ALFALFA N, P, K, S FERTILIZER APPLICATION

The fertilizer experiment was planted on May 26, 1981 and harvested on July 23 and October 12, 1981. The nitrogen, phosphorus, potassium, and sulphur (N,P,K,S) treatments were applied as ammonium nitrate, triplephosphate, potassium chloride, and calcium sulphate. The N and K applications were split with half banded at planting and half broadcast after first cutting. The soil was fumigated on April 13, 1981 with 30 gallons per acre Telone II to remove microbes, nematodes, and grasses. The alfalfa, a coated type, was hand inoculated from three commercial sources to ensure *Rhizobium* infection. Eptam and Baylan were applied as pre-emergence weed control.

The yield of Valor alfalfa without fertilizer application was 3 tons per acre (Table 2). The addition of P, K, and S in any combination did not increase the yield. The addition of 40, 80, and 160 pounds N per acre to Valor increased the dry matter yield by 625, 1,095, and 1,674 pounds per acre, respectively. This was approximately 500 pounds more alfalfa for each twofold increment of nitrogen. The yield of Vernal was not affected by 40 pounds of N. Yield was increased by 376 pounds for the 80 pounds N and 675 pounds for 160 pounds N application. Vernal yield was increased significantly by P and P, K, S applications but not by P, K or N, P, K, S applications. Plant height at first cutting was increased significantly at 40 and 160 pounds N but not at 80 pounds N. The plant height at second cutting was not affected by any fertilizer treatment.

Table 2. Yield and height of alfalfa grown at Klamath Experiment Station, 1981

Fertilizer Rate					Valor			Vernal		
N	P_2O_5	K_2O	S	Ht.	1st	2nd	Total	1st	2nd	Total
lb/A				in.	lb/A					
0	0	0	0	18.5	2662	3397	6059	2700	3217	5917
0	200	0	0	19.3	2827	3311	6138	3174	3470	6644
0	0	400	0	17.8	2740	3276	6017	2641	3515	6156
0	0	0	80	17.0	2644	3429	6072	2786	3243	6035
0	200	400	0	17.8	2484	3275	5759	2667	3247	5914
0	0	400	80	17.8	2445	3610	6055	2770	2990	5984
0	200	400	80	18.7	2706	3459	6165	3420	3593	7013
40	200	400	80	20.8	3057	3627	6684	2950	3077	6026
80	200	400	80	18.8	3510	3644	7154	2975	3427	6402
160	200	400	80	21.5	3851	3881	7733	3165	3535	6701
			SD	1.8	434	440	466			
			CV	9.7%	14.9%	12.9%	7.37%			
			P(F)	0.1%	0.77%	4.77%	3.46%			

Ammonium nitrate applications at 40, 80, and 160 pounds N increased alfalfa by 519, 989, and 1,568 pounds, respectively. Ammonium nitrate cost $224 per ton and alfalfa sold for $70 per ton.

Table 3. The 1981 economic analysis of nitrogen application to alfalfa

	Nitrogen in lb/A			
	0	40	80	160
	$ per Acre			
Cost of N per A	-0-	13.72	27.50	55.00
Alfalfa Value, Total	247.00	267.00	286.00	309.00
Alfalfa Value, Increase	-0-	20.00	39.00	62.00
Alfalfa Value - N Cost	-0-	6.28	11.50	7.00

The application of 40, 80, and 160 pounds N per acre returned an extra $6.28, $11.50, and $7 per acre, respectively, more than alfalfa plots where no nitrogen was applied at high levels of P, K, and S. No labor or equipment costs have been assigned to the fertilizer treatments in this experiment.

Irrigation of the fertility experiment was two inches of water per week by sprinkler. This was applied in 24 hours and replaced open pan evaporation for that location. This application rate was used until first cutting to allow adequate establishment. After first cut, irrigation treatments were applied to fertility treatments. The irrigation levels were 2 and 1.5 inches applied, with two weeks per cutting without irrigation. The third irrigation level was two inches applied weekly through the entire growing season. No effect of irrigation nor of irrigation interaction with fertility was observed in the first year.