SELECTING AND USING MAGNOLIA CLONAL UNDERSTOCKS

VANCE HOOPER

P.O. Box 340, New Plymouth

INTRODUCTION

In ornamental horticulture clonal understocks have been used more for convenience than for standardising growth of plants produced, but clonal understocks have long been an integral part of commercial orchard operations. Fruit yield and tree performance can be controlled by understock selection, i.e. apple cultivars can have dwarf, semi-dwarf, or vigorous understocks. It is often more convenient to grow understocks from seed than by vegetative methods. This report discusses the selection of clonal understocks for *Magnolia* spp., but the principles can be applied to other genera.

WHY GRAFT MAGNOLIAS?

Plants of *Magnolia* spp. and hybrids are usually grafted. Grafting is a more economic method of production than either taking cuttings, when there may be low takes, or the high cost method of layering. Practical experience with grafted magnolia plants has shown some degree of dwarfing as well as increased flowering. Treseder (1) considered that grafting tended to reduce the vigour of a magnolia, irrespective of the understock, this being borne out by the fact that seed-raised trees of *M. sargentiana* var. *robusta* at Caerhays grew more vigorously than their grafted parents. Grafted plants of *Magnolia campbellii* subsp. *mollicomata* 'Lanarth' usually grew with greatly reduced vigour and began to flower before becoming excessively tall. This reduced size of grafted plants means that they can often be sold in flower. Dwarfing of magnolias, especially *Magnolia campbellii* cultivars, also makes them more suited to smaller, modern suburban gardens.

GRAFTING AND BUDDING METHODS FOR MAGNOLIAS

Summer Budding. This is done using chip budding and can be used with field-grown understocks or understocks grown in containers. The key is using well-ripened budwood and, with container budding, avoiding wetting of the budded stems.

Winter or Bench Grafting. This is done by using conventional whip and tongue grafts, with understocks appropriate to the scion cultivar. Root grafts can also be used if sections of root of similar caliper to the scions are available that also have healthy fibrous feeding roots Root grafting can be of assistance with preliminary

evaluations of newly selected seedlings for clonal understock production, and has the added advantage that no suckers are produced.

REASONS FOR CLONAL UNDERSTOCKS

When using seedlings as understocks each plant produced is effectively a different genetic scion/stock combination. The easiest difference to detect is the relative rate of caliper increase and degree of bulging at the graft union. This is related to the parentage of the understock or to the scion cultivar being examined. Magnolias with the fastest caliper increase come from *M. campbellii* subsp. *mollicomata* and some of the slowest are found among seedlings of the *M.* × *soulangiana* grex.

Variable caliper growth rate in seedlings leading to unsightly scion/stock unions first prompted the investigation of clonal understocks. In addition, some scion/stock combinations tended to make the scion cultivar lose terminal dominance and produce vigorous water shoots from just above the graft union. Long term observation also showed that variation in seedling understocks meant variation in relative dwarfing effects, with occasional combinations actually leading to increased scion vigour, and varying susceptibility to root disease, especially among seedlings of *Magnolia kobus* and *Magnolia* 'Charles Raffill'.

SELECTING CLONAL UNDERSTOCKS

Clonal understocks must be readily produced from cuttings. Three cultivars commonly grown that have been evaluated as clonal understocks are *Magnolia* × *loebneri* 'Merrill', *Magnolia* × *soulangiana* [clonal form] and *Magnolia* × *soulangiana* 'San Jose'. Each has characteristics worthy of a clonal understock to fit a range of scion cultivars. These characteristics are as follows:

Magnolia × *loebneri* 'Merrill': A hybrid with *M.stellata* and *M.kobus* parentage so it is very hardy [to Zone 5, USDA Hardiness Rating] and a moderately vigorous form, with a caliper growth rate comparable to the hardy *M.* × *brooklynensis* types and similar hybrids with *M. acuminata* parentage. This cultivar also shows a resistance to root disease that affects a high percentage of *M.kobus* seedlings.

Magnolia × *soulangiana* [clonal]: A medium to strong grower that covers the range of caliper growth rates from *M.denudata* through various hybrids and species such as *M.cylindrica*, and even *M. sprengeri* 'Diva' forms. However, *M. soulangiana* [clonal] is not vigorous enough for most cultivars with any *M. campbellii* parentage.

Magnolia × *soulangiana* 'San Jose': This bears a striking resemblance to *M.* × *veitchii* and some of its hybrids. When used as an understock *M.* × *soulangiana* 'San Jose' displays vigour corresponding to that of *M.* × *veitchii* [Table 1], making it a good understock for heavily-wooded species such as *M. campbellii* and the hybrids *M.* 'Caerhays Belle' and *M.* 'Charles Raffill'.

When using the above clonal cultivars it became apparent that at least one more clonal selection needed to be made to approach the caliper requirements of *M. campbellii* subsp. *mollicomata* forms. To do this 10-year-old grafted plants of *M.* 'Mark Jury' were examined closely. Two selections were made by cutting the trees to the ground and allowing the understock to regenerate. One [U/S A] showed an even caliper between understock and scion and the other [U/S B] showed a fairly distinct taper from a thicker understock to a thinner scion. The understocks were first reproduced by budding to produce a large volume of material for softwood cuttings. Eight-month-old rooted cuttings were field-planted through polythene mulch and budded as stocks 2 years old from the cutting. Budding allows for quick caliper comparisons since the scion grows vigorously, accentuating any differences in caliper growth rates, which are then visible by the end of the first growing season. When the same combinations are produced by bench grafting it may take 3 years for similar differences to appear.

A sample of "scion ratings" from over 30 studied combinations is presented (Table 1). The figures in the columns represent the average scion caliper for the first 15cm above the graft union expressed as a percentage of the understock caliper, so that a "scion rating" of 110% would be equivalent to a tree caliper of 10cm below and 11cm above the graft union. The final figure in the right hand column is the average of the measurements taken for each combination.

It is apparent that some variation can still occur within a group of identical scion/stock combinations. This is most likely due to the nutritional status of each individual in the group. However, the advantage of using clonal understocks versus seedlings is demonstrated. It must be remembered that each scion/stock combination is different, so each scion cultivar must be tested on a range of stocks to find the one most suitable.

This report has shown the advantage of using clonal understocks to accommodate caliper differences This is only one of the advantages that can occur, and it is anticipated that further benefits, such as controlled dwarfing, will be achieved by using clonal understocks for grafting magnolias.

Table 1. Scion ratings for selected *Magnolia* understock/scion combinations

Understock and scion cultivar combination	Age and graft type	Scion ratings					Mean
***M. kobus* seedling U/S**							
M campbellii 'Lanarth'	4yr bud	155	162	139			152
M campbellii subsp *mollicomata*	4yr bud	105	106	100	112		105
Magnolia 'Mark Jury'	4yr bud	114	113	126	104		112
***Magnolia* × *loebneri* 'Merrill' U/S**							
Magnolia 'Galaxy'	2yr grafts	107	106	103	90	100	101
M × *brooklynensis* 'Woodsman'	1yr grafts	86	94	83	90	77	86
Michelia doltsopa	2yr grafts	125	146				135
***Magnolia* × *soulangiana* [clonal] U/S**							
M camp subsp *mollicomata*	3yr grafts	132	110	93	117	92	108
Magnolia denudata	1yr buds	104	109	103	105	106	105
Magnolia 'Galaxy'	3yr grafts	108	111	115	113	112	111
M × *brooklynensis* 'Woodsman'	3yr grafts	97	104	97	97	95	98
Michelia doltsopa	3yr grafts	121	118				119
Magnolia × understock 'B'	2yr grafts	107	141	124			124
***Magnolia* × *soulangiana* 'San Jose' U/S**							
M campbellii 'Lanarth'	7yr buds	109	116	117	100		110
Magnolia denudata	7yr buds	100	96	100			98
Magnolia × *veitchii*	7yr buds	100	103	100	100		100
***Magnolia* × understock 'A'**							
M campbellii 'Lanarth'	1yr buds	105	104	111	107	105	106
M campbellii subsp *mollicomata*	1yr buds	110	92	114	111	102	105
Magnolia 'Mark Jury'	1yr buds	91	88	93	97		92
Michelia doltsopa	1yr buds	107	113	95	99	109	104
***Magnolia* × understock 'B'**							
M campbellii subsp *mollicomata*	1yr buds	105	101				103

LITERATURE CITED

1 Treseder, N G 1978 *Magnolias* Faber and Faber, London