

## Twenty Years Watching Rootstocks®

### Vance Hooper

Vanplant Nursery, 6 Mahoetahi Road, RD 42, Waitara 4382

Email: vance@vhplants.com

### INTRODUCTION

Many things in gardening and the nursery industry are done by tradition, but many of these practices are also based on availability of raw materials or local conditions. The available choice and use of rootstocks for *Magnolia* grafting is no different. In this article I plan to discuss the extended observations originally developed in a paper I published in 1990 as well as current practices in *Magnolia* grafting. The results of course are based on our conditions, but by extrapolation in plants exported from New Zealand, it has international implications.

### REFINING THE ROOTSTOCK CHOICE

In 1987 I joined the New Developments Department at Duncan and Davies Nurseries in New Plymouth. At this time *Magnolia* taxa were undergoing a resurgence in popularity with the importation of new taxa as well as the locally produced hybrids. Many of these hybrids have a degree of *M. campbellii* type parentage, which means they have a tendency to outgrow the stem diameter of their rootstocks. Observing how the wide range of hybrids had different caliper growth rates due to their parentage, trials were undertaken to determine if it was possible to develop a set of recommended rootstocks to best suit the various hybrids. Duncan and Davies was at the time producing a wide range of *Magnolia* taxa from cuttings, and this meant there was an opportunity to trial several of these for rootstocks. The export market was a significant part of the overall production, so the preference that some customers have for the use of *M. kobus* as a rootstock had to be considered. To address this part of the equation we were able to trial *M. ×loebnerii* hybrids as a substitute, which worked well as most of the hardy hybrids had a similar caliper growth rate. An added advantage of using *M. 'Merrill'* was that it did not suffer from root disease as much as *M. kobus* seedlings tended to in our soils. At the other end of the scale the heavy wooded hybrids like *M. 'Mark Jury'* and *M. 'Caerhays Belle'* were trialed on *M. 'San Jose'*, which has many features that suggest it is in fact a *M. ×veitchii* type hybrid. When grafted with *M. ×veitchii* the union was seamless, and as a stock for *Magnolia* (syn. *Michelia*) *doltsopa* 'Silver Cloud' it proved ideal.

Being conscious of the variation in caliper lead to the accidental discovery of a wildcard clone in *M. 'Iolanthe'*. When 'Iolanthe' was budded on clonal rootstocks, some scions overgrew, and some did not. On close inspection it was found there were two clones being grown as 'Iolanthe'. The wildcard was traced back to the original stockplant, which had developed a strong secondary stem that was in fact rootstock. This imposter was multiplied by cutting collectors doing trials on 'Iolanthe', but who were unaware of the problem. The cutting results meant the imposter proliferated and the resulting plants were planted as stock plants. However, the positive side of this situation meant we had a heavy callipered clonal rootstock that was easy to produce. The plants that were sold as 'Iolanthe' raised a few questions, but 'Eleanor May' appears to take precedence as the name for this clone. The rootstock designa-

tion was *M.* 'Rootstock A', and the flowers and foliage habit suggest the parentages is *M.* 'Rustica' × *M.* 'Lanarth'.

The final recommendations that were made for clonal rootstocks were:

- *Magnolia* × *loebnerii* 'Merrill' for *M.* × *brooklynensis* and *M.* *acuminata* hybrids that were destined for cold climates.
- *Magnolia* × *soulangeana* 'Etienne Soulange-Bodin' for middle range hybrids.
- *Magnolia* 'San Jose' for lighter *M.* *campbellii* hybrids such as 'Charles Raffill' or 'Kew's Surprise'.
- *Magnolia* 'Rootstock A' for the heavier hybrids such as *M.* 'Mark Jury' and *M.* *doltsopa* 'Silver Cloud'.

For one reason or another *M.* 'Rootstock A' became the default rootstock for anything and everything. Although *M.* *stellata* types are cutting grown, *M.* 'Rootstock A' has a strong dwarfing effect on *M.* *stellata* 'Waterlily'.

To propagate *M.* × *wieseneri* and *M.* *obovata* (due to the unavailability of seed) a cutting-grown clone of *M.* *sieboldii* was recommended as a rootstock, since seedlings tend to be prone to soil diseases in a similar way to *M.* *kobus*.

While it was a relatively quick process to address the caliper variation, only time could reveal the other traits that would be modified or moderated by the use of clonal rootstocks.

### COMBINATIONS SUCCESSFUL AND OTHERWISE

In the 30 odd years I have been handling grafted *Magnolias*, I have only seen maybe 6 or 8 cases of outright physical incompatibility where the graft union failed. This is probably something like an incidence rate of 1 in 5,000 — so minor it is effectively non-existent. In any case, these have all been in the first year of growth in the nursery. For this to happen in garden trees would be extremely rare.

Often the difference in caliper between rootstock is viewed as incompatibility but these trees will often grow for many years and flourish with no problem as can be seen by the trees grafted by Felix Jury when originally planting his garden in the 1950s and 1960s. Felix would often graft an insurance tree as soon as he could to avoid the disappointment of losing a treasured plant such as *M.* 'Lanarth' which he successfully introduced to New Zealand after several attempts (Fig. 1). He often used *M.* *kobus* when it was available but sometimes he had to use *M.* × *soulangeana*, which has tended to produce more rootstock suckers than *M.* *kobus*. The accompanying photographs show some of these trees and the variable rootstock/scion growth rates. In the case of *M.* *sargentiana* var. *robusta*, the crown growth in these trees was as healthy as trees of a similar stature observed growing on their own roots in Cornish gardens (Figs. 2 and 3).

One of the heaviest caliper scion cultivars is *M.* *campbellii* ssp. *mollicomata* 'Bernie Hollard'. In my original 1990 IPPS article on rootstocks this clone had a scion stem thickness of 108% of the rootstock based on the first year's growth from a summer-budded plant. When budded onto *M.* × *soulangeana* seedlings it often appears to be twice as thick as the rootstock.

*Magnolia campbellii* subsp. *mollicomata* has been recorded as difficult in warm climates, and as being heat sensitive. This tendency has been observed with 'Bernie Hollard' plants on their own roots grown in the old Duncan and Davies layering beds. The symptoms were a gradual reduction in vigour and leaf size followed by dieback,



**Figure 1.** *Magnolia campbellii* subsp. *mollicomata* 'Lanarth' grafted on *M. kobus* at 40 years plus.



**Figure 2.** *Magnolia sargentiana* var. *robusta* grafted onto *M. kobus* by Felix Jury. Tree is 40 years plus old, and the rootstock is about 60 cm (2 ft) thick. The tree canopy appears healthy despite the caliper difference.



**Figure 3.** Same tree showing old pipe used to support the tree at some point in the past.



**Figure 4.** A 2-year plant of *Magnolia campbellii* subsp. *mollicomata* 'Bernie Hollard' on *M.* 'Rootstock A'.



**Figure 5.** A 6-year-old plant of *Magnolia doltsopa* 'Silver Cloud' grafted onto *M. x soulangeana* seedling showing large difference in caliper size.

and a periodic revival of the plant with water shoots from the base. Similar symptoms can be observed on plants grafted onto *M. x soulangeana* seedlings. With this in mind I specifically budded several plants of 'Bernie Hollard' onto the *M.* 'Rootstock A' clonal rootstock to get a reliable plant for the New Zealand Raised Magnolia Collection we are establishing. The plant was planted out last year and has made the best growth I have observed on budded plants of 'Bernie Hollard' (Fig. 4).

One of the fastest caliper-growing scions we graft regularly is *M. doltsopa* 'Silver Cloud', and years ago I grafted it onto a *M. kobus* to see what would happen. After 3 years the scion was twice the diameter of the rootstock so I drilled a wire directly through the stem and attached it to a post for support. Unfortunately I moved and was unable to follow the progress. *Magnolia* 'Silver Cloud' is often budded onto *M. x soulangeana* seedlings and forms, but without such a marked difference of the scion / rootstock calipers. This has been done for at least 20 years with no record of problems. I have been able to keep track of one of the original plants of 'Silver Cloud' budded onto *M. x soulangeana* and recently was granted permission to dig around the tree to prove that the scion had in fact rooted down above the graft union. For comparison we have a 6-year-old plant budded on *M. x soulangeana* in the garden and it is illustrated with the same pen for comparison. I have not seen magnolias root above the graft very often, but once a tree is planted and growing happily, you don't give it a second thought (Figs. 5 and 6).

Since 'Rootstock A' stock was selected as a stock for heavier wooded *M. campbellii* types, I grafted two seedling selections of *M. campbellii* from the "Cook Block" at Pukeiti Gardens in 1999. The first flowered in 2007 at 8 years from grafting, the second 2 years later. This is a relative reflection of age at first flowering for the original seedlings (Fig. 7).



**Figure 6.** A 20-year-old plant of *Magnolia doltsopa* 'Silver Cloud' grafted on *M. x soulangeana* 'Etienne Soulange-Bodin' that has developed strong roots above the graft union.

As illustrated on the "Cook Block" selection the union is seamless and the time frames to flowering suggest that the selected *M.* 'Rootstock A' is practically the same as having the clone on its own roots, but with not quite the same juvenile phase as a seedling.

Using 'Rootstock A' as a rootstock for the likes of *M.* 'Early Rose' and *M.* 'Caerhays Belle' resulted in overall larger plants and delayed onset of flowering compared to grafting onto *M. x soulangeana* 'Rustica Rubra' seedlings, which were smaller plants over the same time frame.

With the wide range of rootstock experiments I have done over the years, one of the most fascinating and practical combinations are the ability to put evergreen species on deciduous rootstocks. Much of the practical experimentation with evergreen species has been done with *M. doltsopa* (Fig. 8). Using *M. doltsopa* as a rootstock, it is much more difficult to handle when lifting field-grown plants into containers for sale. The biggest lesson from the experiments using deciduous rootstocks was that the evergreen / deciduous combination is that it really only works well by grafting evergreen scions onto deciduous rootstock. There have been reports from Australia where *M. doltsopa* was used as a rootstock for *M.* 'Vulcan', with very unsatisfactory results. In my experience, deciduous scions on evergreen rootstocks appeared to deteriorate over a couple of years and the roots literally starved to death because there was no foliage to feed the roots in winter.

*Magnolia maudiae* is performing well on *M.* 'Rustica' seedlings and the plants are setting flowers well in the first year from budding (Fig. 8). These rootstocks also respond well with a fibrous rootball when root pruned for lifting and container-



Figure 7. A 10-year-old plant of *Magnolia campbellii* on *M.* 'Rootstock A'.



Figure 8. Graft union on tree at Tikitere.



**Figure 9.** Three plants of *Magnolia* 'Freeman' budded onto *Magnolia* 'Rustica' seedlings. The variations show it is not reliable.

izing for sale. There are limits as *Magnolia* 'Freeman' illustrates an inconsistent growth rate, whereas *M. virginiana* 'Autumn Queen' grows well (Fig. 9).

Up to this point the discussion has covered a range of combinations, but these observations have been based on limited numbers of each combination. With the release in New Zealand of *Magnolia* 'Genie' came the opportunity to observe large numbers of the same combinations. For the first 2 years 'Genie' was budded onto *M. kobus* and *M. ×soulangeana* seedlings. The results have to be averaged to allow for seedling variation in the rootstocks, but overall there are definite trends in each species used as seedling rootstock crops. The plants budded on *M. kobus* grew stronger than those on *M. ×soulangeana* and appeared to have an increased degree of juvenility. They began to set summer flowers about a month later or the equivalent of an average of 30 cm (12 in.), which allowed them to grow taller. The lateral branches also set fewer axillary flower buds, which made the budwood from the plants budded on *M. kobus* more desirable. To look at the overall performance as a group, the plants budded on *M. kobus* appeared to be intermediate between *M. 'Genie'* on their own roots, and 'Genie' on *M. ×soulangeana*.

Our main production in the nursery uses *M. 'Rustica'* seedlings as rootstock since this is a fairly even and dependable strain and seed tends to set itself. I have used *M. 'Lennei Alba'* seedlings that set reasonably well, but this strain tends to have a shorter growing season and the seedlings are slower to develop. Once grafted however, the scions tend toward their own normal growing habits, but in a moderated way associated with *M. 'Rustica'* rootstocks.



**Figure 10.** *M. campbellii* 'Mount Pirongia' graft union onto *M. kobus* rootstock.

The variability of individual seedling rootstocks within a group still needs to be kept in mind. A white-flowered clone of *M. campbellii* called 'Mount Pirongia' also illustrates the influence of *M. 'Rustica Rubra'* rootstock compared to *M. kobus* (Fig. 10). The original plant on *M. kobus* shows no sign of flowering at 5 or 6 years whereas a 2-year-old budded on *M. ×soulangeana* has set four flower buds the year after being shifted. The importance of soil fertility and adequate direct sunlight must not be overlooked either.

## CONCLUSIONS

It is not often that you have the chance to follow a project through for 20 odd years. I have been able to keep track of trees planted in previous gardens and other combinations by keeping some trees in the collection by moving them around the country. Others I have re-grafted to build on earlier experience.

The tendency for *M. 'Rustica'* seedlings to be somewhat chlorotic in spring does not appear to come through in the scion taxa. The dwarfing effect that encourages more flowering is useful for smaller sized modern gardens. Another observation is that free-flowering seedling strains can tend to encourage scion taxa to flower sooner.

Although watching these rootstocks over this time has not been a truly scientific trial, time and again with individual trees and crops of several thousand trees you see the same or similar growth trends.

*Magnolia* 'Eleanor May' or 'Rootstock A' has proven itself as a useful option as a rootstock for the large species like *M. campbellii* and similar forms, as well as *M. doltsopa*.

I am sure there is much more to learn such as how soil fertility can affect and enhance these combinations. In the meantime it is interesting to build on the trends observed and enjoy the heavier flowering displayed by grafted *Magnolia*.

**Acknowledgement.** I would like to thank Mark Jury for his assistance with the preparation of this paper.

## LITERATURE CITED

Hooper, V. 1990. Selecting and using magnolia clonal understocks. Comb. Proc. Intl. Plant Prop. Soc. 40:343–346.