

MASTER GARDENER TRAINING—FIRST TWO WEEKS

January 26 through February 4, 2010

By *Peter Longley*

INTRODUCTION

The Springfield-Greene County Botanical Center has been the goal of Friends of the Garden from the commencement of clearing land to create Drummond Lake and Close Memorial Park until today. Now, the dream is close to reality—the building is going up, the landscaping around the center has been planned. The Center embraces more than just Close Memorial Park, however. It is a bringing together of our several independent parks and educational bodies interested in the quadrant of land off Scenic Avenue that makes up Nathanael Greene and Close Memorial Parks. Friends of the Garden will share the building with The Missouri University Extension and Master Gardeners, as well as the Springfield-Greene County Parks Board. In turn, this will bring under one roof, the Mizumoto Japanese Stroll Garden, the Gray-Campbell Homestead, the Federated Garden Clubs Garden, the Master Gardeners' Demonstration Garden, the remaining land of Nathanael Greene Park and the extensive gardens of Close Memorial Park, including the Bill Roston Butterfly House, not to mention the anticipated grounds around the Botanical Center itself. With all this exciting development that will almost certainly create one of the finest Botanical Centers and Gardens in the Midwest, it is only natural that we should start on a cross-pollination of all our interested parties. It is for this reason, along with hoped for personal botanical growth (no pun intended), that I have chosen, while our gardens are dormant, to make my winter project attendance at the classes of this year's Master Gardeners' Training Course.

There are about fifty of us from Greene County undergoing training this year, some of whom are members of Friends of the Garden, including Todd Young, Nancy Hopkins, Rebecca Clemens, and Kelly McGowan. Hopefully, in the future we can encourage many more of our active volunteer members to consider this training. Volunteers will always be the backbone of our future work with the whole park.

WHAT IS HORTICULTURE?

We had our first class last week on Tuesday, January 26. We were all presented with a veritable horticultural bible, *Grounds for Gardening*, produced by the Missouri University Extension, that is a very full and detailed encyclopedia of extension advice and leaflets. The class was conducted by Patrick Byers, Regional Horticultural Specialist with the University of Missouri Extension. He started with a brief introductory course on *What is Horticulture?* This was well summarized by a quote from Gail Nonnecke: *Horticulture is the science and art of producing nutritional plants that provide sustenance for the human body and beautiful plants that provide sustenance for the human soul.* Within this viewpoint, what is Agronomy? What is Forestry? What is Horticulture? There are edible plants and aesthetic plants. Have you heard of Olericulture? It is the cultivation of vegetables. Pomology? It is the cultivation and management of fruit and nut plants. Floriculture? It is the cultivation and management of cut flowers, flowering plants, and foliage plants. There are specialties in horticulture like Nursery crop culture, Turf management, Landscaping, including some elements of architecture. Obviously, all these things will be explored as we go through our training.

Horticultural Propagation

The main thrust of the first class was to tackle the vast subject of horticultural propagation, asexual and sexual. The asexual methods are what we term grafting and budding, taking cuttings, layering, division, and micropropagation. The sexual methods are working with seed. Patrick Byers, with detailed illustrations, explained each technique and the best tools to successfully bring them about. An interesting difference between asexual propagation and sexual propagation is the cloning factor. With asexual methods the clone should be an exact replica of the plant from which the graft, bud, cutting, layer, or division came. With seeds, there is not the same exact cloning guarantee. Generally, the asexual methods produce mature plants in a shorter time period than growing from seed. The most complex asexual method seems

micropropagation that is growing plants from tissue culture. In essence, this requires aseptic laboratory conditions, but has the advantage of massive reproduction. For seed propagation, bed preparation was discussed, highlighting the need for oxygen, moisture, temperature, and light. This was followed with a detailed series of illustrations on how to obtain hybrid seeds from crossing two parents and the pollination methods and needs of different types of plant to create seeds. Some plants self-pollinate and many require cross-pollination through insects and bees, and some again, can be pollinated by hand. The dormant period of seeds was discussed and the best means of creating germination. Some require stratification—exposure to cool, moist conditions, and some respond to scarification—the scratching or removal of the seed coat to induce germination. Patrick Byers used examples of treatments for a number of vegetables from tomatoes and beans, to radishes, parsley, and squash.

WOODY ORNAMENTAL SHRUBS

Our second class on Thursday, January 28, was postponed because of inclement weather conditions, so our second class took place on Tuesday, February 2. It was conducted by Christopher Starbuck, Division of Plant Studies, University of Missouri. The topic was *The Establishment and Care of Woody Ornamentals*. The presentation was permeated with humor, but basically had a simple message of common sense: Plant trees and woody shrubs you know thrive in your area, and be aware of their lifelong needs. Sadly, many that buy from the nurseries do not pay attention to either of these essentials. What is our climate zone in Missouri? We have “Michigan winters and Georgia summers.” The best general average for Missouri is now considered to be Zone 6, but in the summer we are Zone 7, and in the southeast corner of the state things grow that will not grow anywhere else in the state. We have tremendous temperature fluctuations in the winter. Christopher Starbuck used the example of November 11, when in 1911 the temperature dropped from 82 to 13 in one day. On the same date in 1940, the temperature dropped 60 to minus 5 in a few hours, and on Halloween in 1991, it dropped from 55 to minus 5. Severe fall and Easter freezes are common, often following mild warm Indian summer and spring weather. The result is we suffer a 10% loss in our plantings. A useful tip to handle the fall frost is not to fertilize too much in the late summer. Dormant plants can withstand much lower temperatures than those that are actively growing. Also, don’t mulch too early so that the soil temperature has the opportunity to adjust slowly. Fall pruning was also discouraged as it encourages growth. Prune in the spring. In the warmer spells, there can be a vast difference in day and night temperatures that in the winter can cause sunscald, which usually attacks a tree on the southwest side. Wrapping a tree in a light-colored material or painting with white latex paint can protect from this, deflecting the sun. Dark wrapping will have the opposite effect, attracting heat and then when the temperature drops causing cell death. “Plants don’t heal, they compartmentalize,” and often damage will not kill as the effected area is walled off. Watch the location of plantings with reference to power lines. Trees grow. Note, too, that 2” trees actually grow a lot faster than 5” trees because the root system has been dramatically reduced in harvesting. The larger tree has to grow its roots back to the full root spread of a 5” tree, first. With a 2” tree it grows back a lot faster.

Location

When considering location, light is also important. Trees are often planted in the wrong location, and true shade plants are limited in varieties. Even shade impatiens require light at least part of the day to bloom well. Junipers, often planted as a ground cover under an ornamental tree, do not do nearly as well as in full sun. Dwarf lilacs are the same. This should be born in mind when designing beds around the walls of a house, particularly on the north and east. Not only is it a matter of sunlight, but also a matter of moisture. Conifers may look good against a brick wall, but they often get mites because their roots are too dry, overhanging eaves etc., detracting from rainfall. Some plants like hydrangeas, and most azaleas and rhododendrons, will find afternoon sun, too strong, so should be planted in areas that get afternoon shade.

Water

Water is next. Evergreens in general, and plants in the Prunus family, are intolerant of excess soil moisture. They need good drainage, but junipers and pines prefer dry soil and can be killed by even short periods of waterlogging. Long periods of soil saturation are particularly damaging when temperatures are high. Roots

require oxygen to take up water, so the symptoms of waterlogging are usually the same as the symptoms of drought stress. Plants are very resilient, however, and tend to adapt under normal circumstances, but with our Mid-west swings, although the annual precipitation might in theory suit a plant, excessive precipitation is often followed quickly by high temperatures and drought. Automatic lawn or turf irrigation is a common cause of mortality. Excess water may gather in the planting holes of recently placed trees and shrubs, which is particularly damaging when air temperatures are high.

Pest Resistance

When it comes to pest resistance, beware what you plant. Old-fashioned crab apples lose much of their summer foliage to apple scab and cedar apple rust fungal diseases, so plant the new cultivars that are more resistant. Avoid Scotch pines. In this region, it is highly susceptible to pine wilt disease caused by the pine wilt nematode.

Planting

There was a long discussion on planting. The common error is to plant too deep. With our hard clay and rock soils it is not depth that will attract root growth, but width. Do not break up soil under the root ball, it will only cause the root ball to sink, and then the roots will grow upward, often girdling and strangling the trunk. Ideally, there should be a root flair from the trunk at base level. Work the soil around the hole to allow for root spread outwards. Beware of mulch volcanoes! Apply mulch no deeper than 4" and taper down to less than an inch deep near the trunk to make a bagel shape. In fall, mix leaves with mulch. Don't use weedmat. Weedmat stops the rotting mulch from being drawn into the soil as organic matter. If you have to stake, do so only as necessary to prevent movement of the root ball so that the upper trunk can still move in the wind. Don't stake for more than a year. Early fall and late spring are the best times for planting, when soil is warm enough to establish root growth. Early fall has the advantage of a longer period of moist soil through winter into spring, especially for pines, but dogwood, hawthorn, and scarlet oak etc., will all do better after a spring planting. The only pruning really recommended at planting is to correct narrow branch angles or forked leaders, and of course, dead branches. Otherwise, excessive pruning removes growing points that produce root-stimulating growth regulators. Pruning also reduces photosynthetic leaf surface area; sugars from photosynthesis are required for root growth. Excessive use of fertilizer was also discouraged. Excessive nitrogen fertilization can stimulate the growth of rank, water-inefficient foliage at the expense of root growth. Mulching with compost usually eliminates the need to fertilize. If applying fertilizer, be moderate, and wait until at least one month after planting. Over watering can be problematic, too. A new tree or shrub usually requires small amounts of water applied frequently. Beware of over-watering shrubs growing in automatic sprinkled lawns. A drip system of irrigation is best. It is the root ball that needs to be kept moist.

Chlorosis

Once established, a common problem with certain plants such as hollies, pin oaks, and azaleas is chlorosis. This condition, usually characterized by a yellowing of plant leaves, happens when iron in the soil is converted to an unavailable form because of high soil pH (about 7.0 or greater). This is hard to treat, but best chance is to drill iron sulphate into holes about 3 ft from the trunk. An alternative is to use Copperas watered in thoroughly at about 30 pounds per 1,000 square feet. In Missouri, Azaleas will do best in raised beds.

BASIC BOTANY

Thursday, February 4, saw us looking at basic botany. Before we started, however, Patrick Byers gave us an interesting test on checking the freeze damage on peach buds. In early February, by taking a stem from last year's growth just cut across the bud and see whether it is brown inside, or green. If it is green, the bud has not been frozen. The same can be done with grape vines. Although one may well find in Missouri that many buds have been frozen, it is in part nature's compensation, as without this elimination, especially with peaches, whose buds are very prolific, we would have too many peaches forming, causing us to have to thin

them out later—a tedious process. Patrick then introduced Tim Schnakenberg, Agronomy specialist at Stone County Extension Center, Galena, Missouri, to put us through a course in *Basic Botany*. We started with the classification of plants.

Classification

Plants are unique. Some, like the Silversward in Hawaii, bloom every 40-50 years and then die. Some are insect collectors like the *Nepenthis Sibuyanensis* from the Philippines. Some are unique by shape such as the Parrot plant from Thailand. Note how we are here mixing proper names with common names. The trouble with this is that common names vary from place to place. This is why we classify plants in Latin. There are over 500,000 classified plant-like organisms. This is based on the code of the Swedish late eighteenth century botanist Carl Linneaus. Every plant has a unique taxon or name in Latin, a dead language that will not vary anywhere in the world. The name is divided into seven categories: Kingdom, Division, Class, Order, Family, Genus, and Species. So the common name 'Bradford Pear' as we know it in Missouri is really: Plantae Tracheophyta Angiospermae Rosales Rosaceae *Pyrus Calleryana*. Several examples of the breaking down of classification were given, but the importance, as serious botanists, of knowing at least the last two kingdoms in Latin, Genus and Species, was stressed. Plants are further classified as Annuals, Biennials, and Perennials. Annuals are propagated seed to seed in one growing season. Biennials grow over two seasons and Perennials three or more. But, according to climate zones, Annuals can become Perennials and Perennials can become Annuals, so these are really local terms.

Dicots and Monocots

Plants are grown from seeds, and as such can be divided into two classes, Dicots and Monocots. Dicots have two sides to the seed and Monocots just one whole. When in foliage the leaves from plants with Dicot seeds have a network of branching veins, but Monocots have parallel leaf veins running in straight lines. The cell structure of Dicots has vascular veins in a ring whereas a Monocot has random vascular veins. Dicots have quantities of five petals in the flower whereas Monocots have quantities of six. So, if you are a true botanist you can work out whether 'she loves you or she loves you not' ahead of time! You will know the outcome! Finally, Dicots tend to have a few long roots whereas Monocots have a more fibrous mass of roots. Either way, the cells of a plant form tissue cells that give the Vascular system, Epidermis, and Periderm or bark, and the tissues in turn develop the cells to form Organs: Roots, Stems, Leaves, Flowers, and Fruit. The Vascular tissues move water nutrients and carbohydrates (plants feed themselves). The vessels carrying water and nutrients are called Xylem and on the inside, and those carrying carbohydrates, are called Phloem and on the outside. The Xylem and the Phloem are separated by a band called Cambium. I only go into this detail here to show how it is that the Cambium we see as the rings in a tree allows us to count the tree's years of growth, as most trees are Dicots.

Structures

Without going into the same detail, let it suffice to say that on this Master Gardener course in basic botany, we studied the structure of roots, stems, nodes, leaves, buds, and flowers. As stems, it was interesting to note the difference between a bulb and a corm. The leaves on a bulb grow from the bottom of the bulb as in an onion or a daffodil, whereas from a corm they grow out of the top as in gladioli. Other modified stems are rhizomes and tubers. Leaves also have modifications. Spines, tendrils and bracts are leaves, including the spines on a cactus or the red bracts on a poinsettia. The basic biology of the flower was explained. A complete flower will have its female pistil, which carries the ovary that produces the seed, male stamens from which pollen is passed to the pistil by wind or bees, petals, and sepals—small, green leaf-like parts at the base of the flower. Some plants are only one sex, however, and lack either stamen or pistil. These varieties require cross-pollination, usually by bees, to survive. It is the ovary wall in the base of the pistil that develops into the fruit around the seed—some edible, some not. Germination is mostly caused by moisture, but light can also cause germination. Seeds turned up by a plowshare sometimes germinate by light or a combination of light and moisture. Night plowing can greatly reduce this risk of surface seed germination by up to 40%. The ancient Egyptians learned they could split rocks in quarries just by creating

a crack in the stone and filling it with seeds, then watering the seeds so that their expansion would split the rock. Pretty amazing.

Foliage

The leaves create the life force of a mature plant. They are the food factories. The process is called Photosynthesis or the production of carbohydrates. Carbon Dioxide (CO₂) and Water (H₂O) from the leaf creates through light, Sugar and Oxygen (O₂). This gives energy growth to the plant. With this growth through sugar and oxygen more leaves are created and the process can be repeated. This process is called Respiration (One could almost call this the process of the plant breathing in the energy for creation and breathing out to create growth.) Respiration can take place day or night. Leaves also act as an overflow for the water supply coming from the roots. Water is shed through stomata holes under the leaf—a process called Transpiration. In a drought, these holes close up to retain as much water as possible. Also, this is why on certain plants, especially houseplants, it is easy to see the water seeping out from the end and underside of the leaf. The water coming up from the roots also carries the earth's minerals to the plant and is responsible for keeping the stem firm and stiff, which is why wilt occurs in drought. In warm weather, Transpiration also acts as a cooling procedure somewhat like human perspiration.

Allelopathy

The final topic for discussion was Allelopathy, the process whereby certain plants produce a chemical in the roots that is released into surrounding soil. This causes the dominance of this plant against any trespassers in its area. This is why it is very hard to grow other plants near walnuts or thistles that both have this property. Alfalfa is another example. Knapweed thistle is a particular problem now in Missouri pastures. There have been experiments with weevils to try to destroy these dominant weeds, but it is not very effective as thistle spores weigh outweigh weevil damage!

As you can see, this course is intensive, but very worthwhile for those of us who may not have been brought up as botanists, but love our gardens. Personally, I garden as a painter. I have painted all my life and I see the garden as a palette, but this Master Gardener foundation might help me to approach design more scientifically and less experimentally, allowing me to save paint! I will keep you informed week by week.

Peter Longley, MA (Cantab)

Friends of the Garden; Writer and author of novels (www.PeterLongleyBooks.com)