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Browning of Evergreens

The winter of 2008/09 was rough on broadleaf evergreens in Missouri landscapes. Boxwoods, hollies and southern magnolias have more brown tips on their leaves this spring than we have seen for a number of years. I have noticed that bayberry shrubs, which normally have nice green foliage in spring, are currently leafless in Central MO. Although we are still investigating the causes of damage in some cases, we can blame a lot of it on the weather.

Broadleaf evergreens are subject to browning from desiccation of their leaves by cold, dry winds in winter. If the cold does not last too long, broadleaf plants can take up water from the soil to replenish that which has been lost to the atmosphere. However, if the temperature stays below freezing for many days, water can not move through the frozen stems. If the soil is frozen, this problem is compounded. A review of weather condition over the past winter reveals that we had two periods which could easily explain the damage we are currently seeing.

Some of the damage may have been done just before Christmas. Weather data from a station at South Farm in Columbia show that the minimum air temperatures on December 21 and 22 were 2 and 0.5 degrees F, respectively. Maximum wind speed on December

21 was 36 mph. Then, on January 15 and 16, minimum air temperatures were -4 and -3 degrees F, respectively. On January 17, the soil froze to a depth of 8 inches and the average wind speed was 12 mph. Soil freezing to this depth is fairly unusual and may have been due to a combination of unusually cold temperatures and lack of snow cover. The soil actually remained frozen at 8 inches until February 8, with the average wind speed ranging from 6-12

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Figure 1. Weather damage to southern magnolia foliage. -Photo courtesy of Christopher Starbuck

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Organic Food: Is it Worth the Extra Cost?

The organic food industry has never been healthier. Sales of organic products last year topped \$32.9 billion, and from 2005 to 2008 organic sales increased an astounding 67.6 percent. What makes these figures even more remarkable is the (guarded) state of our nation's economy over that same time period. Research by the Hartman Group, a marketing research firm, showed that about 70 percent of Americans buy organic food occasionally and 25 percent buy it weekly.

Undoubtedly, a primary reason for the popularity of organic food is the desire by Americans to "eat healthy". As a nation we are becoming more and more conscious of what we put in our mouths and want safe, fresh and nutritious food. While the label 'organic' in the produce section of a local supermarket was a rather infrequent sight just a decade ago, today two-thirds of our nation's supermarkets carry organic products. However, shoppers usually encounter a fairly significant price increase when purchasing organic food when compared with the price of conventionally produced food. The question arises whether or not organic is worth the extra money.

Since many consumers don't understand what is meant by 'organic' we should start by defining it. The National Organic Program of the United States Department of Agriculture (USDA) offers the following definition: "Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony."

The USDA includes organic production as part of its marketing program. To display the USDA Certified Organic seal or otherwise make the claim of being organic, a product must be both produced and processed

according to the USDA standards for organic production originally established in the 1990 Farm Bill. Those standards regulate the inputs that can be used in organic production and prohibits things such as synthetic fertilizers, pesticides, sewage-based organic fertilizers and biotechnology. Producer certification is necessary in order to make the claim that a product is organic. The certification process is very thorough; details can be found at: www.usda.gov/nop/.

By its own admission, USDA organic labeling standards and certification do not address nutrition or safety of organic products. While the production methods required for organic certification are designed to promote food safety there is no assurance organic food actually is safer or more nutritious than conventionally produced food. Therefore organic identifies a production method as opposed to a product outcome.

Universities and private institutes have researched the safety aspects of organic food and the results are mixed. Without doubt, organically produced food contains less synthetic pesticide residue than conventionally produced food. Numerous research reports document this fact. However, many of the same reports revealed that levels of synthetic pesticide residue on conventionally produced food was under the level established by the government as being safe for adults. This finding was reinforced by the British Nutrition Foundation who concluded: "If pesticides are present at all in non-organically produced fruit and vegetables, the levels are very low. These low levels do not present a risk to human health." It must be pointed out that, according to the National Academy of Sciences, even low levels of pesticide exposure can be significantly more harmful to children and pregnant women.

In contrast, investigations have revealed that organic produce is more likely to contain harmful bacteria such as *E. coli* and *Salmonella*, "natural" toxins and heavy metals because of manures (improperly) used in organic production. Organic regulations clearly state that animal manure must be properly composted before it may be used. Composting manure destroys pathogens while improper composting does not. Since there is a fine line (related to temperature) between proper and improper composting and since animal manure is a major input in organic production, microbial contamination is a possibility especially on organic "root crops" such as potato and carrot.

Organic food also has been found to contain more non-synthetic pesticides than conventionally raised food. The list of approved materials for organic production contains some rather toxic compounds. Because these materials are natural and non-synthetic, they are permitted for use (within guidelines) in organic production. Copper sulfate is a good example. Copper is a heavy metal quite toxic to most living organisms. It is widely used in organic production to control fungal diseases. It remains in the soil once applied and does not break down like synthetic pesticides. Nicotine sulfate is another example of a toxic natural compound labeled for use in organic production. However, unlike copper it breaks down rather rapidly after application.

As far as nutritional benefits are concerned, the jury is still out on organic foods. Published research supports the claim that organic foods have higher nutritional value than conventional. It has been documented that, on average, organic foods contain slightly higher levels of trace minerals, vitamin C, and antioxidant phytonutrients than conventionally grown crops, according to the USDA. Phytonutrients have

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been receiving much attention recently because of their benefits to human health.

Conversely, others maintain there is no conclusive evidence that organically grown produce is more nutritious. Research results published in an August, 2008 issue of the *Journal of the Science of Food and Agriculture* concluded "there is no evidence to support the argument that organic food is better than food grown with the use of pesticides and chemicals." The fact is the composition of any plant depends on many factors including soil, nutrients, water, sunshine and genetic composition. These conditions tend to vary widely in both organic and conventional plant production.

A third factor which might motivate people to pay extra for organic products surrounds the environment. Organic farming focuses on the creation of a healthy soil and minimizing environmental contamination from fertilizer and pesticides. The latter are showing up in public water supplies at alarming rates in isolated cases. As an added environmental benefit, one extended study showed that organic farming uses 50 percent less energy than conventional.

All of the above have led to two separate "camps" relative to organically produced food. Alex Avery, outspoken organics critic and author of "The Truth about Organics", maintains that "organics is a total con." He cites the

lack of scientific evidence to support the claim that organic food is safer or more nutritious to support his claim. David Katz, associate professor of medicine at Yale University, warns that "organic can be a gimmick." He suggests the term is often used to make people think a food or product is wholesome. Katz insists that any risk posed by pesticide residue is more than compensated for by the proven beneficial affects fresh fruits and vegetables in our diet have. The implication is that even if organic produce is proven to be safer, people will tend to eat less of it since it is more expensive.

Conversely, there are learned individuals who laud the benefits of eating organically grown food. Dr. Marion Nestle, chair of the department of nutrition, food studies and public health at New York University, one of them. "I don't think there is any question that as more research is done, it is going to become increasingly apparent that organic food is healthier," she concluded.

When all is said-and-done the decision to buy organic or not is a personal one. This often boils down to a matter of "risk versus reward" or "cost versus benefit." For some, eating organic imparts peace of mind, as they attempt to do everything within their power to promote health and longevity for themselves and their family. But this peace of mind does not come without a cost. Buying organic is likely to increase

the family food bill by at least 20 percent according to a study conducted by the University of California--Davis. The same study concluded that eating organic can consume 35-40 percent of the total food budget of a typical low-income family.

Whether you buy organic products or avoid them they probably are here to stay. However, for those who are concerned about the safety of their food and either question the benefit of or cannot afford organics there is a viable alternative. Buy locally grown food. Personally, I would trust more the safety of conventionally grown food produced locally by a conscientious grower with whom I am acquainted than organic food produce by someone I don't know. The University of Missouri's "Food Circles" program addresses this issue and promotes the consumption of safe, locally grown food. It attempts to allow consumers to become familiar with those who produce their food, be it conventional or organic in nature, by forming symbiotic relationships. Such relationships can go a long way to create the peace-of-mind coming from the knowledge that you are feeding your family the same wholesome the producer is feeding his or her family, at a price most can afford.

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mph over that 23 day period. A summary of weather data for this period can be viewed at <http://agebb.missouri.edu/weather/stations/boone/framesfm.htm>.

Another factor which may have contributed to evergreen damage is low soil moisture. From October 1 through February 7, we recorded a total of 5.4 inches of precipitation at South Farm. If evergreens were not irrigated in fall, they could have gone into these high stress periods under drought stress. Given the unusual

combination of cold temperatures, frozen soil, strong winds and low precipitation, it is not surprising that we are seeing some ugly broadleaf evergreens this spring. The take home message from last winter is that we should plant broadleaf evergreens where they are protected from the wind, water them in the fall and mulch them well to prevent soil freezing. Also, keep in mind that the average minimum winter temperature in most of Missouri is supposed to be -10 to -15 degrees F. The winter if 08/09 may

cause some of us to reconsider planting more of the marginally hardy, broadleaf evergreens that have survived several of our recent, mild winters.

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Managing Zoysiagrass Lawns

With the recent warm weather, zoysiagrass is beginning to show some green leaf tissue. However, with the extended cloudy, wet days we have experienced our potential for large brown patch disease increases. Large brown patch or zoysia patch is a cool to warm weather disease of zoysiagrass. Large circular patches of zoysia fail to green up in the spring with noticeable thinning followed by weed invasion. Homeowners and lawn managers will notice off-yellow to orange coloring of the entire patch with very distinct orange margins surrounding the patch. Although the onset of zoysia patch is related to exact weather conditions, heavy thatch buildup is also a contributor to this disease. Thatch management/control in zoysia will help reduce your potential for this disease. Presently there are no truly effective fungicides available to homeowners that are sold over the counter. Control has been seen with Heritage and Prostar fungicides; however they need to be applied by a professional lawn care operator.

Beyond the winter woes and spring disease problems, standard zoysiagrass maintenance can be very simple. Follow the procedures listed below for fertilization, mowing, watering and thatch control for improved lawn quality.

Fertilizing

Established zoysiagrass requires less fertilizer than many other species for healthy, attractive turf. A seasonal total of 2 pounds of nitrogen per 1,000 square feet is ample. Excessive or untimely fertilizer applications can lead to problems such as fewer roots, more thatch, diseases, and more top growth that requires increased mowing.

For best results, soil testing is recommended before fertilizing. A soil test will indicate major nutrient deficiencies and the acidity or alkalinity (pH) of the soil. Slightly acidic soil pH

(6.0-6.5) is best. Lime should be applied only if the pH is less than 6.0.

Established zoysiagrass should be fertilized from May through August. Early spring (March/April) fertilization benefits weeds and promotes premature top growth before roots begin to grow. Late fertilization (September) may interfere with the natural hardening process before winter.

For routine maintenance where soil tests indicate no major deficiencies, use a lawn fertilizer with approximate nitrogen (N):phosphorus (P):potassium (K) ratio of 3:1:1 or 4:1:1 or 4:1:2. A 16-4-8 fertilizer has a 4:1:2 N:P:K ratio.

Where soil test indicates low phosphorus or potassium levels or where basic fertility levels are not known, use a fertilizer with a ratio that more closely approximates 1:1:1 or 2:1:1.

Mowing

Zoysiagrass is mowed at a shorter cutting height (1-2 inches) than Kentucky bluegrass or fescue. In the spring of the year, zoysiagrass lawns may be mowed at the lowest setting on your mower to remove dead leaf tissue. This increases the greenup rate and allows easier and more uniform mowing during the growing season. The mowing height should be raised in September by 1/2 to 1 inch in preparation for fall.

When mowing, never remove more than one-third of the leaf blade at any one time. Clippings need not be collected if they do not remain as clumps on the lawn surface.

Watering

Zoysiagrass is a drought-tolerant lawn grass that requires less water than Kentucky bluegrass to remain green and actively growing during the summer months. Watering usually is not necessary except during prolonged dry periods.

Cultural practices, such as proper fertilizing, mowing and thatch control, can go a long way toward building a drought-tolerant lawn.

When watering, follow these simple rules:

- Water in early morning to reduce disease incidence
- Water deeply, wetting the soil to a depth of 4 to 6 inches.

Thatch

Thatch is a layer of decomposed and partially decomposed roots, stems, stolons and rhizomes. Thatch appears as a distinct horizontal layer of brown spongy or felt-like material just above the soil surface. Zoysiagrass is prone to thatch accumulation because of its thick network of rhizomes and stolons and coarse, tough stem tissue. When managed properly, clippings returned to a zoysiagrass lawn contribute little, if any, to the thatch layer.

Lawns should be dethatched when thatch exceeds 1/2 inch in thickness. A spring-tine power rake or vertical mower will accomplish this task.

If thatch is greater than one inch, do not attempt complete removal in one year. Instead, remove the thatch over a period of two or three years. Intensive coring should also be considered since this causes much less damage to the turf than does power raking or vertical mowing.

Thatch buildup can be minimized through good cultural practices, including the following:

- Fertilize moderately to maintain turf density without excessive growth
- Cut grass regularly at the recommended height to maintain vigor and to avoid shock. Clippings may be left to decompose if mowing occurs at regular intervals. No more than one-third of the leaf tissue

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should be removed with each mowing. Remove excessive clippings that accumulate in clumps on the surface

- Water deeply and only as needed
- Power rake or vertical mow with dethatching equipment as needed to keep thatch less than

1/2 inch thick. For zoysiagrass, early summer after the lawn has greened up is the best time to dethatch

- Where lawns are subjected to traffic, core aerify to improve penetration of water and fertilizer. Leave soil cores on

the surface to dry and crumble before mowing

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Missouri State Soil Testing Association Approved Labs

The Missouri Soil Testing Association (MSTA) Approval Program is designed to assure that results provided by participating public and private labs serving the citizens of Missouri agree with allowable statistical limits. This is accomplished by evaluating the soil testing laboratories in their performance through inter-laboratory sample exchanges and a statistical evaluation of the analytical data. Based on this premise, soil test results from MSTA approved labs will be accepted by the U.S. Department of Agriculture, Farm Service Agency (FSA) and Department of Natural Resources and Conservation Services (NRCS) in federally assisted cost share programs and nutrient management plans in the state of Missouri.

Beginning in 1999, MSTA combined its efforts with the North American Proficiency Testing Program (NAPT). The NAPT coordinator sends soil test data from quarterly sample exchanges of the labs participating in MSTA program to the state coordinator.

The MU Soil Testing Lab director serves as the state program coordinator and performs statistical analysis of the data as specified in the MSTA program. If a lab's results fall within the allowable limits, the lab will be placed on the Farm Service Agency's (FSA) list of approved labs. A lab that is not approved may re-apply after six months. An updated listing of Missouri State Approved Soil Testing lab list can be found at <http://soilplantlab.missouri.edu/soil/mstacertified.htm>

List of Missouri State Approved Soil Testing Labs

- Custom Lab
204 C St.
Golden City, MO 64748
Telephone: 417-537-8337
Fax: 417-537-8337
- Delta Soil Testing Lab
University of Missouri
PO Box 160
Portageville, MO 63873
Telephone: 573-379-5431
Fax: 573-379-3383
- MU Soil and Plant Testing Lab
University of Missouri
23 Mumford Hall
Columbia, MO 65211
Telephone: 573-882-3250
Fax: 573-884-4288
- Perry Agricultural Lab
PO Box 418
State Highway 54 East
Bowling Green, MO 63334
Telephone: 573-324-2931
Fax: 573-324-5558
- Alvey Laboratory, Inc.
1511 East Main St.
PO Box 175
Belleville, IL 62222
Telephone: 618-233-0445
Fax: 618-233-7292
- Mowers Soil Testing Plus Inc,
117 East Main St.
Toulon, IL 61483-0518

Telephone: 309-286-2761
Fax: 309-286-6251

- A&L Great Lakes Laboratory, Inc.
3505 Conestoga Drive
Fort Wayne, IN 46808
Telephone: 260-483-4759
Fax: 260-483-5274

- A&L Heartland Laboratory, Inc.
111 Linn St.
PO Box 455
Atlantic, IA 50022
Telephone: 901-213-2400
Fax: 901-213-2440

- AgSource Belmond Labs
1245 Highway 69 N
Belmond, IA 50421
Telephone: 641-444-3384
Fax: 641-444-4361

- Servi-Tech Laboratories
1816 East Wyatt Earp Blvd.
Dodge City, KS 67801
Telephone: 620-227-7123
Fax: 620-227-2047

- Midwest Laboratories, Inc
13611 B St.
Omaha, NE 68144-3693
Telephone: 402-334-7770
Fax: 402-334-9121

- Ward Laboratories
4007 Cherry Ave.
PO Box 788
Kearney, NE 68848
Telephone: 308-234-2418

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Fax: 308-234-1940

• Brookside Lab Inc.
308 S. Main St.
New Knoxville, OH 45871
Telephone: 419-753-2448
Fax: 419-753-2949

• Spectrum Analytical
1087 Jamison Road
PO Box 639
Washington Court House,
OH 43160
Telephone: 740-335-1562
Fax: 740-335-1104

• Ag Source Cooperative Services
106 N. Cecil Street
PO Box 788
Bonduel, WI 54107
Telephone: 715-758-2178
Fax: 715-758-2620

• Waters Agricultural
Laboratories, Inc.

2101 Old Calhoun Road
Owensboro, KY 42301
Telephone: 270-685-4039
Fax: 270-685-3989

• Waters Agricultural
Laboratories, Inc.
257 Newton Highway
PO Box 382
Camilla, GA 31730
Telephone: 229-336-7216
Fax: 229-336-0977

• A&L Analytical
Laboratories, Inc
2790 Whitten Road
Memphis, TN 38133
Telephone: 901-213-2400
Fax: 901-213-2440

• A&L Canada Laboratories, Inc
2136 Jetstream Road
London, ON N5V 3P5
Canada
Telephone: 519-457-2575

Fax: 519-457-2664

Note: Approval of soil analysis does not imply approval of fertilizer and limestone recommendations by the individual labs. The approval allows the clients to use the University of Missouri soil fertility recommendations as required by the federal and state agencies for cost share and nutrient management planning programs. In order to use the University of Missouri soil fertility recommendations and get meaningful results, it is recommended that the labs use the soil test procedures required by the MSTA program.

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Clinic Update: April Samples at the Diagnostic Clinic

In the plant diagnostic clinic, we have had a number of plant submissions in April. Many of the samples had abiotic problems, issues with nonliving factors, especially winter injuries. Several holly samples in particular have been submitted with this type of injury, especially from central Missouri. Typical symptoms have been tip dieback and death of branches. Winter weather fluctuations play an important role in the development of these problems.

While only one sample has been submitted, Kabatina tip blight on juniper, appears to be common in the landscape this spring. The damage appears to be very similar to Phomopsis tip blight on junipers. Phomopsis is treatable with fungicides while no products are labeled for Kabatina. We are able to confirm microscopically which disease is present on samples submitted to the plant diagnostic clinic.

Several bedding plant submissions have been submitted. Periwinkle (*Catharanthus*) was diagnosed with *Rhizoctonia* root rot and *Botrytis* blight. We received Verbena and Calibrachoa samples with severe thrips injury. Calibrachoa also had *Pythium* root rot. On a daylily sample we detected daylily leaf streak, *Collecephalus hemerocalli*. The symptoms of this disease are chlorosis along the midveins of the leaves, usually beginning at the tip. This tissue dies soon after causing the leaves to be streaked with brown and yellow bands. Small reddish spots may develop along the streaks causing this disease to be confused with daylily rust, however the two diseases can be confirmed microscopically in the lab. We have also had submissions of rose rosette disease. Typical symptoms of rose rosette disease are “witch’s brooming”, or abnormal twig development, leaf

distortion, excessively thorny stems and red pigmentation.

A few fruit and vegetable submissions have also been received. Some watermelon seedlings with lesions on stem appeared to be “damping off”, however we were able to confirm anthracnose in the lab. Due to the potential for additional damage in the field, anthracnose is a serious and important disease on watermelon and related cucurbits. A severe spider mite infestation was detected on a greenhouse strawberry plant submission. Some high tunnel tomato plants had a wilt that affected branches and leaves and a dark stem decay. We were able to confirm bacterial canker.

Sample submission can provide you with an accurate diagnosis which is very important when managing plant problems. Many diseases require microscopic examination or advanced

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testing techniques for confirmation. Without a good diagnosis, a great deal of time and expense can be put into ineffective control measures and crops can be lost. The MU plant diagnostic clinic also provides research-based management recommendations to

allow you to effectively manage your plant problems, as well as allow us to provide comprehensive updates in the newsletter. Please refer to the sample submission section of our website <http://soilplantlab.missouri.edu/plant/>

index.htm or contact us for more information on sample submission.

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Thousand Cankers Disease: Reason for Concern?

Recently some alarming reports have been posted concerning the walnut twig beetle (*Pityophthorus juglandis*) and thousand cankers disease of black walnut (*Juglans nigra*). This disease has been found on walnut trees west of the Rocky Mountains. The first symptoms of thousand cankers disease are leaf yellowing and branch dieback in the upper part of the tree. Eventually, limb mortality occurs and eventually the whole tree dies. Tree mortality is the result of walnut twig beetle tunneling and canker development around the beetle galleries. Two fungal organisms, *Geosmithia* sp. and *Fusarium solani* are associated with the cankers. Thus far, this disease has been found primarily on black walnut trees, although other walnut species are susceptible. Pecan trees are also currently being tested for thousand canker disease.



Figure 1. Walnut twig beetle, side view. Photograph by Jim LaBonte, Oregon Department of Agriculture.

The walnut twig beetle is native to North America. Before 1992, the beetle was found in Arizona, New Mexico, and Chihuahua, Mexico. Since 1998, it has been found in Washington, Oregon, Idaho, Utah, and Colorado. It is thought that the original native host of the insect is the Arizona walnut (*J. major*) since the range of this insect coincides with

the distribution of this tree species. The first report of black walnut mortality associated with the walnut twig beetle was in 2001. At first, drought was thought to be the primary cause of tree mortality and the twig beetle was a secondary pest. Since then, irrigated black walnut trees have also succumbed to this disease. The recent discovery of the presence of *Geosmithia* fungus in association with the insect galleries suggests that an insect-disease complex is the underlying cause of thousand cankers disease.

The walnut twig beetle is a small (1.5-1.9 mm) yellowish-brown bark beetle. Adults overwinter in cavities excavated in the bark of the tree trunk. In the spring, mating occurs and new tunnels are formed for egg galleries. During tunneling, the *Geosmithia* fungus is introduced with the insect and subsequently spreads. Cankers with dark staining then develop around the tunnels of the twig beetle. Branch cankers may not be always be visible until the outer bark is removed to expose the tunnels with staining around the galleries. Eventually, cankers form on the bark surface the tree. As cankers coalesce, girdling occurs, which results in branch dieback. Many cankers develop on the branches and the trunk. Thus, thousand cankers disease aptly describes the symptoms of the tree.

This disease could have economic consequences on English walnut grown



Figure 2. Walnut twig beetle tunneling under bark of large branch. -Photo courtesy of Colorado State University

in California because *Geosmithia* has recently been isolated from *J. hindsii*, which is used as a parent for the Paradox rootstock. Other concerns are that walnut logs or wood may be transported to eastern areas where the thousand cankers disease has not been found. Additionally, the disease could be spread through the distribution of black walnut scion wood.

To date, thousand cankers disease or the walnut twig beetle has not been found in Missouri. This spring, black walnut scion wood and grafted trees of the most widely-grown cultivars will be tested for the presence of *Geosmithia*. Updates on this disease and insect pest will be provided as more information is collected.

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June Gardening Calendar

Ornamentals

- **Week 1:** Deadhead bulbs and spring flowering perennials as blossoms fade.
- **Week 1:** Early detection is essential for good control of vegetable pests. Learn to identify and distinguish between pests and beneficial predators.
- **Weeks 1:** Thin seedlings to proper spacings before plants crowd each other
- **Weeks 2-3:** When night temperatures stay above 50 degrees, bring houseplants outdoors for the summer.
- **Weeks 2-3:** Rhizomatous begonias are not just for shade. Many varieties, especially those with bronze foliage do well in full sun if given plenty of water and a well-drained site.
- **Weeks 2-3:** Apply a second spray for borer control on hardwood trees
- **Weeks 3-4:** Softwood cuttings can be taken from trees and shrubs as the spring flush of growth is beginning to mature.
- **Weeks 3-4:** Continue spraying roses with a fungicide to prevent black spot disease.
- **Weeks 3-4:** Tired of the same old foundation plantings? Find fresh ideas among the evergreens planted in the Dwarf Conifer collection.
- **Weeks 3-4:** Trees and shrubs may still be fertilized before July 4th.
- **Weeks 3-4:** Pruning of spring flowering trees and shrubs should be completed before the month's end.

Lawns

- **Weeks 1-4:** Water turf as needed to prevent drought stress.
- **Weeks 1-4:** Mow lawns frequently enough to remove no more than one-third the total height per mowing. There is no need to remove clippings unless excessive.
- **Weeks 1-4:** Gradually increase the mowing height of zoysia lawns throughout the summer. By September, the mowing height should be 2 to 2.5 inches.
- **Weeks 1-2:** Zoysia can be fertilized now while actively growing. Do not exceed 2-3 pounds of actual nitrogen fertilizer per 1000 sq. ft. per year.

Vegetables

- **Weeks 1-2:** Plant pumpkins now to have Jack-o-lanterns for Halloween
- **Weeks 1-2:** As soon as cucumber and squash vines start to 'run,' begin spray treatments to control cucumber beetles and squash vine borers.
- **Weeks 2-4:** To minimize diseases water with overhead irrigation early enough in the day to allow foliage to dry before nightfall.
- **Weeks 2-3:** Start seedlings of broccoli, cabbage and cauliflower. These will provide transplants for the fall garden.
- **Week 3:** To maximize top growth on asparagus, apply 2 pounds of 12-12-12 fertilizer per 100 sq. ft., water well and renew mulches to conserve moisture.

Fruits

- **Week 1:** Thinning overloaded fruit trees will result in larger and healthier fruits at harvest time. Thinned fruits should be a hands-width apart.
- **Week 1:** Summer fruiting raspberries are ripening now.
- **Weeks 2-3:** Begin control for apple maggot flies. Red painted balls that have been coated with tanglefoot may be hung in apple trees to trap egg-laying females.

Miscellaneous

- **Weeks 1-4:** When using any gas powered equipment, be sure to allow the engine a few minutes to cool before refilling empty fuel tanks.
- **Weeks 2-4:** A mailbox mounted on a nearby post makes a handy place to store and keep dry any small tools, seed labels, etc. frequently used in the garden.