

Nitrate Quick Test Procedure

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Using the Pre-Sidedressing Soil Nitrate 'Quick Test' to Guide N Fertilizer Management April 2010
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In California vegetable fields nitrate-form nitrogen (NO_3^-) can build up to levels high enough to supply crop nitrogen demand for an extended period. Sampling the root zone soil for NO_3^- concentration before sidedressing can identify fields in which N application can be delayed or reduced without affecting crop productivity. Collection of a composite soil sample representative of the entire field is necessary to make an accurate determination of soil nitrate status. Eight to 12 soil cores from throughout the field is usually adequate. Sample depth should cover the active root zone, which for most vegetable crops is the top foot of soil. Collect the soil cores starting in a plant row and angling the core toward the bed center. Be sure not to sample the zone where a fertilizer band has been recently applied. Thoroughly blend the soil cores together. Laboratory analysis is the most accurate method of soil nitrate determination, but a semi-quantitative estimate of soil nitrate concentration can be made using the following on-farm 'quick test' procedure. The advantages of this procedure are:

- ▶ Results can be obtained in less than an hour for most soils
- ▶ No weighing or drying of soil is required, although you do need to estimate the soil texture and moisture content.

Procedure

1. Make the extracting solution by dissolving approximately 6 grams of calcium chloride (about one teaspoon) in a gallon of distilled water. The concentration of this solution is approximately 0.01 Molar. Your teacher will do this.
2. Fill a volumetrically marked tube or cylinder to the 30 ml level with the extracting solution. Any volumetrically marked tube or cylinder will work, but 50 ml plastic centrifuge tubes with screw caps are convenient and reusable.
3. Add the soil to the tube until the level of the solution rises to 40 ml; cap tightly and shake vigorously until all soil clods are thoroughly dispersed. It is critical that the soil you test is representative of the sample; for moist clay soils that are difficult to blend, pinch off several small pieces of each soil core. Testing duplicate samples will minimize variability.
4. Let the sample sit until the soil particles settle out and a clear zone of solution forms at the top of the tube. This may take only a few minutes for sandy soils, but as much as an hour or more for clay soils.
5. Dip an EM Quant[®] nitrate test strip into the clear zone of solution, shake off excess solution, and wait 60 seconds. Compare the color that has developed on the strip with the color chart provided. When the strip color is between two color samples on the chart, interpolate the nitrate concentration of the strip as closely as possible. The strip color will continue to darken with time, so make the determination between 60 and 70 seconds after dipping the strip.

Nitrate Quick Test Procedure *(continued)*

Interpretation of Results

The nitrate test strips are calibrated in parts per million (ppm) NO_3^- . Conversion to ppm NO_3^- in dry soil requires dividing the strip reading by a correction factor based on soil texture and moisture content:

Strip reading \div Correction factor = ppm NO_3^- in dry soil

Correction Factor

Soil Texture	Moist Soil	Dry Soil
Sand	2.3	2.6
Loam	2.0	2.4
Clay	1.7	2.2

- ▶ Soil less than 10 ppm NO_3^- on a dry soil basis has limited N supply, and fertilization is usually justified.
- ▶ Soils between 10-20 ppm NO_3^- have enough N to meet immediate plant needs but a modest amount of sidedress N may be appropriate.
- ▶ In soil with NO_3^- greater than 20 ppm, additional N application should be postponed until retesting shows that residual soil NO_3^- has declined.