LANDSCAPE AND TURF MANAGEMENT
Lesson 16: WEEDING, WATERING, AND MULCHING

Segment One - Weeding

Controlling weeds is perhaps the number one cultural problem facing nurserymen. Winter annuals, summer annuals, biennials, perennials, grasses, sedges, broadleaves -- there are weeds for all places in all seasons. If one type is eliminated, another will take its place.

Weeds must be controlled because they can cause direct or indirect reductions in crop growth or quality and because they are aesthetically objectionable. They directly compete with crops and landscape plants or water, nutrients and light. Some weeds affect the growth of woody plants by producing chemicals that stunt their growth (allelopathy). Weeds indirectly affect crops or landscapes by harboring rodents that may damage the bark of trees and shrubs and cause severe injury or death. Weeds can also harbor insects and diseases that can also attack nursery plants. Air movement is slowed by weeds. This may result in a higher incidence of foliar diseases or frost damage. Aesthetically, weeds create a bad image for a nursery and are generally unacceptable in a landscape.

Weed Control Program

It is much easier to prevent weed growth than to kill existing weeds. The preventive measures are also safer and longer-lasting. Nurserymen should think in terms of a weed control or management program. This means planning how to control weeds in the crop before it is planted. A proper weed management program should have three parts:

1. Eliminate all weeds prior to planting. It is especially important to kill all perennial weeds because they are not controlled by mulches or pre-emergence herbicides. Post-emergence herbicides that can be used freely before planting must be used with extreme caution after planting. Controlling existing perennial weeds prior to planting is the most important factor in the successful management of weeds in the field and landscape.
2. Prevent weed growth. Mulches and/or pre-emergence herbicides work very well for controlling weeds from seed. Repeat applications of herbicides will usually be necessary for season-long control.
3. Eliminate weeds when they appear. Few methods give total control, so cultivating or careful spot treating with a post-emergence herbicide may be necessary. It is especially important to keep perennial weeds such as quackgrass, goldenrod, or Canada thistle from getting established.

Methods of Weed Control

To control weeds, nurserymen can use physical methods and herbicides.

Physical Methods

- Cultivation and mowing are two commonly used methods of controlling weeds in fields of nursery stock or Christmas trees. Both are time-consuming, provide only short-term control of weeds, and must be repeated throughout the growing season to provide effective control.
- Mulches may be applied to limit weed growth around high-value crops in a nursery or in landscape plantings. They provide the best weed control in landscape situations where herbicide use is frequently restricted by the presence of susceptible ornamental plants.
- Hand pulling will be needed to eliminate weeds that escape the preventive measures.
- Pasteurization of container media prior to planting kills the weed seeds and limits container weed problems to those seeds blown into the growing area.
- Controlling weed growth around the growing areas and preventing weeds from going to seed will limit the potential for re-infestation.

Herbicides

- Chemical herbicides – Numerous synthetic chemicals are designed to be either nonselective or selective, killing some plants but not others. Herbicides may be selective, non-selective, contact or systemic. Other chemicals are available as pre-emergence and post-emergence herbicides, only killing weeds as they germinate or after they have emerged from the soil, respectively.
- 2,4 – dichlororphenxyacetic acid (2,4-D), a selective herbicide used to control emerged broadleaf weeds is the most widely used herbicide worldwide.
- Organic herbicides – A few options are available, but far fewer than chemical herbicides.

Segment Two - Watering

Proper watering, or irrigation, is one of the most important factors in producing top-quality plants. Watering is also probably one of the most misused practices in growing plants. Improper watering may consist of too little, too much, the wrong method or incorrect timing.

The pH of water may vary. Low pH (acid; pH<7.0) water seldom causes any serious problems, but high pH (alkaline) water may be a real problem. Where the soil pH is already over 7.0 (7.0= neutral; a pH>7.0 is alkaline), the addition of alkaline water could be detrimental to plant life.

Water is the primary constituent of plants, comprising between being 70-85% water of the fresh weight of most herbaceous plants. For trees, 45-50% of their fresh weight is water. Water is not only a component part of plants, but also a raw material necessary for food manufacture. It is broken down by chemical reaction and becomes a part of the sugars, starches and proteins found in plant sap and cell tissues.

Water serves as the solvent for the transportation of minerals from the soil. These dissolved minerals come from the soil itself as well as from applied fertilizer.

The evaporation of water from the leaves, a process called transpiration, accounts for the loss of large amounts of water by plants. If the absorption of water by the roots of a plant does not occur as rapidly as transpiration, cellular turgor pressure falls to zero and the plant wilts. If this condition of wilting continues for an extended period, the plant will dry up and die.

The rate of transpiration or water loss, which influences the frequency of watering, is caused by several factors. Some of these factors include the amount of sunlight, humidity, temperature, air movement, and the size and morphology of the leaves.

- Water loss is greatest in full sun. It increases from morning until afternoon and gradually decreases in the late afternoon until it is lowest during the night.
- High humidity will cause less water to be transpired and less watering is required. Damp or foggy days will also cause the humidity to be higher.
- Air temperature influences water loss from a plant. At high temperatures water is lost more rapidly since it is changed more quickly into vapor. Then, too, warm air is capable of holding more water than cold air and thus the humidity is also influenced. The temperature of the plant tissues is generally similar to the air temperature. An increase in air temperature and accompanying increase in the leaf temperature results in increased water loss.
- Wind or air movement over the plant increases water loss since it carries away the nearby air with its humidity and replaces it with drier air. Under conditions of little or no air movement the humidity is increased around the plant with a reduction in water loss.
- Another factor influencing water loss is size and type of leaves. Generally, plants with small leaves do not have to be watered as often as plants with large leaves. Leaves may also have a waxy coating or a hairy surface which can help reduce water loss.

Until sufficient experience has been gained, the appearance of the plant and the feel of the soil may inform you of a need to water. One test is to form a lump of soil into a ball. If it adheres together, there is usually adequate moisture; if it appears more like a “mud pie,” there is far too much moisture; if it completely crumbles, there is insufficient moisture. By determining where the ball of soil fits on this scale, the time or interval of water can be established. It is generally better that some drying takes place between

waterings. Water less often, and water enough to penetrate the soil deeply to provide an adequate amount of water and to encourage deep rooting.

Other methods of checking or measuring soil moisture are available including moisture meters.

Watering Lawns

Lawns should be watered to a depth of 6 inches or more. Soaking the lawn to wet both the topsoil and subsoil is ideal. Light sprinklings are not recommended. Lawns should not be watered until they show a need, usually during dry periods or extremely high temperatures. Deep watering encourages development of a deep root system capable of extracting water from a larger volume of soil and utilizing more efficiently the nutrients available in the soil.

Watering Plants in Containers

Water should be added slowly to the container to avoid splashing and displacement of materials from the surface, the rate may be somewhat regulated by the size of the container. Apply sufficient water so that a small amount comes through the drainage holes. Care should be taken that the soil ball never dries out or it will separate from the surface of the container and the water will simply flow out around the soil ball and through the drainage holes, leaving the interior of the ball dry.

A common problem in container soils is high soluble salts or soluble minerals; plants will not grow if soluble salt levels are too high. Several reasons for the excessive soluble salts accumulated in nursery soils are excessive applications of fertilizer, insufficient water during routine watering, poor drainage or when the water itself has a high soluble salt content.

When soluble salts do accumulate, the situation should be corrected as soon as possible. One of the most effective methods of reducing the salt content of soil is “leaching.” If the drainage is good, two or three thorough waterings or leachings should be sufficient. In some cases, additional leachings may be necessary.

Devices for Watering

- Water breakers and nozzles – When watering with a hose, high pressure will tend to dislodge soil, or compact the soil so that it becomes less aerated and this may slow down the growth of certain plants. High pressure water can also damage plants. Various types of water breakers or devices may be used at the

end of a hose to reduce pressure and permit a greater amount of water to be applied.

- Sprinklers - The most common types of sprinklers are the rotating impulse sprinkler and oscillating and fixed head sprinklers. All sprinklers have particular spray patterns, most of which require overlapping to provide the proper amount of water evenly distributed over the entire area.
- Drip or tickle irrigation - This method allows precise application of water in the immediate vicinity of plant roots. Soil moisture in the area around the plant is maintained at a uniformly high level throughout the growing period. Small amounts of water are applied frequently, perhaps daily, to replace that withdrawn by evaporation and transpiration. Growth and production potential are greater when plants are not subjected to wet and dry cycles that normally occur with other irrigation methods. Drip irrigation simplifies irrigation procedures, reduces labor requirements and minimizes distribution and evaporation losses. Less of the total soil area is fully wetted than with sprinkler and furrow systems, significantly reducing the amount of water required for irrigation. Automatic control of the irrigation system using time clocks and/or soil moisture sensors and automatic valves is simple and relatively inexpensive, such devices are increasingly required by law when irrigating landscapes to conserve water.

Segment Three - Mulching

Mulching is the practice of placing a suitable barrier material on the soil surrounding planted nursery stock and landscape plants. The primary reasons for mulching are weed control and moisture conservation. Other benefits include beautification, root zone temperature insulation and the beneficial gradual decomposition of organic material. Mulching also protects the soil surface, reducing compaction, and surface sealing and improves water infiltration and aeration.

Many times homeowners use grass clippings and green wood chips as mulch material. Grass clippings should not be used in close proximity to shallow rooted plants. Rotting and fermenting grass clipping can raise soil temperatures, rob nutrients from plants and decompose quickly. Green wood chips, in addition to tying up nitrogen, can introduce insects and pests to the garden. Nursery and Landscape professionals should be aware of potential problems associated with the practice of using grass clipping and green wood chips as mulch.

Types of Mulch

Mulch materials are separated into inorganic and organic types.

1. Organic Mulches

Wood Chips - composed primarily of wood from trees or recycled from fabricated wood products such as pallets. This material turns gray very quickly and decomposes quickly when applied as mulch in garden areas. Fresh, undecomposed wood chips can "steal" nitrogen from plants and the plants will generally take on a light yellow color. This condition can become severe in some locations.

Bark Chips - West Coast lumber producers chip bark from Redwood and Fir (Douglas Fir) trees to obtain this product. It is entirely bark and generally comes in three sizes - small chips, medium chips and large chips. Different size chips can be applied in different landscape areas depending on the texture of the plants and size of the area for effect. This material usually retains its color for several years, but eventually turns gray with age. It is extremely durable and will last for 5 to 10 years or more.

Shredded Bark - this product is what is typically available from sawmills or bark suppliers. It is mostly tree bark from a variety of hardwood and softwood trees that has been stripped from the log before it is sawed into boards. It contains some wood as few trees have straight trunks and are usually tapered. This material decomposes over a period of 2 to 4 years and usually holds its color longer than woodchips. Although not a serious concern, some trees release toxic amounts of minerals that had been stored in the wood and bark, such as toxic amounts of manganese. Newly planted plants in the landscape can turn a yellowish color due to these substances as well as from nitrogen deficiency.

Peat Moss - Peat moss (or more correctly "moss peat") is readily available, but has some disadvantages. Peat moss (sphagnum peat) is rather lightweight and has a tendency to blow around in exposed areas. As it dries it becomes difficult to re-wet and can form an impervious layer and not permit water to pass through. Peat moss is not typically used as a landscape mulch.

Pine Needles - are available from southern states such as Virginia, N. & S. Carolina and Georgia. The needles are packed in bales like straw. Although "pine straw" makes a great mulch it can be rather expensive to use for large areas. When applied as mulch it is extremely durable and will last for many years. It is also very flammable (flash burns - burns fast and goes out).

Shredded Leaves - readily available, and can be produced by anyone with a shredder. Shredded leaves rot quickly and have to be renewed every season. The leaves must be shredded in order to use as mulch or they will pack down and cut off oxygen from entering the soil, which can eventually lead to death of the plants they are mulching. Leaf mulch can also harbor various leaf diseases that can be spread to the trees or shrubs that are mulched and cause problems.

Sawdust - available from any lumberyard or sawmill. Sawdust can cause severe nutrient deficiencies, especially nitrogen and should be composted for a year or more with the addition of nitrogen at the rate of 1-2 lbs. per 100 lbs. sawdust prior to use as a mulch.

Leaf mold - a readily available material, made from decomposed leaves. It is fine and can blow around like peat moss. It must be replaced often and generally appears as a brown-gray color. Supports weed growth.

Cocoa Hulls - available in areas where chocolate is produced (Harrisburg/Hershey, PA). Has a controversial odor, some like it and some don't. It is an excellent mulch material especially where small plants, like bedding plants are used. It can be attractive to flies which can be a nuisance. Long-lasting, stays a nice brown color and does not blow easily.

Licorice Root - ground and shredded is available around candy plants. Makes an excellent mulch, again this product has a smell but not an offensive one, maintains a good color but does not last more than 3-4 years before it has to be replaced. Its availability can be a problem in some areas.

Many other organic mulches are available; essentially any organic material has potential as a landscape mulch. Landscape fabric should not be used under organic mulches; it is a waste of money. Plastic should never be used under mulches.

2. Inorganic Mulches

River stone or gravel - oval, flat stone is widely used in certain areas as mulch. Aggregate size can be sorted and different texture effects can be achieved. Colors vary greatly. It is of course very durable and will not blow away but can be a problem in public places where vandalism may be a problem. Depending on aggregate size, 3-4" should be applied and this product is used mostly in locations where no plants are grown (i.e., under building overhangs, traffic islands, around or beneath fences, etc). It is the only mulch for which the use of landscape fabric beneath is recommended. Again, plastic should never be used. Stone aggregate size ranging from 1-2" up to 8-10" is regularly used. Larger material may be used to simulate a dry stream or creek bed instead of using water in the landscape.

Crushed brick - this material is becoming increasingly popular in the landscape industry. It is made from waste brick or seconds from brick manufacturing plants. The brick can be crushed to varying sizes and comes in a variety of colors as well. This is a similar material to stone or gravel and the use of a landscape fabric beneath is recommended. A great way to recycle old bricks.

White marble chips – may evoke strong opinions as to their aesthetic value in the landscape. The strong unnatural color attracts too much attention to itself and away from other landscape features. Landscape mulch should never be the star of the show.

Deco-mulch - is inorganic mineral clay that has been sterilized and guaranteed weed free and weed seed free. It is fire proof as other inorganic mulches are. It holds its weight in water and slowly releases it to the soil. This material is unaffected by water, temperature fluctuations or fertilizers, and will not break down or decompose. This material is available in 50 lb. bags and has a honey brown color.

Other inorganic mulches include recycled glass (available in various colors), rubber tire chips (another recycled product), and others.

16_WeedsWaterMilch_Reading.doc