

Plant Lover's Almanac

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For the second straight year, this is quite a winter, but let's put it into perspective. First of all, it is nothing like the East Coast, where my brother Bill lives as a nurseryman along the southern Maine seacoast (over 100 inches of snow within the last month). Or consider my oldest daughter Sara who moved to Cambridge, Massachusetts this past summer after eight years in California. Nor is our winter like my sister-in-law Jane's family in Seattle, where they planted their early garden this past weekend. In fact, a good portion of the country and much of the rest of the world has warmer than usual weather – and globally January was the 2nd warmest since records were first kept.

It sure is cold here, though, and almost all of us cannot wait for March and the start of the beginning of the green. And fortunately, the verdict is still out on whether we will get much winter injury to woody plant tissue. Certainly lows such as the -16 and lower we had earlier this week caused some damage, especially to marginally hardy plants, but the snow cover helps protect root systems from the worst cold, so some shrubs will show stem dieback but less threat to total death than root death would cause.

At any rate, let's talk trees and tree-care for this next season. Here are the first of my Top Ten Tips For Tree Health Management, the sort of horticulture we talk about in my Sustainable Landscape Maintenance Course on the OSU Campus each winter and spring, and this past week at "The Future of Trees is in Your Hands" Conference in Dayton, sponsored by the Ohio Chapter of the International Society of Arboriculture. We will start with soil and roots, and this is no accident: though we do not see them - plant roots matter most!

1). **Soil Chemistry Matters.** The chemistry of the soil in your yard is a factor in terms of which woody plants grow well there. Some plants are acid-loving, such as river birch, rhododendron, white pine, and red maple. Soil considered neutral has a pH of 7.0: above that alkalinity increases and below that acidity increases. We are in pretty good shape in much of northeast Ohio, with moderately acid soil, but it all depends on the location and the source of the soil and if it has been limed (increasing alkalinity) for too long. The problem for an acid-loving plant is that at more alkaline pH values certain plant nutrients are bound to other soil chemicals, making needed minerals such as iron and manganese relatively unavailable to plant roots. Don't guess – soil test. And select trees and shrubs for planting with the results in mind.

Another chemical factor of soil is something called the cation exchange capacity (CEC). Without going in to too much detail in this Almanac, suffice it to say that CEC relates to how well macronutrients such as nitrogen, so essential for plant growth adhere to soil. Don't guess – soil test.

2). **Soil Physics Matters.** Physics relates to soil texture: the percentages of sand (the largest particles), silt, and clay (the smallest particles) in the soil in your yard. Though plant growth may be supported by a wide range of combinations of sand, silt and clay, the best soils for many woody plants is a loam soil with all three components, with clay being a smaller percentage than sand and silt. Even though it has a bad reputation for root growth, clay is good, just not too much clay: a "heavy" clay soil with too many tiny particles, results in not enough room for

oxygen, a key to root health. Soil physics also relates to CEC. Nitrogen easily leaches out of predominately sandy soils with their large particles, compared to clay portions of soil, which retain more nitrogen compounds and other cations, thus making them more available to plant roots.

3). **The Living Soil or Organic Matters.** Roots need water and minerals and oxygen, but we often forget the oxygen part, so essential to the cellular metabolism of plant root cells. Obviously, soil texture comes into play: small particles like clay have less room for oxygen than larger particles such as silt and especially clay. Soil chemistry comes into play relative to the mineral need, as noted with CEC mentioned above. But overlooked too often is the living component of soils, including all of the microorganisms that number in the hundreds of billions in even as little a soil volume as a cup.

We are talking, bacteria and fungi and nematodes and many other microorganisms. Some of these microbes are damaging plant pathogens, causing plant disease, but many more are essential to the root-conducive health of the soil, transforming soil chemicals to usable forms, competing with damaging plant pathogens, ad infinitum. So, how do we encourage an optimal balance of microorganisms in the living soil?

There are no short cuts. We cannot simply buy soil activators or add beneficial fungi or magical chemicals to make what we call “soil structure” better, though these “chicken soup for the soil” solutions seem attractive. To improve soil structure, which increases oxygen availability to roots and is essential to microbial balance in soil, we need to do the hard work of adding organic matter over time. Not just any organic matter, but well-decomposed organic matter, such as composted materials.

How does this help with oxygen availability to roots? Organic matter is essential for the development of soil “aggregates” or “peds”. Adding organic matter encourages the growth of soil microbes that provide en masse a sticky “microbial glue”. These billions upon billions of microorganisms in microbial glue causes soil particles to adhere into peds that allow for macro-pores between the peds instead of micro-pores between soil particles, allowing for better air availability in the soil for root metabolism. Soil that is crumbly. Healthier roots mean healthier plants – this is a big deal. No short cuts here: add organic matter each year. Next year: repeat. That is why gardeners mature with age.

Next time we will start with “Where Roots Grow Matters”, and move up the plant to the stems and eventually the leaves and flowers and fruits. And if you despair in this discussion of macropores and CEC and alkalinity, remember the words of Aristotle: “*The roots of education are bitter, but the fruit is sweet.*” And if you worry that our woody plants will perish after this winter, remember J. R. R. Tolkien of Lord of the Rings fame, (speaking of Aragorn):

*All that is gold does not glitter,
Not all those who wander are lost;
The old that is strong does not wither,
Deep roots are not reached by the frost.*