

## NATIVE RANGE FERTILIZATION WITH AMMONIUM NITRATE AND UREA – 1983

### DICKINSON EXPERIMENT STATION

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A study that compares fertilization of native range between Ammonium Nitrate and Urea was started at the Dickinson Experiment Station in the spring of 1982. The trial was established on 2.6 acres located on the SW $\frac{1}{4}$  SW $\frac{1}{4}$  NW $\frac{1}{4}$  sec. 16, T. 143 N., R. 96 W. at the ranch headquarters of the Dickinson Experiment Station. The 30 X 60 foot plots were arranged in a randomized block design with three replications. The alleys between the replications were 10 feet wide and the perimeter border was 40 feet wide. A barbed wire fence was constructed to exclude grazing on the plots until after all of the data for that season were collected. The soil is moreau silty clay. The range site is clayey. The fertilization treatments were 40 and 60 pounds of Nitrogen per acre for Ammonium Nitrate and Urea applied annually and biennially, and 100 pounds of Nitrogen per acre for Ammonium Nitrate and Urea applied biennially. A total of ten fertilizer treatments and two control plots with no treatment were included in each replication. The fertilizer was Broadcast, applied on 4 May 1982 and 1983. The data that were collected from these plots were: above ground herbage production separated into seven categories, leaf height measurements and phenological phases of five major graminoid species, quantitative species composition, soil moisture and soil nutrient content at increments to 48 inches in depth.

The above ground herbage production was sampled by clipping to ground level two  $\frac{1}{4}$ m<sup>2</sup> quadrats for each plot. The herbage was separated into seven categories: cool short, warm short, cool mid, western wheatgrass, warm mid, sedge and forbs. The samples were oven dried at 80°C. The dried samples were then weighed in grams. The average weight of each category for the two  $\frac{1}{4}$ m<sup>2</sup> quadrats was determined and the average pounds per acre of herbage production was calculated for each category by multiplying the average weight in grams by 35.68. The total average production for each plot was found by the summation of the average pounds per acre for each category. The reported figures are means of the three replications for each treatment. Four clips were made for the 1983 season. The dates for these were: 1-6 June, 27-30 June, 25-26 July, and 16-17 August.

The herbage samples were ground in a Wiley mill and analyzed for nutrient content by proximate analysis at the Nutrition Laboratory in the Animal Science Department at North Dakota State University under direction of Dr. Duane Erickson. The results of these analysis will be made available at a later date.

Leaf height measurements and phenological development of the flower stalks were collected for five dominant graminoid species: *Carex filifolia*, *Bouteloua gracilis*, *Koeleria pyramidata*, *Agropyron smithii* and *Stipa comata*. Twelve plants of each species were selected at random on each plot. All of the leaves of each plant were outstretched and measured to the nearest millimeter in sequence from the oldest to the newest. Along with the length measurements, the degree of dryness for the leaf blades were recorded. The categories of dryness used were: 0, 0.1-2, 2.1-25, 25.1-50, 50.1-75, 75.1-98 and 100 percent dry. The highest figure of the category was used to record the percentage of dryness for each leaf blade.

If the flower stalks were present, the height was measured and the phenological stage of development was recorded. The categories used were: flower stalk developing, head emergence, anthesis, seeds developing and seeds being shed. Leaf height and phenological development data were collected in the 1983 season. The dates for these were: 7-9 June, 8, 11 July and 9-10 August.

Quantitative species composition data for each plot was collected during the period of 27 July to 3 August for the 1983 season. The herbaceous plants were sampled by the ten pin point-frame method (Levy and Madden 1933, Tinney, Aamodt, and Ahlgren 1937, Heady and Rader 1958, and Smith 1959). The point frame is a metal frame that is constructed to stand at a 60° angle with holes for ten pins spaced at 5 cm intervals. The frame was set down and the pins raised and then allowed to move down through the existing vegetation. If a pin hit the basal portion of a living plant, the species of that plant was recorded. Hits on *Selaginella densa* and the various species of lichens were also recorded as hits. The pins that did not make contact with living vegetation were counted as no hits. These were divided into: litter (dead and decaying vegetation), soil (mineral soil not covered by litter or living vegetation) and rock (a hard mass of mineral substance large enough to obstruct plant growth, about the size of a half dollar or larger). Aerial hits were not recorded. Fifteen hundred points were read for each treatment (500 points per plot). A systematic sampling scheme was used for each plot. A permanent major transect was established two feet inside and parallel to the north boundary of each plot. Five minor transects were established perpendicular to the major transect at three foot intervals starting three feet from the east boundary of the plot. One hundred points were read on each minor transect.

Forb and shrub densities were sampled by the use of one tenth meter square quadrats. The forbs and shrubs that were rooted within the frame were counted by species in each of the 10 quadrats per plot, 30 quadrats per treatment.

Soil moisture by the gravimetric method was taken three times during the 1983 season. The dates for these were: 21 June, 15 July, and 8 August. The one inch Veihmeyer soil tube was used to collect the samples. Three locations were selected as sample sites for the trial: at the north end, in the center and at the south end. Two replications were taken at each location. The samples were collected at increments of 0-6, 6-12, 12-24, 24-36 and 36-48 inches in depth. Each subsample was placed in a numbered steel can of known weight. These were weighed, then oven dried at 100°C. The dried soil cans were again weighed. The difference in weight is the weight of the soil water. Percent soil moisture then can be calculated.

Soil nutrient content was collected monthly during the 1983 season. The samples were collected using the one inch Veihmeyer soil tube. Two replications were taken from each plot. The samples were collected at increments of 0-6, 6-12, 12-24, 24-36, and 36-48 inches in depth. Each subsample was placed in labeled soil bags and frozen. The samples will be analyzed for nutrient content by the Soils Laboratory at North Dakota State University. The results of these analysis will be made available at a later date.

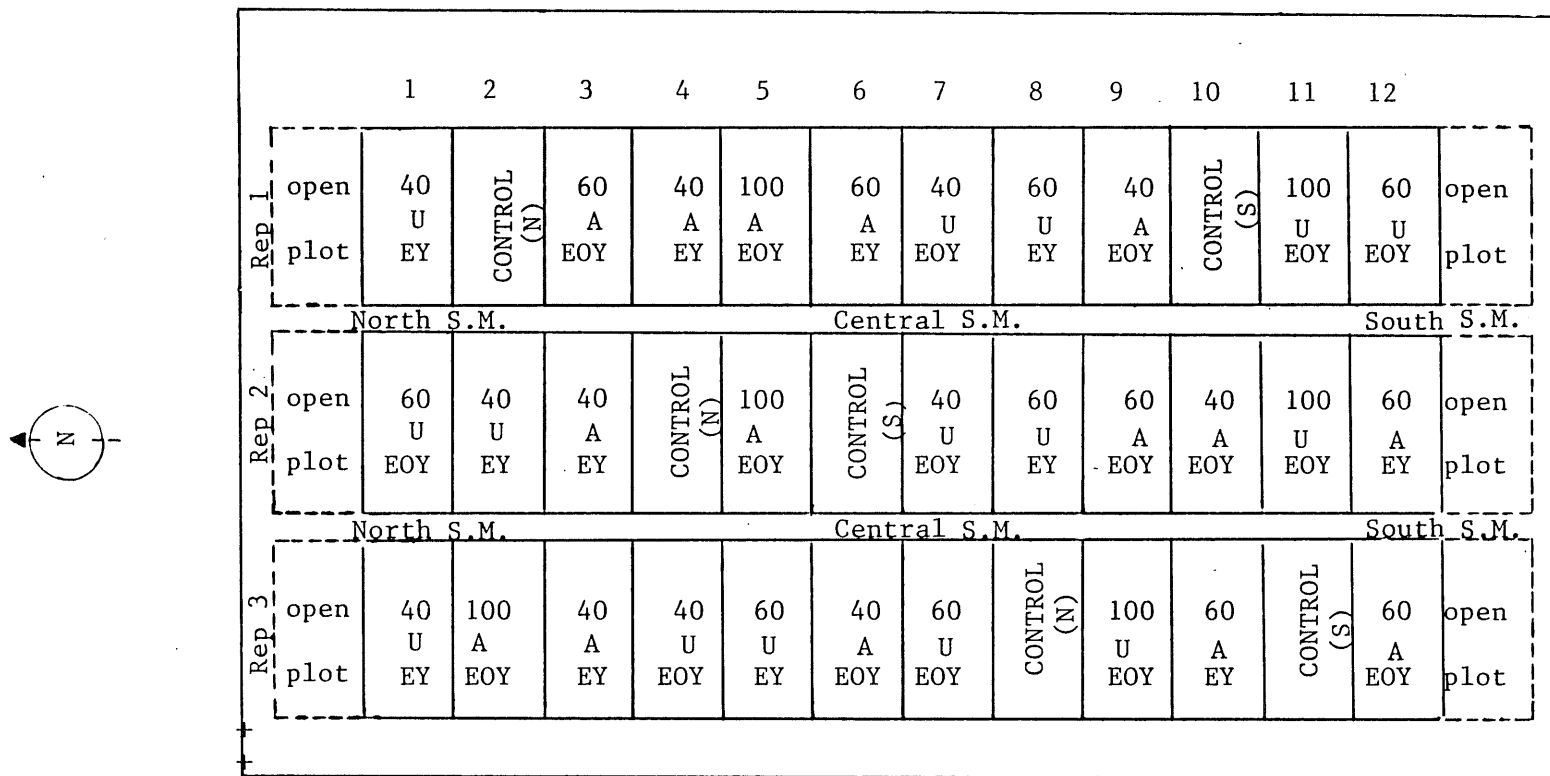


Figure 1. Native range fertilization with ammonium nitrate (A) and urea (U) randomized block plot design with three replications. Rates are 40, 60 and 100 lbs. of nitrogen per acre. Fertilizer is broadcast applied annually (EY) or biennially (EOY). Soil moisture (S.M.) samples collected at north, central and south location in each alley.

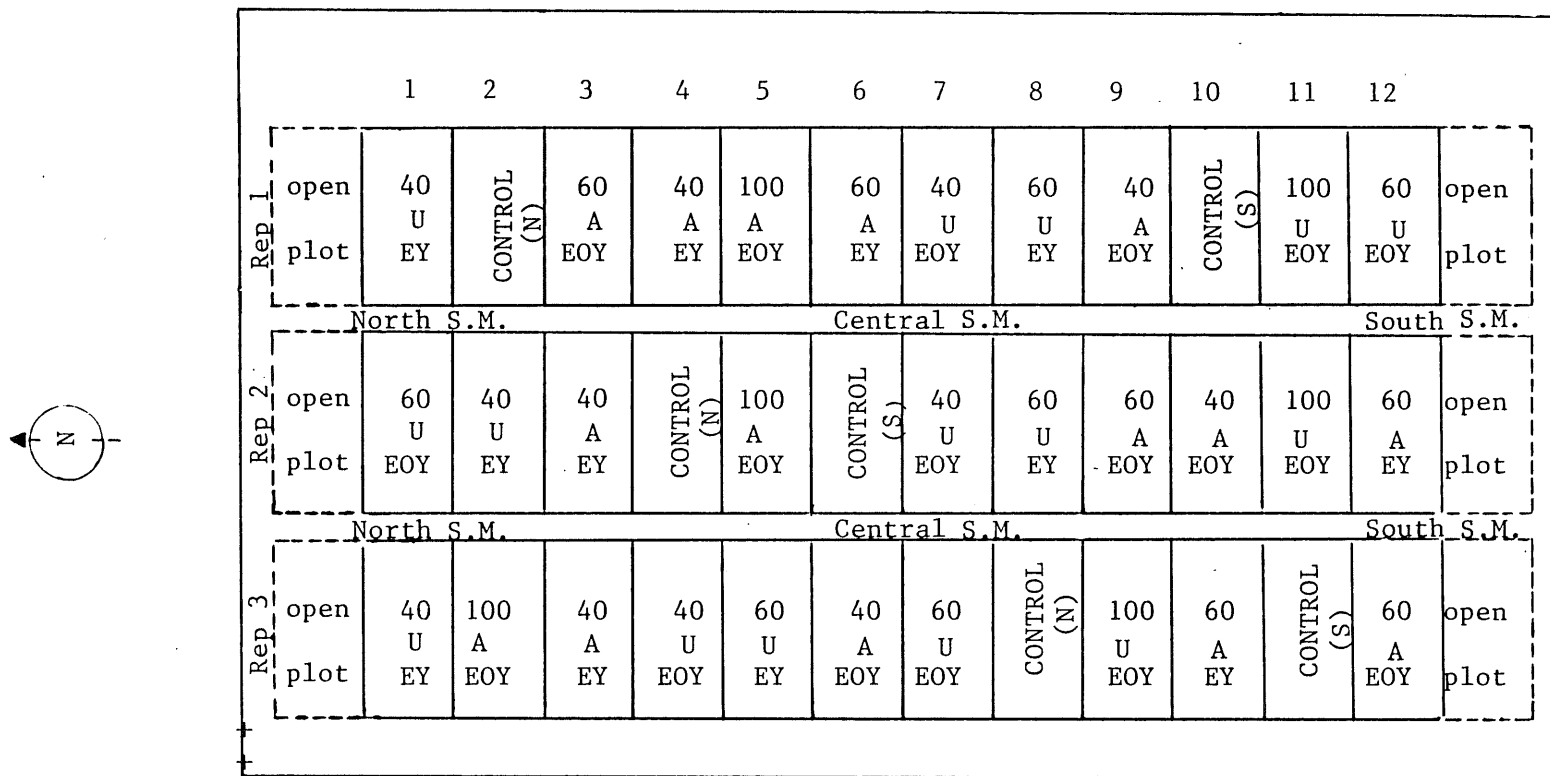


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**Table 1. Monthly Mean Maximum, Minimum and Average Temperatures in Fahrenheit (°F) and Monthly Precipitation in Inches (in) at the Ranch Headquarters, Dickinson Experiment Station, Jan-Dec, 1983**

Month	Temperature			Precipitation
	Max (°F)	Min (°F)	Avg. (°F)	(in)
Jan	32.61	13.84	23.23	0.18
Feb	37.29	17.25	27.27	0.04
Mar	35.74	20.68	28.21	1.12
Apr	50.43	25.43	37.93	0.21
May	62.23	35.55	48.89	1.53
Jun	74.37	46.73	60.55	3.26
Jul	84.54	55.61	70.08	2.56
Aug	88.65	57.81	73.23	4.45
Sep	68.87	42.17	55.52	0.86
Oct	58.61	31.97	45.29	0.72
Nov	40.30	22.37	31.33	0.33
Dec	6.55	-11.29	-2.37	0.29

**Table 2. Mean Above Ground Herbage Production by Category in Lbs/Acre for the Ammonium Nitrate Fertilization Treatment on Native Range at the Dickinson Experiment Station – 1983**

<b>Lbs of N/Acre EY=annually EOY=biennially</b>	<b>1-6 Jun</b>	<b>27-30 Jun</b>	<b>26 Jul</b>	<b>16-17 Aug</b>
<b>Control:</b>				
Cool short	314.88	353.23	306.25	313.09
Warm short	79.39	166.21	201.29	192.37
Cool mid	154.02	165.91	129.10	187.81
Western wheatgrass	116.26	89.50	86.23	77.60
Warm mid	0.00	2.97	14.27	48.46
Sedge	104.45	154.61	115.15	42.82
<b>Grass Total:</b>	769.00	932.43	852.29	862.15
Forbs	160.86	280.68	257.20	258.68
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	929.86	1213.11	1109.48	1120.83
<b>40 EY:</b>				
Cool short	396.64	547.09	498.93	372.86
Warm short	80.87	127.26	186.73	191.48
Cool mid	303.87	404.97	359.77	342.53
Western wheatgrass	311.01	321.71	403.78	243.22
Warm mid	0.00	1.19	36.87	35.68
Sedge	97.53	102.88	50.67	29.73
<b>Grass Total:</b>	1189.94	1505.10	1536.75	1215.50
Forbs	261.06	330.63	322.90	282.47
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1450.98	1835.73	1859.65	1497.97
<b>40 EOY:</b>				
Cool short	401.99	519.14	410.91	381.78
Warm short	76.12	153.42	211.70	250.95
Cool mid	237.87	306.85	367.50	203.97
Western wheatgrass	199.81	176.02	202.78	121.91
Warm mid	0.00	22.00	14.87	0.00
Sedge	93.36	111.38	201.59	58.28
<b>Grass Total:</b>	1009.15	1288.81	1409.35	1016.89
Forbs	166.27	111.80	199.81	280.09
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1175.42	1400.61	1609.16	1296.98

<b>Lbs of N/Acre EY=annually EOY=biennially</b>	<b>1-6 Jun</b>	<b>27-30 Jun</b>	<b>26 Jul</b>	<b>16-17 Aug</b>
<b>60 EY:</b>				
Cool short	543.53	578.02	381.78	335.99
Warm short	148.67	206.94	190.29	324.09
Cool mid	287.82	451.95	432.92	240.84
Western wheatgrass	252.14	302.69	111.20	83.85
Warm mid	7.73	29.14	20.22	0.00
Sedge	196.83	231.92	173.05	108.82
<b>Grass Total:</b>	1436.72	1800.66	1309.46	1093.59
Forbs	290.79	349.66	265.22	270.57
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1727.51	2150.32	1574.68	1364.16
<b>60 EOY:</b>				
Cool short	399.62	469.79	463.84	365.72
Warm short	75.52	230.14	221.22	226.57
Cool mid	212.30	387.72	422.21	373.45
Western wheatgrass	179.59	274.14	492.38	384.15
Warm mid	0.00	11.30	0.00	0.59
Sedge	250.95	121.31	206.35	237.27
<b>Grass Total:</b>	1117.98	1494.40	1806.00	1587.75
Forbs	149.86	253.33	84.44	144.50
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1267.84	1747.73	1890.44	1732.25
<b>100 EOY:</b>				
Cool short	399.02	608.34	396.64	330.63
Warm short	67.20	179.59	250.95	209.32
Cool mid	196.83	286.03	431.13	267.01
Western wheatgrass	282.47	298.52	240.25	229.54
Warm mid	0.00	0.00	39.84	0.00
Sedge	192.67	127.26	153.42	107.04
<b>Grass Total:</b>	1138.19	1499.74	1512.23	1143.54
Forbs	220.62	289.01	197.43	349.07
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1358.81	1788.75	1709.66	1492.61

**Table 3. Mean Above Ground Herbage Production by Category in Lbs/Acre for the Urea Fertilization Treatment on Native Range at the Dickinson Experiment Station – 1983**

<b>Lbs of N/Acre EY=annually EOY=biennially</b>	<b>1-6 Jun</b>	<b>27-30 Jun</b>	<b>26 Jul</b>	<b>16-17 Aug</b>
<b>Control:</b>				
Cool short	314.88	353.23	306.25	313.09
Warm short	79.39	166.21	201.29	192.37
Cool mid	154.02	165.91	129.10	187.81
Western wheatgrass	116.26	89.50	86.23	77.60
Warm mid	0.00	2.97	14.27	48.46
Sedge	104.45	154.61	115.15	42.82
<b>Grass Total:</b>	769.00	932.43	852.29	862.15
Forbs	160.86	280.68	257.20	258.68
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	929.86	1213.11	1109.48	1120.83
<b>40 EY:</b>				
Cool short	397.24	504.28	381.78	329.45
Warm short	52.93	117.74	179.59	90.39
Cool mid	286.03	401.40	611.32	335.39
Western wheatgrass	332.42	579.21	374.64	368.10
Warm mid	0.59	0.00	3.57	16.65
Sedge	36.27	54.11	39.25	14.27
<b>Grass Total:</b>	1105.48	1656.74	1590.15	1154.25
Forbs	268.79	324.69	217.65	344.31
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1374.27	1981.43	1807.80	1498.56
<b>40 EOY:</b>				
Cool short	350.26	385.94	305.66	371.67
Warm short	91.58	240.84	129.04	210.51
Cool mid	176.02	252.14	201.59	176.02
Western wheatgrass	159.37	107.04	165.91	145.69
Warm mid	0.00	21.41	35.68	46.38
Sedge	105.85	80.28	105.26	120.72
<b>Grass Total:</b>	883.08	1087.65	943.14	1070.99
Forbs	175.43	374.64	298.52	335.39
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1058.51	1462.29	1241.66	1406.38



<b>Lbs of N/Acre</b> <b>EY=annually</b> <b>EOY=biennially</b>	<b>1-6</b> <b>Jun</b>	<b>27-30</b> <b>Jun</b>	<b>26</b> <b>Jul</b>	<b>16-17</b> <b>Aug</b>
<b>60 EY:</b>				
Cool short	427.57	534.01	449.57	410.32
Warm short	103.47	159.37	283.06	142.13
Cool mid	321.12	599.42	397.24	295.55
Western wheatgrass	194.46	259.87	201.59	193.27
Warm mid	0.00	1.19	3.57	1.19
Sedge	175.43	164.72	233.11	151.64
<b>Grass Total:</b>	1222.05	1718.58	1568.14	1194.10
Forbs	210.51	204.57	210.51	236.68
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1432.56	1923.15	1778.65	1430.78
<b>60 EOY:</b>				
Cool short	261.06	301.50	266.41	240.25
Warm short	139.15	194.46	209.32	181.97
Cool mid	345.50	506.66	325.88	204.57
Western wheatgrass	264.63	353.83	303.28	462.65
Warm mid	0.00	1.19	37.46	0.00
Sedge	286.63	211.70	241.43	179.59
<b>Grass Total:</b>	1296.97	1569.34	1383.78	1269.03
Forbs	124.29	286.03	124.29	118.34
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1421.26	1855.37	1508.07	1387.37
<b>100 EOY:</b>				
Cool short	426.97	491.19	369.88	166.51
Warm short	151.64	209.32	230.73	248.57
Cool mid	355.61	867.02	691.00	151.64
Western wheatgrass	394.26	250.35	260.46	177.81
Warm mid	1.78	4.16	0.00	62.44
Sedge	408.54	180.18	213.49	101.69
<b>Grass Total:</b>	1738.80	2002.22	1765.56	908.66
Forbs	159.37	283.06	140.34	491.79
Shrubs	0.00	0.00	0.00	0.00
<b>TOTAL:</b>	1898.17	2285.38	1905.90	1400.45

**Table 4. Mean Percentage of Herbage Production Increase for the Fertilization Treatments Compared to the Herbage Production on the Unfertilized Plots for 1982 and 1983**

Rate Lbs of N/Acre	Ammonium Nitrate		Urea	
	1982	1983	1982	1983
40 EY	67.1	51.9	72.1	52.3
40 EOY	49.3	25.4	44.1	18.2
60 EY	74.0	55.9	53.6	50.1
60 EOY	69.0	51.8	86.0	41.1
100 EOY	111.3	45.2	117.9	71.3

**Table 5. Points Analysis of the Control Treatment (North and South) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	2.20	3.28	19.00	5.16	8.44
<i>Bouteloua gracilis</i>	20.03	29.83	85.00	23.10	52.93
<i>Buchloe dactyloides</i>	0.43	0.65	3.33	0.91	1.56
<i>Calamagrostis montanensis</i>	0.43	0.65	4.00	1.09	1.74
<i>Koeleria pyramidata</i>	7.80	11.61	54.00	14.67	26.28
<i>Muhlenbergia cuspidata</i>	0.57	0.84	4.00	1.09	1.93
<i>Munroa squarrosa</i>	0.33	0.50	3.33	0.91	1.41
<i>Stipa comata</i>	2.63	3.92	19.67	5.34	9.26
<i>Stipa viridula</i>	0.80	1.19	6.33	1.72	2.91
<i>Carex filifolia</i>	4.20	6.25	29.00	7.88	14.13
<i>Carex heliophila</i>	0.57	0.84	4.67	1.27	2.11
<i>Achillea millefolium</i>	0.13	0.20	1.00	0.27	0.47
<i>Androsace occidentalis</i>	0.13	0.20	1.33	0.36	0.56
<i>Antennaria parvifolia</i>	0.87	1.29	6.33	1.72	3.01
<i>Artemisia dracunculus</i>	0.33	0.50	3.00	0.82	1.32
<i>Artemisia frigida</i>	0.37	0.55	3.67	1.00	1.55
<i>Cerastium arvense</i>	0.13	0.20	1.33	0.36	0.56
<i>Grindelia squarrosa</i>	0.03	0.05	0.33	0.09	0.14
<i>Hedeoma hispida</i>	0.20	0.30	2.00	0.54	0.84
<i>Lactuca oblongifolia</i>	0.20	0.30	2.00	0.54	0.84
<i>Lithospermum incisum</i>	0.03	0.05	0.33	0.09	0.14
<i>Lotus americanus</i>	0.10	0.15	1.00	0.27	0.42
<i>Orthocarpus luteus</i>	1.17	1.74	10.33	2.81	4.55
<i>Oxytropis lambertii</i>	0.10	0.15	1.00	0.27	0.42
<i>Petalostemon purpureum</i>	0.07	0.10	0.67	0.18	0.28
<i>Phlox hoodii</i>	0.57	0.84	5.67	1.54	2.38
<i>Plantago purshii</i>	0.03	0.05	0.33	0.09	0.14
<i>Polygala alba</i>	0.13	0.20	1.33	0.36	0.56
<i>Potentilla pensylvanica</i>	0.10	0.15	1.00	0.27	0.42
<i>Psoralea argophylla</i>	0.13	0.20	1.00	0.27	0.47
<i>Psoralea esculenta</i>	0.07	0.10	0.67	0.18	0.28
<i>Ratibida columnifera</i>	0.20	0.30	2.00	0.54	0.84
<i>Solidago rigida</i>	0.03	0.05	0.33	0.09	0.14
<i>Sphaeralcea coccinea</i>	0.47	0.69	4.33	1.18	1.87
<i>Taraxacum officinale</i>	0.10	0.15	1.00	0.27	0.42
<i>Vicia americana</i>	0.07	0.10	0.67	0.18	0.28
<i>Viola nuttallii</i>	0.07	0.10	0.67	0.18	0.28
<i>Selaginella densa</i>	13.47	20.05	43.00	11.68	31.73
Lichen spp.	7.87	11.71	39.33	10.69	22.40
Litter	31.67		90.00		
Soil	1.13		9.67		
Rock	0.03		0.33		

**Table 6. Points Analysis of the Control Treatment (North) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	1.47	2.24	13.33	3.58	5.82
<i>Bouteloua gracilis</i>	14.73	22.46	76.00	20.39	42.85
<i>Buchloe dactyloides</i>	0.87	1.32	6.67	1.79	3.11
<i>Calamagrostis montanensis</i>	0.40	0.61	4.00	1.07	1.68
<i>Koeleria pyramidata</i>	6.53	9.96	48.67	13.06	23.02
<i>Muhlenbergia cuspidata</i>	1.00	1.52	6.67	1.79	3.31
<i>Munroa squarrosa</i>	0.40	0.61	4.00	1.07	1.68
<i>Stipa comata</i>	2.07	3.15	18.00	4.83	7.98
<i>Stipa viridula</i>	0.60	0.91	6.00	1.61	2.52
<i>Carex filifolia</i>	2.33	3.56	21.33	5.72	9.28
<i>Carex heliophila</i>	0.47	0.71	4.00	1.07	1.78
<i>Achillea millefolium</i>	0.20	0.30	1.33	0.36	0.66
<i>Antennaria parvifolia</i>	1.13	1.73	8.00	2.15	3.88
<i>Artemisia dracunculus</i>	0.27	0.41	2.67	0.72	1.13
<i>Artemisia frigida</i>	0.27	0.41	2.67	0.72	1.13
<i>Lactuca oblongifolia</i>	0.33	0.51	3.33	0.89	1.40
<i>Lithospermum incisum</i>	0.07	0.10	0.67	0.18	0.28
<i>Lotus americanus</i>	0.20	0.30	2.00	0.54	0.84
<i>Orthocarpus luteus</i>	1.13	1.73	10.00	2.68	4.41
<i>Oxytropis lambertii</i>	0.20	0.30	2.00	0.54	0.84
<i>Petalostemon purpureum</i>	0.13	0.20	1.33	0.36	0.56
<i>Phlox hoodii</i>	0.80	1.22	8.00	2.15	3.37
<i>Polygala alba</i>	0.13	0.20	1.33	0.36	0.56
<i>Potentilla pensylvanica</i>	0.20	0.30	2.00	0.54	0.84
<i>Psoralea argophylla</i>	0.20	0.30	1.33	0.36	0.66
<i>Ratibida columnifera</i>	0.27	0.41	2.67	0.72	1.13
<i>Sphaeralcea coccinea</i>	0.67	1.02	6.67	1.79	2.81
<i>Taraxacum officinale</i>	0.07	0.10	0.67	0.18	0.28
<i>Vicia americana</i>	0.07	0.10	0.67	0.18	0.28
<i>Selaginella densa</i>	24.20	36.89	72.00	19.32	56.21
Lichen spp.	4.20	6.40	34.67	9.30	15.70
Litter	33.60		99.33		
Soil	0.80		7.33		
Rock	0.00		0.00		

**Table 7. Points Analysis of the Control Treatment (South) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
Agropyron smithii	2.93	4.27	24.67	6.79	11.06
Bouteloua gracilis	25.33	36.86	94.00	25.87	62.73
Calamagrostis montanensis	0.47	0.68	4.00	1.10	1.78
Koeleria pyramidata	9.07	13.19	59.33	16.33	29.52
Muhlenbergia cuspidata	0.13	0.19	1.33	0.37	0.56
Munroa squarrosa	0.27	0.39	2.67	0.73	1.12
Stipa comate	3.20	4.66	21.33	5.87	10.53
Stipa viridula	1.00	1.45	6.67	1.83	3.28
Carex filifolia	6.07	8.83	36.67	10.09	18.92
Carex heliophila	0.67	0.97	5.33	1.47	2.44
Achillea millefolium	0.07	0.10	0.67	0.18	0.28
Androsace occidentalis	0.27	0.39	2.67	0.73	1.12
Antennaria parvifolia	0.60	0.87	4.67	1.28	2.15
Artemisia dracunculus	0.40	0.58	3.33	0.92	1.50
Artemisia frigid	0.47	0.68	4.67	1.28	1.96
Cerastium arvense	0.27	0.39	2.67	0.73	1.12
Grindelia squarrosa	0.07	0.10	0.67	0.18	0.28
Hedeoma hispida	0.40	0.58	4.00	1.10	1.68
Lactuca oblongifolia	0.07	0.10	0.67	0.18	0.28
Orthocarpus luteus	1.20	1.75	10.67	2.94	4.69
Phlox hoodii	0.33	0.48	3.33	0.92	1.40
Plantago purshii	0.07	0.10	0.67	0.18	0.28
Polygala alba	0.13	0.19	1.33	0.37	0.56
Psoralea argophylla	0.07	0.10	0.67	0.18	0.28
Psoralea esculenta	0.13	0.19	1.33	0.37	0.56
Ratibida columnifera	0.13	0.19	1.33	0.37	0.56
Solidago rigida	0.07	0.10	0.67	0.18	0.28
Sphaeralcea coccinea	0.27	0.39	2.00	0.55	0.94
Taraxacum officinale	0.13	0.19	1.33	0.37	0.56
Vicia americana	0.07	0.10	0.67	0.18	0.28
Viola nuttallii	0.13	0.19	1.33	0.37	0.56
Selaginella densa	2.73	3.98	14.00	3.85	7.83
Lichen spp.	11.53	16.78	44.00	12.11	28.89
Litter	29.73		80.67		
Soil	1.47		12.00		
Rock	0.07		0.67		

**Table 8. Points Analysis of the Ammonium Nitrate Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	2.87	4.34	24.00	6.34	10.68
<i>Agropyron trachycaulum</i>	0.33	0.50	3.33	0.88	1.38
<i>Bouteloua gracilis</i>	15.87	24.02	72.67	19.19	43.21
<i>Calamagrostis montanensis</i>	0.47	0.71	4.00	1.06	1.77
<i>Calamovilfa longifolia</i>	0.80	1.21	6.67	1.76	2.97
<i>Koeleria pyramidata</i>	9.27	14.03	61.33	16.20	30.23
<i>Muhlenbergia cuspidata</i>	0.07	0.10	0.67	0.18	0.28
<i>Munroa squarrosa</i>	0.47	0.71	4.67	1.23	1.94
<i>Stipa comata</i>	2.27	3.43	21.33	5.63	9.06
<i>Stipa viridula</i>	1.27	1.92	10.00	2.64	4.56
<i>Carex filifolia</i>	2.33	3.53	18.00	4.75	8.28
<i>Carex heliophila</i>	0.87	1.31	8.67	2.29	3.60
<i>Achillea millefolium</i>	0.33	0.50	2.67	0.70	1.20
<i>Antennaria parvifolia</i>	1.27	1.92	8.67	2.29	4.21
<i>Artemisia frigida</i>	0.07	0.10	0.67	0.18	0.28
<i>Erysimum asperum</i>	0.07	0.10	0.67	0.18	0.28
<i>Orthocarpus luteus</i>	1.73	2.62	14.67	3.87	6.49
<i>Phlox hoodii</i>	0.87	1.31	7.33	1.94	3.25
<i>Solidago mollis</i>	0.07	0.10	0.67	0.18	0.28
<i>Sphaeralcea coccinea</i>	0.27	0.40	2.00	0.53	0.93
<i>Taraxacum officinale</i>	0.07	0.10	0.67	0.18	0.28
<i>Selaginella densa</i>	8.93	13.52	36.67	9.68	23.20
Lichen spp.	15.53	23.51	68.67	18.13	41.64
Litter	32.53		92.00		
Soil	1.40		11.33		
Rock	0.00		0.00		

**Table 9. Points Analysis of the Ammonium Nitrate Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	1.60	2.58	14.00	4.15	6.73
<i>Bouteloua gracilis</i>	17.87	28.76	80.00	23.72	52.48
<i>Calamagrostis montanensis</i>	0.07	0.11	0.67	0.20	0.31
<i>Koeleria pyramidata</i>	5.93	9.55	45.33	13.44	22.99
<i>Muhlenbergia cuspidata</i>	0.60	0.97	4.67	1.38	2.35
<i>Munroa squarrosa</i>	0.07	0.11	0.67	0.20	0.31
<i>Poa compressa</i>	0.07	0.11	0.67	0.20	0.31
<i>Stipa comata</i>	1.80	2.90	16.00	4.74	7.64
<i>Stipa viridula</i>	0.73	1.18	7.33	2.17	3.35
<i>Carex filifolia</i>	4.53	7.30	31.33	9.29	16.59
<i>Carex heliophila</i>	0.13	0.21	1.33	0.40	0.61
<i>Achillea millefolium</i>	0.27	0.43	2.67	0.79	1.22
<i>Antennaria parvifolia</i>	0.93	1.50	6.67	1.98	3.48
<i>Artemisia frigida</i>	0.20	0.32	2.00	0.59	0.91
<i>Astragalus canadensis</i>	0.07	0.11	0.67	0.20	0.31
<i>Chrysopsis villosa</i>	0.07	0.11	0.67	0.20	0.31
<i>Lactuca oblongifolia</i>	0.07	0.11	0.67	0.20	0.31
<i>Melilotus officinalis</i>	0.07	0.11	0.67	0.20	0.31
<i>Orthocarpus luteus</i>	0.67	1.07	6.67	1.98	3.05
<i>Phlox hoodii</i>	0.93	1.50	6.67	1.98	3.48
<i>Polygala alba</i>	0.07	0.11	0.67	0.20	0.31
<i>Potentilla pensylvanica</i>	0.07	0.11	0.67	0.20	0.31
<i>Psoralea argophylla</i>	0.07	0.11	0.67	0.20	0.31
<i>Sphaeralcea coccinea</i>	0.33	0.54	2.67	0.79	1.33
<i>Vicia americana</i>	0.13	0.21	1.33	0.40	0.61
<i>Selaginella densa</i>	15.47	24.89	47.33	14.03	38.92
Lichen spp.	9.33	15.02	54.67	16.21	31.23
Litter	34.40		86.00		
Soil	3.40		21.33		
Rock	0.07		0.67		

**Table 10. Points Analysis of the Ammonium Nitrate Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
Agropyron smithii	2.40	4.62	24.00	7.91	12.53
Agropyron trachycaulum	0.07	0.13	0.67	0.22	0.35
Bouteloua gracilis	19.00	36.54	84.00	27.69	64.23
Calamagrostis montanensis	0.13	0.26	1.33	0.44	0.70
Koeleria pyramidata	7.60	14.62	48.67	16.04	30.66
Muhlenbergia cuspidata	0.27	0.51	1.33	0.44	0.95
Stipa comata	1.73	3.33	15.33	5.05	8.38
Stipa viridula	0.40	0.77	4.00	1.32	2.09
Carex filifolia	3.67	7.05	29.33	9.67	16.72
Carex heliophila	0.80	1.54	8.00	2.64	4.18
Achillea millefolium	0.07	0.13	0.67	0.22	0.35
Antennaria parvifolia	0.27	0.51	2.67	0.88	1.39
Artemisia frigida	0.27	0.51	2.67	0.88	1.39
Artemisia ludoviciana	0.07	0.13	0.67	0.22	0.35
Erysimum asperum	0.07	0.13	0.67	0.22	0.35
Grindelia squarrosa	0.07	0.13	0.67	0.22	0.35
Liatis punctata	0.07	0.13	0.67	0.22	0.35
Orthocarpus luteus	0.07	0.13	0.67	0.22	0.35
Petalostemon purpureum	0.07	0.13	0.67	0.22	0.35
Phlox hoodii	0.40	0.77	2.67	0.88	1.65
Solidago rigida	0.07	0.13	0.67	0.22	0.35
Sphaeralcea coccinea	0.27	0.51	2.67	0.88	1.39
Vicia americana	0.07	0.13	0.67	0.22	0.35
Selaginella densa	7.33	14.10	30.67	10.11	24.21
Lichen spp.	6.80	13.08	39.33	12.97	26.05
Litter	45.47		100.00		
Soil	2.53		18.00		
Rock	0.00		0.00		



**Table 11. Points Analysis of the Ammonium Nitrate Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	2.87	4.88	23.33	6.35	11.23
<i>Agropyron trachycaulum</i>	0.20	0.34	2.00	0.54	0.88
<i>Bouteloua gracilis</i>	16.60	28.26	98.67	26.86	55.12
<i>Koeleria pyramidata</i>	5.20	8.85	38.67	10.53	19.38
<i>Muhlenbergia cuspidata</i>	0.73	1.25	4.00	1.09	2.34
<i>Munroa squarrosa</i>	0.27	0.45	2.67	0.73	1.18
<i>Stipa comata</i>	3.27	5.56	26.67	7.26	12.82
<i>Stipa viridula</i>	1.13	1.93	10.67	2.90	4.83
<i>Carex filifolia</i>	4.20	7.15	31.33	8.53	15.68
<i>Carex heliophila</i>	0.53	0.91	4.67	1.27	2.18
<i>Achillea millefolium</i>	0.27	0.45	2.67	0.73	1.18
<i>Androsace occidentalis</i>	0.07	0.11	0.67	0.18	0.29
<i>Antennaria parvifolia</i>	0.13	0.23	1.33	0.36	0.59
<i>Artemisia dracuncululus</i>	0.20	0.34	2.00	0.54	0.88
<i>Artemisia frigid</i>	0.27	0.45	2.67	0.73	1.18
<i>Cerastium arvense</i>	0.07	0.11	0.67	0.18	0.29
<i>Erysimum asperum</i>	0.13	0.23	1.33	0.36	0.59
<i>Gaura coccinea</i>	0.33	0.57	3.33	0.91	1.48
<i>Hedeoma hispida</i>	0.27	0.45	2.67	0.73	1.18
<i>Orthocarpus luteus</i>	0.33	0.57	2.67	0.73	1.30
<i>Petalostemon purpureum</i>	0.07	0.11	0.67	0.18	0.29
<i>Phlox hoodii</i>	1.13	1.93	9.33	2.54	4.47
<i>Plantago purshii</i>	0.13	0.23	1.33	0.36	0.59
<i>Potentilla pensylvanica</i>	0.20	0.34	2.00	0.54	0.88
<i>Ratibida columnifera</i>	0.07	0.11	0.67	0.18	0.29
<i>Salsola kali</i>	0.07	0.11	0.67	0.18	0.29
<i>Sphaeralcea coccinea</i>	0.07	0.11	0.67	0.18	0.29
<i>Taraxacum officinale</i>	0.07	0.11	0.67	0.18	0.29
<i>Vicia Americana</i>	0.07	0.11	0.67	0.18	0.29
<i>Selaginella densa</i>	15.33	26.11	57.33	15.61	41.72
Lichen spp.	4.47	7.60	30.67	8.35	15.95
Litter	37.27		99.33		
Soil	4.00		23.33		
Rock	0.00		0.00		

**Table 12. Points Analysis of the Ammonium Nitrate Treatment at the 100 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	4.87	9.00	34.67	10.83	19.83
<i>Bouteloua gracilis</i>	16.07	29.72	78.67	24.58	54.30
<i>Calamagrostis montanensis</i>	0.47	0.86	4.67	1.46	2.32
<i>Koeleria pyramidata</i>	5.93	10.97	40.67	12.71	23.68
<i>Muhlenbergia cuspidata</i>	1.07	1.97	5.33	1.67	3.64
<i>Munroa squarrosa</i>	0.07	0.12	0.67	0.21	0.33
<i>Panicum oligosanthos</i>	0.13	0.25	1.33	0.42	0.67
<i>Stipa comata</i>	1.60	2.96	15.33	4.79	7.75
<i>Stipa viridula</i>	1.13	2.10	9.33	2.92	5.02
<i>Carex filifolia</i>	4.27	7.89	30.00	9.38	17.27
<i>Carex heliophila</i>	0.13	0.25	1.33	0.42	0.67
<i>Achillea millefolium</i>	0.53	0.99	4.00	1.25	2.24
<i>Agoseris glauca</i>	0.07	0.12	0.67	0.21	0.33
<i>Antennaria parvifolia</i>	1.33	2.47	8.67	2.71	5.18
<i>Artemisia frigida</i>	0.13	0.25	1.33	0.42	0.67
<i>Erysimum asperum</i>	0.13	0.25	1.33	0.42	0.67
<i>Lactuca oblongifolia</i>	0.07	0.12	0.67	0.21	0.33
<i>Melilotus officinalis</i>	0.07	0.12	0.67	0.21	0.33
<i>Orthocarpus luteus</i>	0.33	0.62	3.33	1.04	1.66
<i>Phlox hoodii</i>	1.07	1.97	8.00	2.50	4.47
<i>Potentilla pensylvanica</i>	0.13	0.25	1.33	0.42	0.67
<i>Ratibida columnifera</i>	0.07	0.12	0.67	0.21	0.33
<i>Sphaeralcea coccinea</i>	0.20	0.37	2.00	0.63	1.00
<i>Selaginella densa</i>	3.07	5.67	16.00	5.00	10.67
Lichen spp.	11.13	20.59	49.33	15.42	36.01
Litter	43.73		99.33		
Soil	2.20		11.33		
Rock	0.00		0.00		

**Table 13. Points Analysis of the Urea Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
Agropyron smithii	4.80	8.21	27.33	8.30	16.51
Bouteloua gracilis	18.60	31.81	80.67	24.49	56.30
Buchloe dactyloides	0.07	0.11	0.67	0.20	0.31
Calamagrostis montanensis	0.20	0.34	2.00	0.61	0.95
Koeleria pyramidata	8.53	14.60	53.33	16.19	30.79
Muhlenbergia cuspidata	0.40	0.68	2.00	0.61	1.29
Munroa squarrosa	0.13	0.23	1.33	0.40	0.63
Poa compressa	0.07	0.11	0.67	0.20	0.31
Stipa comata	2.13	3.65	18.00	5.47	9.12
Stipa viridula	0.80	1.37	7.33	2.23	3.60
Carex filifolia	1.60	2.74	14.00	4.25	6.99
Carex heliophila	0.33	0.57	3.33	1.01	1.58
Achillea millefolium	0.53	0.91	5.33	1.62	2.53
Antennaria parvifolia	0.87	1.48	6.67	2.02	3.50
Artemisia frigida	0.40	0.68	4.00	1.21	1.89
Cerastium arvense	0.33	0.57	2.67	0.81	1.38
Melilotus officinalis	0.07	0.11	0.67	0.20	0.31
Orthocarpus luteus	1.40	2.39	14.00	4.25	6.64
Penstemon albidus	0.20	0.34	2.00	0.61	0.95
Petalostemon purpureum	0.07	0.11	0.67	0.20	0.31
Phlox hoodii	0.53	0.91	4.00	1.21	2.12
Potentilla pensylvanica	0.07	0.11	0.67	0.20	0.31
Ratibida columnifera	0.27	0.46	2.67	0.81	1.27
Sisyrinchium montanum	0.07	0.11	0.67	0.20	0.31
Solidago rigida	0.07	0.11	0.67	0.20	0.31
Sphaeralcea coccinea	0.47	0.80	4.67	1.42	2.22
Vicia americana	0.07	0.11	0.67	0.20	0.31
Selaginella densa	10.07	17.22	36.67	11.13	28.35
Lichen spp.	5.33	9.12	32.00	9.72	18.84
Litter	39.47		98.67		
Soil	2.00		12.67		
Rock	0.07		0.67		

**Table 14. Points Analysis of the Urea Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	3.20	4.95	27.33	7.32	12.27
<i>Agropyron spicatum</i>	0.07	0.10	0.67	0.18	0.28
<i>Bouteloua gracilis</i>	23.33	36.12	90.00	24.11	60.23
<i>Buchloe dactyloides</i>	0.13	0.21	1.33	0.36	0.57
<i>Calamagrostis montanensis</i>	0.93	1.44	8.67	2.32	3.76
<i>Koeleria pyramidata</i>	6.53	10.11	46.00	12.32	22.43
<i>Muhlenbergia cuspidata</i>	0.53	0.83	4.67	1.25	2.08
<i>Munroa squarrosa</i>	0.47	0.72	4.67	1.25	1.97
<i>Poa compressa</i>	0.20	0.31	2.00	0.54	0.85
<i>Stipa comata</i>	1.87	2.89	16.67	4.46	7.35
<i>Stipa viridula</i>	1.60	2.48	13.33	3.57	6.05
<i>Carex filifolia</i>	3.40	5.26	24.00	6.43	11.69
<i>Carex heliophila</i>	0.80	1.24	6.67	1.79	3.03
<i>Achillea millefolium</i>	0.13	0.21	1.33	0.36	0.57
<i>Androsace occidentalis</i>	0.07	0.10	0.67	0.18	0.28
<i>Antennaria parvifolia</i>	0.67	1.03	5.33	1.43	2.46
<i>Artemisia dracunculus</i>	0.07	0.10	0.67	0.18	0.28
<i>Artemisia frigida</i>	0.27	0.41	2.67	0.71	1.12
<i>Cerastium arvense</i>	0.20	0.31	2.00	0.54	0.85
<i>Hedeoma hispida</i>	0.13	0.21	1.33	0.36	0.57
<i>Lotus americanus</i>	0.13	0.21	1.33	0.36	0.57
<i>Opuntia fragilis</i>	0.07	0.10	0.67	0.18	0.28
<i>Orthocarpus luteus</i>	1.00	1.55	9.33	2.50	4.05
<i>Phlox hoodii</i>	1.27	1.96	12.00	3.21	5.17
<i>Ratibida columnifera</i>	0.07	0.10	0.67	0.18	0.28
<i>Sphaeralcea coccinea</i>	0.27	0.41	2.67	0.71	1.12
<i>Taraxacum officinale</i>	0.07	0.10	0.67	0.18	0.28
<i>Vicia americana</i>	0.20	0.31	2.00	0.54	0.85
<i>Selaginella densa</i>	4.20	6.50	18.00	4.82	11.32
Lichen spp.	12.73	19.71	66.00	17.68	37.39
Litter	33.87		88.67		
Soil	1.53		10.67		
Rock	0.00		0.00		

**Table 15. Points Analysis of the Urea Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	3.47	5.62	26.00	7.25	12.87
<i>Bouteloua gracilis</i>	20.60	33.37	77.33	21.56	54.93
<i>Buchloe dactyloides</i>	0.20	0.32	1.33	0.37	0.69
<i>Calamagrostis montanensis</i>	0.67	1.08	6.00	1.67	2.75
<i>Koeleria pyramidata</i>	10.40	16.85	62.67	17.47	34.32
<i>Muhlenbergia cuspidata</i>	0.80	1.30	6.00	1.67	2.97
<i>Munroa squarrosa</i>	0.07	0.11	0.67	0.19	0.30
<i>Stipa comata</i>	3.07	4.97	28.00	7.81	12.78
<i>Stipa viridula</i>	1.47	2.38	13.33	3.72	6.10
<i>Carex filifolia</i>	3.93	6.37	28.67	7.99	14.36
<i>Carex heliophila</i>	0.87	1.40	7.33	2.04	3.44
<i>Achillea millefolium</i>	0.40	0.65	4.00	1.12	1.77
<i>Antennaria parvifolia</i>	0.67	1.08	5.33	1.49	2.57
<i>Artemisia frigida</i>	0.27	0.43	2.67	0.74	1.17
<i>Cerastium arvense</i>	0.13	0.22	1.33	0.37	0.59
<i>Echinacea angustifolia</i>	0.07	0.11	0.67	0.19	0.30
<i>Liatris punctata</i>	0.07	0.11	0.67	0.19	0.30
<i>Melilotus officinalis</i>	0.07	0.11	0.67	0.19	0.30
<i>Orthocarpus luteus</i>	0.40	0.65	4.00	1.12	1.77
<i>Phlox hoodii</i>	0.93	1.51	8.67	2.42	3.93
<i>Psoralea argophylla</i>	0.07	0.11	0.67	0.19	0.30
<i>Ratibida columnifera</i>	0.07	0.11	0.67	0.19	0.30
<i>Solidago rigida</i>	0.07	0.11	0.67	0.19	0.30
<i>Sphaeralcea coccinea</i>	0.67	1.08	6.67	1.86	2.94
<i>Selaginella densa</i>	6.80	11.02	29.33	8.18	19.20
Lichen spp.	5.53	8.96	35.33	9.85	18.81
Litter	37.60		94.67		
Soil	0.67		6.00		
Rock	0.00		0.00		

**Table 16. Points Analysis of the Urea Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Basal Cover</b>	<b>Relative Basal Cover</b>	<b>Percent Frequency</b>	<b>Relative Frequency</b>	<b>Importance Value</b>
<i>Agropyron smithii</i>	1.93	2.95	18.00	5.08	8.03
<i>Agropyron spicatum</i>	0.07	0.10	0.67	0.19	0.29
<i>Aristida longiseta</i>	0.07	0.10	0.67	0.19	0.29
<i>Bouteloua gracilis</i>	16.53	25.25	80.00	22.56	47.81
<i>Calamagrostis montanensis</i>	0.67	1.02	6.00	1.69	2.71
<i>Koeleria pyramidata</i>	6.07	9.27	46.00	12.97	22.24
<i>Muhlenbergia cuspidata</i>	1.00	1.53	6.67	1.88	3.41
<i>Stipa comata</i>	2.67	4.07	22.67	6.39	10.46
<i>Stipa viridula</i>	0.53	0.81	5.33	1.50	2.31
<i>Carex filifolia</i>	4.60	7.03	32.67	9.21	16.24
<i>Carex heliophila</i>	0.93	1.43	8.67	2.44	3.87
<i>Achillea millefolium</i>	0.07	0.10	0.67	0.19	0.29
<i>Antennaria parvifolia</i>	0.67	1.02	4.00	1.13	2.15
<i>Artemisia frigida</i>	0.20	0.31	2.00	0.56	0.87
<i>Cerastium arvense</i>	0.07	0.10	0.67	0.19	0.29
<i>Grindelia squarrosa</i>	0.07	0.10	0.67	0.19	0.29
<i>Orthocarpus luteus</i>	0.33	0.51	2.67	0.75	1.26
<i>Oxytropis lambertii</i>	0.07	0.10	0.67	0.19	0.29
<i>Petalostemon purpureum</i>	0.07	0.10	0.67	0.19	0.29
<i>Phlox hoodii</i>	0.40	0.61	4.00	1.13	1.74
<i>Polygala alba</i>	0.07	0.10	0.67	0.19	0.29
<i>Psoralea argophylla</i>	0.07	0.10	0.67	0.19	0.29
<i>Ratibida columnifera</i>	0.13	0.20	1.33	0.38	0.58
<i>Sphaeralcea coccinea</i>	0.07	0.10	0.67	0.19	0.29
<i>Selaginella densa</i>	16.93	25.87	48.67	13.72	39.59
Lichen spp.	11.20	17.11	59.33	16.73	33.84
Litter	30.93		90.67		
Soil	3.60		17.33		
Rock	0.00		0.00		

**Table 17. Points Analysis of the Urea Treatment at the 100 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	3.13	5.93	26.67	8.08	14.01
<i>Agropyron trachycaulum</i>	0.07	0.13	0.67	0.20	0.33
<i>Bouteloua gracilis</i>	17.60	33.29	82.67	25.05	58.34
<i>Calamagrostis montanensis</i>	0.60	1.13	6.00	1.82	2.95
<i>Koeleria pyramidata</i>	4.40	8.32	35.33	10.71	19.03
<i>Muhlenbergia cuspidata</i>	0.47	0.88	4.67	1.41	2.29
<i>Stipa comata</i>	3.07	5.80	28.67	8.69	14.49
<i>Stipa viridula</i>	0.53	1.01	4.67	1.41	2.42
<i>Carex filifolia</i>	5.60	10.59	38.00	11.52	22.11
<i>Carex heliophila</i>	0.80	1.51	6.67	2.02	3.53
<i>Androsace occidentalis</i>	0.07	0.13	0.67	0.20	0.33
<i>Antennaria parvifolia</i>	0.40	0.76	4.00	1.21	1.97
<i>Artemisia dracunculus</i>	0.13	0.25	1.33	0.40	0.65
<i>Cerastium arvense</i>	0.07	0.13	0.67	0.20	0.33
<i>Convolvulus arvensis</i>	0.07	0.13	0.67	0.20	0.33
<i>Erysimum asperum</i>	0.07	0.13	0.67	0.20	0.33
<i>Gaura coccinea</i>	0.07	0.13	0.67	0.20	0.33
<i>Lepidium densiflorum</i>	0.07	0.13	0.67	0.20	0.33
<i>Orthocarpus luteus</i>	0.27	0.50	2.67	0.81	1.31
<i>Phlox hoodii</i>	0.20	0.38	2.00	0.61	0.99
<i>Sphaeralcea coccinea</i>	0.07	0.13	2.67	0.20	0.33
<i>Selaginella densa</i>	10.53	19.92	53.33	16.16	36.08
Lichen spp.	4.60	8.70	28.00	8.48	17.18
Litter	43.67		99.33		
Soil	3.40		24.00		
Rock	0.07		0.67		

Table 18. Mean Percent Basal Cover for the Native Range Fertilization Trial at the Dickinson Experiment Station – 1983

Treatment	Application Rate	Grass	Sedge	Forbs	Shrubs	Club Moss	Lichen	Litter	Soil	Rock
<b>Control:</b>	0 lbs	35.22	4.77	5.83	0.00	13.47	7.87	31.67	1.13	0.03
<b>Ammonium Nitrate:</b>	40 lbs EY	33.69	3.20	4.75	0.00	8.93	15.53	32.53	1.40	0.00
	40 lbs EOY	28.74	4.66	3.95	0.00	15.47	9.33	34.40	3.40	0.07
	60 lbs EY	31.60	4.47	1.84	0.00	7.33	6.80	45.47	2.53	0.00
	60 lbs EOY	30.27	4.73	3.95	0.00	15.33	4.47	37.27	4.00	0.00
	100 lbs EOY	31.34	4.40	4.13	0.00	3.07	11.13	43.73	2.20	0.00
<b>Urea:</b>	40 lbs EY	35.73	1.93	5.42	0.00	10.07	5.33	39.47	2.00	0.07
	40 lbs EOY	38.86	4.20	4.62	0.00	4.20	12.73	33.87	1.53	0.00
	60 lbs EY	40.75	4.80	3.89	0.00	6.80	5.53	37.60	0.67	0.00
	60 lbs EOY	29.54	5.53	2.29	0.00	16.93	11.20	30.93	3.60	0.00
	100 lbs EOY	29.87	6.40	1.49	0.00	10.53	4.60	43.67	3.40	0.07



**Table 19. Density Analysis of the Control (North and South) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.43	1.36	25.00	3.74	5.10
<i>Androsace occidentalis</i>	0.32	1.00	13.33	2.00	3.00
<i>Antennaria parvifolia</i>	2.02	6.35	16.67	2.49	8.84
<i>Artemisia dracunculus</i>	0.68	2.15	18.33	2.74	4.89
<i>Artemisia frigida</i>	1.35	4.25	53.33	7.98	12.23
<i>Artemisia ludoviciana</i>	0.03	0.10	1.67	0.25	0.35
<i>Aster ericoides</i>	0.53	1.68	11.67	1.75	3.43
<i>Astragalus canadensis</i>	0.08	0.26	3.33	0.50	0.76
<i>Cerastium arvense</i>	0.20	0.63	8.33	1.25	1.88
<i>Conyza canadensis</i>	0.02	0.05	1.67	0.25	0.30
<i>Erysimum asperum</i>	0.02	0.05	1.67	0.25	0.30
<i>Galium boreale</i>	0.58	1.84	18.33	2.74	4.58
<i>Gaura coccinea</i>	0.02	0.05	1.67	0.25	0.30
<i>Grindelia squarrosa</i>	0.02	0.05	1.67	0.25	0.30
<i>Hedeoma hispida</i>	1.88	5.93	50.00	7.48	13.41
<i>Helianthus rigidus</i>	0.05	0.16	1.67	0.25	0.41
<i>Hippuris vulgaris</i>	0.05	0.16	5.00	0.75	0.91
<i>Lactuca oblongifolia</i>	0.20	0.63	15.00	2.24	2.87
<i>Lepidium densiflorum</i>	0.02	0.05	1.67	0.25	0.30
<i>Liatris punctata</i>	0.12	0.37	1.67	0.25	0.62
<i>Linum rigidum</i>	0.17	0.52	13.33	2.00	2.52
<i>Lithospermum incisum</i>	0.05	0.16	5.00	0.75	0.91
<i>Lotus americanus</i>	1.17	3.67	30.00	4.49	8.16
<i>Melilotus officinalis</i>	0.03	0.10	1.67	0.25	0.35
<i>Neslia paniculata</i>	0.12	0.37	10.00	1.50	1.87
<i>Orthocarpus luteus</i>	6.97	21.93	58.33	8.73	30.66
<i>Oxytropis lambertii</i>	0.13	0.42	3.33	0.50	0.92
<i>Penstemon albidus</i>	0.02	0.05	1.67	0.25	0.30
<i>Phlox hoodii</i>	1.22	3.83	36.67	5.49	9.32
<i>Plantago purshii</i>	7.65	24.08	75.00	11.22	35.30
<i>Polygala alba</i>	0.07	0.21	6.67	1.00	1.21
<i>Potentilla pensylvanica</i>	0.08	0.26	5.00	0.75	1.01
<i>Psoralea argophylla</i>	0.25	0.79	11.67	1.75	2.54
<i>Psoralea esculenta</i>	0.07	0.21	6.67	1.00	1.21
<i>Ratibida columnifera</i>	1.05	3.31	43.33	6.48	9.79
<i>Senecio plattensis</i>	0.05	0.16	5.00	0.75	0.91
<i>Sisyrinchium montanum</i>	0.02	0.05	1.67	0.25	0.30
<i>Solidago rigida</i>	0.02	0.05	1.67	0.25	0.30
<i>Sphaeralcea coccinea</i>	1.22	3.83	46.67	6.98	10.81
<i>Taraxacum officinale</i>	0.03	0.10	3.33	0.50	0.60
<i>Vicia americana</i>	0.35	1.10	21.67	3.24	4.34
<i>Selaginella densa</i>	2.43	7.66	28.33	4.24	11.90

**Table 20. Density Analysis of the Control (North) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.63	2.28	36.67	5.16	7.44
<i>Androsace occidentalis</i>	0.10	0.36	10.00	1.41	1.77
<i>Antennaria parvifolia</i>	3.87	13.91	30.00	4.23	18.14
<i>Artemisia dracunculus</i>	1.10	3.96	30.00	4.23	8.19
<i>Artemisia frigida</i>	1.03	3.72	43.33	6.10	9.82
<i>Artemisia ludoviciana</i>	0.07	0.24	3.33	0.47	0.71
<i>Aster ericoides</i>	0.07	0.24	6.67	0.94	1.18
<i>Astragalus canadensis</i>	0.13	0.48	3.33	0.47	0.95
<i>Cerastium arvense</i>	0.23	0.84	3.33	0.47	1.31
<i>Erysimum asperum</i>	0.03	0.12	3.33	0.47	0.59
<i>Galium boreale</i>	0.93	3.36	26.67	3.76	7.12
<i>Hedeoma hispida</i>	1.00	3.60	33.33	4.69	8.29
<i>Lactuca oblongifolia</i>	0.20	0.72	16.67	2.35	3.07
<i>Liatris punctata</i>	0.23	0.84	3.33	0.47	1.31
<i>Linum rigidum</i>	0.13	0.48	13.33	1.88	2.36
<i>Lithospermum incisum</i>	0.10	0.36	10.00	1.41	1.77
<i>Lotus americanus</i>	2.20	7.91	46.67	6.57	14.48
<i>Melilotus officinalis</i>	0.07	0.24	3.33	0.47	0.71
<i>Neslia paniculata</i>	0.03	0.12	3.33	0.47	0.59
<i>Orthocarpus luteus</i>	3.40	12.23	36.67	5.16	17.39
<i>Oxytropis lambertii</i>	0.27	0.96	6.67	0.94	1.90
<i>Penstemon albidus</i>	0.03	0.12	3.33	0.47	0.59
<i>Phlox hoodii</i>	1.10	3.96	50.00	7.04	11.00
<i>Plantago purshii</i>	2.63	9.47	66.67	9.39	18.86
<i>Potentilla pensylvanica</i>	0.07	0.24	6.67	0.94	1.18
<i>Psoralea argophylla</i>	0.30	1.08	16.67	2.35	3.43
<i>Psoralea esculenta</i>	0.10	0.36	10.00	1.41	1.77
<i>Ratibida columnifera</i>	1.40	5.04	50.00	7.04	12.08
<i>Senecio plattensis</i>	0.03	0.12	3.33	0.47	0.59
<i>Sisyrinchium montanum</i>	0.03	0.12	3.33	0.47	0.59
<i>Sphaeralcea coccinea</i>	1.40	5.04	50.00	7.04	12.08
<i>Taraxacum officinale</i>	0.07	0.24	6.67	0.94	1.18
<i>Vicia americana</i>	0.43	1.56	26.67	3.76	5.32
<i>Selaginella densa</i>	4.37	15.71	46.67	6.57	22.28

**Table 21. Density Analysis of the Control (South) for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.23	0.65	13.33	2.13	2.78
<i>Androsace occidentalis</i>	0.53	1.49	16.67	2.66	4.15
<i>Antennaria parvifolia</i>	0.17	0.47	3.33	0.53	1.00
<i>Artemisia dracunculus</i>	0.27	0.75	6.67	1.06	1.81
<i>Artemisia frigida</i>	1.67	4.66	63.33	10.11	14.77
<i>Aster ericoides</i>	1.00	2.80	16.67	2.66	5.46
<i>Astragalus canadensis</i>	0.03	0.09	3.33	0.53	0.62
<i>Cerastium arvense</i>	0.17	0.47	13.33	2.13	2.60
<i>Conyza canadensis</i>	0.03	0.09	3.33	0.53	0.62
<i>Galium boreale</i>	0.23	0.65	10.00	1.60	2.25
<i>Gaura coccinea</i>	0.03	0.09	3.33	0.53	0.62
<i>Grindelia squarrosa</i>	0.03	0.09	3.33	0.53	0.62
<i>Hedeoma hispida</i>	2.77	7.74	66.67	10.64	18.38
<i>Helianthus rigidus</i>	0.10	0.28	3.33	0.53	0.81
<i>Hippuris vulgaris</i>	0.10	0.28	10.00	1.60	1.88
<i>Lactuca oblongifolia</i>	0.20	0.56	13.33	2.13	2.69
<i>Lepidium densiflorum</i>	0.03	0.09	3.33	0.53	0.62
<i>Linum rigidum</i>	0.20	0.56	13.33	2.13	2.69
<i>Lotus americanus</i>	0.13	0.37	13.33	2.13	2.50
<i>Neslia paniculata</i>	0.20	0.56	16.67	2.66	3.22
<i>Orthocarpus luteus</i>	10.50	29.48	80.00	12.77	42.25
<i>Phlox hoodii</i>	1.33	3.73	23.33	3.72	7.45
<i>Plantago purshii</i>	12.67	35.45	83.33	13.30	48.75
<i>Polygala alba</i>	0.13	0.37	13.33	2.13	2.50
<i>Potentilla pensylvanica</i>	0.10	0.28	3.33	0.53	0.81
<i>Psoralea argophylla</i>	0.20	0.56	6.67	1.06	1.62
<i>Psoralea esculenta</i>	0.03	0.09	3.33	0.53	0.62
<i>Ratibida columnifera</i>	0.70	1.96	36.67	5.85	7.81
<i>Senecio plattensis</i>	0.07	0.19	6.67	1.06	1.25
<i>Solidago rigida</i>	0.03	0.09	3.33	0.53	0.62
<i>Sphaeralcea coccinea</i>	1.03	2.89	43.33	6.91	9.80
<i>Vicia americana</i>	0.27	0.75	16.67	2.66	3.41
<i>Selaginella densa</i>	0.50	1.40	10.00	1.60	3.00

**Table 22. Density Analysis of the Ammonium Nitrate Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.90	2.91	36.67	5.53	8.44
<i>Androsace occidentalis</i>	0.47	1.51	23.33	3.52	5.03
<i>Antennaria parvifolia</i>	2.63	8.50	23.33	3.52	12.02
<i>Artemisia dracunculus</i>	1.20	3.88	16.67	2.51	6.39
<i>Artemisia frigida</i>	1.60	5.17	46.67	7.04	12.21
<i>Aster ericoides</i>	0.07	0.22	3.33	0.50	0.72
<i>Cerastium arvense</i>	0.80	2.58	3.33	0.50	3.08
<i>Conyza canadensis</i>	0.03	0.11	3.33	0.50	0.61
<i>Erysimum asperum</i>	0.03	0.11	3.33	0.50	0.61
<i>Grindelia squarrosa</i>	0.03	0.11	3.33	0.50	0.61
<i>Hedeoma hispida</i>	2.10	6.78	60.00	9.05	15.83
<i>Helianthus rigidus</i>	0.10	0.32	3.33	0.50	0.82
<i>Hippuris vulgaris</i>	0.13	0.43	10.00	1.51	1.94
<i>Lithospermum incisum</i>	0.03	0.11	3.33	0.50	0.61
<i>Lotus americanus</i>	0.33	1.08	23.33	3.52	4.60
<i>Neslia paniculata</i>	0.03	0.11	3.33	0.50	0.61
<i>Orthocarpus luteus</i>	10.30	33.26	76.67	11.56	44.82
<i>Oxytropis lambertii</i>	0.03	0.11	3.33	0.50	0.61
<i>Penstemon albidus</i>	0.07	0.22	6.67	1.01	1.23
<i>Phlox hoodii</i>	1.17	3.77	40.00	6.03	9.80
<i>Plantago purshii</i>	3.73	12.06	73.33	11.06	23.12
<i>Polygala alba</i>	0.03	0.11	3.33	0.50	0.61
<i>Potentilla pensylvanica</i>	0.20	0.65	10.00	1.51	2.16
<i>Psoralea argophylla</i>	0.07	0.22	3.33	0.50	0.72
<i>Psoralea esculenta</i>	0.03	0.11	3.33	0.50	0.61
<i>Ratibida columnifera</i>	1.20	3.88	56.67	8.54	12.42
<i>Sphaeralcea coccinea</i>	1.67	5.38	56.67	8.54	13.92
<i>Vicia americana</i>	0.10	0.32	10.00	1.51	1.83
<i>Viola nuttallii</i>	0.13	0.43	6.67	1.01	1.44
<i>Selaginella densa</i>	1.73	5.60	46.67	7.04	12.64

**Table 23. Density Analysis of the Ammonium Nitrate Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.30	1.17	13.33	2.25	3.42
<i>Androsace occidentalis</i>	0.60	2.33	13.33	2.25	4.58
<i>Antennaria parvifolia</i>	1.07	4.15	10.00	1.69	5.84
<i>Artemisia dracunculus</i>	0.40	1.55	13.33	2.25	3.80
<i>Artemisia frigida</i>	0.50	1.94	30.00	5.06	7.00
<i>Aster ericoides</i>	1.23	4.79	26.67	4.49	9.28
<i>Cerastium arvense</i>	0.23	0.91	16.67	2.81	3.72
<i>Echinacea angustifolia</i>	0.03	0.13	3.33	0.56	0.69
<i>Erysimum asperum</i>	0.03	0.13	3.33	0.56	0.69
<i>Gaura coccinea</i>	0.10	0.39	3.33	0.56	0.95
<i>Gutierrezia sarothrae</i>	0.10	0.39	3.33	0.56	0.95
<i>Hedeoma hispida</i>	2.13	8.29	46.67	7.87	16.16
<i>Hippuris vulgaris</i>	0.07	0.26	3.33	0.56	0.82
<i>Liatris punctata</i>	0.23	0.91	10.00	1.69	2.60
<i>Linum rigidum</i>	0.10	0.39	10.00	1.69	2.08
<i>Lithospermum incisum</i>	0.07	0.26	3.33	0.56	0.82
<i>Lotus americanus</i>	0.23	0.91	13.33	2.25	3.16
<i>Neslia paniculata</i>	0.10	0.39	6.67	1.12	1.51
<i>Orthocarpus luteus</i>	4.27	16.58	60.00	10.11	26.69
<i>Oxytropis lambertii</i>	0.27	1.04	6.67	1.12	2.16
<i>Phlox hoodii</i>	0.93	3.63	33.33	5.62	9.25
<i>Plantago purshii</i>	7.33	28.50	83.33	14.04	42.54
<i>Polygala alba</i>	0.07	0.26	3.33	0.56	0.82
<i>Potentilla pensylvanica</i>	0.20	0.78	13.33	2.25	3.03
<i>Psoralea argophylla</i>	0.27	1.04	13.33	2.25	3.29
<i>Psoralea esculenta</i>	0.20	0.78	10.00	1.69	2.47
<i>Ratibida columnifera</i>	0.57	2.20	36.67	6.18	8.38
<i>Senecio plattensis</i>	0.17	0.65	10.00	1.69	2.34
<i>Sphaeralcea coccinea</i>	0.83	3.24	33.33	5.62	8.86
<i>Taraxacum officinale</i>	0.10	0.39	10.00	1.69	2.08
<i>Vernonia fasciculata</i>	0.13	0.52	6.67	1.12	1.64
<i>Vicia americana</i>	0.30	1.17	20.00	3.37	4.54
<i>Selaginella densa</i>	2.57	9.97	23.33	3.93	13.90

**Table 24. Density Analysis of the Ammonium Nitrate Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.87	3.42	20.00	3.14	6.56
<i>Androsace occidentalis</i>	2.07	8.16	26.67	4.19	12.35
<i>Antennaria parvifolia</i>	0.07	0.26	6.67	1.05	1.31
<i>Artemisia dracunculus</i>	1.93	7.63	40.00	6.28	13.91
<i>Artemisia frigida</i>	1.37	5.39	50.00	7.85	13.24
<i>Aster ericoides</i>	0.60	2.37	20.00	3.14	5.51
<i>Cerastium arvense</i>	0.07	0.26	6.67	1.05	1.31
<i>Conyza canadensis</i>	0.03	0.13	3.33	0.52	0.65
<i>Echinacea angustifolia</i>	0.07	0.26	6.67	1.05	1.31
<i>Erigeron glabellus</i>	0.17	0.66	3.33	0.52	1.18
<i>Erysimum asperum</i>	0.03	0.13	3.33	0.52	0.65
<i>Gaura coccinea</i>	0.13	0.53	6.67	1.05	1.58
<i>Grindelia squarrosa</i>	0.10	0.39	10.00	1.57	1.96
<i>Hedeoma hispida</i>	2.57	10.13	73.33	11.52	21.65
<i>Hippuris vulgaris</i>	0.17	0.66	13.33	2.09	2.75
<i>Kochia scoparia</i>	0.03	0.13	3.33	0.52	0.65
<i>Lepidium densiflorum</i>	0.03	0.13	3.33	0.52	0.65
<i>Liatris punctata</i>	0.23	0.92	6.67	1.05	1.97
<i>Lotus americanus</i>	0.07	0.26	6.67	1.05	1.31
<i>Melilotus officinalis</i>	0.03	0.13	3.33	0.52	0.65
<i>Neslia paniculata</i>	0.03	0.13	3.33	0.52	0.65
<i>Orthocarpus luteus</i>	3.57	14.08	53.33	8.38	22.46
<i>Oxytropis lambertii</i>	0.10	0.39	6.67	1.05	1.44
<i>Phlox hoodii</i>	0.13	0.53	10.00	1.57	2.10
<i>Plantago purshii</i>	7.50	29.61	80.00	12.57	42.18
<i>Potentilla pensylvanica</i>	0.13	0.53	6.67	1.05	1.58
<i>Psoralea argophylla</i>	0.13	0.53	10.00	1.57	2.10
<i>Psoralea esculenta</i>	0.07	0.26	6.67	1.05	1.31
<i>Ratibida columnifera</i>	0.83	3.29	43.33	6.81	10.10
<i>Senecio plattensis</i>	0.20	0.79	10.00	1.57	2.36
<i>Sphaeralcea coccinea</i>	1.37	5.39	66.67	10.47	15.86
<i>Taraxacum officinale</i>	0.03	0.13	3.33	0.52	0.65
<i>Vicia americana</i>	0.07	0.26	6.67	1.05	1.31
<i>Viola nuttallii</i>	0.03	0.13	3.33	0.52	0.65
<i>Selaginella densa</i>	0.50	1.97	13.33	2.09	4.06

**Table 25. Density Analysis of the Ammonium Nitrate Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
Achillea millefolium	0.37	1.70	16.67	3.09	4.79
Androsace occidentalis	1.67	7.72	26.67	4.94	12.66
Antennaria parvifolia	1.87	8.64	10.00	1.85	10.49
Artemisia dracunculus	0.63	2.93	20.00	3.70	6.63
Artemisia frigida	0.73	3.40	36.67	6.79	10.19
Aster ericoides	0.27	1.23	3.33	0.62	1.85
Cerastium arvense	0.07	0.31	6.67	1.23	1.54
Chenopodium album	0.03	0.15	3.33	0.62	0.77
Echinacea angustifolia	0.07	0.31	6.67	1.23	1.54
Gaura coccinea	0.07	0.31	3.33	0.62	0.93
Grindelia squarrosa	0.17	0.77	13.33	2.47	3.24
Hedeoma hispida	3.20	14.81	63.33	11.73	26.54
Hippuris vulgaris	0.07	0.31	6.67	1.23	1.54
Lepidium densiflorum	0.03	0.15	3.33	0.62	0.77
Liatris punctata	0.03	0.15	3.33	0.62	0.77
Linum rigidum	0.03	0.15	3.33	0.62	0.77
Lithospermum incisum	0.13	0.62	6.67	1.23	1.85
Lotus americanus	0.07	0.31	6.67	1.23	1.54
Melilotus officinalis	0.10	0.46	6.67	1.23	1.69
Neslia paniculata	0.03	0.15	3.33	0.62	0.77
Orthocarpus luteus	1.90	8.80	36.67	6.79	15.59
Phlox hoodii	0.80	3.70	30.00	5.56	9.26
Plantago purshii	7.10	32.87	93.33	17.28	50.15
Polygala alba	0.03	0.15	3.33	0.62	0.77
Potentilla pensylvanica	0.07	0.31	6.67	1.23	1.54
Psoralea esculenta	0.13	0.62	6.67	1.23	1.85
Ratibida columnifera	0.60	2.78	40.00	7.41	10.19
Sphaeralcea coccinea	0.37	1.70	26.67	4.94	6.64
Vernonia fasciculata	0.10	0.46	3.33	0.62	1.08
Vicia americana	0.10	0.46	10.00	1.85	2.31
Rosa arkansana	0.03	0.15	3.33	0.62	0.77
Selaginella densa	0.73	3.40	30.00	5.56	8.96

**Table 26. Density Analysis of the Ammonium Nitrate Treatment at the 100 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	1.03	5.34	50.00	9.26	14.60
<i>Androsace occidentalis</i>	0.80	4.14	16.67	3.09	7.23
<i>Antennaria parvifolia</i>	1.23	6.38	13.33	2.47	8.85
<i>Artemisia dracunculus</i>	0.37	1.90	10.00	1.85	3.75
<i>Artemisia frigida</i>	1.70	8.79	46.67	8.64	17.43
<i>Aster ericoides</i>	0.03	0.17	3.33	0.62	0.79
<i>Cerastium arvense</i>	1.17	6.03	20.00	3.70	9.73
<i>Cirsium undulatum</i>	0.03	0.17	3.33	0.62	0.79
<i>Grindelia squarrosa</i>	1.03	5.34	16.67	3.09	8.43
<i>Hedeoma hispida</i>	1.77	9.14	50.00	9.26	18.40
<i>Lactuca oblongifolia</i>	0.17	0.86	10.00	1.85	2.71
<i>Linum rigidum</i>	0.07	0.34	6.67	1.23	1.57
<i>Lithospermum incisum</i>	0.03	0.17	3.33	0.62	0.79
<i>Lotus americanus</i>	0.40	2.07	23.33	4.32	6.39
<i>Neslia paniculata</i>	0.03	0.17	3.33	0.62	0.79
<i>Orthocarpus luteus</i>	3.27	16.90	50.00	9.26	26.16
<i>Phlox hoodii</i>	1.03	5.34	33.33	6.17	11.51
<i>Plantago purshii</i>	2.13	11.03	56.67	10.49	21.52
<i>Potentilla pensylvanica</i>	0.17	0.86	6.67	1.23	2.09
<i>Psoralea argophylla</i>	0.07	0.34	6.67	1.23	1.57
<i>Psoralea esculenta</i>	0.07	0.34	6.67	1.23	1.57
<i>Ratibida columnifera</i>	1.00	5.17	36.67	6.79	11.96
<i>Senecio plattensis</i>	0.20	1.03	3.33	0.62	1.65
<i>Sphaeralcea coccinea</i>	1.17	6.03	46.67	8.64	14.67
<i>Taraxacum officinale</i>	0.03	0.17	3.33	0.62	0.79
<i>Vernonia fasciculata</i>	0.07	0.34	3.33	0.62	0.96
<i>Vicia americana</i>	0.03	0.17	3.33	0.62	0.79
<i>Symphoricarpos occidentalis</i>	0.07	0.34	3.33	0.62	0.96
<i>Selaginella densa</i>	0.17	0.86	3.33	0.62	1.48



**Table 27. Density Analysis of the Urea Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	2.33	7.17	63.33	10.33	17.50
<i>Androsace occidentalis</i>	0.17	0.51	10.00	1.63	2.14
<i>Anemone cylindrica</i>	0.20	0.61	6.67	1.09	1.70
<i>Antennaria parvifolia</i>	4.30	13.22	53.33	8.70	21.92
<i>Arnica fulgens</i>	0.03	0.10	3.33	0.54	0.64
<i>Artemisia dracunculus</i>	0.27	0.82	3.33	0.54	1.36
<i>Artemisia frigida</i>	1.37	4.20	63.33	10.33	14.53
<i>Cerastium arvense</i>	1.97	6.05	23.33	3.80	9.85
<i>Galium boreale</i>	0.07	0.20	6.67	1.09	1.29
<i>Gaura coccinea</i>	0.37	1.13	16.67	2.72	3.85
<i>Grindelia squarrosa</i>	0.20	0.61	6.67	1.09	1.70
<i>Hedeoma hispida</i>	0.93	2.87	30.00	4.89	7.76
<i>Lactuca oblongifolia</i>	0.07	0.20	3.33	0.54	0.74
<i>Linum rigidum</i>	0.07	0.20	6.67	1.09	1.29
<i>Lithospermum incisum</i>	0.33	1.02	6.67	1.09	2.11
<i>Lotus americanus</i>	0.10	0.31	6.67	1.09	1.40
<i>Neslia paniculata</i>	0.07	0.20	6.67	1.09	1.29
<i>Orthocarpus luteus</i>	12.03	36.99	56.67	9.24	46.23
<i>Penstemon albidus</i>	0.33	1.02	16.67	2.72	3.74
<i>Phlox hoodii</i>	0.33	1.02	16.67	2.72	3.74
<i>Plantago purshii</i>	4.27	13.11	90.00	14.67	27.78
<i>Potentilla pensylvanica</i>	0.03	0.10	3.33	0.54	0.64
<i>Psoralea argophylla</i>	0.23	0.72	10.00	1.63	2.35
<i>Ratibida columnifera</i>	0.93	2.87	43.33	7.07	9.94
<i>Solidago rigida</i>	0.03	0.10	3.33	0.54	0.64
<i>Sphaeralcea coccinea</i>	0.80	2.46	33.33	5.43	7.89
<i>Viola nuttallii</i>	0.13	0.41	6.67	1.09	1.50
<i>Selaginella densa</i>	0.57	1.74	16.67	2.72	4.46

**Table 28. Density Analysis of the Urea Treatment at the 40 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.70	2.25	26.67	4.73	6.98
<i>Androsace occidentalis</i>	0.90	2.89	20.00	3.55	6.44
<i>Antennaria parvifolia</i>	0.73	2.35	13.33	2.37	4.72
<i>Arnica fulgens</i>	0.03	0.11	3.33	0.59	0.70
<i>Artemisia dracunculus</i>	0.23	0.75	13.33	2.37	3.12
<i>Artemisia frigida</i>	1.93	6.20	50.00	8.88	15.08
<i>Aster ericoides</i>	0.10	0.32	3.33	0.59	0.91
<i>Cerastium arvense</i>	0.17	0.53	6.67	1.18	1.71
<i>Echinacea angustifolia</i>	0.03	0.11	3.33	0.59	0.70
<i>Gaura coccinea</i>	0.03	0.11	3.33	0.59	0.70
<i>Hedeoma hispida</i>	1.37	4.39	40.00	7.10	11.49
<i>Hippuris vulgaris</i>	0.03	0.11	3.33	0.59	0.70
<i>Liatris punctata</i>	0.03	0.11	3.33	0.59	0.70
<i>Linum rigidum</i>	0.07	0.21	3.33	0.59	0.80
<i>Lotus americanus</i>	0.27	0.86	13.33	2.37	3.23
<i>Neslia paniculata</i>	0.13	0.43	13.33	2.37	2.80
<i>Orthocarpus luteus</i>	13.40	42.99	73.33	13.02	56.01
<i>Oxytropis lambertii</i>	0.03	0.11	3.33	0.59	0.70
<i>Penstemon albidus</i>	0.03	0.11	3.33	0.59	0.70
<i>Phlox hoodii</i>	1.10	3.53	33.33	5.92	9.45
<i>Plantago purshii</i>	5.87	18.82	76.67	13.61	32.43
<i>Potentilla pensylvanica</i>	0.20	0.64	6.67	1.18	1.82
<i>Psoralea esculenta</i>	0.10	0.32	10.00	1.78	2.10
<i>Ratibida columnifera</i>	1.63	5.24	53.33	9.47	14.71
<i>Sphaeralcea coccinea</i>	1.50	4.81	66.67	11.83	16.64
<i>Vicia americana</i>	0.20	0.64	6.67	1.18	1.82
<i>Viola nuttallii</i>	0.07	0.21	3.33	0.59	0.80
<i>Selaginella densa</i>	0.27	0.86	6.67	1.18	2.04

**Table 29. Density Analysis of the Urea Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Annually for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.73	2.85	26.67	4.49	7.34
<i>Androsace occidentalis</i>	0.40	1.55	16.67	2.81	4.36
<i>Antennaria parvifolia</i>	3.37	13.08	20.00	3.37	16.45
<i>Artemisia dracunculus</i>	0.57	2.20	16.67	2.81	5.01
<i>Artemisia frigida</i>	1.17	4.53	40.00	6.74	11.27
<i>Aster ericoides</i>	0.20	0.78	10.00	1.69	2.47
<i>Gaura coccinea</i>	0.10	0.39	3.33	0.56	0.95
<i>Grindelia squarrosa</i>	0.23	0.91	10.00	1.69	2.60
<i>Hedeoma hispida</i>	2.17	8.42	50.00	8.43	16.85
<i>Hippuris vulgaris</i>	0.17	0.65	10.00	1.69	2.34
<i>Lactuca oblongifolia</i>	0.17	0.65	3.33	0.56	1.21
<i>Liatis punctata</i>	0.20	0.78	6.67	1.12	1.90
<i>Linum rigidum</i>	0.03	0.13	3.33	0.56	0.69
<i>Lotus americanus</i>	0.03	0.13	3.33	0.56	0.69
<i>Neslia paniculata</i>	0.13	0.52	10.00	1.69	2.21
<i>Orthocarpus luteus</i>	3.10	12.05	50.00	8.43	20.48
<i>Oxytropis lambertii</i>	0.03	0.13	3.33	0.56	0.69
<i>Penstemon albidus</i>	0.07	0.26	3.33	0.56	0.82
<i>Petalostemon purpureum</i>	0.03	0.13	3.33	0.56	0.69
<i>Phlox hoodii</i>	0.97	3.76	23.33	3.93	7.69
<i>Plantago purshii</i>	5.53	21.50	80.00	13.48	34.98
<i>Polygala alba</i>	0.03	0.13	3.33	0.56	0.69
<i>Potentilla pensylvanica</i>	0.07	0.26	3.33	0.56	0.82
<i>Psoralea argophylla</i>	0.17	0.65	6.67	1.12	1.77
<i>Ratibida columnifera</i>	1.67	6.48	76.67	12.92	19.40
<i>Senecio plattensis</i>	0.20	0.78	6.67	1.12	1.90
<i>Sphaeralcea coccinea</i>	0.90	3.50	46.67	7.87	11.37
<i>Vicia americana</i>	0.40	1.55	20.00	3.37	4.92
<i>Selaginella densa</i>	2.90	11.27	36.67	6.18	17.45

**Table 30. Density Analysis of the Urea Treatment at the 60 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
<i>Achillea millefolium</i>	0.27	0.96	23.33	3.76	4.72
<i>Androsace occidentalis</i>	0.43	1.56	16.67	2.69	4.25
<i>Antennaria parvifolia</i>	2.10	7.56	30.00	4.84	12.40
<i>Arnica fulgens</i>	0.07	0.24	3.33	0.54	0.78
<i>Artemisia dracunculus</i>	0.13	0.48	6.67	1.08	1.56
<i>Artemisia frigida</i>	2.17	7.80	53.33	8.60	16.40
<i>Aster ericoides</i>	0.30	1.08	10.00	1.61	2.69
<i>Coryza canadensis</i>	0.13	0.48	3.33	0.54	1.02
<i>Echinacea angustifolia</i>	0.43	1.56	16.67	2.69	4.25
<i>Erysimum asperum</i>	0.17	0.60	3.33	0.54	1.14
<i>Gaura coccinea</i>	0.87	3.12	23.33	3.76	6.88
<i>Hedeoma hispida</i>	1.83	6.60	46.67	7.53	14.13
<i>Liatris punctata</i>	0.27	0.96	13.33	2.15	3.11
<i>Linum rigidum</i>	0.07	0.24	6.67	1.08	1.32
<i>Lotus americanus</i>	0.47	1.68	13.33	2.15	3.83
<i>Neslia paniculata</i>	0.03	0.12	3.33	0.54	0.66
<i>Orthocarpus luteus</i>	4.57	16.45	60.00	9.68	26.13
<i>Oxytropis lambertii</i>	0.07	0.24	3.33	0.54	0.78
<i>Penstemon albidus</i>	0.10	0.36	3.33	0.54	0.90
<i>Petalostemon purpureum</i>	0.13	0.48	6.67	1.08	1.56
<i>Phlox hoodii</i>	1.00	3.60	30.00	4.84	8.44
<i>Plantago purshii</i>	5.97	21.49	83.33	13.44	34.93
<i>Polygala alba</i>	0.07	0.24	3.33	0.54	0.78
<i>Psoralea argophylla</i>	0.07	0.24	6.67	1.08	1.32
<i>Psoralea esculenta</i>	0.03	0.12	3.33	0.54	0.66
<i>Ratibida columnifera</i>	0.67	2.40	30.00	4.84	7.24
<i>Senecio plattensis</i>	0.17	0.60	16.67	2.69	3.29
<i>Solidago missouriensis</i>	0.03	0.12	3.33	0.54	0.66
<i>Sphaeralcea coccinea</i>	0.60	2.16	30.00	4.84	7.00
<i>Vernonia fasciculata</i>	0.40	1.44	13.33	2.15	3.59
<i>Vicia americana</i>	0.20	0.72	10.00	1.61	2.33
<i>Viola nuttallii</i>	0.03	0.12	3.33	0.54	0.66
<i>Selaginella densa</i>	3.93	14.17	40.00	6.45	20.62

**Table 31. Density Analysis of the Urea Treatment at the 100 Pounds of Nitrogen per Acre Rate Applied Biennially for the Native Range Fertilization Trial at the Dickinson Experiment Station, 1983**

<b>Species</b>	<b>Density</b>	<b>Relative % Density</b>	<b>% Frequency</b>	<b>Relative % Frequency</b>	<b>Importance Value</b>
Achillea millefolium	0.17	0.49	10.00	1.96	2.45
Androsace occidentalis	1.33	3.93	26.67	5.23	9.16
Artemisia dracunculus	0.47	1.38	16.67	3.27	4.65
Artemisia frigida	1.30	3.83	33.33	6.54	10.37
Aster oblongifolius	0.03	0.10	3.33	0.65	0.75
Erysimum asperum	0.07	0.20	3.33	0.65	0.85
Galium boreale	0.03	0.10	3.33	0.65	0.75
Gaura coccinea	0.20	0.59	13.33	2.61	3.20
Hedeoma hispida	4.80	14.16	90.00	17.65	31.81
Lepidium densiflorum	0.07	0.20	6.67	1.31	1.51
Liatris punctata	0.17	0.49	6.67	1.31	1.80
Linum rigidum	0.03	0.10	3.33	0.65	0.75
Lithospermum incisum	0.03	0.10	3.33	0.65	0.75
Lotus americanus	0.03	0.10	3.33	0.65	0.75
Melilotus officinalis	0.07	0.20	3.33	0.65	0.85
Neslia paniculata	0.07	0.20	6.67	1.31	1.51
Orthocarpus luteus	1.13	3.34	43.33	8.50	11.84
Phlox hoodii	0.73	2.16	23.33	4.58	6.74
Plantago purshii	18.90	55.75	96.67	18.95	74.70
Polygala alba	0.03	0.10	3.33	0.65	0.75
Ratibida columnifera	0.33	0.98	23.33	4.58	5.56
Senecio plattensis	0.03	0.10	3.33	0.65	0.75
Sphaeralcea coccinea	1.47	4.33	43.33	8.50	12.83
Vicia americana	0.03	0.10	3.33	0.65	0.75
Selaginella densa	2.37	6.98	36.67	7.19	14.17

**Table 32. Percent Soil Moisture for Native Range Fertilization Trial,  
Dickinson Experiment Station, 1983**

Sample Location Depth (in)	21 Jun			8 Jul			9 Aug		
	East Rep	West Rep	Mean	East Rep	West Rep	Mean	East Rep	West Rep	Mean
<b>South:</b>									
0-6	17.86	22.18	20.02	18.13	19.21	18.67	11.08	14.75	12.92
6-12	13.41	15.53	14.47	14.85	16.69	15.77	9.71	12.17	10.94
12-24	19.39	14.66	17.03	17.72	17.56	17.64	11.35	10.72	11.04
24-36	19.39	17.63	18.51	19.55	16.08	17.82	19.68	12.21	15.95
36-48	16.19	15.00	15.60	15.67	14.60	15.14	16.63	13.93	15.28
<b>Central:</b>									
0-6	20.49	22.22	21.36	22.24	19.78	21.01	13.51	13.81	13.66
6-12	15.58	16.28	15.93	18.60	14.36	16.48	12.74	9.91	11.33
12-24	17.93	18.29	18.11	17.60	16.10	16.85	12.06	12.31	12.19
24-36	20.02	12.81	16.42	19.73	10.67	15.20	15.34	10.37	12.86
36-48	18.72	19.42	19.07	15.94	15.72	15.83	16.14	13.16	14.65
<b>North:</b>									
0-6	20.53	19.91	20.22	20.28	18.92	19.60	13.61	10.39	12.00
6-12	15.46	18.11	16.79	17.12	16.16	16.64	12.57	12.12	12.35
12-24	18.44	18.57	18.51	19.18	17.32	18.25	12.45	12.97	12.71
24-36	21.22	12.33	16.78	20.96	13.04	17.00	17.29	12.52	14.91
36-48	13.28	12.38	12.83	14.40	12.73	13.57	15.81	12.52	14.17

**Table 33. Mean Percent Soil Moisture for the Native Fertilization Trial,  
Dickinson Experiment Station, 1983**

Depth in Inches	21 Jun	8 Jul	9 Aug
0-6	20.53	19.76	12.86
6-12	15.73	16.30	11.54
12-24	17.88	17.58	11.98
24-36	17.24	16.67	14.57
36-48	15.83	14.85	14.95

**PLANT SPECIES LIST OF THE NATIVE RANGE FERTILIZATION TRIAL,  
DICKINSON EXPERIMENT STATION, 1983**

**Graminoids:**

Ag sm	<i>Agropyron smithii</i>	Western wheatgrass
Ag sp	<i>Agropyron spicatum</i>	Bluebunch wheatgrass
Ag tr	<i>Agropyron trachycaulum</i>	Slender wheatgrass
Ar lo	<i>Aristida longiseta</i>	Red threeawn
Bo gr	<i>Bouteloua gracilis</i>	Blue grama
Bu da	<i>Buchloe dactyloides</i>	Buffalo grass
Ca mo	<i>Calamagrostis montanensis</i>	Plains reedgrass
Ca lo	<i>Calamovilfa longifolia</i>	Prairie sandreed
Ko py	<i>Koeleria pyramidata</i>	Prairie junegrass
Mu cu	<i>Muhlenbergia cuspidata</i>	Plains muhly
Mu sq	<i>Munroa squarrosa</i>	False buffalo grass
Pa ol	<i>Panicum oligosanthos</i>	Scribner panic grass
Po co	<i>Poa compressa</i>	Canada bluegrass
St co	<i>Stipa comata</i>	Needle-and-thread
St vi	<i>Stipa viridula</i>	Green needlegrass
Ca fi	<i>Carex filifolia</i>	Thread leaved sedge
Ca he	<i>Carex heliophila</i>	Yellow sedge

**Forbs:**

Ac mi	<i>Achillea millefolium</i>	Yarrow
Ag gl	<i>Agoseris glauca</i>	Prairie dandelion
An oc	<i>Androsace occidentalis</i>	Fairy candelabra
An cy	<i>Anemone cylindrica</i>	Cottonweed

**Forbs (Continued):**

An pa	<i>Antennaria parvifolia</i>	Pussytoes
Ar fu	<i>Arnica fulgens</i>	Arnica
Ar dr	<i>Artemisia dracunculus</i>	Green sage
Ar fr	<i>Artemisia frigida</i>	Fringed sage
Ar lu	<i>Artemisia ludoviciana</i>	White sage
As er	<i>Aster ericoides</i>	White prairie aster
As ob	<i>Aster oblongifolius</i>	Aromatic aster
As ca	<i>Astragalus canadensis</i>	Little rattlepod
Ce ar	<i>Cerastium arvense</i>	Prairie chickweed
Ch al	<i>Chenopodium album</i>	Lamb's quarters
Ch vi	<i>Chrysopsis villosa</i>	Golden aster
Ci un	<i>Cirsium undulatum</i>	Prairie thistle
Co ar	<i>Convolvulus arvensis</i>	Field bindweed
Co ca	<i>Conyza canadensis</i>	Horseweed
Ec an	<i>Echinacea angustifolia</i>	Purple coneflower
Er gl	<i>Erigeron glabellus</i>	Rough erigeron
Er as	<i>Erysimum asperum</i>	Western wallflower
Ga bo	<i>Galium boreale</i>	Northern bedstraw
Ga co	<i>Gaura coccinea</i>	Gaura
Gr sq	<i>Grindelia squarrosa</i>	Gumweed
Gu sa	<i>Gutierrezia sarothrae</i>	Broomweed
He hi	<i>Hedeoma hispida</i>	Rough pennyroyal
He ri	<i>Helianthus rigidus</i>	Stiff sunflower
Hi vu	<i>Hippuris vulgaris</i>	Marestail
Ko sc	<i>Kochia scoparia</i>	Kochia
La ob	<i>Lactuca oblongifolia</i>	Blue wild lettuce



**Forbs (Continued):**

Le de	<i>Lepidium densiflorum</i>	Peppergrass
Li pu	<i>Liatris punctata</i>	Blazing star
Li ri	<i>Linum rigidum</i>	Stiffstem flax
Li in	<i>Lithospermum incisum</i>	Narrow-leaved puccoon
Lo am	<i>Lotus americanus</i>	Prairie bird's foot trefoil
Me of	<i>Melilotus officinalis</i>	Yellow sweetclover
Ne pa	<i>Neslia paniculata</i>	Ball mustard
Op fr	<i>Opuntia fragilis</i>	Brittle prickly pear
Or lu	<i>Orthocarpus luteus</i>	Owl clover
Ox la	<i>Oxytropis lambertii</i>	Purple loco
Pe al	<i>Penstemon albidus</i>	White beardtongue
Pe pu	<i>Petalostemon purpureum</i>	Purple prairie clover
Ph ho	<i>Phlox hoodii</i>	Moss phlox
Pl pu	<i>Plantago purshii</i>	Woolly plantain
Po al	<i>Polygala alba</i>	White milkwort
Po pe	<i>Potentilla pensylvanica</i>	Potentilla
Ps ar	<i>Psoralea argophylla</i>	Silverleaf scurfpea
Ps es	<i>Psoralea esculenta</i>	Indian breadroot
Ra co	<i>Ratibida columnifera</i>	Long headed coneflower
Sa ka	<i>Salsola kali</i>	Russian thistle
Se pl	<i>Senecio plattensis</i>	Prairie ragwort
Si mo	<i>Sisyrinchium montanum</i>	Blue-eyed grass
So mi	<i>Solidago missouriensis</i>	Early goldenrod
So mo	<i>Solidago mollis</i>	Soft goldenrod
So ri	<i>Solidago rigida</i>	Stiff goldenrod
Sp co	<i>Sphaeralcea coccinea</i>	Scarlet globemallow

**Forbs (Continued):**

Ta of	<i>Taraxacum officinale</i>	Dandelion
Ve fa	<i>Vernonia fasciculata</i>	Ironweed
Vi am	<i>Vicia americana</i>	Wild vetch
Vi nu	<i>Viola nuttallii</i>	Nuttall's violet

**Shrubs:**

Ro ar	<i>Rosa arkansana</i>	Prairie wild rose
Sy oc	<i>Symphoricarpos occidentalis</i>	Wolfberry

**Lycopods:**

Se de	<i>Selaginella densa</i>	Club moss
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**Eumycota:**

Li spp.	Species of lichens	Lichens
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**LITERATURE CITED**

Heady, H.F. and L. Rader. 1958. Modifications of the Point Frame. *Journal of Range Management* Vol. II (2): 95-96.

Levy, E.B. and E.A. Madden. 1933. The Point Method of Pasture Analysis. *New Zealand Journal of Agriculture* Vol. 46: 267-279.

Smith, Justin G. 1959. Additional Modifications of the Point Frame. *Journal of Range Management* Vol. 12(4): 204-205.

Tinney, F.W., O.S. Aamodt and H.L. Ahlgren. 1937. Preliminary Report of a Study on Methods Used in Botanical Analysis of Pasture Awards. *Journal of the American Society of Agronomy* Vol. 29(10): 835-840.