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***Potato Response to Foliar-Applied Monopotassium Phosphate Solution 96-9***George J. Hochmuth<sup>1</sup>**Abstract**

Monopotassium phosphate solutions of 3% by weight with water were sprayed on potato plants twice and resulting effects on tuber growth, yield, and shape measured. Foliar sprays were made on potatoes grown with two fertilization programs, a commercial program (290-174-295 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) and a reduced program (240-0-230 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O). There was a tendency for slightly improved yields with foliar sprays through the season, especially with the reduced fertilizer. These differences were not significant, however.

**Materials and Methods**

A foliar spray test with monopotassium phosphate solution was carried out on a commercial potato farm near Hastings, FL in the spring season of 1996. Two fields of potatoes were used. In one field, a reduced fertilization program was used where 240-0-230 lbs/acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O were applied. In the other field, the typical grower fertilization program was used where 290-174-295 lbs/acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O were applied. The potatoes were grown in raised beds on 42-inch centers with approximately seven inches between hills. In the grower field, fertilizer was applied on 3 Jan at 1050 lbs/acre of 6-12-28 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) (broadcast 36 days before planting). At planting on 8 Feb, 12 gallons of 10-34-0 plus 30 gallons of 32% N solution per acre were banded in the bed. On 4 Mar, 30 gallons of 32% N solution were sidedressed. The reduced-field potatoes were planted on 14 Feb. On 20 Feb, 700 lbs/acre of 15-0-15 was applied, followed by another 700 lbs/acre of 15-0-15 on 26 Mar. Following heavy rain, a supplemental application of 30-0-20 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) was made on 3 Apr for the reduced-fertilizer potatoes only.

On 19 April, 64 days after planting for the reduced field and 70 days after planting for the grower field, the first foliar spray was made. Plants were blossoming and were at the early tuber set stage. The second foliar spray was made on 3 May. Sprays were made with a CO<sub>2</sub>-powered back-pack sprayer with three fan nozzles operated at 30 PSI delivering 80 gallons per acre.

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<sup>1</sup> George J. Hochmuth, Professor, Horticultural Sciences Department, University of Florida/IFAS, Gainesville FL 32611-0690

Starting with 19 April and for three more biweekly intervals, tubers from two hills in each plot were dug and the tubers separated by size into four categories, counted, and weighed. Size categories were <1 cm, 1-2 cm, 2-4 cm, and >4 cm.

On 31 May, tubers in a 5-foot section of each plot were harvested from the grower field. Reduced-field potatoes were harvest on 6 June. Tubers were graded according to USDA standards and weighed.

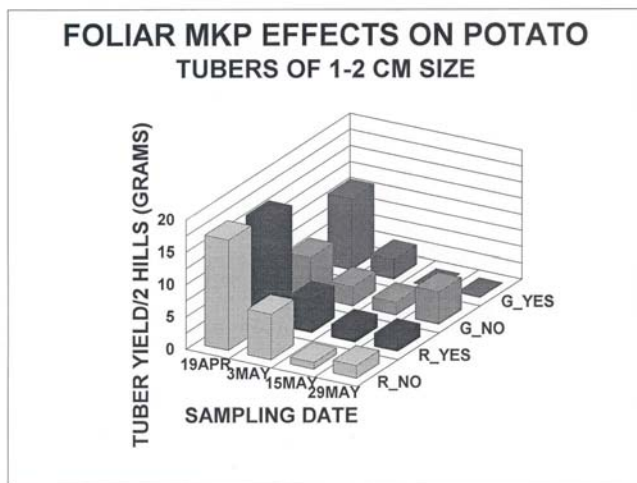
**Results**

Data from tuber growth measurements are presented in Table 1 and Figs. 1-3. Tubers were larger on early sampling dates with the grower fertilization program, probably a reflection of the difference in age; grower potatoes were seven days older than the potatoes with the reduced fertilizer program. Tuber growth differences in the two fields remained until 29 May, the last sampling date (Table 2). However, tuber growth continued in the reduced program so that final yields were similar (Table 3).

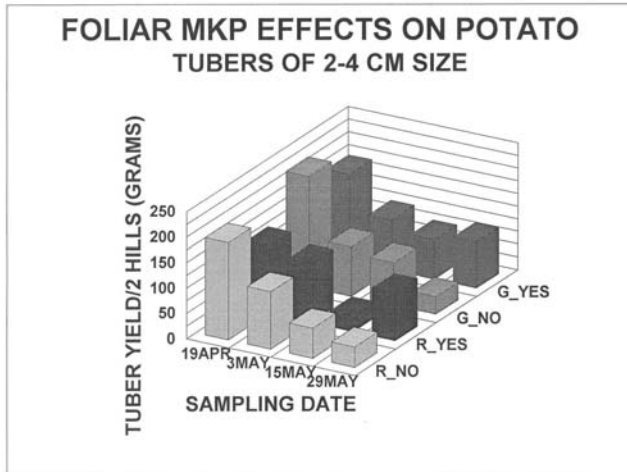
Foliar monopotassium phosphate spray effects were variable (Table 1), with slight effects on yields of large size A potatoes (Table 2). The probability for the interaction for foliar spray and fertilizer program was 0.25. Results presented in Table 3 and Fig 4 show a trend for better yields of size A and total tuber yields with monopotassium phosphate compared to no spray especially for the potatoes with the reduced fertilizer program.

**Figures**

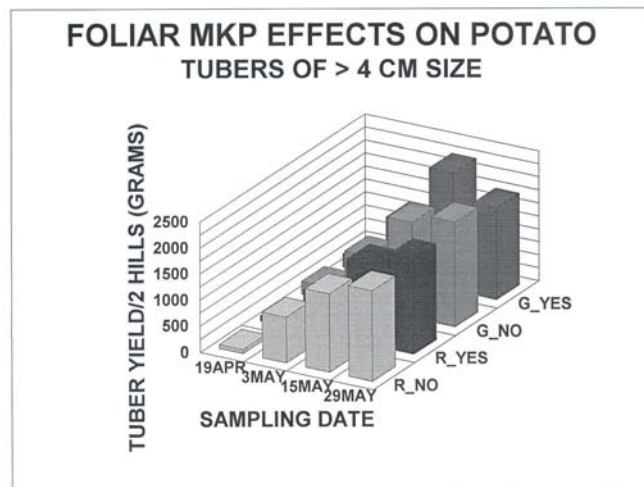
For all figures, “R” = reduced fertilizer program, “G” = grower fertilizer program, “YES” = two MKP foliar sprays, and “NO” = no foliar sprays.



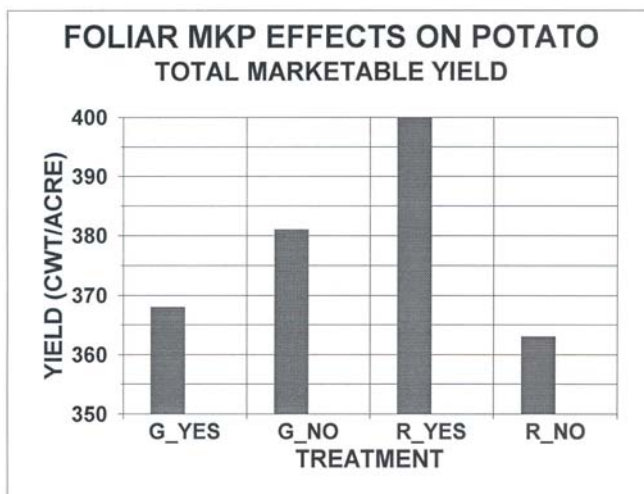
1. Amounts of small tubers decreased greatly after the first sampling date with no effects of fertilizer or foliar sprays.



2. Amounts of tubers in the 2-4 cm category decreased during the season with all treatments but at a slower rate with MKP sprays. Data in Table 1 shows that tubers with MKP sprays developed faster than those without MKP because, on the last sampling date, plants with MKP had fewer tubers in the smallest (1-2 cm) category than plants without MKP.



3. Yields of tubers larger than 4 cm in size were not greatly affected by fertilizer treatment. Although, younger, reduced-fertilizer potatoes had caught up in yield with grower potatoes. Reduced-fertilizer potatoes with MKP sprays were equal in yield to the average of the grower treatments which might indicate enhanced growth rate of reduced-fertilizer potatoes with MKP.



4. There was a trend for improved yields of reduced-fertilizer potatoes with MKP sprays, but not for grower-fertilized potatoes.

**Table 1.** Effects of fertilizer program and foliar monopotassium phosphate on potato growth, Spring 1996, Hastings FL.

Date	Field <sup>y</sup>	Foliar MKP <sup>z</sup>	Tuber Classification							
			<1 cm		1-2 cm		2-4 cm		>4 cm	
			No.	Wt. (gr)	No.	Wt. (gr)	No.	Wt. (gr)	No.	Wt. (gr)
----- from two plants -----										
19 Apr	Grower	Yes	0.5	0.5	2.5	11.0	7.8	170	2.5	250
		No	0.0	0.0	1.8	6.0	10.3	218	4.3	242
	Reduced	Yes	2.3	2.3	3.5	15.5	7.5	132	2.5	101
		No	4.5	2.8	4.3	16.8	10.5	191	2.0	74
3 May	Grower	Yes	0.0	0.0	1.0	3.3	5.0	98	11.8	1140
		No	0.0	0.0	0.8	2.5	4.8	96	13.0	1007
	Reduced	Yes	0.0	0.0	1.3	5.3	5.5	116	11.3	775
		No	0.0	0.0	2.5	6.8	5.8	113	10.3	869
15 May	Grower	Yes	0.0	0.0	0.0	0.0	3.5	77	19.3	2255
		No	0.0	0.0	0.8	1.5	3.5	84	14.5	1830
	Reduced	Yes	0.0	0.0	0.5	1.5	2.0	31	11.8	1555
		No	0.0	0.0	0.5	1.3	3.3	59	14.5	1498
29 May	Grower	Yes	0.0	0.0	0.0	0.0	3.3	90	11.3	1765
		No	0.0	0.0	0.5	5.0	1.3	35	14.5	2015
	Reduced	Yes	0.0	0.0	0.3	2.0	2.8	95	12.0	1835
		No	0.0	0.0	0.3	2.0	1.5	40	12.8	1735

<sup>z</sup> Foliar MKP (monopotassium phosphate) applied twice as a 3% spray in water on 19 April and 3 May. On 19 Apr, plants in grower field were 70 days old and plants in reduced field were 64 days old.

<sup>y</sup> Grower field received 290-174-295 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) lbs per acre and reduced field received 240-0-230 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O).

**Table 2.** Main effects of sample data, field, and foliar monopotassium treatments for potato, Spring 1996, Hastings FL.

Date	Field <sup>y</sup>	Foliar MKP <sup>z</sup>	Tuber Classification							
			<1 cm		1-2 cm		2-4 cm		>4 cm	
			No.	Wt. (gr)	No.	Wt. (gr)	No.	Wt. (gr)	No.	Wt. (gr)
----- from two plants -----										
19 Apr			1.8	1.4	3.0	12.3	9.0	178	3.5	166
3 May			0.0	0.0	1.4	4.4	5.3	106	11.6	948
15 May			0.0	0.0	0.4	1.2	3.1	63	15.0	1784
29 May			0.0	0.0	0.3	2.3	2.2	65	12.6	1840
Signif.			**	**	**	**	**	**	**	**
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	Grower		0.1	0.1	0.9	3.7	4.9	108	11.7	1313
	Reduce		0.8	0.6	1.6	6.4	4.8	97	9.6	1056
	Signif.		*	*	**	*	NS	NS	*	**
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		Yes	0.3	0.3	1.1	4.9	4.6	102	10.7	1210
		No	0.5	0.3	1.4	5.2	5.1	104	10.7	1160
		Signif.	NS	NS	NS	NS	NS	NS	NS	NS

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<sup>y</sup> Grower field received 290-174-295 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) lbs per acre and reduced field received 240-0-230 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O).

**Table 3.** Total yield and tuber length: width ratio as affected by fertilizer program and monopotassium phosphate foliar spray, Spring 1996, Hastings FL.

Fertilizer Program <sup>y</sup>	Folar MKP <sup>z</sup>	Size B	Size A	Total Yield	Length:width ratio
		cwt/acre	cwt/acre	cwt/acre	
Grower	Yes	25	343	368	1.22
	No	23	358	381	1.14
Reduced	Yes	14	386	400	1.14
	No	23	340	363	1.11
<u>Main Effects:</u>					
Grower		24	350	375	1.18
Reduced		18	363	382	1.12
Signif.		NS	NS	NS	NS
	Yes	19	365	384	1.18
	No	23	349	372	1.12
	Signif.	NS	NS	NS	NS

<sup>z</sup> Foliar MKP (monopotassium phosphate) applied twice as a 3% spray in water on 19 April and 3 May. On 19 Apr, plants in grower field were 70 days old and plants in reduced field were 64 days old.

<sup>y</sup> Grower field received 290-174-295 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) lbs per acre and reduced field received 240-0-230 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O).