Some breeding possibilities in subgenus Magnolia

Bill Smith

The last ten years or more have seen a veritable explosion of new and improved cultivars, mostly hybrids in subgenus *Yulania*, with even more in the final evaluation stage. Based on flowering characteristics, these are, hands down, the stars and dramatic show stoppers in the genus *Magnolia*. However, to my eye, subgenus *Magnolia* has as much to offer—perhaps even more with multi-seasonal foliage interest that extends the plant's ornamental value well beyond the flowering stage. I have a personal perspective in comparing the two subgenera. I live in mid-zone 7, Virginia, USA with a 10- to 12-week period of roller coaster spring temperatures. The yulanias, except for the really late bloomers, too often disappoint and once our heat and humidity come in, most are not particularly ornamental as foliage plants. On the other hand, many species of subgenus *Magnolia* (except those from Section Oyama) thrive here, attractive for months. While I am continuing to grow and hybridize magnolia from the subgenus *Yulania* (particularly for very late or frost-resistant blooms), breeding within subgenus *Magnolia* has a broader appeal and I'd like to share some specific goals.

In general, there are four factors that apply to all ornamental magnolias (I call these "the big four"): flower, foliage, form, and health. The priority flower trait is floriferous-ness; the more blooms and the longer the bloom period, the better. Since magnolias bloom on terminal buds, the plants need at least fairly dense branches and branchlets. Twinning (double blooms at each terminal) and repeat blooms are bonuses. Foliage traits are variable per species, but here again, the more dense the branches/branchlets, the better the foliage display. In the form category, I'm a bit opinionated: I'm not fond of a wide-spreading growth habit. It takes up too much room in a smaller garden and, to my eye, often looks weedy and unkempt. So, I'm seeking fairly upright, symmetrical growth whether the plant is a single-trunked large tree or a multi-stemmed shrub. There are several variables to consider for the health factor: vigor, pest and disease resistance, and, perhaps most importantly, adaptability. As much as possible, the plant

should be able to grow in a wide range of conditions (heat, cold, sun, shade, moisture, etc.) while maintaining the desirable ornamental characteristics. Considering the "big four," it's been helpful to me to identify the pros and cons of each section within the subgenus with some possible genetic solutions for improvement.

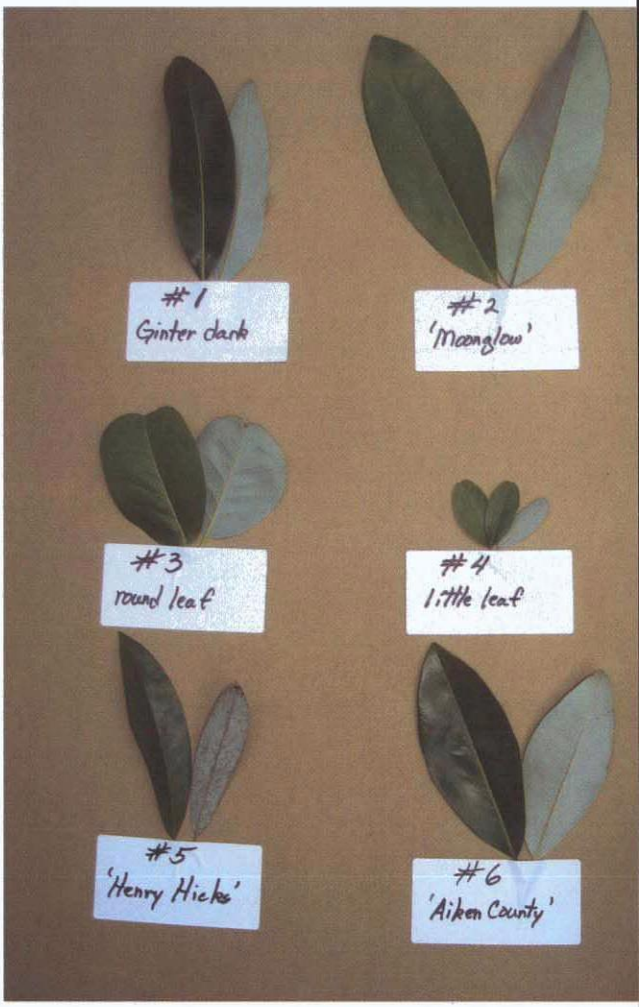
Following is a discussion of these factors involved in each of the commonly grown species in subgenus *Magnolia*: *M. virginiana*, *M. virginiana* var. *australis* (considered together), *M. grandiflora*, (section *Rhytidospermum* (considered together), section *Oyama* (considered together). In this article, I am only minimally considering the role of sections *Manglietia* and *Gwillimia*, plus others of the "newly" introduced semi-tropicals, although Dick Figlar has certainly piqued my interest. As the crosses are made—and undoubtedly they will be—these plants will be of great value in future breeding and could open the door to some spectacular improvements.

Magnolia virginiana, M. virginiana var. australis and the intermediate forms

To me, no other group of magnolias offers so much variation. Foliage shapes include round, spatulate, lance, strap, broad oval with sizes from as small as my thumb to 10in (25cm) plus (see photo). Color ranges from dark green to pale grey-green to bright green, glossy to dull surfaced. The leaf undersides are pale grey to almost silver-white (see photo). The form and growth habit is equally as varied with very compact shrub forms to multi-trunked, spreading, medium/large shrub/trees to single-trunked 50ft (15.25m) plus trees. The flowers are more consistent with most in the 1.5–4in (3.8–10cm) range although 6in (15.25cm) plus flowers have been reported. Collectively, the group offers purely deciduous through semi-evergreen to fully evergreen forms. The variations go on and on, particularly as the zones get warmer—zone 7b to zone 10. Driving down from Virginia to the Tallahassee, Florida meeting, I spotted stand after stand of *M. virginiana*, many of which looked like exceptional forms—it was hard to keep my eyes on the road!

The positive factors from such diverse genetic material are obvious. However, the negative factors, of which there are several, need breeding improvement. One is that in zones cooler than 7b, particularly where summers are either shorter or not hot or when sunlight is limited, the plants do not bloom well. Often the other ornamental traits are diminished: the foliage is less dense, the plants exhibit a general rattiness (for lack of a better word) during the fall and winter, growth appears very late in spring, and in zone 6a/zone 5, the plants may be less vigorous.

I have identified three plants of seedling origin here in Richmond, Virginia that are exceptionally floriferous, vigorous, densely foliaged or dark leaved. I'm crossing these with known zone 5/6 cultivars: 'Moonglow,' 'Henry Hicks,' 'Milton', 'Havener,' etc. Thus far, I'm not impressed with the zone 5 cultivars as compared to the zone 7–8 plants. I know it is a bit of an unfair comparison, but I think it is possible to get a zone 5 plant that is vigorous, densely branched, more or less upright and also smothered in blooms. I'd welcome pollen from anyone in zone 5 with a good performing *M. virginiana* (particularly floriferous) and, of course would be happy to share seeds or seedlings for testing in zones 5–4.



Variations in Magnolia virginiana foliage.

Another negative factor in the evergreen, semi-evergreen *M. virginiana* is the fall, winter, and early spring rattiness. Significant numbers of old leaves brown and fall off with no replacement appearing until late spring or early summer. The remaining evergreen foliage is sparse and a bit worn, which creates an unattractive plant for four or five months. Selections and crosses can be made using plants that do not have this flaw. There is a fully evergreen plant at Lewis Ginter Botanical Gardens that looks as good year round as any *M. grandiflora*. I've been using it as a parent with other *M. virginiana* and with selected *M. grandiflora* to enhance this quality. How well the offspring performs in climates colder than zone 7 remains to be seen.

Also on the negative side for *M. virginiana* is the very short cycle of the individual bloom, usually effective only for one to two days from opening to final stages. Fortunately, on the more floriferous clones there are so many blooms that it doesn't make too much difference. However, crosses have been made and will continue to be made within other sections that have blooms with a longer shelf life: *Oyama, Rhytidospermum*, and possibly *Manglietia*. Bonuses from such crosses may be larger blooms and pronounced stamen color. Some of these crosses are fairly easy to make (*M. virginiana* × *M. tripetala*). Others, at least for me, are not so easy but are possible. Unfortunately, the offspring of these intersectional crosses appear to be sterile as seed parents.

Another effect from some of these crosses has been a spreading, somewhat ungainly large shrub form with less dense branches or branchlets, which results in a reduced number of blooms. By choosing the more upright tree form, parents and the more floriferous plants, this could be minimized. These crosses bear repeating. (I have not found any reports of seed or pollen crosses using 'Nimbus,' *M.* × *thompsoniana, M. sieboldii* × *M. virginiana, M. insignis* × *M. virginiana*, Phil Savage's two M. *macrophylla* × *M. virginiana* hybrids, or 'Procelain Dove' as a parent with *M. virginiana*)

Some additional *M. virginiana* goals build on the foliage variations. Many of my plants are young, so blooms to work with are scarce. However, I plan future crosses using the dwarf, round, and "strap" leaf forms onto zone 5–6 cultivars to try to work these variations into plants that perform well in colder areas.

Regarding *M. virginiana* bloom, one goal is a pink (or at least strongly pink-blushed) bloom. Both 'Pink Halo' and 'Havener' have some presence of pink pigment, and *M. insignis* (pink-red form) has been crossed with *M. virginiana*. 'Havener' is known to be seed fertile. From these sources, it should be possible to get the good pink blush. Another outside possibility would be to use a pink *M. obovata* cultivar or Phil Savage's 'Rosy Cheeks' crossed with 'Havener' or 'Pink Halo.' It would probably take a number of attempts and neither 'Rosy Cheeks' or the pink form of *M. obovata* are readily available (pollen would have to be shared) but, theoretically, the cross is possible.

Final thoughts on *M. virginiana* bloom goals: a larger and longer lasting bloom is clearly possible and, if the floriferous-ness can be maintained, would be real assets. Twinning is not infrequent in some *M. virginiana*. Double or semi-double tepals are also possible. Mostly it is a matter of selecting the best parent plants and then getting the pol-

len to an appropriate seed parent. Once again, I'd be happy to try the crosses and share the resulting seeds/seedlings.

Magnolia grandiflora

Magnolia grandiflora is a very close runner-up in the variation race with *M. virginiana* as it has almost as many foliage and form variables—some might say it even has more. Certainly cultivars abound, some going back a century or more. I'm rather cautious about any need to select another. I live in a *M. grandiflora* embarrassment of riches. I can't drive three blocks without seeing six to ten large established plants and usually spot at least one with some foliage or form trait that might be useful in a parent plant. At least 90% of the city's trees are of seedling origin, going back one hundred years, so the genetic diversity readily available is enormous. The temptation to make many crosses in this gold mine is tantalizing but best restrained unless there are distinct and specific goals. However, I'm exploring areas for improvement: cold hardiness, diversity of foliage, and form.

Since I live in zone 7 and work with zone 7 plants, I provide can't provide much help in trying to develop a cold-hardy *M. grandiflora*. However, I can supply pollen to more northern hybridizers. I've identified at least two fertile plants that produce exceptionally viable seeds. Dennis Ledvina has been using *M. grandiflora* pollen on *M. sieboldii*, *M. liliiflora*, and *M. acuminata*, so I'm sending him some pollen and I'll continue attempting some *M. sieboldii* and *Yulania* crosses (however far fetched) here with these super fertile *M. grandiflora*. Both Kehr and Ledvina have created sieboldii × grandiflora plants and I have some seeds (hopefully viable) from five of such crosses made in 2006. An added benefit, if successful, may be a longer lasting individual bloom as well as a hardier plant. Just out of curiosity, I've also made several *M. grandiflora* crosses with *M. virginiana*. I'd like to think a zone 5 *M. virginiana* would increase hardiness in these crosses but have no evidence to support the theory. Who knows what might happen?

Another area for possible selection is for diversity of form (at least hardy into zone 6?). All candidates (for breeding) would need to be densely branched and floriferous. Particularly desirable would be a semi-dwarf, suitable for smaller gardens. Years back, 'Little Gem' held the promise of such a plant but quickly outgrew it. I've used it as parent plant anyway, but thus far it seems to have poor seed fertility/viability. Other cultivars have been reported as very compact: 'Harold Poole,' 'Workman,' 'Teddy Bear,' 'Opal Haws' (also known as 'Suzette') but my information is old and most of the these plants

are not readily available. 'Orbit' is listed as a shrub but I know of no source. I've tried crossing some grandifloras with the shrub *M. coco* (section *Gwillimia*) but no "takes" yet. Apparently *M. coco* is reluctant to set seed although I did come close with *M. virginiana* pollen. I'll continue working to get this elusive small *M. grandiflora* anyway. Any suggestions would be welcome.

As for foliage diversity, I'm working with a narrowly lance-leaved plant and another with a smaller, more rounded leaf with densely compact branching and abundant bloom. Both are zone 7 plants of seedling origin. I'm crossing some with named cultivars and with some *M. virginiana*. The high chromosome count of *Magnolia grandiflora* should produce much variation in these seedlings. Time will tell what foliage variations emerge.

Seeds from many of the 2005 *M. grandiflora* crosses sprouted. I'll hopefully have these seedlings to share at the MSI meeting in Raleigh, North Carolina in 2007 for those who are interested.

The big leaf clan (sections Rhytidospermum, Macrophylla, and Auriculata)

This is a group in which I see much potential for development. The foliage and form are both unique, not only in genus *Magnolia* but among the temperate deciduous trees. Even without blooms, the foliage sets them apart in any garden. The bloom period nicely fills a niche, starting when the late precocious magnolias are winding down and ending as the summer bloomers (*M. grandiflora*, section *Oyama* and overlapping *M. virginiana*) are revving up. Also, the blooms are medium to large sized and some are quite fragrant.

When considering breeding goals, I am not taking each species separately. Within the section, enough hybrids have been created to draw some tentative conclusions and to warrant treating the hybrids and the species collectively. Many intrasectional hybrids have proven to have at least some seed fertility and most seem pollen fertile. The crosses of Phil Savage and August Kehr and those of Dennis Ledvina have given us multiple species combinations blending at least three to five species in hybrids—*M. tripetala*, *M. obovata*, and *M. officinalis* being the most prevalent. Some *M. macrophylla* is being worked into the mix. *Magnolia fraseri* is the least present in the hybrids to date. The other species commonly involved is *M. sieboldii* in section *Oyama* (more on that later).

For all of their unique assets, there are some negative factors, which, in my opinion, have kept them from a typical home garden. One is sheer size. None of the pure species of the big leaf clan are small plants and most, given a favorable site, become large trees in time, very suitable for large public spaces but difficult to work into a typical sized garden. Many of the hybrids with *M. sieboldii* are somewhat smaller and don't get really big very fast (the jury is still out on final size for some of these plants). *Magnolia tripetala* does have some smaller, slower growing forms, but in my opinion, 20–30ft (6–9m) trees are about as small as this group will get, barring some dwarf aberrant. 'Summer Solstice' may contribute a large shrub form but I am not familiar enough with the mature plant to guess it's ultimate size. Bottom line: accept and appreciate them as true trees. If a yard has room for a typical maple, oak, linden or sweet gum, it can handle a big leaf magnolia.

Kehr's *M. officinalis* × (*M.* × *wieseneri*).

Another negative among some of the big leaf clan has been the need for wind protection to keep the large leaves from becoming tattered. I'm happy to report that at least one of the hybrids—Kehr's *M. officinalis* × (*M.* × *wieseneri)* has met this need. Several years ago hurricane Isabel hit Richmond with a vengeance. The soil was saturated before the storm and the winds toppled well over 10,000 trees, many 50-150 years old (interesting side note: almost none of the large *M. grandiflora* or *M. virginiana* blew over—some branches were lost, but not whole trees). From my window I watched the branches and foliage of my fully exposed big leaf hybrid 12ft (3.7m) blew almost horizontally. The large leaves looked like umbrellas blown inside out and sideways. Inspection the next day revealed at least 90% of the leaves completely intact. The only ones torn were those with prior insect damage and even those weren't shredded. The plant has not only handsome but very strong foliage.

The flowers are a good size (see photo) and wonderfully fragrant, perhaps the best of any magnolia I know. Unfortunately, my plant

has proven slow to bloom (five years to first single bloom from a graft) and thus far only has sparse bloom. Growth is very vigorous with strong apical dominance. In full foliage it is a handsome typical big leaf magnolia. However internal branching is rather gaunt with three to five feet of bare limbs, foliage all at the terminus (a true umbrella). With so few branches and few internal branches, the typical terminal bloom possibilities are limited. Dennis Ledvina has a *M. officinalis* × (*M.* × *wieseneri*) seedling from August Kehr that he has named 'Angel Mist' and has used it in crosses. Perhaps it is more floriferous. At any rate, I'll continue to cross mine with a floriferous, densely branched *M. tripetala* at Lewis Ginter Botanical Gardens and perhaps with *M. sieboldii* and others in the collective group. Pollen seems quite fertile but my plant appears to be seed sterile. Both August Kehr and Otto Eisenhut reported decorative seed cones, so it may be my fault.

Bloom quantity is another factor in this collective group. Here again, the number of probable blooms is directly proportional to the number of branches/branchlets. Diminished bloom is most evident in trees planted in shaded locations. Branches become more spaced reaching for the light and internal branchlets are too shaded to develop in quantity. There are exceptions of course. Because this group needs abundant and large blooms to stand out from such large leaves, there is a continued need to identify among the species and hybrids those plants that are genetically densely branched and more floriferous. Once identified, crosses need to be made from these parents. Adding *M. sieboldii* to the mix clearly does increase the branching pattern. There is an excellent photo of a mature, floriferous *M.* × *wieseneri* in MSI *Journal* Vol. 36, Issue 69 (2001). This is the kind of bloom coverage I'm working for. Unfortunately, *M. sieboldii* genes also tend to reduce the bloom size so it may take evaluating a number of seedlings to find the one floriferous plant with 8-10in (20–25cm) blooms. Of course using parents with twinning tendencies and/or extra tepals would add to the show.

Genetically there is also good potential for pink-flushed bloom. *Magnolia officinalis* × (*M.* × *wieseneri*) has some pink blush on the outer tepals. Phil Savage's 'Rosy Cheeks' and 'Pink Nightie' also have pink pigments. There exist pink(ish) forms of *M. obovata*. Reports on 'Summer Solstice' indicate pink coloring. Perhaps with some pollen sharing, the color could be worked in the mix. Unfortunately many of these plants are rarely propagated and grown, so parent availability is an issue.

Magnolia 'Southern Belle.'

This leads me to another negative for this group—propagation is challenging. Grafts probably are best done on *M. tripetala* or *M. obovata* rootstock for best future compatibility. Neither of them is readily available to most propagators—at least not in quantity—and neither of them does well in containers for very long. However, cutting propagation is distinctly possible if there is some *M. sieboldii* in the hybrid mix. With Pat McCracken's help, I have rooted both 'Southern Belle' and 'R20-1;' the success rate wasn't great but they do root. It will be interesting to see if any of Ledvina's recent crosses in this section will also root. It's definitely an issue that has to be addressed. Some fine plants are in the offing but if they are too difficult to propagate, they won't be grown.

Now for some potentially good news: among the species in the big leaf clan, previous reports indicate some are a bit finicky– susceptibility to heat (sun damage) and poor drought resistance in addition to the need for wind protection. My plants of 'Southern Belle', 'R20-1,' *M. officinalis* × (*M.* × *wieseneri*) are open grown, fully exposed and doing quite well. Several times a year, we have dry spells of four to eight weeks. I do water my babies and transplants when necessary during these periods. The bigger plants are on their own. All three plants are doing fine. I'm also planting, in a fully exposed test site, seedlings of this group's hybrids. They are just getting started, so it's too early to tell, but I have high hopes that they will adapt well. I


Magnolia R20-1.

can't credit the adaptability on any one species but tentative observations indicate that *M. officinalis* and *M. tripetala* are fairly adaptable. I'm growing nine different new hybrids from this group (mine and those of Ledvina). I have a strong feeling that these mixed species hybrids are going to prove remarkably resilient. It also looks as though they will be hardy in zones 5 through 9 although summer heat resistance remains to be tested in warmer areas.

At any rate it's an exciting time for the big leaf hybrids with much potential to be grown and tested. I know there are some real winners waiting in the wings. I plan to bring some of these hybrid seedlings to the 2007 MSI meeting, as well.

Oyama

As a group, these are a bit difficult for widespread ornamental use. Climate and site requirements are truly demanding. All have poor heat resistance even in cooler areas; all have poor drought tolerance. All tend to be spreading or sprawling in habit. *M. sinensis*, from reports, may be the most cooperative but far from a sure bet. Yet where they can be grown, they have some wonderful qualities: the fragrance, the dramatic stamen color, the long bloom period—I look at the photos and drool. So, I continue to plant them and keep them alive enough to get a few blooms to use in crosses and hope that sooner or later, a seedling will adapt and do well. The good news: they are very useful in hybridizing throughout subgenus *Magnolia*, with *M. virginiana*, *M. grandiflora*, and the section *Rhytidospermum*, and I'm currently trying manglietia crosses. I've already touched on their use and many named hybrids exist. In the hybrid forms, much, if not all, of their site pickiness seems diminished. Crosses with other sections almost always add foliage and branch density; at least some

of the stamen color usually transfers. These crosses usually enhance the fragrance of the hybrids and *M. sieboldii* can add increased cold hardiness. As mentioned before, they may add cutting propagation ease to the mix and, as a bonus, they tend to start blooming when young (4–6 years old). In short they are good parents.

Unfortunately the intersectional hybrids are usually not seed fertile but some are pollen fertile. I have used 'Southern Belle' and 'R20-1' pollen on *M. tripetala* with fairly good results. No luck yet with 'Charles Coates' or 'Porcelain Dove' on anything. *M.* × *wieseneri* has been used by others as pollen parent with some good results.

Apparently the nodding/pendant bloom poise is recessive with only hints of it showing up in the hybrids thus far. I have a personal interest here. I'd like to get a 20–30ft (6–9m) single trunked tree form (*e.g. M. virginiana* var. *australis*) with nodding blooms so one could readily see the red stamens from under the tree.

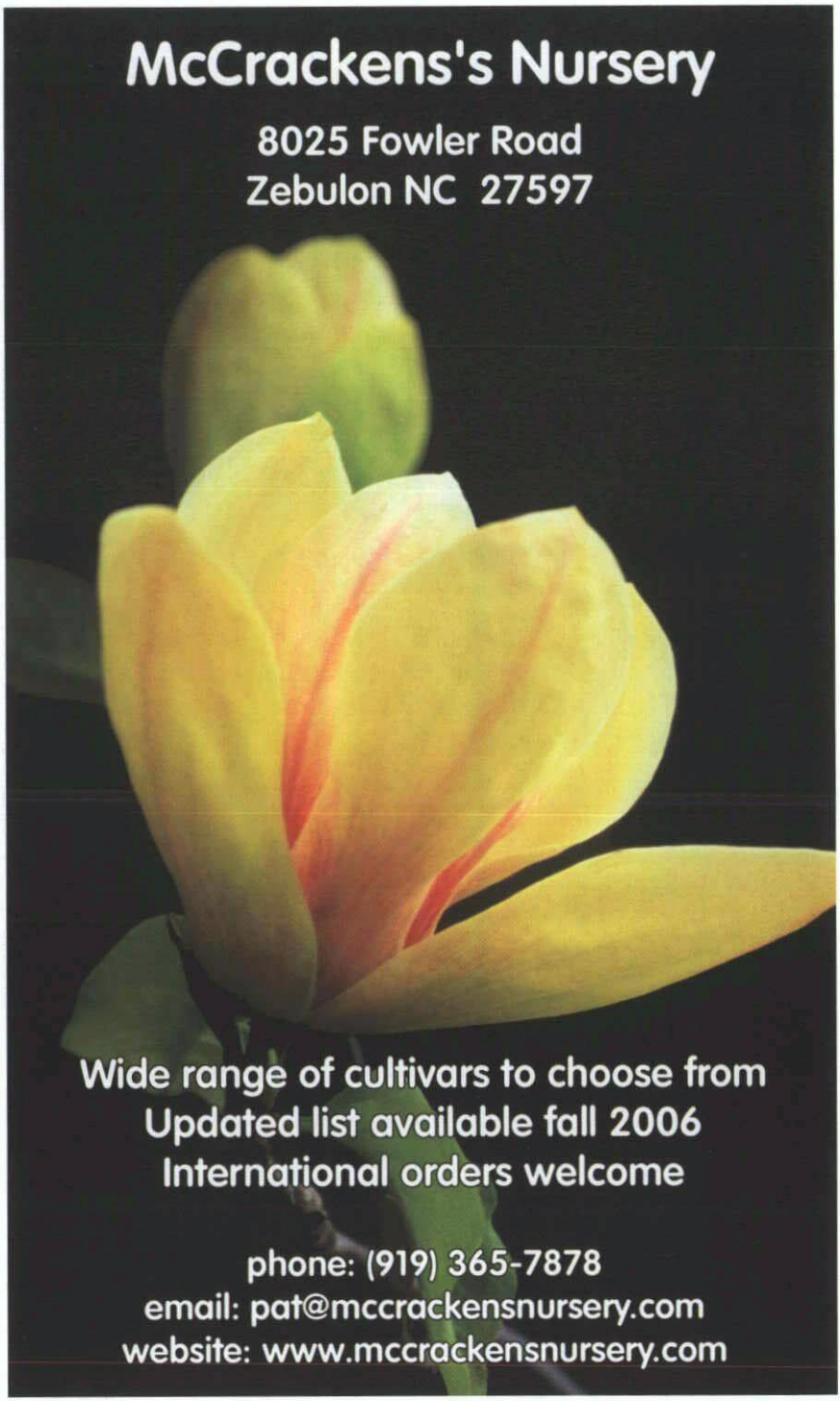
Obviously adding *Oyama* genes into the subgenus *Magnolia* mixing bowl offers much potential value.

Final Thoughts

The potential in subgenus Magnolia breeding and selection are clearly intriguing. The additional opportunities from some of the "new" semi-tropicals are icing on the cake.

Despite the individual achievements, this process always involves much cooperation—getting the plants and blooms to use as parents, sharing pollen, sharing seeds and seedlings, and above all planting out for evaluation. I am grateful to many MSI members in the past and present for their roles in plant improvement. It takes a group effort to create these special plants. In re-reading many past MSI journals, it becomes readily clear how much members have given to each other to move this process along. It's good to know that the tradition continues. As work, testing and evaluations of seedlings progresses, the magnolia world will see some truly useful improvements.

You can contact Bill Smith at 804.285.2072 (regrettably, he does not have e-mail).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