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Overwintering Succulents

By Corinne Frey, vcfrey@yahoo.com

Karol Lowe tends to some of the 20,000 succulents (369 different cultivars and varieties) being grown at Lowe's Garden Center in Minot, ND (Fig. 1). This spring, the plants will be dispersed to eleven remote sites. In the meantime, they will receive optimum care in one of the 20+ greenhouses on the locally owned and operated third generation facility.

Karol's passion for succulents was apparent as she told about the care required for successful overwintering in our northern climate. She said, "Succulents are the perfect plant for today's busy society. They come in a large variety of shapes, textures, sizes, and colors, but don't require a lot of work. However, they do require tons of light."

In botany, succulent plants, also known as succulents, are plants with parts that are thickened, fleshy, and engorged. The leaves and stems of succulents are water storage organs that help them survive in arid climates and soil conditions. The word "succulent" comes from the Latin word *sucus*, meaning juice, or sap.

Karol's overwintering tips to improve success:

- Choose healthy, pest free plants from a reputable source (Fig. 2).
- Select a sterile pot/container with multiple drainage holes.
- Use a sterile non-clumping potting soil. Potting soil mixed with coarse sand, and perlite or vermiculite, works well. Test the soil before planting. It should crumble in your hand when wet, and not form a ball.

Start with one part potting soil mixed with one part coarse sand, or buy a good cactus mix. Fill container with damp soil, and plant at same level as previous container.

- Succulents need water, they are not a cactus (all cacti are succulents, but not all succulents are cacti). Karol's motto: Succulents will survive, but they will not thrive without adequate water. Beautiful winter blooms show how succulents can thrive when cared for properly (Fig. 3). The majority are dormant in the winter, so less

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EXTENSION

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Fig. 1. Karol Lowe tends to some of the 20,000 succulents (369 different varieties) being grown at Lowe's Garden Center in Minot, ND. Photo courtesy of Corinne Frey.

water is needed than when they are outside and actively growing. Water only when top 1 - 1 1/2 inch is dry. Water thoroughly until water drains out of the bottom of the container. Immediately dispose of any excess water in tray.

- Too much water results in yellowed, translucent, soggy leaves.
- Not enough water results in shriveled/puckered leaves.
- Bottom brown leaves are natural, just pull them off and discard.
- Brown and dry top or middle leaves are an indication of extreme lack of moisture.
- Give your succulents tons of light, four to six hours a day near a south facing window. Inadequate light results in leggy, less colorful foliage. Even in optimal greenhouse conditions, succulents will become leggy. Don't be afraid to prune them.
- Succulents are easy to start from leaf and stem cuttings. If a leaf or stem breaks off or is cut, just stick it back into the soil. The Lowe's have numerous "mother plants" like the one in (Fig. 4) that they do not sell, but use for propagating.
- Plants need air flow, but keep them away from heat vents.
- Do not fertilize in the winter. Begin fertilizing around Mother's Day, and every two weeks throughout the active growing season.
- To enhance even growth, rotate pot 180 degrees once a week.
- Groom plants to keep them clear of dead foliage.
- Pest problems should be handled as soon as noticed. A cotton swab dipped in 70% rubbing alcohol can be used to wipe off pests, however diagnosis and treatment should be handled by a professional. Take a close up picture of the problem, or bring the plant to an NDSU Extension agent, or year round greenhouse. While transporting the plant, place in a clear plastic bag to prevent the spread of pests.
- Artificial light can also be used while overwintering succulents. The vast amount of information about artificial lighting can be overwhelming. Dr. Esther McGinnis starts a three part series on light in this issue of The Dirt. Please refer to her article for more information.

Special thanks to Karol Lowe for sharing her expertise. She highlighted some family history during our visit, and additional information was found in a June 10, 2019 article by Ashton Gerard in the Minot Daily News. Karol's husband, Phil, is the third generation in the 90 year family owned and operated garden center. Phil's grandfather, Albert Lowe, ran a local



Fig. 2. Choose healthy, pest free plants from a reputable source. Photo courtesy of Corinne Frey.



Fig. 3. Beautiful winter blooms show how succulents can thrive when cared for properly. Photo courtesy of Corinne Frey.



Fig. 4. The Lowe's have numerous "mother plants" that they do not sell, but use for propagating. Photo courtesy of Corinne Frey.

grocery store from the 1920's to the 1940's. In 1929, he purchased 18 acres of land to grow vegetables to sell at his grocery store. Ten years later, Clarice and Jim Lowe, Phil's parents, headed the company, and slowly moved the truck or market operation to a bedding plant business. After graduating from college in 1973, Phil took over the family operation, and expanded it to a year-round facility. Phil and Karol's plan for retirement was to pass the business to his son, James L. Lowe, however James passed away unexpectedly in August of 2018 after being diagnosed with cancer. Following James' death, Karol's son, Kristofer Williams, asked to purchase the business and continue its operation at the original site - 1640 4th Avenue NE in Minot, ND.

Kristofer's offer was a relief to Phil, Karol, and the thousands of customers who rely on Lowe's Garden Center.

For more information about Lowe's Garden Center, check out their website lowesfloral.com or find them on Facebook@[LowesGardenCenter](https://www.facebook.com/LowesGardenCenter).

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Additional Source:

Gerard, Ashton. "90 Years of Family and Growth" Minot Daily News. 10 June 2019. Business Print.

Light Quality and Artificial Lighting

By Esther E. McGinnis, Ph.D., NDSU Extension Horticulturist, esther.mcginnis@ndsu.edu

Light is very important for plant growth, development, and reproduction. Gardeners are surprised to learn that many university horticulture programs require students to take a semester of college-level physics for the purpose of learning about light energy. Plant producers are interested in three dimensions of light: photoperiod, light intensity, and light quality. This column will be the first of three articles on the different light dimensions and will focus on light quality. While this article may be a little more complex than usual, stick with me because there will be a payoff! You will understand why LED plant lights come in those strange multi-colored arrays.

The Three Dimensions of Light

Photoperiod is the number of hours of light per day and it ebbs and flows with the seasons. Short or long day photoperiods may trigger flowering in certain plants. For example, poinsettias and mums require short daylengths of 8 to 9 hours to flower. In contrast, certain milkweed species may require more than 14 hours of light to bloom.

Light intensity is the amount of light energy (think of them as individual packets or particles of light) that a plant receives to power photosynthesis. It takes an astounding amount of light energy to perform photosynthesis because the plant must essentially split an atom of water into hydrogen protons (H⁺) and oxygen to drive complex chemical reactions. Light intensity can be measured instantaneously or over the course of an entire day. During winter, light intensity decreases dramatically in North Dakota because of the earth's tilt and because of the short daylength.

Light quality, the third of the three dimensions of light, refers to the different colors of light wavelengths. Visible light appears white to the human eye. However, we can split white light into a rainbow of different colored wavelengths using a spectrum. Each color has a different wavelength measured in nanometers (nm); shorter wavelengths have more energy than longer wavelengths. While a spectrum can split visible light into a rainbow of colors, plant scientists focus on blue, green, and red wavelengths because of their importance in photosynthesis.

The Color of Light

Blue light has the shortest wavelengths and is the most energetic (400-500 nm). Table 1. Plants strongly absorb blue wavelengths for photosynthesis. If plants were only exposed to blue light, they would be extremely short and have tiny leaves. Red light (600-700 nm) is also strongly absorbed for photosynthesis and is useful for flowering. In contrast to blue light, plants only exposed to red light would be fairly tall with bigger leaves. Exposure to both red and blue wavelengths results in a quality plant that is more compact and well-branched. Another benefit of exposure to both red and blue wavelengths is that red or purple-leaf plants will color up faster under this combination. This is important if you are growing a red leaf lettuce or an ornamental plant with red leaves.

Newer research shows that green light is also useful for photosynthesis in plants but less so than blue and red. Plants reflect more green light than blue or red. This is why plants appear green. Beyond the visible spectrum of light is far red light (700-800 nm).

Plants exposed to larger amounts of far red light will appear stretched and lanky. An example would be plants that are shaded and crowded by other plants. Shaded plants are exposed to higher levels of far red light and will put all of their energy into growing tall to rise above the plants that are shading them. This is called shade avoidance. However, a small amount of far red light is necessary for normal leaf expansion and stem elongation.

The reader may be asking, "Why are you torturing us with this boring lecture on the physics of light?" Here's the payoff—understanding light quality is important for picking a plant grow light. The takeaway message is that you want a light that emits red and blue wavelengths. It is acceptable to mix in green wavelengths but is not required. Finally, too much far red light will decrease plant quality. However, a small amount of far red light is still necessary for normal plant growth.

Artificial Lighting

The plant industry has many types of lights to enhance plant growth. This article will focus on incandescent, fluorescent, and LEDs (light-emitting diodes) as light sources to grow seedlings for transplant in the garden or to provide supplemental amounts of light for houseplants.

Incandescent lights are being phased out because they give off a lot of heat and are less energy efficient than other lights. From a plant growth standpoint, incandescent lights emit too much far red light to be useful as a single light source to start tomato or flower seedlings. Plants grown solely under incandescent bulbs will appear spindly just like they were grown under the shade of another plant.

Fluorescent lights are more energy efficient and are commonly used as plant grow lights. The 4-foot long fluorescent tube lights (shop lights) are inexpensive and effective for growing plants. Two tube lights are mounted in each shop light. To be effective, the fixture should be hung on an adjustable chain at a height of 6-12 inches above the plants (Fig. 1). As the plants grow, the chain will need to be adjusted. From a light quality perspective, fluorescent tube lights are considered broad spectrum and will emit both red and blue



Fig. 1. Fluorescent shop lights are mounted on a steel shelving unit at a height of 6-12 inches above the plants. Home microgreen production is shown.

wavelengths. Very little far red light is emitted. In some applications, a small number of incandescent bulbs are added to supplement the amount of far red light.

Light emitting diodes (LEDs) are relatively new to the market and are generating a lot of excitement because they are remarkably energy efficient and the “bulbs” are long-lasting. However, LEDs are very different than fluorescent tube lights and are not broad spectrum. Instead, LEDs are engineered to emit a narrow band of light. Commonly marketed LED plant lights emit a purple light because they contain both red and blue diodes in the array (Fig. 2). As discussed above, red and blue wavelengths maximize photosynthesis and normal plant growth. Commercial greenhouses that use LEDs primarily use red and blue arrays.

Some of you may be asking, “Esther what about the white LED bulbs in the hardware store!” A white LED that you would put in your ceiling fixture at home is actually a blue light disguised with a coating on the bulb to make it appear white to the human eye. The white coating on the bulb does produce a small amount of far red light that may be beneficial in some applications.

Thoroughly confused? What do we tell fellow gardeners? I would say the science of LEDs is still in its infancy and plant growth results may differ depending upon the plant species and the stage of plant growth. Don't be afraid to experiment and make adjustments if needed.

Light	Wavelength (nm)	Function in Plants
Ultraviolet	100-400	Initiate plant defense responses
Blue light	400-500	Photosynthesis (more efficient)
Green light	500-600	Photosynthesis (less efficient)
Red light	600-700	Photosynthesis (more efficient)
Far red	700-800	Shade avoidance
Infrared	780-2500	Heat
Thermal (longwave)	2500+	Heat

Table 1. The distribution of light by wavelength. Wavelengths between 400 and 700 nm are visible to the human eye. Plants use blue, green and red light wavelengths to power photosynthesis and they have a large effect on the size and shape of plants.

For now, we can say red and blue LEDs are very efficient at promoting photosynthesis in plants. These fixtures can be used for starting seedlings and for providing supplemental light for tropical houseplants. The only drawback is that red and blue fixtures may not provide the small amount of far red light that is necessary for optimal growth.

In the near future, plant light arrays will come in different color combinations because people do not like the purple light that results from the combination of blue and red diodes. Can you imagine working in an indoor vertical plant farm in purple light all day? The purple light makes it hard to recognize plant disease symptoms and nutrient deficiencies. Green LEDs may be added to the blue and red array to result in a white light that is more pleasing to the eye. The only disadvantage is that green LEDs are less energy efficient.

In addition, we are seeing more people buying LED fixtures that contain red and white lights. The pink light that results from the combination is less irritating to the human eye and contains blue, red, and far red wavelengths.

Reader, thanks for reading the whole article! LED lights are definitely the future. We just need more research to optimize their use in different settings. In the next issue, we will talk about the effect of photoperiod on flowering.



Fig. 2. Photo of a red and blue LED grow light that is being used for supplemental lighting in an office.



Begonias as Houseplants

By Lila Hlebichuk, lilahl@yahoo.com

Most begonias are enjoyed as shade loving annuals for the outdoor garden here in North Dakota. When the snow is blowing and the temperatures are too often below freezing we can only dream of the many beautiful begonias available for our outdoor gardens. Many of these same begonias can brighten the chilliest day when grown as houseplants.

“*Begonia* is a genus of about 1,300 species of annuals, perennials, shrubs and climbers. Most have fleshy stems. Some produce underground

tubers or rhizomes. They are grown for their showy flower or colorful leaves; some for both. The genus name honors Michael Begon (1638-1710), Governor of French Canada.” (Missouri Botanical Garden).

Many of us may remember our parents and grandparents keeping houseplants with dots covering the long elegant leaves. The widely popular Angel Wing begonia is a fibrous cane type of begonia and is a hybrid between two species. Cultivars such as ‘Snow Capped’ (Fig. 1)

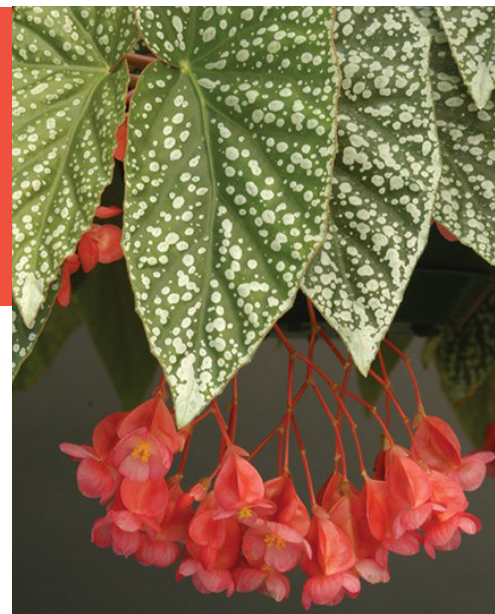


Fig. 1. Angel Wing Begonia ‘Snow Capped’. Photo courtesy of Logee’s.

have intense leaf spotting and rose-red blooms. For hanging baskets, 'Whimsy', is ideal with its spreading form, dark green leaves with light pink spotting and bright pink blooms. Another favorite for hanging baskets is the dwarf and ever blooming 'Coral Chimes'.

Wax begonias (*Begonia semperflorens-cultorum*) (Fig. 2) are a beloved garden plant in our area. They can also be enjoyed as a houseplant growing to about 18 inches high. After all danger of frost is past in the spring they can be planted outside and in the fall the plant or cuttings can be brought inside to over winter and be enjoyed as a houseplant.

Tuberous begonias (*Begonia x tuberhybrida*) (Fig. 3) can be a bit tricky to grow as a houseplant due to their winter dormancy requirement. Most gardeners dig up and store the tubers for winter. They can be upright or trailing with single, double or ruffled blooms. Colors include shades of pink, yellow, orange, red and white. Their leaves in green, gold, purple and burgundy can be as stunning as the flowers.

The flowers on the Rex begonia (*Begonia rex-cultorum*) (Fig. 4) are insignificant. These stunning plants are grown for their four to nine inch asymmetrical leaves and dramatic leaf markings if provided with the proper indirect light, not too much water, a light, but rich soil, monthly feeding in the summer and at least 50% humidity.

Easier to grow and less fussy about humidity than the Rex begonias are the rhizomatous begonias (many species). This type grows from a modified stem called a rhizome. Rhizomatous begonias vary in size from compact houseplants to shrub-sized giants. Included in this group

are star begonias with their pointed leaves, iron cross begonias with their distinctive leaf markings, and the beefsteak begonia with oval leaves.

With so many choices available, there is a begonia for everyone that will brighten the indoor landscape throughout our long, harsh winters.

Sources:

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<https://www.logees.com/>
<https://www.thespruce.com/rex-begonias-1403155>

American Begonia Society: https://www.begonias.org/Articles/Vol47/Rhizomatous_begonias.htm

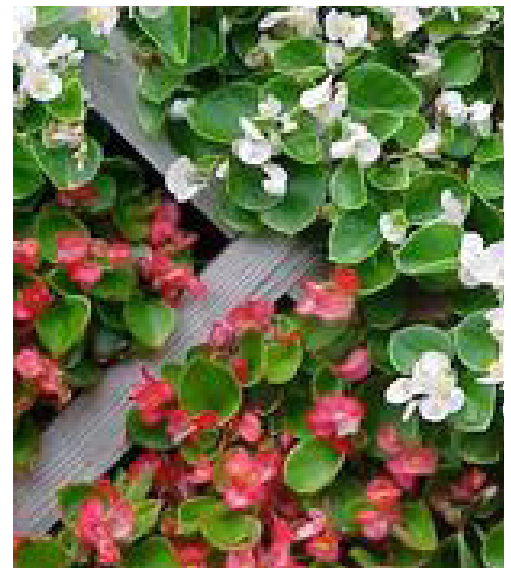


Fig. 2. Wax Begonias. Photo courtesy of Missouri Botanical Gardens.

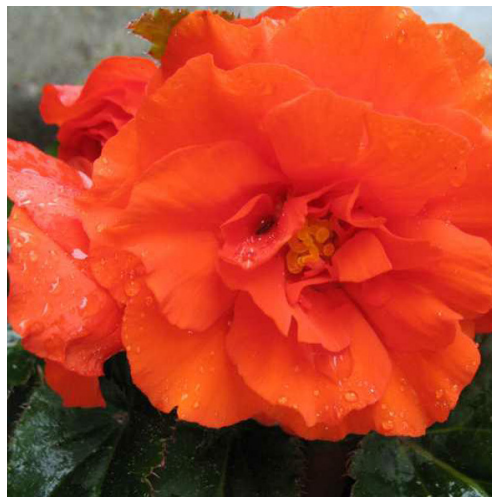
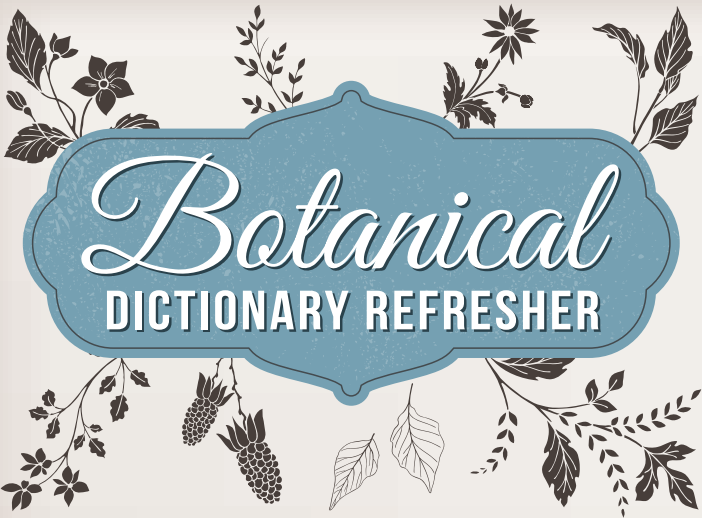


Fig. 3. Tuberous Begonia. Photo courtesy of Missouri Botanical Gardens.



Fig. 4. Rex Begonia. Photo courtesy of Missouri Botanical Gardens.



Botanical

DICTIONARY REFRESHER

By Lila Hlebichuk, lilahl@yahoo.com

The following can be found in the article on Begonias:

asymmetrical: Having parts which fail to correspond to one another in shape, size, or arrangement; lacking symmetry.

cultorum: Relating to gardens and cultivation

fibrous: A fibrous root system is the opposite of a taproot system. It is usually formed by thin, moderately branching roots growing from the stem. A fibrous root system is universal in monocotyledonous plants and ferns. The fibrous root systems look like a mat made out of roots.

rhizomatous: A plant stem that grows horizontally under or along the ground and often sends out roots and shoots. New plants develop from the shoots. Rhizomes are used to store starches and proteins.

tuberous: Tubers are enlarged structures in some plant species used as storage organs for nutrients. They are used for the plant's survival, to provide energy and nutrients for regrowth during the next growing season, and as a means of asexual reproduction.

Bird Houses

Putting out the Welcome Mat

By Cathy Ruebel, foxtail2400@gmail.com

Looking at open prairie in the middle of January can give you plenty of time to think and dream about spring, and all of last year's ideas that didn't come to fruition. Years ago, a friend gave us a bird house that he made out of scrap wood. I always thought that I could do that too, but had no place to put a new bird village. My trees are little, but there's plenty of room with hundreds of feet of fence line that could support a small colony. It's time to build that bird house!

Even before heading to the building center for materials and supplies, there are bigger questions to be answered. What birds do I want to attract to my garden? Is my location suitable to their natural habitat? What is the nesting habit – shelves, open or closed boxes – even the material is important. What about predators, such as other birds or neighborhood pets? Hole size can be critical to the species of bird you want to occupy your nest box; the wrong bird can compete and chase off the desired birds, destroy the eggs, or kill the hatchlings. As you can see from the chart, an eighth inch isn't much, but can determine the ultimate occupant.

You can buy any type of bird house to suit your fancy online, or pick up some cute ones at a craft fair. (Fig. 1) Some of those pre-made houses and kits can be more decorative than functional, especially

Species	Hole Diameter
House Wren	1"
House Finch	1 ½"
Eastern Bluebird	1 ¾"
House sparrow	1 ½"

when you think about the natural habitat of a particular species. Maybe you're missing out on the real fun? Check out North Dakota Game and Fish Department's publication by Chris Grondahl, "Plans for Building Wildlife Nesting Structures and Feeders for Songbirds." This excellent resource has general information for nesting material and cutting instructions for a wide variety of birds found in this state. It's available for free download, or there is a plethora of free bird house plans online.

A few miles down the road, I spotted some bluebird nest boxes on fence posts around a youth camp. I've never seen a bluebird around here, but apparently they are found in North Dakota. The North American Bluebird Society (NABS) has a wealth of information, from fact sheets to a number of tried and proven nest boxes. I learned that my location would be ideal habitat: shorter grassland, good distance from wooded areas and shrub covered coulees, water nearby, not many other birds they list as deterrents, and insects...yes, bugs and spiders galore! Time to put out the Bluebird Welcome Mat.

I decided on the Peterson Bluebird House design after reading about how Minnesota naturalist, Dick Peterson, designed this nest box with a sloping roof to deter predators and rebuild declining species populations. Finding a plan that makes sense for your skill level will save a lot of time and several trips to the building center. Some plans assume more skill or a workshop full of the best tools and



Fig. 1. Birdhouses, Cathy Ruebel.



Fig. 2. Stove pipe or ducting and wire mesh can be used to protect bird boxes from predators. "2013_04_24_EABL_WWVSP_2663" by Kathy1006, CC BY-NC-ND 2.0

equipment. The plan I found said it could be done by an experienced woodworker in an hour, or an afternoon for a novice. It wasn't that quick and easy. I had to draw out the various pieces on paper to figure out what dimension lumber to buy. It didn't indicate what size screws and nails to use either, which accounted for two of the trips to the building center.

Use untreated wood, preferably rot resistant varieties such as cedar or redwood. Select a nontoxic sealant for pine or hardwoods, or light colored paint to reduce heat buildup in the hot summer months. Don't paint or seal the inside, as the hatchlings will peck at the finish. Cardboard or flimsy board are not suitable as that can be easily destroyed by the weather or predators. No perch is needed on a bluebird box; it would only facilitate harassment by house sparrows.

All of the boxes should be vented and openable to allow for cleaning of old nesting material. Check the boxes thoroughly for



Fig. 3. Peterson Bluebird House design, Cathy Ruebel.



"Angry Little Bluebird" watercolour by Cathy Ruebel

cracked or rotten wood and mounting security. Predators, such as other birds, cats, raccoons, or even climbing snakes, can be deterred by installing devices such as baffles, shields, or wire mesh around the entrance hole. (Fig. 2) Keeping an eye on the comings and goings during nesting time will also help to deter unwanted newcomers or predators. If the entrance hole becomes enlarged by squirrels or woodpeckers, a wooden guard or metal hole plate can be installed.

Location of the nest box is important because bluebirds are territorial, and other birds can chase them away. Mount the box at least five feet off the ground, ideally on a smooth sturdy support, such as metal conduit or a T-post. A pair of nest boxes mounted 15 to 30 feet apart will allow for one box to be used by an earlier arriving other species, while leaving a second box for the bluebird pair. Allow 300 feet distance

(or out of line of sight) between individual or paired bluebird nest boxes to reduce territorial competition.

I didn't find the NABS or the North Dakota plans until I had my nest box pieces cut out and ready to assemble. It was a good learning experience on many levels. Safety glasses are a must (not just cheap words for legal purposes) as there was sawdust flying everywhere. Certainly a miter saw would have made those angled cuts a lot more accurate and safer than what I experienced with my trusty jig saw. I now have enough screws to build a small village of bird houses. It's certainly not perfect, but I shall call it a success. (Fig. 3) My second bluebird nest box will be better looking and quicker because I know what to expect, plus I will invest in more expensive cedar wood.

Weather permitting, the best fencepost will be scoped out and prepared for mounting the bluebird box. It still needs a coat of linseed oil to protect the untreated pine, but good ventilation in the room is a must; January doesn't provide much opportunity for opening a window. The silence of a long winter is an opportunity. It gives us time to educate ourselves on the latest gardening trends, develop carpentry skills, and prepare for the upcoming gardening season. Soon, the sound of migrating waterfowl will break the quiet, with the songbirds following in their wake. The Bluebird Welcome Mat will be out on this little piece of the North Dakota prairie. Invite some new birds to your neighborhood with a bird house this spring!

Resources:

North Dakota Game and Fish Department, author Chris Grondahl: "Plans for building Wildlife Nesting Structures and Feeders for Songbirds"

https://gf.nd.gov/sites/default/files/publications/nest_structure_plans-1.pdf

North American Bluebird Society (www.nabluebirdsociety.org)



Herbal Tea at Home

By Martha Willand, marthawilland@hotmail.com

There are fewer things more comforting on a cold day than a hot cup of tea. This explains why tea is second to water as the most-consumed beverage in the world. Traditionally, 'tea' refers to the leaves and buds of the plant *Camellia sinensis*, but it is sometimes erroneously applied to 'herbal infusions' or 'tisanes.' Tisanes have been enjoyed for thousands of years for both culinary and medicinal use. They can be made with fresh or dried herbs, fruits, berries or roots, and are easy to make at home from plants commonly found in your garden or growing in the wild. Making tisanes at home is economical, fun, and simple way to utilize abundant plants and fruits. What else will you do with all that mint?

Harvesting and Drying

Gather herbs in the early morning before the sun and wind can reduce the levels of medicinal oils within the plants. You can use the

herbs fresh and simply pour boiled water over them, or dry them for future use (Fig. 1). There are several methods for drying your herbs, fruits and roots. Dehydrators are hassle-free and require little attention during the process. Most herbs will be dry within a few hours. A dehydrator also works well for drying large yields.

An oven can also be used. This method is especially successful for larger fruits or those with higher moisture such as lemons, raspberries or ginger root. Simply set the temperature below 212° F and lay your harvest in a single layer on a baking sheet. Move and flip your items every 5 minutes to

ensure even drying.

Perhaps the most traditional method is to simply hang your herbs in upside bunches. Not only is this easy, it can be decorative. For best results hang your herbs in upside down bunches in a dry, warm and dark location with good ventilation (Fig. 2).



Fig. 1. Fresh Chamomile Tea, CCO 1.0 Universal <https://www.pxfuel.com/en/free-photo-jokml>



Fig. 2. Hanging Herbs, MJ, CC BY 2.0 <https://www.flickr.com/photos/149811903@N04/34130252776>

Tea Bags

Various methods can be used for infusing your tisanes. Tea balls work well for bulk teas, but are less handy when using a travel mug or if you plan to give tisanes as a gift. Tea bags are readily available for purchase online or in specialty shops, and can be easily filled at home. Originally created in 1908, tea bags were created by a New York merchant looking for ways to cut prices on tea samples. Prior to the tied silk bags, tea was sold in tins. Customers mistakenly thought the bags were meant for submerging in water as opposed to them merely being packaging. This marked the creation of the tea bag. While initially made of silk, tea bags are now made of nylon or paper and can be sealed with staples, draw strings, pressure-sealed or glued.

Preparing Tisanes

The most important element for tea is the water. To showcase the flavor of the tea or herbs, try to use spring water that is free of minerals that could alter the taste. Boiling water is generally too hot, and can damage the flavor or aroma of most plants. The ideal temperature for water is 176 °F. To easily reach this range without a thermometer, let your water come to a boil, remove from heat and wait 2 minutes before using. Dried herbs should be steeped for 5-10 minutes, and fresh leaves for even longer. If you are using a root or rhizome, you will have to make a decoction rather than an infusion. To draw out the full flavor and medicinal qualities you should simmer the root directly for 15-30 minutes.

Herbal Iced Tea

You needn't ditch your favorite herbal teas in the heat of summer; one can easily create refreshing, tasty and elegant iced teas (Fig. 3).

While it may be tempting to abandon the stovetop in favor of making sun tea, studies have shown that this can actually be dangerous. To kill bacteria, water must reach 195° for 3-5 minutes. Sun tea will only reach a maximum of 130° outdoors, and this creates a hospitable environment for the bacteria *Alcaligenes viscolactis*. To safely make iced tea, steep your tea at twice the regular strength and pour over ice. If adding sugar, be sure to dissolve in the hot tea prior to pouring over ice. You can enjoy the iced tea immediately, or leave it in the fridge. Enrich the flavor profiles by adding fruits such as lemons, raspberries and strawberries (and their leaves), cucumbers, and herbs such as lemon verbena, mint, anise hyssop, etc. Strain upon serving and add floral and herbal ice cubes for extra decadence (Fig. 4).

Storage

Like spices, tisanes should be stored properly to ensure quality and improve longevity. Enemies are heat, light, moisture and aromas. Store tea at room temperature in a vessel that limits moisture and blocks sunlight, or stow in a cabinet. The best containers are opaque glass, stainless steel, plastic and ceramic.

Common North Dakota Tisane Ingredients

Many herbs, flowers, and fruits that flourish in the upper Midwest can make tasty additions to herbal teas. You may already have some of these perennials and annuals in your garden or perhaps growing wild nearby. Flavors you may want to include: violet flowers, rosehips,



Fig. 3. Ice Tea, Unconventional Emm, CC BY-NC 2.0 <https://www.flickr.com/photos/fluffymuppet/21933424645/>



Fig. 4. Floral Ice Cubes, Poppet with a camera, CC BY 2.0 <https://www.flickr.com/photos/infobunny/7388612104>

elderflowers, chamomile, wild licorice, anise hyssop, lemon balm, lemon verbena, pineapple sage, mint, echinacea, ginger, apples, raspberries, aronia berries and chokecherries. The combinations are limitless! Even if you want to skip the hassle of making your own tea mixes you can add herbs or fruits to your favorite store bought teas: ex. add raspberries or apple slices to green tea, or add rosehips to orange pekoe. There are many online and printed sources to guide you on your culinary pursuit so think beyond the ordinary. Put on your creative thinking cap for enjoying herbs, flowers and roots in a new context this upcoming summer.

Additional Reading:

Dubrin, Beverly. *Tea Culture: History, Celebrations, Recipes and More*. New York: Penn/imagine Publishing, 2010.

Martin, Laura. *A History of Tea: The Life and Times of the World's Favorite Beverage*. New York: The Ivy Press Ltd., 2015.

Liversidge, Cassie. *Homegrown Tea: An Illustrated Guide to Planting, Harvesting and Blending Teas and Tisanes*. New York: St. Martin's Griffin, 2014.



Fig. 1.

A Native Prairie Meadow

By Tamara Metzen, Master Gardener Intern, tamara.metzen@outlook.com

Since I was a child growing up in rural southeast North Dakota in the 1970s, I have always enjoyed exploring the landscape, even though the area where I lived was mostly farmland. I pretended that I was living in the era of Laura Ingalls Wilder who, along with her family, moved onto the Great Plains when it was an uncultivated expanse of native prairie grasses and flowers (Fig. 1). I clearly remember the opening scenes of the tv show, *Little House on the Prairie*, where Laura and her sisters are running across the landscape through the tall, waving grasses. However, there were very few native prairie meadows where I lived. The few wild flowers I remember were Canadian anemone (*Anemone canadensis*) growing in the ditches, prairie phlox (*Phlox pilosa*) peeking out of the edges of shelterbelts and occasional prairie roses (*Rosa arkansana*) hiding under fence lines where the plows couldn't reach them. At home, my mother was known for her hybrid irises and daylilies which were beautiful but a little ostentatious for me.

In 1988, my husband and I moved to a rural farmstead near the Sheyenne River Valley (Fig. 2). Working in the public education field, I had the summers to explore. I began to take excursions into public lands and started to notice the subtle beauty of the plants. I purchased several native prairie identification books and was soon able to recognize common species and began searching for those that were less common and even rare. I noted blazing star (*Liatris pycnostachya*), purple cone flower (*Echinacea purpurea*), and wild bergamot (*Monarda fistulosa*). I also searched for prairie smoke (*Geum triflorum*), closed gentian (*Gentiana andrewsii*), pasque flower (*Anemone patens*) (Fig. 3), marsh marigold (*Caltha palustris*), blue-eyed grass (*Sisyrinchium angustifolium*) and the wood lily (*Lilium philadelphicum*). I never did locate the endangered white fringed prairie orchid (*Platanthera blephariglottis*). As I learned to appreciate these plants in their native habitats and the ecological role that they play, I also developed an interest in growing them.

I attempted to propagate the more common native prairie flowers into my own flower beds, often with disappointing results. At the time, I was not overly concerned about digging up common species for my garden. I later learned that, in many states, there are laws about protecting native plants. In fact, species that are on state or federal threatened and endangered lists cannot even have their seeds, or any



Fig. 2.

parts, collected without a permit. In addition, I know now that very few native plants tolerate being dug up as their roots are uncommonly deep, having to compete with native prairie grasses in times of drought. One of the few I did get to grow was spiderwort (*Tradescantia bracteata*), which became a real nuisance in my garden, as it tended to reseed prolifically. My family and I moved in the 1990s to another rural home near Hankinson, ND, near several native prairie sites. The local women's group I belonged to partnered with Tewaukon National Refuge to establish a walking trail through Stack Slough and hosted several events to encourage the public to enjoy the prairie. One goal we had was to locate an endangered prairie butterfly known as the Paweshiek Skipper, (*Oarisma poweshiek*), which had been previously seen on the site, although no sightings to my knowledge were made.

More recently, in 2017, my husband and I moved to his family



Fig. 3. Pasque flower. Photo courtesy of Mississippi WMO <https://flic.kr/p/FXR5Fd>.

farmstead near Milnor, ND. Behind the old barn is a one-acre site that was an old dairy cattle yard which hasn't been occupied for 40 years. It had been planted in non-native grasses with very little species diversity. The soil is very sandy with a gravelly base, being on the western edge of the Red River Valley on the shores of ancient Lake Agassiz. This area would have been considered the transition zone where the tall grass prairie meets the mixed grass prairie. When we built our new home, we used about ½ acre of the cattle yard to build a drain field for our septic system. This area quickly grew into a weed patch that needed to be mowed at least weekly once the soil had been disturbed. Tired of looking at a field of weeds, I talked my husband into replanting the area into native prairie. I discovered that, although many native plants will tolerate a variety of soils and moisture levels, it is a good idea to determine the general soil type and soil moisture for the intended planting area and to select the species that are best adapted to these conditions. I also knew that it was wise to locate locally-grown seed and plants, so that their genetics would be suitable for the climate and soil conditions that we have. I did not want naturalized species that were known to be invasive. Some species, for example purple loosestrife (*Lythrum salicaria*), have been outlawed in many states because it is an invasive species in waterways.

I consulted with Mathew Olson from the Sargent County Soil Conservation District. He recommended the seed company, Milborn Seeds, Brookings, SD, as a good source. I decided to order the Little Country Native Mix which was designed with grass species suitable for both wildlife and landscaping purposes. In addition, many of the grasses are bunch grasses that grow in clumps and will not provide too much competition for the wildflowers. Sod-forming grasses, which are often used in lawns, would be less desirable in a wildflower meadow for this reason. The grass species and the percentage of each in the mix included 30% little bluestem (*Schizachyrium scoparium*), 20% blue grama (*Bouteloua gracilis*), 20% side oats grama (*Bouteloua curtipendula*), 5% prairie dropseed (*Sporobolus heterolepis*), 10% Virginia wildrye (*Elymus virginicus*), 10% slender wheatgrass (*Apropyron trachycaulum*) and 5% prairie June grass (*Koeleria cristata*). Because I was interested in establishing native wildflowers for both their beauty and for their pollinator benefit, I also included the Native Forbs mix which included 12% black-eyed Susan (*Rudbeckia hirta*), 9% prairie coneflower (*Ratibida columnifera*), 9% purple coneflower (*Echinacea purpurea*), 8% evening primrose (*Oenothera speciosa*), 8% western yarrow (*Achillea millefolium* var. *occidentalis*), 6% white prairie clover (*Dalea candidum*), 6% wild bergamot (*Monarda fistulosa*), 5% plains coreopsis (*Coreopsis tinctoria*), 4% Canada milkvetch (*Astragalus canadensis*), 4% hoary vervain (*Verbena stricta*), 3% blanket flower (*Gaillardia aristata*), 2% false sunflower (*Heliopsis helianthoides*), 2% grayhead coneflower (*Ratibida pinnata*), 2% Illinois bundle flower (*Desmanthus illinoensis*), 2% Indian blanket (*Gaillardia pulchella*), 2% Maximilian sunflower (*Helianthus maximiliani*), 2% New England aster (*Symphotrichum novae-angliae*), 2% partridge pea (*Chamaecrista fasciculata*), 1% common milkweed (*Asclepius syriaca*), and 1% Rocky Mountain Bee Plant (*Cleome serrulata*). I realized that some of the grass and wildflower species in the mix are not local but compromised due to the lower cost for a mix of species rather than purchasing them individually. I searched the internet for other relatively

local sources of seed and found Prairie Moon Nursery based in Winona, Minnesota. They offer individual seed packets for \$2.00. I have seen most of these species growing wild regionally and was willing to take a chance. I ordered



Fig. 4.

packets of Canada anemone (*Anemone canadensis*), pasque flower (*Anemone patens*), bottle gentian (*Gentiana andrewsii*)(Fig. 4.), smooth blue aster (*Symphotrichum laeve*), prairie blue-eyed grass (*Sisyrinchium campestre*), early buttercup (*Ranunculus fascicularis*), common blue-eyed grass (*Sisyrinchium albidum*), Joe Pye Weed (*Eutrochium maculatum*), prairie onion (*Allium stellatum*), prairie smoke (*Geum triflorum*), prairie spiderwort (*Tradescantia bracteata*), prairie larkspur (*Delphinium virescens*), tall larkspur (*Delphinium exaltatum*), butterfly weed (*Asclepias tuberosa*), queen of the prairie (*Filipendula rubra*), blue wild indigo (*Baptisia australis*), Maxmilian's sunflower (*Helianthus maximiliani*), dotted blazing star (*Liatris punctata*)(Fig. 3), harebell (*Campanula rotundifolia*), golden alexander (*Zizia aurea*), and showy beardtongue (*Penstemon cobaea*). It was important for me to choose a variety of species to attract a diversity of pollinators and to provide pollen and nectar sources from early spring to late fall. Sources recommended that at least 3 flowering species per season from early spring to late fall should be planted.

Once the seeds from Prairie Moon Nursery arrived, I read individual packet directions, realizing that the majority of the seed required 30-120 days of cold stratification. This was ideal, as they were going to be planted in the fall with all winter to remain dormant. If I had waited to seed until spring, the seeds that required cold stratification should have been sowed in growing media and placed in the refrigerator for the appropriate time period. In addition, wild blue indigo (Fig. 4) was leguminous and needed the addition of soil inoculants containing rhizobia bacteria which was included but required an additional step to prepare before planting. I did not purchase species that required scarification, heat treatment or light treatment although some native species may need one of these treatments to germinate. I planned to plant the seeds of these individual species in marked 4 foot square trial areas on the edge of the ½ acre site to determine germination rates of each and to transplant the seedlings throughout the site once they were growing well next spring or summer.

Removing existing vegetation from the planting site was recommended so that it would not compete with the desired varieties.

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2020 Horticultural Workshops and Events for North Dakota

Date	Workshop	City	Website for More Information
March 14	7th Annual Spring Tree and Garden Workshop	Williston, ND	https://www.ag.ndsu.edu/willistonrec
March 26	NDSU Spring Fever Garden Forums (Home and Environment Sessions)	Many county locations and online	https://www.ag.ndsu.edu/springfever
March 28	West Otter Tail County Garden Day	Fergus Falls, MN	https://ottertailcountymn.us/departement/u-of-mn-extension/
April 2	NDSU Spring Fever Garden Forums (Vegetables)	Many county locations and online	https://www.ag.ndsu.edu/springfever
April 4	Grand Forks Gardening Saturday	Grand Forks, MN	https://www.ag.ndsu.edu/grandforkscountyextension/events/gardening-saturday
April 9	NDSU Spring Fever Garden Forums (Landscapes)	Many county locations and online	https://www.ag.ndsu.edu/springfever
April 16	NDSU Spring Fever Garden Forums (Fruits and More)	Many county locations and online	https://www.ag.ndsu.edu/springfever
April 17-18	Dakota Garden Expo	Bismarck, ND	https://www.ag.ndsu.edu/dakotagardenexpo
April 25	Garden Palooza	Fargo, ND	https://www.ag.ndsu.edu/casscountyextension/horticulture/save-the-date-garden-palooza-2020
April 25	Stutsman County Extension Garden morning	Jamestown, ND	https://www.ag.ndsu.edu/stutsmancountyextension

