

using the mature buds was most successful. The regular T-bud works best with the physical arrangement of our benches. The plants are in solid blocks and with this technique we do not have to pick them up to bud them. We are still trying to improve; 90% take may not be good enough if that means 1,000 out of 10,000 fail for a nurseryman.

Chip budding and inverted-T budding have never been used on magnolia at the Foundation. Chip budding was used on *Ginkgo biloba* at first because of the extreme thickness of the bark at the point where the buds were inserted. Later it was changed to T-budding because of the extra work involved in painting and waxing the budded portion of the plant. The thickness of the bark was reduced by using younger rootstock.

MAGNOLIA PROPAGATION

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For many years I have propagated magnolias, both evergreen and deciduous, from cuttings, using coarse sand and perlite, or sand and pumice, half and half, for the rooting medium, treating with Hormodin #3 (0.8% IBA in talc), and using bottom heat, 75° to 78° F. The technique that seems to work best is to wound one side before applying the hormone. With such high bottom heat, watering is critical.

The deciduous cultivars are propagated using summer cuttings under intermittent mist, on 3 to 5 sec/6 min. If wood is available, we use a 4- to 6- inch heel cutting. Mid-July or early August seem to give the best results. You cannot set a definite date by the calendar. The wood is ready when the terminal snaps easily. We take the tip out of the cutting, which will generally leave a 2- to 3- inch cutting of the magnolias such as *M. soulangiana*, *M. stellata*, and most of the Kosar hybrids. *M. soulangiana* 'Rustica Rubra' cuttings will be much longer. I like to take the cuttings off field stock in vigorous growth. We do have some stock plants for cutting wood.

The deciduous magnolia cuttings are stuck in flats when rooted, and are wintered in a cool house with heat, if necessary. Just as the new foliage breaks in the spring, they are potted and set out in a heated house. We never prune any of the roots when potting. Sometimes a few of the *M.s.* 'Rustica Rubra' are potted into 1- gallon short cans.

In most years they are planted in the field in early August, but if the weather is too hot, we line the potted magnolias out early next spring.

We grow evergreen *M. grandiflora* 'Victoria'. It is hardier than most and easy to root. (I think Joe McDaniel has one alive at Urbana, Illinois.) *M. grandiflora* cuttings are stuck in early November. The most economical size cutting is from 4 to 8 in long. We have rooted cuttings 18 in long, but the losses are greater.

Two-year field-grown *M. grandiflora* plants send out many shoots along the stem below the heavy branches. We use a sharp knife to cut these shoots off, leaving a heel. The cuttings are taken to the propagating house where some of the leaves are removed, the heel is trimmed and a 1- to 1¼- in wound is made on one side, depending upon the size of the cutting. We then dip in Hormodin #3 and stick the cuttings in a deep flat using sand and perlite or sand and pumice, 50% of each.

We hand water to keep the medium moist. There is a lot of foliage as we do not trim the top leaves. Again, we use high bottom heat. In 90 to 120 days the cuttings are heavily rooted. When we pot, we do not trim off any of the roots. If the roots are too heavy for a 1- gallon container, we put the cuttings in a 2- gallon container. These potted magnolias grow one year before lining out in the nursery. In the spring they are planted in the nursery with 2- ft spacing in rows of 4 ft apart.

Ordinarily, we get 90% rooting with the cuttings having a good root system. However, two years ago we did not get this percentage because our timing was off.

Last year the *M. stellatas* let us down. We only had a 50% stand. A visiting nurseryman from Europe who was touring the Northwest, saw our problem and made this suggestion: "In Europe we use a 2-bud cutting for the smaller-leaved cultivars of deciduous magnolias" By the time he was out of the driveway, I was in the nursery taking *M. stellata* cuttings. The crew filled flats with coarse pumice and sand, and before quitting time we filled all the flats with 2-bud cuttings of *M. stellata*, plus several flats of *M. 'Kosar's Betty'* and *M. 'Susan'*. We had over 90% take.

We did not line out any deciduous magnolia this summer. It was too hot. However, the 2-bud cuttings grew vigorously and were hard to distinguish from the normal size cuttings.