

Missouri Environment & Garden

October 2009

Volume 15, Number 10

Forcing Bulbs Indoors

Plan ahead. These words are sound advice for any walk of life and especially relevant for gardeners since we simply cannot rush nature. For example, in an attempt to add a bit of color to the dull days of winter plant lovers might consider forcing spring bulbs next January or February. To their disappointment they will learn the process should have started the previous fall since spring bulbs have a chilling requirement which must be met before they will flower indoors. It is possible to lessen the doldrums of a typical Missouri winter by getting an early start on spring and now is the time to “plan ahead”.

“Forced” bulbs are those which are induced to flower at other than their normal time. This practice is commonly used to flower narcissus (daffodils), hyacinths, tulips, crocus and other spring-flowering bulbs in containers during the winter. The process is relatively simple and involves five basic stages or steps.

Step 1: Preparation stage. The general procedure for forcing all species of spring bulbs is similar and starts with purchasing only top quality, flowering-size (large) bulbs. Good bulbs contain the stored reserves necessary for successful production of roots, leaves and flowers.

Hyacinths: This species is considered by most to be the spring bulb easiest to force and may be forced potted in a growing medium or in ` with water so that the base of the bulbs are continually wet. Potting should be done in late September or early October. Plants will flower about four weeks after being taken out of the chilling treatment (described later) and brought indoors.

Narcissus: The cultivars of narcissus most suitable for forcing include Rembrandt, Cragford, Golden Harvest, King Alfred and Carlton. Paperwhites are a form of narcissus that can be forced without chilling either in pots or water.

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Table 1. Tulip cultivars (colors) recommended for forcing indoors

Apeldoorn (orange-scarlet)	Jewel of Spring (yellow-streaked red)
Attila (purple-violet)	Make Up (red-edged white)
Bellona (golden yellow)	Merry Widow (white-edged red)
Blizzard (creamy white)	Olympic Flame (yellow-flamed red)
Christmas Gold (deep yellow)	Orange Nassau (double orange)
Christmas Marvel (cherry pink)	Orange Wonder (bronzy-orange)
Couleur Cardinal (cardinal red)	Paul Richter (scarlet red)
DeWet (orange)	Peach Blossom (double deep rose)
First Lady (reddish-violet)	Preludium (salmon, white base)
Garden Party (white-edged red)	Queen of Sheba (mahogany orange)
Gudoshnik (streaked yellow)	Westpoint (yellow)

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White Grubs: A Common Turfgrass Insect

White grubs are the primary insect problem many homeowners face annually. Damage is usually noticed in late July to early August. However, last and this year damage has been noticed late in September and with the excess moisture fall feeding on turfgrass roots could extend into Fall. The earliest symptoms of white grub feeding on turfgrass roots is a gradual thinning and weakening of the stand. Damage may progress from sudden wilting of the grass, even with adequate moisture, to patches of dead grass. Small or large patches of dead or dying grass will have roots pruned so that sod can be pulled up or rolled back like a loose carpet. Numerous C-shaped whitish larvae with a brown head will lay in the upper soil directly below the dead sod. Mammals, such as skunks and armadillos, or birds digging for grubs can also cause additional turfgrass damage.

Adults are scarab beetles, May/June beetle, masked chafer, Japanese beetle, and green June beetle. These are the primary white grub species many homeowners face with the May/June beetle and masked chafers being the most common. Identification of white grub species can be made by: time of the year the grub is present, size of the grub and raster patterns on the abdomen of the grub (see diagrams).

May/June Beetles

Damage is typical wilting and small dead patches of sod. These beetles have a 3-year life cycle. Adult beetles can be damaging to trees and ornamentals. White grubs should be treated during late July to early August to control any newly hatched larvae. However, during the second year of the grub's life cycle, treatments can be made from April through September.

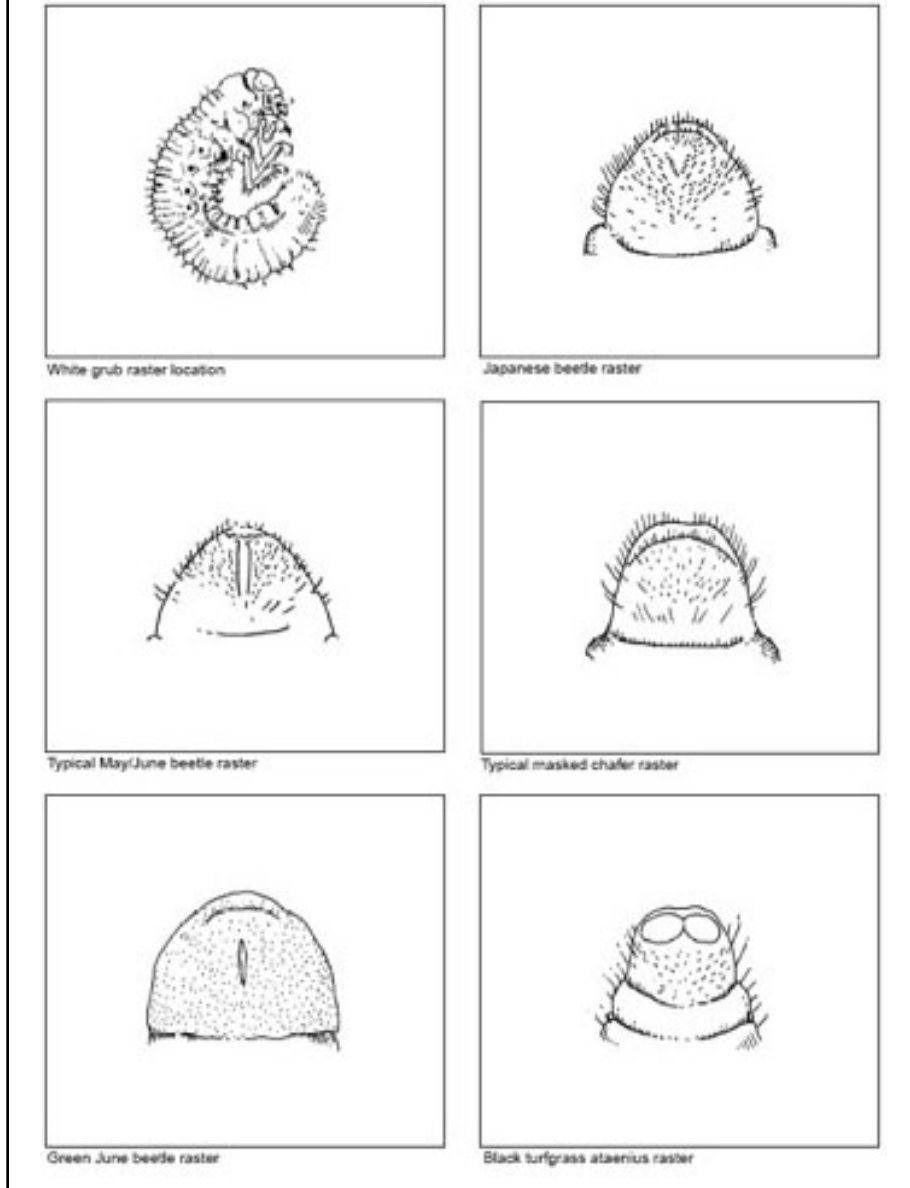
Masked Chafer

Turfgrass infested with this species exhibits the typical white grub damage. Wilting, irregular dead patches of turf are the symptoms. These beetles have a 1-year life cycle. Treat grubs about four weeks after the adult beetles start to emerge when egg deposits begin to hatch in late July to early August.

Japanese Beetles

These beetles are now considered to be state-wide in Missouri. Grubs feed on roots of turfgrasses and cause a wilting appearance and gradual thinning, however

Figure 1. Raster Patterns of White Grub Species



we generally do not see large amounts of turf damage specific to Japanese beetle grubs. Adult beetles can be damaging to about 400 host plants of both turf and ornamentals. Adult females will lay about 200 eggs per season, throughout the summer months. Therefore, we do not have a single egg laying time frame. Using a long-term residual product will work best to cover multiple egg laying episodes. Adult beetles can be treated at any time. If large numbers of adult beetles are noticed defoliating trees and shrubs, a preventative long-term residual product may be warranted.

Green June Beetles

Feeding activity of these grubs rarely causes severe turf damage. Rather, the damage to a lawn generally is mechanical in nature. The grubs burrow in and out of the turf, which produces mounds. These beetles are attracted to soils with high organic materials. The decaying organic matter in the soil is the primary food for this grub. This white grub is large, 1 ½ inches in length.

Control

The major factor influencing white grub density in turfgrass appears to be soil moisture; that is, in years with

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normal or above normal precipitation, grub populations tend to increase. This is because all white grub species require moist soil for their eggs to hatch. Young grubs are very susceptible to desiccation.

This dependence on soil moisture by white grubs can be exploited as a type of cultural control option. In areas where turf can stand some moisture stress, do not water as much in the hot summer months, particularly July and August when adults are laying eggs and young grubs are present.

In recent years, several strains of insect parasitic nematodes in the genera *Steinernema* and *Heterorhabditis* have offered somewhat effective biological control of white grubs. For these beneficial organisms to be most effective in managing white grub populations, it is critical that the labeled application instructions are followed exactly (e.g., time of day, soil moisture, size of grub, rates).

Because damaging white grub populations tend to be sporadic from year to year, preventative chemical control applications are not really justifiable. But in areas where moderate to damaging levels of grubs have been perennial, preventative applications made in late May or June may be warranted. Some products that seem to have extended activity are imidacloprid (e.g., Merit), and halofenozide (e.g., Mach 2).

Insecticides that have shorter residual periods (3 weeks or less) or must be ingested (preferably by small grubs) to be most effective are best used in a curative chemical control program. The successful use of these materials depends to a large degree on the proper timing of the applications (reapplication often necessary). These products must be applied shortly after egg hatch when the grubs are small and actively feeding. Remember, the smaller (younger) the grub, the easier it is to control. As a general rule, the recommended time to treat for grubs is about 4 weeks after the adult beetles start to emerge, the time when the eggs begin to hatch. For the Masked Chafer, this period is around late July to early August. Because emergence of May/June Beetle adults can last for several weeks, chemical treatment for May/June Beetle grubs is also recommended during late July to early August. Insecticides that appear to be effective as curative treatments include trichlorfon (e.g., Dylox), halofenozide (e.g., Mach 2), and carbaryl (e.g., Sevin).

Chemical applications can be rendered useless if the material has not been thoroughly watered-in (0.5-inch). The water not only moves the chemical down to the thatch layer (the final destination for most of the chemical), but it will often stimulate the grubs to move upward in the soil, closer to the thatch and toxicant. However, if the thatch layer is 0.75 inch to 1 inch thick, the grubs probably will not

come into contact with lethal doses of the insecticide. It may be necessary to remove some of the thatch before a chemical application.

To determine if a chemical treatment is necessary, a sampling of the grub population is necessary. To do this, cut a 1 square foot piece of sod in each of several areas of the lawn, pull it back, count the number of grubs, and inspect their rastral patterns to identify the species. Replace the sod squares back on the soil. If you have on average more than 10 Masked Chafer grubs or more than 5 May/June beetle grubs per square foot, then a chemical treatment is recommended. Remember, it is not unusual to have more than one species of white grub infesting the same lawn.

All chemical information is presented with the understanding that no endorsement of named products is intended, nor criticism implied of similar products that are not mentioned.

Before using any chemical please read the label carefully for directions on application procedures, appropriate rate, first aid, and storage and disposal. Make sure that the chemical is properly registered for the intended use.

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Forcing Bulbs Indoors

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Tulips: While any cultivar of tulip can be forced into flower early, some are more suitable than others. Table 1 below lists cultivars of tulips especially suited for forcing. Tulips should be potted before the end of October for adequate root growth and chilling. Most cultivars flower about four weeks after being removed from chilling treatment and brought indoors, although there is variation according to cultivar and forcing conditions.

Step 2: Potting stage. Whatever the species, bulbs usually are potted in the month of October. Use azalea or bulb pots four to eight inches in diameter, according to the species being forced. Although equal parts of garden soil, peat and sand can be used, excellent results can be obtained through the use of soilless media containing

primarily sphagnum peat, perlite and vermiculite. These mixes have the advantage over soil of being biologically inert and possessing better drainage properties than soil-based mixes.

Add enough potting medium to fill the pot so bulbs are planted as follows:

- 1) Narcissus—plant so about one-half of the bulb will be above the soil line after watering and settling. Use five bulbs per six-inch pot.
- 2) Hyacinths and tulips—allow only the tip of the bulb to show above the soil line. Use three hyacinths or six tulips per six-inch pot. Tulips should be placed in the pot with the flattened side facing toward the outside of the pot to insure a uniform flower display.

- 3) Small bulbs (e.g. crocus) –plant so they will be about one inch below the soil line. Use 15 bulbs per six-inch pot. Label each pot with cultivar of bulb, date of planting and expected forcing date and water thoroughly.

Step 3: Rooting/chilling stage. After potting and watering, keep hardy bulbs where temperatures will range between 35 to 40 degrees F. This might be a cool north room, basement, bulb cellar, outdoor trench, cold frame or refrigerator. If the latter is used, food products should not be stored in the refrigerator while the bulbs are being chilled. The purpose of this stage is to allow bulbs to produce a healthy root system and to elongate their flower

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primordium in advance of being forced to bloom. If placed outdoors in trenches or cold frames, bulbs should be exposed to at least three weeks of favorable temperatures (around 40 degrees) before the first hard freeze ensues. Most cultivars will require 13 to 14 weeks of chilling treatment to develop necessary root growth and flower primordium development being forced into flower

Stage 4: Top-growth stage. The actual forcing of the plants into flower indoors adds an additional three to four weeks to total forcing time, depending upon species and forcing conditions. If the potting

medium and tops are frozen when they are brought indoors, place them in a cool room at about 40 degrees F for two or three days to thaw out slowly. If the plants are not frozen, they can be brought directly into a cool, bright window where temperatures are in the 60 degree F range. They should remain in this environment until nearly ready to bloom. Bulbs must be kept watered during this stage but fertilization is not necessary.

Stage 5: Bloom stage. When flower buds are almost fully developed, pots may be moved out of the bright window into the living room or other area of the

home they are to be displayed and enjoyed. Avoid placing them close to heater or in direct sunlight. The life of the flower can be lengthened by moving the plants back into a cool room each evening. Unfortunately, bulbs that have been forced indoors are of little value for outdoor planting and probably should be discarded after their bloom period is over.

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Black Walnuts: Pick Them and Clean Them Up Quickly

Now is the time to take advantage of the wild black walnuts as trees are shedding their nuts rapidly. Since there are over 97 million wild black trees in Missouri, there is likely one near you! While commercial producers typically harvest with a mechanical tree shaker, homeowners can enjoy the nuts picked from the tree or from the ground after falling from the tree. The highest quality nuts are those still attached to the tree. To determine the right time to harvest nuts from the tree, a "dent test" can be used. This is performed by holding a walnut and depressing the husk with the thumb. When more than 75% of the black walnut husks dent, the walnut tree is ready for harvest. Research at the University of Missouri has shown that husk softening is associated with walnut maturity. An instrument, such as the durometer, which measures husk hardness, is another way to determine the harvest date for black walnuts. However, if you are too late to harvest the nuts from

the tree, it is important to collect the nuts soon after they drop to enjoy them before squirrels find them.

Another reason to harvest them when the hulls are softening and green is that the kernels will be mature and flavorful, but not dark in color or taste rancid. With a two week delay in husk removal, kernels turn black and the less desirable flavors will have developed. Not only is it important to collect the walnuts quickly, but it is also important to remove the husks as soon as possible after harvest. For large scale production, mechanical hulling (husk removal) is used, but homeowners often use other creative methods such as running over the nuts with a vehicle or using grinders or other abrasive means to remove the husks.

Once husks are removed, walnuts are hung in bags and dried for about five weeks. Onion bags or other loose-woven bags that permit air movement are ideal. After the nuts have dried, either crack them

immediately or store them at 32 to 40 °F. Before cracking, inspect the shells to make sure that there are no fissures or cracks in the shell. Walnuts with cracked shells are often infected with microorganisms and should be discarded. Bright yellow, blue streaked, or black kernels should not be consumed. For black walnuts with sound shells, heavy duty crackers are needed to break open the thick shells. An example of such a nut cracker can be found at: <http://www.nutgrowing.org/>. After cracking, walnuts for immediate use can be placed in an airtight container in the refrigerator or they can be stored in the freezer until next year's harvest. To enjoy black walnuts year round, try some of the recipes at: <http://www.black-walnuts.com/>.

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Find black walnut recipes at www.black-walnuts.com

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Preparing the Garden for Winter

As fall approaches, it is time to take on the task of garden clean-up. Fall is also a great time to consider planting trees and shrubs, and many perennials thrive by being planted in the fall. The key factor in plant establishment is root growth, and the faster the roots grow into the back-fill area of a newly planted plant, the more successfully the plant will become established. Roots never go completely dormant like the above-ground part of a plant, and soil temperature and moisture are some of the primary factors influencing healthy root growth. In the fall, the soil temperatures stay warm and there is usually ample soil moisture with fall rains. Thus the plant has a great head start on root growth before hitting the stressful summer drought and heat the following year, versus planting in the spring in which the roots have only a short period of time to establish before the summer heat and drought. It is also important that a newly establishing plant have time to put adequate energy into root growth. If planted in the spring, the plant is putting energy into foliage and flowers, and less energy is going into root development. However, if planted in the fall, the foliage is already developed, and the plant can concentrate its energy into root development without competing for leaf and flower development as well.

Another important fall task is preparing to move non-winter hardy plants indoors.

For many of us, indoor space is very limited and the decision must be made on which plants to over-winter and which to discard. And many of us have started to use tropical plants in our patio containers, and these plants need bright light to thrive through the winter indoors. In some cases, especially if space and light is limited indoors, it may be best to discard your annuals and purchase new plants the next year.

Cannas are fairly easy to over-winter. After the first frost, dig them and cut back the tops. Do not divide the rhizomes at this point as the fresh cutting may rot through the winter. Then store the rhizomes in peat, vermiculite or sand in a cool, dry location with temperatures around 40 degrees F. In spring, cut the rhizomes into pieces with several growing points each and start them as you would new rhizomes.

Tuberous begonias and caladium are also easy to store over the winter. If the tuberous begonias were grown in containers, these plants can be brought in for winter enjoyment and treated as a houseplant. If the planted into the ground, dig up the tubers carefully after the first light frost and remove the top growth. Leave the soil and roots around the bulb intact and place the bulbs in a cool, dry area for 2-3 weeks. Then, remove the soil and remaining roots that should be shriveled by this time and pack the bulbs in peat, sand or vermiculite to prevent excess moisture loss. As with

cannas, store in a cool 50-55 degrees and be sure the bulb aren't subjected to freezing temperatures.

Whatever plants you bring indoors, it is important that you take precautions so you don't move insects into your house and contaminate other houseplants. Carefully inspect the plants for insects that will proliferate in the warm, dry conditions indoors. If insects are found, it is a good idea to spray the leaves thoroughly with an insecticidal soap or spray with a pesticide approved for use indoors. As you move the plants indoors, isolate them from any other indoor houseplants for approximately two weeks to ensure you don't contaminate other houseplants.

Other important tasks to remember are to gather up fallen fruit, leaves, or other debris that has fallen and discard. Discarding fallen fruit and twigs aids in reducing disease and insect spread that may be harboring in that material. Fall is a great time to re-seed turf, especially bare patches. And don't forget to disconnect the garden hose to prevent freezing.

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Pest of the Month: Fall Armyworm on Turfgrass

The Fall Armyworm, *Spodoptera frugiperda* (Smith), is a late season pest in Missouri, especially in southern parts of the state. It does not overwinter in Missouri, but arrives here in late June / early July from the Gulf Coast area where it overwinters. Fall Armyworm can be an occasional, but sometimes severe pest on turfgrass.

Fall Armyworm adults are medium sized, dull-colored moths with a wingspan of about 1 1/2 inches. They resemble cutworm moths, a close relative. The front wings of male moths are dark gray, mottled with lighter and darker splotches, with a noticeable whitish blotch near the extreme tip (see Figure 1.). The forewings of females are more uniform gray, with less distinct markings. The hind wings of

both sexes are grayish white. Adult moths are mainly active at night. The larvae of newly hatched Fall Armyworm are about 1/16 inch long and light grayish green in color, with older larvae ranging from light tan, to olive green, to nearly black. The full grown larvae measure about 1 1/2 inches long and have longitudinal stripes running along their sides. Although Fall Armyworm larvae resemble True Armyworms, they can be distinguished by the more prominent, light-colored, inverted Y-shaped marking on the front of the head as well as the presence of four distinct, black tubercles (a little projecting knob) on the back of each abdominal segment (Figure 2.). In addition, Fall Armyworms have well-defined teeth on their mandibles, unlike True Armyworms.

The pupae of both Fall and True Armyworm are very similar in appearance.

Several generations of Fall Armyworms can occur each year, but generally only two occur in Missouri. Female moths are capable of laying 50 to several hundred eggs in masses covered with the grayish moth scales. Larvae hatch in 3 to 5 days and a new generation can take anywhere from 24 to 35 days to mature.

On turfgrass, Fall Armyworm is a sporadic, but occasionally severe pest. Damage is very similar to that of the True Armyworm. Newly hatched larvae feed gregariously at first, scraping the underside of leaf blades and leaving the clear, upper epidermal layer, or chewing the leaf margins

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and producing a tattered look. As the larvae grow they can consume the equivalent of a good-sized handful of grass. The Fall Armyworm can feed anytime during the day or night, but move about mostly in the early morning or after dark. Although they are not as aggressive as the true armyworm; they can progressively thin a lawn over several days if not treated.

Look for discolored areas of turfgrass as the first sign of fall armyworms. Damage often begins along one edge of the turf area. Large numbers of birds looking for larvae in a turf area may well be a sign of Fall Armyworms infestation. Also look for green, fecal pellets that can often be seen in areas of damage. A valuable time-saving tool to use when scouting for Fall Armyworms in turf is to use a soapy water flush to bring to the larvae to the surface prior to severe damage. Mix two tablespoons of liquid dishwashing detergent in two gallons of water. From a bucket or sprinkling can, slowly pour the entire contents onto a square yard area where signs of infestation have occurred and then observe closely over the next few minutes for the Fall Armyworms (and any other larvae present) to make their way to the top of the turfgrass. It is not uncommon for the turf to be severely damaged and by the time someone begins looking for caterpillars, they have already entered the soil to pupate.

Fall Armyworm can be more difficult to control chemically than True Armyworm. Control will be improved if you cut the turf prior to treating. Light irrigation prior to treatment may also help as will treating late in the day. Chemical control is needed if natural enemies do not keep infestations below the economic threshold of 1 per square foot on general turf or 1 per square yard on golf greens. If possible, do not mow turf and remove clippings for several days after treating for any of the caterpillar pests.

Fall Armyworm (FAW) is one of eleven insect pests currently monitored by the IPM Pest Monitoring Network. Thirteen pheromone traps located in 6 of Missouri's 8 geographical regions are checked frequently to provide up-to-date pest-population data as an important tool to help pest managers make sound pest management decisions. Since the FAW monitoring season began in mid-May, there have been 8 FAW Pest



Figure 1.



Figure 2.

Alerts sent to our subscribers from August 28th through October 4th due to potentially significant moth captures in pheromone traps. Significant captures have occurred in 2 Missouri counties in the Southeast region; 5 alerts at the Delta Center near Hayward in Pemiscot County, and 3 alerts from Benton in Scott, County.

Individuals interested in pest management can sign up and receive electronic Pest Monitoring Alerts when potentially significant insect captures have been reported. To subscribe to this service,

visit our web site at: <http://ppp.missouri.edu/pestmonitoring/subscribe.htm>.

At the site, fill in the required fields and then mark the boxes next to the insects of interest and click submit. When pest captures reach significant numbers you will automatically be notified via email.

Although Pest alerts from moth and beetle captures in pheromone traps DO NOT indicate that treatment is necessary, they do provide a valuable tool to our subscribers indicating that scouting for

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potential pests in nearby locations may be in order.

Monitoring for pest outbreaks is a cornerstone of MU's Integrated Pest Management (IPM) Program. IPM stresses scouting practices rather than calendar-based treatments to detect pests and determine if action is necessary. MU's IPM Pest Monitoring Network provides farmers, landowners and pest managers with an up-to-date tally on several economically important insect species captured in pheromone traps throughout Missouri.

For additional information on Fall Armyworm and possible damage symptoms on corn and other crops as well as treatment recommendations follow this link: <http://extension.missouri.edu/publications/DisplayPub.aspx?P=G7115>

Image citations:

Figure 1: *Spodoptera frugiperda* moth: University of Georgia Archive, University of Georgia, Bugwood.org

Figure 2: *Spodoptera frugiperda* larva with inverted 'Y' on front of head, and four

distinct, black tubercles on back of abdominal segments: Russ Ottens, University of Georgia, Bugwood.org

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November Gardening Calendar

Ornamentals

- **Weeks 1-4:** Now is the ideal time to plant trees and shrubs. Before digging the hole, prepare the site by loosening the soil well beyond the drip line of each plant. Plant trees and shrubs at the depth they grew in the nursery and not deeper. Remove all wires, ropes and non-biodegradable materials from roots before back filling. Apply a 2-3 inch mulch layer, but stay several inches away from the trunk. Keep the soil moist, not wet, to the depth of the roots.
- **Week 1:** Now is a good time to observe and choose nursery stock based on fall foliage interest.
- **Week 1:** Plant tulips now.
- **Weeks 3-4:** Mums can be cut back to within several inches of the ground once flowering ends. After the ground freezes, apply a 2 to 3 inch layer of loose mulch such as pine needles, straw or leaves.
- **Weeks 3-4:** Roses should be winterized after a heavy frost. Place a 6 to 10-inch deep layer of mulch over each plant. Top soil works best. Prune sparingly, just enough to shorten overly long canes. Climbers should not be pruned at this time.
- **Week 3-4:** Covering garden pools with bird netting will prevent leaves from fouling the water. Oxygen depletion from rotting organic matter can cause winter kill of pond fish.

Vegetables

- **Weeks 1-4:** Fall tilling the vegetable garden exposes many insect pests to winter cold, reducing their numbers in next years garden.
- **Weeks 1-4:** Any unused, finished compost is best tilled under to improve garden soils.
- **Weeks 1-4:** To prevent insects or diseases from over-wintering in the garden, remove and compost all plant debris.
- **Weeks 1-3:** Overcrowded or unproductive rhubarb plants can be divided now.
- **Weeks 3-4:** Root crops such as carrots, radishes, turnips and Jerusalem artichokes store well outdoors in the ground. Just before the ground freezes, bury these crops under a deep layer of leaves or straw. Harvest as needed during winter by pulling back this protective mulch.
- **Week 4:** Thanksgiving - Weave a holiday wreath of garlic, onions, chili peppers and herbs. It will make a gourmet gift for a lucky friend.

Fruit

- **Weeks 1-4:** Keep mulches pulled back several inches from the base of fruit trees to prevent bark injury from hungry mice and other rodents.
- **Week 1:** Harvest pecans when they start to drop from trees. Shake nuts onto tarps laid on the ground.
- **Week 1:** Fallen, spoiled or mummified fruits should be cleaned up from the garden and destroyed by burying.
- **Weeks 3-4:** A dilute whitewash made from equal parts interior white latex paints and water, applied to the southwest side of young fruit trees will prevent winter sun scald injury.
- **Weeks 3-4:** Mulch strawberries for winter with straw. This should be done after several nights near 20 degrees, but before temperatures drop into the teens. Apply straw loosely, but thick enough to hide plants from view.

Miscellaneous

- **Weeks 1-4:** To prevent injury to turf grasses, keep leaves raked up off of the lawn.
- **Weeks 1-4:** A final fall application of fertilizer can be applied to bluegrass and fescue lawns now.
- **Weeks 2-4:** Clean house gutters of leaves and fallen debris before cold wet weather sets in.
- **Weeks 1-4:** Set up bird feeders. Birds appreciate a source of unfrozen drinking water during the winter.
- **Weeks 3-4:** For Cyclamen to bloom well indoors, they need cool temperatures in the 50-60 degree range, bright light, evenly moist soils, and regular fertilization.