

LANDSCAPE PLANTS

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LANDSCAPE PLANTS

Learning Objectives

- Understand what an ornamental plant is
- Understand soil and water considerations for ornamental plants
- Understand how to prepare a site and to plant ornamental plants
- Understand the different types of problems associated with ornamentals

Why Ornamental Plants?

Landscape plants are placed as they are for various purposes: to create shade, to define space, to enhance architecture, to provide food (e.g., fruit trees), and to further general aesthetics. These plants should be installed according to a plan, so that they are correctly selected and placed to create the desired design effect. Plantings should be in tune with the environmental situation and take into account such things as exposure, amount of light, pH, water availability, and soil type.

Trees and shrubs will last in the landscape for many years. However, when a stress is imposed on a plant, that plant becomes much more susceptible to other problems, including insects and disease. A large percentage of landscape plant problems can be related directly to improper selection of plant material and improper cultural practices that lead to plant stress. In some cases, the effects of improper cultural practices may not be seen for years.

Soils and Water Considerations

SOIL COMPOSITION

Soils are roughly 50% solid material and 50% pore space. (Pores are holes in the soil that are either filled with air or water.)

Pore Space

Pore space, ideally, should be 50% air and 50% water.

Air is necessary for root respiration and normal metabolism, including the uptake of water.

Water is used in transpiration within the plant and for the transport of dissolved mineral nutrients from the soil to roots and on up the plant through the xylem.

Solid Material

The solid material is composed of organic matter, decomposed rock, and various biological life.

WATER STATUS DEFINITIONS

capillary or available water. Held less tightly to soil particles; available for plant usage.

gravitational water. Moves with the force of gravity; drains away. This water is not available to the plant.

hygroscopic water. Tightly bound to the soil particles; not available for plant growth.

saturated conditions. Tend to exclude air; detrimental to most plants (with the exception of aquatic species).

WATER MOVEMENT

The thicker the film of water, the greater the ease of movement in the soil. The thinner the film of water, the harder it is to move through the soil, therefore, becoming less readily available to plants.

Water movement is always from wetter areas in the soil mass to drier areas. When water is lost from the soil surface (through evaporation), more water is drawn up from lower levels. When a plant draws water in through the roots, more water moves into the area.

Roots **do not** seek water; roots grow where water is.

SOIL STRUCTURE (AGGREGATE SIZE)

Soil particles may be made up of many small particles clumped together.

Spaces (**macropores**) between large particles contain air for root respiration.

Spaces between smaller particles and within very large particles contain capillary (available) water. Water also is found on the surface of larger particles.

Increase aggregate size by

- Adding calcium (usually gypsum): only works with clay soils.
- Adding organic matter: Water and air are found **in** and **between** the organic matter particles. Organic matter loosens a clay soil for better air and water movement. In sandy soils, organic matter helps hold water and nutrients.

DRAINAGE PROBLEMS

Hard, Compacted Soil

Air space squeezed out; low infiltration, little air space, and slow drainage.

Impenetrable Layers

Clay layers, hardpan, and plowpans, etc.; may not allow water or roots through.

Fine-Textured Soil

Preferable over a coarse-textured soil or gravel.

At the **interface**, water cannot move rapidly into coarse soil; consequently, moisture is limited or not continuous.

MASTER GARDENER TIP

The interface is where one soil type stops and another begins.

Water movement downward is impeded across the interface and much of the finer soil's pore space may fill with water.

Coarse-Textured Soils Over or Contained within a Fine-Textured Soil

Drainage through coarse soils is rapid.

Infiltration into fine soils is slow, causing macropores in the coarse soil to fill with water.

Roots lack oxygen and root rots may ensue.

Add organic matter to the coarse soil to slow water penetration.

OVERCOMING DRAINAGE PROBLEMS

1. Till by adding 3–4 inches of organic matter.
2. Raise plant slightly above grade and create a bed with good soil or a raised bed.

3. Add tile to create good drainage.
4. Contour slope away from the plants so that water runs off.
5. Break through hardpan layers.

Planting and Site Preparation

TYPES OF PLANT MATERIALS

Bareroot (B.R.)

Dug without a ball of soil; little or no soil around the roots. Examples: dormant deciduous shrubs, roses, deciduous trees, and small evergreens.

Balled and Burlapped (B and B)

Dug with soil that is enclosed in burlap or some sort of synthetic material. The root system has been cut for easier handling and transport.

Field-Potted

Dug with or without soil and potted into a container.

Container

Plant grown for a time in a container.

PLANTING

Bareroot (B.R.)

1. Cut back damaged or broken roots.
2. Dig hole twice as large as the root system.
3. Put the plant in the hole at the same level it grew originally. Build a cone or mound of soil at the bottom of the hole under the plant for support and to aid in spreading the roots. Be sure the roots are spread.
4. Backfill with native, **not amended**, soil.
5. Water thoroughly.
6. Fertilize with a high phosphate fertilizer (5-10-10) or a balanced slow-release fertilizer (10-10-10). Fertilizers may be added to a backfill material. Fertilizer may also be added to the soil surface after watering. Always follow label directions as to amount.

Balled and Burlapped

1. Dig hole twice as wide as the ball of soil.
2. Remove **all** of the rope, twine, or string on the ball after setting it in position in the hole. The burlap can be sliced on the sides and the top burlap should be laid back so that no burlap is exposed aboveground. Burlap exposed aboveground will wick moisture away from the

root ball. Synthetic or plastic burlaps should be removed totally. Unless B and B trees have been kept in burlap for a long time, don't worry about girdling roots or cutting damaged roots.

3. Backfill with native, **not amended**, soil.
4. Water thoroughly.
5. Fertilize with a high phosphate fertilizer (5-10-10) or a balanced slow-release fertilizer (10-10-10). Fertilizers may be added to a backfill material. Fertilizer may also be added to the soil surface after watering. Always follow label directions as to amount.

Container Plant

1. Dig hole twice as wide for root-system spread.
2. **Remove** container, no matter what type.
3. Roots:
 - If the roots are not circling (potbound), carefully spread the exterior roots outward, away from the soil ball.
 - If the roots are circling, make three to four vertical cuts into the sides of the root ball ($\frac{1}{4}$ – $\frac{1}{2}$ inch into the ball). If the roots are woody and cannot be cut with a knife, lay the ball on its side. Using a sharpened spade or shovel slice through the lower half of the root ball. This is called "butterflying." Spread out the two flaps of roots and place in planting hole so the top of the root system is level with, or slightly higher, than the surrounding soil. When butterflying, be sure not to damage the crown by splitting too close to the trunk. Make sure the split area is filled with soil so that no air spaces are left.
4. Backfill with native, **not amended**, soil.
5. Water thoroughly.
6. Fertilize with a high phosphate fertilizer (5-10-10) or a balanced slow-release fertilizer (10-10-10). Fertilizers may be added to a backfill material. Fertilizer may also be added to the soil surface after watering. Always follow label directions as to amount.

PRUNING AFTER PLANTING

1. Leave as much of the crown intact as possible, and remove only dead, injured, and diseased branches.

2. Remove interfering, rubbing, or poorly placed branches.
3. Remove a branch from narrow “V” crotches or multiple leaders.
4. Prune to shape, if necessary.

STAKING

Avoid staking unless wind is a problem. Stake as low on the stem as possible and remove the stake after one year.

Reasons for staking:

- To anchor plant until it can root into the soil.
- To protect the tree from slanting with the wind.
- To straighten a crooked trunk.

Staking is used mostly for B.R. and B and B plants. There are one-stake and two-stake methods.

Plant Problems

Problems associated with plant roots may show up in other plant parts, especially the leaves.

CIRCLING ROOTS/POTBOUND

Symptoms

A general decline of plant vigor over a period of time.

Causes

Plant remaining in container too long at some stage of development, not necessarily the last stage of production.

Remedies

“Butterfly” the root ball or cut and spread the roots before planting.

GIRDLING ROOTS

Symptoms

Girdling roots limit water and nutrient transport causing deterioration of the plant. Top growth diminishes; plant is stressed.

Causes

An impenetrable planting hole; twisting the plant after setting into hole; bending roots to fit into a hole that is too small; and planting potbound or rootbound container stock.

Remedies

Chop off girdling root; spread roots when planting; remove debris or rocks in planting area.

KINKED ROOTS/ONE-SIDED ROOT SYSTEM

Symptoms

A general decline of plant vigor over a period of time.

Causes

Improper production methods (such as dragging with a mechanical planter, causing “J”-hooked roots, or jamming the plant in the pot or the planting hole).

Remedies

Cut off kinked roots when planting; carefully spread and straighten the roots.

ROOT ROTS

Symptoms

Soft, brown, partially to totally decayed roots, resulting in wilting or death of the plant.

Causes

Cause varies with susceptibility of the plant. There might not have been enough soil aeration; the water table might be high; the backfill might have been amended with fresh manures when planting; or the soil might be waterlogged.

Remedies

Improve downward and lateral drainage; tile, if necessary; and plant in raised beds. Select a water-loving species of plant and amend the soil to improve drainage.

CHANGING SOIL GRADES

Symptoms

No buttressing or flaring roots at tree base; general decline of tree; leaves and branches die from top down; collar rots are evident. The decline may take several years to occur or to complete. Susceptibility varies with species.

Causes

Filling with soil or pavement on top of an established root system results in a decreased air supply to the plant, changing drainage and water patterns.

Remedies

Cover roots with a thick layer of gravel, then with soil. Provide drainage, and in some cases, **welling** the trunk will help.

MASTER GARDENER TIP

Welling is the building of a “well” or wall around the tree several feet out to keep soil away from the trunk.

TRENCHING/CUTTING ROOTS

Symptoms

Cutting roots reduces water and nutrient uptake. The decline may take several years to occur or complete. Cuts can become infected with root rot, leading to the decline of plant growth. The result is often the death of a tree from the top downward. Sometimes the decline is limited to that half of the tree with the cut or damaged roots.

Causes

Removing top layers of soil to change a grade or damaging roots by cutting.

Remedies

Avoid cutting large roots; fertilize and water the rest of the root system; use a high-phosphorus fertilizer to encourage new root development.

COMPACTION

Symptoms

Decline of the tree from the top down.

Cause

Soil compaction after the plant is in the ground.

Remedies

Direct foot traffic and machinery away from the dripline of trees. Aerate soil using a core aerator or cushion the soil with a thick mulch.

Stem Problems

Stem maladies usually arise from improper cultural practices and stresses to the plant.

HEART ROT

Symptoms

Decay of heartwood.

Causes

Improper pruning, topping, breakage, or wounding of the stem or the large branches.

Remedies

Prune properly and avoid wounding. Remove decayed branch wood; if rot is in an advanced stage, remove the tree.

STEM WOUNDS

Symptoms

Cankers, girdling, holes, splits, and oozing.

Causes

Various, including hitting the tree with lawn mowers and string weeders; leaving support wires or B and B string around stem; diseases, borers, and sunscald.

Remedies

Keep equipment away from plant stems and trunks. Remove all lawn grass to at least 1 foot from the trunk. Keep all mulch 2–3 inches from plant stems. Identify and treat insects or disease. Remove labels and ties when planting. Painting or spraying with tree wound compound does **not** improve healing, but it may prevent insect entry.

SUNSCALD OR SOUTHWEST DISEASE

Symptoms

Bark tends to be blistered, burnt, dead, or split on the southern or southwestern sides of the trunk. Young, newly transplanted trees are the most susceptible.

Causes

Alternating freezing and thawing of bark on sunny side of tree during winter. Intense heat during summer.

Remedies

Shade southern and southwestern sides of trunk; wrap the trunk with tree wrap or paint with white, water-based (latex) paint. If there is an advanced stage of damage, carefully remove any dead bark, apply tree wound dressing, and wrap to keep insects out of heartwood.

BRANCH ROTS AND INFECTIONS

Symptoms

Oozing, cankers, holes, and splits.

Causes

Improper pruning. Branch stubs or flush cuts leave a tree open to disease and insects.

Remedies

Prune correctly; cut back only to the branch collar; do not top trees. Treat insects and diseases when first noticed.

DAMAGE TO CROTCH AREAS

Symptoms

Splits, oozing at crotch.

Causes

Narrow “V” crotches, borers, water gathering in crotch.

Remedies

Prune out all but one of the leaders if the tree is young and has multiple leaders. Narrow branch angles can be spread when the tree is young; cable or brace narrow crotches if the tree is older to prevent breakage.

FREEZE DAMAGE

Symptoms

Blackened tissue; dead twigs or buds; death of plant. Stem dieback. Usually younger stems die, but older wood also can be damaged during severe winters. There is generally a partial to total necrosis of the young leaves. Older leaves may become distorted later. New growth might have been frozen by late spring frost when plant was in the soft-growth stage.

Causes

Lethal winter temperatures and early or late frosts.

Remedies

Use frost-prevention methods; select trees and shrubs specified for your zone; do not fertilize trees and shrubs after July 1.

GRAFT INCOMPATIBILITY

Symptoms

Large overgrowths above and below union; earlier than normal fall coloration; a stem that breaks off at graft.

Cause

Incompatibility between scion and stock.

Remedy

Purchase plants rooted from cuttings or use a reliable source of grafted stock.

Leaf Problems

Problems with stems and roots often will show up in the leaves. If a plant is wilted, the leaves are either not getting enough water or are losing water faster than it is being supplied by the roots. Determine the cause of wilting. There also are many insects and diseases that affect leaves.

DROUGHT

Symptoms

Wilting, drying of soft growth, and blotchy necrosis.

Causes

Extended periods of dryness. High heat/bright sunlight on shade-loving plants could cause leaf

scorch, early leaf drop, or marginal and interveinal chlorosis or necrosis.

Remedies

Water plant; provide better soil preparation by adding organic matter to increase water-holding capacity; mulch to reduce surface evaporation. Select drought-tolerant plants. Shade plant; mist periodically for temporary cooling.

FROST DAMAGE

Symptoms

Partial to total necrosis of young leaves or buds. Older leaves may become distorted if buds were injured.

Causes

New growth frozen by late spring frost when the plant is in the soft-growth stage.

ROOT INJURY

Symptoms

Wilting, early leaf drop, leaf chlorosis, root damage, necrosis, and plant death.

Causes

Root damage due to trenching, insects (such as root weevils), or disease. Overwatering limits oxygen uptake by roots and encourages root rot.

Remedies

Determine the cause, then take appropriate action. If the cause is not a root rot, then proper watering of the remaining root system will help. Fertilization with a high phosphorus fertilizer may help rejuvenate the root system. If overwatering is the problem, increase drainage and cut back on water. If a high water table or poor drainage exists, choose water-loving plants (such as a willow).

VASCULAR SYSTEM INJURY

Symptoms

Wilting or drying of a portion of the plant.

Causes

Disease, such as *Verticillium* wilt, can plug the xylem vessels.

Remedies

Determine the cause and take appropriate action. Remove the infected portion; treat for *Verticillium*.

SALT DAMAGE

Symptoms

Marginal to interveinal chlorosis/necrosis; rootlets are brown instead of white.

Causes

Salts from excessive use of commercial fertilizers, manures, and deicing salts. The latter may be more prevalent next to sidewalks and driveways.

Remedies

Leach with water, if possible; limit the use of offending materials. Alternate organic fertilizers with commercial fertilizers to reduce salt buildup.

LEAF CHLOROSIS AND NUTRIENT DEFICIENCIES

Nitrogen Deficiency

Symptoms. Overall yellowing of older leaves first. Stunted growth of plant. Pale green color on rest of plant.

Cause. Nitrogen deficiency.

Remedy. Fertilize with a nitrogen fertilizer.

High pH (Over 7.5)

Symptoms. Interveinal chlorosis, light green to white in color (with zinc, older leaves affected; with iron, new leaves affected first). The margins of leaves may become necrotic, but the veins remain green. With zinc deficiency, leaves may be small, narrow, and thickened. Foliage loss may be early and leaves at tips of branches may be bushy with few or none along the branch. Manganese deficiency is similar to iron deficiency, but chlorosis is not so dominant on young leaves. Also there is severe browning and dropping of leaves with maturity.

Cause. Iron, zinc, or manganese deficiencies because of the soil pH.

Remedies. A long-term solution is to decrease soil pH. A temporary solution is to apply the deficient nutrient. You may need to make annual spring or fall applications.

Other Causes of Leaf Chlorosis

- Wrong soil pH for acid-loving plants
Example: azaleas
- Herbicides (see subsection “Herbicide Damage” of this section and Table 1)
- Drought (see section “Leaf Problems,” subsection “Drought”)

- Natural leaf maturity and abscission in autumn
- Natural variegation

HERBICIDE DAMAGE

Herbicides are formulated to be toxic to specific weeds, but they also may cause damage to desirable plants.

Symptoms

Some herbicides act hormonally and produce a twisted, cupped, puckered, or distorted growth. Other herbicides inhibit photosynthesis and chlorophyll formation, causing a peculiar coloration or characteristic chlorosis depending on the material used (see Table 1 on next page). In general, if many plants in one area are affected with unusual twisting, puckering, or with strange colorations and drying leaves, chemical or herbicide misuse may be the culprits. If only part of the conifer root system is affected by a herbicide, the damage may create a spiral pattern on the stem of the plant.

Table 1. Common herbicides.

Herbicide	Damage Symptoms
Dichlobenil (Casoron)	Broadleaf plants: Tip, marginal to interveinal chlorosis/necrosis. Sometimes more severe on leaves oriented toward the afternoon sun. Conifers: Needle tip chlorosis to necrosis.
Phenoxy compounds (2,4-D, MCPP, MCPA)	Broadleaf plants: Twisted, distorted leaves and stems. Blistering of bark on London plane tree. Conifers: Misshapen, hooked needles.
Dicamba (Banvel)	Broadleaf plants: Twisted, cupped, distorted new growth, chlorosis, necrosis, death of stem tissue. Conifers: Distorted, twisted needles, needle necrosis from the base to the tip; club-shaped growth, needle distortion on pines.
Glyphosate (Roundup)	Broadleaf plants: Yellowing and necrosis of part or entire plant. New leaves do not develop correctly; they are skinny, strap-shaped, yellow.
Triazines (Atrazine)	Broadleaf plants: Marginal chlorosis.
Simazine (Princep)	Conifers: Tip chlorosis.
Chemical sterilants (many kinds)	Severe chlorosis; necrosis; death if applied near the root system of desirable plants.

Causes

Most people do not know where the root zones of desirable plants are; consequently, they overspray, and translocation of the herbicide into a desirable plant occurs.

Remedies

Almost all problems arise from misapplication and misuse. Few problems arise when label directions are followed closely and the broadcasted material is kept 5–10 feet away from the dripline of desirable plants. Spot treat weeds rather than broadcast when possible.

INSECTICIDE INJURY

Symptoms

Dormant oil will remove the waxy bloom that gives the blue cast to Colorado Blue Spruce. Oils used on deciduous plants that have started to show green will burn exposed green tissue. Some insecticides, such as malathion, will burn leaves when applied during high temperatures.

Causes

When used for insect and mite control on needled evergreens, dormant oil may cause burns, especially if the concentration is too high, if the oil is applied during freezing weather, or if the plant has started to grow.

Further Reading

BOOKS

Harris, R. W. 1983. *Arboriculture: Care of Trees, Shrubs and Vines in the Landscape*. Hoboken, NJ: Prentice Hall.

Partyka, R. E. et al. 1980. *Woody Ornamentals: Plants and Problems*. Columbus, OH: ChemLawn.

