

Much ado about mulches

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It's arrived! You now have a lovely new pile of wood chips from some local tree work, just what you wanted for mulching your garden to suppress weeds and reduce moisture loss. As you stand there surveying your prize, questions may start popping into your mind. Didn't you read somewhere that wood product mulches steal nitrogen from the soil? What about the soil pH? Will that be changed to the detriment of your plants?

I, too, have heard about these concerns. I've also read that as long as the wood chips are used only as surface mulch, and not incorporated into the soil, then they don't cause a nitrogen deficiency in the plants. As far as pH is concerned, this seems something of a gray area, and the results may not be what you'd expect. Although I've personally used wood chips as mulch without concern and without problems, I went looking for science-based answers to these two common questions.

Firstly, let's examine why there may be concern, starting with nitrogen deficiency. Nitrogen is an essential nutrient for plant growth. It's the only plant nutrient that doesn't naturally originate from soil mineral particles. Instead, it is captured as a gas from the atmosphere by soil microorganisms and converted into forms of nitrogen that plants can use, ammonium and nitrate. When materials high in carbon — such as wood chips — decompose, the microorganisms that do this job use nitrogen that would otherwise have been available to the plants. This can happen when wood products are used in potting mixes or incorporated into the soil. This raises the question whether wood mulches only on the soil surface can create nitrogen deficiency in the plants as the mulch decomposes.

In general, the answers I found indicate that surface woody material mulching does not cause nitrogen deficiency in the plants. There may be some effect at the interface between the soil and the mulch¹, but this wouldn't impact plants other than those with shallow roots near the surface. Thus, if it does happen, established daylilies are less likely to be affected than are young, newly planted seedlings.

Quoting from some of the literature, "After twelve months, no evidence of nitrogen immobilization or growth suppression under the wood or bark-based mulches was observed"². In another study comparing pine bark and other wood-derived mulches, "In the present study, we found no evidence of nutrient depletion or reduced foliar N [nitrogen] of plants grown with mulch compared with bare ground (no mulch + weed control)."³

If your plants do turn out to be affected by nitrogen deficiency, they will show reduced growth and yellowing (chlorosis) of the foliage. I have not seen this happen with wood chip mulches, but if you are still concerned, one suggestion is to use landscape fabric to separate the mulch from the soil⁴.

The other question is whether wood product mulches will affect the underlying soil pH. Why might this be a problem if it happened? Soil pH indicates how acidic or alkaline a soil is, with pH 7 being neutral. The lower the number below 7, the more acidic it is. Conversely, the higher the number above 7, the more alkaline (basic) that soil is. Not all plants are tolerant of a wide pH range, and fussy ones need it kept within certain limits. Even the soil microbes can be affected by the soil

pH, and the availability of essential plant nutrients varies according to the soil's pH. If your plants are happily growing in your soil at its current pH, you may be concerned about upsetting them by adding material that could change it. On the other hand, people sometimes deliberately use wood product mulches hoping to make, or keep, their soil more acidic for plants that prefer it that way.

It can actually be quite difficult to influence the soil pH to a significant extent with added materials. The ability of a soil to resist changes in its pH (called its buffering capacity) depends on the soil type. For example, it is typically harder to change the pH of a high clay content soil than that of a sandy soil. So, the current soil pH, the soil's buffering capacity, and the type of mulching material are all factors that could vary between gardens and studies.

My literature search suggests that the influence of wood mulches on soil pH is generally not significant, but that in some other cases, the pH could go either way, sometimes actually increasing. This may surprise some gardeners who hope these mulches will make their soil more acidic.

One experiment² testing six types of mulch (cocoa shells, coarse conifer bark chips, wood chips, garden compost, horse manure and finely ground conifer bark), found that, "Initial mulch pH was not a good indicator of how that mulch would affect the underlying soil pH over time. After 12 months the organic mulches had either no significant effect on soil pH or increased it slightly relative to un-amended soil." Another study⁵ found that, "Soil pH readings were highest under shredded bark and wood chips, and lowest in the non-mulched control." A study⁶ to test the effects of chipped pine and shredded hardwood chip mulches compared to an un-mulched control found, "Soil pH, nitrates, and salt levels were unaffected." Over two years, they sampled the soil to see if the surface layer would acidify, and it did not.

Lastly, in a review of numerous studies on mulches, Dr. Linda Chalker-Scott¹ noted, "Organic mulches such as wood chips and bark are thought by some to be soil acidifiers. No scientific research supports this, and in fact studies refute this perception." ■

References:

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