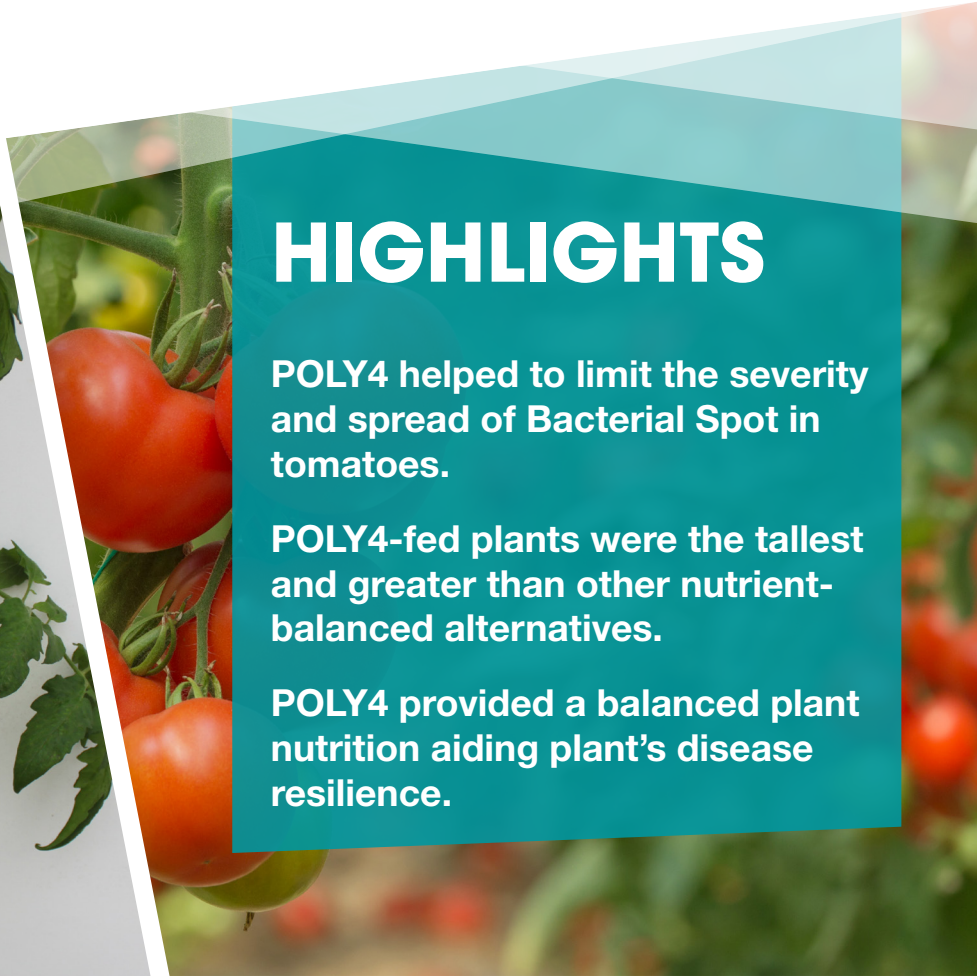
POLY4
A SIRIUS MINERALS PRODUCT

TRIAL RESULTS

TOMATO (BACTERIAL SPOT DISEASE)

FLORIDA, USA (2016)



HIGHLIGHTS

POLY4 helped to limit the severity and spread of Bacterial Spot in tomatoes.

POLY4-fed plants were the tallest and greater than other nutrient-balanced alternatives.

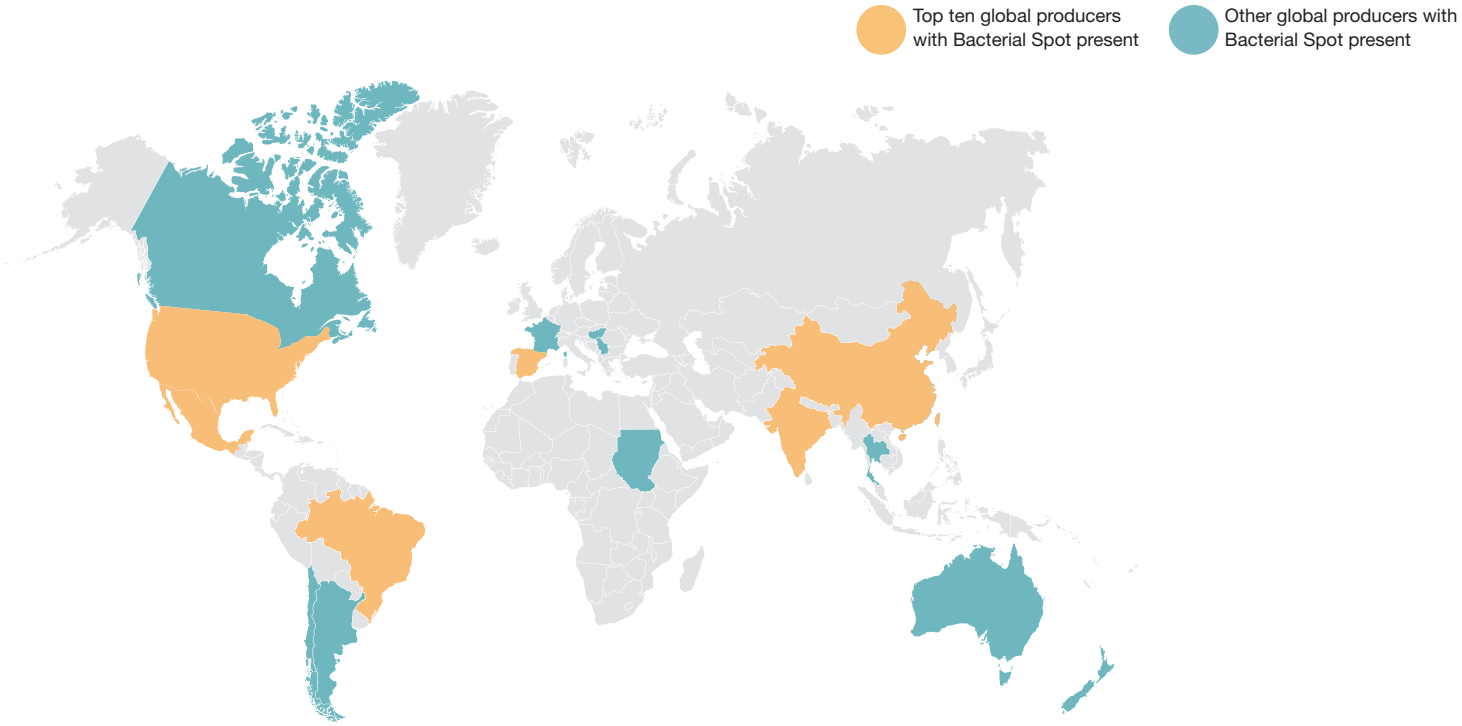
POLY4 provided a balanced plant nutrition aiding plant's disease resilience.

poly4.com

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.

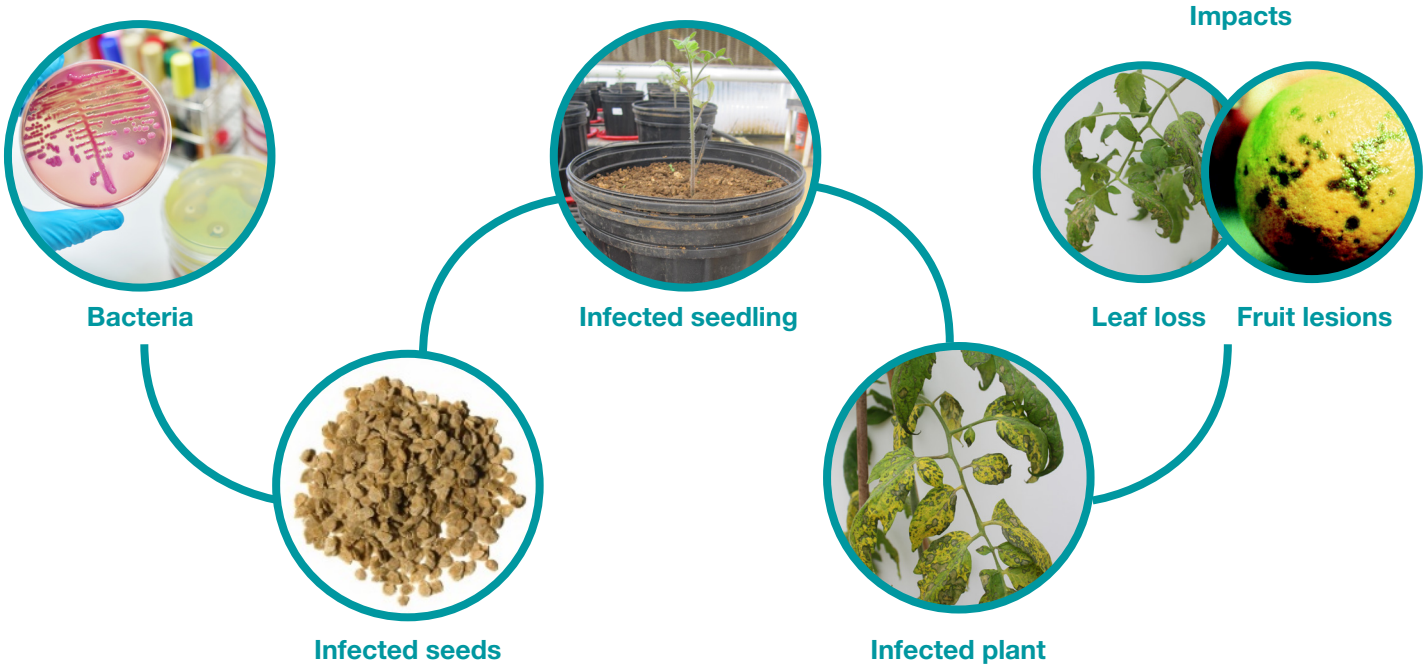
The United States is one of the world's leading producers of tomatoes, second only to China. USDA reported that in 2016 fresh and processed tomatoes sales in the United States account for more than US$2 billion.

Global tomato market is worth US$96.3 billion.[1] Bacterial Spot presents a challenge for six of the top ten producers in the world affecting tomato yields.[2]



BACTERIAL SPOT DISEASE CYCLE

- Environmental and human factors put tomato crops at risk of infection.
- Infected seedlings can produce infections which threaten the whole crop.
- Bacterial Spot causes poor plant health, fruit lesions and leaf loss, resulting in yield loss and re-infection.
- Balanced plant nutrition and particularly greater uptake of K and Ca contained in POLY4 can aid plant's resilience and lower disease infection.



OVERVIEW

- Bacterial Spot is a significant disease caused by Xanthomonas bacteria that affects tomato yield.[2]
- This second iteration of the greenhouse trial fertilized tomatoes with POLY4 and equivalent nutrients from alternative sources.
- The first study of the Bacterial Spot's effects on tomatoes fertilized with POLY4 was done by the University of Florida in 2015 (Source: 1000-UOF-1020-14 and www.poly4.com).

TRIAL OBJECTIVE

In this second-year greenhouse trial, to validate previous findings that POLY4 reduces the severity and spread of bacterial spot in tomatoes.

PARTNER: University of Florida
LOCATION: Florida, US
YEAR: 2016

METHODOLOGY

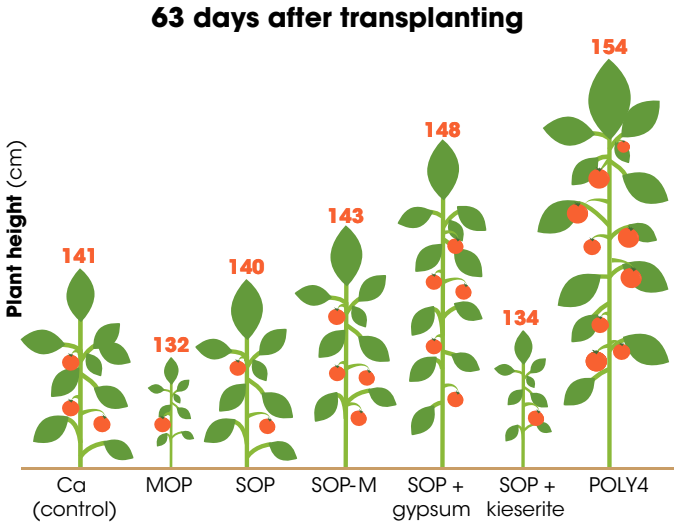
- Tomatoes were grown in pots in a greenhouse with fertilizer treatments incorporated into the soil at the start of the trial. All treatments received the same rates of nitrogen and phosphorus .
- The trial was a complete randomised block with six replicates.
- Plants were inoculated with a bacterial spot suspension at 57 days after planting.
- Bacterial spot severity was assessed 71 and 78 days after transplanting.
- Plant height was assessed at 63 and 88 days after transplanting.

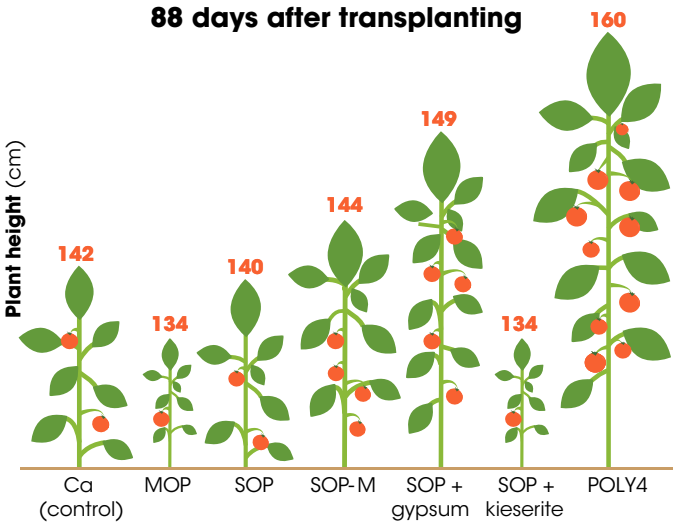
TREATMENT TABLE[3-5]

Treatment	Nutrients applied (kg ha^{-1})			
	K_2O	CaO	MgO	S
Ca (control)	0	97	0	0
MOP	200	97	0	0
SOP	200	97	0	72
SOP-M	200	97	162	204
SOP + gypsum	200	335	0	230
SOP + kieserite	200	97	85	137
POLY4	200	335	85	272

PLANT HEIGHT

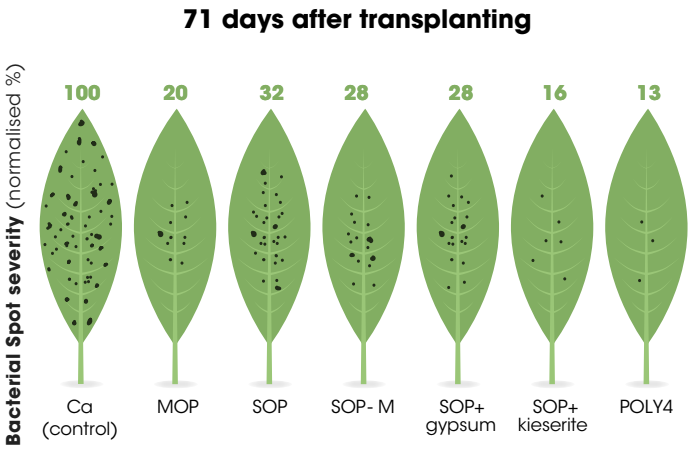
- Height measurements over time showed that tomato plants grew in response to fertilizers supplied.
- POLY4-fed plants were the tallest compared to plants fertilized with other nutrient-balanced alternatives.
- The difference in plant height showed how the disease affected tomato growth. POLY4 supplemented the nutrient spectrum, especially K and Mg, improving growth and nutritional heath. The latter improved resilience to disease infection and spread.

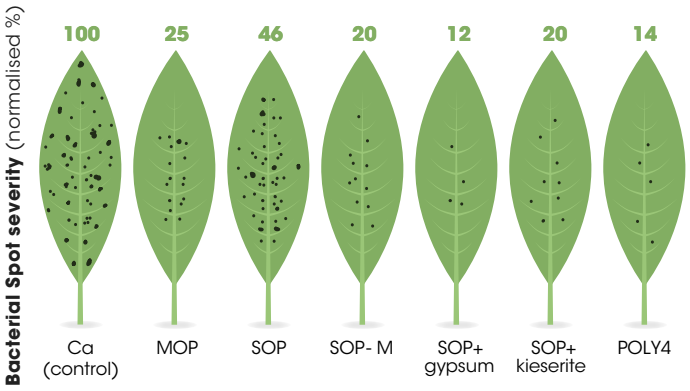




TOMATO BACTERIAL SPOT SEVERITY

- Supplying potassium helped to significantly reduce the severity of Bacterial Spot.
- POLY4 supplied potassium, sulphur, magnesium and calcium, and the least tomato Bacterial Spot infection.
- Results were consistent with first glasshouse study and field observations.
- Results indicated that disease resilience persists over time.
- Appropriate fertilizer practices may offer a route to reduce pesticide use.





Notes: 1) FAO, 2013; 2) Obradovic *et al*. (2008); 3) All pots were supplied field equivalent rates of 224 kg N ha^{-1} as urea, 224 kg P_2O_5 ha^{-1} as TSP and 200 kg K_2O ha^{-1} from applied treatments; 4) Initial soil analysis: very gravelly loam, pH 7.3, 2.4% organic matter, K 85 mg kg^{-1}; 5) Genstat means.

*Sirius Minerals recommends that growers utilise local good phytosanitary practices in disease management.

Source: University of Florida (2016) 1000-UOF-1021-15

siriusminerals.com | +44 1723 470 010 | commercial@siriusminerals.com

Registered Address: 3rd Floor Greener House, 66–68 Haymarket, London SW1Y 4RF, UK

Company Registered Number: 4948435

SIRIUS MINERALS PLC