# HOBBY GREENHOUSE

WINTER 2017 VOL.39 NO. 1

THE MAGAZINE FOR INDOOR GARDENERS


## BUILD A GREENHOUSE USING VINTAGE WINDOWS

by Tara Mihalech

Haworthias: Winter's Windowsill Wonders - Garden Spot Aeroponics Greenhouse
Poinsettia - Putting Your Greenhouse on a Schedule
The Green Thumb - Hardening Off Plants Isn't Hard
Start Your Own Seeds

# *EDITORS NOTES*

Tom Eckert tjghg@verizon.net

I certainly wish to thank those of you whom have taken the time to write articles for the magazine. Since we are a members only association your very practical growing techniques are highly regarded by your fellow members.

We continue to receive **rejected email notices** These rejections run the range of *"mail box full, unable to delver at this time, to rejected address."* Please try to keep your email boxes within the limits your carrier requires. My email carrier sends me a notice when my mail box is approaching it's limit and requests that I delete un-needed emails.

Please continue to notify the HGA of email address and mailing address changes.

The heat of summer is behind us for the year but we remain at season highs, not personally complaining about the nice 70 degree days. This year played havoc with many annual and perennial flowers. Bulbs pushing up early, trees budding early and hey, we have a great early spring. They we get slammed, at least here in the eastern states, with frigid temps that killed off many bud sets.

The wild oak, shell bark, butternut and walnut trees on our property have provided only about half the crop this year. So I took pity on the squirrels and started setting out a couple trays of shelled corn and sunflower seeds for them. They are definitely putting on winter fat from those goodies. Then the deer took notice of the squirrel activity and deer being nosy deer, they too started to pay extra attention to the trays. I had to build tree mounts for the trays as it is somewhat illegal to feed the deer in PA.

Winter time and all is basically quiet in the greenhouses except for some stock plants and the tillandsia collection. The cleaning and sterilizing the many benches is in progress as well as cleaning the floor areas of left over plant debris. The first week of March will arrive quickly bringing with it my orders of over 6,500 plant plugs and decisions when to start the seeding of some 2,500 vegetable and annual flower seeds. I love spring time in the greenhouse and look forward to it every year.

# CONTENTS WINTER 2017 Volume 39, No 1
















# IT'S TIME TO TALK POINSETTIA CARE

**by**
**Wally Wolfgang, PA**

Christmas is just around the corner and with the holiday season it's also time for the favorite plant, the formidable poinsettia. Almost every box store and home supply store not to mention various nurseries and greenhouses will have a nice variety of poinsettia on display.

I highly recommend purchasing your poinsettia from your local greenhouse and garden center. Box store plants are routinely subjected to little or no care until they are wilted. Then an area manager gets nervous and dispatches a worker who knows nothing about plants to water them. "Move then out to water them so you do not get water onto the floor area." Yep, put them out there in the cold drafts of the loading docks to put cold water on them. They should perk up enough to sell and then you wonder why your plant collapsed a day or two after you brought it home.

The Poinsettia (Euphorbia pulcherrima) is in the large (spurge family), which is comprised of worthy garden plants and out-and-out weeds, spotted spurge for example. Its popular name came by way of Joel Roberts Poinsett, the first US Minister to Mexico who introduced the plant into the US around 1825. The poinsettia is native to Mexico and was considered a wildflower at the time. Today the plant does not quite look like the small shrub tree Poinsett introduced. The poinsettia has gone through a lot of breeding to produce many stem structures and bract colors.

## The Purchase

When purchased in the cool to cold November to January months care has to be taken to insure the

plant is not subjected to cold drafts and freezing temperatures. When purchased in reputable greenhouses and garden centers your poinsettia will be put into a protective sleeve, plastic or paper, for the trip home. Exposure to low temperatures can damage the leaves and the colorful, flower-like bracts. A lot of dead leaves around the bottom of the plant can indicate improper care, especially caused by the lack of timely watering.

## Placement in the Home

The poinsettia in bloom needs bright light but direct sunlight is not a necessity. The plants will survive a few hours of early morning direct sunlight but remember, afternoon sun can be brighter. Place the plant where it is free from heating system drafts and from baseboard heating vents.

## Watering Your Poinsettia

When you bring home a poinsettia, remove it from the protective wrapping to be sure water hasn't accumulated in the bottom. You do not want to have the plant's roots standing in water--ever. Let the plant go to slightly or semi-dry between watering. Place a saucer or plant tray under the pot. This will protect your floor, counter, or other place you have set the plant. After the possible excess of water has drained through the plant's pot, promptly dump the excess water out of the catch tray.

continued on page 5

## Fertilizing The Poinsettia

When purchased for the holidays, the plant does not need any fertilizer. It is best to keep the plant compact during its blooming cycle. We will look at the bloom a little later.

## Temperature for Poinsettia Comfort

Poinsettias are usually grown in the commercial greenhouses in a temperature range of 60 to 70 F. degree, reduced to 55 to 60 F. degrees at night. Unless you have an extremely warm living quarters normal house temperature suit the poinsettia.

## Long-term Poinsettia Care

Your poinsettia can be kept yearly and with care you can have the plant re-bloom next year. How good of a gardener are you? Follow these time-tested steps to keeping your poinsettia for another year. The poinsettia will show its beautiful foliage for many months. I say "foliage" because the leaf color is not really a flower. The poinsettia flower is actually the small red to green little round ball type things in the center and on top of the petal-like and colorful bracts. (Buyer's tip: If these true flowers are well developed they are an indication that the plant has reached maturity already and won't last as long as you might like for the holidays.)

As early spring arrives your poinsettia will begin to produce new shoots. So far so good as you have kept the plant alive for many months. The old leaves will continue to die back and drop off. Discard these to keep the top of the pot's soil clean.

## Repotting The Plant

Early to mid-March is a good time to repot. Simply lift the plant from its pot and see if the roots are packed around each other. If so, gently loosen the root system. Trim off any very long roots and repot using any all-purpose potting soil. Use a brand name potting soil, not anything labeled simply "topsoil."

## Trimming The Plant

At this time of the year the plant has produced new shoots. Cut off the old bract-topped stems to about 4 to 6 inches tall. Take care not to damage the new growth. This trimming will encourage the new growth to take over and continue the plant's growing cycle. Also trim the plant to keep it rounded in shape and not have any branches longer than others. At this time add a balanced time- release fertilizer to the top of the pot soil. Osmocote or another name brand will work. Follow the recommended amount to apply depending on the pot size as printed on the package. P.S. The poinsettia you purchased was treated with a growth retardant to make it more compact with more bract-topped stems. The re-grown plant will not have been treated and may well grow out two to three times taller and bigger around than originally.

## Moving The Plant Outside

You can move the plant outside after the chance of frost is past to continue its growth. Keep it watered and monitor for plant pests like mealy bugs, aphids and other common pests. Depending on your region, bring the plant back inside before any chance of frost or the temperature dips down to below 60 degrees F. In other words, poinsettias do well outdoors in weather suited to tomatoes and basil.

## The Critical Time

Now you enter the critical time in the plant's growth and changing colors. Skip a daily period of total darkness and all can be lost! ***The poinsettia must nightly receive 14 hours of total darkness.*** There may be a week of leeway but peg October 1 as the beginning of the regimen for the total darkness cycle. Total is just that, "total," and it must not be interrupted. I recommend the box method. Take a box larger than the plant and set it over the plant. The box must be totally closed so as not to let any light inside. Keep the plant covered for the required 14 hours. You can pick the time of day/evening to cover and uncover the plant but make it easy on yourself. Remember this is the critical period for your plant to do its magic. And if you forget, better that the plant be inside the box for extra hours rather than not so many.

## Color Emerging

In early December you should start to see the leaf-like bracts color up. Keep the temperatures around 60 to 70 degrees. You may now discontinue the darkness routine. Your poinsettia should be in full bloom for Christmas. Always remember to keep the soil moist. Poinsettias do not like to be dried out or wilting and leaf drop will occur.

**Wally Wolfgang** is a HGA member and frequent contributor to the *Hobby Greenhouse Magazine.*

# HAWORTHIAS: Winter's Windowsill Wonders
## By Kay Bokelman

H Manda's hybrid

When winter's cold sets in, fill your windows with low-light, low-maintenance, drought-hardy haworthias. These fascinating plants can brighten a gloomy day as well as aiding in cleaning the air.

Haworthias are small, shade-tolerant succulents native to South Africa. They vary greatly in form, size and color. Some have patterned leaves. Some have firm tough leaves with varying patterns of raised dots or bands. *Haworthia pumila*, sometimes called "donut polka dot," is my favorite. Still others have softer if leathery leaves seemingly filled with a transparent jelly, the tips translucent and called windows that take in light even when most of the plant is buried.

There are approximately 150 recognized species and many more "unresolved" for lack of sufficient information. Because they are highly variable in form, there is much confusion as to the names and the naming of new finds. I will leave the taxonomy to the professionals, as this plant has had more than its share of controversy. There are some excellent books on haworthias available in libraries or bookstores, several written by Bruce Bayer of South Africa, an entomologist and leading enthusiast. *Haworthia bayeri* is named for him and is currently in my collection.

Haworthias do most of their growing in spring and fall and go dormant in the summer. Frequent misting in the summer is adequate with normal watering during the spring and fall. A diluted fertilizer (¼ - ½ strength) can be applied during the growth periods. If your plants are in a warm area in the winter, light watering will be needed. If the area is cool, monthly light watering will keep them in good health. Overwatering will lead to root rot.

continued on page 7


*Haworthia pumila*, sometimes called ‘donut polka dot’ is my favorite.

H viscosa

continued on page 8

Haworthias need a loose, fast-draining potting mix. The addition of perlite to a standard all-purpose potting mix allows water to pass through the soil rapidly. Adequate ventilation helps prevent pests and keeps the plants healthy. In habitat, many haworthias thrive in windy locations. Keeping a fan running on low speed, constantly, works well. Haworthias are relatively pest free with the exception of mealybugs and scale. Mealybugs look like tiny cotton balls. They can be removed with a Q-tip dipped in rubbing alcohol. Scale is a tan or brown insect covered with a waxy coating and appearing as a raised bump; eliminate the same as recommended for mealybugs or apply a systemic insecticide. Scale insects leave little scars wherever they pierce the leaves, so there are times when getting a new plant is the best option.

Propagation of haworthias is from offsets, division, leaf cuttings or seed. Haworthia's small, white flowers grow from a long, narrow tube and usually have greenish stripes. It is for the interesting variety of leaf patterns that haworthias are grown, not so much for the flowers.

The addition of colorful stones called top dressing to the top of the soil on potted plants, in addition to creating a pleasing appearance, prevents water from splashing soil onto the leaves and conserves water. Top dressing keeps the soil from drying out as quickly as bare soil.

A word of caution: Check top dressed plants for moisture before you water. Overwatering, especially in colder months, can quickly turn your plants to mush. Top dressing should just cover the soil. The thicker the top dressing, the greater chance of overwatering.

Any type of material may be used. An affordable option is aquarium gravel. It comes in different sizes, colors, and textures. If you plan to enter your plants in a show, avoid the bright colors because they detract from the plant. Your eye is naturally drawn to the bright color versus the exhibited plant. River rock or pea gravel also comes in a variety of sizes. Make sure the size of your top dressing complements your plants. Large plants look balanced with larger sized stones or rocks. Small plants are overwhelmed with large stones. Turkey grit, available at any store that carries farm supplies, comes in off white or a dull gray. Its small pieces work well for tiny pots. It is available in larger bags than aquarium gravel and is inexpensive.

Because I show succulents in competitions, I am always on the lookout for attractive material to use. Change the top dressing before every show to perk up the plant's appearance. As a judge, the first thing I notice is the overall appearance. A plant with either no top dressing or old, stained material will struggle to get a first place in a competition.

Sources:

*Haworthia Revisited: A Revision of the Genus* by Bruce Bayer

T*he Complete Book of Cacti & Succulents* by Terry Hewitt. Google.

*Haworthia for the Collector* by Rudolf Schulz

Footnote: var. or v after the species name stands for variation. cv stands for cultivar. X indicates a cross.


H. reinwardtii

continued on page 9

H. belineata

H. bayeri

H. cooperi

H. truncata cv lime green

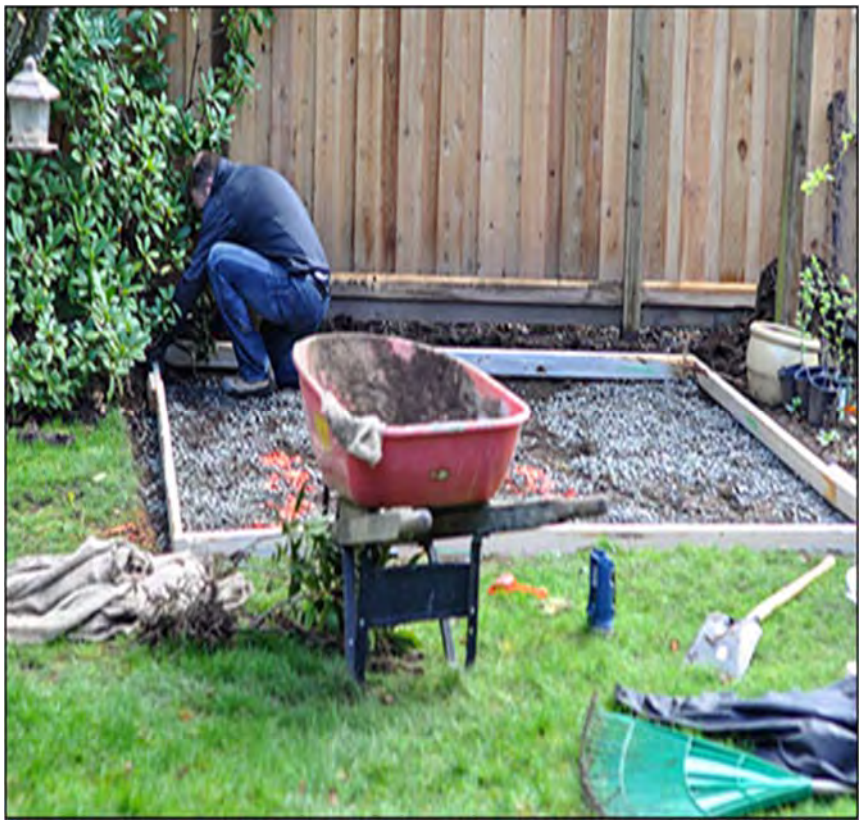
# Build a Greenhouse Using Vintage Windows

by Tara Mihalech

I have dreamed of having a greenhouse for the past few years. Starting seedlings indoors and nursing them on windowsills and under grow lights sparked my love for planting, but I was quickly running out of room. I looked at plans, kits and the greenhouses that hide in my neighbors' backyards. My parents had built a fairly large--13'x16--greenhouse using single-paned windows and I was inspired to build my own.

I collected single-paned vintage windows from various places: my parents' property, off craigslist and from the new-and-used shop. We acknowledged that it would be easier to design the greenhouse with windows that were all the same dimensions, but beggars can't be choosers. We wouldn't turn our noses up at even a window that had been tagged with a large spray-painted eye. We let the space available in our yard and our collection of windows dictate the dimensions of the greenhouse--10'x10'. It was time to start on the foundation.

continued on page 11



## Preparing the 10 X 10 foundation

We began with a poured concrete foundation. We built a form using 2x4s but made sure to slip a metal conduit into the earth beneath the form. This would be where we could run an electrical cord or a hose for future greenhouse needs. I warn you: It's easy to underestimate the amount of concrete you will need to fill the form. We thought we'd need four bags of cement. We ended up using seven.

## Installing the block knee wall

We drilled into the concrete and stuck a length of rebar that was taller than our planned wall into each hole. We then stacked cinder blocks with the rebar running through the holes in the blocks; this ensured that our wall was completely secure.

The blocks were filled with concrete (again, don't underestimate your supply needs here - it's easier to take a bag of cement back than to leave a half-done wall and rush out to the store). After the concrete had hardened, we topped the wall with a layer of sill gasket and then the sill plate. We drilled holes through the sill plate so that the rebar could act as a bolt that would hold the wood securely to the wall. At this point, we were faced with a dilemma: Do we cut down the rebar or leave it slightly taller than the wall? Because we didn't have a saw to cut down the rebar, we left it. It was mostly a matter of aesthetics, not of necessity.

continued on page 12

Windows framed in their designated location

Because our windows were various sizes, we opted to frame them in place, instead of on the ground. After talking to various people, we decided to build the roof with shed rafters rather than trusses.

## The assembled 2X6 roof rafters

2 X 6 rafters were used for the roof along with metal straps for added strength.

I stained the wood prior to building the roof, using a water-based exterior stain in a shade of off-white ("Pinto White," it's called). I know this means that soil and wear will show over the years, but I love the look of white buildings in the garden, even as they weather.

continued on page 13

Our roof was made from sheets of Coroplast® plastic sheeting. We used roofing screws with washers to secure the semi-transparent sheets to the rafters. A metal roof cap slid over the peak to finish the roof (and to make it aesthetically pleasing).

Our windows were hung with hinges, which not only makes for easier installation but also allows for air circulation during the hotter months. The windows can be opened as wide as necessary to let air and pollinators into the greenhouse during the day.

Because of time and a motivated husband, our windows were hung before they could be stained. While this meant that my arm was unbelievably sore after hours of painting, it did allow me to paint the hinges after they had been hung, which made for a much nicer look.

continued on page 14

Door, a bit of plywood and some window boxes later — the greenhouse was done!

We installed a stained-glass transom window above the door to add personality. The front peak was filled with plastic left over from the roof, and the gaps in the back of the greenhouse were filled with stained plywood. The white color allows light to reflect back into the space.

An old countertop became a potting table, and we put in plastic shelving for the trays of seedlings.

The flooring material chosen was crushed stone as to allow for water drainage.

Shelving was built under the bench top for storage of flats and pots.

continued on page 15

Now that the sunshine is here nearly every day, we have happy little plants peeking out from the windows

.

The greenhouse is now the pride of our backyard! It's the spot where beginnings of all things – plants, plans and my gardening career – are happening.

And I won't let a vintage window pass me by again.

*Text and photos by Tara Mihalech*

*Tara is the writer and flurry of chaos behind Suburble (www.suburble.com), a blog about all things that make a home. Whether it's digging in the dirt, cooking, crafting or hauling a piece of furniture off of the curb, she isn't afraid to get her hands dirty, nor have a laugh at her own expense. Her projects and tutorials have been featured in various print and online publications.*

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# Write for Us

Tell our readers about your experiences in your greenhouse. Hobby Greenhouse magazine is looking for stories about greenhouse gardening, growing techniques, and raising plants under cover.

All indoor gardeners have a plant (or plants) they love to grow. Many of us have discovered new growing techniques and tools that others want to know about. Many of us built our own greenhouse and learned several valuable lessons. Why not share your knowledge with others.

Write about your passion. *Hobby Greenhouse* magazine is looking for articles about 800 to 900 words in length. If you write one you'll get free membership for one year in HGA. (Shorter articles compensated proportionately.)
If you have or can take photographs that's even better.

(Contact the Editor for ways to submit a story.)

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## Deadlines for articles and advertising

Spring issue: Jan 15th

Summer issue: April 15th

Fall issue: July 15th

Winter issue: Oct 15th

*The Hobby Greenhouse Association does not promote any products but only provides information relating to them as a service to our HGA members.*

# The Green Thumb

By **Doc and Katy Abraham**

**Amaryllis Care:** If your amaryllis bulb grows outdoors all summer, don't follow the old, oft-repeated advice of drying it off for 60 days in the fall. We used to recommend drying the bulb for two months in the fall, but we don't anymore. The secret for reblooming is to keep the plant growing, instead if drying it off. Also, give it a liquid feeding each month with your favorite fertilizer mix.

We've had people tell us their bulbs have developed disease problems, and we'd like to mention a few:

(1) **Leaf Scorch:** Leaves and flower stalks hit by a fungus that bends or deforms. Diseased flower stalks and bottom leaves have a small red raised spot. Dark, brownish-red spots form on the flower parts. Severely infected plants dry up without producing flowers. If plants are suspected of disease, cut them off at the base and dip bulbs in a solution of captan, 1 TBS to a gallon of water. Old timers immerse bulbs for 1/2 hour in hot water at 104 degrees F.

(2) **Mosaic (virus):** Leaves at first have yellow mottling and plants become stunted. All plant parts are much reduced in size. Control: None. Destroy all infected plants, pots and all.

**(3) Blight (botrytis)** Pick off badly infected leaves and burn them.

**(4) Bulb rots:** If bulbs are spongy, evil-smelling, toss out bulbs, soil and pots. Make sure your bulbs have good soil drainage.

**LYME DISEASE:** With Lyme disease (spread by tick bites) classified as public enemy No.1 in many parts of the U.S., many gardeners are asking if it's possible to have a tick-free yard. Spraying the lawn with pesticide is not effective in destroying the ticks. Many ticks live underground in animal burrows, and others hide on the undersides of leaves; either way, they escape the spray. Ticks are stubbornly embedded in our ecosystem and there's not much you can do about it.

## The Green Thumb Question Box

*"Please tell us what we can use to put a shine on our foliage plants. I don't like the kind sold in spray cans."*

Glycerine is one of the best substances to use to put a gloss on the leaves of snake plant, philodendrons, and all other hard-leaved foliages. Put a few drops glycerine on a cloth and swab the leaves with it. It is much better than olive oil, since it does not collect dust. Or you can use milk. A half and half mixture of milk and water makes a fine solution for glossing hard surfaced leaves.

*"Every year you tell us how to make a fuchsia bloom indoors, but we never have any luck, Is there a special kind which blooms in the home, and one for outdoors?"*

No, they are the same. Fuchsias are what is known as short-night plants, meaning that if they are exposed to night lengths shorter than 12 hours, the plants will initiate and develop flower buds. If night lengths are longer than 12 hours, the plants will not flower, but will "vegetate" or produce only leaves. Usually between March 1 and October 15, the nights are just about right and the plants will flower. After that keep artificial light away from them at night. You can do this by placing a black cloth over the plant, or moving it to a dark room at night. In other words, too much artificial light after October 15 will cause all leaf growths and no flowers. You can start new fuchsias from tip cuttings , rooted in plain tap water or perlite.

### Growing Tip

**Fertilizing:** If your flowering plants are on a "constant feed" program, never, never use the amount of fertilizer prescribed on the commercial package directions. One/fourth the amount is sufficient.

**Doc and Katy Abraham** provided articles for the HGA for many years. This article was reprinted from the Winter 1990 Hobby Greenhouse magazine.

# GARDEN SPOT AEROPONICS GREENHOUSE

By TOM ECKERT, PA

The state of the art Garden Spot Aeroponic Greenhouse is located within the Garden Spot Community Retirement Center in New Holland, Pennsylvania. Operational in 2016, the 4,600-square foot aeroponic greenhouse provides a large variety of fresh vegetables and herbs for the retirement community's dining rooms and restaurants at much less cost than purchasing it on the market. The greenhouse facility was designed by AERO Development Corp. located in Gap, PA. The project came in at around $350,000. In addition to growing fresh vegetables, the greenhouse will also provide training under supervision for some disadvantaged individuals and the residents of the retirement center who enjoy growing.

Aeroponics is a soilless method of growing similar to hydroponics. However, using aeroponic techniques, the plants are grown in Rockwool and the roots are suspended in air without any growing medium. Growing cubes usually consist of Rockwool material which is an inert or sterile cube, in which seeds are started. The Rockwool with seeds inserted into them are grown in trays on flood-and-drain tables. The "flood" is a water-based nutrient providing moisture and food to the cubes for germination and root growth. Depending on conditions within the greenhouse, the flood-and-drain back to tank operation is performed by programmable, adjustable timers. Fifteen-minute intervals for this "feeding" normally meets the seedlings' needs. After the roots are protruding from the cubes they are removed from the growth table and inserted into the Aeroponics growing tower slots.

continuer on page 19

The flood and drain bench for starting seeds in Rockwool cubes

Since the seed is just dropped into the ¼ inch round hole in the Rockwool grow cubes, the seed would be exposed to light and have a hard time germinating. To make the seed "think" it is buried in the ground, a cover is placed over the rooting trays to provide darkness and fool the seed into germinating quicker. Note: Some seeds require light in order to sprout; the index in the Park Seed catalog includes this information; request a catalog by writing to Park Seed, Greenwood, SC 29647-0001.

**Gloria Stevens,** greenhouse manager, provided an excellent tour of the facility providing background information on the growing techniques they incorporate**.** Pictured is Gloria holding a rooted plant from the growing tower. The root system was excellent on the plant.

Rockwool cubes with 1/4 inch holes. The sheet of cubes can be separated or broken off for smaller growing amounts.

Plastic sheet to cover the cubes for germination. The color of the cover is not important for germination. For individual trays it just needs to cover the tray to provide total darkness for the seed to germinate.

continued on page 20


The computerized control panel is very impressive. Not shown are the nutrient tanks for the tower columns.

The greenhouse is totally computerized, including the weather station on top. The weather station feeds information down to the computer, including atmospheric conditions of dew point, wind speed, wind chill, rainfall, humidity, temperature and pressure. The computer acts on this information to control the greenhouse heating and cooling. While on the greenhouse tour a wind and rain squall was approaching. As the distant sound of thunder could be heard, the greenhouse ventilators, both roof top and side, were automatically activated to close. About ten minutes later when the rain squall had passed, the computer again activated the ventilators to open them to help maintain the greenhouse temperature.

Another automatic feature is the overhead shade cloth installation. The computer adjusts the positioning of the shade cloth on its ceiling track to give the maximum of shade possible during high light times of the day. The shade cloth is manufactured by Wadsworth Control Systems (wadsworthcontrols.com) and consists of several layers including a top layer of thin aluminum to reflect sunlight during the day and to provide heat retention during the cooler nighttime. The white bottom layer of the cloth scatters light back down onto the growing area, improving the effectiveness of supplemental lighting when used in the greenhouse.

The computer controlled ceiling shade cloth

continued on page 21

This picture shows the pod arrangements . The 40 gallon reservoir is located under the platform and is part of the pod structure.

The greenhouse consists of 25 growing pods with eight towers on each pod. Each tower is 10 foot tall and has 76 slots for insertion of the Rockwool cubes containing the seedlings. In all they can grow up to 15,200 plants at any given time. Gloria Stevens stated that when calculated out the greenhouse is producing almost an acre of in-ground growing.

Each pod has a 40-gallon reservoir at its base with the nutrient solution and is pumped up to the top of the pod's towers and sprayed downward where the nutrient solution drips down across each of the growing slots where the Rockwool cubes have been inserted. Excess solution is collected back into the reservoir to be repumped up the tower again. When the pod reservoir float signals the need for more nutrient supply from the main supply reservoir another small pump automatically comes on to refill the pod reservoir. The drain back design of the towers does not allow the nutrient solution to escape outside of the columns and be wasted. Outside of possible pipe fitting leaks, the system is self-contained.

Cover removed to show the nutrient solution float assembly that rests in the nutrient tank in the base of the pod structure.

continued on page 22

The cycle of the nutrient feeding is easily adjustable through the computer and depends on conditions in the greenhouse. Higher greenhouse temperatures equal quicker moisture loss across the root systems and the need for more nutrient flow. The cycle timing can be computer controlled by temperature and humidity sensors or by the grower's preference. Note: the nutrient solution from the holding tanks is pumped through a fertilizer injector to maintain the exacting nutrient formula that is sent to the pod reservoir. The injector mixes the reservoir solution with fresh water; the nutrient solutions are measured in PPM or parts per million.

The greenhouse walls have automatic gear driven closures that can be manually or computer controlled.

Several of the pods do have auxiliary light fixtures attached onto them for supplemental lighting. Currently the lamps used are four-foot T5HO 5000k lamps. The T5 is the newer round energy efficient lamp on the market. The HO means that the lamp is a "high output" lamp. The "k" is an abbreviation for "kelvin." The kelvin is often used, but not limited to, the measurement of the color temperatures of light sources. It is a complex measurement where temperatures below 4000k appear reddish whereas those above 7500k appear bluish. These grow lamps can be purchased in a wide variety of color range depending on growing preferences.

There is a backup electrical generator in case there is a power loss that automatically kicks in to operate the greenhouse functions. Water was another concern and currently there is planning to increase onsite cisterns for storing collected rain water. Testing resulted in the city-treated water supply as not being very good for aeroponics growing. The RO (reverse osmosis) system they have installed does help this problem. When construction is completed they will be able to store 10,000 gallons of rain water onsite.

The cycle of the nutrient feeding is easily adjustable through the computer and depends on conditions in the greenhouse. Higher greenhouse temperatures equal quicker moisture loss across the root systems and the need for more nutrient flow. The cycle timing can be computer controlled by temperature and humidity sensors or by the grower's preference. Note: the nutrient solution from the holding tanks is pumped through a fertilizer injector to maintain the exacting nutrient formula that is sent to the pod reservoir. The injector mixes the reservoir solution with fresh water; the nutrient solutions are measured in PPM or parts per million.

## Crops Grown

Harvests are planned and the choice of plant being grown change per a wish list schedule the center's kitchen requests. It may not always work out but with the variety of vegetables and herbs grown in the greenhouse there is always excellent produce for the kitchen's chefs.

Lettuce is always a staple for growing and the Five Star Greenhouse Mix (johnnyseeds.com) is a favorite. It is a leaf lettuce with the appealing name of "cut and come again." They can take three to four cuttings from the pod before it needs to be replaced with a new growing cube.

Other crops being grown when we visited were arugula, basil, Thai basil, purple basil, cutting celery, chives, garlic chives, collard greens, cucumbers, endive, kale, lettuce mixed with varieties of Bibb, Mexican mint marigold, mint, parsley, peppers, rosemary, shiso, sorrel, Swiss chard, tomatoes, and zucchini.

continued on page 23


A good view of the growing towers on the pod. Note the reservoir cover with the number 20 on it. Each pod is numbered for growing purposes. Information gathered can be beneficial for future planning. The reservoir cover provides for the inspection of the level control float on the pod.

This pod does have two light fixtures containing the T5 grow lights mounted on it in the center of the pod.

A good view of the grow holders that the Rockwool cubes are placed into for growing. The holders are designed so as the Rockwool cubes fit snugly into them. The sloping design also makes for the excess flow of growing nutrient to be directed back down and into the reservoir. There is no loss of nutrient even if the holder does not have a cube inserted into it.

A nice view of some crops reaching maturity and ready for the harvest.

Also note that HAF, "horizontal airflow fans" are used to gently move fresh air around in the greenhouse.

Gloria Stevens pictured at the right answering my many questions about their aeroponics growing operation.

We wish to give **Gloria Stevens** a big thank you for the tour of the greenhouse and greatly appreciated her excellent knowledge of aeroponic growing.

# Putting Your Greenhouse on a Schedule
# Elvin McDonald

January

As you work at your potting bench this month, pause to catch the fragrance of freesias, paperwhites, and those first hyacinths, you will know that a greenhouse is one of life's pleasures. January in my greenhouse brings the discovery of still more buds pushing up from amaryllis that bloomed in November, a pot of gold when crocus 'Canary Bird' blooms, and the unmatched beauty of a rose bud reaching skyward. Toward the end of the month there will be azaleas, bougainvillea "Barbara Karst', and a camellia joining the cyclamen in a display of Schiaparelli pink, but for relief from this shocking color, there will be wands of daffodils mixing companionably with sky-blue ixias, and the species gloxinia, *Sinningia eumorpha*, covered with creamy slipper flowers.

My greenhouse is a place of retreat in January. After the hurried activities of the holidays, I take special pleasure in a really thorough inspection of every plant. I remove all spent leaves and discard any failing plants. Inevitably this work is neglected in December, so I always plan to spend part of New Year's Day in the greenhouse. When order is restored, I settle down at my potting bench with the new seed catalogs. My practice is to place orders for seeds, plants, bulbs, and supplies twice yearly, once in January or early February, and again in August or September.

January can be a month of glorious bloom in the home greenhouse, and while you enjoy this bounty, straighten up, plan, and order. When the myriad activities of February and March arrives, you will be ready for the planting, all of your planning well in hand for the year.

If yours is a severely cold climate with rough winter storms, check the greenhouse heating system daily. If the heat should be lost, and the temperature drops below freezing, raise it slowly, about 5 degrees per hour, and mist foliage frequently until the usual temperature has been reached. This procedure will save plants that might otherwise be lost. Install a battery-powered temperature alarm in a part of your residence where someone is likely to hear it at any time of day or night. If you have an alarm system already, check it out at least once every week all winter.

In the short, often cloudy days of January, keep the nighttime temperature the same, even in severely cold weather. Raising it will promote soft growth. Keep dying leaves, decaying flowers, and other debris picked up. At intervals of 6 to 8 feet along your greenhouse walkways, place a small plastic wastebasket. Spaced closely, this means that no matter where you are working the greenhouse, you can put debris where it belongs without taking more than a step or two. Instead of feeding biweekly in January, reduce to one good feeding, or apply two at half-strength.

Water plants in the morning, if possible, so that excess moisture can dry off the foliage, and evaporate before nightfall. Keeping the soil of potted plants "evenly moist" requires much less frequent watering in January than April.

***First Weekend of January.*** Feed plants in active growth with a half-strength solution. Feed bougainvillea twice this month with a 0-14-4 or 2-12-12 fertilizer. It will do wonders for flower production. While you make the rounds, check every plant closely for signs of insects and diseases. One slip in pest control now can mean a battle later- a few mealybugs on the leaf undersides of an innocent-looking coleus, for instance can cause a lot of trouble.

Tulips, daffodils, and other spring-flowering bulbs you have potted up for forcing should have a good root system now. Bring a few pots into the greenhouse. Pay a call on your local garden center. You may find a supply of plump, healthy amaryllis. Planted now, these will give you a welcome flower show in March and April.

***Second Week in January.*** This is the usual time in the month for taking cuttings, repotting, and dividing. However if your January days are cold and cloudy, put off such activity until later. Bring in more pots of hardy bulbs for forcing. Now while the days are short, check to be sure the glass is clean. Dirty windows reduce the amount of light. To keep down the growth of algae inside, use a household detergent to wash all greenhouse parts including the glass. Once a year (now or in June, whichever you prefer), clean all parts with a copper sulfate solution, mixed at the rate of one-third pound to 2 gallons of water.

***Third Weekend of January.*** Feed growing plants with a half-strength solution of fertilizer. Maintain your vigilant watch of signs of pests. Begin the forcing process for pots of well-rooted hardy bulbs brought in from a cold place. Clean your tools.

Give the handles a coating of

continued on page 25

bright-colored enamel. Write out labels for seeds and bulbs as they arrive. Attach the labels to packets or paper bag with masking tape. This pleasant January activity saves hours of precious time later in the year.

***Fourth Weekend of January.*** Your best efforts to start the year with a clean greenhouse will need fortification now. Bring in a few more pots of bulbs for forcing. If you have the space to experiment, plant six gladiolus corms in a 12-inch pot or tub. These will give extra early bloom in the greenhouse, or you can use them to decorate your patio for the first brunch of the outdoor-living season. In my experience, tomatoes need ten weeks' growth before being planted outside. If your average date of last killing frost is April 15th, you need to plant tomato seeds in late January for the first of February. To start tomato seeds, I fill twelve 2 ¼ –inch pots with a mixture of equal parts garden loam, peat moss, and sand, then plant a few hybrid seeds in each. Later these are thinned to leave one seedling in each pot. In February, I start six 2 ¼ -inch pots each of hot and sweet peppers, and in March six 3-inch pots of cucumbers the same way. All this saves transplanting time, and gets the plants off to a rapid start with minimum trouble on my part.

**Dividing and Repotting to do in January**

African Violets Clerodendrum
Orchids Begonia Geranium

**Cuttings to Make in January**

Ageratum Carnation Crossandra
Beloperone Clerodendrum Gardenia
Browallia Crassula Geranium

**Bulbs to Plant in January**

Amaryllis Calla-Lily (yellow or pink) Gloxinia

# Put Your Greenhouse on a Schedule

## Elvin McDonald

## February

Outdoors the sky is winter gray, but in the greenhouse there is the blue of summer. Ageratum, browallia, exacum, felicia, myosotis, and clematis bloom like swatches of a heavenly June day. There is the freshness of spring as Dutch irises, tulips and daffodils unfold dewy petals, and marguerites reflect the sunny mood of a meadow in May. Purple-flowered heliotrope, trained to tree form, opens rich clusters of fragrant bloom, with pink king's crown (Jacobinia carnea) in a royal display beneath. In the southeast corner of my greenhouse in February there are the warm colors of the annual flowers of July-beloperone, bougainvillea 'California Gold', and Chinese hibiscus- and across the aisle, in what I've come to know is a cool micro-climate, are nearly bursting buds of calceolarias and cinerarias.

Lengthening days cast a feeling of optimism over the greenhouse this month, and the propagation of plants goes into full swing. You can be freer with the fertilizer- I go to biweekly feedings at container-recommended strength unless the month proves uncommonly cloudy and damp. In February, and again before frost in fall, I am thankful that most of the area underneath my benches is not regularly occupied. By the end of this month, seedlings, pots of spring bulbs and maturing cinerarias, calceolarias, and other spring flowers will crowd every semi-dormant plant from the benches and shelves to the floor.

***First Weekend in February.*** Put feeding at the top of your list, but as you make the rounds, look for pests and diseases. There are many seeds to sow now for greenhouse flowers. For example schizanthus (poor man's orchid) planted now will give May flowers. Transplant to 3-inch pots; pinch back to induce branching. Shift on to 5's before bloom time.

If you want an abundance of early-flowering annuals for your outdoor garden, February is the ideal time for sowing most kinds. To start non-transplantables like bush sweet peas, sow individual seeds in 2 ¼ inch pots of vermiculite. Keep warm and moist. Feed biweekly after growth is apparent, and keep in a sunny, airy atmosphere. By the time you have planting –out weather, these will be near the budding stage.

***Second Weekend in February.*** Vegetative propagation by cuttings and divisions can go into full swing now. This the time when I make quantities of coleus and dusty miller (Cineraria maritima 'Diamond') cuttings in order to carry out a yearly planting outdoors that combines foliage colors of golden chartreuse, mahogany, and silver. Check the lists at the end of this chapter for repotting you may need to do now, and for bulbs to plants. Tuberous begonias started in February will give flowers for Mother's Day, well head of summer heat in most areas.

***Third Weekend in February.*** After feeding and pest control, sow some more seeds. Whenever you have a considerable quantity to plant, space sowings two weeks apart so that all seedlings will not need to be transplanted at the same time.

continued on page 26

***Fourth Weekend in February.*** Cleanup and catch-up now. There will hardly be any time in March to do what should have been done in February. Groom mature plants. Transplant seedlings and rooted cuttings. Bring in the last pots of bulbs for forcing. Check your supplies. You may need to stop at the garden center for pots, labels, stakes, plant ties, fertilizer, pesticides, or soil mixture ingredients.

**Repotting and Dividing to Do in February**

| | |
|---|---|
| Abutilon | Kaempferia |
| African Violet | Orchids |
| Agapanthus | Strelitzia |
| Begonia | Tulbaghia |

**Cuttings to Make in February**

| | | |
|---|---|---|
| Achimenes | Clerodendrum | Dipladenia |
| Ageratum | Coleus | Dusty Miller |
| Allamanda | Crassula | Gardenia |
| Beloperone | Crossandra | Lantana |
| Campanula | Croton | Tibouchina |
| Cestrum | | |

**Bulbs to be Planted in February**

| | | |
|---|---|---|
| Achimeses | Agapantus | Amaryllis |
| Caladium | CallaLily (yellow and pink) | |
| Gloxinia | Begonia, Tuberous | |

# Put Your Greenhouse on a Schedule

**Elvin McDonald**

## March

Dreams of a greenhouse filled with flowers come true this month. There are bouquets of cinerarias, every plant covered with daisies of unmatched brilliance. Calceolarias open pocketbook flowers in fiesta colors, and, picking up the theme, *Oncidium spendidum* wafts dancing-girl orchids into the air. Pansies, oxalis, bougainvillea, calendulas, geraniums, impatiens, lantanas, nasturtiums, and Thumbelina zinnias carry on the riot of color. But there is dignity too in this dazzling flower show; a Dutch hybrid amaryllis with flowers of pristine white, fairy primroses blooming in delicate heather colors, the last fragrant freesias of the season, and baskets of sweet alyssum like a fall of snow.

March is a month of great activity in the home greenhouse. Keep a firm hand on the schedule you developed when there was less to do. Work can easily pile up now, and then the gardener is tempted to go grasshopper from one thing to another. This experience led me to the work plan that I have carried into this book-lists of things to do by weekends. Sometimes I put in an hour or two early in the morning, or at night, so that the work of one weekend doesn't encroach on that of the next.

This is a month of abundant bloom. And it follows that your program of good housekeeping will intensify. Keep fading blooms off plants and in your wastebasket. Tend pest control carefully. Watering is required more frequently. Be sure automatic ventilators and the exhaust fan are working properly. At no time in the year is my greenhouse more flower-filled than in March.

***First Weekend in March.*** While you go about the feeding routine, look for aphids, mealybugs, red spider mites, scale, or other pests. A minor infestation this weekend could be major by next. At the end of this chapter you will find a list of seeds to sow now for flowers for your greenhouse; this is also the time to start seeds for the outdoor garden. A list of annual flowers and vegetables that benefit from an early start indoors is included in February's schedule.

***Second Week in March.*** This is the time to channel all efforts to the greenhouse. Repot and divide. Put in cuttings to assure a future of vigorous, young plants for the greenhouse. Plant bulbs of achimenes, tuberous begonias, caladiums, calla-lilies (yellow and pink), and haemanthus. This may not sound like a busy weekend, but repotting and dividing even two or three plants has a way of leading from one thing to another, like pulling crabgrass in July. Before all this pleasant activity becomes work, take a break. Sit down for a cup of tea and feast your eyes on the flower show.

***Third Weekend in March.*** This is a repeat of the first one. Apply a full round of liquid fertilizer. Take care of pest control. Plant seeds for greenhouse flowers (see list at end of this month).

***Fourth Weekend of March.*** By now you have a healthy cache of seedlings started for the summer garden, and for your greenhouse. Be sure they have ample light, fresh air, moisture and fertilizer. If you have a perennial border, this is a good time to sow seeds of some new kinds, or to replenish those you have already. Transplant later to nursery rows in your outside work center, or to an out of the way, protected part of the garden. This place needs to easily reached with the hose for frequent watering in dry periods and convenient to your comings and goings. Seedlings started now will be vigorous clumps by September, ready for permanent planting in the border.

continued on page 27

**Repotting and Dividing To Do In March**

| | | |
|---|---|---|
| Abutilon | Begon | Croton |
| African Violet | Beloperone | Haemanthus |
| Agapanthus | Cacti | Kaempferia |
| Ardisia | Camellia | Orchids |
| Allamanda | Capsicum | Strelitzia |

**Cuttings To Make In March**

| | | |
|---|---|---|
| Acalypha | Crassula | Ixora |
| Allamanda | Crossandra | Jasminum |
| Aphelandra | Croton | Lantana |
| Ardisia | Dipladenia | Nerium |
| Beloperone | Echeveria | Passiflora |
| Bouvardia | Episcia | Salvia |
| Cacti | Euphorbia | Stephanotis |
| Cestrum | Gardenia | Stevia |
| Clerodendrum | Geranium | Tibouchina |
| Coleus | Hibiscus, Chinese | |
| Columnea | Hoya | |

**Bulbs To Plant In March**

| | |
|---|---|
| Achimenes | Calla-Lily (yellow and pink) |
| Begonia, Tuberous | Haemanthus |
| Caladium | |

# Start Your Own Seeds

By Tom Eckert, PA

This time of the year normally brings an abundance of seed catalogs especially if you purchased seeds from one company in the past. Why are these companies sending me catalogs? The simple answer is that most companies, including seed companies, sell their customer information to other companies for a profit. Seed companies are no different from other companies looking to gain your attention and hopefully becoming a new customer. However, it does amaze me how many catalogs I receive that never make it past the recycle bin on the back porch.

For the average gardener purchasing from more than one or two seed catalogs is enough especially when the postage and handling is included. Be cautious about those "buy 10 seed packs and get one free" or other promotional "it's too good to pass up this offer." Only order what you originally wanted or you just might end up with more seed packs than you have place to seed and plant them. Going into box stores that sell plants and seed packs, how can you resist the temptation to look over the racks of seed, I know it is hard to resist but try.

There are many very good seed companies out there and I have in the past 55 years dealt with many of them. Harris Seeds 800-544-7938, Horticultural Products Supply (HPS) 800-322-7288, Totally Tomatoes (they sell a lot more than just tomato seeds) 800-345-5977, Johnny's Select Seed 800-854-2580, and Ivy Garth Seed 800351-4025, Burpee Seed 800-888-1447, just to mention a few. Burpee Seed and Ivy Garth offer free shipping with minimum purchases, others may also make this offer. [Copy editor's note: All these companies have appealing and informative websites that facilitate ordering with a few clicks and no tedious filling-out of paper order forms that must be stamped and mailed. Writer Tom hints at why I wonder at receiving a knee-high stack of catalogs when everything I need is waiting at my computer.]


There are many seed starter kits available on the market.

continued on page 28


Garden Centers have many displays of seed starting items and growing lights available.

Some seed companies like Ivy Garth Seed cater to the more commercial grower, providing larger seed packs and selling by the seed count per pack. I switched my allegiance to Ivy Garth Seed several years ago after learning about their customer service and especially their 330-page seed catalog. The catalog can be a little difficult to master but I like the CD ROM included in the inside front cover that shows a picture of every plant in the catalog including vegetables, also a little difficult to learn how to use it. Growing information is also listed as to height, zone, germination, temperature tips and any special needs for germination of the seed.

***When to start seeds and what kind.***

There is "no one time fits all for seeding." Seed type determines when to seed them. Add to that area will the seed be started indoors or directly seeded into the gardens. It must be determined if the seed is a cool loving seed or needs warm soil conditions to germinate and grow. Learn what your hardiness zone might be. There are nine growing zones in the lower 48 states. If you can, visit a local greenhouse and garden centers that have information racks with growing information on the plants and seed that they sell. This is a wonderful customer service provided to their shoppers. Do not bother looking in those box stores for such information, they only want to sell their products. Most of the smaller seed packs purchased from store racks have some planting information on them. Seed catalogs do a better job of providing guidelines for when to start your seed. Starting seed indoors or outdoors, this information is a guide and depends on the area of the country that you live. [Copy editor's note: The index to the Parkseed catalog continues a remarkable amount of information in little space—like if a seed needs darkness in order to sprout or if it's one that needs light to trigger growth.]

If you are new to starting from seeds, whether flower, vegetable or herb, follow directions as best you can and don't scold yourself for any failures. Remember most "but not all" flowers and vegetable seed like warm soil to grow their roots and develop into plants you will be proud to show off. Warm soil is usually in the range of 60 to 70 degrees. Tomatoes are a good example to talk about. Many people want tomato plants the last week of April or the first week of May in our area. "I want to beat the neighbor to having the first tomato this year." Tomatoes love warm soil of at least 65 degrees to spread their root system. This year we experienced a long cold spring until mid-May and then the soil temperature averaged only 60 degrees until June.

I planted out my tomato and pepper seedlings the first week of June. With the cooler than normal weather conditions, the plants just seem to set there not growing much. With the entry of July into the growing season, the temperature went into the 85 to 90-degree area and stayed there. The plants just took off growing.

I get a lot of "the late frost got my tomatoes but the peppers were ok, how come?" The simple answer is that peppers can handle the cooler weather better than tomatoes. Tomatoes are basically 80 to 85 per cent water where pepper plants are in the 12 percent range. Tomatoes freeze much quicker than peppers.

***Know your seed requirements***

Alyssum as an annual seed is a cool loving plant and will germinate at 50 to 55 degrees and thrive. However, alyssum perennial seed need warmer soil of 69 to 75 degrees to germinate and grow.

continued on page 29

***What Are You Interested Growing?***
Are you interested in growing annuals, biennials or perennials?

**Annuals** are plants that live for one year until the hard frost of fall kills them. Some annuals under ideal conditions may look like they came back in the spring but these plants are usually growing from seed dropped by the "mother" plant last fall and just had enough shelter from the harsh winter to be able to germinate in the early spring. Marigold, begonia, poppy, and morning glory are good examples.

**Biennials** are plants capable of living for two years to complete their growing cycle and then die out. They normally do not flower the first year of their growth. Here again some varieties can self-seed themselves and appear to grow like perennials. Forget-me-not, foxglove, hollyhock, and Sweet William are a few examples.


Excellent Garden Centers will have displays such as this one at Stauffers' of Turkey Hill

**Perennials** will live for three or more years given good growing conditions. Depending on the flower type and color you desire, there is a perennial variety that will fill your growing needs. Like annuals, perennial seed can be purchased in a wide variety of color and leaf styles.

continued on page 30

**What Best?**

Depends on your outlook with flowers. Perennials may be cheaper in the long run as you plant them and they come back year after year providing the same flowering color year after year. Annuals on the other hand are usually much cheaper to purchase and allow you to change colors in the gardens every year. To get around this problem area many people plant both perennials and annuals gardens and inter mix the plantings yearly.

***Seed Starting Indoors***

***The containers***

You will need seeding trays, cups or some container to hold your seed starting mix. Dixie cups and egg cartons can provide ideal seeding containers if you poke drainage holes in the bottom of them. These holes should be about one-fourth-inch size. If containers are used that had food in them they should be sanitized by soaking in a mix of household bleach and warm water. One part of bleach to eight parts of water. A "part" will be determined by the amount of a sanitizing mix you wish to make, a cup can be the "part" measurement. Example: one cup of bleach to 8 cups of water. Soak for about one hour and then rinse the containers with clean water.

Do not use regular potting soil as it is too large of particle size – the peat moss, vermiculite and pearlite contained in these mixes are simply too large and many seed variety will be "washed" deep into the soil. The seed will rot before it has a chance to germinate. For seed starting use a good quality ***seed starting mix*** such as Pro-Mix PGX, Berger BM2, Burpee seed start mix, Jiffy mix, or another fine grind germination seed starting mix. Quality seed starting mixes contain those nutrients proven to aid in seed germination and growth while providing proper drainage of excess over watering. Organic seed start mixes are also available, read the package for instructions when using them.

Fill the containers with the seed starting mix and lightly press down to somewhat compact it. Moisten the seed starting mix enough to make the container moist to the bottom. Test a container of mix by moistening it, let it set for a minute and then dump it out. If the bottom of the mix is not moist try again. You will get the procedure down quickly.

***Seeding***

Large size versus small size seed: Know your seed and their germination requirements. The seed packs or the catalog growing information will be your guide. Generally larger seed can be placed on top of the container and gently pressed into the soil mix. Larger seed normally need to be covered slightly with additional soil mix to properly germinate. Most seed need total darkness to germinate. How many seed per container will depend on again on seed size. Larger seed will produce a larger root system so you do not want to place the seed against each other. When it comes time to transplant the seedlings you do not want to have to pull apart the plants because the root systems are intertwined with each other. Having to do so may well damage your new plants.

Very small seed like petunia seed are almost as fine as dust. For this reason, many seed companies offer these seed types as a coated seed or "pelleted seed" to increase their size for ease of planting. The coating is usually made from clay and as such it takes more time for the clay coat to break down for the seed to germinate. It is important to keep these seed container moistened. Pelletized seed are worth the little extra cost when it comes to sowing them into containers.

Again, seed size determines how to sow them into containers. Large seed like squash can be "stuck" into the containers with the "pointed" end of the seed into the soil. I grow several varieties for sale and the seed is stuck directly into three-inch pots with regular potting soil and with a cover of about one-fourth inch of soil over the seed. Large size vegetable seed do not need special seed starting mix to properly germinate. Seeds like squash, cucumber and basil will germinate in five days when properly watered and kept in a warm place such as a greenhouse. On the other side of things, if you wait until the garden soil is warm, 60 degrees plus, you can directly sow into the gardens; however, it is difficult to judge how big the plants will grow. Many plants do not like to be crowded together and will not perform well.

Using one of those many types of vibrating and hand held clickers work well for seeding. Tapping the seed out of a small cut in the seed pack works but it takes some trial and error to properly learn this process so as not to dump a small pile of the seed in one spot. Depending on seed size you can remove some from the seed pack into the palm of your hand and then individually pick and place them into the containers.

continued on page 31

I should mention that some seeds with a hard seed coating will need what is called scarification. These seed have a coating that just will not allow moisture to break down the coating for germination. These seed need to be "nicked or scratched." This takes time doing it by hand. The seed can be rubbed across a light grit of sandpaper or across a fine metal file to scratch the seed coat. The may also be soaked in water overnight starting with water that is hot. How hot is hot is a good question?

After two years of growing the morning glory *Ipomoea* 'Cameo Elegance,' I still have trouble reaching an 80 per cent germination rate. Their seed coat is hard and they get soaked in water overnight. However, they are a variegated morning glory plant most have not seen and well worth the trouble to grow them. They are one of our big sellers at market. A very beautiful plant with a reddish flower and a white throat on a variegated leaf pattern.

### *After Planting the Seed*

Lightly spray water over the planting surfaces but do not soak them. Do not use a hose with the setting to jet unless you want to knock the seed out of the containers. Likewise, do not hold the containers under the sink faucet and turn on the water, it will blast the seed and soil out if the container. *You should use warm to the touch water* for your seeds and seedlings as they sprout. Some people set the containers in trays of water to bottom water. Although this works I have found that you can somewhat "forget" about the containers and let them set in the water which will water log the growing soil and possibly damage the seed.

Since I seed in growing flats I use those "flat domes" or "humidity domes" that are placed on over the flats to help control soil moisture. The possible problem here is not to forget to remove the domes during the daytime after the seed have sprouted. Forgetting to do so allows the temperature inside the domes to raise upwards of 140 degrees and frying the young seedlings and killing them. It is best to get into the habit of removing the humidity domes every morning. Placing a piece of clear plastic over the containers works the same way to help control soil moisture, it also has the same problem if you forget to remove it during the day time hours.

You do have to daily check the growing containers to monitor the moisture in the soil. The soil should be kept moist for the seed to germinate. Seeds that do not require a covering of soil need plenty of light to germinate. If the seed pack or catalog state, the seed need "light" do not cover them. Just sow the seed on top of the potting soil and moisten them.

### *Seed Sprouting*

Many seed varieties will show sprouting in 5 to 10 days. Some seed with a harder seed coat could take up to a month to sprout. Soil temperature is critical to seed sprouting. Seed catalogs normally state the desired temperature range for the soil for various seed varieties. Most seed do well at 65 to 75 degrees F. Here again you should know if the seed needs to be covered or sowed on top of the container soil. If the seed catalogs note "light" for a seed make sure the seed is sowed on top of the soil and lightly pressed into the soil so it holds its position when watering. These "light" sprouting seed will need auxiliary lighting above them on cloudy days. These seeds should have 10 to 12 hours of light per day.

After the seeds have sprouted, remove the container covering or humidity domes from them. This will prevent too much buildup of heat and frying your new seedlings. When the first true set of leaves appear on the plant it is best to provide a light airflow over the seedlings. Just enough so the seedlings can feel it but not be blown over by it. This will help in the plant growing a strong stem system and help prevent fungal problems like damping off disease. Depending on how you started your seeds, they may need separated and transplanted into individual pots.

### *Hardening Off*

When the plants have at least two true sets of leaves you can start to use a diluted fertilizer mix to water them. As the plants grow to around five inches tall you can then start the hardening off or getting the plants used to the outdoor climate. This should be done in steps by moving the plants outdoor in late morning till late afternoon. This should take place over a five to 10-day period and after the chance of frost has passed in your area. The plants will then be ready for their inground planting.

Tom Eckert is the HGA Publications Director and Editor of the HGA Magazine. Tom enjoys growing in 3,000 SQ feet of greenhouse space for spring sales of mostly annual plants.

# HARDENING OFF PLANTS ISN'T HARD

## By Steve Aegerter, Colorado

**"**Hardening off" may sound like some sort of difficult preparation for a college exam, but take heart, it isn't. It isn't even hard.

Hardening off refers to the process of acclimating plants that have begun life indoors to the outdoors. Because plants usually are grown in greenhouses, hot houses or basements under fluorescents or on a kitchen window ledge, they've been fairly well pampered. They need to be introduced slowly to the usual garden elements of wind, sun and temperature fluctuations.

Initially, you will put the plants outdoors primarily in the shade for a couple of hours daily. Then work up to semi-shade then finally after about a week, into full sun – after which time the plants will be ready for the garden.

*Tip of the day:* To make it easier, especially if you tend to get distracted and I'm speaking from experience here, place the plants on the east side of the house and in the sun, but only about 12 inches from the shade. Why? Well, if you forget or something time-consuming interrupts your concentration, the plants are protected automatically as they will be in full sun for only about 15-20 minutes. Then the savior of the shade rides in wearing a white hat and saves you from your forgetfulness–no harm, no foul.

Then repeat by again placing them in the sun the same distance for a several more times, gradually lengthening the distance between the plants and the shade**.**

To further toughen the plants prior to their outdoor move and as part of this acclimation process, about a week before taking them outside slowly cut back a little bit on the water. Also, another big assist in the hardening off process can come from using an oscillating fan set on low to gently jiggle the plants – this will strengthen the stem prior to the initial move outdoors. The use of a fan can be started well before moving the plants outdoors.

It's not absolutely necessary if the above acclimation process has been followed but transplanting on a cloudy day certainly has it merits. When you transplant, arrange the soil to provide support for the stems and water with a weak solution of fertilizer similar to the strength you've been using during the time they were mere seedlings. Allow the water to do most of the work of settling the soil around the roots.

Just in case, like a good scout, "be prepared" and always have season extenders handy, hot caps, frost blankets (Reemay) or just some old sheets and blankets to offer protection from a cold snap, but avoid plastic. The use of a 40- or 60-watt incandescent bulb provides a great deal of heat in an enclosure of Reemay (1).

So you see, "hardening off" isn't hard if you follow some simple steps to protect your "precious babies" from the big bad effects of the sun and imperfect weather.

(1) Reemay is a lightweight, highly effective row cover that Territorial Seed Company (territorialseed.com) has been promoting and selling for 30 years. Use it once and Reemay will likely become a staple in your garden shed.

**Steve Aegerter** is a Master Gardener and landscape designer based in Denver. Steve is also an HGA member.

A display of some “ICE” ORCHIDS
Picture provided by Elvin McDonald

Elvin McDonald will be providing several orchid related articles starting with the Spring 2017 HGA magazine issue.

## MEMBER GREENHOUSE FOR SALE

Nancy Smith smithnan88@yahoo.com
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I am no longer able to spend the time necessary in my greenhouse. Purchased from Charley’s Greenhouse, August 2013. Specs: Vitavia Jupiter Greenhouse. Foundation 8 ft. 5 in. by 14 ft 4 in. Ridge Height 8 ft. 4in. Eve Height 4 ft. 11 in. Anodized Aluminum frame with 10 year guarantee.

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AIS is the International Registration Authority for Hedera, provides source for new and unusual ivies.

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