PROGRESS REPORT

PROJECT NO: BJK-085

TITLE: Placement of Fall Applied P for Early Season Onion Growth

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ACCOMPLISHMENTS:

A field study was conducted to evaluate Vapam and P fertilizer placement in fall bedded onions at the Parma Research and Extension Center. The soil was a Nyssaton silt loam with moderate soil test P (10.2 ppm) and high lime (12%). Rates of P (0 or 58 lb P_20_5/A) were either broadcast prior to bedding or banded into 22" bed centers after bedding in the fall. All P treatments were evaluated with and without Vapam (33%) applied at 35 gal/A after beds were formed in the fall. The treatments were arranged in a randomized complete block design with six replications.

Soil samples (0-12") were collected from each individual plot in the spring at various bed locations and soil test P determined. Broadcast P resulted in P enrichment of the soil extending across the 44" beds with greatest enrichment within 5.5" of the planted row (Table 1). As expected, the banded P placement resulted in elevated soil test P only between the planted rows. Vapam had no influence on the soil test P concentration across all bed locations.

Table 1. Soil test P as affected by method of P placement

Placement	Bed Location				
	furrow	5.5" from furrow	mid row	16.5" from furrow	bed center
	ppm				
Broadcast	12.9	38.9	23.0	20.5	14.7
Banded	10.1	11.1	74.3	11.3	10.3

Onion stunting with Vapam was associated with greatly reduced beneficial mycorhizal infection in 1998 but there was little infection in any treatment in 1999. Vapam did not affect infection in 1999. But Vapam delayed leaf and bulb development, and stunted early season onion growth measured in late June regardless of whether P was added. Macro nutrient uptake in late June was also reduced with Vapam.

Broadcast P increased bulb diameter in late June as compared to banded P, especially in Vapam treated soil. Dry weights of plants in late June also tended to be higher with broadcast than with banded P.

Vapam effects on growth were not as evident at maturity as they were at bulb initiation in late June. Nevertheless, Vapam reduced bulb diameter on August 30, delayed maturity at the end of the season as measured by the percentage of tops down, reduced the incidence of pink root, and reduced marketable onion yield. Marketable yield was not significantly affected by applied P or P placement regardless of Vapam treatment, despite a moderate soil test P in a high lime soil.

Table 2. Onion growth and nutrient uptake at bulb initiation, June 29.

Vapam	P Added	Placement	Mycorhyzae	Bulb diameter	Leaf number	Dry weight	Nutrient Uptake						Roots
							P	K	S	Ca	Mg	Na	P
Gal/A	lb P_2O_5/A		Vesicles per plant	inches		tons/A	----------(lb/A)----------						
0	0	--	2.9	0.71	6.4	0.30	2.33	24.3	4.4	8.63	2.79	3.1	1.9
0	58	Broadcast	--	0.79	6.8	0.36	2.74	29.7	5.6	10.48	3.86	3.3	2.8
0	58	Banded	--	0.71	6.7	0.32	2.82	28.2	5.0	9.83	3.33	2.5	2.2
35	0	--	3.9	0.45	5.9	0.22	1.64	19.6	3.5	5.99	2.13	2.1	1.5
35	58	Broadcast	--	0.63	5.6	0.26	2.16	22.6	4.2	7.30	2.43	2.5	1.9
35	58	Banded	--	0.49	5.4	0.21	1.79	18.3	3.2	5.68	2.08	2.2	1.5
		$LSD_{.10}$	2.1	0.11	0.5	0.07	0.74	7.3	1.3	2.47	0.78	2.0	0.56

Table 3. Onion growth and nutrient uptake when tops were falling, August 30

Vapam	P Added	Placement	Pink Root[1]	Bulb diameter	Dry weight	Tops Down	Nutrient Uptake					
							P	K	S	Ca	Mg	Na
Gal/A	lb P_2O_5/A			inches	tons/A	%	----------(lb/A)----------					
0	0	--	0.23	2.8	2.73	53.3	19.9	111.0	30.0	72.7	19.7	10.9
0	58	Broadcast	0.20	3.0	2.44	64.2	17.8	94.4	25.7	61.8	19.4	9.4
0	58	Banded	0.14	3.0	2.81	68.3	20.9	118.9	29.8	75.4	23.2	11.4
35	0	--	0.11	2.4	2.25	18.0	15.9	94.7	26.0	59.7	16.5	8.3
35	58	Broadcast	0.07	2.9	2.90	42.5	22.7	120.5	32.4	83.2	21.1	10.4
35	58	Banded	0.04	2.6	2.55	27.7	19.7	104.8	26.6	68.6	19.5	9.4
		$LSD_{.10}$	0.1	0.3	0.63	17.1	4.6	27.0	6.4	19.5	5.0	5.4

1 Pink root ratings: 0=none 1=25% 2=50% 3=75%

Table 4. Onion yield and grade as affected by Vapam, phosphorus and placement. Parma, 1998.