



Piedmont Chapter
North American Rock Garden Society
Chapel Hill, Durham, Raleigh, NC

Making and Using a Bottle-Pot for Seed Germination and Rooting of Cuttings

by Maurice Farrier

Introduction

The 2-liter bottle can be made into an inexpensive self-watering pot helpful for amateur gardeners (Wicked Wonders. Rebecca and Michael Taylor. National Gardening [Magazine], Nov.-Dec., 1992, p.63). Since 1992, I have added pots of another 2-liter bottle as a humidity hood and have used the devices to germinate more than 302 packets of perennial seeds from 60 genera. By replacing the seedling mix with a rooting mix, more than a dozen species of cuttings were rooted using it. The bottle-pot was especially helpful when starting seeds having a long germination period or requiring cold stratification.

Advantages

- Relatively inexpensive and re-usable, if cleaned.
- Little maintenance is required when in use.
- Water level is visible, thus no over- or under-watering.
- Can be made hydroponic by adding soluble fertilizer to the water chamber.
- Useful for seeds having long germination periods, such as cyclamen, hellebore, iris, lilies, narcissus or those requiring cold stratification, such as iris or roses.
- Adaptable for seed requiring darkness for germination.
- Minimal water consumption after set-up.
- Seeds that are sensitive to pH can be germinated using rain water or de-mineralized water.
- If the components (pot pinned to water chambers, hood, screen, wick and seed mix) are prepared ahead, then final assembly may be expected when the seeds arrive.
- In most cases, many plants may be obtained at a minimal price. This permits planting in drifts or at several sites with one or two hopeful successes.

Disadvantages

- When the humidity hood is in place, it must be shaded from direct sunlight to prevent overheating. Fluorescent lighting can be used to provide light without excessive heat.
- Singly [*standing alone*], the bottle-pot is easily tipped over. Individually they may be placed in a half-gallon drink carton that has been cut off 2 inches tall. In multiples, they may be placed in groups of 6 in a rectangular plastic dishpan.

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Supplies Needed

- Two-liter drink bottles (with caps for the hood).
- Fiber-glass window screen available by the foot at most hardware stores.
- Synthetic (not cotton) knitting yarn.
- Two big-headed galvanized roofing nails (short is better) per pot.
- Plastic rectangular dishpan or commercial castle-crate.
- Fluorescent light with 2 tubes (cool white, also called “Residential”).
- Piece of paper, about 3 inches wide, with a straight edge and at least 16 inches long (newspaper will do) to aid marking for the initial cut.
- A 12 inch 2 x 2 (slightly rounded to approximate the inside curvature of the bottle) to be used as backing when drilling the fill hole and nail holes.
- Masking tape or cellophane tape to secure the paper straight-edge to the bottle before marking.

Tools Needed

- Utility knife (box cutter)
- Scissors
- Marking pen
- Brad-point drill bit (5/8 “ diameter)
- Trist-drill bit (1/8” diameter)
- Electric drill (reversible)

Making the Bottle-Pot

2- or 3-liter soda bottles may be used. The 2-liter are more readily available and fit snugly in the plastic dishpan if off-set. Caps will be needed for the hood but not for the pot. Remove the label, measure and mark the side 5 inches from the top. Wrap the straight edge of the paper around the bottle at the 5 inch mark. Tape to the bottle and mark at the edge of the paper. Cut on the line with the utility knife. When assembled, the uncapped top of the inverted top section will mark the normal fill level for the water chamber, thus serving as a “fill-ring.”

Keep each top and bottom



Photo by Bobby Ward

associated as each bottle is of a slightly different size! Using the 5/8 inch brad-joint bit, drill the fill-hole 1 1/2 inches (at the center) below the top edge of the bottom section.

Invert the top section, place it snugly, but not excessively so, into the bottom section and level by eye. In forward [clock-wise] mode, drill the 1/8 inch holes approximately opposite each other and insert the nails. Should the assembly in use be lifted without the pins holding it together, the bottom section may drop to the floor and act as a military mortar shooting water up over the gardener.

The work will proceed faster if each step is done in multiples rather than completing each pot separately.

Cut the fiber-glass screening into 1 1/2 inch squares and roughly round the corners and fold twice and nip the center hole for the wick. Knot the 7-inch knitting yarn one inch from the end and unravel it slightly to give better contact with the growing mix.

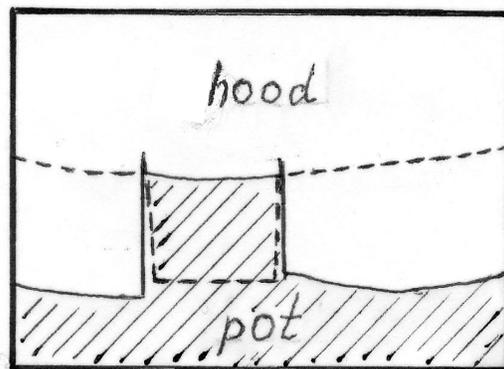
The capacity of the upper chamber for the growing mix and the lower chamber for water (filled to the fill-ring) will be one pint each when made with 2-liter bottles. When the growing mix is filled to within 1/2 inch of the top of the pot and the water is brought up to the fill-ring, the distance from the top of the growing mix to the water level will be 4 1/2 inches. This is between the 4 to 5 optimum parameters established 69 years ago by Post (*Sub-irrigation of Seed Flats*. Kenneth Post. [Florists Exchange and Horticultural Trade World, 1941, p.16](#)).

Making the Humidity Hood

Cut the second bottle at the 5 inch line as before. With scissors, make 3 cuts about 3/4 inch upward in the bottom edge of this section, one in the back and two about 3/4 inch apart in front to form a tongue with a lip on each side. (For clarity, these slits were over-marked in black for the photo.) Shorten one lip to enable easier placement of the hood over the pot (see diagram). The cap should be in place for long germination periods. It may be removed for conditioning the seedlings prior to complete removal of the hood.

Half-gallon milk or juice cartons may be cut and slipped over the hood if the seeds require darkness for germination or for transport of the seedlings in sunlight.

More light may be gotten to the emerging seedling, if needed, by substituting and shortening the bottom section of the bottle when used for the hood. With many plant species, the hood was removed when a few seedlings first appeared. Without the hood, the hazard of overheating was eliminated. The pots were then moved to the appropriate level of light. More frequent observation of the water level was necessary in more light and without the hood.



Sketch by Maurice Farrier.
Photo by Bobby Ward

Soil-less Mix for Seeds

The basic formula for germination seeds that I have used is:

- 1 pint Metro-Mix 250
- 1 pint pine bark chips
- 1 1/2 cups perlite

A good commercial mix may be substituted for Metro-Mix if a few of the larger particles are removed. The pine bark chips are often sold as soil conditioner. (Over the period that I have used bottle-pots, bark-based soil conditioners have become coarser and more contaminated with raw wood. Though more expensive, I may try half Metro-Mix 350 and half perlite when my supply of good bark chips are used.) The perlite

and bark chips regulate the water content in the mix. Most commercial potting mixes if used “straight” will water-log after a while. Then plants rotted for me after starting off good.

Rooting Mix for Cuttings

A potting mix of half perlite and half milled sphagnum by volume (Tips on propagating hollies. Harold L. Elmore, p.33. in *Hollies, A Gardener's Guide. Plants and Gardens*, Brooklyn Botanic Gardens Record 49 (2): 1-06, 1993.) has proven satisfactory so far. With the use of the hood and the consistent capillary feed, the mist system with its problems can be avoided. I keep some perlite-sphagnum mix on hand. When my wife comes home from garden club with a cutting that I am sure is crying “code blue”, I can grab an assembled bottle-pot. Add the screen, wick, and rooting mix, establish capillarity and possible save the poor thing!

Establishing Capillarity

Whether used for seeds or cuttings, a continuous capillary system must be established. At the first assembly, place the long end of the wick through the inverted bottle neck. Make sure the wick reaches to the bottom of the water chamber and the screen will prevent the growing mix from dropping into the water chamber. Place 1 pint of soil-less mix into the upper chamber. About ½ inch of the pot rim will remain above the surface of the mix. Fill the water chamber past the fill-ring to the level of the bottom of the full-hole. This will submerge the growing mix in the neck of the bottle. Allow to soak for about an hour or overnight. Level the surface of the mix by lightly spraying until it levels itself. Slightly better results have been obtained by covering the unraveled end of the wick with pure Metro-Mix as a “bridge” between the wick and the growing mix.

The capillary system should not be permitted to dry out, especially when the seed are germinating. Should it dry out after the plants are up, sometimes capillarity may be re-established by repeating the above procedures. Monitoring the water level periodically will prevent this. Normally, with the hood in place and no active plant growth little attention will be needed for 2 or 3 month periods.

Seeding

After pouring off the excess water needed to establish capillarity and with the surface of the growing mix leveled, the point of a wooded pencil was used to open the dibbles. As packets of seeds from seed exchanges do not have planting instructions, planting depth for most seed was ¼ inch more or less. Larger seeds were set a bit deeper with the eraser end of the pencil. By using this light seed mix and with the humidity controlled, the planting depth is not as critical as it would be in the open garden.

Unless information dictated otherwise, the initial spacing was 8 seeds around the perimeter at a half inch from the wall of the pot with 4 seeds in the remaining central area. If a packet contained less than 12 seeds, they were spaced out accordingly. The dibbles were closed by applying a light spray of water and the final water level was adjusted.

If the seeds were very small or required light for germination, they were just pressed into the surface of the mix. For seeds requiring darkness, the bottle-pots were placed under the house or the individual pots were covered with cut-off inverted half gallon milk or juice cartons. This inverted carton also was used to prevent overheating when the pot with the hood in place was transported into the sunshine.

Labeling and Final Assembly

A three-inch plastic label fits satisfactorily and if placed face out, it can be read without opening the assembly. The position of the fill-drain hole was indicated by placing the label on the opposite side. I like to make labels for the seedlings based on the following lines:

- 1) source or code for source and number of seeds (which allows later estimate of germination rate)
- 2) scientific name, variety, color, etc
- 3) seeding date and germination conditions in abbreviated code

After placing the label, the single slit of the capped hood was placed at the label outside the pot rim and it was tipped forward. Then the long lip was placed outside the front view with tongue inside and finally the short lip was placed outside (see diagram). An uncut bottle was useful in measuring the clearance to the light as it would be about ½ inch taller than the pot with hood in place.

Storage of the Components

For storage, I like to remove the caps and thread the hoods on to a 5 foot heavy string fitted with an 8-inch needle made of wire. When hung on a nail, the hoods take minimal space and are ready for immediate use if washed before stringing. Caps are placed in a plastic bag.

The pots are stored inverted in the plastic dishpans after assembly. They were re-used after disassembly, thoroughly washed with brush and detergent water, dried, re-assembled and pinned. So far, no problems with diseases have been noticed without chlorinated sterilization.



Photo by Bobby Ward

Screen discs were brushed clean after use and stored in a lidded jar.

New wicks were always used. They were cut by wrapping around a 3 ½ inch card and cutting along one edge, then stored in a folder.

Conclusion

This inexpensive gadget when used in conjunction with plant society seed exchanges and patience has permitted the writer to view plants from around the world. Without it, such pleasure, learning and sharing with others would have been limited and expensive. The plan and instruction for use are shared here patent-free as also were specifications about capillary-fed seed flats some 68 years ago. Do not be discouraged by failure; learn by them. Enjoy.

Editor's note. Two annual seed exchanges are sponsored by the North American Rock Garden Society: the Seed Exchange (stored dry seed) and the Ephemeral Seed Exchange (freshly harvested seed sent directly between members). Membership (\$30.00/year) in the national society is required for participation. There is a fee per packet (\$0.50) for dry seed. Rules must be followed for the fresh seed exchange as well as the dry seed exchange. The packets are assembled and distributed by volunteers. The selection offered over the years has been outstanding. Warning: As the plants form the seeds grow, the space required for them explodes! Start small.]

Maurice Farrier, Professor Emeritus, NCSU, with joint appointments in Entomology and Forestry Departments, is a member of the Piedmont Chapter, NARGS.



Membership Renewal Form

Piedmont Chapter

Please take this opportunity to renew you Chapter membership. It is very helpful to the Treasurer to receive membership renewals as soon as possible, preferably before Sept 1. Thanks.

Circle one: Single membership \$15/year

Household membership \$20/year

You can pay dues for multiple years. Circle the number of years paid. One year Two years Three years

Not sure if you are due to renew?

The label on your issue of The Trillium indicates the date you membership expires. Alternatively, you will receive an email from Treasurer, Bobby Wilder, informing you that your membership is expiring or has expired.

Please print clearly:

Name # 1 _____

Name # 2 _____

Address _____

City _____ State/Zip _____

Email _____

Are you a member of the North American Rock Garden Society? Circle one: YES NO

Membership in NARGS is \$30.00 a year. You may include it in your check and it will be sent to the NARGS secretary.

Checks made payable to Piedmont Chapter, NARGS

Mail to: Bobby Wilder, 2317 Elmsford Way, Raleigh, NC 27608

Ph: 919-755-0480

Email: wilder@nc.rr.com

Opportunity to Advertise Your Business

We are offering members of the Chapter the opportunity to run an ad in the Trillium.

Use this chance to network with other members, possibly obtain some new clients and help each other out with reliable services. Certainly all plant related businesses would be great, but also other services - plumbers, painters, electricians - whatever - are welcome to participate.

We distribute 5 newsletters per year. You can place 1/8th or 1/4 page ads. The cost for a 1/8 page ad is \$10/newsletter or \$45 for the full year. For a 1/4 page ad, \$20/newsletter or \$80/year. Marian Stephenson will work with you on the copy or you can submit something ready to print (in a jpeg format).

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Defined Responsibilities for Board Members:

Patricia Scolnik: Membership Chair

Marlyn Miller: Travel Chair.

Kirt Cox: Plant Sale Co-ordinator

Vacant: Plant Acquisition TopDog

The Trillium: We intend to have a theme/focus for the *Trillium* issues this year. Tentatively, they are:

Gardening in pots

Italy and wildflowers of the Mediterranean

Iris or Japanese maples

To be determined based on Anne Raver article or other materials

We really need plant profile articles to complement these themes. Our membership has the experience and expertise to contribute these articles. Marian lamented the reticence of such talented members to share their knowledge.

Excerpted by Co-Editor Marian Stephenson

Piedmont Chapter NARGS Speakers Fall 2009—Spring 2010



September 19, 2009
Rob Evans
“North Carolina’s Plant
Conservation Program”
N.C. Dept. of Agriculture
Raleigh, N.C.

October 17, 2009
James Mickle
“Adventures of a Botanist in Italy:
Development of a New Museum of
Paleobotany in Naples”
N.C. State University
Raleigh, N.C.

November 21, 2009
Nick Turland
“From the wine-dark sea to the Olympian heights:
Plant-hunting in Greece”
Missouri Botanical Garden
St. Louis, Mo.

January 16, 2010
Robert Pries
“Irises for Rock Gardens”
Roxboro, N.C.

February 20, 2010
Joann Currier
“The World of Japanese Maples”
Chapel Hill, NC

March 27, 2010
Note: it’s fourth Sat. in the month
Anne Raver
Topic to be announced
Garden writer, New York Times
Reisterstown, Md.

April 24, 2010
Note: it’s fourth Sat. in the month
Martha and Charles Oliver
“Flora of the Shale Barrens of the Mid-Atlantic
States”
The Primrose Path Nursery
Scottsdale, Pa.

*Special Activity: Free tours of Montrose during
blooming of masses of snowdrops, Galanthus
elwesii var. monostictus (probably in November),
and hellebores (probably in February).
Dates and times to be announced on short notice
by email through chapter membership list.*

*If you don’t have email, ask a friend to contact
you when the invitations are issued. Please up-
date your email address now with chapter
treasurer, Bobby Wilder <wilder@nc.rr.com>.*

Chapter Annual Fall Plant Sale

Our September 19th meeting and plant sale is coming up, so it’s time to get your contributions divided and potted up. Plants of some size with a good root system will sell quickly. We depend on this sale to pay for our programs, so we count on your help. Good plants of all sizes, shapes and seniority are needed. We encourage you to pot up your contributions early, so they will have some time to establish, rather than waiting until the day before.

Bring plants in clean pots and label each pot; there is no time to do it that morning. Remember to have the labels complete, accurate and legible.

We will start setting up behind the Totten Center when it opens at 9:00 am, and will be eagerly accepting plants at any time between then and the start of the sale. The program starts at 10am with the sale beginning immediately afterwards. Remember that those who have contributed will lead the way at the start of the sale.

For more information, contact Kirt at 919-489-7892 (H) or by email (kirtley@ncrrbiz.com).



Piedmont Chapter Meeting

Totten Center, Chapel Hill, NC

September 19

9:30 am

Rob Evans

Raleigh, NC

North Carolina's Plant Conservation Program

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OTHER SIGNIFICANT POSITIONS:

Sept. Plant Sale Manager: Kirtley Cox

Refreshments:Gwen and Maurice Farrier

The Trillium, Newsletter of the Piedmont Chapter
The North American Rock Garden Society
1422 Lake Pine Drive, Cary, NC 27511

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Refreshments at the Meetings

You are encouraged to bring goodies to share in the month as indicated below by the first letter of your last name. However you are always welcome to bring something.

Sept A-C

Feb O-So

Oct D-G

March Sp-Z

Nov H-K

April Everyone or anyone

Jan L-N

Excerpts from the July Board Meeting

The good news is that we have money in the bank, The bad news is that we spending down at the rate of ~ \$1400 each year. Though we've had a decrease in *The Trillium* mailing & printing expenses and speaker costs, this does not compensate for the decrease in plant sales.

Several options were discussed to offset the operating deficit: increasing dues, reducing speaker expenses (speaker expenses account for roughly 60% of our annual expenditures), hosting the NARGS Eastern Winter Study Weekend, reducing gift donations to public gardens and increasing plant sales. Based on current membership levels, a dues increase of \$10/yr would generate roughly \$1,400, but may impact membership renewals. Reducing speaker expenses by reducing the number of meetings or of out-of-town speakers was viewed as contrary to our reason for existing. Hosting a Winter Study Weekend is a major commitment that needs 2-3 year planning. Increasing plant sales means increasing the number and quality of plants for auctions and at the Sept meeting sale. The board agreed that for the coming year we should focus on trying to increase plant sales, rather than increasing dues or reducing programs. However, this topic will need to be reviewed if we do not improve our financial situation in the next year

The Board recommended three people be added to the current board: Vivian Finkelstein, Joann Currier, and Elsa Liner. All three have been members for multiple years and could contribute to future operation of the chapter. They will be presented to the membership in September.

Bobby Ward presented the proposed list of speakers (See page 7).

We expect the September meeting to be in the new NCBG building, but it might not be ready by then. We hope to be using the Reeves Auditorium. Members will be notified by email of the location when determined.

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