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For Iron You Almost Have To Be A Chemist

If you are a chemist, iron is really neat. If not, here is an attempt to describe some of the chemical quirks of iron associated with plants need for it. Iron (chemical symbol Fe) exists in two ionic forms Fe^{++} called the ferrous ion and Fe^{+++} called the ferric ion. It is the ferrous form that plants utilize and it is the ferric from that makes all the soils red. Thus, there can be a lot of iron in the soil, but most of it is not available to the plant.

There are all kinds of chemical forces promoting conversion of the ferrous to the ferric form. The presence of oxygen, pH values above 6, excess amounts of copper or manganese all promote the ferric form. Then add to that that the ferric forms are much less soluble than the ferrous, so that once the ferric form is created it no longer is in the "soil water" so the chances of it reacting with something to create the ferrous form becomes less probable. Even classic treatments like liming to promote better yields, in some cases, causes the Iron that is adequately available in the soil to converted to the ferric form and precipitates, making it no longer available to the plants. Where there was adequate Iron now the plants had Iron deficiencies. All in all, it is not surprising that Iron was determined to be an essential element for plant growth in 1845. Iron is required by plants for various enzymatic reactions and to facilitate production of chlorophyll.

Like other micronutrients, symptoms of Iron deficiency appears first in new leaves as a yellow (light green) colored leaf with dark green veins (interveinal chlorosis). The older leaves retain the dark green color because the Iron in them is fixed (doesn't move to and is not shared with other areas of the plant), and there isn't enough Iron for the needs of the newly growing leaves. Because of the similarity of these symptoms to other micronutrient induced chlorosis, in agricultural settings, plant tissue analysis is suggested to determine the specific cause. Landscape conditions with lesser work and small amounts of material needed to remediate the condition allows a broad spectrum application approach to be taken.

Iron deficiency can be treated by application of fertilizers like Iron sulfate (this is a Ferrous sulfate). However, where the soil conditions result in a rapid conversion to the ferric form, this method may not work. Indeed, there are many examples of the lack of success of this treatment. Alternatively, Iron can be added in chelated form which protects it from precipitating and from be converted to the ferric form. Small amounts of the cheleated Iron can overcome the plant Iron deficiency.