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key to a quality  
fertilizer  
recommendation**A.E. Ludwick and P.N. Soltanpour<sup>1/</sup>

no. 500

COLORADO STATE UNIVERSITY COOPERATIVE EXTENSION

**Quick Facts**

A quality fertilizer recommendation depends on a quality soil sample.

A composite soil sample should represent a uniform field area.

A systematic sampling scheme should be used throughout the field obtaining a minimum of 20 subsamples, regardless of acreage involved.

Sampling depth depends on crop and plow layer.

A soil sample should be done every year. Stainless steel or plastic equipment should be used for soil sampling to avoid contaminating the samples.

The information sheet should be carefully and completely filled out to provide information so the fertilizer recommendation can be tailored to a specific situation.

All soil samples must be air dried thoroughly as soon as possible after sampling.

Careful soil sampling is essential for an accurate fertilizer recommendation. If a sample from a field does not reflect the overall or average fertility of that field, then subsequent analyses, interpretations and fertilizer recommendations are all wrong. It is as simple as that.

Each of the following should be considered before beginning a soil sample:

- 1) Field area (acreage) per sample
- 2) Sampling procedure
- 3) Sampling depth
- 4) When to sample
- 5) Sampling tools
- 6) Information sheet
- 7) Handling and mailing

1) *Field area (acreage) per sample.* A composite soil sample\* should represent a uniform field area. Each such area should have a similar crop and fertilizer history for at least the last five years. Soil characteristics—such as color, slope, texture, drainage and degree of erosion—should appear similar.

Small areas within a field that are obviously different should be excluded. These can be sampled separately if they are large enough to warrant special treatment. The smaller the field area represented by a single composite soil sample, the more likely that sample will truly represent the area. One composite sample should represent no more than 40 irrigated acres (16 hectares) or 100 dryland acres (40 hectares). Less acres would be better.

2) *Sampling procedure.* A systematic sampling scheme should be used. That is, subsamples should be obtained at approximately equidistant intervals from each other throughout the field (e.g., 200-foot or 61-meter intervals north-south and east-west).

Grid the area in your mind's eye (do not actually measure it) and sample once within each grid. A minimum of 20 subsamples should be taken per area regardless of acreage involved. In this case, more is always better. These subsamples should be mixed thoroughly and approximately one pint saved for analysis. This pint mixture is the composite soil sample.

3) *Sampling depth.* The surface sample should be taken to plow depth. For perennial pastures or hay crops (cases where the soil is not annually mixed), sample only to 4 inches (10 centimeters) deep; be sure to separate and discard surface litter. Deeper samples (subsoil) should be taken for nitrate analysis where the nitrogen fertilizer recommendation is of special importance. Sugar beets are an excellent example: there is a delicate balance between yield response (too little nitrogen) and quality reduction (too much nitrogen).

Nitrogen recommendations could be greatly improved for irrigated crops with deep soil sampling. Deep samples should be taken to 3 feet (.9 m). There is little point in going deeper unless an unusual situation requiring special attention is suspected. Sample as follows: surface to plow depth; plow depth to 2

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feet (.6 m); and 2 feet to 3 feet (.6 to .9 meter). Each depth should be kept separate. Request a routine test for the surface composite sample and nitrate only for the subsoil samples.

- 4) *When to sample.* Fields should be sampled before each cropping season. Fertility trends over a period of years provide important information, indicating the adequacy of a fertilizer program—too much, too little, or about the correct amount.

The closer samples are taken to planting time, the less chance there is for changes to occur. This usually is a problem only with nitrogen. However, soil samples may be taken either in the fall or spring. Fall sampling is advantageous time-wise, ensuring the test results will be ready in plenty of time for spring, or for fall fertilization when weather is usually good and time not so critical.

Beware of situations that may cause soil values to change between sampling and planting. For example, heavy rainfall or pre-irrigation on sandy soils could leach nitrate below the root zone of shallow-rooted crops. A case in point would be pre-irrigation of potato fields in the San Luis Valley.

- 5) *Sampling tools.* The authors recommend a stainless steel soil sampling probe (sometimes called a moisture probe) for obtaining a soil sample. A shovel also is satisfactory, but works much slower. Tools must be clean and free of rust. The subsamples should be

collected in a plastic or stainless steel container. Galvanized or brass equipment of any kind should *not* be used as the samples will be contaminated with important micro-nutrients.

- 6) *Information sheet.* The information sheet should be filled out completely. Interpretations depend on a series of field and crop factors. Such items as past crop, manuring, crop to be grown and its yield goal and irrigation, all enter into the final fertilizer recommendation. Without this information, a fertilizer recommendation cannot be tailored to a specific situation.

- 7) *Handling and mailing.* Soil sample bags and information sheets are available at the county extension office or from the CSU Soil Testing Laboratory. The county agent will mail soil samples to the Soil Testing Laboratory as a service to the farmer.

**IMPORTANT NOTE:** All soil samples must be thoroughly air dried before mailing. Moist storage of samples for more than 12 hours can significantly increase nitrate values. Satisfactory drying may be accomplished by spreading the samples out in a thin layer in a clean, warm location (room temperature).

*\*Composite soil sample—the soil mixture representing a single field area composed of a number of individual samplings (subsamples).*