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ALFALFA RESPONSE TO SOIL SERIES AND APPLIED PHOSPHORUS

T. L. Beedy, V. A. Haby, F. M. Hons, J. V. Davis, and A. T. Leonard

Background. In spring of 1992, 8 soils (Table 1) were limed to neutrality. Plots were treated with 0, 50, 100, or 150 lb P_2O_5/ac in three replications in June, 1992. Each site was fertilized with a blend of 150 K_2O, 25 magnesium, 50 sulfur, 1 boron, 0.5 copper, and 0.5 lb zinc/ac on 25 June. Treatments were rototilled six inches into the soil. All sites were relimed in August and the lime was incorporated. The blended fertilizer was reapplied to all plots 2 Oct. 1992. 'Alfagraze' alfalfa was seeded in 21-inch rows at 8.9 lb seed/ac in early Oct. 1992. The same blend of fertilizer and the phosphorus rates were reapplied to all sites after the first cutting in the spring of 1993, 1994, and 1995. In August of 1993 and 1994, 100 lb K_2O and 2 lb boron/ac were applied to each experiment. Alfalfa weevils were controlled with carbofuran (Furadan) in 1993, 1994, and 1995. Grassy weeds were controlled with sethoxydim (Poast) and broadleaf weeds with imazethapyr (Pursuit). The sites were harvested only three times in 1993 due to an extended dry period, but were harvested five times, at monthly intervals in 1994 and 1995.

Research Findings. The Lilbert, Cuthbert, and Bowie soils produced good yields in 1993 and 1994 (Table 1). Because of initially adequate levels of soil P, yield was not increased significantly by P application rates on these soils. Yields increased significantly as applied levels of P were raised on the Keithville-Sawtown soil association and on the Darco soil in 1993, 1994, and in 1995 (1995 data not shown). In 1994, with applied P, the yield on the Keithville-Sawtown soil was comparable to that of the Lilbert, Cuthbert, and Bowie soils. In 1993, because of an extended dry period, alfalfa production on the Darco soil was less than 1 ton/ac at the highest rate of applied P. The Thenas soil produced the highest yield in 1994 and in 1995. This soil contains a water-conducting sand lens at 19 inches. Alfalfa did not respond to P application when soil P was greater than 10 ppm.

Application. Preliminary data after two seasons indicated that the Lilbert, Cuthbert, Keithville-Sawtown and Bowie soils are well adapted for production of alfalfa. The Redsprings, Kirvin, and Darco series are droughty soils, and produce lower yields. The low position of the Thenas soil on the landscape leaves it at risk of damage from prolonged flooding even though this soil produced the higher yields in 1994 and 1995.

Yield data from 1993 and 1994 indicate that 125 to 150 lb P_2O_5 per acre are needed for establishment of Alfagraze alfalfa on soils with very low initial P levels. Yields should be

maintained by 100 lbs P_2O_5 per acre in subsequent years on low P soils. As soil P increases, this rate may be lowered.

Table 1. Response of alfalfa dry matter and soil P levels to applied phosphorus by soil series in 1993 and 1994.

Applied	1993		1994		1993		1994	
P_2O_5	Yield	Soil P	Yield	Soil P	Yield	Soil P	Yield	Soil P
lb/ac	t/ac	ppm	t/ac	ppm	t/ac	ppm	t/ac	ppm
	Lilbert				Cuthbert			
0	2.5	13 b[1]	1.7	15.1	2.8	29 ab	3.8	40.0
50	3.0	18 ab	2.9	26.9	2.2	22 b	3.6	22.7
100	3.1	24 a	2.7	37.5	3.2	23 b	3.7	48.2
150	3.4	26 a	2.5	42.7	3.0	37 a	3.9	37.7
	N.S.		N.S.	N.S.	N.S.		N.S	N.S.
R^2	0.71	0.71	0.84		0.76	0.68	0.73	
C.V.	16.9	23.6	14.4		10.8	21.6	8.97	
	Bowie				Keithville-Sawtown			
0	2.0	17	4.4	11.6	0.4 c	2 c	0.6 a	2.6
50	2.1	19	4.5	16.1	1.3 c	6 b	3.1 a	9.6
100	2.3	33	5.2	24.5	2.2 a	8 b	3.8 a	17.2
150	2.6	24	4.9	35.2	2.5 a	12 a	3.8 a	29.8
	N.S.	N.S.	N.S.	N.S.				N.S.
R^2	0.61	0.71			0.90	0.89	0.89	
C.V.	16.2	36.0			24.9	24.7	23.4	
	Redsprings				Thenas			
0	1.4	25	3.0	10.2	1.2	74	4.6	54.1
50	1.6	22	2.7	28.9	1.2	75	4.5	75.8
100	1.5	38	2.8	30.4	1.4	85	4.8	74.7
150	1.3	35	2.7	22.1	0.8	86	4.2	93.0
	N.S.	N.S.	N.S.	N.S.	N.S.	N.S	N.S.	N.S.
R^2	0.58	0.29	.66		0.44	0.51	0.58	
C.V.	18.9	54.3	14.2		31.2	9.4	13.9	
	Kirvin				Darco			
0	1.0	64	1.5	38.2	0.4 b	7 c	2.3 b	7.1
50	1.1	83	1.0	77.0	0.7 a	9 c	3.3 a	19.6
100	1.2	86	1.5	80.0	0.8 a	17 b	3.7 a	25.9
150	1.1	81	1.3	68.5	0.8 a	21 a	4.0 a	44.3
	N.S.	N.S.	N.S.	N.S.				N.S.
R^2	0.74	0.12	0.59		0.74	0.96	0.81	
C.V.	15.0	47.4	30.8		28.5	12.4	25.1	

[1]Yield and P levels within a column and soil series followed by the same letter are not significantly different at .05 level.