Harvesting Nature's Science



HUMA GRO® SUPER PHOS® Soil Column Study

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Research Report

Objectives

The objectives of this study are to (1) evaluate and compare phosphorus (P) distribution in soils from various P fertilizer sources to those resulting from HUMA GRO® **SUPER PHOS®** (**SP**), and (2) test the hypothesis that Micro Carbon Technology® (MCT®) increases P mobility in acidic soils.

Introduction

The P saturation ratio (PSR) measures P retention in soil (Equation 1), while the Soil P Storage Capacity (SPSC) refers to mg of P that can be added to a kg of soil before a threshold of PSR is reached (Equation 2). The soil is a P sink (P is unavailable) when SPSC is positive and a P source (P is available) when SPSC is negative.

Materials and Methods

Two soil types—Candler, with a pH of 4.8, and a more P-retentive Apopka, with a pH of 5.4—were prepared for the 42-column study (2 soils x 7 treatments [6 + control] x 3 reps = 42). The amount of fertilizer applied per column to achieve an equal rate of P application is shown in Table 1. Liquid fertilizers were diluted with distilled water to 1 gallon of **SP** per acre and applied with the first 10.16 cm (4") of water. Solid fertilizers were mixed in the top 2.54 cm (1") inch of soil to a concentration equivalent to that in liquid **SP** solution. Water (10.16 cm) was added in weekly (7-day) intervals for 4 weeks. The column leachates were collected and analyzed. A week after the fourth water application, the soil columns were sectioned into 6 increments (3 cm = 1.18"), and soil samples (42 x 6 = 252) were air-dried for laboratory analyses. The P saturation ratio (Equation 1) and SPSC (Equation 2) were calculated for all soils.

Equation 1:

$$PSR = \frac{\text{Mehlich 3 P}}{\text{Mehlich 3 (Fe + Al)}}$$

Equation 2:

$$SPSC = (0.10 - \text{soil PSR}) * \text{Mehlich 3 (Fe + Al)} * 31$$

Table 1. Amount of fertilizer applied per column.

Fertilizer	Amount (mg)
SUPER PHOS® 0-50-0 (liquid)	2.88
Phosphoric acid 0-52-0 (liquid)	2.70
Ammonium polyphosphate 10-34-0 (liquid)	4.28
Diammonium phosphate 18-46-0 (solid)	2.81
Triple superphosphate 45% P_2O_5 (solid)	3.27
Monoammonium phosphate 11-52-0 (solid)	2.48

Results

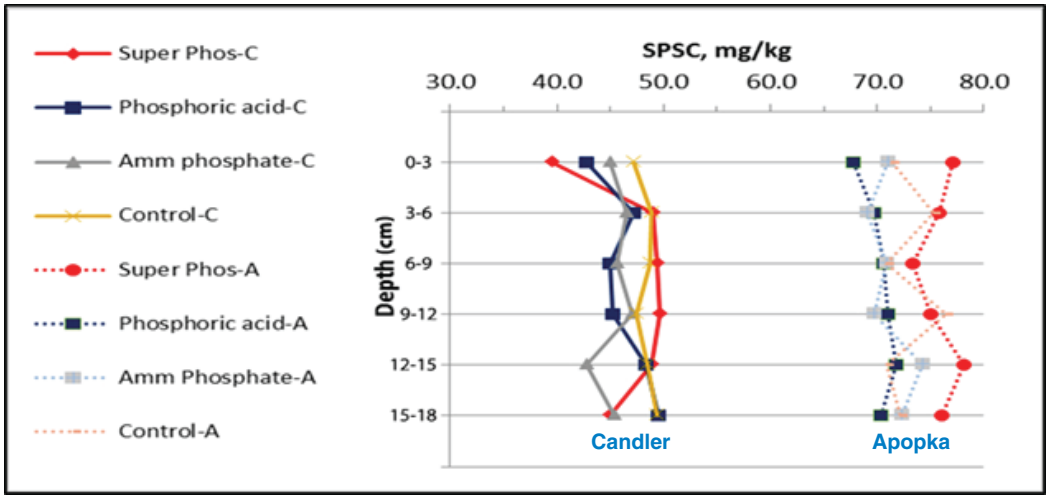

Figure 1. Soil P storage capacity (SPSC) as a function of depth for the various liquid fertilizer treatments. "C" and "A" in the legend indicate Candler and Apopka soils, respectively.

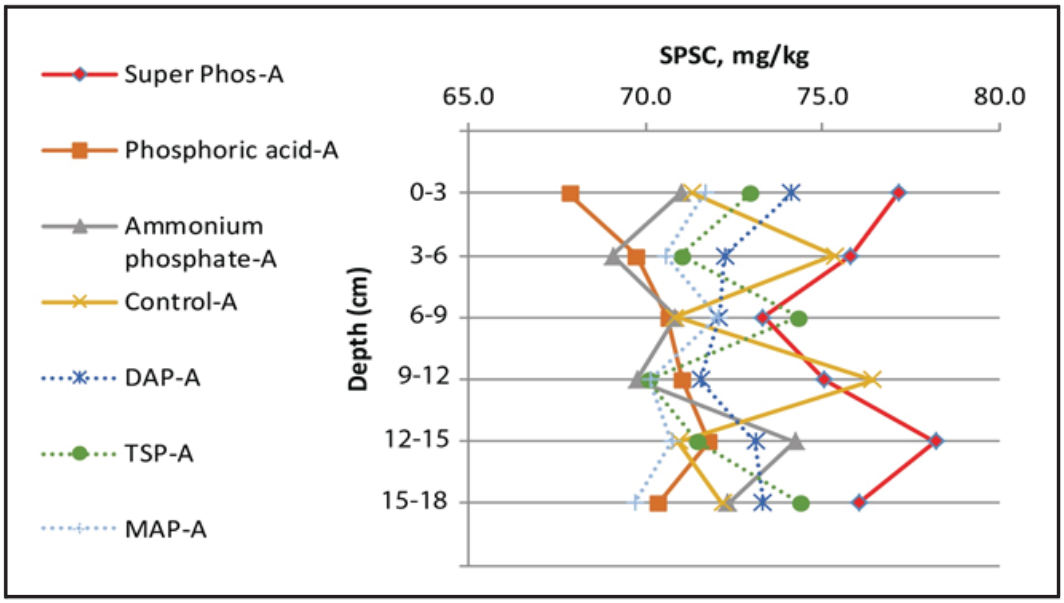

Figure 2. Soil P storage capacity (SPSC) as a function of depth for the various liquid and solid fertilizer treatments in Apopka soil.

Conclusion

- Changes in SPSC within the soil column indicate that **SP** likely moves faster than white phosphoric acid or ammonium polyphosphate in Apopka and Candler soils.
- **SP** fertilizer provides more mobile P to the soil than does solid P fertilizer.
- Due to **SP**'s organic factor (MCT®), P does not react with Fe and Al at low pH to the extent that other P fertilizers do.

SUPER PHOS® keeps phosphate available and soluble in the soil solution for rapid and controlled uptake by plant roots without being blocked by clays or organic matter, and it can be applied by foliar application, according to label directions, without the risk of phytotoxicity. Phosphate encourages the production of amino acids, proteins, and carbohydrates necessary for cellular division.

HUMA GRO® Products Are Highly Efficient and Effective Due to Our Unique Delivery System

MICRO CARBON TECHNOLOGY Delivering Nature's Science™

Full research report available upon request.

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