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Soil and Water Science
Research Brief
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P QUICK TEST

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Vertical movement of phosphorus (P) is an important transport pathway in some sandy soils like those found in the Suwannee River Basin. It is necessary to account for the depth of elevated P concentrations from previous P loading to predict the subsequent available P retention capacity of a given soil volume.

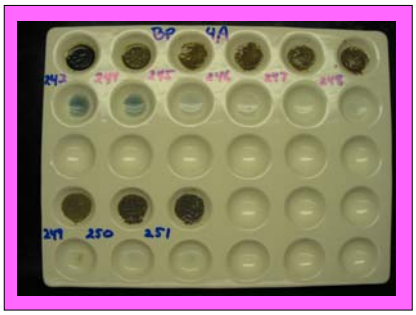
Risk assessment of P for leaching-prone soils requires that a valid and practical indicator of the affected depth be included in the assessment protocol for nutrient management using the Florida P Index.

This research describes a field test, the *'P quick test'*, which can quickly determine the depth to background P levels. The *P quick test* relates to common laboratory-measurable tests such as water soluble P (WSP), Mehlich-1 soil test P and the degree of P saturation (DPS). The latter is a parameter that has been recently developed for environmental risk assessment of P. Calculation of DPS makes use of P, Al, and Fe determined in the same Mehlich 1 extract (For details on DPS, refer to Research Briefs SWS-01-04 and SWS-02-03).

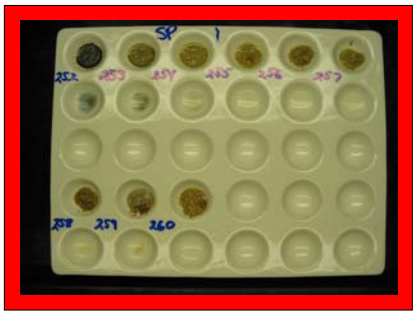
The *P quick test* has been tested so far on soils affected by two poultry operations (Barnes Poultry in Suwannee County, FL and Simpson Farms in Lanier County, GA), and two dairy sprayfields (Oak Grove in Dixie County, FL).

The *test* involves mixing a small amount (1.0 g) of soil in a ceramic test plate with reagents used in the phosphomolybdate blue colorimetric method for P determination. Details of the procedure are provided as an appendix to this Brief. Analyses were conducted by soil horizon for the two dairy sprayfields and two poultry manure-application sites.

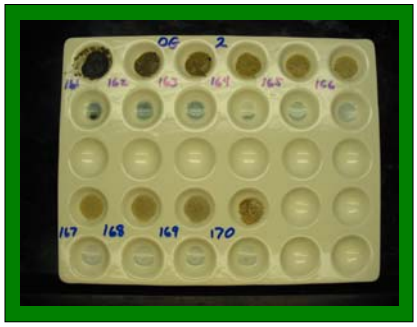
***P quick test* - Barnes Poultry**

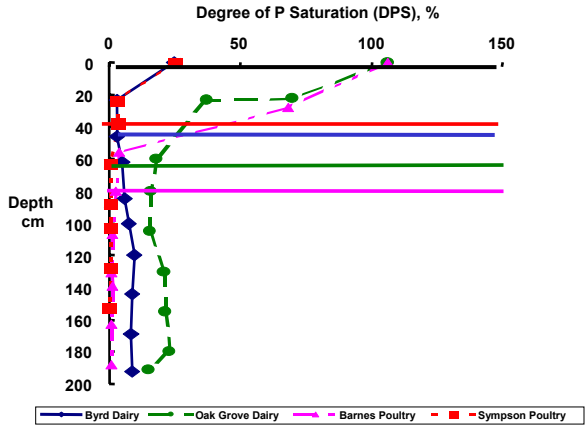


***P quick test* - Simpson Poultry**

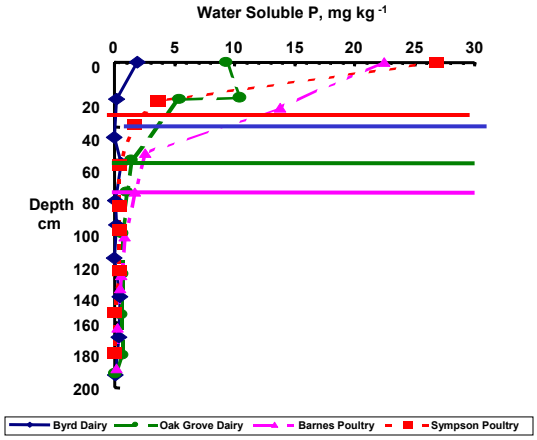


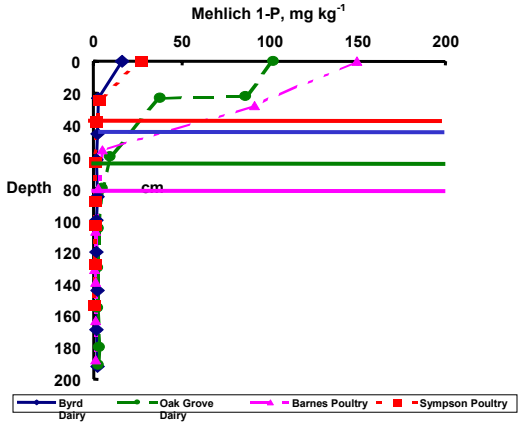
P Quick test - Oak Grove Dairy





P quick test - Byrd Dairy





The horizontal lines in the above figures indicate depth to background P for the four sites as determined by the *P quick test*. Depth to background P is the depth recorded when the blue color fades. The color may intensify in the deeper horizons of soils where sand overlies heavier textured materials. However, the color changes correspond closely with P measurements made with other laboratory methods except that the *P quick test* may be more sensitive than the other P determinations.

Data indicate that the *P quick test* will be a reliable and practical field indicator of depth to background P concentrations**.**

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Appendix: Soil Phosphorus Quick Test

REAGENTS

0.18 M H_2SO_4 - Dilute 0.5 mL of concentrated H_2SO_4 (18 M) to 50 mL using deionized water.

Reagent A - Dissolve 6.0 g ammonium molybdate in 100 mL of distilled water. Dissolve 0.1454 g antimony potassium tartrate in 25 mL of distilled water. Dilute 72 mL of sulfuric acid in about 750 mL of distilled water and allow to cool to room temperature. To the room temperature sulfuric acid, add the ammonium molybdate and the antimony potassium tartrate. Take to 1.0 L with distilled water, mix thoroughly, and store in the dark.

Reagent B - Dissolve 0.15 g ascorbic acid in 10 mL of Reagent A. Make Reagent B on site and store in a cool, dark place while running tests.

PROCEDURE

1. Place about 1 g of soil in a sample well of a white porcelain spot plate. The exact amount of soil is unimportant as long as sufficient soil is used that, when saturated, will produce one or two drops of clear solution for testing. Note: Leave alternate rows of wells free for collecting the solution for testing.

2. Add 0.18 M H_2SO_4 drop by drop until soil is just saturated. Some surface soils are hydrophobic when dry and may require mixing with a glass rod to force wetting before bringing to saturation. Clay soils will need slightly more H_2SO_4 solution than sandy soils in order to provide sufficient solution for the test.

1. Allow saturated soil to stand for **five minutes**.

2. Gently tap side of spot plate. This will cause the soil to settle and the solution to rise and pond on top of the soil.

3. Carefully tip the spot plate toward you, allowing ponded solution to flow to the lower end of the sample well. Using a clean glass stirring rod, bring one or two drops of clear solution over into the well below. Be careful not to transfer soil with the solution.

4. While continuing to support the spot plate in a slightly tilted position, add one drop of Reagent B to the upper end of the clear solution and allow it to flow down into the sample. **Do not stir the solution and Reagent B together**. Color will develop in about 5 to 10 minutes. Low P concentrations will usually result in a very fine blue line around the edge of the solution. Higher P concentrations will result in more uniform blue color throughout the solution. The intensity of the blue color increases as the soil phosphorus concentration increases.