POLY4
A SIRIUS MINERALS PRODUCT

TRIAL RESULTS

TOMATO

VIRGINIA, US (2016)

HIGHLIGHTS

POLY4 increased tomato yield by up to 54% compared to MOP.

The POLY4 option generated up to US$16,822 greater financial margin compared to the industry standard blend.

The POLY4 blends showed the lowest CO_2e emissions supporting economic and environmental sustainability.

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TRIAL OBJECTIVE

To investigate the response of fresh market tomatoes to POLY4 and MOP in two NPK blends (6:3:12 and 11:4:17).

Tomato is the most consumed vegetable worldwide. FAOSTAT reported that 177 Million metric tonnes (Mmt) of tomatoes were grown globally in 2016, with approximately five million hectares of crop planted. The largest producers were China, the United States and India. The European Union produced around 18 Mmt of tomatoes in the 2016 – 2017 season, 40% of which were sold on the fresh market.

OVERVIEW

PARTNER: VIRGINIA TECH

LOCATION: VIRGINIA, US

YEAR: 2016

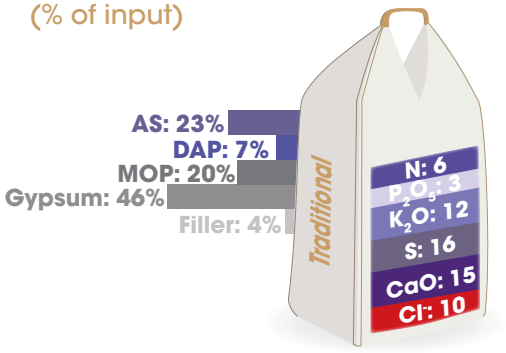
TREATMENT TABLE[2-4]

Treatment	Nutrients applied (kg ha^{-1})				
	K_2O	CaO	MgO	S	Cl^-
Control	0	0	0	0	0
MOP (6:3:12 & 11:4:17) blends	160	0	0	0	128
MOP + (N, P, K, Ca, S) blends	160	126	0	146	128
POLY4 (6:3:12 & 11:4:17) blends	160	130	46	146	65

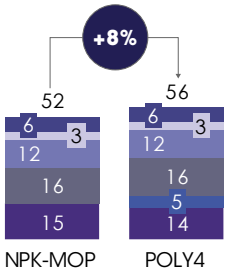
- The United States is one of the world's leading producers of tomatoes, second only to China. Fresh and processed tomatoes sales in the United States account for more than US$2 billion.[1]
- Virginia is the third largest tomato-producing state after California and Florida. Tomatoes are produced on coastal plain soils with high K and S deficiencies.
- Virginia tomato growers typically use NPK blends containing MOP which miss S, Mg and Ca.
- The trial was conducted as a follow up to a similar trial in 2015. It was a randomised complete block design with four replications.
- An additional treatment augmented MOP with Ca and S to balance these inputs with the POLY4 fertilizer.
- The trial included a K response experiment with an N + P control. This data is not reported.

NPK BLENDS COMPOSITION[5]

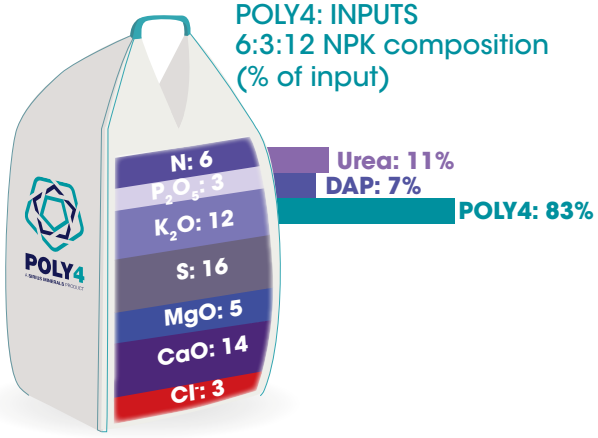
TRADITIONAL: INPUTS
6:3:12 NPK composition
(% of input)



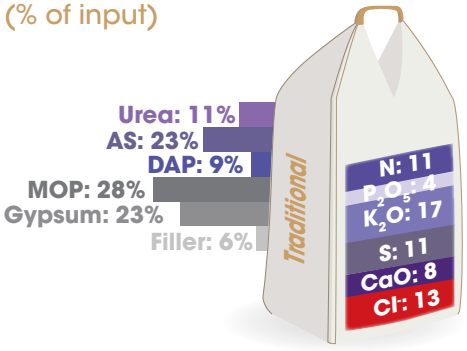
NUTRIENT LOADING



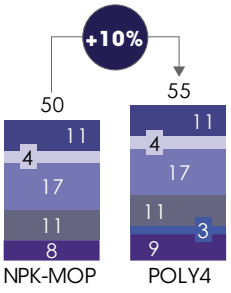
POLY4: INPUTS
6:3:12 NPK composition
(% of input)



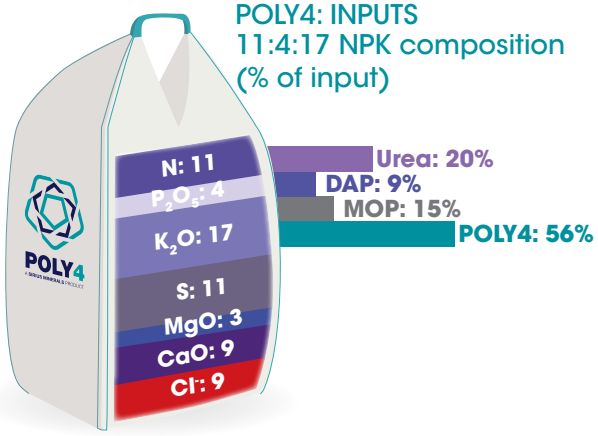
TRADITIONAL: INPUTS
11:4:17 NPK composition
(% of input)



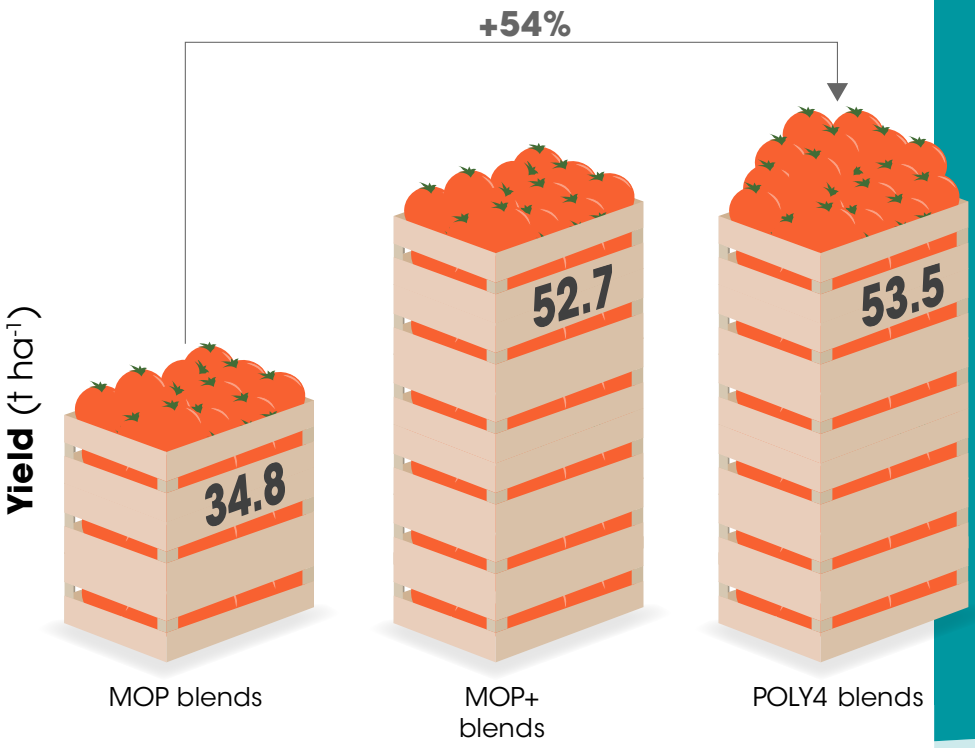
NUTRIENT LOADING



POLY4: INPUTS
11:4:17 NPK composition
(% of input)



YIELD[6-9]

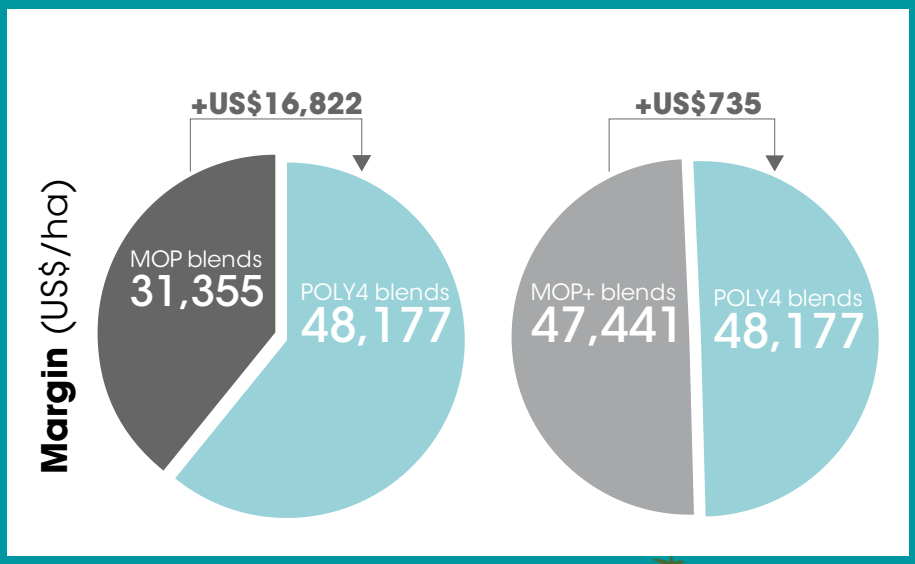


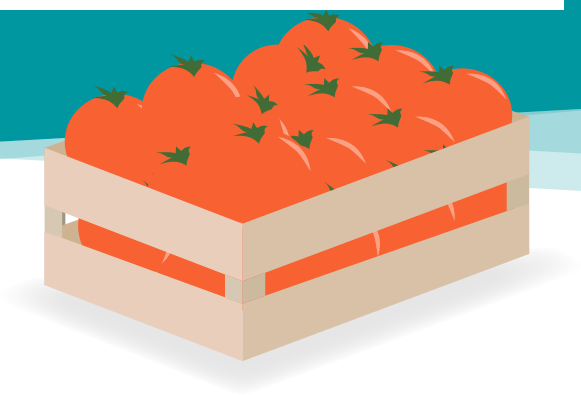
- POLY4 fertilizer programme delivered greater yield with up to 54% increase compared to MOP blends whilst also supplying S, Mg and Ca.

- When growing tomatoes, sulphur encourages green leaves and imparts flavour to tomatoes; magnesium is particularly important at flowering and throughout fruiting; calcium is needed to ensure strong leaf and root development and foliage growth.

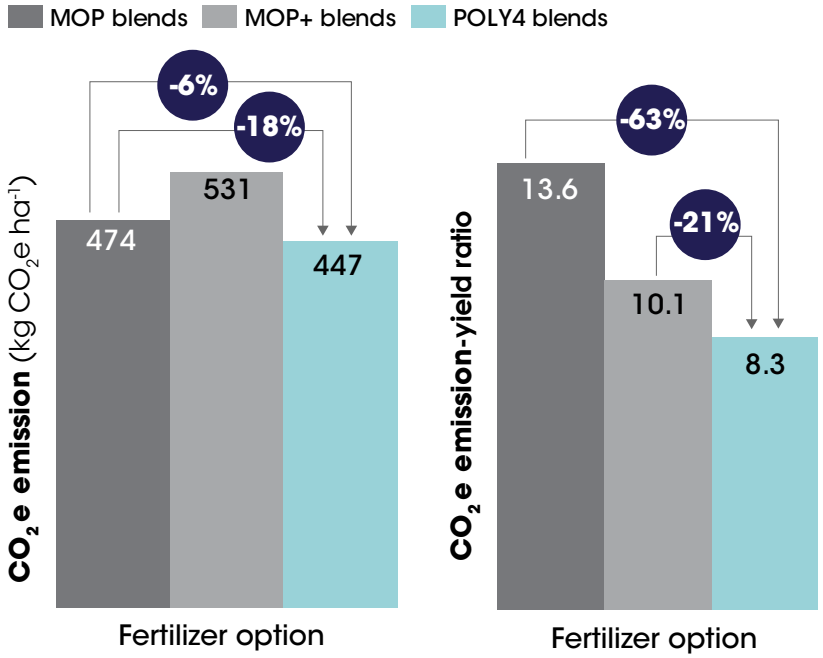
MARGIN[7-10]

- Blends containing S and CaO delivered higher yields and higher net margins.
- The POLY4 option generated US$735 greater financial margin compared to the nutrient-balanced MOP blends (MOP + Ca + S).





ENVIROMENTAL SUSTAINABILITY[11]



- CO_2 emissions per tonne of fertilizer were calculated for each blend.
- The POLY4 blends showed the lowest CO_2e emissions. The lowest CO_2e emission-tomato yield ratio meant POLY4 was the most CO_2e efficient and environmentally-friendly fertilizer solution for growing tomatoes.

Note: 1) USDA (2016); 2) Blends and fertigation delivered 224 kg N ha^{-1} to all plots 3) P_2O_5 was applied in blends for good agricultural practice; 4) Initial soil analysis: pH 6.4; 24 mg P kg^{-1}, 61 mg K kg^{-1}, 294 mg Ca kg^{-1}, 47 mg Mg kg^{-1}; 5) Nutrient content: urea: 46:0:0; DAP: 18:46:0; MOP: 0:0:60 + 48 Cl^-; ammonium sulphate: 21:0:0 + 24 S; gypsum: 0:0:0 + 22 S + 33 CaO; POLY4: 0:0:14 + 19 S + 6 MgO + 17 CaO +3 Cl^- 6) Yield results presented are based on a K_2O rate of 160 kg ha^{-1}; 7) MOP blends were made with urea, DAP and MOP; 8) MOP+ blends were made with AS, urea, DAP, MOP and gypsum; 9) POLY4 blends were made with urea, DAP, MOP and POLY4; 10) Fertilizer prices were obtained from CRU, based on US Mid-West 2016 (end of 2016) annual prices: urea (US$243/t), AS (US$248/t), DAP (US$346/t), MOP (US$239/t), POLY4 (US$200/t), gypsum (US$25/t); 10) Net return = Crop output minus (cost of fertilizer material + cost of fertilizer application). The price of tomato: US$904/t; 11) CO_2e (CO_2 equivalent) emission per tonne of fertilizer associated with fertilizer materials were obtained from Ricardo-AEA: 51 kg POLY4CO_2e, 1800 kg urea CO_2e, 350 kg MOP CO_2e, 840 kg ammonium sulphate CO_2e, 125 kg gypsum CO_2e.

Source: Virginia Tech 23000-VIR-23015-16

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