

FERTILIZER USE IN WESTERN NORTH DAKOTA

Experiments with commercial fertilizer conducted by the Soils Department of North Dakota State University and by the branch stations, plus farm experience with commercial fertilizer have shown that farmers can make a profit from the proper use of fertilizer. However, the margin of profit from the use of fertilizer on crop land is probably less in western North Dakota than in any other area of the state. Crop response to commercial fertilizer has been inconsistent in trials at both Williston and Dickinson. Commercial fertilizer, when applied to small grain crops in western North Dakota, does not pay its way each year. On the average however, yields of fertilized small grain crops are increased enough to pay for the fertilizer used, and the operator continues to fertilize in anticipation of the years when maximum response to commercial fertilizer application occurs. The magnitude of the difference in yield between fertilized and unfertilized wheat has ranged from zero to one hundred per cent increase in the trials tabulated here.

Use of fertilizer is a good management practice only when the returns from a dollar spent for fertilizer are as great or greater than the returns would be from an alternative expenditure in the farm business. Depending on the prices of grain and fertilizer, the use of commercial fertilizer can be a marginal practice in western North Dakota.

Table 39. FERTILIZER RATE & FORMULATION TRIAL 1971 – BEACH

		Yield in Bushels per Acre					
Variety or Treatment		Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
18-46-0	100#	40.7	52.8	46.2	44.0	45.9	59.5
18-46-0	50#	45.1	49.5	40.7	38.5	43.5	61.0
0-46-0	100#	49.5	47.3	41.8	40.7	44.8	61.0
0-46-0	50#	47.3	52.8	41.8	42.9	46.2	61.5
23-23-0	200#	53.9	53.9	44.0	49.5	50.3	61.0
23-23-0	100#	50.6	52.8	40.7	45.1	47.3	60.0
CHECK		49.5	48.4	37.4	37.4	43.2	61.5
Nutrient recommendations based on soil test are zero-N, 20 lbs. P ₂ O ₅ , & zero K ₂ O.							
Standard error of a treatment mean = 1.4601 Standard error of a difference among treatment means = 2.0649 The CV = 6.36 per cent. The L.S.D. at 5% is 4.34 bushels per acre.							

Table 40. FERTILIZER RATE & FORMULATION TRIAL 1971 – GLEN ULLIN

		Yield in Bushels per Acre					
Treatment		Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
18-46-0	100#	48.5	43.8	40.7	51.7	46.2	61.0
18-46-0	50#	41.5	39.2	34.5	50.9	41.5	62.0
0-46-0	100#	45.4	40.7	40.7	53.2	45.0	61.5
0-46-0	50#	40.7	39.2	40.7	48.5	42.3	63.0
23-23-0	200#	44.6	40.7	43.8	51.7	45.2	62.0
23-23-0	100#	39.2	42.3	37.6	50.1	42.3	62.5
CHECK		39.2	37.6	36.0	45.4	39.6	62.5
Nutrient recommendations based on soil test are zero-N, 20 lbs. P ₂ O ₅ , & zero K ₂ O.							
Standard error of a treatment mean = 0.9698 Standard error of a difference among treatment means = 1.3715 The CV = 4.50 per cent. The L.S.D. at 5% is 2.88 bushels per acre.							

Table 41. FERTILIZER RATE & FORMULATION TRIAL 1971 – KILLDEER

		Yield in Bushels per Acre					
Treatment		Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
18-46-0	100#	42.9	38.5	40.7	49.5	42.9	62.5
18-46-0	50#	44.0	45.1	46.2	53.9	47.3	62.0
0-46-0	100#	44.0	46.8	42.9	55.0	47.2	62.0
0-46-0	50#	44.0	40.7	44.0	51.7	45.1	62.5
23-23-0	200#	42.9	40.7	38.5	52.8	43.7	61.7
23-23-0	100#	44.0	38.5	46.2	51.2	45.0	61.5
CHECK		40.7	36.3	46.8	51.7	43.9	62.0
Nutrient recommendations based on soil test are zero-N, 20 lbs. P ₂ O ₅ , & zero K ₂ O.							
Standard error of a treatment mean = 1.1993. Standard error of a difference among treatment means = 1.6960 The CV = 5.33 per cent. The L.S.D. at 5% is 3.56 bushels per acre.							

Table 42. OFF-STATION FERTILIZER RATE AND FORMULATION TRIAL - 1971

		Yield in Bushels per Acre			
Fertilizer Treatment	Pounds Applied	Beach	Glen Ullin	Killdeer	1971 Avg. 3-Station
18-46-0	100	45.9	46.2	42.9	45.0
18-46-0	50	43.5	41.5	47.3	44.1
0-46-0	100	44.8	45.0	47.2	45.7
0-46-0	50	46.2	42.3	45.1	44.5
23-23-0	200	50.3	45.2	43.7	46.4
23-23-0	100	47.3	42.3	45.0	44.9
CHECK		43.2	39.6	43.9	42.2
L.S.D. is		4.34	2.88	3.56	
CV is		6.36	4.50	5.33	

Table 43. OFF-STATION FERTILIZER RATE & FORMULATION TRIAL 1969-1971

Fertilizer Treatment	Lbs. Applied	Beach				Glen Ullin			
		1969	1970	1971	3 Year Avg.	1969	1970	1971	3 Year Avg.
18-46-0	100	38.2	36.0	45.9	40.0	43.8	27.7	46.2	39.2
18-46-0	50	36.5	36.7	43.5	38.9	40.4	26.2	41.5	36.0
0-46-0	100	39.5	37.8	44.8	40.7	37.5	26.5	45.0	36.3
0-46-0	50	36.5	36.4	46.2	39.7	37.5	25.5	42.3	35.1
23-23-0	200	40.8	34.4	50.3	41.8	38.9	25.6	45.2	36.6
23-23-0	100	35.8	34.7	47.3	39.3	32.9	24.0	42.3	33.1
CHECK		28.5	35.0	43.2	35.6	24.2	26.4	39.6	30.1
L.S.D. is		6.08	2.59	4.34		4.57	2.63	2.88	
CV is				6.36				4.50	

Table 44. PROTEIN DETERMINATION FROM THE FERTILIZER RATE & FORMULATION TRIAL 1971 - BEACH

Treatment	Pounds Applied	Test Weight Lbs./Bu.	Moisture %	Wheat <u>1</u>/ Protein %
CHECK		60.5	10.8	13.6
0-46-0	50	60.8	10.9	14.0
18-46-0	50	60.3	10.8	14.8
18-46-0	100	60.0	10.8	14.6
23-23-0	100	60.4	11.0	14.8
0-46-0	100	60.5	11.0	14.7
23-23-0	200	60.8	11.0	14.9
<u>1</u> / 14.0% Moisture Basis				

Table 45. PROTEIN DETERMINATION FROM THE FERTILIZER RATE & FORMULATION TRIAL 1971 – GLEN ULLIN

Treatment	Pounds Applied	Test Weight Lbs./Bu.	Moisture %	Wheat <u>1</u>/ Protein %
CHECK		61.1	10.6	13.5
0-46-0	50	61.5	10.8	12.8
18-46-0	50	61.3	10.5	13.0
18-46-0	100	60.6	10.6	12.6
23-23-0	100	61.0	10.5	13.4
0-46-0	100	62.0	10.4	12.7
23-23-0	200	61.5	10.4	13.9
<u>1</u> / 14.0% Moisture Basis				

Table 46. SUMMARY OF PROTEIN DETERMINATION FROM THE FERTILIZER RATE & FORMULATION TRIAL 1971 AT BEACH & GLEN ULLIN

Treatment	Pounds Applied	Test Weight Lbs./Bu.	Moisture %	Wheat <u>1</u>/ Protein %
CHECK		60.8	10.7	13.6
0-46-0	50	61.2	10.9	13.4
18-46-0	50	60.8	10.7	13.9
18-46-0	100	60.3	10.7	13.6
23-23-0	100	60.7	10.8	14.1
0-46-0	100	61.3	10.7	13.7
23-23-0	200	61.2	10.7	14.4
<u>1</u> / 14.0% Moisture Basis				

ADDITIONAL FERTILIZER TRIALS

Trials with commercial fertilizer were designed to measure the residual accumulation from broadcast application and from drill attachment application, and to measure crop yield response to the two methods of application.

These trials were initiated in 1970 on the east end of the old rotation and tillage plot layout. Unfortunately the location has not been entirely satisfactory because of bird damage from birds that inhabit adjacent tree plantings.

Plans are to relocate the trial site for these experiments in the spring of 1972.