FIXING WHAT AILS YOUR SOIL

The soil doctor is IN!

By Kelli Belden

Organic matter. Organic matter. ORGANIC MATTER!

Fall is a great time to think about increasing the organic matter in your soils – adding organic matter is the most common fix for soil issues in Wyoming.

If this were 1892, I'd be selling it off the back of a wagon as the cure for everything that ails soil. Advertising rules are stricter now, but organic matter is still an important limiting factor for soil quality in the arid West.

Unfortunately, not much organic matter (which comes from decomposed plant material) is in Wyoming because of short growing seasons and scarce rainfall. An abundance of vegetation that will die down and create organic matter is not produced.

Common problems we've seen in Wyoming soils include low fertility, low water retention, compaction, and poor drainage. Organic material can help address these issues. As organic materials degrade during the growing season, they release valuable nutrients that plants can utilize. If the soil is heavy clay, adding organic matter loosens the soil, relieving the compaction problem and improving drainage. Soil structure is improved, creating pore space. Many organic materials retain significant amounts of water and improve moisture-holding capacity in very sandy soils. Organic matter is truly a wonder drug for your soil.

Improving the organic matter of your soil on a small scale

Organic matter content is easy to improve on a small scale. Add a 1- to 2-inch layer of organic material to vegetable or flower gardens whenever soil is turned. Add the layer and then turn the soil to mix in. Adding compost, sawdust, lawn clippings, and manure are ways to add organic matter, but each has its own limitations.

Adding organic matter can fix many soil problems in Wyoming.

Compost

Use only mature compost. Compost that has not finished the decomposition process can contain compounds toxic to plants. See the barnyardsandbackyards.com "Composting" section for more information on simple methods of composting. Note the comments on manure use in compost in the manure paragraph later in story.

Sawdust

If using sawdust, add extra nitrogen (usually 1 to 2 pounds nitrogen per cubic yard of sawdust) evenly distributed throughout the soil. The extra nitrogen is needed to "feed" the soil bacteria, which will go to work breaking down the sawdust. If extra nitrogen is not added, bacteria will take nitrogen from the soil and cause a nitrogen deficiency for plants. Don't leave any sawdust clumps or there may be mold or fungus problems.

Lawn Clippings

Lawn clippings can be added as mulch. If using lawn clippings, ensure the grass has not been treated with any herbicides that might damage your plants. Apply a 1-inch layer between garden rows. Be sure to let a layer dry before adding additional layers. If a still wet or too-heavy layer is added, the layers will turn soggy, the oxygen will get squashed out of the layer, and it will begin to smell due to the activity of anerobic bacteria. The mulch can be turned into the soil at the end of the growing season.

Manure

Manures have been used as a nutrient and organic matter source for thousands of years, but they have unique issues. Because of the high, volatile nitrogen content in fresh manure, it can burn plants. Let manure age at least six months to a year before use. Manures often contain high levels of salts. This varies by the type of livestock, what they've been eating and drinking, and how often the manure is cleaned out of holding areas. Have a sample tested for salt content before use. Check out the Colorado Soil Testing Laboratory (http://www.soiltestinglab.colostate.edu) for more information on testing.

Never use dog, cat, or pig manures on plants for human consumption. The manures often contain parasites that can infect humans. These parasites can survive a long time in the soil. Don't even add them to your compost pile. Other manures (beef, dairy, goat, chicken) can contain pathogenic strains of *Salmonella sp.* and *E. coli* bacteria. As manure ages, the bacteria decline, but they can still

be a potential threat to health. The USDA Organic Standard (http://www.ams.usda.gov/AMSv1.0/nop) requires a 90- or 120-day waiting period after aged, uncomposted manure application, depending on the crop, before harvesting for human consumption. The 90-day requirement applies to fruit trees. The 120-day wait applies to anything grown in a vegetable garden.

Manure can be composted to minimize the risk of disease organisms, but it is hard to maintain the appropriate conditions throughout the compost pile. The USDA Organic Standard requires a compost pile be maintained at 131°F to 170°F for three days using an in-vessel or aerated static pile (http://www.epa.gov/osw/conserve/rrr/composting/static.htm). Manure should be avoided if anyone with a compromised immune system is likely to eat produce from the garden. Manure can also contain weed seeds. These weed seeds have had their hard outer coats weakened by their trip through an animal leaving them ready to germinate. Composting will usually kill weed seeds if the appropriate temperatures are maintained.

Improving the organic matter of soil on a large scale

Adding organic matter to large areas can be expensive due to the high quantity of material that needs to be added. Animal manures can be economically added to grass hay fields or other crop areas to improve soil organic matter levels. Green manure (a crop grown and then turned into the soil while green) is also an option for adding organic matter to tilled areas.

Animal manure

Spread animal manure at recommended agricultural rates to avoid potential problems with nitrogen leaching into ground water or phosphate runoff into surface waters. For the correct agricultural rate, determine the nutrient content of the manure and the nutrient needs of the crop based on a soil test and the yield goal for the crop. The Colorado State Soil Testing Laboratory (Web address above) can provide assistance with the testing of manure and soil. Discuss appropriate crops, yield goals, and agricultural rates with a University of Wyoming Extension educator or someone in a local Natural Resources Conservation Service office.

Green manure

Green manure is another way to add organic matter to soil. A quick-growing forage or cereal crop is planted and then turned into the soil while plants are young and succulent. Turn them in before seed heads or pods develop. Vetches, alfalfa, clovers, medics, winter peas, and winter (annual) rye are possible choices. Legumes (vetch, clover, pea) are especially good choices because they will add more nitrogen to soil.

Remember, organic matter is your best friend when it comes to soil!

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