

## Introduction

The goal of Oklahoma City's Park and Recreation and Public Works Department's and the Oklahoma City Community Foundation's Clean and Beautiful Schools is to create a clean and safe environment for all citizens to enjoy and prosper.

This manual is a monthly list of suggested activities and brief tips for landscape maintenance personnel. Bold numbers following tips refers to OSU Extension fact sheets and current reports. These are available from your county Extension office or through the internet at <http://agweb.okstate.edu/pearl/>. Information is designed to increase plant inspections that minimize plant health and pest problems. This practice will result in a healthier landscape with fewer unnecessary chemical applications.

Pesticide safety, compost/mulching, weed management, and irrigation maintenance must be practiced every month. Therefore, these tips are located before monthly tips. Review these each time monthly tips are read.

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## Tips for Consideration

### Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is strongly supported by the City of Oklahoma City. IPM is common sense pest control that protects the environment. It involves careful use of three pest management tactics – cultural, biological, and chemical.

Plant materials are selected according to the site and location. This is particularly important when plantings are near buildings or in parking lots. Asphalt, concrete, glass, brick, and other building materials emit heat and increase soil pH. These factors weaken and eventually kill sensitive plants.

Proper plant and pest identification is essential to IPM. There are numerous resources available to obtain correct identification including your county Extension office (Cleveland County – 321-4774 and Oklahoma County – 713-1125), local garden center, books, and online sources. *A resource list is provided with this publication.*

Monitor plant and pest problems regularly before they become difficult to manage. Check plants weekly throughout the growing season. Thoroughly check the entire plant and bed. Begin at the base of the plant, noting older leaves, new leaves, and under leaves. Check the trunk and limbs on shrubs and trees. This practice also ensures that natural enemies are not misidentified as pests to prey on pest insects.

Other management tactics that reduce unnecessary chemical applications include selection of disease resistant plants and selective pruning to reduce bird habitat. When necessary apply pesticides. These are effective IPM tools when applied correctly. Record all pesticide applications. In addition, record all other treatments for future landscape and other requirements.

IPM solutions include:

- ◆ *Oklahoma Proven* plants recommended by OSU;
- ◆ Maintain plant health with proper watering and fertilization;
- ◆ check plants often to catch problems early;
- ◆ identify pests correctly before treating;
- ◆ attract or release beneficial insects;
- ◆ use least toxic pesticides;
- ◆ read and follow pesticide labels.

### Record Keeping/Maps

Record keeping is essential to IPM and pesticide applications. The Oklahoma Department of Agriculture (405-521-3864) regulates pesticides and their application. Recorded information must be available for authorized State Board of Agriculture agents during business hours for at least two years. Minimum information required includes:

- 1) Time of application.
- 2) Place of each application.
- 3) Name and address of the applicator.
- 4) Name and address of the person for whom applied.
- 5) Legal description of the land where applied:
  - (A) May be a street address when properly marked.
  - (B) Shall not be a Post Office Box address.

- 6) Date of application.
- 7) Pesticide tank mix concentration.
- 8) Dilution rate for mixing.
- 9) Total quantity of pesticide used:
  - (A) Total amount of pesticide concentrate used.
  - (B) Total amount of pesticide tank mix used.
- 10) Complete trade name of pesticide product used.
- 11) EPA registration number of pesticide product used.
- 12) EPA establishment number of pesticide product used.
- 13) Any lot or batch number appearing on the pesticide product used.
- 14) Target pest for the application.
- 15) Site where the pesticide was applied.
- 16) Restricted Entry Interval as stated on the product label.
- 17) A copy of the pesticide product label as it appears on the container.
- 18) Copies of any contracts issued.
- 19) Other information as required by the Board.

*35:30-17 a. Combined Pesticide Law & Rules, Oklahoma Department of Agriculture, Plant Industry and Consumer Services, Oklahoma City, Oklahoma. May 11, 2000.*

The above list does not include other considerations such as wind speed, rainfall, etc. This additional information may also be recorded.

IPM relies on plant and pest monitoring. Written plant inspections provide documentation for plant health, pest population increase or decrease, and pest management effectiveness. Many landscape maintenance personnel create maps and use these as a form of record keeping. The map provides a visual record of plant health, pest infestations, and IPM treatments.

### **Fertilizer**

Plant health is a major component of IPM. When plants are lacking or have too little of one or more nutrients, they become sick and susceptible to pests. A soil test every two years provides an accurate analysis of nutrient availability and pH in the soil. County Extension offices interpret soil test results from the OSU Soils Laboratory.

Fertilizer may contain one or more nutrients. It may be organic or commercially formulated. Plants do not differentiate between these two forms. The nutrients found in synthetically derived or commercial fertilizers are readily available and may be referred to as quick-release. Organic forms must decompose before plants can utilize nutrients. These are called slow-release fertilizers. Some synthetic fertilizers are slow-release. The container will indicate if the fertilizer is slow-release.

The numbers on the container are listed as percentages of the nutrient found in the fertilizer. The first number represents nitrogen (N) and assists in leaf growth. The second number represents phosphorus (P) and assists in root growth & flower production. The third number represents potassium (K) and assists in general health.

### **pH**

pH aids in the availability of nutrients for plant roots to absorb. Lime increases soil pH, which increases the alkalinity of the soil. Sulfur decreases soil pH, which makes the soil more acid. A pH of 7 is considered neutral. A soil test will report the soil pH. This result can be used for plant selection,

determine the reason for poor plant health, etc. A plant expert can interpret pH results and recommend effective plant/soil solutions.

### **Plant Disease**

Diseases on plants are pest problems often confused with environmental stress. Before treating, correctly identify the problem. Disease causing organisms or pathogens include bacteria, fungi, nematodes, and viruses.

There are four factors required for diseases to infect and grow on plants: virulent pathogens; moist, shady, and mild temperatures; susceptible host; and, time. Most disease problems occur during the spring and fall when temperatures are mild and there is increased rainfall. However, microclimates may be created in landscapes that favor disease problems throughout the growing season. Shady areas have a greater potential for disease outbreaks since moisture does not dry as quickly as sunnier spots.

Pathogens require a certain amount of time to infect and grow on plants. Remove water on foliage as frequently as possible and avoid wetting leaves. Soaker hoses or drip irrigation eliminate water on plant foliage. Gently shake plants remove heavy morning dew. Water plants in the morning versus evening hours. This allows the sun to dry moisture on leaves. A few disease symptoms include:

- ◆ leaf yellowing;
- ◆ galls (swellings) on leaves or stems;
- ◆ decayed or rotted plant tissue;
- ◆ stunted plant growth;
- ◆ wilt when the soil is moist.

These examples are similar symptoms that may indicate other plant problems. An expert can distinguish between plant disease and environmental stress problems.

Healthy plants resist diseases better than stressed ones. IPM cultural practices that minimize diseases include:

- ◆ *Resistance* - Use disease-resistant plants.
- ◆ *Exclusion* - Rotate annual plant species to different areas to avoid disease pathogens in the soil.
- ◆ *Eradication & Sanitation* - Remove and destroy diseased plants when symptoms are seen.

Use pesticides when necessary. More than one application may be required for plant diseases. Read and follow label directions. Select the appropriate pesticide for the specific disease (i.e. – fungicides for fungi, bactericides for bacteria, etc.

### **Water Management**

Proper watering is the main factor in healthy landscape plants. Improper watering increases pest problems. Water plants deeply and less often.

Generally, most plants, including bermudagrass, need one inch of water a week. Fescue lawns require two inches of water a week. Water young trees weekly the first three years if needed and apply mulch.

Water in the morning. This allows leaves to dry quickly and prevents disease problems. Use soaker hoses in flowerbeds to prevent wet leaves and evaporation loss.

To determine the output of a sprinkler, place containers (butter dishes, pie plates, etc.) around sprinklers to collect water. Record the time it takes to fill an inch of water in the container. This is the amount of time needed for one inch of water.

### **Steps for Overseeding Bermudagrass with Ryegrass**

- 1 Plant when growth has slowed, but before November 1.
- 2 Mow lawn short for proper light for germination.
- 3 Apply 10 - 20 pounds of seed per 1,000 sq. ft
- 4 Use a rake to work seed into the soil for seed-to-moisture contact.
- 5 Keep the soil moist (water three to four times daily) for the first 7-10 days.
- 6 Fertilize to maintain color and vigor until March 1.
- 7 Mow perennial ryegrass when it reaches 2 1/2 inches tall.

### **Tree Selection and Planting**

October is a good month to select a tree based on its fall color. This is also a good time to plant trees.

Soil preparation and proper placement are essential for tree growth and prevention of problems.

- 1) Plant trees even with the soil grade in sandy and loamy soils and one to two inches above the grade in clay soils.
- 2) The hole should be at least two to three times the diameter of the rootball and only as deep as the rootball will sit. Do not loosen the soil below the rootball.
- 3) Fill the hole with original soil from the hole.
- 4) Do not add fertilizer to the planting hole. Water with a solution of 15-30-15 fertilizer.
- 5) Stake if necessary with wide nylon webbing. Do not use wire or rope. Remove after one year.
- 6) Add three inches of mulch. Maintain a weed and grass free zone three to five feet around the tree.
- 7) If trees are ball and burlap, cut the twine to prevent girdling.
- 8) Never use a string weed trimmer near a tree trunk.

### **Pruning Management**

Pruning improves the appearance or form of shrubs and trees. Pruning can also reduce ice damage. Selective pruning enhances tree and shrub health and is a cultural component of IPM. Some trees like the Bradford pear attract birds because of dense branches. Pruning is an IPM solution to reducing bird populations without chemicals.

Most trees benefit from late fall or winter pruning, while others require special seasonal attention. Shrubs that bloom in early spring should be pruned immediately after blooming to permit the development of next spring's buds in early summer. Never top trees.

## Storm Drain Management

Storm drains are designed to remove storm water from streets. The water that enters storm drains empties into the nearest creek, river, or lake. This water is not treated before it enters these surface water areas.

According to the Clean Water Act, nothing other than storm water is permitted to enter into storm drains. Any other substance is an illicit discharge and a fineable offense in Oklahoma City limits. No equipment can be washed near storm drains, excess fertilizer and pesticide granules must be swept from concrete areas, and pesticides must be mixed and applied away from storm drains to prevent contamination.

### Pesticide and Plant/Pest Identification Resources

Cleveland County Extension Office	321-4774
Oklahoma County Extension Office	713-1125
Poison Control Center	271-5454
Oklahoma City Storm Water Quality	297-1774
Oklahoma Department of Agriculture	521-3864
Local Garden Center or Chemical Supply	

OSU Fact Sheets	<a href="http://agweb.okstate.edu/pearl/">http://agweb.okstate.edu/pearl/</a>
OSU Department of Entomology and Plant Pathology	<a href="http://www.ento.okstate.edu/">http://www.ento.okstate.edu/</a>
OSU Department of Horticulture and Landscape Architecture	<a href="http://www.okstate.edu/OSU_Ag/asnr/hortla/">http://www.okstate.edu/OSU_Ag/asnr/hortla/</a>
Oklahoma Department of Agriculture	<a href="http://www.state.ok.us/~okag/picshome.html">www.state.ok.us/~okag/picshome.html</a>

Major Horticultural and Household Insects of Oklahoma, E-918, OSU Oklahoma Cooperative Extension Service  
Ornamental Pest Management, E-838, OSU Oklahoma Cooperative Extension Service  
Turfgrass Pest Management, E-879, OSU Oklahoma Cooperative Extension Service  
Southern Living Garden Problem Solver  
Southern Living Garden Book  
Oklahoma Gardener's Guide by Steve Dobbs  
Know It and Grow It by Carl Witcomb

## For All Months of the Year

### Pesticide Safety

- **Rotate** pesticides applied. For example, do not use the same active ingredient frequently.
- **Date** chemical containers when first opened.
- Select **less toxic** pesticides. *Caution* signal words (on the front label) indicate less toxic compared to *warning* or *danger*. **L-261, F-7457**
- **Read** labels before mixing and applying. **F-7450, L-263**
- **Calibrate sprayer and spreader equipment** before each use.
- Wear **Personnel protective equipment (PPE)** when mixing, applying, and cleaning pesticide equipment. Dispose or clean PPE after each use. Wash contaminated items separately from household laundry. **F-7450, L-263**
- **Mix** all pesticides away from inside or outside drains. **L-263, L-264, F-7450**
- **Spot treat** problem areas to minimize unnecessary pesticide applications.
- **Rinse spreaders and other pesticide equipment** on grass. Fill sprayers with water and apply rinsate on labeled sites. **L-263**
- Triple rinse **empty containers** away from drains. Place rinsate into a sprayer and apply on labeled sites according to manufacture recommendations. **L-263, F-7462**
- **Puncture** and dispose of containers properly. **F-7462**
- **Sweep excess** fertilizer and pesticide granules from concrete surfaces. This will eliminate unused chemicals from washing into storm drains. **L-264**
- **Record** application information. **F-321**
- **Update** pesticide inventory and material safety data sheets (MSDS).
- **Dispose** of unwanted household chemicals correctly. Contact 297-1774 (City of Oklahoma City Storm Water Quality Management) for location of disposal site.
- **Do not dump** chemicals, paint, pesticides, grass clippings, etc. into storm drains. **L-264, F-7463**

### General

- **Litter** picked up daily.
- **Compost or chip/mulch** grass clippings, limbs, and other healthy plant debris. Do not compost diseased or insect infested plants. **L-251, L-252, L-253**
- Maintain 3-4 inches of **mulch/compost** in all ornamental beds and 6 feet around trees without touching the trunk. Keep mulched areas weed free. **L-251, F-6005**
- **Weeds** are easier to control when small. Hand pulling weeds reduces herbicide applications. Keep areas around newly planted trees, shrubs, and flowers weed-free. This practice reduces plant competition on water and nutrients so the plant has a healthy transplant transition. **F-6408**
- Monitor **soil moisture**. Water trees, shrubs, flowers, and turf as needed during dry spells. Winter irrigation is ideal when temperatures remain above freezing for a few days. Water deeply and less frequently in the morning. This practice will reduce evaporation and disease problems. Mulch will also reduce moisture loss. **L-251, F-6408, F-6420, F-7612**
- **Check and adjust irrigation systems** according to rainfall and temperature. This may be weekly or monthly depending on weather conditions.
- Appropriate **seasonal color** added and maintained. **F-6425**.

## January

### Turf

- **Treat winter annual weeds** in bermudagrass with non-selective herbicides when temperatures are above 50 degrees F. **F-6421, F-6601**

### Trees and Shrubs

- Remove **bagworm cases** from infested evergreens and deciduous plants. **F-6431, F-7306**
- Remove **cedar-apple rust** galls from cedars. **F-7611**
- Pine **needle drop** is a naturally occurring plant mechanism since pine trees drop their needles every 2 or 3 years. No need to worry when inside pine needles turn brown and drop. It is a concern when tips turn brown or if the whole tree turns brown. Contact your county Extension office for more information. **F-6408, F-7618**
- Apply **dormant oil** for overwintering insects (euonymus and other scale, aphids, bores, and spider mites) when temperatures are above 40 degrees F. Do not apply on evergreens. **F-7306**
- Determine if **overgrown foundation shrubs** need rejuvenation pruning or replacement.
- Remove **dead trees** and limbs. Consult a qualified arborist if the tree or limbs are large. **F-6404, F-6409**
- Prune **deciduous trees** (birch, elm, maple, willow, etc.) Do not prune after February. **F-6404, F-6409**
- Prune **spring flowering shrubs** right after bloom. **F-6404, F-6409**
- **Remove stakes and wires** on any trees after one year. **F-5036**
- A **windbreak** is a row of evergreen trees or shrubs (arborvitae, juniper, and holly) that block wind. A 1 mile per hour increase in wind lowers temperatures by 1 degree. **F-6417**

### Flowers

- Let leaves remain as mulch on smaller plants. **F-6431**

### Classroom Activities

- Discuss **wind chills**. Which direction(s) are local prevailing winds? What causes wind?
- Discuss the process of **freezing**. Why are days shorter. How bark protects trees (bark rubbings).
- Discuss **deciduous vs. evergreen plants**. How plants transpire. How to determine if plants need water.
- Bring cut branches of **conifers**. Cover topics such as flowering plants vs. conifers. How plants “heal”. Artistic forms of pruning.

## February

### General

Attract **wildlife** with plants. Identify existing plants and select additional plants to increase wildlife potential. **F-6435, F-6430**

### Turf

- Control winter **weeds** in bermudagrass with non-selective herbicides when temperatures are above 50 degrees F. **F-6421, F-6601**
- Apply **preemergence** herbicide for crabgrass when soil temperatures reach 50 degrees F, or when forsythia flower. This can be tank mixed with glyphosate herbicides according to directions. **F-6420, F-6421**

### Trees and Shrubs

- Prune **summer flowering shrubs**. **F-6409**
- Prune **spring flowering shrubs** immediately after flowers fade. **F-6409**
- Keep areas around **new trees free of weeds** to reduce plant competition. **F-6408**
- **Fertilize** trees and shrubs at leaf swell. **F-6412**
- **Apply** dormant oil **for overwintering insects** (euonymus and other scale, aphids, bores, and spider mites) when temperatures are above 40 degrees F. Do not apply on evergreens. **F-7306**
- Remove **cedar-apple rust** galls from cedars. **F-7611**

### Flowers

- **Clean up and remove** dead plant material from beds. **F-6408**
- Remove **weeds** from beds physically or with labeled herbicides when temperatures are above 50 degrees F.
- **Spring bulbs** break the soil surface.
- Leave **bulb foliage** until fully ripened.
- **Do not overwater** dormant bulbs.
- Make plans to incorporate more multi-seasonal **low maintenance bulbs**.

### Classroom Activities

- Discuss the major **nutrients** plants require. Perform a **soil test** with do-it-yourself equipment.
- Discuss **soil profiles**.
- Discuss **animal habitats and diets**. List contribution plants have to the ecosystem. Plant identification.
- Discuss **bulbous plants**. Historical implications 'Tulip Craze'. Dissection of bulbs, tubers, etc.
- Bring in cut branches for **forcing**. 2) Discuss flower parts and function. Discuss pollination and seed formation.

## March

### Turf

- Apply labeled **preemergence herbicides** mid-to-late month for summer annual grassy weeds (foxtail, goosegrass, and sandbur). The optimum time for application is when soil temperatures reach 50 degrees F, or when forsythia flower. Do not apply on areas to be seeded. **F-6421**
- **Fertilize fescue** with 1 lb. of nitrogen per 1,000 sq. ft. **F-6420**
- **Broadleaf weeds** (aster, carpeted, knotted, common purslane, and spotted spurge) are easily controlled in cool-season lawns at this time with postemergence herbicides. **F-6601, F-6421**
- **Aerify** cool-season grasses now. **F-6420**
- **Mow** cool-season grasses approximately 3 inches high. Remove no more than 1/3 of the leaf blade. Prevent grass clippings from entering storm drains. **F-6420**
- Remove excess **thatch** from warm-season lawns every 2 or 3 years. **F-6604**

### Trees and Shrubs

- **Remove** dead trees and limbs. **F-6409**
- **Remove and destroy trees killed by pine wilt.** This will prevent further spread of the disease. **F-7618**
- **Remove** stakes and wires on trees after one year. **F-6415**
- Remove **tree wrap.** **F-6415**
- Finish **planting new trees** and shrubs by the end of the month. Provide proper care until established. Plan for long term care, watering, etc. **F-6414**
- Keep areas around **new trees free of weeds** to reduce plant competition. **F-6408**
- Prune **spring flowering shrubs** as flowers fade. **F-6409**
- Prune **broad-leaved evergreens** (holly, juniper, and arborvitae) before new growth begins. **F-6409**
- If **summer flowering shrubs** were not pruned in February, then do so this month. **F-6409**
- Prune **new growth (candles) on pines** before needles reach full length. Always leave ½ the length of the candle. **F-6409**
- **Pine tip blight** is a disease that infects and kills branch tips. Remove and destroy infected tips. For severe problem, apply labeled fungicides when buds open, and twice more at weekly intervals until the needles break through the needle sheaths. **F-7763**
- **Fertilize** trees and shrubs at leaf swell. **F-6412**

### Flowers

- Remove **dead and sick** plant material removed. **F-6408**
- **Prune roses** in late March according to shrub type, as needed. **F-6400, F-6403, F-7607**
- Remove **weeds** from beds physically or with labeled herbicides when temperatures are above 50 degrees F.
- Cut back **ornamental grasses** and ground covers including monkey grass. **F-6408**
- **Dig and divide** any perennials not attended to in fall. Provide appropriate care until reestablished.
- **Groom herbaceous** plants as needed. **F-6410, F-7608**
- Begin **planting perennials** and hardy summer flowering bulbs.

### Classroom Activities

- Discuss **soil erosion** and the Dust Bowl, plants that clump vs. runners, various types of root systems, and observe sedimentation.
- Discuss **insect** lifecycles. Use hand lens or microscopes for observations. Discuss beneficial and pest insects.

- Discuss **perennial plants** including asexual reproduction. Demonstrate with plant cuttings and divisions.
- **Plant a tree or shrub** for a special occasion. Schedule students to volunteer with tree care maintenance plan at school. Use trees for art projects.

## April

### Turf

- Apply **preemergence** for summer grassy weeds (foxtails, goose grass, and sandburs) the first of the month when soil temperatures reach 50 degrees F. **F-6421**
- **Spring dead spot** is a fungal disease that infested the turf the previous fall. There are no recommended fungicides for this disease. Maintain turf health throughout the year. Rake and aerify affected areas. **F-7675**
- **White grubs** eat grass roots and are white C-shaped worms. The best time for treatment is July through September. Adults are attracted to outdoor lights. Reduce lighting to discourage egg laying. **F-6420**
- **Do not apply** preemergence herbicides on areas to be seeded. **F-7419**
- **Mow** warm-season grasses at appropriate heights. Adjust according to temperatures. **F-6420**
- Follow a **turf maintenance plan**. Eliminate turf in favor of ornamental plantings or vice-versa where practical. Select alternatives to either turf or ornamental plantings. **F-6420, F-6601**

### Trees and Shrubs

- **Anthracnose** causes leaves to fall from sycamore, maple, and oak trees. This disease is dependent on spring weather and is not noticeably visible every year. Treatment is not necessary since affected trees produce new leaves when conditions are favorable. **F-7634**
- **Cedar-apple rust** affects cedar trees, susceptible apple trees, hawthorn, and other rose family members. Susceptible apple trees can be severely affected resulting in tree death over a period of years. Remove galls during the winter months. Fungicide treatments are impractical on cedars. Fungicides are available for apple trees. **F-7611**
- Complete final **pine tip blight** fungicide treatments. **F-7645**
- **Powdery mildew** (white/grayish coating) on leaves occurs on crepe myrtle, lilac, roses, etc. when temperatures and humidity are high. Space or prune plants to increase air circulation. Choose resistant plants. If fungicides are applied, more than one treatment may be needed. **F-6403, F-7617**
- **Remove** stakes and wires on trees at the end of one year. **F-6415**
- Continue observations for **winter damage** and prune if needed. **F-6409**
- **Identify unknown** trees and shrubs to determine proper maintenance and care. **F-6412**
- Check new growth for **aphids**. **F-7306**

### Flowers

- **Aphids** love new, tender growth. These little insects are found on the undersides of leaves and on new leaves and buds. Rinse plants with water to knock them down. Insecticide soap or other labeled pesticides can be used. Beneficial insects like lady beetles and lacewings may attack aphids. Ants near plants may indicate an aphid problem. **F-7307**
- **Caterpillars** are immature moths or butterflies. When possible, hand pick these pests. Apply Bt if necessary. **L-260**
- Remove **dead or sick** plant material. **F-6408**
- **Plant annuals** after danger of frost. Use drought resistant and low maintenance annuals. Alternate planting sites to avoid pests and diseases. **F-6410, F-6425**
- **Fertilize** annuals and perennials appropriately. **F-6410, F-6425**
- Leave **bulb foliage** intact until brown.
- Start a **rose disease** preventative spray program and continue through the fall. **F-6400, F-6403**
- Continue **planting** perennials and warm-season flowering bulbs.
- Begin monitoring for **Red Imported Fire Ants**. If you suspect fire ants, contact the Oklahoma Department of Agriculture (405/521-3864) or the OSU Department of Entomology and Plant Pathology (405/744-3351). Apply a bait control product when worker ants are searching for food.

Randomly place several potato chips or small pieces of meat in an area where fire ants are suspected. Check the area in 30 minutes. If ants are present, then apply baits when they are feeding. Daytime applications should be made when soil temperatures are 70 to 90 degrees F. Apply bait products in late afternoon when temperatures are higher during summer months. Do not disturb mounds. Apply according to label rates away from the mound, not on the mound. **CR-7309**

### **Classroom Activities**

- Discuss **annual plants**, important agricultural crops, and seed development and germination.
- Collect **turfgrass insects** on a safari.
- What are **weeds**? Count the number of weed species in three square feet. Discuss the impact of weeds on food productions.
- Make **leaf collections**. Explain the types of leaf adaptations. Explain leaf physiology/structure.
- Discuss **water conservation**, they hydrological cycle and historical developments of plumbing, irrigation etc.

## May

### Turf

- **Dollar spot** disease is first seen mid-May and June when daytime temperatures are mild (70 degrees F). Adjust soil fertility before applying fungicides. **F-7658**
- **Fertilize warm-season** grasses with a complete fertilizer ratio 4:1:2 such as 20-5-10. Apply 1lb. of nitrogen per 1,000 sq. ft. **F-6420**
- **Fertilize fescue** with 1/2 to 1 lb. of nitrogen per 1,000 sq. ft. **F-6420**
- Apply **postemergence herbicides** for summer weeds (Dallisgrass, crabgrass, foxtail, goosegrass, and sandbur). Follow label directions since additional applications may be necessary. Make sure grass is completely green. **F-6420, F-6421**
- Apply **postemergence herbicides** to summer annual and perennial broadleaf weeds (aster, carpetweed, knotweed, common purslane, and spotted spurge). For best results, apply herbicides soon after their emergence. **F-6420, F-6421, F-6601**
- **Yellow and purple nutsedge** are more challenging to control. Correctly identify the nutsedge before applying a herbicides or select one that will control both types. **F-6420, F-6421**
- May is the best month to **spring, plug or sod bermudagrass**. Do not apply preemergence herbicides in March or April on areas to be seeded. **F-6419**
- **Aerify** warm-season grasses if soil is compacted. **F-6420**

### Trees and Shrubs

- Continue to monitor and remove **winter-damaged** branches or plants not growing. **F-6404**
- **Junipers and arborvitae** can be sheared. To avoid constant shearing, install smaller maturing plants. **F-6409**
- **Fall webworm** eggs hatch in late May/early June and the second generation hatches in August through September. Larvae spin webbing on the outside of tree canopies. Remove webbing or penetrating webbing with Bt. **CR-6209**
- **Bagworm** larvae and adult females are found in bags on evergreen trees and deciduous plants. Reduce infestations by hand picking bags in the fall, winter, and spring before eggs hatch. Insecticides are most effective in early June. **F-7306**
- **Lace bugs** attack azalea, elm, oak, sycamore, and pyracantha. Small tar-looking spots on the undersides of leaves indicate activity. A heavy rain may deplete populations. Apply a labeled insecticide if infestations are high. **F-7306**
- **Pine needle blight** begins as tan or brown spots in the middle of needles. Eventually, half of the needle turns brown with the inner portion remaining green and attached to the branch. Apply the first fungicide application mid-May for needle blight if pines are affected. **F-7618**
- **Elm leaf beetle** adults eat small, circular holes in leaves. Larvae hatch late May and feed in groups causing skeletonized areas. Apply a labeled insecticide to larvae, if necessary. **F-7602, F-7306**.
- **Euonymus scale** attacks several species and varieties of euonymus. The best time to apply labeled insecticides is when scale are immature, mobile, and not protected by a waxy covering. This is difficult to determine, so winter dormant oil applications may be more appropriate. However, the *best option* is the selection of plant materials not susceptible to euonymus scale. **F-7306**
- Monitor and treat **powdery mildew** if necessary. **F-6403, F-7617**

### Flowers

- Begin **deadheading** roses.
- **Continue planting** warm-season annuals and perennials for summer color. Do not forget to match the transplant to its appropriate growing site and space when planting. **F-6410, F-6425**.

- Continue monitoring for **aphids**. Ants around plants may indicate an aphid problem. Treat as necessary. **F-7306**.
- **Fertilize** annuals.
- Continue a preventative spray program since **black spot and powdery mildew** may affect **roses**. Reduce black spot on roses with good ventilation, since the fungal causing agent requires wet leaves, high humidity, and mild temperatures to grow. Apply fungicides to suppress or prevent the disease. The best option is the selection of disease resistant species and cultivars. **F-6400, F-6403, F-7607**
- Continue monitoring **Red Imported Fire Ant activity**. **CR-7309**

### **Classroom Activities**

- Discuss the importance of **mulching**. A beneficial IPM landscape practice. Reasons for mulching include moisture retention, even soil temperatures, provides humus and plant nutrients, and reduction of weeds and soil compaction. Mulching materials are wood chips, cocoa hulls, hay, pine needles, compost, or whatever can be used to cover the ground to reduce evaporation and keep roots as cool as possible.
- Discuss **lady beetles** and how they are beneficial insects. Lady beetle activity can be encouraged through fewer insecticide applications and additional flowering ornamentals .

## June

### General

**Spider mites** love dry, hot weather. Check plants weekly. **F-7306**

### Turf

- **Aerate** compacted soils. **F-6420**
- **Complete seeding** bermudagrass the end of June. **F-6419**
- Continue **vegetative establishment** of warm-season grasses. **F-6419**
- **Dollar spot disease** is first seen mid-May and June when daytime temperatures are mild (70 degrees F). Correct soil fertility reduces the severity. **F-7658**
- **Brown patch** can be a problem on cool-season grasses. Treat with a labeled fungicide.
- **Fertilize** with 1lb. of nitrogen to bermudagrass per 1,000 sq. ft. **F-6420, L-265**
- **Treat** summer grassy **weeds** with labeled herbicides. **F-6420, F-6421**
- **Water** - Bermudagrass requires about 1 inch of water each week.  
Fescue and rye grasses require about 2 inches of water each week. **F-6420**

### Trees and Shrubs

- **Junipers and arborvitae** can be sheared. **F-6409**
- If pines have **pine needle disease** apply fungicides again. **F-7618**
- Look for **elm leaf beetle larvae** and treat in early to mid-June if the population is high. **F-7306**
- Continue monitoring for **lace bugs** underneath leaves on azalea, elms, oak, sycamore and pyracantha. Small tar spots indicate lace bug presence. **F-7306**
- Continue monitoring plants for **powdery mildew**. **F-7617**

### Flowers

- Continue **planting** warm-season annuals and perennials. **F-6410, F-6425**
- Continue monitoring for **black spot** on roses. **F-6403**
- **Deadhead** roses, annuals, and perennials. **F-6403**
- Cut **chrysanthemum** 3 inches high for fall bloom. Fertilize for new growth.
- Continue monitoring **Red Imported Fire Ant** activity. Apply bait in the later afternoon when temperatures are above 90 degrees F. **CR-7309**

### Classroom Activities

- Look for **insects** and their activity. What are they doing? What are they eating? How many are on each leaf, plant, etc.? How can you treat them without applying insecticides? Will it eliminate the generation?
- Determine the exact **square footage** of the school grounds covered by grass. Remove flower beds, trees playground area, etc.

## July

### General

- **Spider mites** love dry, hot weather. Check plants weekly. **F-7306**
- **Cicada killers** are large wasps that prey upon cicadas. Avoid killing wasps, if possible, as they rarely sting. Nests (holes) are found in bare soil or areas with little vegetation. **F-7305**

### Turf

- **Complete vegetative establishment** of warm-season grasses by the end of July. **F-6419**
- **Continue fertilizing** warm-season grasses if water is present for growth. **F-6420, L-265**
- **Treat** summer grassy **weeds** with labeled postemergence herbicides. **F-6421, F-6420**
- **Brown patch** on cool-season grass can be a problem. **F-6420**
- **Treat white grubs** with labeled insecticides if they were a problem in the spring. **F-7306**
- **Aerate** compacted soils. **F-6420**

### Trees and Shrubs

- Some **leaf drop** is common during drought. Do not spray with pesticides. **F-6408**
- **Pine needles** that turn brown and drop near the trunk is a normal process.
- **Minimum pruning** on all trees and shrubs. Junipers and arborvitae can be sheared. **F-6409, F-6408**
- Monitor **fall webworm** activity and treat by removing webbing or penetrating webbing with Bt, if needed. **CR-6209**
- Continue looking for **elm leaf beetle larvae** and treat if needed. Use a high pressure, high volume spray. **F-7306**
- Continue monitoring for **powdery mildew** on crepe myrtle, lilac, roses, etc. **F-7617, F-7607**

### Flowers

- Continue monitoring for **black spot** on roses. **F-7607**
- **Deadhead** roses, annuals, and perennials. **F-6400, F-6403**
- For **easy watering** place potted plants together.
- Continue monitoring **Red Imported Fire Ant** activity. **CR-7309**

### Classroom Activities

- What insects are active this time of year?
- What plants in your yard or at school are doing well in the heat?

## August

### General

Continue checking plants weekly for **spider mites**. **F-7306**

### Turf

- **Fertilize** warm-season grasses if water is present for growth. Apply 1 lb. of nitrogen fertilizer to 1,000 sq. ft. **F-6420, L-265**
- **Treat white grubs**. If ground is dry, thoroughly water before and after application. Disregard if applied a labeled insecticide in July. **F-6420, F-7306**
- Apply **preemergence herbicides** to grasses later in the month. Gently water lawn after application. **F-6421, F-6408**
- For areas being **converted to tall fescue** this fall, begin spraying bermudagrass with non-selective herbicides in early August. **F-6420**
- **Brown patch** on cool-season grass can be a problem. **F-6408**

### Trees and Shrubs

- *Minimal pruning* on hedges and shrubs if needed in mid-August. **F-6408, F-6409**
- Adult female **fall webworms** may be laying eggs. Squash eggs and treat larvae when small. **CR-6209**
- If your entire **pine tree** turns reddish-brown quickly, it may be infected with pine wilt. Remove immediately. **F-7618**
- **Pine needles** that turn brown and drop near the trunk is a normal process.
- Continue monitoring for **powdery mildew** on crepemyrtle, lilac, roses, etc. **F-7617, F-7607**

### Flowers

- Discontinue **deadheading roses** by mid-August to help initiate winter hardiness. **F-6403, F-6408**
- Continue **deadheading** annuals and perennials as needed.
- **Red Imported Fire Ants** are less active during hot weather. Apply bait in the late afternoon. Do not disturb mounds. **CR-7309**
- Continue monitoring **black spot** on roses. **F-7607**

### Classroom Activity

- All **creatures in nature** have a function. Find 10 that you encounter everyday (flies, roaches, lice, ticks, rats, wasps, birds, spiders, etc.) and explain their job in nature.
- **Help your neighborhood** dispose of unwanted household chemicals safely. Contact 297-1774 for more information.

## September

### Turf

- **Treat white grubs** if no insecticides were applied in July or August by September 15. If the ground is dry, thoroughly water before and after application. **F-7306**
- **Brown patch** on cool-season grass can be a problem. **F-6420**
- For areas being **converted to tall fescue** this fall, begin spraying bermudagrass with glyphosate herbicides. **F-6420**
- **Treat** winter annual grassy **weeds** (annual bluegrass, cheat, and downy brome) with preemergence herbicides by the 1st of the month. Do not treat areas that will be seeded in the fall. **F-6420, F-6421**
- Apply the **last application of fertilizer** on bermudagrass by September 15. Use a complete fertilizer, ratio of 4:1:2, such as 20-5-10. Use 1 lb. of nitrogen per 1,000 sq. ft. This will enhance winter hardiness. **F-6420**
- **Establish cool-season grasses** such as fescue or overseed bermudagrass with ryegrass late September and October. **F-6420**

### Trees and Shrubs

- **Adult elm leaf beetles** may be active. They look for overwintering places such as buildings and homes. Insecticides are ineffective on adults. Check seals around doors and windows to reduce indoor infestations. **F-7306, F-7602**
- **Boxelder bugs and redshoulder bugs** are black with red markings. They attack seedpods on goldenrain, boxelder, and maple trees. These do not harm trees or people, but are nuisances indoors. Insecticides are ineffective on adults. Check seals around doors and windows to reduce indoor infestations.
- The second generation of **fall webworms** may be attacking pecan and other susceptible trees. Penetrate webbing with Bt if problem is severe. **CR-6209**
- **Lacewing** eggs can be seen now. They are very small and found on the bottom of leaves on sycamore trees. These are concentrated where lace bug populations are high. Lacewing larvae are predators of insect pests like aphids and lace bugs. **F-7303**
- If your entire **pine tree** turns reddish-brown quickly, it may be infected with pine wilt. Remove immediately. **F-7618**

### Flowers

- Continue **deadheading** annuals and perennials as needed.
- Choose **spring flowering bulbs** as soon as available. Store in a cool closet and plant in November.
- Plant **cool-season annuals** such as pansies, ornamental cabbage, and kale. **F-6425**
- **Dig, divide, and replant** spring blooming perennials. **F-6409, F-6408**
- Dispose of all **diseased** plants. Do not compost these. **F-6409**
- Monitor **aphids** activity on new growth. **F-7306**
- Monitor **Red Imported Fire Ant** activity. Place a chip or piece of meat near an active mound. Treat when soil temperatures are between 70 and 90 degrees F on sunny mornings after cool nights when the ground is dry and no rain is expected for 24 hours. Do not disturb mounds. **CR-7309**

### Classroom Activities

- Start **spring flowering bulbs** such as paperwhite narcissus indoors.

- **Plant a cool-season vegetable garden** using mixed salads. Toss the salads before planting. Mix some of each seeds together in a pail and sprinkle the mixture in the garden.

## October

### General

- **Test the soil for nutrients** prior to fertilizing. Develop a fertilizer schedule to ensure proper application rates and procedures are followed. **F-2207, F-2225, F-2236**
- **Remove diseased** plant material from the landscape to reduce disease problems next year. Do not compost. **F-6409**

### Turf

- Apply **postemergence herbicides** if broadleaf weeds are a problem. **F-6601, F-6421**
- **Fertilize fescue** with 1 lb. of nitrogen per 1000 sq. ft. **F-6420, L-265**
- **Seed cool-season grasses** through mid-October. **F-6420, F-6408**
- **Overseed warm-season** lawns with cool-season grass for winter this month. Warm-season lawns are healthiest if winter over-seeding does not occur. **F-6420, F-6408**
- **Remove leaves** from cool-season grasses or mow with a mulching mower. **F-6408**
- **Treat brown patch** on fescue if necessary. **F-9420**

### Trees and Shrubs

- Remove **diseased pine** cones and needles. **F-6408, F-7618**
- Pine **needle drop** is a naturally occurring plant mechanism since pine trees drop their needles every 2 or 3 years. No need to worry when inside pine needles turn brown and drop. It is a concern when tips turn brown or if the whole tree turns brown. Contact your county Extension office for more information. **F-6408, F-7618**
- If your entire **pine tree** turns reddish-brown quickly, it may be infected with pine wilt. Remove immediately. **F-7618**
- **Plant** ball and burlap trees. Water newly planted trees as needed throughout the winter. **F-6414**
- **Boxelder bugs** are black with red markings. It is common for them to enter homes this time of year and are harmless. They may stain walls or curtains with their excrement when smashed. **F-6408, F-7306**

### Flowers

- **Move** houseplants to lower light areas in early October well before the first predicted freeze. Treat pest problems before moving plants inside. **F-6408**
- **Deadhead** chrysanthemums and other fall blooming perennials as needed.
- **Dig** tender perennials (dahlias, caladiums, elephant ears) and store dry in peat or vermiculite in garage. **F-6408, F-6410**
- Continue **planting cool-season annuals** like pansies, ornamental cabbage, kale and dusty miller. **F-6425**
- Monitor **Red Imported Fire Ant** activity. **CR-7309**

### Classroom Activities

- How many **pounds of ryegrass** would it take to sow your football field?
- How many **pounds of nitrogen** should be applied in the football field?

## November

### Turf

- Pull **weeds**, they are easier to control when small.
- Apply postemergence herbicides if broadleaf weeds (chickweed and henbit) are a problem. **F-6420, F-6421, F-6601**
- **Fertilize fescue** with 1 lb. of nitrogen per 1,000 sq. ft. **F-6420**
- **Remove leaves** from cool-season grasses or mow with a mulching mower. **F-6420**

### Trees and Shrubs

- Check for **scale** on woody ornamentals and fruit trees. Apply dormant oil when trees are completely dormant when temperatures are above 40 degrees F. Do not use dormant oil on evergreens. **F-7306**
- **Remove diseased limbs** and twigs on trees, shrubs and vines. **F-7618**
- November 15 through March 15 is the **major pruning season**. Consult an arborist. **F-6409**
- **Fertilize** trees and shrubs after frost and before freezing weather begins. **F-6412**
- The best **planting** time for most trees and shrubs is fall frost until late spring. **F-6414**
- **Soak** all plantings before hard freezing weather. **F-6404**

### Flowers

- Plant **spring flowering bulbs** (tulips, hyacinths and daffodils).
- **Leave foliage on mums** and other perennials to help insulate crowns for harsh winter conditions. **F-6009**

### Classroom Activities

- Discuss the importance of **tree planting** and tree values in a community. The role of trees in providing beauty and shade in communities, neighborhoods and schools. Discuss the unseen things trees do: Reduce energy costs, clean the air, increase home values, screen noise and undesirable views, attract wildlife, slow runoff and prevent erosion. Plant a tree on school grounds.
- Discuss the **three basic elements** needed for plant growth. Nitrogen (N), phosphorus (P), and potassium (K). You can associate nitrogen with leafy growth, phosphorus with abundant flowering, necessary for crops that produce vegetables like tomatoes, squash, and beans and potassium with strong stem and root growth.

## December

### General

Join a horticulture, plant or urban forestry society and support community greening projects.

### Turf

- **Apply lime or sulfur** as indicated by soil test results.
- **Treat annual bluegrass** and other winter annual weeds established *dormant* bermudagrass with non-selective herbicides. **F-6420, F-6421**
- **Fertilize fescue** with 1 lb. of nitrogen per 1,000 sq. ft. **F-6420**

### Trees and Shrubs

- Remove **cedar-apple galls** on evergreens. **F-7611**
- **Light pruning** of evergreens can be used for Christmas decorations.
- Check for overwintering **bagworm** hideouts. These 2-inch long gray/brown web-like bags usually composed of leaves, twigs and silk hang from branches of cedars and arborvitae. Next spring, larvae will emerge from these bags to feed on the foliage of trees. Hand pick and destroy the bags, taking care not to injure the tree branches. **F-7306**
- **Apply winter mulch** to protect rose bush bud unions and other perennials, etc. Wait until after several early freezes or insects will have a good place to winter. **F-6004, F-6404, L-251**
- **Treat mistletoe** in deciduous trees with labeled fruit eliminator chemicals.
- Apply **dormant oil** to dormant deciduous trees and shrubs for control of overwintering scale, aphids, spider mites, twig borers and pecan phylloxera. **F-7306**

### Flowers

- **Select and order seeds** and plants from catalogs and garden centers that are pest resistant.

### Classroom Activities

- Study OSU Factsheets on **bagworms**. Discuss handpicking vs. chemical spraying. Tour school grounds looking for bagworms, handpick and dispose.
- **Discuss mistletoe** (Oklahoma's state floral emblem). Mistletoe is a common parasite of trees in our area. It grows on twigs and branches extracting water, mineral elements, and food from the tree. The seeds are sticky and are explosively discharged up to 50 feet. They also spread by birds. The seeds stick to their bills until they wipe it off.
- **Plant** a living Christmas tree.

## Definitions

**Annual plant** – completes a lifecycle in one growing season. The seed emerges, grows into a plant, eventually flowers, and produces seed in a single year.

**Bacteria** – single-celled organism. Bacteria reproduce through spores that are carried by insects, people, animals, tools, and rain/irrigation. Spores enter plants through wounds or natural openings and require moisture and mild temperatures to grow. Symptoms include leaf blights and spots, galls, wilts, stem and root rot, soft rot, cankers, and root nodules.

**Bactericide** – a pesticide used to kill bacteria.

**Broadleaf weed** – dicot with two seedling leaves or cotyledons. The leaves are usually wide and have net-like veins.

**BT** – *Bacillus thuringiensis* is a bacterial toxin that causes caterpillars to stop feeding and die several days later when ingested.

**Cool-season grass** – tolerates less than 6 hours of shade (not complete shade) and cool temperatures. This grass remains green longer than warm-season grasses during winter months.

**Disease resistant plant** – a plant that is less susceptible to plant pathogens. This does not mean the plant is immune.

**Fertilizer** – nutrients contained in a packaged container for plant growth.

**Fungicide** – a pesticide used to prevent fungal organism growth.

**Fungus (plural fungi)** – multicelled organism that grows on plant surfaces. Fungi reproduce through spores spread by wind, rain, rain/irrigation, tools, insects and people. Symptoms include leaf spots and curls, galls, wilts, soft rots, cankers, stem and root dieback.

**Grassy weed** – monocot plant with thin, narrow leaves.

**Herbicide** – a pesticide used to kill or inhibit plant growth.

**Integrated Pest Management or IPM** – a common sense control strategy that utilizes cultural, biological, and chemical tools.

**Insect** – a body composed of three segments and 3 sets of legs.

**Insecticide** – a pesticide used to kill, repel, or attract insects.

**Natural enemy** – a beneficial insect that preys on pest insects. Natural enemies do not completely eliminate pest populations since this is their food source. An examples is a lady beetle that feeds on aphids.

**Nematode** – microscopic worm-like animal. Most pest nematodes are found in soil and attack the root system, however some live in plants (pine wood nematode). Above ground symptoms include chlorosis (yellowing), stunting, dead buds or blind terminals, distorted leaves and stems. Below ground

symptoms include root galls and lesions, stubby roots, excess root branching, Y-shaped root tips, and devitalized root tips.

**Non-selective herbicide** – a pesticide that kills annual and perennial weeds and grasses.

**Organic fertilizer** – refers to non-commercial fertilizer including manure and compost.

**Perennial plant** – a plant that lives more than one growing season, continues to grow year after year, and increases in size by stolens or rhizomes.

**Pest** – a living organism that is detrimental or undesirable to the interests of humans including insects, spiders, weeds, and plant diseases.

**Pesticide** – a chemical or other agent used to kill, repel, or otherwise control pests or to protect from a pest.

**pH** – refers to the acid or alkaline content of the soil that affects how plants can absorb nutrients in the soil. Lime increase soil pH (makes the soil more alkaline). Sulfur decreases soil pH (makes the soil more acidic). Plants cannot uptake nutrients when the are highly acidic or highly alkaline soils.

**Plant disease** – a stress that weakens and can cause plant death due to a pathogen such as bacteria, viruses, nematodes, and fungi. Symptoms include leaf yellowing, galls (swellings) on leaves or stems, decayed or rotted plant tissue, stunted plant growth, and wilting with moist soil. These symptoms can also indicate environmental stresses. Contact an expert for proper diagnosis of the problem and an IPM solution.

**PPE** – Personal protective equipment used during the mixing, application, and equipment cleaning to protect the applicator from direct contact through inhalation, clothing, or skin contact. Examples include dust mask or respirator, liquid proof gloves and boots, goggles, etc. Specific details for each pesticide is located on pesticide labels.

**Preemergence herbicide** – a pesticide that acts as a barrier, preventing shoots and roots from emerging.

**Postemergence herbicide** – a pesticide used to kill emerged weeds.

**Quick-release fertilizer** – rapidly available for plant uptake.

**Shrub** – plants that normally produces more than one woody stem at, near, or below soil surface.

**Slow-release fertilizer** – small amounts released into the soil in small quantities over time.

**Spider** – an arachnid composed of two body parts, a head and thorax, with 4 sets of legs.

**Summer annual plant** – germinates in the spring and die in the fall.

**Tree** – plants that normally produce only one woody stem.

**Warm-season grass** – tolerates full sun (greater than 6 hours of shade) and remains green April through the first fall frost.

**Weed** – a plant out of place.

**Winter annual plant** – germinates in the fall and dies the flowering summer.

**Winter and summer perennial weeds** – follow similar pattern to annual plants, but become dormant rather than dying at the end of their respective growing season.

**Virus** – pathogens that disrupt the plant by altering the genetic material. These are spread through infected plants, tools, and insects. Symptoms include chlorosis (yellowing), mottling/mosaic patterns, stunting, ring spots, tumors, and malformed fruit. There is no pesticide for viruses. Prevention through sanitation is the best IPM solution.