Growth and biomass production due to the application of alternative sources of phosphorus

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Introduction

Brazilian soils have low fertility due to the high acidity, toxicity of some chemical elements and low availability of P. The production of phosphate fertilizers generates a lot of intermediate materials considered like waste, but riches in P yet, whose use is not possible by current industrial methods, representing therefore a P source not used and capable to generate a big environmental problem due to the large volumes involved. The search for greater efficiency in fertilization, it is essential to conduct research, where integration of information can lead to new alternatives for use and management of phosphatic fertilizers.

Objective

The objective of this work is to seek new alternatives for use and management of alternative sources of P, according to the evaluation of the growth parameters of maize plants.

Materials and Methods

Were carried out in pots of 20 L in a greenhouse.

The treatments consisted of applying four sources of phosphorus: Triple superphosphate (TSP) (reference), Bayovar (reactive phosphate), phosphate precipitate 1 and 2 phosphate precipitate, and a treatment without P and five soil types.

The P level was 120 mg dm^{-3}. The variables of growth and biomass production were evaluated 55 days after plant emergence.

Plants were conducted by a cycle in corn (approximately 55 days after emergence) when were then collected for evaluation of dry matter, height and stem diameter.

To determine the dry matter, the plants were washed in deionized water with mild detergent and placed in drying oven at 70 ° C to constant weight.

The variables were subjected to analysis of variance (F test), Tukey 5% through Sisvar 4.2 program

Results

Table 1: Plant height (cm), depending on soil types and sources of P in corn.

Corn plant height (cm)					
	Without P	NRP	PP1	PP2	TSP
Typ. Quart. 1	48,3 Bc	58,2 Bc	119,2 ABab	112,8 Ab	134,9 a
RH (medium texture)	43,0 Bd	37,1 Cc	106,9 BCb	75,9 Cc	142,9 a
Alf. Ferrud.	74,6 Ac	87,1 Ac	135,0 Aa	116,5 Ab	143,8 a
Typ. Quart. 2	34,4 Bd	50,1 BCd	123,1 ABb	81,2 BCc	140,9 a
RH (clay)	39,4 Bc	54,6 Bc	101,6 Cb	93,7 Bb	128,5 a
CV(%) 9,04					

Means with different lowercase letters in the same row and averages with capital letters in the same column differ significantly by the Tukey test at P<0.05

- The P sources showed positive interaction with soil types. The Alfisol ferrudalfs showed the highest values of height in all sources studied
- Followed by sandy soils Typic Quartzipsamment the medium texture and Rhodic hapludox clayey
- Only for biomass production Alfisol ferrudalfs soil showed lower biomass production.
- The TSP, soluble phosphate and source of reference provided the greatest amounts of dry matter in all soils.

The NRP among sources, was found to be the lower production of dry matter by having slower solubilization, allowing not meeting the demand of maize plants and, consequently, promoting constraint to their growth and development.

Table 2: Production of dry matter (g pot^{-1}), depending on soil types and sources of P in corn.

Dry mass of maize plants (g pot^{-1})					
	Without P	NRP	PP1	PP2	TSP
Typ. Quart. 1	4,1 c	7,2 ABc	54,4 Bb	47,5 Ab	109,8 ABa
RH (medium texture)	3,9 c	4,0 Cc	51,1 Bb	16,7 Bc	125,6 Aa
Alf. Ferrud.	9,6 d	21,1 Ad	79,5 Ab	46,7 Ac	99,7 Ba
Typ. Quart. 2	4,7 d	5,5 ABd	58,5 B	22,1 Bc	119,4 Aa
RH (clay)	3,3 d	5,3 ABcd	34,8 C	21,0 Bbc	55,1 Ca
CV(%) 19,04					

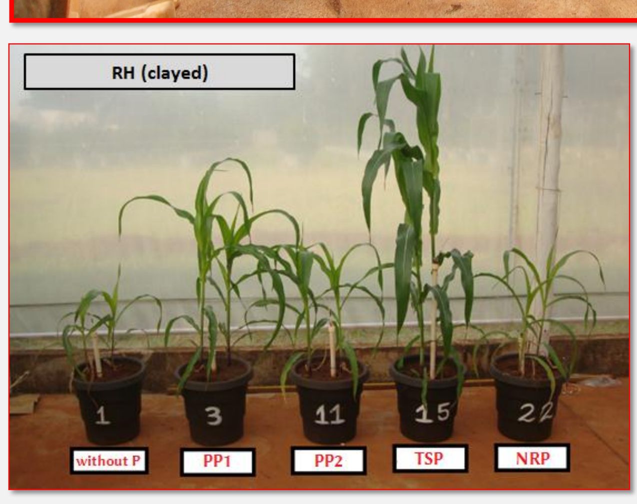
Means with different lowercase letters in the same row and averages with capital letters in the same column differ significantly by the Tukey test at P<0.05.

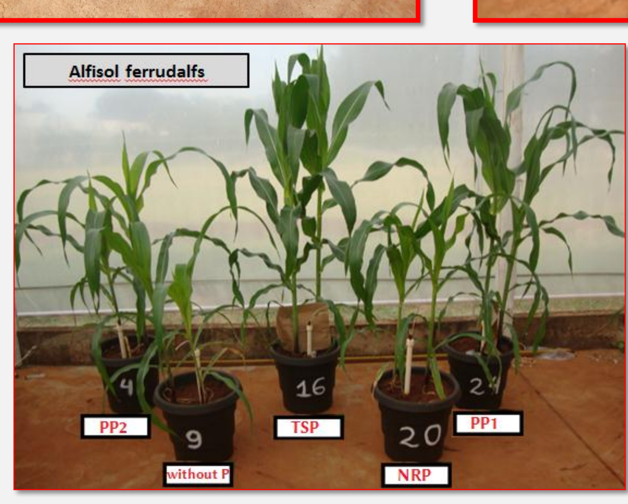
Among the sources, the precipitate 1, when compared to (TSP), was the source from which it obtained the highest values of growth and production of dry matter.

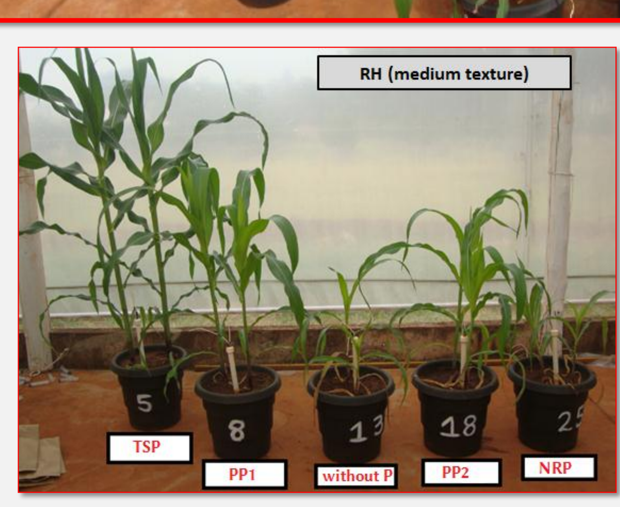
You may notice that for soils with high P fixation capacity, some sources with lower solubility in water can, over time, become viable alternatives from the point of agronomic and economic perspective, compared to sources of high solubility in water .

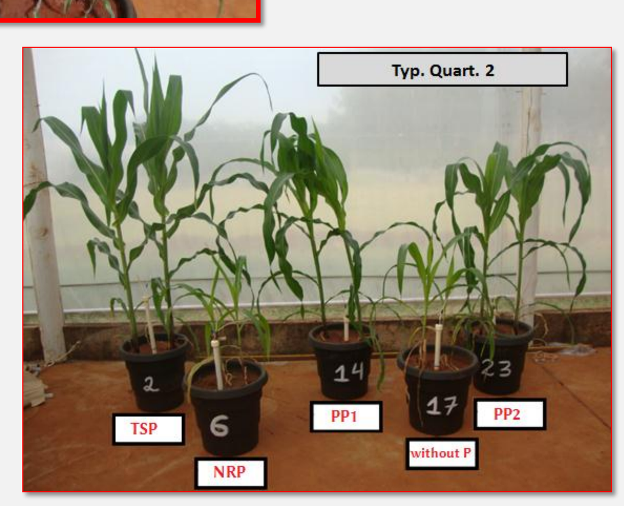
Conclusion

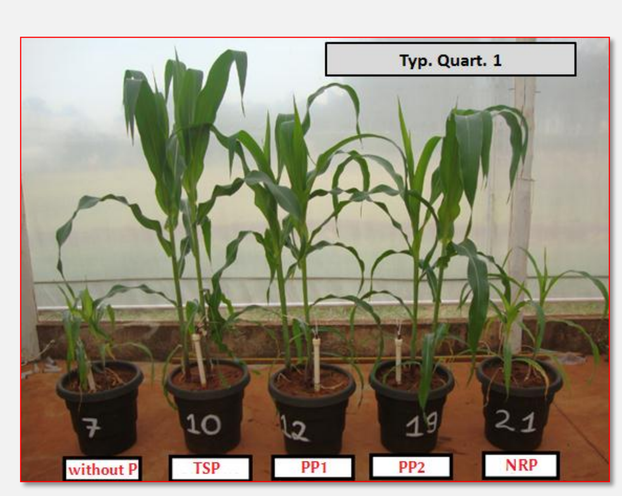
- The FP1 has obtained better yields of dry matter production and plant height being generally less than just the reference source.
- The NRP is not recommended as a source of phosphorus for annual crops such as corn, independently of the soil.
- The PP1 is the most recommended for corn alternative source compared to other sources of phosphorus analyzed.











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