Essential Elements: Sulfur
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Sulfur
Sulfur is an essential major element and is involved primarily in protein and certain enzyme syntheses. Because of the similarity of roles in protein synthesis for both nitrogen and sulfur, sulfur deficient plants exhibit almost identical symptoms as plants suffering from less than adequate nitrogen. Thus, plants deficient in sulfur normally exhibit off color (yellowing) of both older and younger foliage. As with nitrogen deficiency, plants lacking adequate sulfur can be stunted, thin-stemmed and spindly. It is quite easy therefore to visually misdiagnose a sulfur deficiency as one caused by a lack of nitrogen.

Geographically, sulfur is generally low in most Northwest soils. This is particularly true in areas west of the Cascade mountain range where rainfall has a tendency to leach sulfate (the primary available form of sulfur) from plant root zones. The sulfur-supplying power of soils in this area is frequently very low, thus requiring supplementation in the form of fertilizer or amendment application.

There are several alternatives for supplying sulfur. The type and amount of sulfur-containing fertilizer or amendment should be based on soil test data that verify whether or not a deficiency exists. Soil testing laboratories commonly use the saturation extract method for determining the amount of sulfate ion present in the soil solution. It is preferable to maintain at least 2 milliequivalents per liter (2 meq/l) sulfate. Solving the problem of a sulfur deficiency will depend on other soil factors as well, including pH and fertility levels of other major elements such as nitrogen, potassium and calcium.

Should the soil reaction (pH) be in a desired range where little if any pH adjustment would be deemed necessary, then one might consider amending the soil with calcium sulfate (gypsum) at the standard rate of 25 pounds per 1000 square feet of area treated. The advantage of using calcium sulfate is that it provides additional calcium as well as sulfate without noticeably altering pH conditions. If both sulfur and potassium are in need of improvement, potassium sulfate (0-0-50) can be applied without changing the soil pH. When the soil pH is in a favorable range with both magnesium and sulfur low, consider the use of magnesium sulfate (Epsom salt).

When nitrogen and sulfur deficiencies coexist, utilizing fertilizers such as ammonium sulfate (21-0-0) or sulfur coated urea (40-0-0) would be warranted. However, continued use of ammonium sulfate or sulfur-coated urea will result in a gradual soil pH decline. These two fertilizers would therefore be excellent choices for soils that are higher in pH than desirable. If low sulfur and alkaline soil (soil pH above 7.0) exists, use of elemental sulfur (soil sulfur) or iron sulfate may be most suitable. Regardless of the situation encountered, there is usually some fertilizer or amendment that will correct sulfur deficiencies and adjust other factors in soil chemistry as needed.

Conclusions
Optimum plant growth response in landscape soils can be gained by making sure plants are provided a reasonable supply of all essential elements. With many soils west of the Cascades, conditions are conducive to low soil levels of sulfur. By including testing for sulfur, deficiencies or toxicities can be identified and corrected before or after planting.