Growing magnolia seedlings in containers

By CHARLES E. TUBESING

To my mind, the Magnolia Society Seed Counter is the most valuable, unique benefit of membership in the society. To be sure, other plant societies offer seed distributions or exchanges, which also give their members access to seeds of species which are difficult to locate, unavailable, or expensive at nurseries, as well as seeds from artificial crosses or named hybrids for those who like to take a chance. However, I know of no other plant society in which the seed chairman takes such pains to protect the viability of the seeds and to treat them to overcome their inherent dormancy, so that they arrive ready to germinate. Several articles have been written in *MAGNOLIA* and its predecessor, *Newsletter of the American Magnolia Society,* which describe how to override seed dormancy in magnolias (Savage, 1973; Seitner, 1980), and I refer you to them for details. For the purposes of this article, let us assume that you have seeds ready to sow. What I wish to describe are methods and materials for sowing and growing magnolias in containers.

Magnolia seedlings are robust and have coarse, sparse root systems. Because of this, they benefit from being sown in deeper containers than are commonly used for seeds of vegetables or bedding plants. I like to use a #1 plastic nursery pot, which is six inches across by seven inches deep. Any container with similar dimensions will do, such as a fruit juice can, coffee can or #10 food can. Just be sure to make four holes in the bottom and in the side with a can piercer for good drainage. For a sowing medium, I like to use a mixture of equal parts by volume of perlite and sphagnum peat moss.

Because peat moss often contains one or more types of fungi capable of causing root and/or stem rots, which can be fatal to young seedlings, the mixture is pasteurized by moistening it and then heating it to 140°F (60°C) for 30 minutes. Once the mix cools, it may be used immediately, or stored for later use. Various devices may be used to pasteurize small amounts of the medium, including conventional or microwave ovens, or barbecue grills. If this seems to be too much trouble, a good alternative sowing medium is horticultural vermiculite, which is sterile to begin with. You need only be careful not to squeeze or compress the vermiculite when working with it, or it will collapse and waterlog.

The sowing procedure is straightforward. First, fill the container to within one-half inch of the top with the medium, then water until there is some drainage from the pot. If the medium has settled, top off the container with more medium, to the half inch mark. Sow the seeds thinly, about one inch (2.5 cm) apart on the surface of the medium. Cover the seeds with additional medium to the top of the pot, then water again until drainage occurs. Cover the pot with plastic wrap,

set in a warm place (minimum 70°F, 21°C), and you won't need to water it again until after germination. This may take as long as four to five weeks, so don't be prematurely discouraged.

When the seedlings begin to emerge, remove the plastic cover and move the seedlings to a south-facing window or sunny porch. If you have a fluorescent light set-up for starting vegetables or growing house plants, the pot of seedlings can be placed under the lights, which should be lowered until they almost touch the seedlings. The lights should be left on at least 16 hours per day: 24 hours will do no harm.

As soon as the cotyledons (seed leaves) have emerged from the seed coats, the seedlings can be transplanted into individual containers. Here, again, I favor deeper containers for the following reasons. First, for a given medium, a deeper pot is always better drained (If you would dispute this, take a sponge and saturate it with water. Hold the sponge so that it lies flat on your palm and allow the excess water to drain off. Now rotate the sponge so that its longest dimension is vertical, and lo, additional water drains away!).

Second, roots of magnolias (and of many plants) tend to grow rapidly downward in a container until they contact the bottom, at which point they circle uselessly. When repotting, it is better to cut off these circling roots rather than try to unwind them or simply leave them, which almost certainly will doom the plant to eventual self-strangulation or windthrow because of inadequate anchorage. If the magnolia is planted in a two to four-inch deep pot, however, this will entail removal of a large portion of the root system, which does not promote vigorous growth or even survival. Obviously, transplanting a magnolia initially into a deeper container will result in a larger portion of the root system remaining undistorted and able to expand normally into a larger container at repotting.

How deep a container am I talking about? Six inches is a minimum depth, and ten inches is a practical maximum. As for width, three to six inches across the top works well for an individual seedling. There is no end to the types of food and drink containers than be recycled for use as seedling pots which fit these dimensions. Half-gallon milk cartons, plastic cups from fast food restaurants, and fruit juice cans are all suitable. My personal favorite is an oversize styrofoam cup, 16 ounces or more in volume. Plants grow exceedingly well in styrofoam containers, a result, I believe, of the insulation provided by the styrofoam, which minimizes fluctuations in root zone temperature.

Several large holes should be made in the bottom of the transplant container. A large nailhead heated with a propane torch can be used to melt holes in plastic containers, but do this in a well-ventilated area. For those who are obsessed with developing "the perfect root system", containers can be modified in the following way to provide "air pruning" of roots. First, construct a flat (wooden nursery tray) with the bottom made of quarter-inch galvanized hardware cloth. Then cut the entire bottoms out of the containers. Transplant your seedlings into the bottomless pots, compressing the medium only enough to keep it from falling out the bottom.

After potting, place the containers in the screen-bottomed flat, and place the flat so that it rests an inch above the surface it is set upon. Two inch-thick lengths of wood nailed to the bottom of the flat will serve the purpose. Now, when the seedlings send their roots down they meet no barrier to start them circling but extend

through the mesh into the air. Upon contacting the air, the root tips dry out and cease growth. This results in the branching of new root tips within the pot, which grow out until they contact the air and are "pruned". At time of transplanting, there are no circling roots to cut, but there is a more densely branched root system and a multitude of root tips just ready to take off.

On the subject of growing medium or potting soil, the physical structure of the medium is at least as important as the chemical composition or nutrients supplied. A balance must be achieved between moisture-holding capacity and porosity/aeration. Roots consume oxygen during growth, and if oxygen is excluded from the root zone through waterlogging, root growth, as well as water uptake, ceases. The higher the porosity of a medium, the better the plants will grow, provided sufficient water and nutrients are supplied. This is the principle upon which hydroponics is based.

A medium which I have used that is sufficiently porous to promote vigorous growth of magnolias is made up of equal volumes of perlite and Canadian sphagnum moss, with one tablespoon of pulverized dolomitic limestone added per gallon of mix. Major nutrients are supplied by one of the balanced, water-soluble fertilizers (Miracle-Gro, Peters, Rapid-Gro, Schultz's, etc.). Some fertilizers formulated for use with soilless mixes also provide micronutrients, but if the one you are using does not, an alternative source is Liquid Seaweed or another of the seaweed-based fertilizers, which is applied once per month according to direction.

If you do not wish to mix your own potting medium, but prefer to buy a packaged potting soil, I recommend that you buy some perlite also and mix two parts by volume of potting soil with one part of perlite. Commercial potting soils that I have seen are too fine-textured and poorly aerated. The addition of perlite opens them up, and improves plant growth considerably. Packaged potting soils are generally supplied with micronutrients, but they will require the application of a water soluble, balanced fertilizer as for the peat/perlite mix. Instructions for the individual product should be followed as to dilution rates and intervals between applications. If a rate is given for constant feeding with every watering, I can recommend this method as a simple means to insure regular feeding. Just be sure when you water that you apply enough water so that there is an excess draining from the container. This will forestall an accumulation of excess fertilizer salts, which will damage roots.

After transplanting, the seedlings are best returned for a week to ten days to that sunny window or porch where they were before. Once it is obvious that they are established and growing again, they should be moved outdoors

to a shaded cold frame or under a tree and gradually hardened off. They can then be moved into full sun, much as you would do with tomato plants started indoors. Don't forget to check them for watering at least once a day until you become familiar with their requirements. You will find that the plants dry out more quickly outdoors, and they will need more frequent watering as they grow and their leaves expand.

Young, vigorous magnolias are, in my experience, little troubled by diseases or pests. The one exception is the two-spotted mite, or "red spider", which can run rampant over plants which are sheltered from rain, such as those in a greenhouse. I am sure that there is potential for mites to attack plants growing outdoors during rainless periods also. It is better to prevent mite outbreaks rather than to try to control them after they appear because, unless you are very watchful, a lot of damage is done before you even notice that they are there. Application of two different miticides, a week apart, with new applications to new leaves and after rain is effective against mites, but a simpler preventative practice is to syringe or spray the foliage with water twice a week, taking care to hit the undersides of the leaves as this is where mites tend to congregate. The water does not kill the mites outright, but reduces their numbers on the leaves to innocuous levels.

Starting in August, it is a good idea to reduce fertilization to help the seedlings prepare for winter. Either cut the application rate in half or switch to a fertilizer containing little or no nitrogen. The latter is usually sold as a plant food for promoting blooming.

By September, some vigorous seedlings may be eighteen inches (45 cm) or more in height, and you may be tempted to plant these out in their permanent locations. There is some justification for this, if you are confident of the hardiness of the plants and if you place a screen around the base of each plant for protection against rabbits and errant lawnmowers. Trees and shrubs planted up to three or four weeks before the onset of cold weather will have time to become sufficiently established for winter survival. Small plants, as well as those whose hardiness is suspect, will have a better chance if you delay planting them out until spring or even later, and this necessitates overwintering them in containers.

The most important consideration in overwintering container plants is protecting their roots from extreme cold. While the stems of the most cold-hardy magnolias may withstand -30°F (-34°C) without damage when fully hardened, the roots can be killed by temperatures as mild as 25°F (-4°C). Several methods can provide the necessary root protection. The best is placement of the plants in a greenhouse which can be maintained at near-freezing temperatures. Barns, garages, or cellars which can be maintained at 32-40°F (0-4°C) may be used also, but being poorly lit, provision must be made for moving plants which break into growth prematurely (before last killing frost) into well lighted conditions indoors.

Plants can also be carried over the winter successfully in a well-insulated cold frame. Plants are watered well, and tall plants can be laid on their sides before sealing the frame. The function of a cold frame is not to keep plants warm, but by insulating them against the ground to protect them from extremes of warm or cold and rapid fluctuations of temperature. Once the frame is closed in the fall, it is not necessary to check it again until late winter/early spring, when day temperatures rise above 50°F (10°C). Then the frame should be propped