

Introduction

At *Leaning Pine* Arboretum we foster horticultural practices that are in harmony with nature. The goal in our 5-acre garden is to have a positive impact on the environment, rather than a negative, damaging impact. This system of gardening is sometimes described using various terms and catch phrases: “green gardening,” “sustainable gardening,” “best management practices,” “organic gardening,” or just plain “sensible gardening.” By whatever name, our system of environmentally sensitive gardening uses sound horticultural practices to produce strong, healthy plants grown in an environment that is safe for our students, visitors, and employees. We have listed below some of the practices we try to follow and foster in our pursuit of horticulture in harmony with the environment.

- Choose the right location for each plant
- Group plants by water zones
- Perform each garden job at the correct time
- Use organic mulches
- Recycle green waste
- Use a mulching lawn mower
- Fertilize only as needed and use organic fertilizers
- Improve soil health by adding and encouraging soil mycorrhizae
- Use only environmentally friendly pest control materials
- Prevent and control weeds with minimal or no spraying
- Control gophers using traps
- Control slugs and snails using non-toxic materials
- Design to capture and filter runoff water

The following pages are a series of brief essays written to help explain how these practices are followed at *Leaning Pine* Arboretum. As with any natural system, ours is in constant flux, and as time, technology, and resources permit, other techniques will be added and some will be modified and improved. While you enjoy the arboretum, we encourage you to observe the results of our system and to read the essays so you can begin incorporating as many environmentally sound practices as possible into your own garden. Feel free to download and print individual essays or the entire document.



Choose the Right Location for Each Plant

“The right plant in the right place” is an adage often heard among experienced horticulturists and garden designers. Following this adage can be as simple as determining the ultimate size of a plant before planting, or as sophisticated as carefully observing a site for its microclimate qualities and characteristics before choosing a plant. Regardless, one of the most important results of locating a plant in the right place is a better chance of developing strong vigorous growth and the ability to resist diseases and pests. The resulting healthier plants are much less likely to require the use of pest controls.

For example, the arboretum’s Australian garden displays several plants in the genus *Eremophila*. These plants perform much better in a location where they receive full sun all day, or perhaps just a few hours of shade in the late afternoon. If *eremophilas* receive more shade they grow weak and spindly, often not holding their form, and their flowering is reduced – all the result of being planted in an area that is inconsistent with their natural growing environment.

In the arboretum’s early years, most of the plants had to be tolerant of full sun because there was very little shade. As trees in the arboretum mature they cast more and more shade, consequently plant choices beneath them have to be changed as more shade develops. For ideas on shade tolerant plantings, visit the area of the Californian garden under the tall redwoods near the gazebo, the Australian garden area beneath the large *Grevillea* tree, or the Mediterranean garden beneath the Italian stone pines. There you will see examples of several different plants that are adapted to and grow best in shade. Sometimes the simplest solution in areas of heavy shade is to not plant anything beneath trees and large shrubs. Instead, simply cover the ground with mulch as seen beneath many of the oaks in the Californian and Mediterranean gardens.

Books and web sites on plants and garden design usually present a litany of factors to consider when locating a plant. What is its growth form and ultimate size? How much sun, shade, heat, cold, or wind does it tolerate? Does it tolerate dry or wet conditions? While an ever learning and changing process, throughout *Leaning Pine* Arboretum you will see many examples of “the right plant in the right place”. Many wind tolerant plants are located along the upper fence line, those tolerant of more water are usually along the edge of the lawn or in drainage swales, and plants requiring excellent drainage are sited on raised or mounded beds.

Regardless of the situation, when plants are properly sited they grow best, are less prone to pest problems, require less maintenance, and are more satisfactory in the overall landscape. In short, choosing the right location for each plant is a major part of gardening in harmony with nature.



Group Plants by Water Zones

Mediterranean climate plants are naturally adapted to receiving seasonal and sometimes very sparse rainfall. That is one of the main reasons using mediterranean plants is so important when gardening in harmony with nature in California. Once established, most plants from mediterranean regions grow well in gardens with very little or no supplementary irrigation. In fact, one of the surest ways to weaken or kill many mediterranean plants is to overwater them during the summer – their normal dry season. This is especially true in heavy clay soils and poorly drained garden sites.

The older, more established plants in *Leaning Pine* Arboretum receive very little irrigation during the dry summer and fall months, making them water-thrifty garden plants. If you visit the arboretum during late summer or early fall, you will notice some plants are not growing actively, and others may have dropped some or all their leaves. These plants are in their natural period of rest or summer dormancy. For most mediterranean landscapes this somewhat dry, dormant appearance is the norm during late summer and fall – much like the surrounding hillsides - changing only with the arrival of shorter days, cooler temperatures, and seasonal rains. These older, established plants in the arboretum are located in what could be described as summer dry zones, or minimal water zones. If plants in these zones are watered during the dry season, the irrigation is infrequent but enough to move deep into the soil.

A garden featuring mediterranean climate plants does not need to lack vibrant color and growth during the dry summer season. At *Leaning Pine* Arboretum you will see areas displaying colorful flowers growing actively during the summer. One such area is in the Australian garden, above the lawn just as you enter the arboretum; another is in the Mediterranean garden beyond the olive trees and above the lawn. These areas have been developed as summer water zones. They have separate irrigation systems, which allow more frequent watering targeted at a selected area without overwatering and harming nearby plants. Such summer water zones are usually located in garden areas that are well drained, allowing for careful irrigation of selected plants, without wasting water on the entire garden.

It is important to use plants that are tolerant of summer water in these higher water zones. The Australian garden area displays large sweeps of perennial straw flowers (*Bractyantha*) punctuated with other water tolerant Australian native plants. The Mediterranean garden summer water zone is built around marguerite daisies (*Argyranthemum*), interspersed with summer annuals, grasses, and other appropriate choices.

By developing separate water zones and planting them appropriately you'll discover you can have an overall water thrifty mediterranean garden with pockets or areas of colorful flowers even during the dry months.



Perform Each Garden Job at the Correct Time

Knowing how to correctly perform horticultural jobs is one of the most important keys to success in the garden. Just as important, in many situations, is a knowledge and understanding of when the job should be performed. While there is no “right” time for many garden tasks, for some tasks it is important to watch the calendar and, more importantly, learn how to “read” plants for signals.

For example, many of the clumping grasses throughout the arboretum should be periodically cut back close to the ground. For most grasses this task is completed annually; for others it is performed every two or three years; and, for best results, timing is critical. Grasses send up their new growth from the base of the clump near soil level, so pruning is done just as that new growth begins to show on a few plants. *Eragrostis curvula*, a grass growing in the South African garden, is usually cut back in mid- to late-fall; for many of the California native grasses pruning is done in early winter with the goal of finishing by late January. While other times of the year may work, we find that careful timing of clump grass pruning, based on signals of new growth, produces healthy, vigorous plants that are less subject to problems.

The arboretum features several plants known as geophytes. These are plants that grow from underground structures such as bulbs, corms, and rhizomes. These underground, or geophytic, structures store energy in the form of food which is vital for growth the following year. The energy manufactured in the leaves of the plant is moved into the underground structure during the leaf growth cycle. For maximum food storage, and ultimately better growth and flowering, it is important to keep the leaves on geophytes until they wither and turn brown. Dead leaf removal cleans up the garden and removes breeding areas for pests such as snails. You can read more about geophytes and their life cycles on a colorful interpretive sign located in the South African garden.

Sometimes it is important to understand when not to carry out a task. For example, manzanita (*Arctostaphylos*) plants are subject to a disease known as botryosphaeria, a fungus that causes discoloration and often death of leaves and branches. Diseased parts of affected plants can be pruned away, but they should not be pruned during the rainy season, as water easily spreads the disease into open wounds. Instead, pruning of affected parts should be delayed until dry weather.

Whether cutting back grasses, pruning manzanitas, cleaning up bulb crop foliage, or other such garden tasks, it is important to pay attention to the calendar and observe signals from the plants. By timing garden tasks appropriately, results are usually better and your efforts will be in harmony with the environment.



Use Organic Mulches

Mulching with natural organic material increases soil health, reduces fertilizer and water usage, helps control weeds, and is one of the easiest and most dramatic ways to improve the appearance of the garden. Mulch can be nearly any material spread over the soil surface, but at *Leaning Pine* Arboretum we prefer to use naturally occurring organic materials such as bark products, wood chips, and pine needles. Most of the mulch used throughout the arboretum is produced using locally recycled chips from tree and shrub pruning.

The *Leaning Pine* Arboretum mulch program begins when fresh wood chips and bark chips are delivered by local tree trimming companies, or are chipped on site using tree and shrub prunings. The chips are sprinkled with an organic nitrogen fertilizer and kept moist, then blended into our larger mulch pile and allowed to partially decompose for several months. This seasoned mulch is then taken from the pile for use in the garden where we spread it two to four inches deep, taking care to keep it six inches back from tree trunks and plant root crowns to prevent disease and fungal crown rots. Mulch can be applied at any time of the year, and we try to apply a new layer annually to give a fresh look to the garden and to compensate for natural decomposition. With five acres of gardens, maintaining a healthy layer of mulch is a never ending process.

This layer of natural organic mulch provides many functional and aesthetic benefits. It increases soil health and workability by adding vital organic matter, helps retain soil moisture, replaces some of the nutrients used by plants, and reduces erosion. The addition of mulch to native soil improves aeration and water holding capacity through increased pore space, which lightens the texture of heavy soils. As mulch decomposes, it releases nutrients and humus, promoting beneficial worms, soil microbes, and mycorrhizal fungi. Other functional benefits of mulch include moderating soil temperatures, reducing compaction and soil crusting from rain and watering, and preventing rain and irrigation water from splashing soil borne disease organisms onto plants. When applied correctly, mulch can reduce the need for herbicides as small weeds are smothered and germination of weeds seeds is dramatically reduced. Additionally, the need for fertilizers is decreased because of the ultimate release of nutrients. Visually, mulch provides a dark, even color for the ground surface, often creating contrast and texture to accentuate plant foliage and flower color, as well as hiding drip irrigation systems that often accompany water thrifty gardens.

In your own garden a small mulch pile utilizing grass clippings, leaf litter, and other garden green waste may provide enough mulch to keep your soil healthy and protected. If time or space constraints make maintaining your own mulch pile difficult, seasoned mulch may be obtained from some municipal green waste recycling programs. Locally, mulch created from recycled green waste is available through Cold Canyon Landfill and some other distributors of landscape supplies.



Recycle All Green Waste

Green waste describes all prunings, clippings, and other plant debris produced in the garden. At one time it was common to throw green waste into the garbage where it was added to the landfill – a true waste of green. *Leaning Pine* Arboretum now uses a system where nearly all green waste is recycled, either on the property or at a nearby green waste recycling center.

The bulk of the arboretum's green waste is recycled on site. Most woody material pruned from trees and shrubs is run through an industrial chipper and then partially composted before returning to the garden as mulch. Herbaceous refuse and most other debris too soft or too small for chipping is collected and sent to a nearby green waste recycling center where it is composted and eventually sold for commercial and home landscape use, or it is composted on site. A few materials are not suitable for recycling in these ways, such as tough fibrous palm fronds and agave leaves, and obviously diseased plant parts.

Lawn clippings are either recycled directly on the lawn or added to the herbaceous refuse pile on site where they are composted and eventually used as a soil amendment. Where practical, prunings from ornamental grasses in the arboretum are left directly on the ground, serving as a mulch and wildlife cover and saving the time and labor of hauling and composting.

Our program not only recycles nearly all the green waste we produce, every year the arboretum also recycles several hundred cubic yards of wood chips that come from area tree service companies. These are added to the chips produced on site, partially composted, and used as mulch.



Use a Mulching Lawn Mower

Should grass clippings be allowed to remain on the lawn after mowing? In most situations the answer is a resounding yes. That is because grass clippings are a rich source of nitrogen, a nutrient used in large amounts by lawngrass plants for lush, rich, green growth. When allowed to remain on the lawn, the clippings eventually sift down to the soil and decompose, releasing their nitrogen and other plant nutrients, and reducing lawn fertilizer needs by as much as 33 percent. This recycling of plant nutrients back into the lawn is a perfect way to maintain a lawn in harmony with nature, but it works best only when a mulching mower is used.

A mulching mower is designed to chop the clippings into very small pieces so they sift down to the soil surface and begin to decompose quickly, usually without thatch buildup. Mulching mowers work in various ways: some use blades designed to cut the clippings several times, others use a vacuum system to suspend the clippings so they are cut several times before falling to the lawn, and others use a special screen-like attachment that helps pulverize the clippings. Mowers not designed for mulching can sometimes work satisfactorily, but they often leave behind clumps of large clippings that look unsightly and do not readily decompose in the lawn.

Many lawn mowers are designed with a collection bag so very few clippings remain on the lawn. These are usually non-mulching types of mowers, and they do not produce the benefits of recycling green matter directly back to the lawn. However, the accumulated clippings are a valuable resource that should be composted and ultimately returned to the garden as mulch or as a soil amendment. Lawn clippings should not be thrown into the garbage where they unnecessarily tax already overburdened landfills.

At *Leaning Pine Arboretum*; we use two types of mowers; both with multiple, high velocity blades that chop the clippings into fine pieces. One mower leaves the clippings on the lawn for natural recycling, while the other vacuums them up into a collector. Those collected clippings are composted in a separate area and ultimately returned to the soil in the arboretum.

Whether you use a mulching mower or a mower that collects the clippings, you can develop a scheme for managing your lawn and recycling the clippings in harmony with the environment.



Fertilize Only as Needed Using Organic Fertilizers

Many mediterranean region plants have evolved and survive in areas of nutrient poor soils that are notably deficient in nitrogen and phosphorus. This is especially true of plants from Australia and the Cape region of South Africa; and, to a lesser extent, Chile, California, and the Mediterranean basin. Consequently, most plants grown in the *Leaning Pine* Arboretum are well adapted to soils that receive no added fertilizers.

Typically, fertilizers are not added to the plants in the arboretum, either at planting time or anytime after. The few exceptions receive periodic applications of fertilizer only as needed and include the lawn, the conifer garden, and the boxwood garden. Some individual plants, such as certain of the banksias and proteas, may receive applications of minor elements (such as iron and manganese) when needed. Otherwise, as you look around the arboretum almost every plant you see is growing quite well on just the elements present in the native soil with no added fertilizers.

Where supplemental nutrients are required, we use only organic, non-petroleum based fertilizers. These organic fertilizers benefit the soil food web organisms and significantly reduce the possibility of pollution of runoff water and underground water by nitrate fertilizers.

Typical ingredients in an organic fertilizer might include fish meal, cottonseed meal, bone meal, kelp meal, and others. Such organic carriers do not release nutrients readily; instead they must be worked on by soil microbes operating within the natural cycle of growth, feeding plants steadily and naturally. Typically, more nutrients are released during warmer weather, when plants are normally growing.

When organic fertilizers and other organic matter in the soil are broken down, humus is created. Humus acts somewhat like a natural glue, dramatically improving soil over time. The soil ecosystem also becomes the home to abundant macro- and microorganisms that add to soil health and vitality.



Improve Soil Health by Adding and Encouraging Soil Mycorrhizae

Mycorrhizae are specialized beneficial fungi that establish symbiotic relationships with plant roots. The mycorrhizal fungi penetrate growing plant root tissues, surround the root mass, and extend far into the soil. Their growth increases root effectiveness by encompassing a far greater volume of soil than that occupied by the plant's own roots and root hair system. It is estimated that as many as 6,000 mycorrhizal fungi species exist and that up to 95% of the world's higher plants develop some kind of mycorrhizal relationship.

Mycorrhizae act as important soil binding agents, significantly contributing to an improved, more workable soil structure. The mycorrhizal fungi's long threadlike structures (hyphae) are especially effective at reaching into the soil beyond the roots and capturing moisture and nutrients from the soil, particularly nitrogen and phosphorus. The fungi consume some of the moisture and nutrients, but more importantly they share the moisture and nutrients with the host plant. Additionally, mycorrhizal fungi can store nutrients and release them to the host plant during times when the nutrient supply from the soil has diminished. In essence, mycorrhizal fungi help plant roots absorb nutrients and water, act as a storehouse of nutrients, assist in developing drought tolerance and overall better growth, and help create better soil structure. In return, the host plant provides the fungi with photosynthesized foods such as sugars, resulting in a true symbiotic relationship.

At *Leaning Pine* Arboretum we have developed a scheme to encourage beneficial mycorrhizal relationships throughout the gardens. Though we do not use supplemental fertilizers on most of the arboretum, we do fertilize the lawn and a few other selected areas. When we fertilize we use a non-synthetic organic product that contains nutrients and a blend of beneficial soil microbes plus several strains of mycorrhizae. If you prefer not to apply a fertilizer-mycorrhizae blend, you can purchase and apply soil inoculants containing a range of mycorrhizae which are often mixed with other beneficial soil microbes. As an added bonus, some of these products also discourage growth of undesirable microorganisms in the soil ecosystem.

Additionally, we encourage overall soil health through our program of applying organic mulches that ultimately decompose, releasing vital nutrients and improving soil structure. We avoid the application of any kind of pesticide-based soil drenches. These products are marketed as a control for certain root or soil problems, but they can be detrimental to the growth and development of beneficial microorganisms, including mycorrhizae.

You can also inoculate new plants by adding some soil taken from the root zone of nearby healthy plants and incorporating it into the backfill. This effectively transfers the established mycorrhizae from the healthy plant's roots to the new plant. Many mycorrhizal relationships are specific, sometimes to just one genus of plants, so it is a good idea to collect the inoculant soil from closely related plants, if possible.



Use Only Environmentally Friendly Pest Control Materials

Often, when thinking of insects in the garden, we think only of those that are pests, forgetting about the myriad of desirable, helpful insects and related organisms that ought to be encouraged and preserved as part of a natural pest defense system. Referred to as “beneficials,” they can include tiny harmless mites and wasps, larger and more colorful moths and butterflies, familiar ladybug beetles, dainty lacewings, and numerous others that naturally help control insects pests.

One of the surest ways to encourage beneficials is to stop using pesticides, especially broad spectrum types. Birds, pollinators, and other beneficials are often far more sensitive to pesticides than the pest you might be trying to control. Unfortunately, complete elimination of pesticides is not always possible, but you can usually switch to low impact, environmentally friendly pesticides targeted at specific pests. For example, mealybugs are often a problem on some of the aloes and other succulents in the arboretum. One environmentally sound approach is to spray the mealybugs with household rubbing alcohol, being careful not to saturate the leaves and damage the protective outer leaf tissues. Neem oil, a natural plant derivative, can be sprayed as an alternate control. When using any pesticide, including environmentally friendly types, it is important to follow directions and avoid over application because of possible damage to plants and beneficials.

Another, less obvious, way to encourage a healthy population of beneficials is to grow a wide variety of plants in the garden. A diverse population of plants encourages and nourishes a wide range of beneficials. Many beneficials perform their pest control services only during the immature stage, but it is important to provide the adults with pollen, nectar, water, and cover so they can breed. Some beneficials can be purchased and released in the garden. This can be especially productive when there is a high population of damaging pests.

The arboretum is currently investigating the possible establishment of insectary areas around the garden. These areas are usually planted with special insectary seed mixes, producing a wide range of plants that attract beneficial insects and promote a balanced ecology in the garden. These plantings have the added bonus of competing with weeds. Insectary plantings are part of an environmentally friendly strategy of managing insect pests by reducing or replacing dependency on insecticides.



Prevent and Control Weeds with Minimal or No Spraying

It has been said that weeds are just plants out of place. Regardless of how you define weeds, most gardeners agree they do not want them. At *Leaning Pine Arboretum* weed management was, at one time, performed almost entirely through the use of herbicides. Now weeds are mostly controlled by extensive mulching throughout the garden and by mechanical means.

The arboretum has developed a system of preventing and controlling weeds that is largely environmentally friendly and has resulted in fewer and fewer weeds in the gardens each year. Our primary defense against weeds is the generous application of organic mulch, covering the soil throughout the planting beds. Organic mulch helps measurably in weed prevention by smothering young weed seedlings before they have a chance to emerge and establish; this is in addition to the numerous other benefits of organic mulch. Even in areas where plants are not growing we try to cover all exposed soil with mulch that is at least two to four inches deep,

In spite of our best efforts with mulch, some weeds still find their way into the garden - mostly in areas around the perimeter where wind blown weed seeds are abundant. Wherever we find weeds, our next step is to control them by removal – either pulling or digging. We try to remove weeds when they are small because the job is easier then and, more importantly, they are removed before they have a chance to set seeds.

Managing weeds in the lawn area relies primarily on developing and maintaining a dense, healthy stand of turf that is mowed at the proper height. Healthy turf that is dense, properly watered, fertilized, and mowed is competitive against most weeds. When necessary, hand weeding is used to remove lawn weeds.

Unfortunately, some weeds are extremely persistent and survive in spite of our best environmentally friendly efforts. These persistent weeds are mostly perennial plants that develop extensive, deep root systems, such as Bermuda grass, kikuyu grass, or wild morning glory. Mulching may slow their growth but often does not kill them, and pulling or digging usually is not entirely effective. For the control of these perennial weeds we resort to a synthetic chemical weed control, using it very sparingly and only where absolutely necessary. When used according to directions, this chemical usually kills the entire plant after one or two applications. As a result, the population of perennial weeds in the arboretum has decreased significantly over the years. We look forward to the time when we will no longer have to resort to the use of any synthetic chemical weed controls.



Control Gophers Using Traps

Gophers, also known as pocket gophers, are burrowing rodents that live and feed almost entirely underground where they eat roots, bulbs, and tender young plants that they pull down into their burrows. They can also damage or kill shrubs and trees by feeding on the roots and girdling the underground part of the trunk or stem.

The first sign of gopher activity is often wilting of all or part of the plant even though the soil may be moist. Mounds of fresh soil on the surface are usually another obvious sign of gopher activity. Typically mounds are crescent- or horseshoe-shaped when viewed from above, and are formed as the gopher pushes loose soil to the surface while excavating tunnels underground. Gophers are active around the clock, but it is often easiest to spot recent digging activity early in the morning while the soil is still moist.

Gophers are classified as non-game mammals by the California Fish and Game Code. This means if they are found to be injuring growing crops or other property, including garden and landscape plants, they may be controlled at any time and in any legal manner by the owner or tenant of the premises. While there are numerous baits available for killing gophers, all are poisonous and are dangerous around children and pets, and can be extremely harmful to wildlife, including predators that might feed on a poisoned gopher. Additionally, when baits are used, it is difficult to be sure the gopher has been killed.

The safest and most environmentally friendly way to control gophers is by trapping; it is fairly easy to do, is environmentally sound, and is usually very effective if done properly. Look for signs of freshly dug mounds early in the morning, then probe the area about a foot deep using a narrow steel rod or pipe. Once the burrow is located, dig - usually no more than a foot deep- until the tunnel branches in two directions. Insert two activated wire pincher traps or box traps, one in each direction in the main tunnel, being careful not to discharge the traps. To prevent a gopher from pulling the traps down into the tunnel system, attach both traps to a stake using a wire or small chain, and drive the stake firmly into the ground. Before covering, it is sometimes effective to put a non-poisonous attractant into the hole between the two traps. At *Leaning Pine Arboretum* we often “bait” the traps using a fistful of fresh anise leaves or slightly crushed malva leaves, weeds common in this area. Some people use a few drops of anise oil as a lure. To keep soil from falling on the traps, cover the hole with a piece of sod, a board, or some wadded up newspaper, and then sprinkle with loose soil to block out all light. Check traps the following day, and wear disposable rubber or vinyl gloves or use a plastic bag when removing the dead gopher. Dispose of it directly in the tunnel and cover with soil to naturally decompose and discourage other gophers from digging in the same area. It is helpful to collapse the tunnel system because migrating gophers will sometimes move into an abandoned burrow.

Other environmentally friendly gopher controls include active cats and attempts to increase owl and raptor population in the garden. Surrounding the root ball of young plants with small-mesh wire cages is a somewhat effective prevention device until roots grow beyond the cage.



Control Slugs and Snails Using Non-toxic Materials

Slugs and snails are some of the most persistent and devastating garden pests. Both feed primarily at night, are active during the rainy season, and during the summer if plants and soil are moist. Aside from plant damage, slugs and snails leave slime trails on plants, the sides of pots, and on walkways and garden paths. Slugs and snails multiply rapidly from small (1/8" diameter), pearl-like milky white eggs laid in masses about one inch deep in the soil or under rocks, boards, and in plant debris.

Garden sanitation should be the first defense against slugs and snails. When you find eggs, crush them or scoop them into a used plastic bag, seal it, and put the bag in the garbage. Remove boards, pots, plant debris, and other breeding and egg laying sites. Moisture makes an area more attractive to slugs and snails, so avoid overwatering and use drip emitters to deliver water only where needed. Water early in the day so areas will dry before nightfall. During the late evening hours look for and destroy slugs and snails. Crush them completely or drown them in a pail of soapy water. They can later be buried in the garden where they add nutrients to the soil.

Several baits are available and are designed to be scattered on the garden. Choose baits carefully because many are toxic to people, animals, earthworms, beneficial insects, and the environment. Baits containing naturally occurring iron phosphate are environmentally friendly, doing a great job of controlling slugs and snails in the garden while not harming other creatures including people and pets. After consuming iron phosphate bait, slugs and snails stop feeding and die within 3 to 6 days. They usually crawl into secluded places, so you may not see dead bodies. As an added bonus, iron phosphate bait eventually breaks down into an iron product that plants can use as a nutrient. As with other baits, iron phosphate should be reapplied about every two weeks during the active feeding season. Keep iron phosphate baits and all other pesticides out of the each of children.

Several commercial slug and snail traps or bait stations are available. Be sure to select non-toxic baits that are safe for people, animals, and the environment. Even with bait stations and traps, some hand picking may be necessary. Slugs and snails can be trapped under upside-down flower pots, dark plastic sheeting, and boards placed flat on the soil. Place these traps around the garden, adding some moisture as a lure, and collect and destroy the pests in the morning.



Design to Capture and Filter Runoff Water

As you tour the *Leaning Pine* Arboretum's Californian garden you will notice a streambed running the entire length of the garden, just above the lower berm. This streambed is an important component of the landscape design because it helps unify many different plant combinations and vignettes taken from throughout the native California landscape. It is also an important part of managing the arboretum in harmony with nature.

As with many stream areas in natural settings, the arboretum's stream is seasonal, with little or no water in summer and an often active flow in winter. This streambed captures rainfall and runoff water from nearly the entire five acre arboretum. When heavy rains drench the arboretum, surface runoff and underground seepage move downhill and find their way to the streambed. Because the slope of the streambed is very gentle, water moves slowly, giving time for some to be absorbed by the roots of plants in and along the streambed and for some to soak into the ground. Additionally, as the plants absorb the water, they help filter out various pollutants such as fertilizer residues.

At the far end of the arboretum, near the council ring, the streambed is wider and flatter than in other areas. In an area such as this, sometimes known as a percolation pool, water usually ponds or stands for several days following a rain, providing even more infiltration and filtering. The combination of slow percolation and biofiltration means more water stays in the arboretum for plant use and any runoff that leaves the arboretum is at least partially filtered.

It is important to use suitable plants when landscaping streambeds, percolation pools, and other riparian areas. The best plant choices in seasonal streambeds and percolation pools are those that thrive in wet, sometimes flooded, conditions in the winter and survive with little or no summer irrigation. Several examples of suitable choices are displayed at *Leaning Pine* Arboretum, including:

Trees: Alder, California sycamore, Fremont cottonwood, coast redwood

Shrubs: Spicebush, creek dogwood, and various native willows.

Perennials & Grasses: Mugwort, sedge, rush, redwood sorrel, and deer grass.

In your own landscape, a meandering seasonal streambed can be a pleasing design feature while providing an area for percolation of water into the soil and filtration of pollutants from your lawn or driveway. If properly designed and planted, a seasonal streambed helps manage difficult boggy or seasonally wet/dry areas while incorporating interesting and functional plants into an environmentally friendly landscape.

