EFFECT OF SULPHUR ON YIELD OF ALFALFA IN NORTHEASTERN SASKATCHEWAN

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Experiments were conducted on three soil types to determine the effect of N, P and S fertilizers on herbage yield of alfalfa (Medicago media Pers.) over the life of the stand. Rates of 10, 45 and 67 kg S ha^{-1} were applied in combination with 0, 22, and 45 kg S ha^{-1} in the spring of each year. Twenty kg P ha^{-1} was applied with these treatments. A control with no fertilizer yielded an average of 2.15 tonnes ha^{-1} per cut. An additional treatment (22 kg N ha^{-1}, 26 kg S ha^{-1}) yielded 3.01 tonnes ha^{-1} per cut (avg. 10 cuts) which was the most economical treatment on Waitville loam (Table 1). Response to S fertilizer was significant on this site but not on Whitefox fine sandy loam which was slightly lower in 0.01 M $CaCl_2$ soluble-S (18.4 vs. 16.5 µg S $(4\ g)^{-1}$ soil). The Whitefox soil was high in sodium bicarbonate soluble-P and soil tests for S were increased slightly (avg. 1.6 µg $(4\ g)^{-1}$) by the application of 20 kg P ha^{-1}. Contrary to expectation, yield responses as much as 0.76 tonnes ha^{-1} of herbage were obtained in two years on Melfort silty clay, a soil initially containing a high amount of sulphate-S (46 µg S $(4\ g)^{-1}$ soil).

The application of S fertilizer increased the amount of available sulphate-S in the soil (Figures 1 and 2). Rates greater than 25 kg S ha^{-1} should not be applied on sandy soils because leaching losses may occur. Results indicated that soils should be tested every four or five years to provide a basis for adjusting sulphur fertilizer rates.

Table 1. Mean yield of alfalfa herbage per cut as affected by N, P and S fertilizers

Soil Type	N fertilizer kg ha^{-1}	P fertilizer kg ha^{-1}	S fertilizers, kg ha^{-1}			
			0	22	26	45
			t ha^{-1}			
Waitville**	0	0	2.15			
loam,	10	0	2.26			
1973 to 1978	22	0	-		3.01	
10 cuts	10	10	2.30	-		
	10	20	2.38	2.73		2.67
	45	20	2.63	2.99		3.21
	67	20	2.55	3.06		2.91
Melfort†	0	0	3.16			
silty clay	10	0	3.07			
1974 to 1980	22	0			3.22	
14 cuts	10	10	3.21			
	10	20	3.09	3.09		3.39
	45	20	3.38	3.11		3.43
	67	20	3.22	3.40		3.28
Whitefox*	0	0	2.95			
fine sandy loam	10	0	2.81			
1974 to 1978	22	0			2.98	
7 cuts	10	10	3.04			
	10	20	3.16	2.96		3.21
	45	20	3.37	2.80		3.12
	67	20	3.42	3.36		3.45

**N and S effects, F tests, were significant at 1% probability level, $S_{y.x}$ = 0.084 Mg ha^{-1}

*N effect, F test, was significant at 1% probability level, $S_{y.x}$ = 0.165 Mg ha^{-1}

†N effect, F test, was significant at 10% probability level, $S_{y.x}$ = 0.109 Mg ha^{-1}

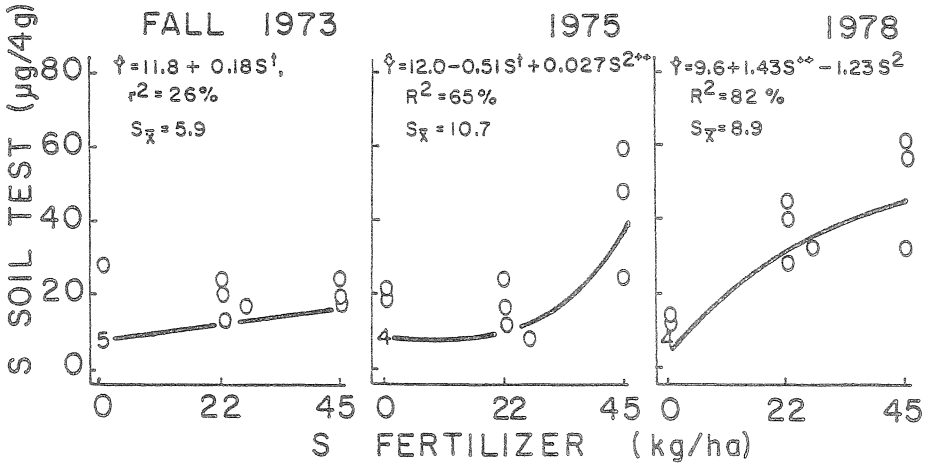

Figure 1. Calcium chloride soluble sulphate-S measured to a depth of 60 cm in relation to applied S fertilizer on the Waitville loam soil site.

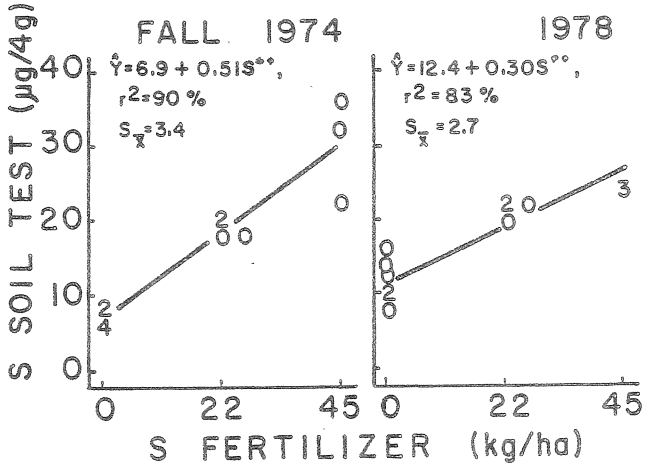

Figure 2. Calcium chloride soluble sulphate-S measured to a depth of 60 cm in relation to applied S fertilizer on the Whitefox fine sandy loam soil site.