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Nitrogen: The fix is in

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By Alex Féthière

Photo in the print edition: An alder root showing characteristic warty nodules inhabited by nitrogen-fixing bacteria.
(Journal photo by Alex Féthière)

“Fixing” nitrogen increases soil fertility without off-site inputs. Nitrogen is the nutrient most commonly lacking in forests worldwide, hampering nutrient accumulation, tree growth and carbon storage. Living in South Sound, you’ve probably got a head start fixing nitrogen on your property.

Red alder grows everywhere here. Not only does it provide a commercially important hardwood, but it fixes atmospheric nitrogen by way of a symbiotic relationship with bacteria that colonize its roots. (It provides the bacteria sugars from its photosynthesis and receives nitrogen in return.)

When the tree dies or self-prunes roots, this nitrogen is released and becomes available to the soil food web. Root dieback can account for up to half of the nitrogen released. This is slow-released through decay, and resists leaching unlike the highly soluble nitrogen found in commercial fertilizers. A 2019 study found that alder also accelerates mineral inputs from rock weathering, turning even bedrock into all the essential nutrients that forests require.

The U.S. Forest Service once called it a “trash tree” and sprayed alder forests with poison, but now values them for fixing nitrogen at the rate of 40-300 pounds per acre. Because alder will shed roots and nitrogen after losing aerial growth, I plan to experiment with alder coppicing (cutting trees in order to harvest trunk sprouts) as part of an orchard system, releasing nitrogen in installments rather than all at once with the tree’s death and decay.

As a seasoned cattleguard will likely tell you, clover is also a star at fixing nitrogen. A thick carpet of clover can fix nitrogen at 100-200 pounds per acre. As if by design, this nitrogen is best available to other plants when eliminated in the waste products of cattle, who retain very little nitrogen from grazing or hay. Clover is often included in grass seed mixes, ostensibly to support the grass with sustained nitrogen release, but it is best distributed elsewhere via browse or the decay of tissues injured by grazing or haying.

The wealth of plants that fix nitrogen shows its importance in the ecology. Dave Jacke and Eric Toensmeier, in their seminal “Edible Forest Gardens” Volume 2, share exhaustive tables of nitrogen-fixing groundcovers, vines, shrubs, and trees of all sizes. Some other native plants in our region include American vetch, deerbrush/snowbrush, and Oregon lupine.

Finding a clearcut on Harstine Island teeming with lupine last year, I tried to transplant some of the few that returned this year. Only one survived long enough to notice, but I chalk that up to having waited until they were flowering.

Another fun nitrogen-fixer to try is *Shepherdia canadensis*, or Canada buffaloberry, or soapberry. (I use the scientific name to distinguish it from poisonous unrelated plants in the genus *Sapindus* that the nursery trade calls soapberry.) In reading for this topic I found that Canadian First Nation tribes widely collect the bitter berries to blend (with a sweeter berry) into a drink, *sxushem*, that foams and may taste like sweetened coffee.

I have raised seaberries, a thicket-like tree, for multiple purposes including nitrogen fixation. They will need a year of watering for establishment through our Mediterranean summer. Resistant to deer and drought, they are also used in Canada for shelterbelts to prevent erosion. The bitter berries are rich in vitamins A, C, E and Omega-3s, and the leaves of male plants are collected for tea.

Anyone fixing to garden or orchard regeneratively can find suitable plants for sustainable nitrogen.

■ *Alex Féthière has lived on Harstine Island long enough to forget New York City, where he built community gardens and double-dug his suburban sod into a victory garden. He can be reached at onlandist@gmail.com.*

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