Missouri Environment & Garden

April 2014 Volume 20, Number 4

Lily: A Symbol of Life

No other flower is associated with the observance of Easter more than the lily. Its beautiful white flowers are symbolic of purity, joy, hope and life. However, lily was cultivated by civilized man long before it became associated with Easter and has symbolic meaning to many different religions. Let's take a closer look at this very special flower which has enjoyed a unique importance throughout the ages.

The name "lily" is applied chiefly (and correctly) to any member of the genus Lilium. A member of the Liliaceae family, this genus contains over 100 species, all of which are herbaceous perennials that arise from bulbs and produce large, showy flowers. Most are native to temperate regions of the northern hemisphere.

The first mention of lily dates back about 4000 years to a pure white version of the Madonna lily (Lilium candidum). The latter species still is popular among gardeners today, although most modern garden lilies are hybrids of various species. A wide array of artifacts (e.g. jewelry and vases) depicting Madonna lily have been unearthed in ancient cities of Crete, Greece and Mesopotamia.

Ancient Egyptians revered the lily and entombed it with their dead. The Greeks and Romans also treasured it. According to their folklore, Venus, the goddess of love and beauty, was so jealous of the lily that she caused an elongated pistil to grow from its center, thus making it less attractive.

In China, lily was used as a valuable source of food. The latter use probably is what caused it to spread throughout Europe. The Victorian Era saw the discovery of many new types of lilies as European explorers introduced them from the orient.

The lily species used for Easter decoration today is Lilium longifolium, which is believed to have originated in Japan. Writings there date it back to at least the 17th century. Its white, long-trumpeted flowers are spectacular both in form and fragrance. However, this species of lily is not reliably hardy in the Midwest and, if planted outdoors, must be given a protected location if it is to bloom in future years.

As mentioned above, most garden lilies planted today are hybrids that can be classified into one of three different groups: Asiatic hybrids, Aurelian hybrids and Oriental hybrids. The Asiatic hybrids are the earliest flowering of the three. They typically bloom during early summer on strong, erect stems. The flowers of Asiatic hybrids tend to exert themselves more upward than other types, although there are pendulous types as well. They typically achieve a mature height of between 24 and 48 inches.

continued on pg. 3.

In This Issue

Missouri Environment & Garden newsletter is published by the MU IPM Program of the Division of Plant Sciences Extension. Current and back issues are available on the Web at **http://ipm.missouri.edu/meg/**. Mention of any trademark, proprietary product or vendor is not intended as an endorsement by University of Missouri Extension; other products or vendors may also be suitable. Editor: Amy Hess (hessa@missouri.edu)

Don't Guess, Test Your Soil

Soil testing is a home gardener's best guide to the wise and efficient use of fertilizer and soil amendments. We frequently get questions from customers like "I apply fertilizer every year. How come my plants are not doing well?" Most of the time the answer is they never have done a soil test, but have been guessing on fertilizer requirements. They do not realize that by guessing they are not only wasting money by over or under application, the excess fertilizer can end up in streams, ponds and underground water polluting the environment.

A recent soil test summary of lawn and garden soils indicated about 55 to 75% of the lawn and garden soils tested high or very high in soil test P levels and about 65 to 80% of the samples tested in high or very high levels of soil test K levels. We see home garden samples testing up to 900 plus lbs of P and 1000 plus lbs of K which is extremely high. So without testing soils and adding a 12-12-12 fertilizer one can keep building their soil test P and K levels which will be harmful to the plant growth and environment.

A soil test is like taking an inventory of the nutrients available in the soil, which can be too high or too low. Although soil testing kits are available in garden centers, laboratory testing is more reliable and the results are accompanied by interpretations and recommendations for the plants of your choice.

Some plants grow well over a wide range of soil pH, while others grow best within a narrow range of pH. For example Blueberries, Azaleas and Rododendrans grows well only on acidic soils. So it is important that you know the pH of soil and use amendments like lime or sulfur to adjust the pH for optimum levels for plant growth. A soil test is the only precise way to determine whether the soil is acidic, neutral or alkaline.

Soil samples should be taken in the spring or fall for established sites. For new sites, soil samples can be taken anytime the soil is workable. Most people submit soil samples for testing in the spring. Since the gardeners apply fertilizers and manures to their soils each year, garden soils should be tested every two to three years.

The test results are only as good as the sample taken. It is extremely important to provide a representative sample to the testing lab so that a reliable test and recommendations can be made for the entire area. Divide the area into lawns, flower gardens, vegetable gardens and take representative samples from each area and submit to the lab for analyses. This can be accomplished by submitting a composite sample. A good representative composite garden sample should contain eight to 10 cores or slices. Each core or slice should be taken at the same depth (zero to six inches) and same volume at each site. Sample at random in a zigzag pattern over the area and mix the sample together in a clean plastic bucket. More samples need to be taken if the areas was recently limed or fertilized.

The Soil Testing Laboratory at MU offers a regular fertility test that includes measurements of pH, line requirement, organic matter, available phosphorus, potassium, calcium, magnesium and cation exchange capacity. Test costs vary according to the number of nutrients tested. The MU testing lab charges $10 when submitting directly to the lab for a regular fertility test. Several other specific analyses are available. Test reports provide interpretation and nutrient and lime recommendations. Normally samples are processed within a day after being received in the lab. But during the busy time (spring/fall) it can take little longer. Customers should add mail time to get their reports by regular mail service. Lab can email your test results too.

You can contact your county Extension office to obtain Sample Information Forms, sample boxes, and submit samples through their offices. You can also send samples directly to the University of Missouri Soil Testing lab at 23 Mumford Hall, Columbia, MO, 65211. For more information call 573-882-0623. The lab also maintains a website at http://soilplantlab.missouri.edu/soil, where useful information on submitting samples, services offered and the sample information forms can be found.

Manjula Nathan
University of Missouri
Division of Plant Sciences
nathanm@missouri.edu

Lily: A Symbol of Life…

continued from page 1.

The Aurelian (trumpet) hybrids are known for their huge trumpet-shaped flowers that tend to be pendulous or nodding in orientation. Aurelian hybrids bloom in July and August and bear flowers that tend to be more fragrant than the Asiatic types. Giants of the lily world, Aurelian hybrids often reach a mature height of 60 inches or more. Because of their tall stature, some sort of support is warranted in order to keep the plants from toppling over.

The Oriental hybrids are the latest to bloom and typically are at their showiest in August. Their colorful and very fragrant flowers are produced on plants that range in height from 24 to 48 inches. The Oriental hybrids are the least tolerant of cold temperatures of three groups and, if grown at our latitude, need winter protection in order to survive. While their somewhat tender nature might limit their popularity as a garden flower, the Oriental hybrids dominate the lily cut flower market. Cultivars such as 'Stargazer', 'Casa Blanca' and 'Mona Lisa' are all quite familiar to retail floristry.

Whatever the type, garden lilies require much the same care. All are sun-loving plants that tolerate light shade, if necessary. Lilies prefer a fertile, well-drained garden loam. The importance of soil drainage for the survival of bulb plants cannot be overemphasized and lilies are no exception. If drainage is a problem, incorporate several inches of well-decomposed organic matter into the area to be planted.

Planting depth also is very important for lilies to thrive. Lilies develop roots along the portion of their stem that remains below the surface of the soil. These "stem roots" are very important for both water and nutrient absorption. Therefore, lily bulbs should be planted deep enough for adequate stem root development. Dig a hole so that six to eight inches of soil remain above the top of the bulb after it has been covered. Addition of bone meal to the bottom of the hole also is recommended. Once planted, water the bulb and mulch if planting is done in the fall. The latter is the preferred planting time for lily.

An annual maintenance application of a general purpose fertilizer relative low in nitrogen (e.g. 5-10-5) can be made when plants start to break through the soil's surface in spring. Be careful not to over-fertilizer, since excessive amounts of nitrogen can lead to tall, weak stem growth. Additionally, adequate amounts of water should be supplied and competing weeds eliminated.

Insects generally are not a problem. However, aphids can transmit lily mosaic virus which distorts blooms and causes mottling of foliage. Basal rot of lily bulbs can be a problem, especially in poorly drained soils.

Lilies make excellent cut flowers. Harvest them when the lower buds are showing color but not yet open. When arranging them, remove the bottom leaves and recut the stem at a 45 degree angle. Change the water in the vase every few days or use a floral preservative to prolong their beauty.

David Trinklein, Associate Professor
Division of Plant Sciences
TrinkleinD@missouri.edu

Interpreting Your Soil Test Results for Lawns and Gardens

Soil testing is an important tool for growing healthy lawns and gardens. To get reliable results and appropriate fertilizer and lime recommendations, it is important that you submit a representative soil sample from your lawn or garden. For guidelines in taking a representative sample and submitting to the lab for testing, visit MU Soil and Plant Testing Lab's website at http://soilplantlab.missouri.edu/soil/. Once the soil test is conducted and the results are available, the ability to interpret the results is an important consideration in correcting the deficiency or imbalance.

Example of Soil Test Report from MU Soil Testing Labs for Lawns and Garden Fertility Test:

University Extension
University of Missouri
Columbia

Soil Test Report
For Lawns and Gardens
----------MU Laboratories----------
23 Mumford Hall, Columbia, MO 65211, (573) 882-0623
or
P.O. Box 160, Portageville, MO, (573) 379-5431

Serial No.	County	Region
H46109H-1	Boone	
Submitted	**Processed**	
3/27/2010	3/29/2010	

http://www.soiltest.psu.missouri.edu/

Sample ID: Home garden 1

Lab No: CO103997

This report is for:
Lawn Garden
1000 Univ. Ave
Columbia, MO 65201

Last Limed: unknown

SOIL TEST RESULTS			RATING					
			Very low	Low	Medium	High	Very high	Excess
pHs	5.5		**********					
Phosphorus (P)	7	lbs/a	***					
Potassium (K)	191	lbs/a	**********					
Calcium (Ca)	5253	lbs/a	**********					
Magnesium (Mg)	495	lbs/a	**********					
Organic Matter:	2.6 %		Neutr. Acidity:	2.0 meq/100 g		CEC:	16.0 meq/100g	

Fertilizer & Limestone Recommendations (lbs/1000 sq ft)

Crop	Nitrogen(N)	Phosphorus(P_2O_5)	Potash (K_2O)	Zinc(Zn)	Sulfur(S)	LIME
1 vegetables	0.5	4.0	0.5			100
2 blueberries	1.0	4.0	1.0		50	0

Comments:
***Fertilizer rates are given in pounds of actual nutrient per 1000 sq. ft to be applied
***The soil needs additional organic matter for gardens and crops other than lawns. See MU Publication G6950, "Steps in Fertilizing Garden Soil" and G6956, "Making and Using Compost".
***Lime takes two to three months to react with the soil. Apply lime three to six months before planting.
*** For blueberries soil needs to be treated with 50 lbs of elemental S per 1000 sq. ft to acidify the soil. It takes 3 months for S to react with the soil and acidify the soil.
---The soil should be tested every 2 to 3 years to determine the effects of your fertilization practices and to develop a new set of fertilizer and limestone guidelines.

continued on pg. 5.

Interpreting Your Soil Test Results…

continued from page 4.

Explanation of Soil Test Report Form:

- "Sample ID": This is information you provided upon submitting your sample. The fertilizer suggestions are based on this.
- "Ratings" indicates how high or low your soil is considered in each category.
- "pHs" is an indication of the acidity or alkalinity of soil. A pH of 7 is neutral, while values below 7.0 are acidic and values above 7 are alkaline or basic. Vegetables and flowers grow best from pHs of 6.0 to 7.0. Most lawns grow well in pHs range of 5.5 -7.0. However, acid loving plants like azaleas, rhododendrons, blueberries and raspberries prefer pH below 5.5.
- "Phosphorus, potassium, calcium, and magnesium" tests results are listed in lbs/a in the next four lines. These are some major essential elements required for plant growth. However, these numbers have little meanings for home owners. The ratings, however, indicate if these nutrients are considered low or high.
- "Organic Matter" is the percent of organic matter found in your sample. Soil organic matter is essential in the formation of soil structure, reducing compaction, and for retaining plant nutrients. It helps in improving the water holding capacity of the soil, aeration, and tilth. While soil organic matter levels between 2% and 3% are fine for lawns, 4% to 6% is better for vegetables and flowers.
- "Neutralizable Acidity (NA)" is a measurement of reserved acidity in soil and reported in mille- equivalents per 100 grams of soil (meq/100 g soil). This number along with pHs is used in calculating the lime requirement in soil.
- Cation Exchange Capacity (CEC) is the ability of the soil to withhold positively charges nutrients and is reported in meq/100 g soil. While soils with high CEC values can retain more nutrients, low CEC soils can only retain fewer nutrients.
- "Fertilizer and Limestone Recommendations" indicates how much nitrogen, phosphate, and potash (potassium), Zinc, Sulfur and lime your soil needs for each selected crop option of your choice. This is the most important part of the report for home owners. These rates are in pounds needed per 1000 square feet. Depending on the garden size specific amount of nutrient requirements needs to be calculated and fertilizers to be selected accordingly.
- "Comments" The soil test reports have comments at the end of the reports with notes on soil test in general, with additional notes for specific recommendations for your soil.

Manjula Nathan
University of Missouri
Division of Plant Sciences
nathanm@missouri.edu

May Gardening Calendar

Ornamentals

Weeks 1-4: Apples, crabapples and hawthorns susceptible to rust disease should have protective fungicidal sprays applied beginning when these trees bloom.

Weeks 1-4: Pinch azaleas and rhododendron blossoms as they fade. Double flowered azaleas need no pinching.

Weeks 1-4: If spring rains have been sparse, begin irrigating, especially plants growing in full sun.

Weeks 1-4: Fertilize azaleas after bloom. Use a formulation which has an acid reaction.

Weeks 1-2: Canker worms (inch worms) rarely cause permanent damage to ornamentals. Use Bt if control is deemed necessary.

Weeks 1-2: Don't remove spring bulb foliage prematurely or next year's flower production will decline.

Week 1: Continue monitoring pines, especially Scotch and mugo, for sawfly activity on new shoots.

Week 1: Begin planting gladiolus bulbs as the ground warms. Continue at 2-week intervals.

Week 1: Plant hardy water lilies in tubs or garden pools.

Weeks 2-4: Scale crawlers are active now. Infested pines and euonymus should be treated at this time.

Weeks 2-3: Plant summer bulbs such as caladiums, dahlias, cannas and elephant ears.

Week 2: Begin planting warm-season annuals.

Weeks 3-4: Begin fertilizing annuals. Continue at regular intervals.

Weeks 3-4: Trees with a history of borer problems should receive their first spray now. Repeat twice at 3-week intervals.

Weeks 3-4: Bulbs can be moved or divided as the foliage dies.

Week 4: Pinch back mums to promote bushy growth.

Lawns

Weeks 1-4: Keep bluegrass cut at 1.5 to 2.5 inch height. Mow tall fescue at 2 to 3.5 inch height.

Weeks 2-4: Mow zoysia lawns at 1.5 inch height. Remove no more than one-half inch at each mowing.

Weeks 2-4: Apply post-emergence broadleaf weed controls now if needed.

Weeks 3-4: Zoysia lawns may be fertilized now. Apply no more than 1 pound of actual nitrogen per 1000 s.f.

Week 4: Watch for sod webworms emerging now.

Vegetables

Weeks 1-4: Place cutworm collars around young transplants. Collars are easily made from cardboard strips.

Weeks 1-4: Growing lettuce under screening materials will slow bolting and extend harvests into hot weather.

Weeks 1-4: Slugs will hide during the daytime beneath a board placed over damp ground. Check each morning and destroy any slugs that have gathered on the underside of the board.

Weeks 1-2: Plant dill to use when making pickles.

May Gardening Calendar

Vegetables Continued.

Week 1: Keep asparagus harvested for continued spear production. Control asparagus beetles as needed.

Week 1: Begin planting sweet corn as soon as white oak leaves are as big as squirrel ears.

Week 1: Isolate sweet, super sweet and popcorn varieties of corn to prevent crossing.

Week 1: Thin plantings of carrots and beets to avoid overcrowding.

Week 1: Control caterpillars on broccoli and cabbage plants by handpicking or use biological sprays such as B.t.

Week 1: Set out tomato plants as soils warm. Place support stakes alongside at planting time.

Weeks 2-3: Place a stake by seeds of squash and cucumbers when planting in hills to locate the root zone watering site after the vines have run.

Weeks 2-3: Remove rhubarb seed stalks as they appear.

Week 2: Watch for striped and spotted cucumber beetles now. Both may spread wilt and mosaic diseases to squash and cucumber plants.

Weeks 3-4: Set out peppers and eggplants after soils have warmed. Plant sweet potatoes now.

Week 4: Make new sowings of warm-season vegetables after harvesting early crops.

Fruits

Weeks 1-4: Mulch blueberries with pine needles or sawdust.

Week 1: Don't spray any fruits while in bloom. Refer to local Extension publications for fruit spray schedule.

Week 4: Prune unwanted shoots as they appear on fruit trees.

Miscellaneous

Weeks 1-4: Birds eat many insect pests. Attract them to your garden by providing good nesting habitats.

Weeks 2-4: Herbs planted in average soils need no extra fertilizer. Too much may reduce flavor and pungency at harvest.

Weeks 3-4: Take houseplants outdoors when nights will remain above 50 degrees. Most prefer only direct morning sun.

Weeks 3-4: Watch for fireflies on warm nights. Both adults and larvae are important predators. Collecting may reduce this benefit.

Weeks 3-4: Sink houseplants up to their rims in soil or mulch to conserve moisture. Fertilize regularly.

Gardening Calendar supplied by the staff of the William T. Kemper Center for Home Gardening located at the Missouri Botanical Garden in St. Louis, Missouri. (www.GardeningHelp.org)

Organic Apple Production

University of Kentucky scientists recently studied the feasibility of producing Redfree, Crimson Crisp and Enterprise apples organically. Trees were on a B.9 (dwarfing) rootstock and were planted at a 6 ft. (in-row) x 18.5 ft. (between row) spacing in 2007 in Lexington. Trees were trained to a slender spindle system and were fertilized with Nature Safe fertilizer at 100 lbs nitrogen/acre each spring. A mixture of lime sulfur plus Organocide (fish oil + sesame oil) each at 2.5% v/v was applied at petal fall to thin fruit, followed by additional hand thinning. Organically-approved products (Table 1) were applied for pest control and a Weed Badger was used to till underneath trees to reduce groundcover growth.

Total and marketable yield were recorded for each tree annually (Table 2). To obtain total yield, every fruit was harvested from trees, whereas marketable yield included fruits of acceptable size without significant disease or insect damage. Results indicated that Enterprise trees were more productive than the other cultivars. Redfree, the earliest ripening cultivar, had the greatest percentage of marketable fruit.

Early results of this study demonstrated that the organic-approved thinning agents were effective with additional hand-thinning. However, some lime sulfur products are no longer manufactured and may become increasingly difficult to purchase. All three apple cultivars are resistant to apple scab and moderately resistant or resistant to fire blight. However, CrimsonCrisp is susceptible to cedar apple rust, whereas the other two cultivars are resistant to this disease. Because scab, fire blight, and rust are common diseases, fruit yields were likely enhanced by their level of resistance, but fruit loss due to pests was still high. Brown marmorated stink bugs were not present in this orchard, but they could cause substantial damage to fruit since organic certified insecticides that provide specific control of this pest are currently unavailable. Although ground cover growth was limited, vegetation underneath trees was sufficient to provide a habitat for voles. These small rodents feed on trunks of trees and in severe cases, can cause tree mortality. Researchers will continue to evaluate pest control strategies to enhance marketable yield.

Table 1. Organic products used for pest control in an apple trial in Lexington, Kentucky during 2011 to 2013.

Diseases	**Products**
fire blight	fixed copper, streptomycin
scab, cedar apple rust, fruit rots, powdery mildew,sooty blotch, flyspeck, leaf spots	Microthiol sulfur, lime sulfur, fixedcopper, Regalia, Kaligreen
Insects	**Products**
scale	dormant oil
plum curculio, codling moth, oriental fruit moth	Entrust, Surround, Carpovirusine, Neem oil, codling moth pheromone mating, disruption lures
dogwood borers	nematodes (Heterohabditis bacteriophora)

Table 2. Total and marketable yield of Redfree, CrimsonCrisp, and Enterprise apple trees grown at Lexington, Kentucky during 2011 to 2013.*

Cultivar	Year	Total yield (lbs/tree)	Marketable yield (lbs/tree)	% Marketable yield of total
Redfree	2011	4.90	3.6	73
	2012	3.00	2.0	67
	2013	13.40	9.9	74
Crimson Crisp				
	2011	4.70	1.9	40
	2012	7.10	3.3	46
	2013	8.00	4.4	55
Enterprise				
	2011	9.10	4.4	48
	2012	8.10	3.5	43
	2013	18.40	7.8	42

**Spring frost likely reduced crop in 2012.*

Michele Warmund
Division of Plant Sciences