THE RESPONSE OF BROMEGRASS AND ALFALFA PASTURE TO NP FERTILIZER AS AFFECTED BY SOIL TESTS

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A pasture experiment with four systems of pasture management was initiated in 1967. Three years later (1970) nitrogen fertilizers at 90 kg N/ha was applied on all pastures. Small fertilizer plots were placed within two of the pasture systems, Put + Take and Fed Barley. In the latter system, the stocking rate was 3.7 steers per hectare and level of rolled grain (barley) was increased gradually until the steers were on self-feed near the end of the season. Nitrogen fertilizer was applied at rates of 0, 45, 90, 135 and 180 kg N/ha in 1970 (Table 1).

Table 1. YIELD RESPONSE OF BROMEGRASS AND ALFALFA PASTURE TO N FERTILIZER, 1970
MSIC

Pasture Management	Nitrogen (kg/ha)					
	0	45	90	135	180	Avg.
	Yield in kg/ha					
Put + Take	4143	4707	4823	5499	5316	4898
Fed Barley	4336	5537	5421	5660	5285	5248
Average	4239	5122	5122	5579	5300	5073

The plots were split in 1971 and 45 kg P_2O_5/ha was applied on one-half of each plot in combination with the nitrogen until 1973 (Table 2). The botanical composition and the residual effects of the NP fertilizer were measured until 1976 (Tables 3, 4 and 5).

Table 2. YIELD RESPONSE OF BROMEGRASS AND ALFALFA PASTURE TO NP FERTILIZER, 1972-3*
MSIC

Pasture Management	P_2O_5 (kg/ha)	Nitrogen (kg/ha)					
		0	45	90	135	180	Avg.
		Yield in kg/ha					
Put + Take	0	3331	3549	4143	4629	4564	4043
	45	4047	5749	5749	5961	6480	5597
Fed Barley	0	3804	4742	5674	6112	6183	5303
	45	5138	5948	6629	6861	7738	6463
Average	0	3567	4145	4909	5370	5374	4673
	45	4592	5848	6189	6411	7109	6030
	Average	4080	4997	5549	5891	6241	5352

* NP Fertilizer was applied in 1971 also.

Table 3. THE EFFECT OF NP FERTILIZER ON PERCENTAGE LEGUME IN A BROMEGRASS AND ALFALFA PASTURE, 1972-3 MSIC

Pasture Management	P_2O_5 (kg/ha)	Nitrogen (kg/ha) 0	45	90	135	180	Avg.
				0/0			
Put + Take	0	54.8	35.6	39.0	38.0	38.9	41.3
	45	51.5	32.3	26.5	25.4	27.1	32.6
Fed Barley	0	42.8	26.2	21.2	25.0	22.2	27.5
	45	34.5	18.1	15.1	16.5	13.8	19.6
Average	0	48.8	30.9	30.1	31.5	30.5	34.4
	45	43.0	25.2	20.8	21.0	20.4	26.1
	Average	45.9	28.1	25.5	26.2	25.5	30.2

Table 4. RESIDUAL YIELD RESPONSE OF BROMEGRASS AND ALFALFA PASTURE TO NP FERTILIZER, 1974-5 MSIC

Pasture Management	P_2O_5 (kg/ha)	Nitrogen (kg/ha) 0	45	90	135	180	Avg.
				Yield in kg/ha			
Put + Take	0	3491	3246	3569	3699	4258	3653
	45	3929	3627	3621	3810	4614	3920
Fed Barley	0	3361	3472	3506	3777	4252	3674
	45	3772	3537	3244	3756	3983	3658
Average	0	3426	3359	3538	3738	4255	3663
	45	3850	3582	3432	3783	4299	3789
	Average	3638	3470	3485	3760	4277	3726

Table 5. RESIDUAL YIELD RESPONSE OF BROMEGRASS AND ALFALFA PASTURE TO NP FERTILIZER, 1976 MSIC

Put + Take	0	2829	2610	2067	3135	2905	2709
	45	4295	3343	3790	4084	4051	3912
	Average	3562	2976	2929	3610	3478	3311

Soil tests were determined on the plots for nitrate-nitrogen, exchangeable ammonium-nitrogen and sodium bicarbonate soluble phosphorus. Regression analyses of percentage yield of control in relation to fertilizer rates and soil teses were determined (Figures 1 and 2).

Results (Table 1) showed very significant increases in herbage due to N fertilizer and also higher herbage yields from the pasture where animals had supplementary grain.

Soil tests indicated that nitrogen and phosphorus in the soil were higher in pastures where supplementary grain had been fed (due to animal feces) and this would account for higher herbage yields.

The addition of phosphorus significantly increased yield of herbage in the pasture (Table 2). However, both N and P fertilizers significantly reduced the amount of alfalfa in the sward (Table 3). Feeding supplementary barley also resulted in less percentage alfalfa in the sward. The yields of herbage from the residual N and P fertilizer was lowest for 45 and 90 kg N/ha rates (Tables 4 & 5). The reduction of alfalfa in the sward at the lower N rates probably resulted in lower yields after the fertilizer N and P had been utilized by the plants. At the higher N rates, there would be more residual N, and this would tend to increase the yield of herbage. With time, however, 45 kg P_2O_5/ha appears to be the best residual treatment.

The percentage yield of the control fertilizer treatment was significantly related by regression analyses to nitrogen and fertilizer rates and the soil test for phosphorus (Figures 1 and 2). The quadratic or curvilinear component of forage yield was not significant when fertilizer N was applied in 1972-73 (Figure 1). Residual effects for 1974-5-6 showed that rates of 45 and 90 kg N/ha gave herbage yields that were lower than the control. Less legume in the stand because of the increased competitive effect of bromegrass from previous N application is concluded to have reduced the total amount of available nitrogen, thus reducing the yield. At the higher nitrogen rates, residual response was greater, as might be expected.

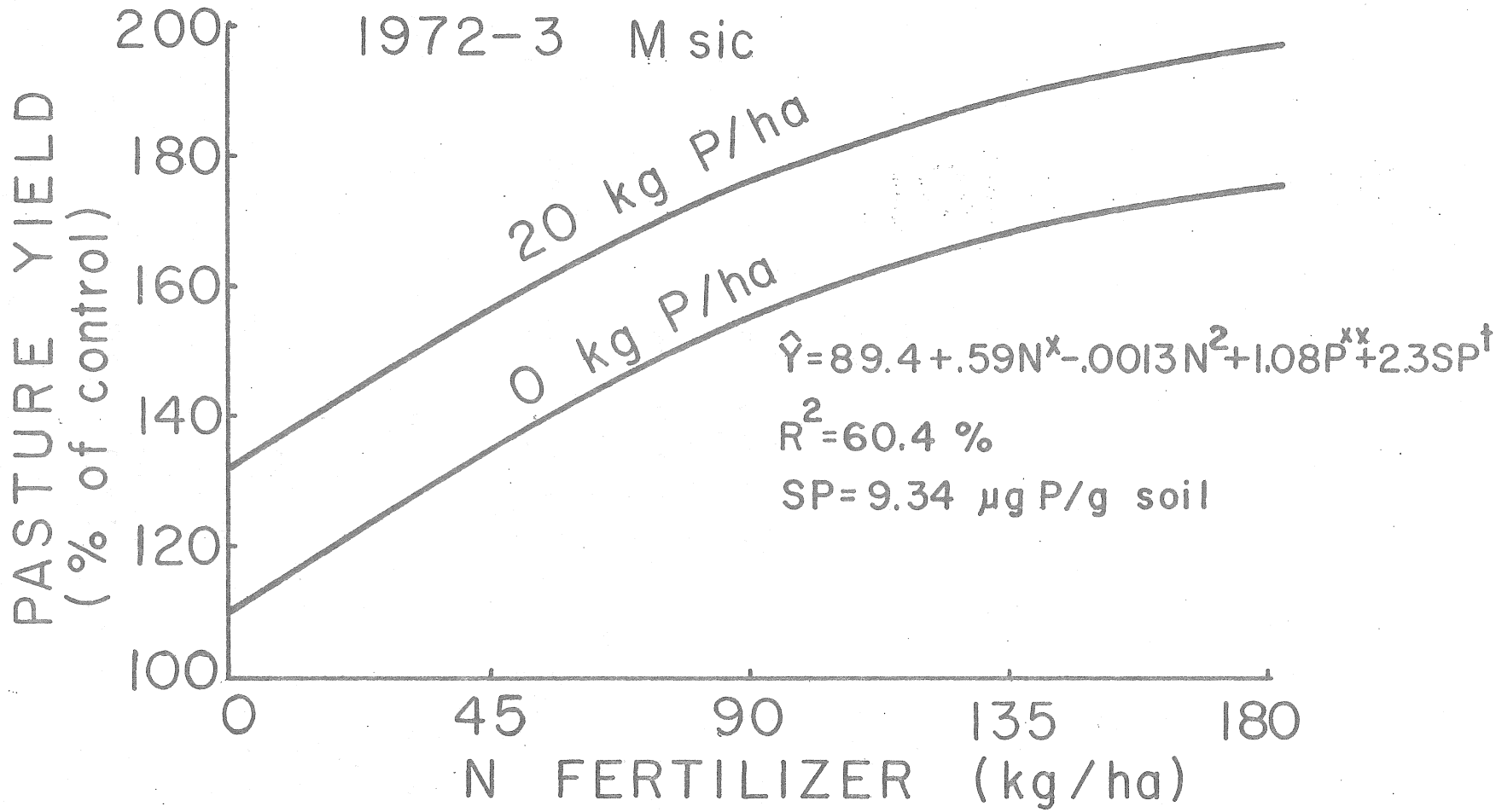

Figure 1. Effect of NP Fertilizers on Bromegrass and Alfalfa Herbage Yields Expressed as a Percentage of Control.

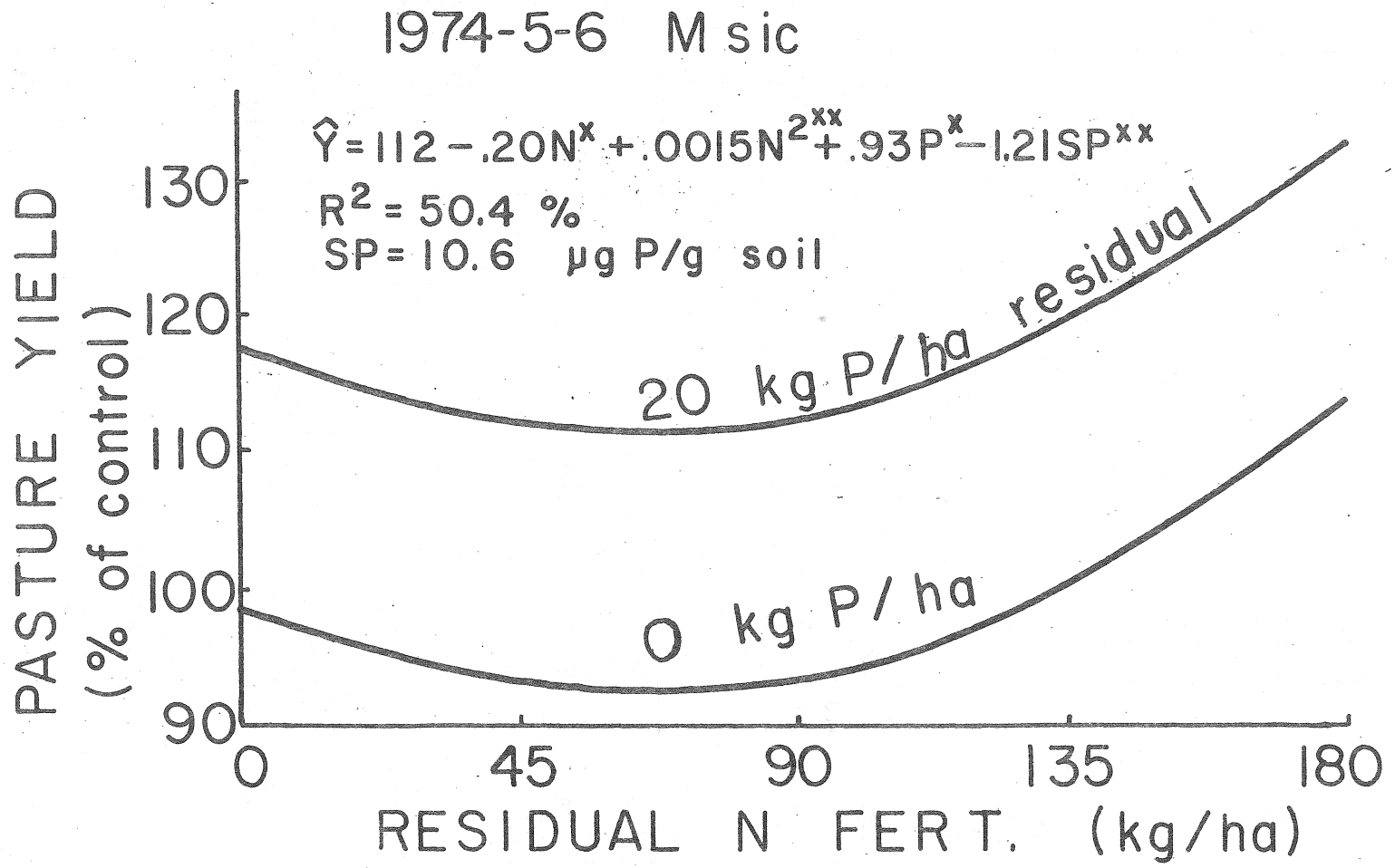

Figure 2. Residual Effect of NP Fertilizers on Bromegrass and Alfalfa Herbage Yields Expressed as a Percentage of Control.