



Fall 2003, No. 5

### STANDARD SOIL SAMPLES MAY MISS DEFICITS LOWER IN THE ROOT ZONE

**Our expectations from soil testing have changed, raising questions about whether we need to make changes in how we collect samples.** Soil testing was originally designed to provide a means of following trends over time, but often today we want to use it as a tool for more of a diagnosis and prescription system. This sometimes stretches the procedures beyond the comfort zone.

**Depth of sampling is one important issue that is sometimes overlooked.** Be sure sampling depth matches the calibration data used for interpreting the soil test results.

**The original objective of soil sampling was to collect a representation of the “plow layer”, which was commonly defined as 6-2/3 inches, and an “acre-furrow-slice” was estimated to be approximately 2 million pounds of an average silt loam soil.** That means 10 pounds of a nutrient per acre was equivalent to 10 pounds in 2 million, or 5 pounds in one million—or 5 parts per million (5 ppm). That leads to an easy conversion between pounds-per-acre and parts-per-million. You simply divide pounds-per-acre by 2 to get parts-per-million. With conventional moldboard plow tillage, nutrients were mixed within the plow layer, and the nutrients in the acre-furrow-slice were a convenient indicator of fertility. A large percentage of the roots, and thus the nutrients available to the crop, were in that area, so a sample collected to the tillage depth was a fairly good representation.

**The adoption of reduced tillage and no-till systems has resulted in less incorporation of nutrients, and the development of stratification, or layers of nutrients in various concentrations, with much more tendency for accumulation of nutrients near the soil surface.** Root structure may also be changed under reduced tillage. This means the sampling depth is becoming more critical. Since most soil test recommendations are based on calibrations of yield data with the standard sample depth, it is important to keep sampling consistent.

**After many years of crop production, nutrient supplies lower in the soil profile become depleted, and with reduced tillage and surface application of nutrients, levels in the upper part of the profile tend to increase.** Standard soil tests do not monitor these developing differences. Under normal conditions, there may be little impact of these changes. But when nutrient uptake by the roots is restricted, serious effects may occur. If the upper profile gets dry, uptake may be restricted to the lower, more depleted profile. Conversely, under wet conditions, roots in the upper profile may be more active. If stratification is suspected, there may be an advantage to collecting some samples from lower in the profile.

**It may not be necessary to have as many samples from greater depths, but getting a few as a spot check may be helpful in fine-tuning nutrient management programs.** Visual symptoms of potassium deficiency late in the season may be especially indicative of developing profile nutrient distribution problems. Deeper sampling could help determine whether a depleted subsoil is the cause.

—HFR—

For more information, contact Dr. Harold F. Reetz, Jr., Midwest Director, PPI, 111 E. Washington Street, Monticello, IL 61856-1640. Phone: (217) 762-2074. E-mail: hreetz@ppi-far.org.