R4-8. This tree is now about 15 years old and 25ft (8m) high. The flowers are an intense deep yellow. It has never been registered or named, but it has been given to several nurserymen. To my knowledge, no other hybrid of this cross exists.

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'Hot Flash.' This tree is the latest flowering magnolia in my entire collection; flowers are deep yellow, heavy textured; tree is open in growth and probably a polyploid; named by a nursery friend.

*Magnolia cordata* is a round-headed tree that grows to about 30ft (10m) high. It is found almost exclusively in the state of Georgia. It differs also from *M. acuminata* by having a heavy pubescence on its leaves and stems. It is preferred as a parent to some degree because of its greater intensity of yellow color in its flowers and its more modest height. Both species are extremely cold tolerant to  $-29$  to  $-34$  °F ( $-20$  to  $-30$  °C), or even more. They are free from any disease or insect pests. Both flower late after all danger of frosts.

### Some First Generation Hybrids

The first breeding program that seriously used *M. acuminata* was at the Brooklyn Botanic Garden, Brooklyn, NY, under the direction of Dr. Lola Koerting, and this work resulted in the grex, *M. × brooklynensis* (*Magnolia acuminata* × *M. liliiflora*). The Brooklyn Botanic Garden also first made the hybrid of *M. acuminata* × *M. denudata*, which was named 'Elizabeth.' Sister hybrids from the same crossing as 'Elizabeth' are:

'Butterflies'—Philip Savage hybrid; flowers 10-16 tepals, yellow; tree spreading; patented US Patent No. 7456.

'Golden Sun'—*M. acuminata* × *M. denudata*, hybridized by Dr. David Leach; no description, picture only in *Magnolia* 31(1), page 24.

'Goldfinch'—*M. cordata* × *M. denudata*, hybrid by Philip Savage; tall upright tree, light yellow. Very early flowering in the spring.

'Ivory Chalice'—David Leach hybrid; yellow to yellow-green tepals, flowers 6in (15cm) across.

'Sundance'—August Kehr hybrid; barium yellow flowers, 8in (20cm) across, mid season flowering, tree is spreading.

'Yellow Fever'—registered by Ken Durio; flowers yellow with yellow-green midribs, 8in (20cm) in diameter.

'Yellow Garland'—David Leach hybrid; flowers 8in (20cm) across, yellow with yellow-green midribs.

There is a tendency for most of the above hybrids to fade in hot humid climates, although 'Sundance' has been reported by Durio to hold its color well in Louisiana. However, in my experience, 'Elizabeth' tends to produce seedlings with higher levels of yellow color than does 'Sundance.' To my knowledge, all these trees are spreading and none are strongly columnar in growth.

I have used colchicine to double the number of chromosomes of 'Sundance' to produce a plant with 10 sets of chromosomes for a total of 190 chromosomes, 76 chromosomes from *M. denudata* and 114 chromosomes from *M. acuminata*. This doubled form has been named and registered as 'Sun Ray' because it has larger flowers, blooms later in the season, and has slightly deeper yellow-colored flowers. In addition, the stems are thicker, the leaves are larger and thicker in texture. It has been reported from field observations that such polyploids with thicker leaves suffer less under low soil conditions and lower relative air humidity.

First generation hybrids involving *M. liliiflora* are relatively few in number. They are:

'Evamaria'—cross made by Brooklyn Botanic Garden; flowers are about 4in (10cm) across, purple with suffusion of yellow-green; US Patent No. 2820.

'Golden Girl'—cross made by August Kehr; flowers are almost entirely light yellow with only slight purple stains; registered in 1991.

'Woodsman'—cross made by Dr. Joe McDaniel, Urbana, Illinois, between *M. acuminata* 'Klassen' and *M. liliiflora*. Named and registered in 1974. The flowers are a mixture of yellow, green and purple, a combination of colors that is pleasing to some and repulsive to others.

'Woodsman' has been used extensively in my own program, and with great benefits. Somewhere in its genetic background are genes governing the character for fastigiate (columnar) growth habit of its offspring. Such a growth habit to me is a valuable asset, especially for street trees and for



small areas. There are some offspring that have a growth habit akin to Lombardy Poplars.

### Some Third Generation Hybrids

It is in the third generation that most of the superior hybrids are being found. Many of these are already named and registered with the International Magnolia Registrar and I will list some of those that have been duly registered. The colors are mostly yellow, but there are also pinks which have arisen from a combination of many genes in the intervening generations. The listing is as complete as circumstances permit, but it is unavoidable if some are missed because of lack of published information:

- 'Barbara Nell'—hybrid by Philip Savage; tree pyramidal in growth; flowers creamy white with an overlay of pink; registered by Patricia Walton in 1994.
- 'Coral Lake'—cross by Dr. David Leach, 'Legend' × 'Butterflies'; flowers pink suffused with yellow.
- 'Curly Head'—formerly 'Editor Hopkins'; cross by Philip Savage, *M. acuminata* × *M. × veitchii* 'Peter Veitch'; tree with dense habit; registered 1990.
- 'Daybreak'—'Woodsman' × a white Gresham, probably 'Tino Durio,' cross by August Kehr. This hybrid represents probably my best hybrid to date. Flowers are 8-9in (20-23cm) across, glowing rose pink in color, extremely fragrant; tree very columnar, flowers late after frosts; hardy to -33 °C (-28 °F) according to experience by Dennis Ledvina (1995); very floriferous. The original tree is 30-40ft (10-12m) high with less than 8ft (2.5m) width at the base. It is a most glorious sight when in full flower. Registered 1991. (See photo on page 5).
- 'Flamingo'—cross by Philip Savage between *M. acuminata* 'Fertile Myrtle' and *M. sprengeri* 'Diva'; flower color pink like 'Diva,' leaves recurved at edges, tree pyramidal and suitable for a street tree.
- Gold Crown—'Woodsman' × 'Sundance,' cross by August Kehr; flowers 10in (25cm) in width, medium deep yellow, perhaps more yellow than 'Elizabeth' according to Durio; flowers after any danger of frosts; tree highly fastigate growth similar to 'Daybreak.'
- 'Golden Gift'—hybridized by Dr. David Leach; compact tree, yellow flowers 4.5 in (11cm) in diameter; produces axillary buds so it flowers over a long period.
- 'Golden Goblet'—*M. acuminata* var. *subcordata* 'Miss Honeybee' × (*M. acuminata* × *M. denudata*); flowers strongly yellow 6.5 in (16cm) in diameter, six tepals of heavy texture; tree pyramidal. Introduced by Dr. David Leach 1997.

- 'Golden Sun'—'Golden Gift,' hybridized by Dr. David Leach; tree compact in growth; flowers strong yellow, six tepals, 18cm (7in) in diameter, flowers in mid May. Registered in 1995.
- 'Gold Star'—cross by Philip Savage between *M. stellata* and *M. cordata*; very floriferous, small butter yellow flowers; tree is upright, vigorous, and fast-growing; the leaves are fuzzy when young and have a bronze color.
- 'Legend'—cross by Dr. David Leach; early flowering, flower light yellow, about 5–6in (13–15cm) in diameter.
- 'Maxine Merrill'—cross by Philip Savage between *M. cordata* and *M. × loebneri*; flowers medium yellow with six tepals; tree small in size.
- 'Peachy'—cross by Philip Savage but named by Richard Figlar, *M. acuminata* 'Fertile Myrtle' × *M. sprengeri* 'Diva'; flowers large, somewhat floppy, peach-pink and pleasantly fragrant.
- 'Pink Surprise'—hybridizer not known by author, 'Galaxy' × (*M. acuminata* 'Picture'); vigorous growing, tall tree-like growth, large pink flowers.
- 'Yellow Bird'—cross made at Brooklyn Botanic Garden by Doris Stone, *M. cordata* 'Evamarie'; late flowering, deep yellow about 4–5in (10–13cm) across.
- 'Yellow Lantern'—cross by Philip Savage, *M. cordata* 'Miss Honeybee' × *M. × soulangeana* 'Alexandrina'; tulip-shaped flowers, lemon yellow in color.
- 'Ultimate Yellow'—backcross of *M. acuminata* × *M. × brooklynensis* (Joe McDaniel) made by Harry Heineman; flowers open cup shaped, 6in (15cm) in diameter, with some green back coloring.

### Some Unnamed and Unregistered Hybrids

The program of developing new hybrids, especially yellow-flowered ones, continues at a feverish pace. All I can do is to mention a few promising candidates. Because I am not fully knowledgeable of other breeding programs, this listing is consequently my own assessment of the most likely hybrids that I know may be registered.

- 'Sunburst'—'Woodsman' × 'Gold Star'; flowers very deep yellow of moderate size, tree floriferous and open in growth; excellent. (Tree No. R-16-22.) (See photo on page 5.)
- 'Gold Cup'—*M. × soulangeana* 'Lennei' × 'Elizabeth'; tetraploid or perhaps even higher ploidy, leaves very thick texture and slightly crinkled, stems very thick; flowers cup shaped, deep yellow, and very heavily textured; late flowering in the spring.
- 'Hot Flash'—'Woodsman' × 'Elizabeth.' This tree is the latest flowering magnolia in my entire collection; flowers deep yellow, heavily textured; tree is open in growth and probably a polyploid; named by a nurseryman friend. (See photo on page 7).



## An Unusual, Unnamed Hybrid

I will list this plant because it is my choice as one of the best in this category. It is a cross of 'Woodsman' × 'Elizabeth' (tree R-18-14) and combines all the genes for upright growth of both parents. It will certainly be named in the near future after some stock has been propagated. Every hybridizer worth his salt has aspirations to have a famous hybrid, and this one is mine. The flowers are deep yellow of good size and are plentiful. However the character that makes it unique is that it is fastigate to the ultimate degree. It is the most columnar magnolia seen in my experience, and certainly the most fastigate in the entire collection. It appears as though the branches had been trussed to the trunk during growth or like a tree that has had its branches tied by a nurseryman, ready for shipment. If this hybrid has the upward growth potential that is characteristic of most *M. acuminata* type plants, it will be a modern day Jack-in-the-Beanstalk. [Since this article was written, Dr. Kehr has registered and named this hybrid 'Sun Spire;' it will be available from Wayside Gardens in the fall of 2001. See photo this page. -Ed.]

While discussing unusual hybrids, another must be included. It is presently called 'March Till Frost' because it starts to flower in March and continues nonstop until the autumn frosts kill the flowers. It is tree number R19-63 with the pedigree (*M. liliiflora* × *M. cylindrica*) × 'Ruby'. This tree forms flower buds along the stems before it does leaf buds. In hot weather the purple flowers do not open fully as is common to all summer-flowering hybrids in the collection.

## Some Reflections

Perhaps there will be many who will take issue with the above three phases in magnolia hybridization, and the fact that three or four species were the primary ones playing a major role in those phases. The fact must remain that this assessment is logical enough to prepare us for the arrival of a fourth



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'Sun Spire.' The character that makes this plant unique is its fastigate growth habit. It is the most columnar magnolia seen in my experience and certainly the most fastigate in the entire collection.

phase. In my own case I am turning my emphasis away from yellow hybrids per se, and toward hardy, late-flowering pure pinks and reds, but meanwhile watching the trend toward the incorporation of other members of the Magnoliaceae into magnolia breeding. High on that list is the use of deep pink forms of *Manglietia insignis* as parental material in magnolia improvement. Already there is a credible report of a pure pink hybrid of *Magnolia virginiana* that has resulted from such intergeneric crosses, and it foretells the possibilities of pink forms of such things as a pink-flowered *M. grandiflora* and pink forms of similar white-colored species. The Chinese have already reported on a pink or red form of *M. delavayi*, which they believe arose with the hybridization of *M. delavayi* with close-by trees of *Manglietia insignis* (Luo Gui-Fen and Sun Wei-Bang 1996). Magnolias are marked exceptions to the accepted rules in regard to barriers to hybridization (Kehr, 1998). One or two species can make a marked difference.

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