

# TRIAL RESULTS TOMATO (BACTERIAL SPOT DISEASE)

#### FLORIDA, US (2015)

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### TRIAL OBJECTIVE

To compare K fertilizer source effectiveness on tomato plant health to combat bacterial spot and rates of application using POLY4.

# HIGHLIGHTS

CALCIUM HAS VALUE IN CONTROLLING BACTERIAL SPOT

UP TO 89% DECREASE IN DISEASE SEVERITY COMPARED TO OTHER K SOURCES

HIGHER RATES OF POLY4 ARE MOST EFFECTIVE FOR DISEASE CONTROL

#### TRIAL DESIGN

PARTNER:	UNIVERSITY OF FLORIDA
LOCATION:	FLORIDA, US
YEAR:	2015
<b>CROP VARIETY:</b>	FLORENTINE

- Bacterial spot is a plant disease caused by *Xanthomonas* bacteria species on tomatoes grown in warm humid conditions<sup>1</sup>.
- Early infection appears as yellow leaves that twist and distort leading to lesions turning dark brown and necrotic spots developing on leaves and fruit.
- China, India, Spain, Brazil, Mexico and US are six of the top ten tomato producers globally that face the challenge of bacterial spot<sup>1</sup>.
- A glasshouse trial provided a controlled environment for inoculation of tomato plants, it was divided into four bench sections.
- Plants were inoculated with the bacterial spot organism via a suspension at 53 and 67 days after planting
- Two sections (Study 1) used MOP, SOP, SOP-M and POLY4 at a fixed application rate of 200 kg  $\rm K_2O~ha^{-1}$  on inoculated and non-inoculated tomato plants.
- The other two sections (Study 2) ran in parallel used applications of POLY4 from 0–250 kg  $K_2O$  ha<sup>-1</sup> with fixed amounts of N and P.
- Disease severity was measured as percentage of canopy affected by bacterial spot at 72, 80, 87 and 95 days after transplanting with plant measurements conducted at 107 days after harvesting.

#### NUTRIENTS APPLIED IN STUDY 1 <sup>(kg ha-1)<sup>2</sup></sup>

Nutrient Input	K <sub>2</sub> O	CaO	MgO	S
Control	0	84	0	0
MOP	200	84	0	0
SOP	200	84	0	72
SOP-M	200	84	67	113
POLY4	200	327	85	271

### NUTRIENT INPUTS SUPPLIED BY POLY4 IN STUDY2 (kg ha<sup>-1)2</sup>

K <sub>2</sub> O	CaO	MgO	S
0	0	0	0
50	60	21	68
150	182	64	205
250	304	107	344



#### STUDY 1 – BACTERIAL SPOT DEVELOPMENT<sup>24</sup>

- Varying the potassium source affects bacterial spot disease development post-planting.
- The greatest difference in macronutrient application was calcium from POLY4, supplying nearly four times more than the other treatments, clearly demonstrating its value.
- At 95 days post planting, POLY4 significantly lowered disease infection rates by 82% compared to SOP, by 80% compared to SOP-M and by 78% compared to MOP<sup>5</sup>.



#### STUDY 1 – LEAF VISUAL ASSESSSMENT <sup>2-6</sup>



# STUDY 2 – BACTERIAL SPOT DEVELOPMENT<sup>2-4</sup>

- In a parallel study, tomato plants were treated with increasing POLY4 application rates ranging from 0 to 250 kg K<sub>2</sub>O ha<sup>-1</sup> balanced for nitrogen and phosphorus<sup>2</sup>.
- POLY4 was most effective at 250kg  $K_2O$  ha<sup>-1</sup> with a 59% reduction compared to the control.
- Over time, 50 kg K<sub>2</sub>O ha<sup>-1</sup> from POLY4 lowered infection rates to less than that experienced with the control.



Days after transplanting

## STUDY 2 – LEAF VISUAL ASSESSMENT

- Infection rates were lowest in treatments supplied with more than 150 kg  $\rm K_2O$  ha^-1.
- At 150 kg K<sub>2</sub>O ha<sup>-1</sup>, POLY4 supplies an additional 182 kg CaO ha<sup>-1</sup>, 64 kg MgO ha<sup>-1</sup> and 203 kg S ha<sup>-1</sup>.

Visual symptoms with increased K<sub>2</sub>O rates from POLY4 (kg K<sub>2</sub>O ha<sup>-1</sup>)



Notes: 1) Obradovic et al. 2008; 2) All plants were supplied 194 kg N ha<sup>-1</sup> as Urea and 194 kg  $P_2O_5$  ha<sup>-1</sup> as TSP; 3) GENSTAT regression analysis; 4) Infection rates determined from amount of plant leaf canopy showing infection; 5) p<0.001; 6) 72 days after transplanting. Initial soil analysis: very gravelly loam, pH 7.3, 2.4% organic matter, K 85 mg kg<sup>-1</sup>.

Bacterial spot severity (% canopy affected)

Sources: University of Florida (2015) 1000-UOF-1020-14

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