



RESPONSE OF FRESH MARKET TOMATOES TO POLY4 COMPARED TO OTHER POTASSIUM FERTILIZERS IN BRAZIL

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Abstract

This trial evaluated the response of tomato yield and quality to potassium chloride (MOP) + polyhalite-based fertilizer POLY4 compared to other sources of potassium (K), sulphur (S) and magnesium (Mg). Three trials were conducted in Conchal and Cerquilha (São Paulo State, Brazil). 40% of total K₂O level was added before transplanting, and the remaining 60% was divided into eight applications as top dressing.

Across all trials MOP + POLY4 achieved the highest yields. The yield with MOP + POLY4 (53.8 t ha⁻¹) was higher than with N + P (control) (46.7 t ha⁻¹) and MOP (49.7 t ha⁻¹) treatments. MOP + SOP (sulphate of potash), MOP + SOP-M (sulphate of potash magnesium) or MOP + SSP (single super phosphate) yields ranged from 49.9 to 51.7 t ha⁻¹. Postharvest residual soil calcium (Ca) and Mg levels were also enhanced under MOP + POLY4.

Introduction

- São Paulo state is the main producer of fresh indeterminate tomatoes in Brazil harvesting 8200 hectares.¹
- Three experiments were conducted in humid sub-tropical climate zones: one trial was in Conchal and the other two in Cerquilha.
- The initial soil analyses indicated fertility typical for the region. All trial sites were on Oxisol soils with sandy loam texture.
- There is potential to improve soil nutrient legacy by using multi-nutrient POLY4 which contains 14% K₂O, 19% S, 6% MgO and 17% CaO.

Trial location



Application rate treatments

Treatments	Average nutrients applied (kg ha ⁻¹)				
	K ₂ O	MgO	S	CaO	Cl
N + P (control)	0	0	0	0	0
MOP	300	0	0	0	230
MOP + SSP	300	0	40	59	230
MOP + SOP	300	0	40	0	134
MOP + SOP-M	300	33	40	0	201
MOP + POLY4	300	13	41	36	207

Pre-trial soil nutrient levels

Site	pH	P (mg kg ⁻¹)	K (mg kg ⁻¹)	Ca (mg kg ⁻¹)	Mg (mg kg ⁻¹)	S (mg kg ⁻¹)
Conchal	5.5	10	84	253	62	7
Cerquilha I	5.4	10	61	202	51	6
Cerquilha II	5.0	9	83	320	114	8

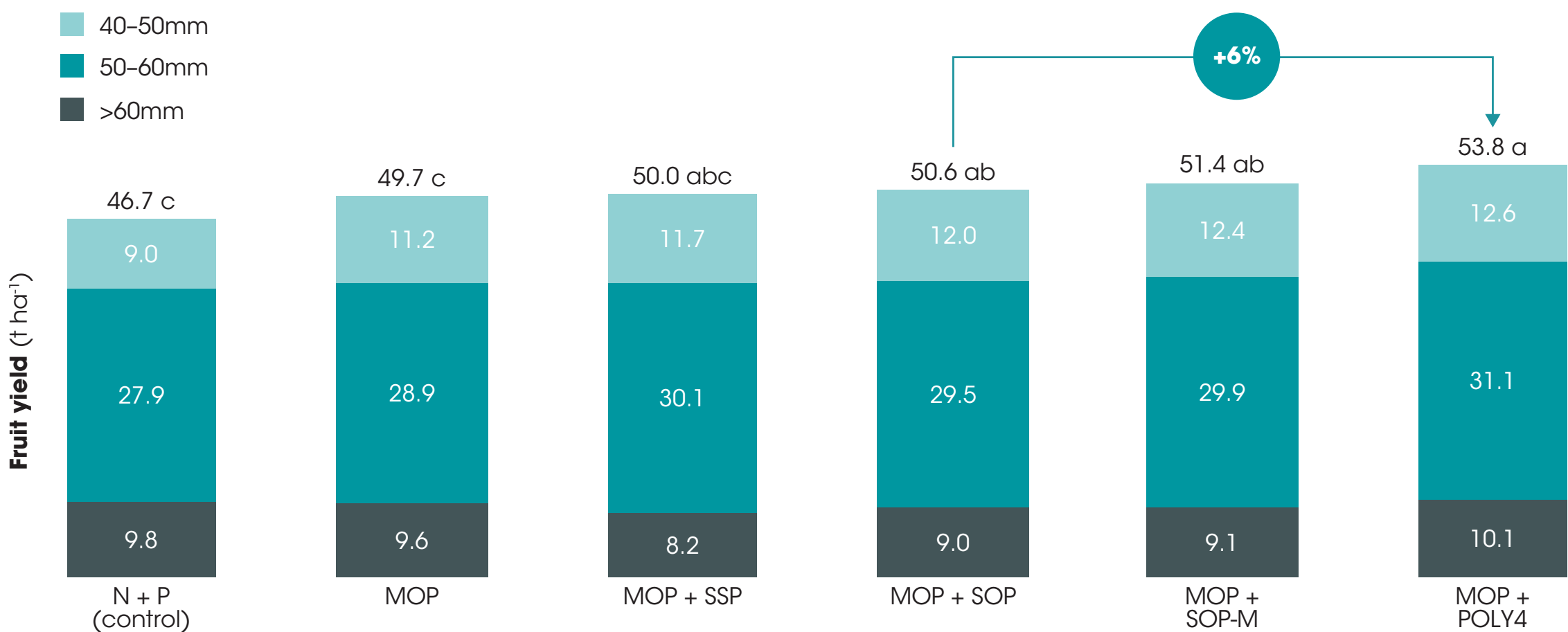
Methodology

- The trial evaluated response of fresh market tomatoes to different fertilizer inputs of K, S, Mg and Ca.
- Randomised complete block design was used with five replicates.
- 40% of total K₂O level was added before transplant, remaining 60% as top dressing. All treatments received standard applications of N and P fertilizer.
- All experiments were drip irrigated with water only.
- Varieties used in the trials were Norte and Arendell.
- Yield, fruit size and post-trial soil nutrient content were evaluated.
- Fruits were collected every seven days for 8-13 harvests. Harvests started at breaker ripening growth stage. The fruits were classified in accordance with the Brazilian tomato classification system (diameter):
 - Non-commercial (<40 mm);
 - Class 1A (small fruit, 40-50 mm);
 - Class 2A (average fruit, 50-60 mm);
 - Class 3A (large fruit >60 mm).
- Data was analysed by Genstat ANOVA with mean separation by Fisher's LSD test. Data was presented as average of three sites. Means represented by letters indicate significant differences of the results.

Results

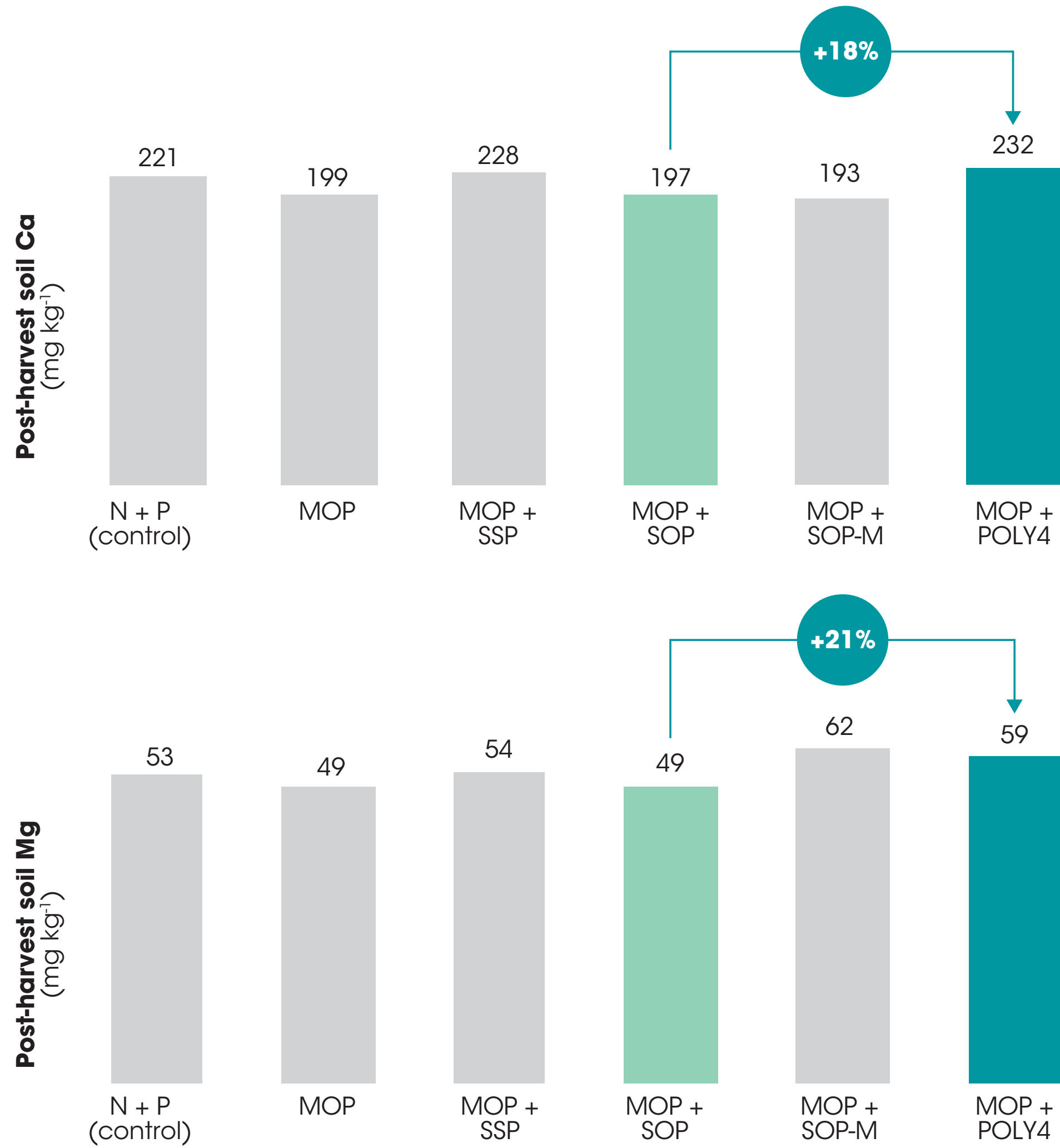
Yield performance

- Tomato yields, particularly of larger fruit, were responsive to the fertilizer treatments.
- Fertilizer programmes with Ca, S and Mg as well as K all had greater yield than when only K was added.
- The MOP + POLY4 treatment had the highest yield while supplying additional nutrients: S, Mg and Ca.
- The MOP + SOP-M had the next largest yield but this was 5% less than the MOP + POLY4.



Post-harvest soil nutrient legacy

- 0-20 cm soil depth was tested.
- Both POLY4 and SSP supplied Ca. Higher calcium soil levels can displace potentially toxic aluminium. Both treatments had the most Ca left in the soil after harvest.
- The POLY4 and SOP-M fertilizers both added Mg and both had most residual soil Mg after harvest.
- POLY4 favours a more suitable soil cation balance for future crops.



Conclusions

- POLY4 blends are an effective nutrient source for Brazilian tomato growers.
- The MOP + POLY4 fertilizer programme had the highest yields across all three sites, highlighting the importance of a balanced nutritional plan.
- Fertilizing with POLY4 contributed to building a sustainable soil nutrient legacy, particularly for Mg and Ca. Increasing soil nutrients post-harvest supports future crop growth.

Notes

Notes: 1) Instituto de Economia Agrícola (IEA). Previsões e Estimativas das Safras Agrícolas do Estado de São Paulo, 2° Levantamento, Ano Agrícola 2015/16 e Levantamento Final, Ano Agrícola.

Source: 4000-USP-4024-17, Universidade de São Paulo.

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