

Antonio C. A. Carmeis Filho^{1*}, Carlos A. C. Crusciol, Lucas O. Oshiro, Nayos A. C. F. Lima, and Chad J. Penn

¹São Paulo State University, College of Agricultural Sciences, Department of Crop Science, Botucatu, São Paulo, Brazil. E-mail: tonycarmeis@hotmail.com

Introduction

In tropical regions, soil acidity is the most limiting crop production factor. Poor chemical fertility, resulting from aluminum (Al³⁺) toxicity and scarce of exchangeable bases has damaged root growth and the absorption of water and nutrients by *Phaseolus vulgaris* plants.

Objective

The aim of this study was to evaluate the effect of lime and gypsum surface application on common bean growth and yield in a long-term experiment under no-tillage system (NTS).

Material and Methods

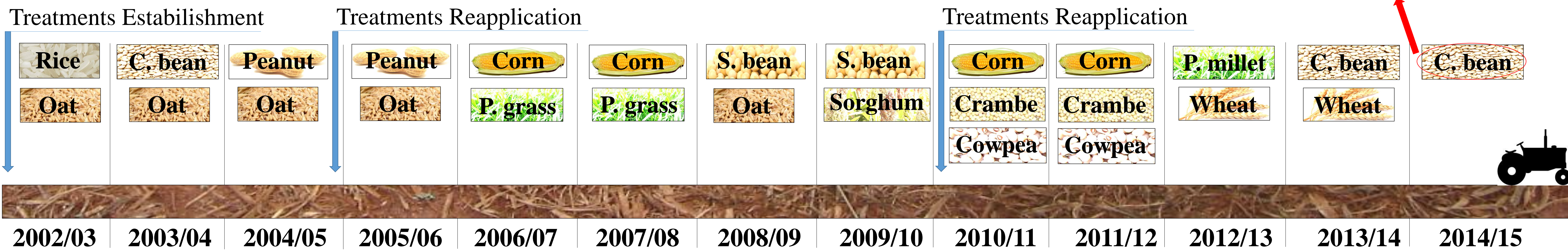
- The experiment was set up in October 2002 in Botucatu, State of Sao Paulo, Brazil.
- Soil is classified as kaolinitic, thermic Typic Haplorthox, with sandy loam texture.
- The field experiment was designed as a completely randomized block, with four treatments:

Control (no soil amendments)	Phosphogypsum (2.1 Mg ha ⁻¹)	Lime (2.0 Mg ha ⁻¹)	Lime + Phosphogypsum (2.0 + 2.1 Mg ha ⁻¹)
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Common bean management

- Emergence: 12/01/2014
- Cultivar: Pérola
- Sowing density: 16 seeds m⁻²
- Fertilization: 300 kg ha⁻¹ of 04-20-20 (NPK) + 100 kg ha⁻¹ of N (as urea)

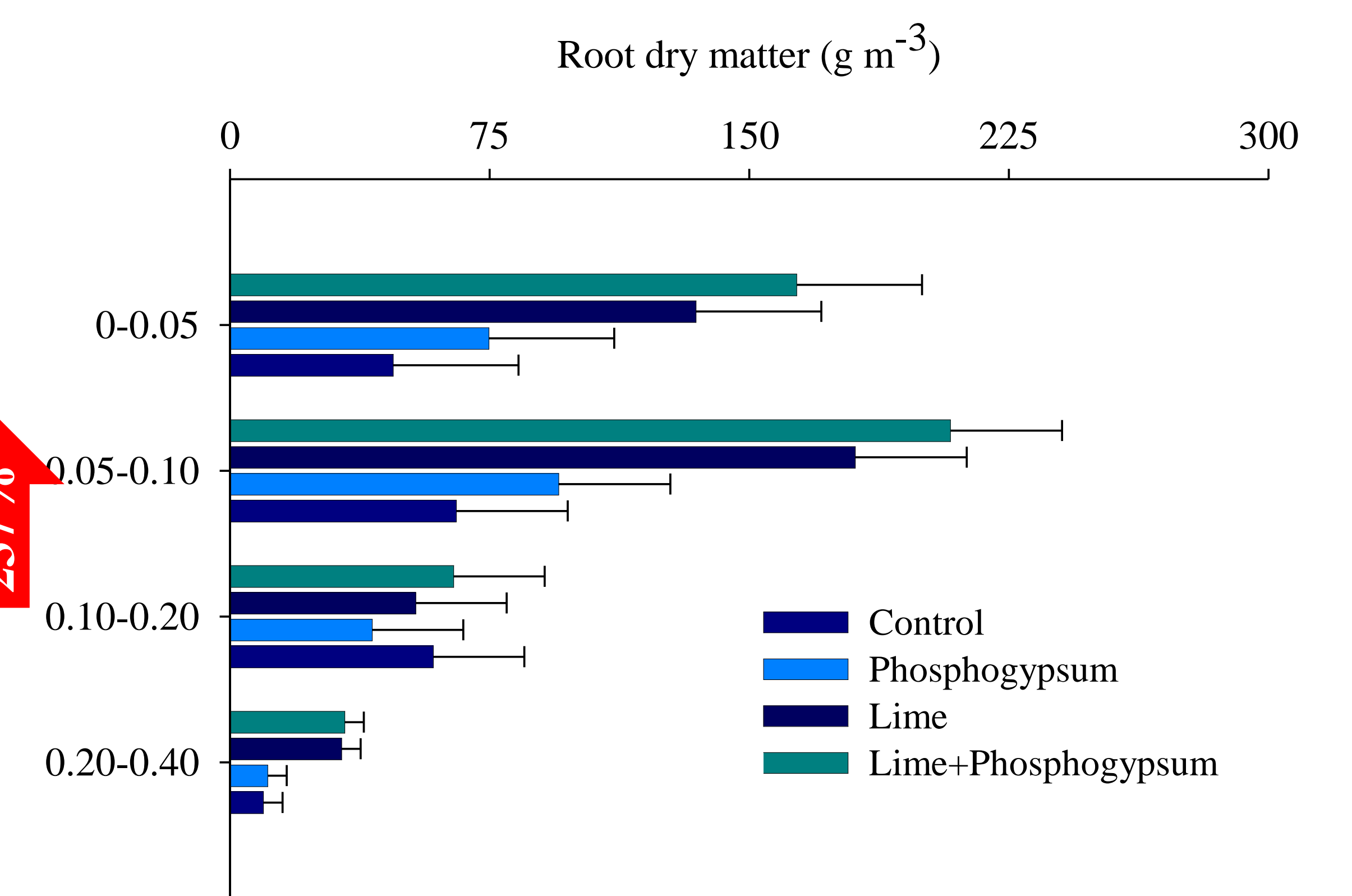
Crop and soil amendments management



Evaluations: common bean shoot dry matter, yield components, and grain yield. **Statistical analyses:** Means were compared by the t test (LSD) at a probability level of 5% (for yield components) and 10% (for root dry matter). Pearson's correlation analysis was conducted to investigate the relationship between soil properties (pH, Al, base saturation, TOC, and MOC) and common bean grain yield.

Results and Conclusion

Treatments	Shoot dry matter kg ha ⁻¹	Final plant population no. plant ha ⁻¹	Pod per plant no.	Grain per pod no.	100-grain weight g	Grain yield kg ha ⁻¹
Control	980 b	80,211 b	10.1 c	3.6 a	25.6 a	717 c
Phosphogypsum	1,011 b	75,943 b	10.0 c	3.0 b	23.6 a	517 c
Lime	1,727 a	145,238 a	15.7 b	3.8 a	25.2 a	2,100 b
Lime + Phosphogypsum	2,044 a	144,444 a	18.6 a	3.7 a	24.7 a	2,416 a
<i>F</i> probability						
Blocks	0.5879	0.3580	0.3281	0.5943	0.7018	0.2043
Treatments	0.0019	<0.0001	<0.0001	0.0050	0.3914	<0.0001



Parameter	Pearson correlation coefficients	
	r	P
pH	0.9160	<0.0001
Al ³⁺	-0.9340	<0.0001
Base saturation	0.9215	<0.0001
TOC ¹	0.8937	<0.0001
MOC ²	0.6664	0.0052



Control



Lime + Gypsum

Conclusion

➤ Surface application of lime and phosphogypsum were considered an effective strategy to increase common bean yield in tropical soils under no-tillage system.

¹Total organic carbon
²Mineral-associated organic carbon