



POLY4
A SIRIUS MINERALS PRODUCT

TRIAL RESULTS

CORN

MINNESOTA, US (2015)



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TRIAL OBJECTIVES

To compare the use of MOP and MOP+POLY4 at a ratio of 75:25 K₂O as potassium and sulphur sources.

HIGHLIGHTS

US\$247 INCREASE IN RETURN PER HECTARE

UP TO 15% INCREASE IN YIELD

UP TO 9% INCREASE IN DRY KERNEL WEIGHT

GRAIN QUALITY MAINTAINED OR IMPROVED

INCREASE IN PLANT POPULATIONS

45% DECREASE IN WEED PRESENCE

TRIAL DESIGN

PARTNER: UNIVERSITY OF MINNESOTA

LOCATION: MINNESOTA, US

YEAR: 2015

CROP VARIETY:

WENSMAN W80841VT2RIB (STAPLES SITE)

PIONEER P0157 AM1 (ST CHARLES SITE)

- Nine US states with over 1 million hectares of corn area were observed to have low soil sulphur content (circa 6 ppm) in 2015.^{1,2}
- Minnesota is the fourth largest corn producing state in the United States with 3.32 million hectares of production in 2014.
- In addition to NPK, sulphur is recommended for most soil types (28 kg S ha⁻¹) in the form of sulphate.
- Corn trials were established at two separate sites (St Charles and Staples) with similar soil nutrient statuses.⁹
- All fertilizer was broadcast and incorporated prior to planting.
- The Staples site was planted at the rate of 86,500 plants per hectare; St Charles site at 87,700 plants per hectare.

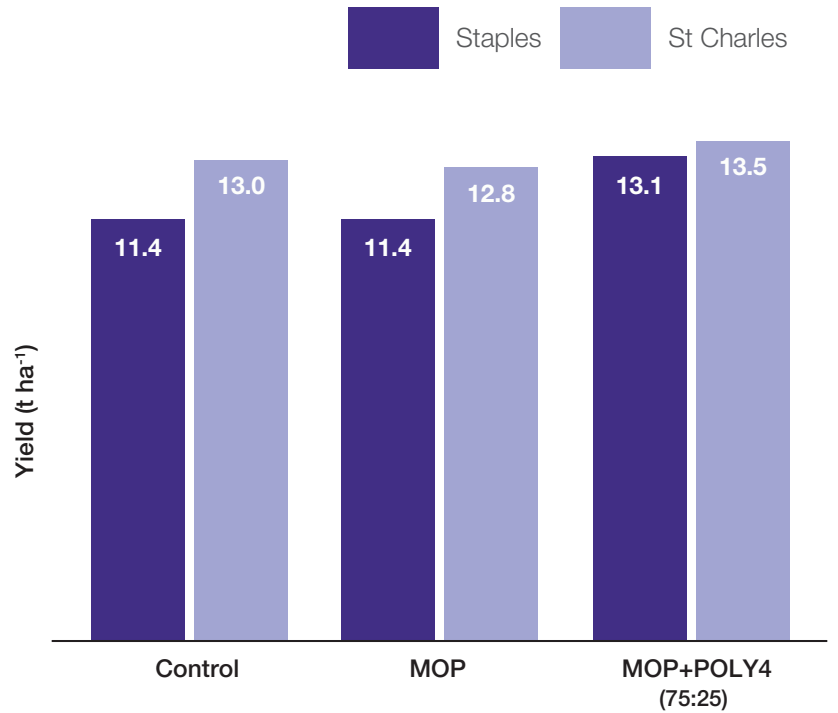
TREATMENT TABLE (kg ha⁻¹)¹

NUTRIENT	AVERAGE NUTRIENT APPLIED IN TRIAL (kg ha ⁻¹)						
	N	P ₂ O ₅	K ₂ O	MgO	CaO	S	Cl
Control	224	70	0	0	0	0	0
MOP	224	70	90	0	0	0	72
MOP+POLY4 (75:25 K ₂ O)	224	70	90	10	27	31	59



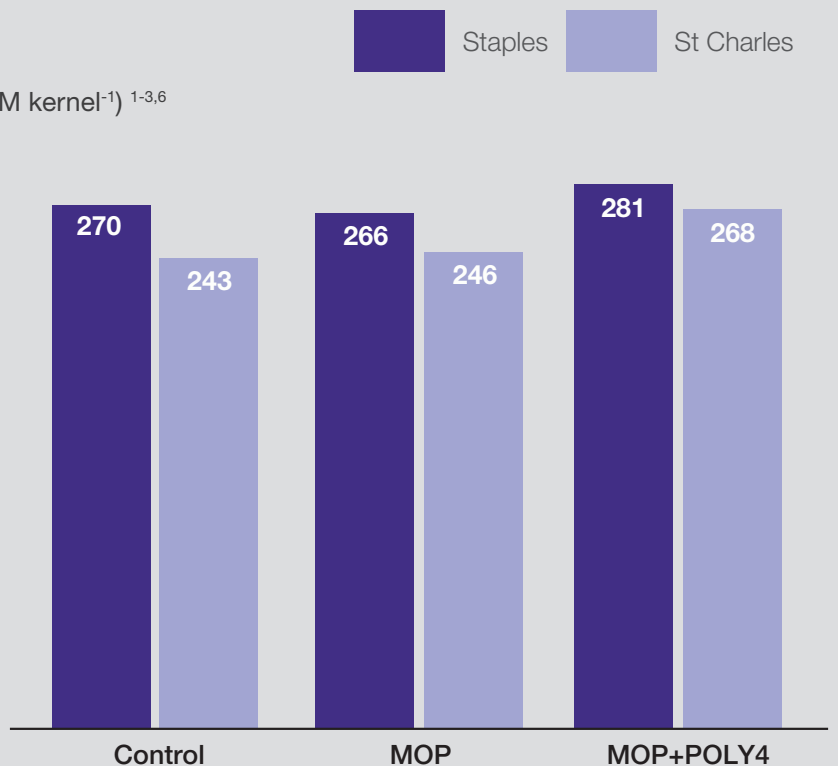
YIELD RESULT (t ha⁻¹)^{1-5,9}

- Using MOP+POLY4 (75:25 K₂O) significantly⁵ improved yields at Staples by 15% and St Charles by 5% compared to MOP.
- At both sites the sulphur supply in the soil was very low indicating the need for a broad-spectrum fertilization strategy.
- The additional sulphur, supplied by POLY4, enhanced corn yield.



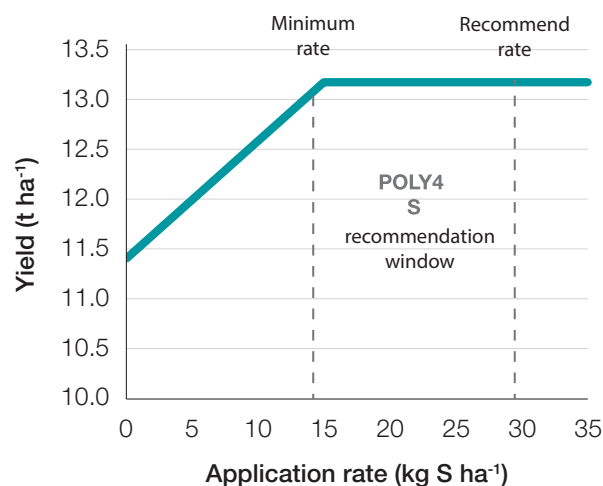
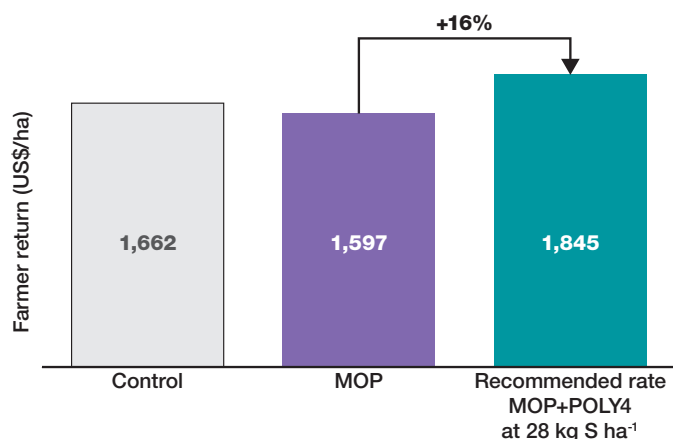
AVERAGE DRY KERNEL WEIGHT (mg DM kernel⁻¹)^{1-3,6}

- The use of POLY4 to supply a quarter of the K₂O requirement led to significant⁵ increases in kernel weight over MOP.
- The MOP+POLY4 (75:25 K₂O) treatment gave the highest kernel weight at both sites.



ECONOMIC SUMMARY (US\$/ha)^{3,7,8}

- A simple NPK plan lacks sulphur, exposing a crop to a yield-limiting deficiency. Therefore, using POLY4 as a substitute for a portion of the K₂O from MOP provided higher returns than MOP alone.
- Using MOP+POLY4 at the recommended 28 kg S ha⁻¹ rate returns an extra US\$247 per hectare compared to MOP.
- A sulphur application of 14 kg ha⁻¹, at the lower end of the recommendation window, delivers the same maximum yield plus a further US\$23.



GRAIN QUALITY RESULT ¹⁻³

- The use of POLY4 to supply part of the K₂O and all sulphur requirements supports high quality corn.
- Maintaining corn quality gives a farmer access to more diverse markets. For example, starch and oil content are important considerations in many food, industrial and pharmaceutical products.
- Corn is a common base ingredient for human foodstuffs that requires good levels of protein and fibre.

QUALITY PARAMETER	STAPLES			ST CHARLES		
	Control	MOP	MOP+POLY4 (75:25 K ₂ O)	Control	MOP	MOP+POLY4 (75:25 K ₂ O)
Starch (g kg ⁻¹)	799.0	790.4	796.8	636.6	644.4	648.5
Protein (g kg ⁻¹)	94.2	96.7	97.3	84.5	84.4	83.2
Oil (g kg ⁻¹)	33.3	33.4	33.7	37.9	37.0	38.0
Fibre (g kg ⁻¹)	19.4	17.9	18.6	12.7	12.8	12.8

Notes: 1) GENSTAT means; 2) All treatments received 224 N kg ha⁻¹ and 70 P₂O₅ kg ha⁻¹ from UAN and DAP; 3) MOP+POLY4 was used in a ratio of 75:25 to meet K₂O requirement; 4) Average grain moisture was 17% at both sites; 5) Staples – p = <0.001; St Charles – p = 0.044; 6) Staples – p = 0.003 ; St Charles – p = 0.001; 7) Fertilizer prices based on US Mid-West 2015 annual prices: MOP (US\$411/t), POLY4 (US\$200/t); 8) Analysis accounts for yield changes and fertilizer application cost of US\$16.16/t. 9) Initial soil analysis at Staples pH 7; Organic matter 0.23%, P 33 mg kg⁻¹, K 86 mg kg⁻¹, Mg 122 mg kg⁻¹, Ca 1411 mg kg⁻¹, S 1.65 mg kg⁻¹. Initial soil analysis at St Charles: pH 6.9; Organic matter 0.27%, P 9 mg kg⁻¹, K 71 mg kg⁻¹, Mg 300 mg kg⁻¹, Ca 1504 mg kg⁻¹, S 1.65 mg kg⁻¹.

Source: University of Minnesota (2015) 14000-UMN-14012-15

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