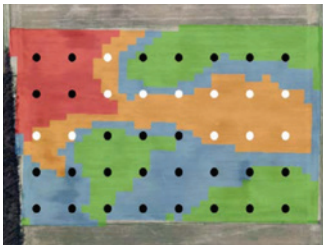
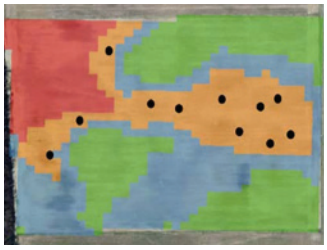
Soil Testing: grid versus zone

Is grid zone sampling right for your cornfields?



An example of grid-based soil sampling with sampling points (dots) located on an evenly distributed grid. This system can lead to bias. In this example, the orange zone is sampled in 30% of the grid points (white points), but the orange zone only represents 22% of the total field. In this case, the resulting soil sample is highly biased to the soil conditions represented by the orange zone.



An example of zone-based soil sampling. In this example, different management zones are represented by different colors. Subsamples are collected and composited for each zone. Subsamples are collected for the orange-colored zone at each location denoted by black dots. Each of these samples will be mixed into a single composite sample.

Feeding the soil at the right rate, timing, placement and source to optimize economic return on your corn crop starts with good soil sampling. But which technique works best — grid or zone soil testing?

Grid versus zone

Pulling soil cores at regular intervals from a field using a straight-line 2.5-acre grid (8 to 10 cores per grid) will improve fertilizer efficiency compared to composite testing. It's often a grower's first step with variable-rate fertility, but it has inherent weaknesses (see chart) compared to management zones.

Many researchers and elite farmers view optimized field management zones as their holy grail. That's because a grid system ignores field characteristics and soil properties, leading to fertility zones that may not represent yield results. But developing management zones takes a lot of data, field knowledge, computer analysis and time.

Management zones are a better choice than grids when a farmer has a working history of the field, says Greg LaBarge, Ohio State University field specialist in agronomic systems. "By overlaying topography, yield map data over time, soils map and other remote sensing data, a farmer can define high-, medium- and low-yielding zone patterns in a field."

Soil sample points should be taken randomly within each management zone, with 10 to 15 cores in zones up to a 25-acre area (often 12 acres or less in size). These points should be georeferenced to compare sample result trends over time, aiding fertilizer recommendation program effects on soil test levels, LaBarge adds.

Agvise Laboratories examined soil test data from over 1,000 fields in its database that used between 3 and 8 samples per zone. It discovered that the difference between the high and low testing zone gets larger with more samples per zone. The more samples per zone, the more you learn about nutrient status.

Soil sample accuracy Is critical

Regardless of your grid or zone strategy, be sure to avoid sampling in problem areas. These include end-rows or heavy-traffic areas, eroded areas, wet spots or depressions, locations of past farmsteads or feedlots, areas within 100 feet of a road and areas where lime is stored before application.

The time of year to sample soil can be either spring or fall, just be consistent every other year or a maximum of every four years. Fields should be in the same crop when sampled to reduce the temporal variability of test results. Also, keep the sampling location and depth consistent.

Obviously crop yield goals, existing soil nutrient levels and other factors help determine the proper rate in a fertilizer prescription. Soil labs offer base recommendations for mobile nutrients like nitrogen and sulfur. For immobile nutrients like phosphorus, potassium, magnesium and zinc, recommendations are based on current nutrient levels and crop grain removal rates.

Soil factors influence weed management

When examining soil variabilities in a field, soil-applied herbicides can be impacted by soil texture, organic matter and pH. All should be considered when determining herbicide rates and how they could vary between management zones.

Heavy soils with higher clay content can tie up herbicides, requiring a higher rate than lighter or coarse-textured soils. Organic matter (OM) levels can lead to further refinement of herbicide rates, since fine OM particles known as humus can tie up more herbicide than clay. And if soil pH varies, reduced weed control can also occur if rates are not adjusted, especially with chemistries such as triazine, clopyralid or flumetsulam.

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