

Budding from the Ground Up

by Harry Heineman

It may seem presumptuous to write about bud-grafting of magnolias, since I am an amateur with more failures than successes. But I decided to go ahead anyway, in hopes of helping others who want to try budding to avoid some of my errors. I am essentially self-taught, although I did see Joe McDaniel do a budding demonstration at the national meeting in D.C. in 1977. I have not been able to find much down-to-earth help in the literature.

I shall try to keep this simple and as clear and specific as possible. Again, these are notes of a layman, gleaned from many trials and limited success. The experts and professionals often leave out details, important to amateurs like me, feeling that these are so obvious they don't need mentioning.

The reason for budding magnolias is to obtain a genetically identical duplicate of a desirable or rare magnolia, which of course is not possible starting with seeds of that plant. This is true because the plant you want to reproduce is often a hybrid. If it's not a hybrid, the open-pollinated seed from it may be, especially if the tree is growing close to other magnolias of different species. Even if the seed results from self-pollination, magnolia offspring are just like people in differing from their parents and from each other. Commercially, most magnolias are propagated from cuttings, but it is often difficult for the amateur to root magnolia cuttings, even assuming he can obtain fresh cuttings, with leaves intact, of the current season's growth.

The cuttings must often be sent through the mails, over long distances; it's much easier to ship budwood in good condition. Then too, few amateurs own an intermittent-mist system, and this lack considerably reduces one's chances of success in rooting cuttings. It might be mentioned, parenthetically, that budding high onto mature plants can dramatically reduce the time it takes to first flowering of the desired magnolia.

So let us assume you have a source of budwood for the magnolia you want to propagate. What will you use for rootstock? Unfortunately the answer is often that you should have started 2 or 3 years before, by planting seed of your rootstock. You can, of course, always try grafting onto one of the upper branches of an established, mature plant, choosing a branch that grew during the last 2 or 3 years, and of a "convenient size," by which I mean that the twig or branch you graft onto should not be too much different in size from the bud branch: this gives a better "fit." If you graft high in this way onto a mature magnolia, you end up with a single branch of the desirable clone, unless you cut away all the rest of the tree after the bud takes.

Understocks commonly used, and grown from seed, are *M. acuminata*, *M. kobus*, and *M. × soulangiana*, because seed of these is generally available, and they are among the hardiest and most vigorous kinds. However, you probably don't want to graft a slow-growing magnolia or one whose mature height is modest onto a fast-growing rootstock that will eventually make a big tree, or vice versa. Naturally, you also want to

choose a rootstock that is at least as winter-hardy as the budwood, unless you live in an area where winter hardiness is not a consideration, such as California or the deep south.

I think, taking all into consideration, it is best, if you can, to choose a rootstock of the same species or hybridization as the grafting material that's going on it, or at least closely related. More studies need to be done on compatibility of budwood with various rootstocks, although Joe McDaniel didn't seem to feel this was critical in most cases. An exception seems to be *M. macrophylla*, which takes better on *macrophylla* rootstock, and there may be others for which the same is true. With all this in mind, a person who expects to do a lot of grafting of magnolias should try to have on hand 2- and 3-year-old seedlings of *acuminata*, *kobus*, * *soulangiana*, and possibly others (depending on your grafting "program"), and smaller plants of these to be used the next year or the year after.

Now comes the trickiest part of all, in my experience: choosing the best time of year for your budding attempts. I shall assume, for purposes of discussion, that your rootstock is growing in the ground, or if in pots, that you do not have a greenhouse or other facilities for forcing it into premature growth.

The principle to be followed in deciding when to bud is easy to state but not so easy to apply: the rootstock should be in vigorous growth and the budwood dormant. You also want to choose a time when night temperatures do not drop too low: any temperature below 50° is probably too low, because the bonding of the cambium layers is slowed at lower temperatures. In effect, if you do your budding outside, you should do it in late spring or late summer. The exact time, of course, will depend on your climate: the advent of spring and of chilly fall nights. If the budding is carried out in late spring,

late enough for the rootstock to be in active growth, then the budwood will have started into growth also, unless it is cut in late winter and held at cool temperatures until the proper time.

Budwood can be kept for several months in tightly-closed plastic bags (I give a squirt or two from the mister before sealing the bags) and held in the refrigerator above freezing temperatures. Since most refrigerators are kept at about 40° F. for food storage, this is the lowest convenient temperature at which you can store your budwood (remembering that this entire article is directed to amateurs, who don't possess cold chests for keeping plant material at 33°).

Because fresh budwood is obviously more likely to take than budwood that has been setting in a refrigerator for 2-3 months, I have had much higher success rates when I did my budding in August or early September. The best time is when the budwood formed the same growing season is mature enough not to be too green and soft, and the time is early enough that the night temperatures for the following two weeks will not be dropping below 50° F. It is clear that the choice of time is something of a gamble, and that you can improve your chances of getting at least one or two takes (which is all you probably want) if you can do your budding at 2 or 3 different times, spaced perhaps a week apart.

How do you choose your budwood? I like to take large, vigorous sticks, with large, fat axial buds spaced at least 2 inches apart, from the present season's growth (of course, it will be from the previous season if taken in early spring). It is better if you can find sticks that have started to turn from green to brown, that is, started to harden off, and aren't too skinny: 3/8 inch diameter or larger are best. The wood onto which you are grafting should not be too much larger, so you can get a good fit, and it should have formed the previous year or the year

before that. In other words, it shouldn't be older wood.

Now, let's assume you've got your budwood and rootstock, and have chosen your time carefully. How do you actually go about doing the budding itself? You will need polyethylene sandwich bags, rubber bands or strips (I use $5 \times 3/16$ inch rubber budding strips, obtainable from Mellinger's, North Lima, Ohio, 44452), and a sharp knife. I use an X-Acto No. 1 - ST knife, so that when it needs sharpening I can just change to a fresh blade.

The leaves of your bud-sticks should be cut off, leaving a short length of petiole with which to hold the chip. Place the bud-stick so it lies flat (if it won't lie flat try turning it over) on a cutting board or a left-over shingle, with the bud pointing horizontally. Then start your crescent-shaped cut about 1 inch below the bud you're preparing. If you use a kind of see-saw motion, letting the point of the knife rest on the board as you gradually work your way up behind the bud, you gain better control of the whole cutting process. The important thing here is not to cut the scion too shallow, or too deep either: one is as fatal as the other to success.

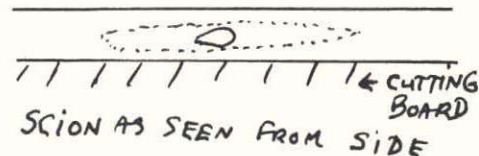
The slice should be more or less uniform in thickness and should barely penetrate the cambium layer. The cambium lies between the light green layer which is immediately under the outermost bark, and the whitish wood. If you are still unsure, the cambium is also the place where the bark separates from the wood when you peel the bark off a green stick. To reiterate: you must cut down into the wood a bit, and not just under the layer of outer bark. But you must avoid cutting into the pithy center. Your knife must sometimes change direction as you cut your chip, particularly behind the bud itself where the stick often bends slightly. Finish your cut about $3/4$ to 1 inch above the bud. Starting the cut below the bud in this way, rather than above, assures that you have an inch of budshield below the bud to facilitate the growing together of the cambium layers, in case your knife doesn't do what you want it to after it has passed behind the bud. I prefer to cut the scionwood first, since this cut is more critical and since the budwood is in shorter supply than the possible locations on the understock.

Now try to cut a slice from the understock matching the scion you have just cut as closely as possible, and

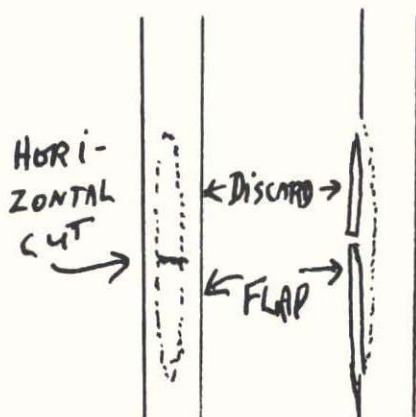
SCION CUT



LOOKING DOWN AT SCION ON CUTTING BOARD



ROOTSTOCK CUT



remembering to penetrate the cambium layer. However, the stock cut is always started at the top and is made downward. This is because you want to leave a flap at the bottom, so try not to sever the chip from the understock. This flap is left to help hold the scion in place until it is tied securely with a budding strip.

Now make a horizontal cut about halfway between top and bottom of this chip right down to the vertical cut, so that the top half is completely severed and discarded. The bottom half, still attached, forms a pocket or flap which should extend just up to the bud or slightly below it, when the budwood is inserted. After insertion, the cambium layers on the scion and understock are matched as closely as possible. (You may find, at this point, that you have to start all over again, making a fresh cut in the understock to get a better fit.

They are then held tightly together by one or two budding strips wound securely around, with the ends of the strips tucked behind the preceding coil and held by its tension. No grafting wax is used. Now wrap a polyethylene sandwich bag entirely around the scion and branch to which it is attached, and secure it tightly above and below the graft by two more budding strips wrapped tightly around the branch. This prevents the drying of the bud while the cambium layers are growing together, which should take from 10 to 14 days, no more.

Joe McDaniel used to suggest that the graft be kept covered for 3 weeks, but I find this unnecessarily long, and it often leads to rotting of the bud. The graft and its polyethylene cover is protected from direct sun, which would cause it to heat up excessively, by a shield made of 1 or 2 layers of newspaper which I wrap around the

budded branch and secure with staples. It must not enclose the graft too closely, because air circulation should be encouraged. The polyethylene and newspaper shield are removed after 2 weeks, at the most. If several buds of the same clone are grafted onto the same rootstock, you might want to uncover them at intervals of 2 days, uncovering the first after, say, 10 days, the second after 12 days, etc.

If you bud anytime before mid-June, then you should cut off the top of the branch a few inches above the graft after you are sure it has taken, to encourage the scion to activate and grow that same season. If you bud in late summer, do not trim the branch above the graft until the following spring, just before the magnolia buds are starting to break open. By the way, when you remove the newspaper and polyethylene covers, do not disturb the budding strips holding the scion securely to the stock. They will fall off on their own at the proper time, as they rot.

Well, there it is, I'll be satisfied if this summary of my experience in budding magnolias has taken some of the mystery out of the procedure and thereby encouraged more of you to try it for yourselves: to experiment with this way of reproducing superior clones. And even though you may not be successful, don't give up after one or two tries. Try, try again: you are improving your technique and gaining experience with every trial. The professionals often fail too. Changing the understock or the time when you do your budding a few weeks may make all the difference in your success rate. So experiment! And please keep records, so you can share your successes with the rest of us at some future time. We can all contribute to the propagation and distribution of our favorite tree.