

Soil Micronutrient Management

Copper (Cu), Iron (Fe), Manganese (Mn), and Zinc (Zn) are required by all plants for proper growth and productivity, but only in minute amounts. Each has several important and specific functions in plant cell metabolism and in photosynthesis. Because they are needed in such small amounts they are only rarely limiting to plant growth or productivity in Maine soils.

All four of these micronutrients are metals, with similar chemistry in well-drained soils. The availability of these metals to growing plants is very dependent on soil pH and organic matter content. The availability of most metals *increases* as the soil pH decreases (becomes more acidic). Availability *decreases* as the soil pH increases (becomes more alkaline). Organic matter or humus will often chelate (form complexes with) these metals, which generally tends to increase or maintain their availability to plants, even at higher pH levels.

Because most soils in Maine have an abundant natural content of these metal micronutrients in the basic mineralogy, managing micronutrient availability is often only a matter of managing the soil for optimum pH and organic matter content. If soil pH is alkaline (above 7.0) and is also low in organic matter, it is likely that the availability of one or more of these metals will be limited. Often the only treatment necessary is to lower soil pH and/or improve soil organic matter content. Specific recommendations will be included, where appropriate, to either lower soil pH by adding yellow sulfur and/or improve soil organic matter content by adding compost, animal manures, or leaves.

If both soil pH and organic matter content are in the optimum range and one or more of copper, iron, manganese, or zinc are below normal levels you may want to consider amending your soil with a safe source of these nutrients. These sources include:

- Azomite or other natural Trace Mineral fertilizers
- Fish meal or liquid Fish fertilizer (if you also need nitrogen and phosphorus)
- Seaweed or Seaweed extract
- Micronutrient “packs” or specific additions to custom-blended fertilizers
- Animal manures and compost (if needed) contain variable amounts of all micronutrients

If a micronutrient soil test level is High or Above Optimum, it does not necessarily follow that it is toxic or harmful to plant growth. High test levels of one or more are not uncommon. Copper, manganese, and zinc do have the potential to be phytotoxic (toxic to plants) under rare circumstances. In most documented cases of phytotoxicity, the test level has been several times higher than the Normal range listed at the bottom of the report. In these rare cases of phytotoxicity, the remedy is to raise the soil pH with a lime application to limit the availability of the problem metal (see pH effects above). In the case of all essential micronutrients, the plant is harmed well below a level that could be a problem for animal or human consumption. This is not the case with certain non-essential metals such as lead, cadmium, and mercury.