POLY4
A SIRIUS MINERALS PRODUCT

TRIAL RESULTS

CHILLI PEPPER

SICHUAN, CHINA (2015)

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TRIAL OBJECTIVE

To demonstrate that POLY4 blend options are a practical alternative to SOP blends.

HIGHLIGHTS

5% YIELD IMPROVEMENT

12% INCREASE IN FRUIT NUMBERS AND A 5% INCREASE IN FRUIT WEIGHT

QUALITY IMPROVEMENTS SEEN VIA INCREASES IN CAPSAICIN, CAPSAICIN PIGMENT, SOLUBLE SOLID, AMINO ACID AND VITAMIN C CONTENT

SIGNFICANT DECREASE IN POST-HARVEST SOIL ELECTRICAL CONDUCTIVITY AND NO pH DRIFT

UP TO 13% INCREASE IN LEAF MACRO NUTRIENT CONTENT

VALUABLE IMPROVEMENTS IN RESIDUAL SOIL CALCIUM, MAGNESIUM AND SULPHUR

TRIAL DESIGN

PARTNER: SICHUAN ACADEMY OF AGRICULTURAL SCIENCE

LOCATION: SICHUAN, CHINA

YEAR: 2015

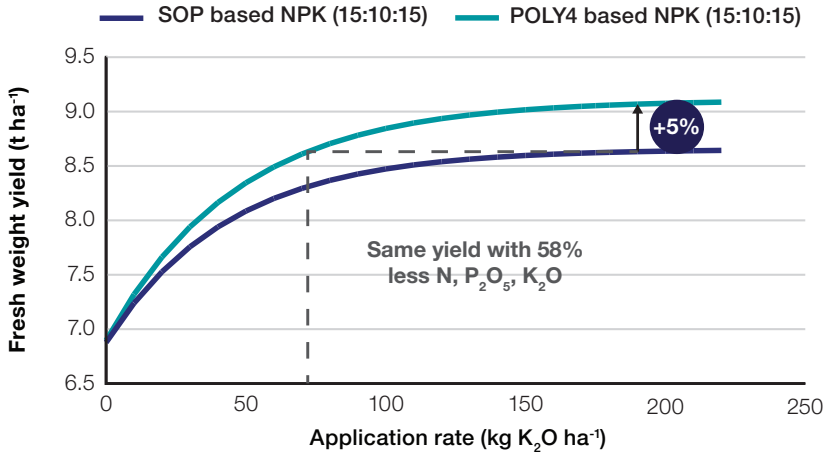
- The global fresh chilli pepper market is estimated to be worth US$ 29.45 billion.[1]
- China is the leading global producer of chilli peppers producing 15.8 Mt in 2013 which translates into a 39% financial share of the global market.[1]
- Hainan, Hunan, Sichuan, Guangdong and Jiangxi are the main provinces accounting for 94% of chilli pepper production in China.[2]
- Chilli peppers require high amounts of magnesium and potassium from low chloride fertilizer sources.[3]
- In this trial, four rates of K_2O application (53, 88, 175 and 263 kg K_2O ha^{-1}) were used to compare SOP and POLY4 based blend options.
- At flowering, both the SOP and POLY4 NPK blend plots were given a top dressing of 90 kg N ha^{-1} from urea.
- The POLY4 option supplies additional magnesium and calcium plus beneficial micro nutrients beyond the SOP based option.
- Plots measuring 15 m^2 each were used for all treatment and rate combinations.

TREATMENT TABLE

FERTILIZER	RECOMMENDED RATE (kg ha^{-1})[4–6]						
	N	P_2O_5	K_2O	MgO	CaO	S	Cl
SOP based NPK (15:10:15)	175	118	175	0	46	63	7
POLY4 based NPK (15:10:15)	175	118	175	23	64	118	19

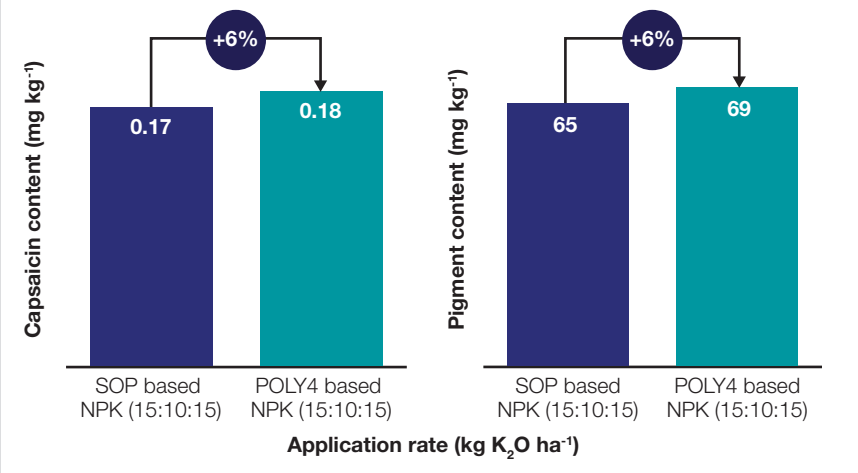
YIELD RESULT (t ha^{-1})[5,6,7,8]

- The supply of magnesium and calcium coupled with potassium from POLY4 in the blend is more suited to the chilli pepper plant's needs.
- The POLY4 based NPK 15:10:15 blend outperformed the SOP based NPK 15:10:15 blend, with a 5% yield improvement at the recommended 175 kg K_2O ha^{-1} application rate.



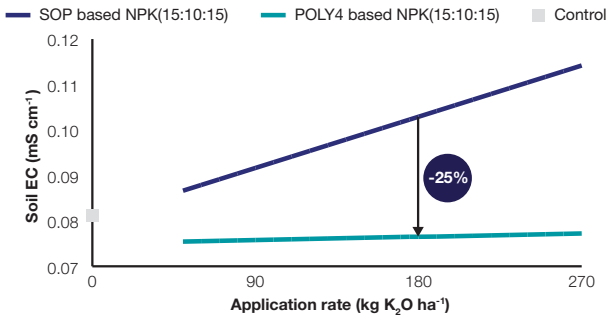
CHILLI PEPPER QUALITY (kg ha^{-1})[5,6,8,9]

- Capsaicin evolved as a natural anti-fungal (against *Fusarium spp.*) but also acts as a deterrent to mammalian vermin.
- Colour changes from capsicum pigment content largely reflect fruit maturity but delays caused by excess nitrogen nutrition can reduce the formation of the red pigment.



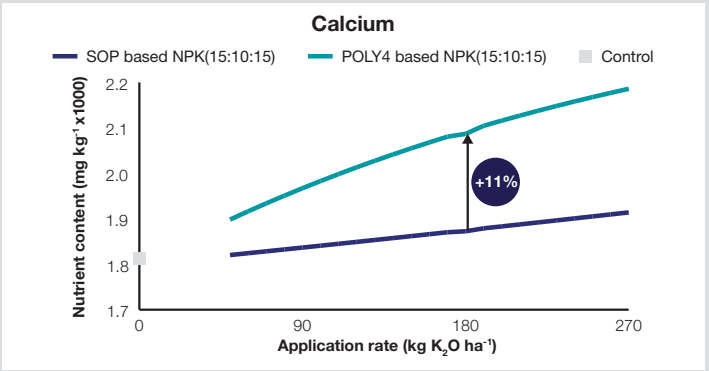
SOIL ELECTRICAL CONDUCTIVITY (EC)(mS cm^{-1})[5-8]

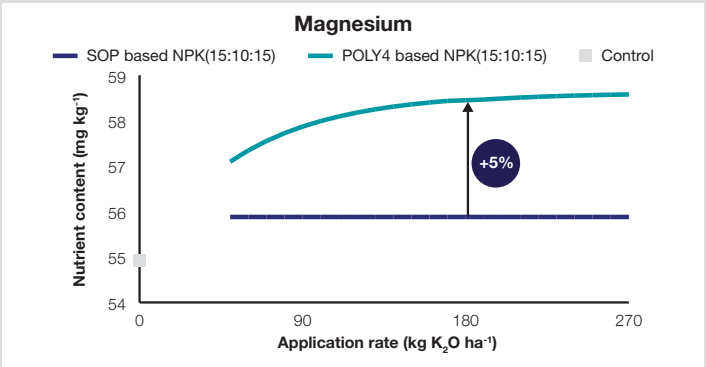
- Fertilizers are soluble salts that can increase soil salinity.
- High soil EC inhibits seed germination and a plant's uptake of water and nutrients.
- The SOP based NPK blend demonstrates an increasing soil EC in line with application rate.
- Plots that had the POLY4 based NPK blend applied showed a 25% reduction in soil EC, at a recommended 175 kg K_2O ha^{-1}, compared to the SOP based NPK blend.

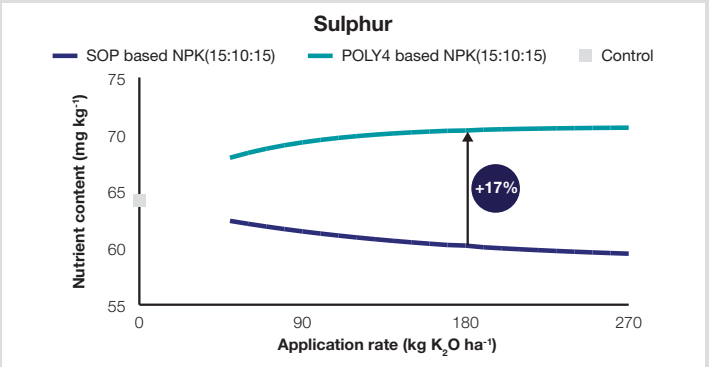


POST-HARVEST RESIDUAL NUTRIENTS[5-8]

- The post-harvest soil nutrient status demonstrates the value of additional nutrients in the POLY4 based NPK blend.
- Enhancing residual soil nutrients can benefit subsequent crops.
- The POLY4 based NPK blends showed consistent increases in post-harvest soil nutrient levels at the recommended application rate of 175 kg K_2O ha^{-1}.







Notes: 1) FAO 2013; 2) Provinces identified by The World Vegetable Center based on share of production in China; 3) IFA World Fertilizer Use Manual 1992; 4) GENSTAT means of inputs for 53–263 kg K_2O ha^{-1}; 5) SOP NPK 15:10:15 blend made from urea, TSP and SOP; 6) POLY4 NPK 15:10:15 blend made from urea, MAP, POLY4 and SOP; 7) GENSTAT regression analysis; 8) Top dressing of 90 kg N ha^{-1} from urea applied at flowering; 9) GENSTAT means. Initial soil analysis: pH 5.2, organic matter 2%, N 69 mg kg^{-1}, P 37 mg kg^{-1}, K 78 mg kg^{-1}, Ca 1710 mg kg^{-1}, Mg 80 mg kg^{-1}, S 65 mg kg^{-1}, EC 0.104 mS cm^{-1}.

Sources: Sichuan Academy of Agricultural Science (2015), FAO (2013), The World Vegetable Center (2006) and IFA (1992). 19000-SAAS-19013-15

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