K-Mag®

Potato Research 2009 – 2011

Oregon State University



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Oregon State University – 2009-2011



Conducted by Oregon State University in Hermiston, OR
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2009 Potato Results

2009 Soil Test Results

Table 1. Preplant soil, Grandview WA, 2009.

pH	OM	NO_3-N	NH_4-N	P	K	S	Ca	Mg	TB
	%	*--lb/acre--*		*---------ppm---------*			*-----meq/100 g------*		
8.1	0.9	72	26	14	75	16	15.9	1.3	17.4

B	Zn	Mn	Cu	Fe	SS
----------ppm----------					*mmho/cm*
0.2	2	3	0.7	19	0.2

Sampled 03/23/09.

OSU Potato K Study in 2009

Table 2. Fertilizer K source and rate treatments, Grandview, WA., 2009.

Source	K_2O lb/a
Check	0
K-Mag (0-0-21.5-11Mg-21S)	300
KCl (0-0-60)	300
K-Mag + KCl (50/50)	300
K_2SO_4 (0-0-50-18S)	300

2009 Yield Results: USA #1 tons

Table 6. Yield of Premier Russet potato as affected by K source and rate, Grandview, WA, 2009.

Treatment		Cull	USDA No. 1 <4 oz	USDA No. 1 4-12 oz	USDA No. 1 >12 oz	USDA No. 1 Total	Specific gravity
Source & Rate K2O lb/a)						*Yield (t/a)*	
Check	0	0.15	2.6	16.7a	9.1b	25.8	1.096a
K-Mag	300	0.0	1.8	15.4ab	15.8a	31.2	1.092abc
KCl	300	0.12	2.0	12.0bc	15.1a	27.1	1.078d
K-Mag+KCl	300	0.0	1.8	15.8ab	13.2a	29.0	1.086bcd
K_2SO_4	300	0.08	2.0	14.9ab	15.0a	29.9	1.094ab
Pr>F		*0.63*	*0.06*	*0.05*	*0.02*	*0.24*	*0.001*
Contrasts		*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*
K-Mag linear		*0.29*	*0.08*	*0.44*	*0.004*	*0.04*	*0.0005*
K-Mag quadratic		*0.37*	*0.61*	*0.08*	*0.10*	*0.91*	*0.06*
K-Mag vs Check		*0.14*	*0.02*	*0.18*	*0.0004*	*0.02*	*0.002*

Means followed by different letters significantly different at P=0.05 (Duncans multiple range test)

Total USDA # 1 K-Mag was:

- 21% higher than Check
- 15% higher than MOP (KCl)
- 4% higher than SOP (K2S04)

2009 Summary

At 300 lbs K2O rate K-Mag outperformed all the different treatments

- 17% better than check
- 13% better than MOP
- 9% better than SOP
- 7% better than a 50/50 rate of K-Mag and MOP

- 300 lbs K2O/ac as K-Mag is quite high rate to apply
- It is 1,395 lbs/ac of K-Mag. But it is still economical
- Future research will test lower rate of K-Mag
- Future studies will consider combinations of MOP and SOP with K-Mag

2010 Potato Results

2010 Soil Test Results

Table 1. Preplant soil, HAREC, Hermiston, OR 2010.

pH	OM	NO_3-N	NH_4-N	P	K	S	Ca	Mg	TB
	%	*--lb/acre--*		*----------ppm----------*			*-----meq/100 g------*		
7.1	0.8	14	17	12	106	6.7	4.7	1.9	6.9

B	Zn	Mn	Cu	Fe	SS
----------ppm----------					*mmho/cm*
0.2	0.9	5	0.8	30	0.04

Sampled 03/23 /10.

OSU Potato K Study in 2010

Table 2. Fertilizer K source and rate treatments, HAREC, Hermiston, OR 2010.

Source	K_2O Rate lb/a
1) Check	0
2) K-Mag (0-0-21.5-11Mg-21S)	75
3) KCl (0-0-60)	300
4) K-Mag + KCl	300 (50/50)
5) K_2SO_4 (0-0-50-18S)	300
6) KMag, KCl and K_2SO_4	300 (33/33/33)
7) KMag, KCl and K_2SO_4	300 (17/50/33)

2010 Yield Results: USA #1 tons

Table 4. Yield of Russet Burbank potato as affected by K source and rate, HAREC, Hermiston, OR 2010.

Treatment		Cull	<4 oz	USDA No. 1 4-12 oz	USDA No. 1 >12 oz	USDA No. 1 Total	Specific gravity
Source	*K_2O Rate (lb/a)*				*Yield (t/a)*		
Check	0	2.0	1.1	28.5	7.7	36.2	1.090ab
K-Mag	75	1.0	1.7	31.3	12.0	43.2	1.092a
KCl	300	2.1	1.8	30.2	9.7	39.8	1.086 bc
K-Mag+KCl	300	2.3	1.3	23.7	9.6	33.3	1.084 c
K_2SO_4	300	1.7	0.6	31.3	11.0	42.3	1.088abc
KMag+KCl+K_2SO_4[1]	300	1.8	1.1	28.3	10.9	39.3	1.086 bc
KMag+KCl+K_2SO_4[2]	300	0.9	1.3	28.1	8.6	36.7	1.090ab
Pr>F		*0.45*	*0.10*	*0.34*	*0.64*	*0.14*	*0.02*

Means followed by different letters significantly different at P=0.05 (Duncans multiple range test).
[1] 33/33/33
[2] 17/50/33

Total USDA # 1 K-Mag was:

- 19% higher than Check
- 8% higher than MOP (KCl)
- 2% higher than SOP (K2S04)

2011 Potato Results

2011 Soil Test Results

Table 1. Preplant soil, Paterson, WA. 2011.

pH	OM	NO_3-N	NH_4-N	P	K	S	Ca	Mg	TB
	%	*--lb/acre--*		*----------ppm----------*			*-----meq/100 g------*		
8.1	0.8	68	9	23	147	68	22.8	2.4	6.9

B	Zn	Mn	Cu	Fe	SS
	----------ppm----------				*mmho/cm*
0.43	3.2	1	1.2	6	0.4

OSU Potato K Study in 2011

Table 2. Fertilizer K source and rate treatments, Paterson, WA. 2011.

Source	K_2O Rate (lb/a)
1) Check	0
2) K-Mag (0-0-21.5-11Mg-21S)	75
3) KCl (0-0-60)	300
4) K-Mag + KCl	300 (50:50)
5) K_2SO_4 (0-0-50-18S)	300
6) K-Mag, KCl and K_2SO_4	300 (33:33:33)
7) K-Mag, KCl and K_2SO_4	300 (17:50:33)

2011 Yield Results: USA #1 tons

Table 4. Yield of Russet Burbank potato as affected by K source and rate, Paterson, WA. 2011.

Treatment		Cull	<4 oz	USDA No. 1 4-12 oz	USDA No. 1 >12 oz	USDA No. 1 Total	Specific Gravity
Source	*K_2O Rate (lb/a)*			*Yield (t/a)*			
Check	0	0.0	1.8	22.5	1.4	24.0	1.088
K-Mag	75	0.1	2.3	26.1	3.8	29.9	1.085
KCl	300	0.0	2.5	26.7	2.2	29.0	1.083
K-Mag+KCl	300[1]	0.3	2.0	21.8	3.0	24.8	1.084
K_2SO_4	300	0.1	2.4	19.6	3.3	22.9	1.085
KMag+KCl+K_2SO_4	300[2]	0.4	2.2	24.8	2.6	27.4	1.085
KMag+KCl+K_2SO_4	300[3]	0.1	2.3	24.1	2.0	26.1	1.084
Pr>F		*0.374*	*0.581*	*0.506*	*0.894*	*0.602*	*0.253*
Contrasts		*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*	*Pr>F*
K-Mag vs Check		*0.284*	*0.161*	*0.352*	*0.174*	*0.165*	*0.014*
K-Mag linear		*0.439*	*0.394*	*0.757*	*0.808*	*0.839*	*0.180*
K-Mag quadratic		*0.291*	*0.905*	*0.690*	*0.375*	*0.473*	*0.028*

Means followed by different letters significantly different at P=0.05 (Duncans multiple range test).
[1] 50:50
[2] 33:33:33
[3] 17:50:33

Total USDA # 1 K-Mag was:

- 24% higher than Check
- 3% higher than MOP (KCl)
- 30% higher than SOP (K2S04)

Bottom line: K-Mag VS MOP

Reference:
Potatoes: $120/mkt ton
MOP: $650/ton
K-Mag: $460/ton

Calculations:
K-Mag @ 75 lbs K2O/ac, it is $80/acre
MOP @ 300 lbs K2O/ac, it is $162/acre

Table 4. Yield of Russet Burbank potato as affected by K source and rate, Paterson, WA. 2011.

Treatment		Cull	<4 oz	USDA No. 1 4-12 oz	USDA No. 1 >12 oz	USDA No. 1 Total	USDA No. 2	Total (No. 1 + 2)	Specific Gravity
Source	*K_2O Rate (lb/a)*				*Yield (t/a)*				
Check	0	0.0	1.8	22.5	1.4	24.0	3.9 c	27.9	1.088
K-Mag	75	0.1	2.3	26.1	3.8	29.9	5.2 bc	35.1	1.085
KCl	300	0.0	2.5	26.7	2.2	29.0	6.0ab	34.9	1.083
K-Mag+KCl	300[1]	0.3	2.0	21.8	3.0	24.8	5.1 bc	29.9	1.084
K_2SO_4	300	0.1	2.4	19.6	3.3	22.9	4.1 bc	27.0	1.085
KMag+KCl+K_2SO_4	300[2]	0.4	2.2	24.8	2.6	27.4	5.3 bc	32.7	1.085
KMag+KCl+K_2SO_4	300[3]	0.1	2.3	24.1	2.0	26.1	5.9ab	32.0	1.084

Grower invests $82/acre less in fertilizer
In this example, K-Mag produced 0.2 tons more @ $120/ton
Extra revenue is $24 minus less fertilizer = **TOTAL $106/acre**

In a 125-acre PIVOT, it is $13,250 MORE REVENUE

Bottom line: K-Mag VS SOP

Reference:
Potatoes: $120/mkt ton
SOP: $680/ton
K-Mag: $460/ton

Calculations:
K-Mag @ 75 lbs K2O/ac, it is $80/acre
SOP @ 300 lbs K2O/ac, it is $204/acre

Table 4. Yield of Russet Burbank potato as affected by K source and rate, Paterson, WA. 2011.

Treatment		Cull	<4 oz	USDA No. 1 4-12 oz	USDA No. 1 >12 oz	USDA No. 1 Total	USDA No. 2	Total (No. 1 + 2)	Specific Gravity
Source	*K_2O Rate (lb/a)*				*Yield (t/a)*				
Check	0	0.0	1.8	22.5	1.4	24.0	3.9 c	27.9	1.088
K-Mag	75	0.1	2.3	26.1	3.8	29.9	5.2 bc	35.1	1.085
KCl	300	0.0	2.5	26.7	2.2	29.0	6.0ab	34.9	1.083
K-Mag+KCl	300[1]	0.3	2.0	21.8	3.0	24.8	5.1 bc	29.9	1.084
K_2SO_4	300	0.1	2.4	19.6	3.3	22.9	4.1 bc	27.0	1.085
KMag+KCl+K_2SO_4	300[2]	0.4	2.2	24.8	2.6	27.4	5.3 bc	32.7	1.085
KMag+KCl+K_2SO_4	300[3]	0.1	2.3	24.1	2.0	26.1	5.9ab	32.0	1.084

Grower invests $124/acre less in fertilizer
In this example, K-Mag produced 8.1 tons more @ $120/ton
Extra revenue is $972 minus less fertilizer = **TOTAL $1,096/acre**

In a 125-acre PIVOT, it is $137,000 MORE REVENUE

THANK YOU

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