IPNI Plant Nutrition TODAY
Better Crops, Better Environment...through Science

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STRATEGIES TO IMPROVE DISTRIBUTION OF LESS SOIL MOBILE PLANT NUTRIENTS

One of the challenges in making and applying fertilizer blends is that we sometimes make compromises in the way we apply specific nutrients. A major complication is that the 14 mineral plant nutrients differ in mobility in the soil.

Nutrients are grouped into three basic classes of mobility: mobile, somewhat mobile, and immobile. Here the term “immobile” isn’t totally accurate as even these nutrients move in soil, just usually very slowly and very short distances, for example an eighth to a quarter of an inch in the year of application. Mobile nutrients can be applied and placed away from were crop roots will grow, and will move one to two feet in distance to crop roots quite easily. Somewhat mobile and immobile nutrients are ideally placed where young crop roots will grow into soil, soon after establishment. Sometimes we apply a less mobile nutrient along with mobile nutrients, away from where young crop roots can assess it, and are disappointed when it is not absorbed well by crop roots.

Nutrient mobility in soil is largely determined by its ionic charge and form. Plant nutrients exist as either negatively charged anions or positively charged cations. The overriding influence in soils is that soil particles (mostly clay size) as well as humus material, have a net negative surface charge. This negative charge will attract cations, and repel anions. Chemical analysis of soils can measure this electrostatic charge, which is called cation exchange capacity (CEC).

Recently developed nutrient forms, additives and management practices are available to improve crop uptake of somewhat mobile and immobile nutrients.

1. If possible apply immobile and somewhat mobile nutrients in the seed furrow blend, and all high rates of mobile nutrients in a sideband or broadcast application.
2. Improve field distribution of lower rates of immobile nutrients, by applying dry powder dressings containing the immobile nutrients as either seed treatments or to seed furrow fertilizer blends.
3. Use recently developed phosphate products designed to improve micronutrient distribution by having each granule contain a low concentration of the needed immobile micronutrient. An example is addition of a low rate of soluble zinc to a compound granule containing primarily monoammonium phosphate.
4. Use of soluble foliar nutrient products can provide low but sufficient rates of immobile micronutrients directly to the leaves of developing crops. This can effectively supply the needed immobile nutrient to all crop plants.

Despite the challenges in optimally applying all needed crop nutrients, there are ways to place immobile and somewhat mobile nutrients so crop seedling roots will intercept, or developing crop leaves can receive, the needed nutrients in the required amounts.

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