AB-12

PROGRESS REPORT - 1995

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Project: Maximizing Forage Productivity by Improving Effectiveness of P Fertilizer

I. Objectives

1. To determine the effect of various levels of P on dry matter and protein yield of alfalfa and smooth bromegrass grown for hay in central Alberta.
2. To compare the effect of broadcast versus banding, low annual versus single high initial rates, and fall versus spring application of P on dry matter and protein yield of alfalfa and smooth bromegrass grown for hay.

II. Activities

Field experiments on alfalfa and bromegrass received P fertilizer in fall, 1994 and spring, 1995 on the existing stands. The plots were harvested two times during growing season in 1995 (i.e., late June and mid September) for hay yield and the finely-ground plant samples are being analyzed for total N and P.

III. Results and Discussion

Alfalfa P Experiment. There was a substantial increase in dry matter yield (DMY) from annual P applications in 1995 and forage yields continued to increase up to 30 kg

P/ha rate (Table 1). Single high initial applications at 50, 100 and 150 kg P/ha rates produced less forage yield than low annual applications. Disc-banding generally produced greater forage yield than broadcast application (at 10, 20 and 30 kg P/ha rates for annual applications, and 50 and 150 kg P/ha rates for initial applications). Broadcast P at 20 kg/ha applied in fall produced slightly lower forage yield than similarly applied P in the spring.

Bromegrass P Experiment. Forage yield increased with annual P application, but increases were small beyond the 10 kg P/ha rate. For annual applications, the forage yield increases were greater with broadcast application than disc-banding (Table 2). For single initial applications, disc-banding gave greater forage yield than broadcast-applied P. Single high initial broadcast P applications produced less DMY than similarly applied annual applications, while single initial disc-banding tended to give forage yields similar to annual broadcast-applied P. Fall-applied P produced more forage yield and spring-applied P.

IV. 1996/97 Action Plan

1. Annual fertilizer applications and collecting forage samples for Cut 1 and 2 in alfalfa P experiment.

2. Weighing, drying, grinding and analyzing forage samples for total N and P.

3. Collecting, drying, grinding and analyzing soil samples for fertility status in all treatments of alfalfa P experiment in fall, 1996 and terminate the experiment.

Table 1. Influence of rate, mode and method of P application on dry matter yield (DMY) of alfalfa in a field experiment at Ponoka in north-central Alberta in 1995.

Fertilizer treatment			DMY (kg/ha)		
Mode/time of application	Method of placement	Rate of P (kg P/ha)	Cut 1	Cut 2	Total
Annual, spring	Broadcast	10	2437	1240	3677
		20	3396	2387	5783
		30	3792	2516	6308
		40	3768	2556	6324
	Disc-band	10	3439	2290	5729
		20	3979	2605	6584
		30	3753	2873	6626
		40	3738	2727	6465
Single, initial	Broadcast	50	1825	1234	3059
		100	2964	1903	4867
		150	3131	1878	5009
		200	4043	2218	6261
	Disc-band	50	2412	1445	3857
		100	2796	1495	4291
		150	4157	2379	6536
		200	3540	2612	6152
Annual, fall	Broadcast	20	1303	1104	2407
Check		0	3272	2323	5595

Table 2. Influence of rate, mode and method of P applications on dry matter yield (DMY) of bromegrass in a field experiment at Ponoka in north-central Alberta in 1995.

Fertilizer treatment			DMY (kg/ha)		
Mode/time of application	Method of placement	Rate of P (kg P/ha)	Cut 1	Cut 2	Total
Annual, spring	Broadcast	10	4697	6293	10990
		20	5836	5590	11426
		30	6545	6036	12581
		40	6505	5364	11869
	Disc-band	10	4266	4600	8866
		20	4966	5684	10650
		30	5051	4961	10012
		40	5236	6032	11268
Single, initial	Broadcast	50	2767	2047	4814
		100†	1238	793	2031
		150	2160	2938	5098
		200	2938	2918	5856
	Disc-band	50	4755	3677	8432
		100	5308	4575	9883
		150	5975	4975	10950
		200	5865	5076	10941
Annual, fall	Broadcast	20	1639	1301	2940
Check		0	6259	5994	12253

† Some plots in this treatment were most likely damaged by gophers.