

The Importance of Mulch

“Oh, and did we mention mulch?” We have been using and promoting the use of arborist wood-chip mulch for some 40 years. It works wonders in our climate and for our soils. If someone told you you could water half as often while your plants grow healthier twice as fast with a free product, who wouldn't jump at the chance to use it?

What is mulch? Mulch is an organic or inorganic material atop the soil, above the spreading roots and associated soil biology. Mulch insulates soil from sun, wind, erosive raindrops, as well as temperature and moisture extremes. Mulch must be coarse enough to allow water and oxygen to gently pass through to the soil (roots NEED air), and to allow carbon dioxide to escape (“gas exchange” - it is as though the roots and soils “breathe”). A good woody mulch, 5-6+ inches thick will keep soil beneath it moist for almost a week.

Mulch and soils? In years of seeing Truckee/Tahoe soil tests, the results have all been remarkably similar. We have mineral soils (usually silty-loam with rocks of every size), plentiful micronutrients, ample P & K (phosphorus & potassium), and minimal S & Ca (sulfur and calcium). Our soils are most importantly lacking organic matter and N (nitrogen).^{*1} Organic mulches compost / decompose to become organic humus that improves soils. Inorganic mulches (or bare soil) keep the soil depleted and sterile. We seldom use gravel as a mulch except next to structures (*see mulch and fire below*). This discussion addresses the benefits of organic mulch out in the planted (and natural) landscapes, a little away from the house.

We want root systems to ultimately be at least as wide as the height of the growing trees (and usually much wider). Most roots are in the top 8” of soil where oxygen is available. If a good native woody mulch is applied in a very wide area around a planted tree, the mulch will have begun to decay and improve the soil effectively in the few years it takes for the tree's roots to get out that far. Also, during those seasons, the beneficial composts used at planting will have been completely digested and needing replenishing that the degrading mulch will provide. In our poor mineral soils, the woody mulch on top of the soil keeps providing humus to the soil for years. Maintain mulches throughout your landscape, cover your bare soils, and your plants will thrive.

Mulching mistakes. There are two common mulching mistakes to avoid. First, take care to not cover the trunks of your terrestrial trees or shrubs with mulch. Most trunk tissues are adapted to living in the dry and open air. In some cases, bark can rot and trees can die when covered with mulch (or soil). Roots are adapted to living in the dark and wet. We always plant a little above grade and bring soil up to the edge of the root ball. After the first year in the ground, we like to move the mulch off the original root ball. We are always trying to grow the largest root system possible so we move drip irrigation further and further from the trunk every year, and add a few micro-sprayers. After year 1, we are gently discouraging roots from growing in the original root ball.

The second common mistake is not mulching wide enough. Gardeners frequently cover a 2-3' area with mulch (usually just an inch or two thick), not thinking or realizing that the bone-dry silty soils surrounding the planting hole, exposed to high-elevation sun and low-humidity winds, are evaporating water from the soil and pulling it from your adjacent irrigated plantings. Water is always

trying to equalize and it moves from wet areas into dry areas. The broader we mulch, the less water we lose to evaporation. We're always looking for simple rules-of-thumb for this. I like "no bare soil" but mulching an area at least the radius of the tree's height should be a minimum. Arborist mulch is usually free from local subdivisions and arborists. Our land-fill sells, fairly clean A-grade wood chips at a reasonable price. Colored chips can look very nice but once used, it is difficult to transition back to natural.

Mulch vs. Compost. Mulch is a functional insulation layer atop the soil as described above. A compost is organic material that's been digested by organisms breaking down the organic matter into smaller and smaller constituents until it is unrecognizable. Humus is mineralized organic matter. (Coal is ancient mineralized organic matter: the energy of the sun, converted into living tissues by photosynthesis, stored in hydrocarbon molecules.) Mature composts contain a high percentage of humus and when added into the soil, they improve soil structure, increase the nutrient and water holding capacity, and promote biological activity and soil resilience. Compost, and eventually humus, is the "miracle panacea" for almost any poor soil.

Woody mulch provides the raw material that maintains the humus working into the soil. We often put down a light layer of mature compost over an area before covering the area with wood chip mulch. We think of it as a "compost starter" like a sourdough, kombucha, or yogurt culture. Compost is full of living microorganisms that have been "eating" woody materials for months so it gives your mulch digestion a head start.

Arborist wood chips often have a component of chopped-up green pine-needle pieces. Some gardeners don't like the way this looks. It is important to realize that in the spirit of what is good about mulch, green pine needles in the mulch add nitrogen that helps speed the overall decomposition of the mulch yields more of an essential nutrient into your soil. I consider them a bonus. The small green pine needle pieces break-down quickly and are seldom visible after the first winter.

It is important to note that you never want to incorporate un-composted, woody material (sawdust, wood chips, pine needles) into the soil. While the many benefits of woody mulch atop the soil are difficult to enumerate, in soil, raw wood can cause myriad problems from "nitrogen drag" / C:N imbalances to disease problems. Trust us, just keep the raw wood on top.**2

Mulch and fire. There is research (some through UNR) regarding the flammability of various mulches. The more mature and broken-down a compost is, the more mineralized it is, the more fungal hyphae it contains, and the less flammable it becomes. Layers of fresh pine needles are not a great mulch. They allow air and light, provide poor insulation, and hold very little moisture. They also ignite easily from embers and burn hot with tall flames. Pine needles that have been composted (piled up and occasionally watered) make an excellent addition to mulch with far smaller air spaces and much lower combustibility. A thick layer of composted woody mulch can be put over the top of pine needles to reduce their combustibility and to help them decompose more rapidly.

Since the vast majority of our natural local organic decomposition occurs in winter, fresh mulch applied in late fall will have composted characteristics by spring. According to local firefighters, in areas where the understory has been chipped and masticated, woody mulch that has been through at

least one winter exhibits low combustibility from embers. And from university studies “composted wood chips produced only incidental flaming with smoldering as the primary form of combustion” (https://naes.agnt.unr.edu/PMS/Pubs/1510_2011_95.pdf). ***³

In our mountain Mediterranean climate, the vast majority of our precipitation comes in winter, as snow. Most of our natural and native organic decomposition (logs and pine cones turning to compost) occurs in winter, under the snow, by fungi, in the moist dark subnivean realm. In more humid climates and in places with summer rains, fungi and also bacteria are decomposing organics year-round. Our lack of moisture is part of the reason we have such poor mineral soils. Without low intensity fires in this dry climate, it takes decades for essential elements to cycle back into our depleted soils.

To dramatically decrease the combustibility of arborist wood chip mulch, “compost” them: leave them piled and add occasional water. Adding an organic fertilizer with live biology over the pile will speed the composting decomposition with the extra nitrogen and additional composting microorganisms. Use the darker, far less flammable composted material as mulch everywhere in later fall to further compost through winter.

A pro technique is to add a few micro-sprayers in with your drip irrigation systems. You not only improve the breadth of root growth, increase relative humidity around your plants, and increase growth rates, but you also accelerate the composting of your woody mulch to reduce flammability and improve soils for expanding roots..

It is never recommended to put woody materials directly adjacent to your home or other structures and woody mulch is no exception. But out in the landscape mulch is essential.

A bit more on pine needle mulching. There is a ubiquitous and frequently misstated assumption that pine needles make your soil acidic: Soil is actually formed from the bottom up, from the degradation of base material – lots of different kinds of rocks in our case, and then rivers or glaciers or wind move it around. If the base material is acidic, the soil is acidic. The pH of composted pine needles is near 6.5 – only slightly acidic and the ideal pH for most plants. Q: Which came first, the soil or the tree? (A.: Soil.)

Good composting organisms need Carbon (“brown”, pine needles), Nitrogen (“green”, grass clippings, kitchen greens), water, and air (the reason we often turn our compost). If you pile your pine needles in spring, mix in a few grass clippings and/or sprinkle in a little organic fertilizer (G&B is a brand of fertilizer with billions of living composters in it), and water occasionally, you will be able to dig into the pile in fall and use the rich dark composted pine needle pieces for your pre-winter mulching. If you turn the pile once or twice during the summer and add a little more water or greens, then it will decay even faster. If you rake and pile pine needles in late fall, they can be usable as mulch in spring if the winter is sufficiently wet and snowy.

While it is a good idea to mow your lawn high and let most of the clippings fall, I actually bag mine about every 3-4 mowings to use in my compost. I keep a pile of pine needles close by to layer between each load of clippings. The pine needles add carbon and maintain air spaces in the pile, accelerating the composting dramatically.

*¹Our organic component: ~.002% (healthy topsoil has 5-7%) and our nitrogen (N): ~5 mg-N/kg (moderately fertile loam soil has 50 – 75 mg-N/kg).

**² [Hügelkultur](#) is an exception, sort of, and worth mentioning. This is a technique where woody material is buried deep, below the level where most roots grow, and as the deep wood ferments and decays it can create excellent soils. I have put 12-18” inches of aged horse manure with native soil over piles of pine needles, cones and branches and the eventual growth of the woody plants atop it has been tremendous. If you are clearing for defensible space or for landscaping and intend to create mounds, burying all the plant debris under the mounds can have many benefits.

***³Fungal Combustibility: <https://www.nature.com/articles/s41598-018-36032-9>,
<https://www.sciencedirect.com/science/article/pii/S0264127519308354#bb0170>,
<https://onlinelibrary.wiley.com/doi/abs/10.1002/FAM.2637>