

How Zinc Reacts in the Soil

One of the natural causes of zinc deficiency is tie-up in high alkaline soils—that is calcareous or high pH soils. Zinc deficiency is also found in soils high in organic matter. Sandy soils, soils high in clay content, and soils naturally high in phosphates (which tend to tie up zinc) are also causes of deficiencies. Surface soils contain a greater proportion of available zinc than soils. It is a general belief that surface accumulation of zinc is caused by subsurface mining by plant roots, decay of organic matter, and subsequent deposition at the surface.

An important property of zinc is that it is highly insoluble and immobile. That is, it is concentrated on the soil surface and does not move down through the soil profile with water. For hundreds of years zinc has been pumped from the soil



by plant roots. Residue has decayed and left zinc in the upper two to three inches of soil. This immobile characteristic tells us that to prevent zinc deficiency, zinc should be applied under the subsoil.

Cool wet soils can cause zinc deficiency by reducing root growth. Zinc is very sensitive to cold temperatures. The movement of zinc is slower in acidic soils, which may reduce crop absorption from spatial unavailability. Liming of soils raises the pH and may help eliminate some movement problems, but these gains are usually offset because the higher pH increases soil zinc-fixing capacity, especially in soils high in phosphate.

Because of its high insolubility and immobility in the soil, zinc is best applied in the subsoil with a starter fertilizer or subsurface band.

Summary

The most common causes of zinc deficiency are:

- 1) high alkaline soils
- 2) high organic soils
- 3) sandy soils
- 4) soils high in clay
- 5) soils high in phosphate
- 6) acid soils
- 7) cool wet soils

The two most common properties of zinc are:

- 1) zinc is highly insoluble
- 2) zinc does not move through the soil.