

SOYBEAN RESPONSE TO POLY4 AS A POTASSIUM AND SULPHUR SOURCE IN NORTHERN SÃO PAULO STATE, BRAZIL

Jose E. Cora¹, Lino Furia², Rachel Fields², Kiran Pavuluri², Robert Meakin²

1) São Paulo State University, Jaboticabal, São Paulo, Brazil; 2) Sirius Minerals, Scarborough, United Kingdom,

Introduction

Brazil soybean production rivals the United States. It is the most important crop grown in Brazil, with a projected production in 2015 – 2016 of 99 million metric tonnes.

In a recent analysis of yields of soybean in Brazil a yield gap of 651 – 800 kg ha⁻¹ was projected¹ associated with crop management deficiencies. The study was conducted in the primary soybean production region in Brazil.¹

Soybean is the largest user of potassium fertilizers accounting for 35% of the total K₂O used in Brazil.² Brazilian soybean growers primarily use a 0:18:18 or 2:20:20 blend as planting fertilizer.



Overview and trial design

- This trial evaluated POLY4 in a commercial fertilizer programme for soybean in Brazil.
- Treatments were a typical 0:18:18 commercial blend with equivalent quantities of K compared to MOP + S from SSP.
- The trial was conducted in Jaboticabal in Northern São Paulo State in a randomized complete block design with seven replications.
- The trial was first run in 2016 and repeated in a different paddock in 2017. Nutrient contents of grain were measured in 2017.

Treatment table³

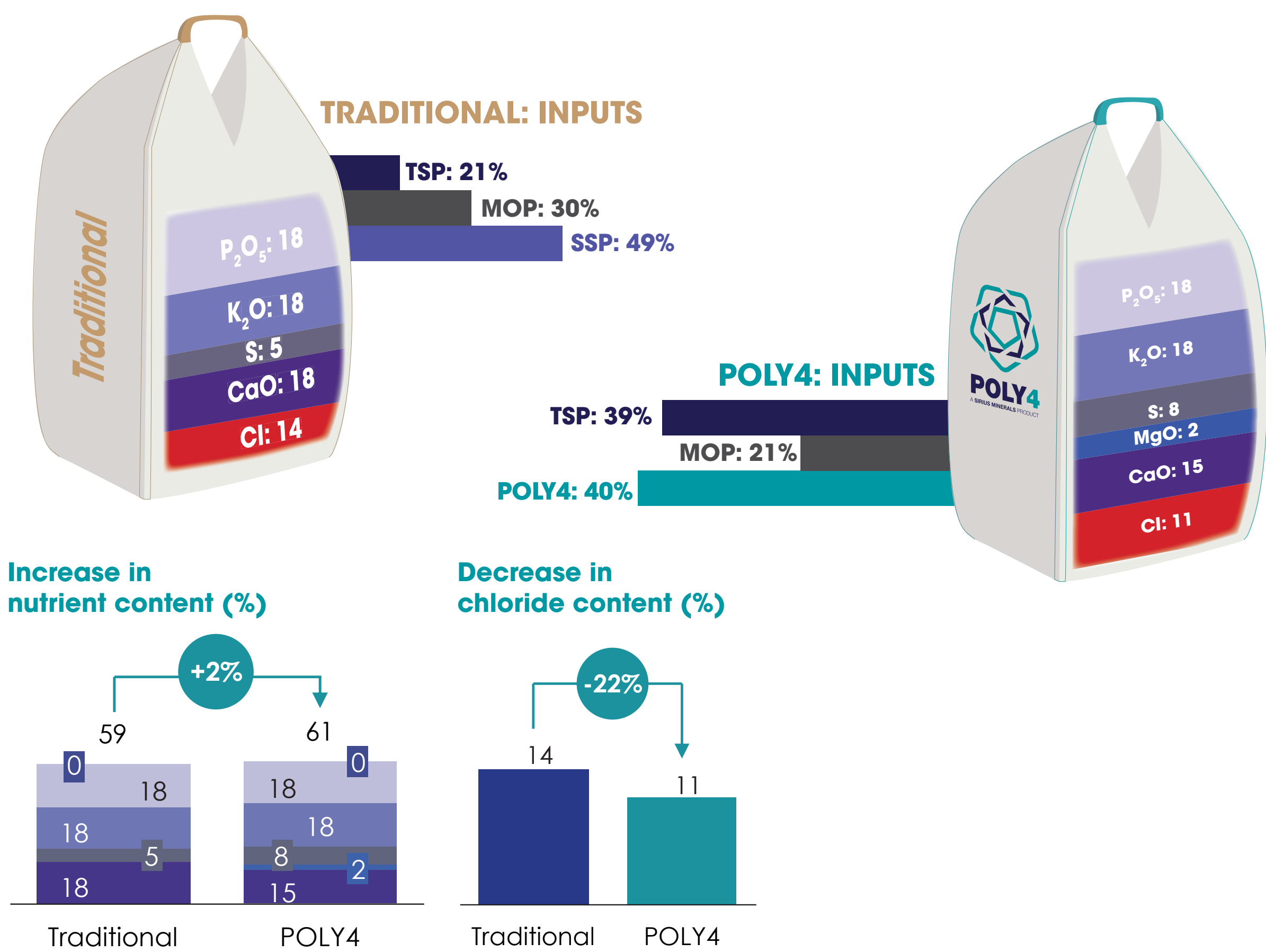
Treatment	Nutrients applied (kg ha ⁻¹)					
	P ₂ O ₅	K ₂ O	CaO	MgO	S	Cl ⁻
Standard 0:18:18 blend	72	72	71	0	23	58
POLY4 0:18:18 blend	72	72	58	10	31	44

Initial soil analysis⁴

Nutrients	Soil nutrient status (mg kg ⁻¹)	
	2016 site	2017 site
P	7	15
K	55	32
Ca	180	160
Mg	36.5	49

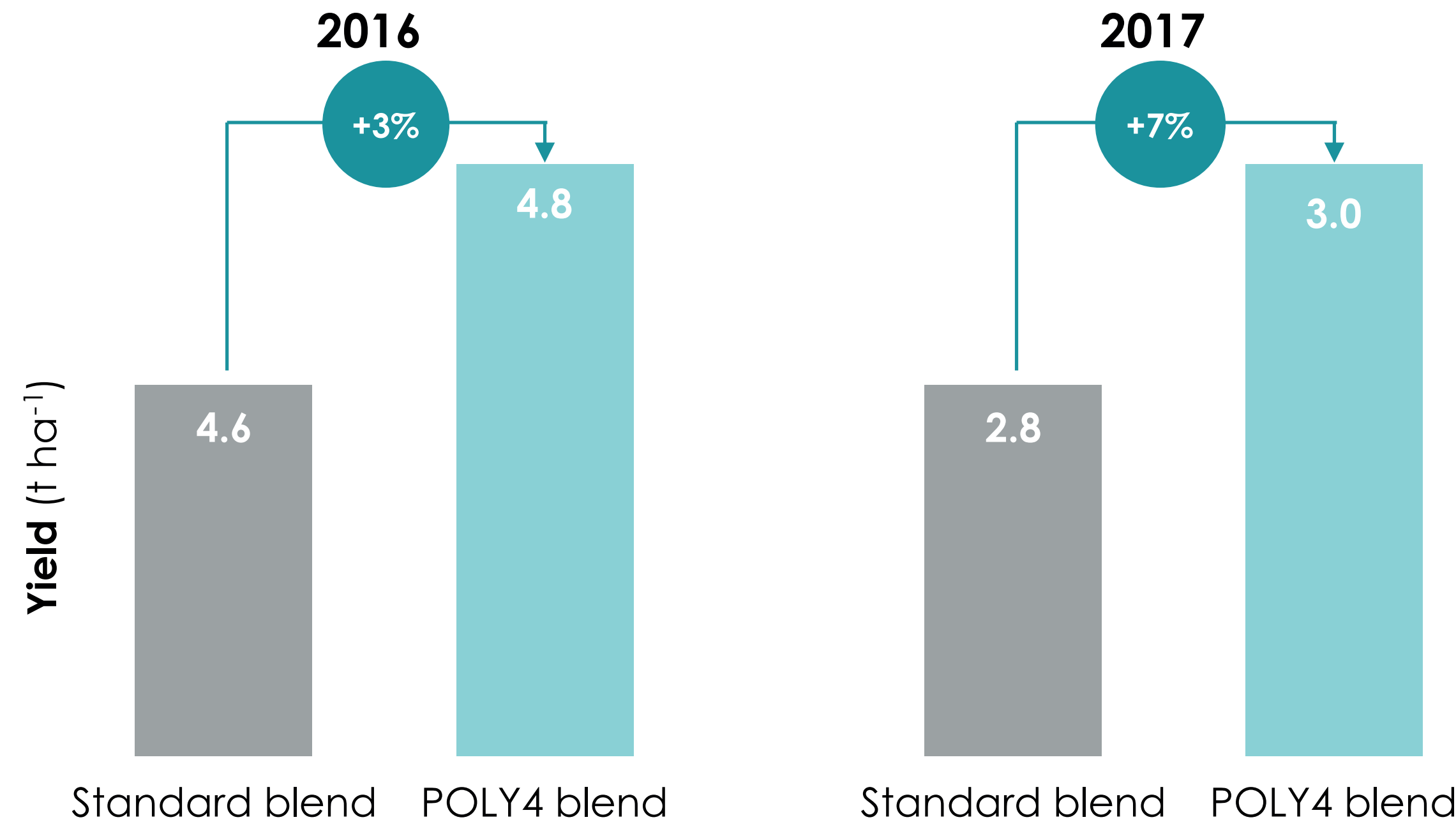
Blend comparison

- POLY4 improved nutrient density of blends increasing S concentration by three points and adding Mg.



Yield performance

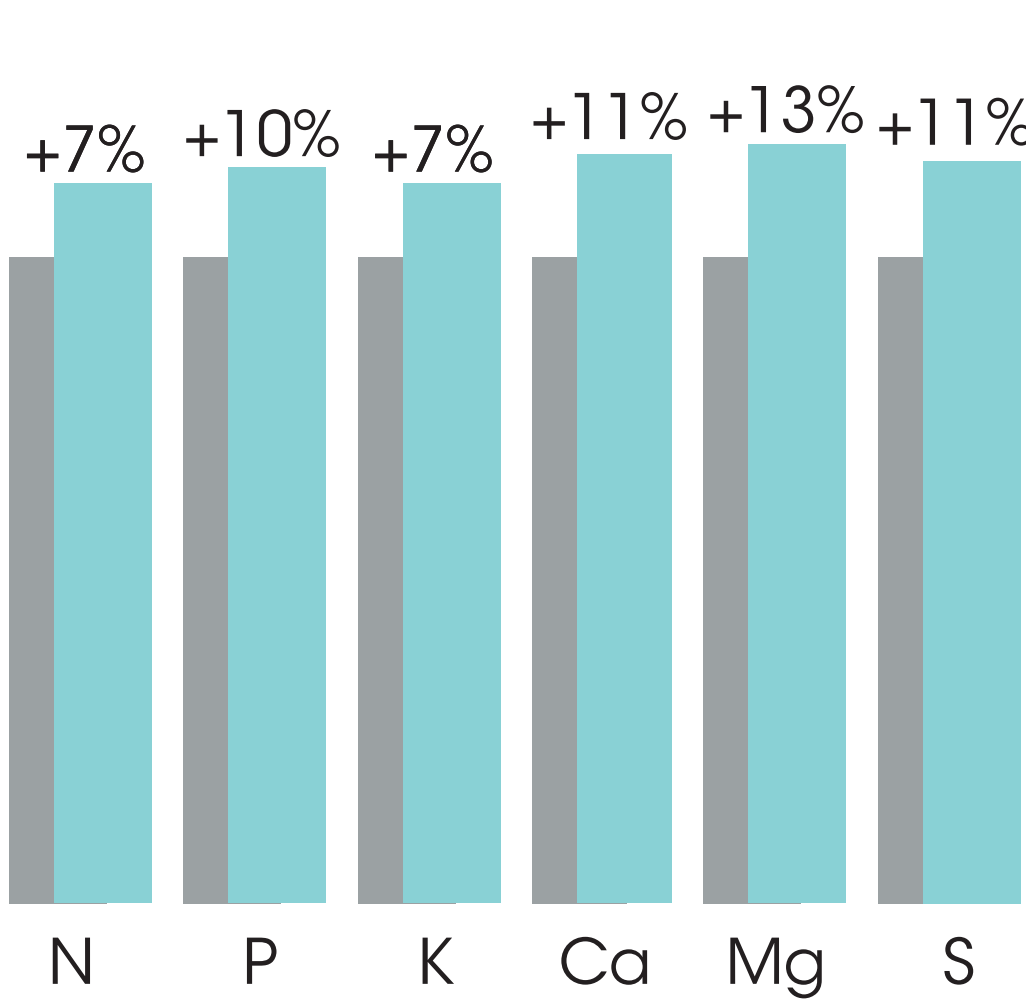
- Yield was improved with the POLY4 blend in both 2016 and 2017.
- The POLY4 blend had 3% greater yield than the industry standard PKS in 2016 and 7% greater yield in 2017.



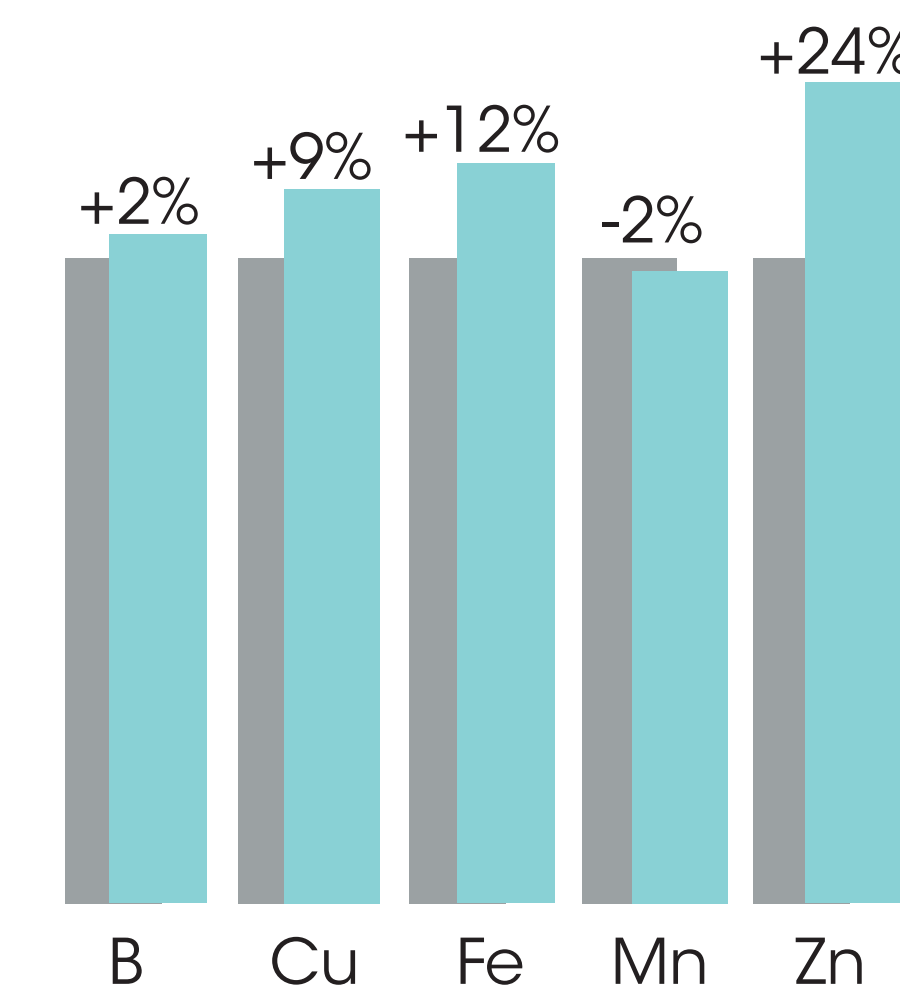
Grain nutrient uptake

- Soybean grain nutrients were measured in 2017 and nutrient uptake calculated.
- Even though the same quantity of potassium was applied from each blend, the POLY4 fertilizer blend enhanced uptake of this nutrient by the soybean as well as other macro and micro nutrients.

Improvements in macro-nutrient uptake compared to the standard blend



Improvements in micro-nutrient uptake compared to the standard blend



Highlights

The POLY4 blend outperformed the industry standard fertilizer on all important measures:

- Yield increased in both years compared to MOP + SSP blend;
- The POLY4 blend improved macro and micro nutrient uptake.

Note: 1) Sentelhas, P.C. et al. (2015) The soybean yield gap in Brazil—magnitude, causes and possible solutions for sustainable production. Journal of Agricultural Science 153(8), 2) International Plant Nutrition Institute, IPNI (2014); 3) Standard blend contained muriate of potash (MOP), single super phosphate (SSP) and triple super phosphate (TSP); POLY4 blend contained MOP, TSP and POLY4. 4)Initial soil in 2016: pH = 4.4, SOM = 1.0%. In 2017: pH = 4.6, SOM = 2.2%. 5) Results presented are based on data from GENSTAT ANOVA means at K₂O rate of 72 kg ha⁻¹.

Source: University of São Paulo (2016) 4000-USP-4017-15; 4000-USP-4022-16.