



## Key findings

- Increased marketable potato yield against MOP balanced
- Enhanced dry matter content
- Improved size grade

# Growing potatoes in USA

## A case for POLY4

- USA grew 22 million tons of potatoes across 1 million acres in 2017.
- Wisconsin has the third greatest production by state with 1.4 million tons produced in 2017, while Minnesota produced 920,000 tons.
- Best practice in the region ensures crop K, Mg and S supply from a balanced fertilizer plan. Where potassium demand is high, current practice substitutes some MOP with SOP to limit chloride load since this known to impair tuber quality.
- POLY4 is a low-chloride fertilizer that delivers potassium, sulphate-sulfur, magnesium and calcium as well as micro nutrients in one product.

## POLY4 BENEFITS



Sustained nutrient delivery profile



Low chloride content



Blends, stores and spreads with conventional equipment



Low carbon footprint



Suitable for organic farming



### Trial focus

To compare the response of potato crops to different POLY4 inclusions within a conventional, nutrient balanced fertilizer plan. Trials were repeated at five sites in Midwestern USA over four years.

### Partner

University of Minnesota  
University of Wisconsin


### Location

Hancock, Wisconsin  
and Becker, Minnesota  
USA

### Date

2014 – 2017

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## University of Wisconsin trial

Treatments	Application rate (lb ac <sup>-1</sup> )				
	% of K from POLY4	K <sub>2</sub> O	S	CaO	MgO
MOP balanced	0	335	528	546	154
MOP + POLY4 (75:25)	25	335	200	102	36
MOP + POLY4 (50:50)	50	335	313	204	203
MOP + POLY4 (25:75)	75	335	427	305	305

\*All treatments received 300 lb N ac<sup>-1</sup> and 156 lb P<sub>2</sub>O<sub>5</sub> ac<sup>-1</sup> and 87 lb S ac<sup>-1</sup> (included in treatment table) from AN, AS, and MAP; MOP balanced is MOP + gypsum + epsom salts.

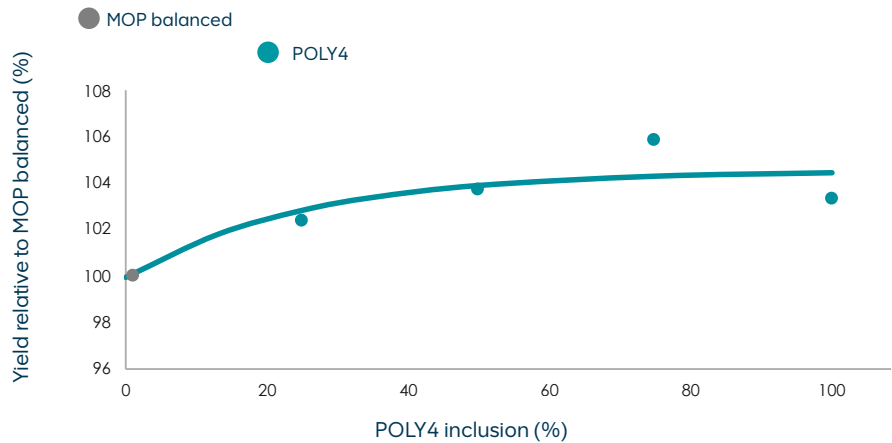
## University of Minnesota trial

Treatments	Application rate (lb ac <sup>-1</sup> )				
	% of K from POLY4	K <sub>2</sub> O	S	CaO	MgO
MOP balanced	0	400	421	486	171
MOP + POLY4 (75:25)	25	400	136	121	43
MOP + POLY4 (50:50)	50	400	271	243	86
MOP + POLY4 (25:75)	75	400	407	364	129

\*All treatments received 240 lb N ac<sup>-1</sup> and 136 lb P<sub>2</sub>O<sub>5</sub> ac<sup>-1</sup> from ESN, UAN and MAP; MOP balanced is MOP + gypsum + epsom salts.

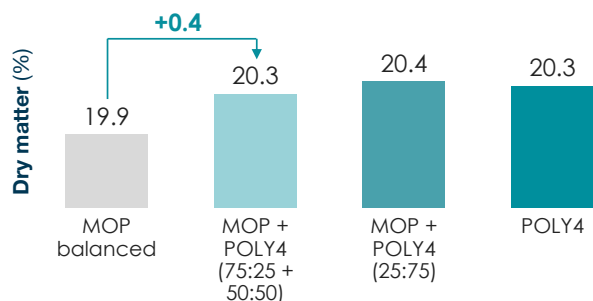
## Increased marketable yield

POLY4 treatments had greater average yield than the MOP balanced in four out of five trials. Compared to a nutrient balanced MOP fertilizer plan with an average yield of 472 CWT ac<sup>-1</sup>, the 25% inclusion of POLY4 increased yield by 2.4% (three trials), the 50% inclusion increased yield by 3.7% (four trials), and the 75% inclusion by 5.8% (five trials).



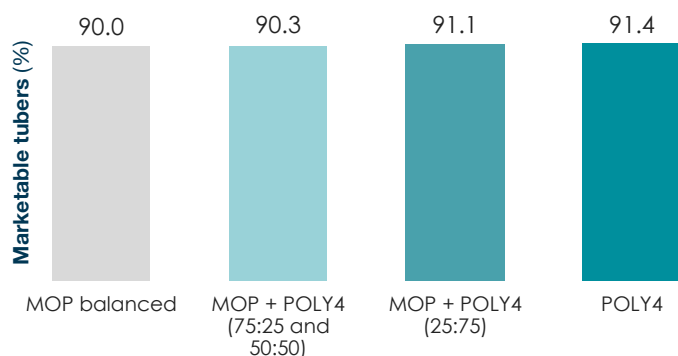
## Improved quality

Tuber dry matter content is an important quality parameter for frying potatoes. High-chloride fertilizers can depress tuber dry matter content. Tuber dry matter was greater with MOP + POLY4 than with MOP balanced treatments.



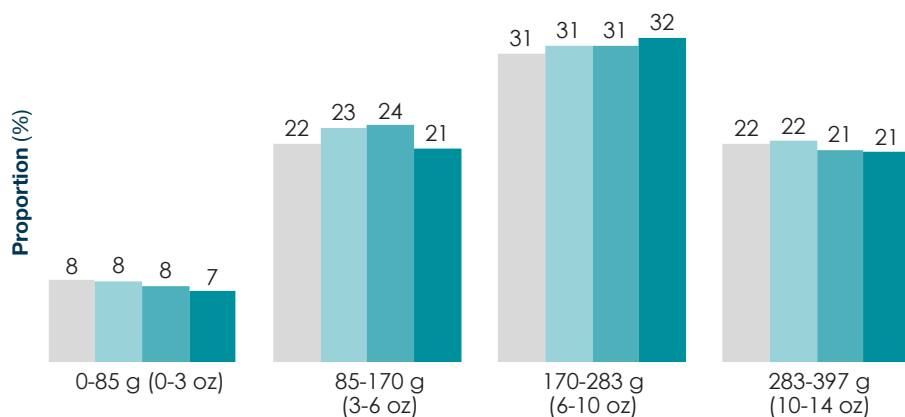
## Maintaining potato marketability

POLY4 treatments maintained the proportion of tubers that were marketable.



Besides high yield and suitable dry matter content, size grade is critical for the potato frying industry. Following the four trials in Minnesota, the Russet Burbank tubers were graded by size. POLY4-fertilized potatoes tended to have a greater proportion of marketable tubers than nutrient balanced MOP in the 3 – 14 oz size range.

● MOP balanced ● MOP + POLY4 (75:25 & 50:50)  
● MOP + POLY4 (25:75) ● POLY4



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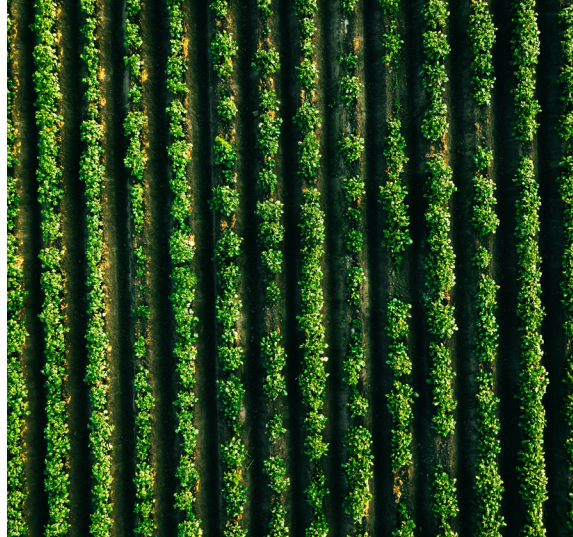
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## RDO trial

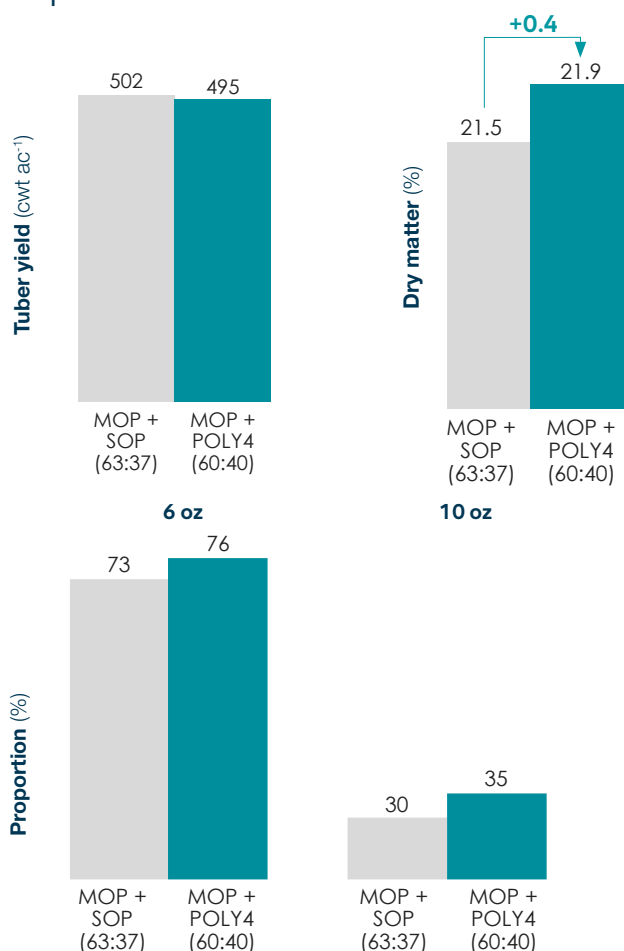
In a high potassium demand plan, POLY4 is an alternative low-chloride K source.

Treatments	Nutrients applied (lb ac <sup>-1</sup> )			
	K <sub>2</sub> O	S	CaO	MgO
MOP + SOP (63:37)	510	65	0	0
MOP + POLY4 (60:40)	510	277	247	87

\*All treatments received 80 lb urea ac<sup>-1</sup>, 290 lb ESN ac<sup>-1</sup>, and 25 Gals UAN ac<sup>-1</sup>.

## Yield maintained with POLY4 plan

POLY4 offered a commercially-viable alternative to support yield. Yields were similar, and dry matter and proportions within 6 and 10 oz size grades were improved with POLY4 treatment.



Notes (Universities of Minnesota and Wisconsin trials): 1) Four trials in Minnesota (2014-2017) and one trial in Wisconsin (2014); 2) MOP balanced received Ca and Mg from gypsum and epsom salts; 3) Potato variety: Russet Burbank; 4) 25 and 50% POLY4 inclusions averaged for bar graphs as 25% POLY4 treatment only tested in 2014 and 2017 while 50% POLY4 treatment not tested in 2014 in Minnesota; 5) Initial soil analysis for Wisconsin: pH 7.2, 0.9% SOM, 90 mg K kg<sup>-1</sup>, 358 mg Ca kg<sup>-1</sup>, 90 mg Mg kg<sup>-1</sup>, 3 mg S kg<sup>-1</sup>. Initial soil analyses for Minnesota: 2014 trial pH 5.2, 1.4% SOM, 37 mg P kg<sup>-1</sup>, 100 mg K kg<sup>-1</sup>, 330 mg Ca kg<sup>-1</sup>, 48 mg Mg kg<sup>-1</sup>; 2015 trial pH 5.0, 1.9% SOM, 37 mg P kg<sup>-1</sup>, 83 mg K kg<sup>-1</sup>, 266 mg Ca kg<sup>-1</sup>, 46 mg Mg kg<sup>-1</sup>; 2016 trial pH 6.1, 1.1% SOM, 17 mg P kg<sup>-1</sup>, 58 mg K kg<sup>-1</sup>, 550 mg Ca kg<sup>-1</sup>, 123 mg Mg kg<sup>-1</sup>; 2017 trial pH 5.3, 1.5% SOM, 26 mg P kg<sup>-1</sup>, 87 mg K kg<sup>-1</sup>, 580 mg Ca kg<sup>-1</sup>, 83 mg Mg kg<sup>-1</sup>.

Notes (RDO trial): potato variety Umatilla Russet; initial soil analysis: pH 7.7, 1.0% SOM, 80 mg P kg<sup>-1</sup>, 132 mg K kg<sup>-1</sup>, 108 mg Mg kg<sup>-1</sup>, 1460 mg Ca kg<sup>-1</sup>, 13 mg S kg<sup>-1</sup>.

Sources: University of Wisconsin: 13000-UWI-13010-14; University of Minnesota: 14000-UMN-14010-14, 14000-UMN-14011-15, 14000-UMN-14014-16, 14000-UMN-14017-17 (potato); RDO: 100000-RDO-100010-18 (potato).



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