

2006 Iowa State FFA Nursery/Landscape CDE
General Knowledge Exam

Directions: Select the best answer for each question and mark your selection on the answer sheet provided.

1. If a leaf cell is plumb with water (not wilted) it is said to be:
 - A. Turgid
 - B. Maxed
 - C. Strutted
 - D. Extended

2. What part of the leaf opens and closes the stoma allowing the plant to breathe, transpire, give off moisture, and exchange gases?
 - A. Guard cells
 - B. Epidermis
 - C. Leafididimus
 - D. Petiole

3. Most plants grow best in soil with a pH of _____.
 - A. 6.0 to 7.0
 - B. 7.0 or higher
 - C. 4.0 to 5.5
 - D. 3.6 to 4.0

4. Which of the following insects would be most desirable to have in the landscape?
 - A. Ants
 - B. Praying mantis
 - C. White flies
 - D. Grubs

5. *Roundup* is a _____ herbicide.
 - A. Selective
 - B. Contact
 - C. Residual
 - D. Non-selective

6. Balled and burlapped plants should be carried by the:

- A. Stems
- B. Top twigs
- C. Rootballs
- D. Side branches

7. A person or company that is hired to do a specific portion of a landscape job is called a:

- A. Value-added sub-retailer
- B. Client installer
- C. Subinstallator
- D. Subcontractor

8. Scientists who identify and classify plants are known as:

- A. Pomologists
- B. Taxonomists
- C. Horticulturists
- D. Taxidermists

9. The first thing you should do before using any pesticide is:

- A. Put on protective clothing
- B. Read the label
- C. Fill the spray tank
- D. Wash all equipment

10. Pines, spruces, junipers, and yews are:

- A. Angiosperms
- B. Cone-bearing angiosperms
- C. Gymnosperms
- D. Legumes

11. Topsoil containing nearly equal percentages of sand, silt, and clay is called:

- A. An organic soil
- B. Clay Loam
- C. A muck soil
- D. Sandy silt-clay

12. A method of establishing turf in which a mixture of seed, water, fertilizer, and a soil stabilizer is sprayed onto the soil is called:

- A. Hydroponics
- B. Hydroseeding
- C. Aquaseeding
- D. Ammonium nitration

13. Which of the following is NOT an organic material?

- A. Bone meal
- B. Manure
- C. Compost
- D. All of these are organic materials

14. If grass blades and stem clippings decompose rapidly between mowings, then _____ will probably not be a problem in turf.

- A. Insects
- B. Disease
- C. Water Penetration
- D. Thatch

15. A _____ pesticide is absorbed into the plant and kills insects as they feed on plant parts.

- A. Repellent
- B. Systemic
- C. Drench
- D. Contact

16. Most seeds remain viable longer if:

- A. Kept warm and humid
- B. Kept cool and dry
- C. Stored after they have been scarified
- D. Kept cool and humid

17. Which pH reading is the least acid?

- A. 5.5
- B. 6.0
- C. 5.7
- D. 4.9

18. Alan has 1.8 acres on which to grow potted shrubs. How many can he grow on this plot if each shrub requires 2.5 square feet, and 8800 square feet will be needed for walks and drives?

- A. 13, 904
- B. 17, 424
- C. 27, 843
- D. 31, 363

19. Lime should be added to soil:

- A. Every year
- B. At 2 the rate of fertilizer
- C. According to package instructions and only in the winter
- D. Based on the soil test results

20. Which of the following plants is most likely to suffer health damage if planted in a low, moist, semi-shaded area?

- A. Common Juniper
- B. Redoiser Dogwood
- C. English Ivy
- D. Purpleleaf Sandcherry

21. By law, all nursery employees must know where the _____ are located.

- A. Fire alarms
- B. MSDS sheets
- C. Pesticides
- D. Safety glasses

22. 150 pounds of 6-9-27 has _____ pounds of Potassium.

- A. 13.5
- B. 27
- C. 40.5
- D. 54

23. Water _____ to help reduce disease in nursery crops.

- A. Late in the afternoon
- B. Early in the day
- C. At night
- D. With overhead sprinklers

24. Who is responsible for establishing the binomial system for naming plants?

- A. Aristotle
- B. Linnaeus
- C. Weinberg
- D. Bernuli

25. A turf grade fertilizer is normally defined as a complete fertilizer having at least 35% of the total nitrogen as water insoluble and an approximate ratio of:

- A. 3-1-2
- B. 2-0-2
- C. 4-1-2
- D. 1-1-1

Key – General Knowledge Test

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Assessment and Solutions Practicum

Questions #1:

This mower is not working. What is the most likely problem?

- a. The blade is missing
- b. The blade has nicks in it
- c. It is out of gas
- d. It is low on oil.
- e. The spark plug is fouled

Questions #2:

This hand pruner is not doing an effective/efficient job of pruning. What is the main reason for that?

- a. It is dull
- b. It is missing a part
- c. It has a broken lock
- d. It is designed for a left-handed person
- e. It has a cracked handle

Questions #3:

The area designated by the enclosed area needs to be paved. Would it be cheaper to use (a) 4 inch by 8 inch pavers at \$.47 each, (b) 12 inch by 12 inch pavers at \$2.89 each, (c) 16 inch by 16 inch pavers at \$3.89 each, or (d) 18 inch by 18 inch pavers at \$4.19 each.

- a. 4 inch x 8 inch pavers
- b. 12 inch x 12 inch pavers
- c. 16 inch x 16 inch pavers
- d. 18 inch x 18 inch pavers

Question #4

While refueling a lawnmower with gas, the can tipped over and 3 to 4 gallons of fuel escaped. Which of the following products should be the first thing used to control the fuel spill?

- a. saw dust
- b. sand
- c. kitty litter
- d. paper towels

Question #5

At \$.47 each, how much would it cost to pave the area outlined by the 2" x 4" board?

- a. < than \$5
- b. \$ 5 to \$10
- c. \$10 to \$20
- d. > than \$20

Question #6

You have just finished using this spreader. What should now be done in order to properly store it?

- a. cover it in plastic
- b. wash it out and leave hopper open
- c. oil the gears and grease the hopper
- d. store it upside down with hopper closed

Question #7:

The area depicted by the lines will need to be mulched. It mulch is applied to a depth of 4 inches and sells for \$3.76 per bag (a bag is 2 cubic feet), how much will it cost to mulch this area?

- a. < than \$10
- b. \$10 to \$25
- c. \$25 to \$40
- d. > than \$40

Question #8:

The following area (4000 square feet) will need to have roundup applied to it. The sprayer has a 4 foot boom and will use 1 gallon of product –“*roundup and water*” on each pass that it makes. A pass is 250 feet. How many total ounces of *roundup* will be required for this area (4000 square feet)? (application rate for a 2% solution is 3 ounces per gallon)

- a. 6 ounces
- b. 9 ounces
- c. 12 ounces
- d. none of these

Question #9:

The aerator shown (30 inches wide) has a recommended travel speed of 240 feet per minute in order to do an effective job. How many acres can it do in one hour if there are no break downs or other problems?

- a. 1.37
- b. 1.19
- c. .99
- d. .83

Question #10:

What is the capacity of the lawn sprayer shown if filled to the recommended level?

- a. 60 gallons
- b. 40 gallons
- c. 20 gallons
- d. none of these

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Plant Disorders Practicum

Station #1

1. The plant disorder before you is most likely caused by:
 - a. Insect damage.
 - b. Chemical damage.
 - c. Wet, warm weather.
 - d. A nutritional deficiency.
 - e. Both B and C are the most correct.
2. The best recommendation for the management/correction of this disorder would be:
 - a. Use a contact insecticide.
 - b. Use recommended rates of application.
 - c. Cultural practices.
 - d. Proper sanitation of plants.
 - e. Both C and D are the most correct.

Station #2:

3. The plant disorder before you is most likely caused by:
 - a. A bacterial pathogen.
 - b. Environmental conditions.
 - c. A nutrient deficiency and/or plant management problem.
 - d. A chewing insect.
 - e. A piercing/sucking insect.
4. The best recommendation for the management/correction of this disorder would be:
 - a. A insecticide prior to the onset of symptoms.
 - b. A insecticide following the onset of symptoms.
 - c. A fungicide application prior to the onset of symptoms.
 - d. Addition of ammonium sulfate.
 - e. Nothing, usually controlled effectively by nature.

Station #3:

5. The plant disorder before you is:
 - a. A broadleaf plant.
 - b. A grassy plant.
 - c. A fungus attack.
 - d. An insect infestation on the foliage
 - e. Both a and c are correct.

6. The best recommendation for the management/correction of this disorder would be:
- Application of a selective broadleaf herbicide.
 - An application of a non-selective insecticide.
 - An application of a non-selective broadleaf herbicide.
 - The application of a wide spectrum herbicide.
 - A post-emergence broadleaf weed killer.

Station #4:

7. The main cause of the plant disorder before you is:
- A fungal pathogen.
 - A chewing insect pest.
 - An egg laying insect pest
 - A nutrient deficiency.
 - All the above.
8. The best recommendation for the management/correction of this disorder would be:
- An application of a balanced fertilizer in the early spring.
 - The addition of potassium to the soil.
 - An application of dormant oil sprays in the spring.
 - A fungicide.
 - Choose plants adaptable to local growing conditions.

Station #5:

9. The plant disorder before you is most likely caused by:
- An application of pruning compounds/sealers.
 - A chewing insect
 - A piercing/sucking insect.
 - A bacterial infection caused by injury.
 - None of the above.
10. The best recommendation for the management/correction of this disorder would be:
- Avoid all unnecessary wounding
 - When grafting use sterilized tools.
 - Plant resistant plants in infested areas.
 - Remove and burn infected plants.
 - All the above.

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Plant Disorders Practicum --key

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Plant Disorders Reference Guide

Nursery/Landscape CDE 2006

2, 4 - D



- 2,4-Dichlorophenoxyacetic acid (2,4-D) is a common systemic herbicide used in the control of broadleaf weeds. It is the third-most widely used herbicide in North America and the most widely used herbicide in the world.
- 2,4-D is sold in various formulations under a wide variety of brand names. It continues to be used for its low cost, despite the availability of more selective, more effective, and less toxic products.
- 2,4-D is part of the Auxin family.
- Major uses:
- 2,4-D is most commonly used for:
- Weed control in lawns and other turf
- Conifer release (control of broadleaf trees in conifer plantings)
- Over 1500 pesticide products contain 2,4-D as an active ingredient

Anthracnose

- Anthracnose (*Discula spp.*, *Kabatiella apocrypta*) is a name for a group of diseases caused by several closely related fungi that attack many of our finest shade trees. It occurs most commonly and severely on sycamore, white oak, elm, dogwood, and maple. Other host plants that are usually only slightly affected include linden (basswood), tulip tree, hickory, birch, and walnut. Each species of anthracnose fungus attacks only a limited number of tree species. The fungus that causes sycamore anthracnose, for example, infects only sycamore and not other tree species. Other anthracnose-causing fungi have similar life cycles, but require slightly different moisture and temperature conditions for infection.
- Disease control measures for different trees vary slightly because the period of infection is different depending on the fungal species involved. If fungicides are used, sprays must be applied on a preventative basis, beginning before infection takes place. Spraying large trees for many anthracnose diseases may be impractical and unnecessary, especially in dry springs. Sanitation is important in reducing the amount of fungal inoculum available for new infections.



Aphids



- **Description:** Aphids are small (about 1/8 of an inch long), soft-bodied, pear-shaped insects of many colors such as green, black, gray, yellow or red. Some are winged during certain times of the year. Generally, aphids can be recognized by their cornicles, a pair of tube-like structures projecting from the rear of their bodies.

Aphids feed by sucking sap from buds, leaves, twigs and developing fruit. Leaves may be stunted and distorted and fruit may become misshapen. Aphids can also carry a number of plant viruses.

Many aphid species excrete a sticky substance known as "honeydew" which usually becomes black with sooty mold. Automobiles parked under trees with large aphid populations will often be subjected to a "rain" of honeydew.

Recommendations: Aphids are usually controlled effectively by nature. Adverse weather conditions such as beating rains and low temperatures, as well as fungus diseases, insect predators and parasites keep the aphids in check. Aphid enemies include lady beetles, syrphid fly larvae, aphid lions and small wasp parasites known as braconids.

Insecticide applications destroy beneficial insects as well as pests and leave trees or shrubs unprotected if pest resurgence occurs. Since beneficial insects play an important role in natural aphid control, try washing aphids away with a forceful stream of water before using insecticide sprays.

Apple Scab

- Apple scab occurs wherever apples are grown and may be the most serious disease on apples. The disease can also infect crabapple and mountain ash. Scab diseases similar to apple scab occur on pear, firethorn, and hawthorne. The scab-like leaf spots and fruit spots, from which the name was developed, may cause defoliation and reduction in fruit quantity and quality.
- Management Strategies

Collect and dispose of fallen leaves in autumn. This will help reduce the inoculum that may cause disease the following spring. A spray schedule with emphasis on the early part of the season is usually required for maximum production of high quality fruit.

Applications should be made at pink, bloom, petal fall, and 10-14 days after petal fall . Some fungicides containing the active ingredients chlorothalonil, mancozeb, potassium bicarbonate, or propiconazole are also registered for this use. In the home orchard, use captan, copper, lime sulfur, sulfur, myclobutanil, or Serenade. Some multipurpose spray mixtures may be available that may also help to control other pests.



Bag Worm

- The common bagworm, *Thyridopteryx ephemeraeformis* (Haworth), is an interesting caterpillar. The most commonly observed form of this pest is the spindle-shaped silk bag camouflaged with bits of foliage, bark and other debris. Completed bags range from 1-1/2 to 2-1/2 inches long. The larva within the bag is brown or tan, mottled with black, and the bee-like adult males have clear wings and fur covered bodies. The females remain larva-like and do not emerge from the bag. The larva may stick its head and front legs out of the top of the bag to feed and move. When disturbed, the larva immediately pulls its head into the bag and holds the opening closed. Mature larvae may stay on their host plant or drag their bags some distance before firmly attaching the bag for transformation into the adult stage.
- Control Measures
- Bagworms are difficult to control because they are often unnoticed until mature. Mature larvae will often pupate early if they detect pesticides on the plant foliage. Though there are a few known parasites and predators, they are often not adequate in urban habitats.
- Option 1-Cultural Control-Mechanical Hand Picking
- Option 2-Biological Control-Use the Bacterial Spray
- Option 3-Chemical Control-Insecticide Sprays Stomach insecticides are very useful for control of bagworms.
- Option 4-Chemical Control-Timed Sprays Using Degree-Day Emergence



Broadleaf Plantain

- These green, weedy plants are native to Europe and Asia, but now grow practically anywhere in the world where there is sufficient water. Plantain should not be confused with the banana-like vegetable of the same name. The leaves of plantain are primarily used as medicine. The seeds of plantain can also be used medicinally, having mild laxative effects similar to the seeds of [psyllium](#), a close relative of plantain.
- Selective **broadleaf weed herbicides (weed killers)** are available for use on lawns. Choices found in garden centers typically include 2,4-D (2,4- dichlorophenoxyacetic acid); mecoprop or MCPP (2-(2-methyl-4-chlorophenoxy) propionic acid); or dicamba (3,6-dichloro-o-anisic acid); with two and three-way combinations available (e.g., Trimec).



Buckhorn Plantain

- A perennial that closely resembles broadleaved plantain, buckhorn is found in more poor lawns than any other dicot; with the possible exception of dandelion. Its tall stocks terminate in a cluster of tightly compressed seeds. Although the seedheads are fairly small, several crops may be dropped into the soil during a season. In lawns where reel mowers are used, these spikes avoid mowing and leave unsightly seed stocks for the following season. Leaves are long, narrow and pointed. Ribs, or veins, are extremely prominent, and the leaves often twist or curl. Buckhorn has a taproot with strong lateral roots. Cutting or pulling only results in a new plant springing from any part of the severed root.



Canker

- Cankers are dead areas of the vascular tissue and surrounding wood of a tree or shrub, or even field crops. The term "canker" is a symptom, like "wilt" or "leaf spot." Cankers may be caused by injuries (such as from hail or mowers), environmental stress (cold, heat, scald, etc.), chemicals, or pathogens. We see cankers on a wide range of trees and shrubs. Typically they occur on trunks, older branches, and injured areas on smaller twigs.
- Fungi are usually the cause of cankers on stressed plants, but occasionally we find a bacterial canker.
- Most canker pathogens enter the host through an injury caused by sunscald, insect feeding, pruning, weather extremes, chemical sources, and the like. Weakened tissue from poor growing conditions, transplant shock, water or temperature extremes, nutritional imbalance, or extensive defoliation also provides entry points for the pathogens.
- If your plant has cankers, try to determine why they are present. If you can determine the cause of the cankers or stress, then you can try to alleviate those conditions. Next, determine whether or not the cankers need to be removed. If they are on the trunk, you may either leave the area alone or remove as much of the decayed wood as possible so that the tree can more readily form callous tissue over the injured area. Prune out stem cankers if they are unsightly or when it is obvious that they will soon girdle the stem. Some cankers, such as anthracnose on sycamore, cannot be removed without removing most branches. Leave these on the tree and take measures to promote tree health.
- You can help avoid cankers on trees and shrubs by heeding the advice you've been hearing for years. Choose plants adaptable to local growing conditions. Plants growing out of their hardiness zone may do well some years, but they will be more prone to winter injury and more likely to have canker problems. Plant trees and shrubs at the proper depth, at the proper spacing for mature size, and in sites for which they are suited.



Cedar apple rust

- During warm rainy days in late April and early May, cedar trees infected with the cedar-apple rust fungus will develop bright orange, gelatinous galls. Cedar-apple rust is an interesting disease. It requires both an apple and cedar or juniper to complete its life cycle. On the cedar, the fungus produces reddish-brown galls that are up to golf-ball size on young twigs. During wet weather these galls swell and begin to push out bright orange gelatinous tubular structures. Wind carries fungal spores from these gelatinous structures to susceptible apple or crabapple cultivars.
- Infection occurs when these spores land on a susceptible apple cultivar and moist conditions prevail. Small, yellow spots begin to appear on the upper leaf surface shortly after bloom. Spots gradually enlarge and become a bright yellow-orange color. These brightly colored spots make the disease easy to identify on leaves.
- Heavily infected leaves may drop prematurely. In late summer small tube-like structures develop on the underside of the apple leaves. Spores are released from these structures and are blown by wind back to susceptible cedars or junipers, completing the disease cycle.
- If you have followed along with this cycle, you might immediately think that a good way to break it would be to avoid planting susceptible hosts next to each other. Unfortunately, this is often impractical, because the fungal spores can travel as far as two miles.
- If cedar-apple rust is a problem on your existing apple or crabapple trees, fungicide sprays can be used to protect trees from infection. Funginex is a fungicide that is widely available to homeowners for control of cedar-apple rust on apple. For adequate control, make sure to read the label and follow its instructions. As indicated on the label, sprays are applied in the spring at the pink and petal-fall stages of flowering.
- An easy way to avoid this disease is to plant disease resistant apple or crabapple varieties.



Crabgrass

Crabgrass is the major weed infesting home lawns. Crabgrass is an annual weed germinating in April, setting seed in August, and dying with the first frost of fall. Crabgrass has tremendous survival reproductive capabilities. Because of this, it is unrealistic to expect no crabgrass plants in your lawn. You cannot eradicate crabgrass (or any other pest for that matter); a few crabgrass plants in your lawn are acceptable.

Cultural Crabgrass Control

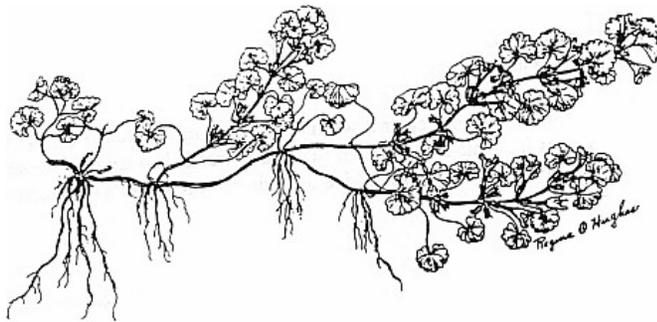
The most effective way to control crabgrass is to create a dense, healthy turf. A healthy turf will compete well with crabgrass and prevent it from establishing. Methods include: mowing, irrigation, fertilization.

Herbicidal Control

Often, cultural control alone will not control crabgrass satisfactorily, and herbicides may be needed. This is especially true in new lawns or lawns that are thin from damage or improper maintenance. When using herbicides and all pesticides, be sure to read, understand, and follow all label recommendations. **Preemergence Herbicides** or **Postemergence Herbicides**



Creeping Charlie



- Creeping charlie (*Glechoma hederacea*), also known as ground ivy and creeping jenny, is a low-growing perennial weed that thrives in moist, shady areas of the lawn and garden, but will invade sunny areas, too, if the lawn is thin. The four-sided stems grow to lengths of 15-30 inches with roots forming at the nodes, where leaves join the stem. Its leaves resemble those of the common geranium, round and scalloped, but are much smaller in size. In the early spring an abundance of tiny, lavender to blue flowers appear on 2 or 3-inch spikes. Try to maintain a healthy lawn by regular and proper mowing, watering, and fertilizing, and reducing shade when possible in excessively shady areas. These cultural steps will greatly contribute to a more weed-free lawn by encouraging thicker grass.
- You may control creeping charlie chemically by applying a herbicide containing 2,4-D and MCPP as its active ingredients. The herbicide will damage or possibly kill any woody or broad-leaved vegetation that comes in contact with the spray, so it must be used with caution

Crown Gall



- Crown Gall is a common disease of many woody shrubs and some herbaceous plants. It is caused by the bacterium *Agrobacterium tumefaciens* which can infect 140 genera in over 90 families of plants. It is especially common in the rose family.
- Symptoms
- As the name implies, galls tend to form on the stem at the soil line. However, galls may also form on the roots or on above ground stems and twigs. The galls are rough, hard and woody when older; young galls may be smooth and somewhat spongy. Unlike insect galls, these galls are solid throughout. They vary in size from very small to over an inch in diameter. Infected plants may be stunted and lack vigor because of the disrupted flow of water and nutrients from the roots.
- Survival and Dispersal
- Crown gall bacteria enter the plant through wounds. Soon after infection the bacteria induce the plant cells to proliferate and also to produce unusual chemicals (opines) which the bacteria use as an energy source. Commonly the disease is moved on infected nursery stock. Chewing insects may also carry bacteria to healthy plants.
- Management
- 1) Avoid all unnecessary wounding 2) When grafting use sterilized tools 3) Inspect plants carefully when buying 4) Remove and burn infected plants 5) Plant resistant plants in infested areas.

Dandelion

- Dandelion (*Taraxacum officinale*), also known as lion's tooth, puffball, blowball, and monk's head, is a major problem in turf, ornamental plantings, meadows, pastures, and alfalfa. The genus *Taraxacum* consists of about 40 species worldwide.
- Dandelion was introduced from Europe and has been used as a potherb and medicinal plant since Roman times. It has a high vitamin and mineral content. Mature leaves are often dried and used to make a mild tea. Roots are often used to make stronger tea or dried and used for various medicinal purposes including a mild diuretic. Salads, beer, and wine are also made from the leaves and flowers.
- **MANAGEMENT**
- Because dandelion seed can be windborne for several miles, prevention of new infestations is difficult. Solitary new dandelion plants along fence rows, roadsides, flower beds, and in turfgrass should be grubbed out (digging out the entire plant, taproot and all) before they produce seed. Monitor the area for several months to make sure that removal was complete. Areas with infestations should be isolated and seed heads removed until control can be accomplished. Turfgrass and ornamental areas should be well maintained to assure maximum vigor. Making these plantings as competitive as possible will slow invasion of the weed. Dense stands of turfgrass and ornamentals shade the soil surface, making the establishment of new dandelion seedlings more difficult.
- Postemergent herbicides that control broadleaf weeds (2,4-D, triclopyr, MCPA, and mecoprop) can control dandelion seedlings. Control of established plants with a postemergent treatment is much more difficult; 2,4-D works best for established dandelion control while triclopyr, MCPA, and mecoprop reduce dandelion vigor but do not kill it.



Fire Blight

- Fire blight, caused by the bacterium *Erwinia amylovora*, affects over 130 plant species in the rose family.
- Bacteria survive winter near the edge of cankers and become active in the spring during warm, humid weather.

Infected flowers first appear water-soaked, then shrivel, turning brown or black. As the infection progresses, leaves on the same spur turn dark brown or black as though scorched by fire.

- A canker is formed when an infection progresses into larger branches. The host may produce callus tissue that walls off the canker, or a host may continue to be infected causing death of the branch. Weather conditions are an important variable influencing the severity of fire blight. New infections may occur throughout the growing season during warm, humid weather, and are especially common after a summer hailstorm when bacteria are washed into wounds created by hail.
- Cultural practices, such as proper pruning, fertilizing, and site selection, can help prevent or minimize fire blight. Prune young trees annually during dormancy (late winter) to eliminate the danger of large cuts which may promote the growth of suckers. Use a balanced fertilizer early in the spring to encourage tree growth during the first part of the season when temperatures are cooler and less conducive to the spread of fire blight. Excess nitrogen stimulates new growth, which is highly susceptible to fire blight, so fertilize only as needed. Fertilizer applied to the lawn is often adequate for the needs of nearby trees. Trees with dark green, well-developed leaves and adequate growth would not benefit significantly from an application of fertilizer.



Frost/Freeze Damage

- Freeze damage to plants usually occurs at temperatures between 32 degrees and 24 degrees F, depending on the plant
- **SYMPTOMS:** Freeze damage on woody plants is usually seen as leaf browning and then leaf drop, or a blackening of a portion of the stem. Scraping the stem will reveal whether the stem is alive or not. Severe freeze damage will result in death of all or part of a stem
- **PRUNING:** Regardless of the symptoms of freeze damage, all pruning of affected parts of woody plants should be delayed until after the danger of frost is past. Not only is there increased risk of infection when pruning before then, but the old plant material provides protection to areas lower on the plant which may not have been affected. When pruning freeze damage from a plant, prune back to healthy tissue. When all the damaged part of the plant is pruned, look carefully at the plant. Many woody plants require further pruning at this point for shaping. Some plants can be pruned entirely to the ground. If you need or want to prune a freeze-damaged plant entirely to the ground, make clean sharp cuts leaving about 6” of stem above the ground. The pruned plant material can be laid on the top of the stumps to provide extra protection in case of subsequent frost.



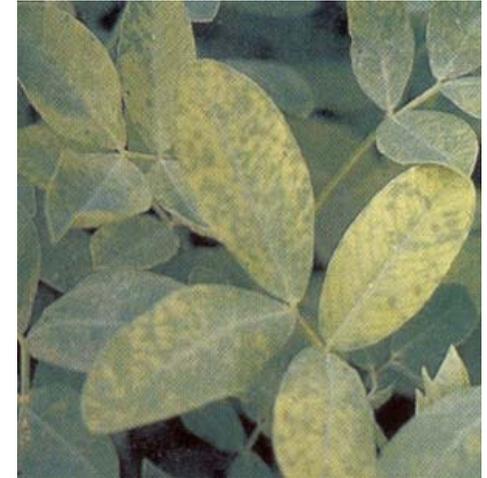
Goosegrass

- Goosegrass (*Eleusine indica*) is a troublesome weed in turfgrasses throughout the South. It is most frequently found in high traffic areas where the turfgrass cover is thin. Athletic fields and golf courses are prime sites for an infestation of goosegrass. The name "goosegrass" is commonly used for this species, but it is also called silver crabgrass, crowfoot or wiregrass.
 - **Description.** Goosegrass, a warm season annual grass, develops in leafy, commonly reclining, tufts. Goosegrass is a prolific seeder and, in most cases, has three to seven fingerlike racemes on a single stem. Often, 15 to 20 stems are produced by a mature plant and as many as 50,000 seed can be produced by a single plant. Once goosegrass becomes established, annual reinfestations are likely to occur.
 - Goosegrass has a strong, extensive root system and readily invades hard, compacted soils found in high traffic areas. It adapts well to close, frequent mowing and even produces seed when mowed at putting green heights.
 - **Control.** Cultural practices that promote vigorous turf and maintain a complete grass cover will keep goosegrass populations to a minimum. But where the grass cover is weakened by traffic or by competition with overseeded grasses, goosegrass emerges in the spring and summer.
- Preemerge herbicides will control goosegrass in warm season grasses. The rate and timing of application(s) is critical to effective goosegrass control. A single application prior to the expected emergence date will provide season-long control of goosegrass. Other products may require split applications for season-long control.



Iron Deficiency

- Iron deficiency is a common problem of landscape plants in some locations. This condition, also referred to as iron chlorosis or lime-induced chlorosis, occurs where soil is pH neutral or alkaline (pH 7.0 or above). Even a soil pH of 6.5 will cause problems for some plants. Woody plants that are particularly sensitive to iron deficiency, and consequently high pH, include: azalea, some birches, blueberry, dogwood, American holly, magnolia, various oaks in both the black and white oak groups, white pine, rhododendron and sweet gum. The problem is most commonly observed on pin oak, azalea and rhododendron. Not all mineral deficiencies are iron-related, however. In these same high soil pH sites, maples may develop manganese deficiency and pecans may show zinc deficiency.
- **Symptoms**
Chlorosis of younger leaves is the most common distinctive symptom of iron deficiency. Early symptoms are green leaf veins with yellowish or whitish (chlorotic) color between veins. As the problem worsens, newest leaves may become nearly white because leaf veins and areas between veins lack any green or yellowish-green coloring. Affected leaves are generally smaller than normal. Brown, necrotic areas may develop along leaf margins and between veins in severe cases. These symptoms may be similar to those caused by other nutritional disorders. To positively identify the problem you need to have a soil test and, in many cases, a leaf analysis. When iron deficiency symptoms progress further, some older affected leaves may become tinted reddish brown. Leaf drop, beginning at the terminals, may occur. In addition, terminal growth is stunted and twigs may die back. Over a period of years, unless treatment is given, branches will die back and the entire plant may succumb.
- **Correcting Iron Deficiency**
Start corrective action when you first observe and confirm the deficiency. If treatment is delayed until most of the terminal growth becomes chlorotic and twig dieback is prevalent, it may be too late to effect a cure. After treatment and for the next year or two, keep the plant growing vigorously by timely watering and fertilization.



Leaf Miner

- Leaf miners form a natural rather than a taxonomic group of insect species that are adapted to a special type of environment.

Definition: A leaf miner is a species, the larva of which lives and feeds for a part of all of its time between the epidermal layers of a leaf. The mining insects have habits that grade into gall making and deeper plant boring as well as external feeders and scavengers. There is little difference between a borer and a miner except that the borer feeds deeper in the tissues of plant. Bark beetles, that mine under the bark in the phloem and cambium layer could be considered miners or borers. The codling moth, typically boring in fruit of apples, sometimes mines the surface of the fruit.

- Insecticides may be used to manage leaf miners; however, because a number of species have developed resistance to several commonly used insecticides, this has complicated control. Also, larvae are well protected within the leaf tissues, thus escaping insecticide contact. Insecticides that are primarily used for controlling leaf miners are either insect-growth regulators such as cyromazine (Citation), which target the larval stage, or materials with translaminar activity, including abamectin (Avid), spinosad (Conserve), and acetamiprid (Tristar). Products with translaminar properties are effective against the larvae, as these materials can enter the leaf and kill the larvae. Pyrethroid-based insecticides are useful against the adults, including permethrin (Astro), bifenthrin (Talstar), cyfluthrin (Decathlon), fenpropathrin (Tame), and esfenvalerate (Mavrik); however, these materials are generally not effective on the larvae. The leaf miner numbers and the occurrence of overlapping generations influence the frequency of insecticide applications needed. Spray in the morning, when females are laying eggs; this action may disrupt their behavior. The problem of insecticide resistance has led to leafminers emerging as a major pest--once again.



Leaf Spot

- **Fungal leaf spots are perhaps the most prevalent plant diseases in the certain parts of the country. They are generally favored by cool, wet weather. Although unsightly in appearance, most leaf spot diseases result in little damage to the host plant.**
- **Control**
Leafspot diseases are controlled by resistance, fungicides and through summer pruning.



Nitrogen Deficiency



- **Nitrogen (N) deficiency** in plants can occur when woody material such as [sawdust](#) is added to the [soil](#). Soil organisms will utilise any nitrogen in order to break this down, thus making it temporarily unavailable to growing plants. '[Nitrogen robbery](#)' is more likely on light soils and those low in organic matter content, although all soils are susceptible. Cold weather, especially early in the season, can also cause a temporary shortage.
- All vegetables apart from [nitrogen fixing legumes](#) are prone to this disorder. Symptoms include poor plant growth, leaves are pale green or yellow in the case of [brassicas](#). Lower leaves show symptoms first. Leaves in this state are said to be [etiolated](#) with reduced [chlorophyll](#). Flowering and fruiting may be delayed.
- Prevention and control of nitrogen deficiency can be achieved in the short term by using grass mowings as a [mulch](#), or [foliar feeding](#) with [manure](#), and in the longer term by building up levels of organic matter in the soil. Sowing [green manure](#) crops such as [grazing rye](#) to cover soil over the winter will help to prevent nitrogen leaching, while leguminous green manures such as [winter tares](#) will fix additional nitrogen from the atmosphere.

Oxalis

- ***Oxalis*** is the largest [genus](#) in the wood sorrel family [Oxalidaceae](#). Of the approximately 900 known species in the Oxalidaceae, 800 belong to *Oxalis*. Many of the species are known as **Wood Sorrel** or **Woodsorrel**. The genus occurs throughout most of the world, except for the polar areas; species diversity is particularly rich in tropical [Brazil](#) and [Mexico](#) and in [South Africa](#).
- These plants are [annual](#) or [perennial](#). The [leaves](#) are divided into three to ten or more round, heart-shaped or lanceolate leaflets, arranged in a whorl with all the leaflets of roughly equal size. The majority of species have three leaflets; in these species, the leaves are superficially similar to those of some [clovers](#), though clovers differ in having the leaflets not in a whorl, and of unequal size with two smaller side leaflets and one larger central leaflet. The [flowers](#) have five petals, usually fused at the base, and ten [stamens](#); the petal colour varies from white to pink, red or yellow. The [fruit](#) is a small [capsule](#) containing several [seeds](#). The [roots](#) are often [tuberous](#), and several species also reproduce vegetatively by production of [bulbils](#), which detach to produce new plants.



Pigweed



- An erect summer annual that is prevalent in lawns during spring periods. It is most abundant during rainy periods. The leaves are alternate, light green, ovate in outline, with petioles that reach 1/2 inch in length. Leaves have wavy margins and hairs that occur along the veins of the lower leaf surfaces. Pigweed's roots are very shallow. The roots often grow in thatch rather than in the soil. The shallow taproot is often, but not always, reddish in color.
- Seedlings are easily pulled or hoed from the garden. Older plants are more difficult to pull out and may scatter seeds in the process. Mulch will prevent seeds already in the soil from germinating.
- **Control**
- When found in the lawn, pigweed can be spot-treated with herbicides containing MCPP, MCPA, and dicamba. In gardens, glyphosate (Round-up, Kleen-up) can be used, taking care not to get any of the chemical on desired plants. Pre-emergents containing oryzalin, pendimethalin, or trifluralin can be effective. When using a herbicide, be sure to read the label carefully and follow directions closely.

Powdery Mildew

- *Powdery mildews are one of the most common and easily recognized diseases that occur with plants.*
- *If you've noticed a white talcum powder-like growth on the tops of lilac, rose, columbine or squash leaves, you've probably seen powdery mildew. Later in the season, small black pepper-like structures may appear within the white powdery material. This is part of the powdery mildew life cycle. These structures serve an overwintering function and will survive on leaf material that falls to the ground.*
- *Powdery mildew is a fungus that grows well in arid climates. It can occur on almost any plant including flowering plants, grasses, vegetables such as squash and cucumbers, trees, shrubs and even weeds. Fruit production on these plants may decrease slightly if powdery mildew is present.*
- *Several weather or environmental conditions favor powdery mildew disease. Unlike most plant pathogenic fungi, the fungi that cause powdery mildew **do not** need water on leaves to infect the plant. It does, however, need relatively high air humidity. That's why the disease is common in crowded plantings where air circulation is poor and in damp, shaded areas. Young succulent growth usually is more susceptible than older plant tissues.*
- *Powdery mildew is not always easy to control, but you can do several things to manage the disease.*
- **Avoid overhead watering** to reduce relative humidity.
- **Clean up** and dispose of all leaves and vegetable debris that falls to the ground in autumn.
- **Increase air circulation.** If plantings are dense, selectively prune to open the area up and reduce relative humidity.
- **Consider using a fungicide labeled for powdery mildew**, but use in conjunction with the above-described practices. Follow exactly instructions on fungicide label. Several "alternative" pesticides work well to help prevent the disease. Sulfur dusts and horticultural spray oils are two non-toxic, effective alternatives that will protect uninfected leaves from the fungus. (Be sure to follow label directions; sulfur can burn leaves if used when the air temperature is above 90 F.)



Purslane

- **Habitat/:** Warm and moist soils
- **Description**
- The stem is fleshy, smooth, branched, and purplish-red or green with reddish coloration. The leaves are thick, smooth and fleshy, and green to reddish in color. They have broad-rounded tips with smooth margins. The flowers are yellow, found solo at the leaf axils and clustered at the end of the branches. A single plant can produce as much as 10,000 seeds.
- **Effects and impacts**
- Common purslane serves as an alternate host for various plant diseases and nematodes. Its ability to produce plenty of seeds can result in the easy colonization of your crop. It forms a dense mat that prevents seedlings from germinating, and competes for soil moisture and nutrients.
- **Methods of control**
- Proper soil tillage or thorough land preparation by plowing and harrowing at least two times
- Hand weeding
- Regular plant monitoring
- Corn gluten meal. Apply ca. 10 kg of corn gluten meal to an area of 1,000 sq ft, to prevent purslane's seeds from germinating (Bingaman; Christians, 1995). Ask for assistance from your local agriculturist office when using this control method.
- Crop rotation with sorghum. Sorghum has the ability to reduce the emergence or growth of pigweeds (Kebede, 2004, p.3).
- Mulching at least 3 inches thick prevent the seeds from germinating



Scale



- **Description:**
Common Scale, Oyster Shell Scale, Eulecanium Scale and Mealy Scale.

Detection:

Check the underside of your leaves and on the stem of the plant for oval, shell or thread-shaped insects. They spend most of their lives stationary on the plant. Protected by a waxy scale which varies in colour from white to brown. A severe infestation will have the appearance of lumpy blisters on the underside of the leaves and on the stem; this will eventually result in the yellowing of affected leaves or fronds and they will drop off. The insects also excrete a sticky honeydew which could attract a black sooty mould.

Control:

Gently remove the scales from the leaves, fronds or stem with a small soft brush, (for tough plants an old toothbrush will suffice) then rinse the plant with clear tepid water containing a little liquid soap (approximately half a teaspoon per 4 litres). For heavy infestations, take the plant into a well ventilated area, preferably outside and spray the plant with an insecticide which is approved for homeowner use in your area. When the spray has dried, rinse the plant with clear tepid water. Repeated applications may be necessary so check regularly for any signs of re-infestation. You can also use a cotton swab dipped in alcohol or use a systemic insecticide. If using a chemical control be very careful to follow label directions exactly.



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Tent Caterpillar

- **Tent caterpillars** are moderately sized caterpillars in the genus *Malacosoma* in the [moth](#) family [Lasiocampidae](#). Species occur in [North America](#), [Mexico](#), and [Eurasia](#). Twenty-six species have been described, six of which occur in North America. Some species are considered to have subspecies as well. Although most people consider tent caterpillars only as pests due to their habit of defoliating trees, they are among the most social of all caterpillars and exhibit many noteworthy behaviors.
- Tent caterpillars are readily recognized because they are social, colorful, day active and build conspicuous silk tents in the branches of host trees. Some species such, as the [eastern tent caterpillar](#), *Malacosoma americanum*, build a single large tent which is typically occupied through the whole of the larval stage while others build a series of small tents that are sequentially abandoned. The [forest tent caterpillar](#), *Malacosoma disstria*, is exceptional in that the [larvae](#) build no tent at all, aggregating instead on silken mats that they spin on the leaves or bark of trees. Tents facilitate aggregation and serve as focal sites of thermal regulatory behavior.
- Control of all three of these pests is essentially the same. Destroying the tents, especially when the tents are small, is an effective way of getting rid of the caterpillars. The best time to do this is around dusk or early morning when the larvae are in the tent. Burning the tents should be avoided because the fire and intense heat may damage the tree. On smaller trees, egg masses may be pruned off and destroyed. For larger trees or trees that have several nests, a spray may be needed. *Bacillus thuringiensis* (Bt) and a number of chemical insecticides are effective against these caterpillars. If an insecticide application is made, it should be made when the larvae are small and easiest to control, not when they are full grown and have already done their damage. The insecticide should be applied in the evening or early morning when the insects are in the nest. A high pressure spray may be needed in order to get the insecticide into the tents.



Truck borer

- The Emerald Ash Borer belongs to a group of insects known as metallic wood-boring beetles. Adults are dark metallic green in color, 1/2 inch in length and 1/16 inch wide, and are only present from mid May until late July. Larvae are creamy white in color and are found under the bark.
- Control and management strategies for emerald ash borer are still being developed.
- The use of chemicals for control have been used.



Urine Damage

- **Application of urine**, which contains ammonia (a salt) and is generally very acidic, to a localized area will burn or dehydrate the leaves, causing the plant to discolor and eventually die. Continual build-up of salts in the soil becomes toxic to the plant.
- **Dog urine can kill grass** in small (4-10-inch diameter) areas. Often the edge of the damaged area will look dark green and vigorous compared with the rest of the lawn. This damage is basically a fertilizer burn, and there is no pre-treatment that will prevent it. Applying liberal amounts of water to the area is effective if the water is applied immediately after the "rest stop". If the edge of stimulated grass is much more vigorous than the rest of the lawn, the quality of the lawn can be improved with additional fertilization. In this case, the urine damage serves as a signal of nitrogen deficiency.
- Other solutions to this problem is training the dog to use a different area. (Easier said than done.) Pet supply stores sell a training device that prevents the animal from getting on the lawn using a mild shock. There are products that can be applied to the area, but this requires application before damage can occur.



White Grub

- White grubs are serious and destructive lawn insect pest. While not all lawns will get grubs and the extent of grub damage varies from year to year, there are some important points to consider concerning managing grubs in lawns. Grubs are white in color, with a characteristic "C" shape body when found in the soil feeding on lawn roots. Grubs are the larval stage of beetles.
- The most common grub species in our area is the annual white grub, of which the adult is a tan chafer beetle. Eggs are laid in the soil in mid-summer, primarily on well-watered lawns in full sun, often near pavement. Damage from annual white grubs typically starts in mid August and may continue until early October. Monitoring and control of these species is the same as for annual white grub. The true white grub (May or June beetle), for example, typically has a three-year life cycle, meaning it could potentially damage lawns throughout the season.
- Since grubs feed on the roots of lawn grasses, damage will appear as browning of the lawn. Consider that this also could be due to problems such as drought, poor soil, or diseases. However, grubs are easy to find by lifting sod in damaged areas and checking the root zone for the whitish grubs. Don't treat for grubs that don't exist! Skunks and raccoons may tear up lawns in search of grubs, even when grub numbers are relatively low.
- Lawns showing damage from grubs may be treated with an insecticide. *Heterorhabditis bacteriophora* nematode is an example of an alternative product for white grub control that is available. For all products, read and follow all label directions, then apply to damaged areas. Water the insecticide into the soil immediately. If treating a large area, stop after a portion has been treated and water the material in, then complete the rest of the lawn area needing treatment. Only treat in and around affected areas; grubs may only be in a small part of the lawn.
- Spring treatment for annual white grub is not suggested since the grubs feed for a short period of time in spring and are reaching maturity, thus are not controlled easily. In addition, turfgrasses are actively growing at that time so usually don't show damage.



White Fly

- **Damage**
- Whiteflies feed on plant juices using piercing-sucking mouthparts, causing stunted growth, leaf yellowing, and reduced yields. They are able to reproduce quickly and spread rapidly, and are considered a major economic pest of greenhouse crops. Whiteflies have a wide host range and thrive on hundreds of ornamental and crop plants such as poinsettia, cabbage, tomato, mustard, cucumber, bush beans, peppers, and soybeans, to name a few.
- **Control Strategies**
- ***Monitor on a regular basis.*** Inspect recently purchased plants by checking for adults, pupae, nymphs and eggs. Use yellow sticky cards to detect infestations in their early stages. Develop a weekly monitoring schedule and note where infested plants are located.
- ***Physical and cultural controls.*** Prevent whiteflies from entering growing areas with screens over intake vents and by keeping doorways closed. Keep unused growing areas empty when possible between crops. Remove plants around the perimeter of the greenhouse that may harbor pests. Dispose of infested plants and plant debris in sealed plastic bags to prevent reinfestation. Avoid overfertilization.
- ***Chemical controls.*** A few things to consider when using pesticides to control whiteflies: 1) Foliar pesticides are effective when there are mostly crawlers, nymphs, or adults present (soil systemics may provide better control); 2) Plant surfaces, including the undersides of leaves, need to be covered for foliar applications to be effective; 3) Prevent insecticide resistance by avoiding consecutive treatments using the same chemical class. Consult a pesticide dealer for more information about which pesticide works best for your situation.
- ***Biological Control.*** Both greenhouse and silverleaf whiteflies have natural enemies that are available for commercial use. The use of biological control agents has been effective for suppressing whitefly populations in indoor plantscapes and in greenhouses as a part of an IPM program. As a general rule, making several small releases over a period of time rather than one single massive release is recommended for best results. If pesticides are used, waiting a minimum of two weeks and/or two waterings before releasing biological control agents is advised.



**2006 Iowa FFA
Nursery/Landscape CDE**

**Plant Disorders
Practicum--Key**

Disorder #1



2, 4 D damage

Disorder #2



Aphids

Disorder #3



Broadleaf Plantain

Disorder #4



Canker

Disorder #5



Crown Gall

**NURSERY/LANDSCAPE IDENTIFICATION
FORM 14**

Participant Name: _____ Participant Number: _____

No. COMMON NAME/TECHNICAL NAME

- | | |
|--|--|
| _____ - White Fir/Abies concolor | _____ - Colorado Blue Spruce/Picea pungens cv. |
| _____ - Amur Maple/Acer ginnala | _____ - Mugo Pine/Pinus Mugo |
| _____ - Japanese Maple/Acer palmatum cv. | _____ - Austrian Pine/Pinus nigra |
| _____ - Norway Maple/Acerplatanoides cv. | _____ - Eastern White Pine/Pinus strobus |
| _____ - Carpet Bugle/Ajuga reptans cv. | _____ - Potentilla/Potentilla fruticosa cv. |
| _____ - Service Berry/Amelanchier Arborea | _____ - Callery Pear/Pyrus Calleryana |
| _____ - Japanese Barberry/Berberis thunbergii | _____ - Pin Oak/Quercus palustris |
| _____ - River Birch/Betula nigra | _____ - Red Oak/Quercus rubra |
| _____ - Korean Box/Buxus microphylla | _____ - PJM Rhododendron/Rhododendron x PJM |
| _____ - Redbud/Cercis canadensis | _____ - Hybrid Tea Rose/Rosa spp. Class Hybrid Tea cv. |
| _____ - Japanese (Flowering) Quince/Chaenomeles speciosa cv. | _____ - European Mountain Ash/Sorbus Aucuparia |
| _____ - Shasta Daisy/Chrysanthemum x superbum cv. | _____ - Spirea/Spiraea x Bumalda cv. |
| _____ - Redstem Dogwood/Cornus spp. | _____ - Common Lilac/Cyringa vulgaris cv. |
| _____ - Spreading Cotoneaster/Cotoneaster divaricatus | _____ - Japanese Yew/Taxus cuspidata cv. |
| _____ - Washington Hawthorn/Crateagus phaenopyrum | _____ - American Arborvitae/Thuja occidentalis cv. |
| _____ - Russian Olive/Elaeagnus angustifolia | _____ - Littleleaf Linden/Tilia cordata |
| _____ - Winged Euonymus/Euonymus alatus | _____ - Canada Hemlock/Tsuga canadensis |
| _____ - Wintercreeper/Euonymus Fortunei cv. | _____ - American Elm/Ulmus americana cv. |
| _____ - Border Forsythia/Forsythia x intermedia cv. | _____ - Periwinkle Vinca/Vinca minor cv. |
| _____ - White ash/Fraxinum americana cv. | _____ - Adam's Needle/Yucca filamentosa |
| _____ - Ginkgo, Maidenhair Tree/Ginkgo biloba | |
| _____ - Thornless Honeylocust/Gleditsia tricanthos inermis cv. | |
| _____ - English Ivy/Herdera helix cv. | |
| _____ - Day Lily/Hemerocallis spp. and cv. | |
| _____ - Hosta/Hosta x hybrida cv. | |
| _____ - Meserve Holly/ilex x Meserveae cv. | |
| _____ - Viburnum dentatum | |
| _____ - Creeping Juniper/Juniperus horizontalis cv. | |
| _____ - Chinese (Saucer) Magnolia/Magnolia x Soulangeana cv. | |
| _____ - Oregon Grape/Mahonia Aquifoli cv. | |
| _____ - Flowering Crabapple/Malus spp. and cv. | |
| _____ - Maiden Grass/Miscanthus sinensis | |
| _____ - Japanese Pachysandra/Pachysandra terminalis | |
| _____ - Peony/Paeonia hybrid cv. | |
| _____ - Boston Ivy/Parthenocissus tricuspidata | |
| _____ - Norway Spruce/Picea abies | |