

ALFALFA INTER-SEEDING TRIAL – 1983

Dickinson Experiment Station

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The Alfalfa Inter-seeding trial is separated into four separate segments. These are: Alfalfa Inter-seeding Row Spacing Techniques Trial, Alfalfa Inter-seeding Furrow Width Techniques Trial, Inter-seeded Alfalfa Variety Response to Grazing Trial and Alfalfa Variety Establishment by Broadcast Seeding into Rangeland Trial.

The personnel at the Dickinson Experiment Station built an inter-seeding machine during the winter of 1982-83. The plans from a machine designed and tested at South Dakota State University (Chisholms et al. 1980) were used for the construction with slight alterations. This inter-seeder was used to establish the alfalfa inter-seeding plots in 1983.

ALFALFA INTER-SEEDING ROW SPACING TECHNIQUES TRIAL

This trial was designed to evaluate alfalfa inter-seeding into rangeland with different intervals between the rows. The intended purpose of the data will be primarily to assist in the determination of a recommended row spacing or row spacings for alfalfa inter-seeding into rangeland for pasture use in western North Dakota.

These plots were established on one acre located on the NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 23, T. 143 N., R. 96 W. at the ranch headquarters of the Dickinson Experiment Station. The 33 X 50 foot plots were arranged in a randomized block design with three replications. The soil is vebar fine sandy loam. The range site is sandy with a few thin claypan sites. Travois alfalfa was seeded at a rate of 0.50 lbs PLS/row/acre on 21 April 1983. A four inch twisted chisel plow shovel was used as the furrow opener. The intervals between the rows were 2, 3, 4, 5, 8 and 10 feet. A control plot of no inter-seeding was included in each replication.

The data that were collected from these plots were: above ground herbage production separated into nine categories, alfalfa seedling counts per meter of row, species composition by point frame and forb densities by use of one tenth square quadrats.

The above ground herbage production was sampled by clipping the vegetation to ground level in three $\frac{1}{4}$ m² quadrats for each plot on 21 July 1983. The herbage was separated into nine categories: cool short, warm short, cool mid, western wheatgrass, warm mid, warm tall, sedge, forbs and shrubs. The samples were oven dried at 80°C. The dried samples were then weighed in grams. The average weight of each category for the three $\frac{1}{4}$ m² 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.

The alfalfa seedling counts were made by counting the number of seedlings along two randomly placed meter sticks for each row of each plot. The mean number of seedlings per meter of row was determined for each treatment. Seedling counts were conducted on 23 June and 30 August 1983.

Quantitative species composition data for each plot was collected on 22-23 August 1983. 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). 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 three feet inside and parallel to the east boundary of each plot. Five minor transects were established perpendicular to the major transect at nine foot intervals starting nine feet from the south boundary of the plot. One hundred points were read on each minor transect equally spaced across the plot.

Forb and shrub densities were sampled by the use of one tenth meter square quadrats on 22-23 and 30 August 1983. The forbs and shrubs that were rooted within the frame were counted by species in each of the 25 quadrats per plot. Five 0.1 m² quadrats were spaced at 6 foot intervals along each of the five minor transects.

ALFALFA INTER-SEEDING ROW SPACING TECHNIQUES TRIAL

Location:	Dickinson Experiment Station Ranch Headquarters NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 23, T. 143 N., R. 96 W.	
Replications:	Three Randomized Block Design	
Study Size:	183' X 241'	1.01 acres
Plot Size:	33' X 50'	0.04 acres
Perimeter Border:	10' on west and south, 3' on north and 0' on east	
Alleys:	10'	
Soil:	Vebar	
Range Site:	Sandy with a few thin claypan sites	
Seeding Date:	21 Apr 1983	
Seeding Rate:	0.50 lbs. PLS/row/acre	
Alfalfa Variety:	Travois	
Chisel Plow Shovel:	4" twisted	
Row spacings:	0, 2, 3, 4, 5, 8 and 10 foot	

Table 1. Mean Above Ground Herbage Production by Category in Lbs/Acre for the Alfalfa Inter-seeding Row-spacing Techniques Trial at the Dickinson Experiment Station, 1983

Clip Categories	ROW SPACING						
	0 Foot	2 Foot	3 Foot	4 Foot	5 Foot	8 Foot	10 Foot
Cool short	207.7	303.6	477.4	133.6	433.4	292.1	346.6
Warm short	140.7	253.3	191.5	152.4	224.0	159.0	281.5
Cool mid	290.2	167.0	166.2	305.3	238.3	280.3	225.5
Western wheatgrass	39.6	20.2	50.0	5.2	9.9	10.4	55.1
Warm mid	50.4	39.6	53.9	143.9	62.7	32.5	19.0
Warm tall	27.4	0.0	2.4	59.9	2.0	19.9	8.0
Sedge	269.5	214.4	164.1	215.6	205.6	152.7	135.1
Total Grass	1025.5	998.1	1105.5	1015.9	1175.9	946.9	1070.8
Forbs	395.6	291.4	290.9	313.2	270.7	265.2	452.0
Shrubs	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1421.1	1289.5	1396.4	1329.1	1446.6	1212.1	1522.8

Table 2. Alfalfa Seedling Counts Per Meter of Row for the Alfalfa Inter-seeding Row Spacing Techniques Trial, Dickinson Experiment Station-23 Jun and 30 Aug 1983

Row Spacing	Rep 1		Rep 2		Rep 3		Mean	
	23 Jun	30 Aug	23 Jun	30 Aug	23 Jun	30 Aug	23 Jun	30 Aug
Control	0	0	0	0	0	0	0	0
2 Foot	27.06	6.32	18.85	1.69	24.32	5.82	23.41	4.61
3 Foot	26.75	5.84	23.21	0.21	11.12	0.34	20.36	2.13
4 Foot	14.82	1.13	25.50	0.07	17.44	0.07	19.25	0.42
5 Foot	24.92	9.00	23.67	0.59	23.83	2.59	24.14	4.06
8 Foot	22.38	0.25	22.75	0.75	18.10	0.0	21.08	0.33
10 Foot	19.38	2.38	20.50	1.63	20.38	0.50	20.09	1.50

Table 3. Alfalfa Seedling Counts Per Foot of Row for the Alfalfa Inter-seeding Row Spacing Techniques Trial, Dickinson Experiment Station–23 Jun and 30 Aug 1983

Row Spacing	Rep 1		Rep 2		Rep 3		Mean	
	23 Jun	30 Aug	23 Jun	30 Aug	23 Jun	30 Aug	23 Jun	30 Aug
Control	0	0	0	0	0	0	0	0
2 Foot	8.25	1.93	5.75	0.52	7.41	1.77	7.14	1.41
3 Foot	8.16	1.78	7.08	0.06	3.39	0.10	6.21	0.65
4 Foot	4.52	0.34	7.77	0.02	5.32	0.02	5.87	0.13
5 Foot	7.60	2.74	7.22	0.18	7.27	0.79	7.36	1.24
8 Foot	6.82	0.08	6.94	0.23	5.52	0.0	6.43	0.10
10 Foot	5.91	0.73	6.25	0.50	6.21	0.15	6.13	0.46

Table 4. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 0 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	0.73	1.73	7.33	3.04	4.77
<i>Aristida longiseta</i>	0.07	0.16	0.67	0.28	0.44
<i>Bouteloua gracilis</i>	18.53	43.71	63.33	26.24	69.95
<i>Calamovilfa longifolia</i>	0.60	1.42	5.33	2.21	3.63
<i>Koeleria pyramidata</i>	3.47	8.18	26.67	11.05	19.23
<i>Muhlenbergia cuspidata</i>	0.60	1.42	4.67	1.93	3.35
<i>Panicum oligosanthos</i>	0.13	0.31	1.33	0.55	0.86
<i>Stipa comata</i>	1.33	3.14	10.00	4.14	7.28
<i>Stipa viridula</i>	1.67	3.93	15.33	6.35	10.28
<i>Carex eleocharis</i>	0.13	0.31	0.67	0.28	0.59
<i>Carex filifolia</i>	6.53	15.41	40.00	16.57	31.98
<i>Carex heliophila</i>	3.20	7.55	24.00	9.94	17.49
<i>Androsace occidentalis</i>	0.07	0.16	0.67	0.28	0.44
<i>Antennaria parvifolia</i>	0.33	0.79	2.00	0.83	1.62
<i>Artemisia dracunculus</i>	0.13	0.31	1.33	0.55	0.86
<i>Artemisia frigida</i>	0.07	0.16	0.67	0.28	0.44
<i>Aster ericoides</i>	0.33	0.79	3.33	1.38	2.17
<i>Echinacea angustifolia</i>	0.13	0.31	1.33	0.55	0.86
<i>Erysimum asperum</i>	0.13	0.31	0.67	0.28	0.59
<i>Euphorbia geyeri</i>	0.07	0.16	0.67	0.28	0.44
<i>Haplopappus spinulosus</i>	0.13	0.31	1.33	0.55	0.86
<i>Hedeoma hispida</i>	0.13	0.31	1.33	0.55	0.86
<i>Liatris punctata</i>	0.07	0.16	0.67	0.28	0.44
<i>Petalostemon purpureum</i>	0.07	0.16	0.67	0.28	0.44
<i>Phlox hoodii</i>	0.27	0.63	2.67	1.10	1.73
<i>Plantago purshii</i>	0.07	0.16	0.67	0.28	0.44
<i>Solidago missouriensis</i>	0.07	0.16	0.67	0.28	0.44
<i>Solidago mollis</i>	0.07	0.16	0.67	0.28	0.44
<i>Vicia americana</i>	0.07	0.16	0.67	0.28	0.44
<i>Selaginella densa</i>	0.33	0.79	0.67	0.28	1.07
Lichen spp.	2.87	6.76	21.33	8.84	15.60
Litter	47.00		99.33		
Sod	0.00		0.00		
Furrow	0.00		0.00		
Soil	10.47		50.67		
Rock	0.13		1.33		

Table 5. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 2 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
Agropyron smithii	0.93	2.20	9.33	3.86	6.06
Agropyron trachycaulum	0.13	0.31	1.33	0.55	0.86
Bouteloua gracilis	18.73	44.11	76.67	31.68	75.79
Koeleria pyramidata	6.73	15.86	44.00	18.18	34.04
Muhlenbergia cuspidata	0.60	1.41	4.67	1.93	3.34
Stipa comata	3.40	8.01	25.33	10.47	18.48
Stipa viridula	0.13	0.31	1.33	0.55	0.86
Carex eleocharis	0.33	0.78	3.33	1.38	2.16
Carex filifolia	6.67	15.70	37.33	15.43	31.13
Carex heliophila	0.73	1.73	4.00	1.65	3.38
Artemisia dracunculus	0.60	1.41	4.67	1.93	3.34
Aster ericoides	0.20	0.47	2.00	0.83	1.30
Chrysopsis villosa	0.20	0.47	0.67	0.28	0.75
Erysimum asperum	0.07	0.16	0.67	0.28	0.44
Euphorbia geyeri	0.07	0.16	0.67	0.28	0.44
Gaura coccinea	0.07	0.16	0.67	0.28	0.44
Gutierrezia sarothrae	0.07	0.16	0.67	0.28	0.44
Hedeoma hispida	0.27	0.63	2.67	1.10	1.73
Lotus americanus	0.27	0.63	2.67	1.10	1.73
Lygodesmia juncea	0.07	0.16	0.67	0.28	0.44
Petalostemon purpureum	0.07	0.16	0.67	0.28	0.44
Phlox hoodii	1.13	2.67	8.00	3.31	5.98
Plantago purshii	0.20	0.47	2.00	0.83	1.30
Potentilla pensylvanica	0.07	0.16	0.67	0.28	0.44
Psoralea argophylla	0.07	0.16	0.67	0.28	0.44
Psoralea esculenta	0.07	0.16	0.67	0.28	0.44
Sphaeralcea coccinea	0.07	0.16	0.67	0.28	0.44
Vicia americana	0.07	0.16	0.67	0.28	0.44
Lichen spp.	0.47	1.10	4.67	1.93	3.03
Litter	17.40		77.33		
Sod	14.07		46.67		
Furrow	23.27		91.33		
Soil	2.80		15.33		
Rock	0.00		0.00		

Table 6. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 3 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	1.13	2.37	9.33	3.37	5.74
<i>Andropogon scoparius</i>	0.07	0.14	0.67	0.24	0.38
<i>Bouteloua gracilis</i>	19.07	39.83	72.67	26.27	66.10
<i>Calamovilfa longifolia</i>	0.13	0.28	1.33	0.48	0.76
<i>Koeleria pyramidata</i>	8.47	17.69	50.67	18.31	36.00
<i>Muhlenbergia cuspidata</i>	1.33	2.79	10.67	3.86	6.65
<i>Stipa comata</i>	4.33	9.05	30.00	10.84	19.89
<i>Stipa viridula</i>	1.27	2.65	12.00	4.34	6.99
<i>Carex eleocharis</i>	0.40	0.84	4.00	1.45	2.29
<i>Carex filifolia</i>	5.27	11.00	32.00	11.57	22.57
<i>Carex heliophila</i>	1.13	2.37	9.33	3.37	5.74
<i>Androsace occidentalis</i>	0.13	0.28	1.33	0.48	0.76
<i>Antennaria parvifolia</i>	0.33	0.70	0.67	0.24	0.94
<i>Artemisia dracunculus</i>	0.40	0.84	4.00	1.45	2.29
<i>Artemisia ludoviciana</i>	0.07	0.14	0.67	0.24	0.38
<i>Aster ericoides</i>	0.47	0.97	3.33	1.20	2.17
<i>Chrysopsis villosa</i>	0.07	0.14	0.67	0.24	0.38
<i>Commandra umbellata</i>	0.07	0.14	0.67	0.24	0.38
<i>Convolvulus arvensis</i>	0.07	0.14	0.67	0.24	0.38
<i>Erysimum asperum</i>	0.07	0.14	0.67	0.24	0.38
<i>Grindelia squarrosa</i>	0.13	0.28	1.33	0.48	0.76
<i>Gutierrezia sarothrae</i>	0.07	0.14	0.67	0.24	0.38
<i>Hedeoma hispida</i>	0.13	0.28	1.33	0.48	0.76
<i>Liatris punctata</i>	0.07	0.14	0.67	0.24	0.38
<i>Linum rigidum</i>	0.07	0.14	0.67	0.24	0.38
<i>Lotus americanus</i>	0.47	0.97	4.00	1.45	2.42
<i>Oxytropis lambertii</i>	0.07	0.14	0.67	0.24	0.38
<i>Phlox hoodii</i>	0.53	1.11	5.33	1.93	3.04
<i>Plantago purshii</i>	0.20	0.42	2.00	0.72	1.14
<i>Psoralea argophylla</i>	0.07	0.14	0.67	0.24	0.38
<i>Solidago missouriensis</i>	0.07	0.14	0.67	0.24	0.38
<i>Sphaeralcea coccinea</i>	0.07	0.14	0.67	0.24	0.38
<i>Vicia americana</i>	0.07	0.14	0.67	0.24	0.38
<i>Selaginella densa</i>	0.07	0.14	0.67	0.24	0.38
Lichen spp.	1.53	3.20	11.33	4.10	7.30
Litter	22.33		83.33		
Sod	10.33		34.67		
Furrow	15.87		66.67		
Soil	3.60		20.00		
Rock	0.00		0.00		

Table 7. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 4 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	0.20	0.50	2.00	0.80	1.30
<i>Bouteloua gracilis</i>	12.87	31.95	46.67	18.57	50.52
<i>Calamovilfa longifolia</i>	0.73	1.82	7.33	2.92	4.74
<i>Koeleria pyramidata</i>	3.53	8.77	29.33	11.67	20.44
<i>Muhlenbergia cuspidata</i>	2.67	6.62	18.67	7.43	14.05
<i>Stipa comata</i>	2.33	5.79	19.33	7.69	13.48
<i>Stipa viridula</i>	2.33	5.79	20.00	7.96	13.75
<i>Carex filifolia</i>	5.67	14.07	27.33	10.88	24.95
<i>Carex heliophila</i>	4.20	10.43	32.00	12.73	23.16
<i>Antennaria parvifolia</i>	0.13	0.33	1.33	0.53	0.86
<i>Artemisia dracunculus</i>	0.33	0.83	3.33	1.33	2.16
<i>Artemisia frigida</i>	0.20	0.50	2.00	0.80	1.30
<i>Aster ericoides</i>	0.13	0.33	1.33	0.53	0.86
<i>Commandra umbellata</i>	0.07	0.17	0.67	0.27	0.44
<i>Echinacea angustifolia</i>	0.20	0.50	2.00	0.80	1.30
<i>Euphorbia geyeri</i>	0.07	0.17	0.67	0.27	0.44
<i>Hedeoma hispida</i>	0.20	0.50	2.00	0.80	1.30
<i>Lactuca oblongifolia</i>	0.07	0.17	0.67	0.27	0.44
<i>Liatis punctata</i>	0.07	0.17	0.67	0.27	0.44
<i>Linum rigidum</i>	0.07	0.17	0.67	0.27	0.44
<i>Lotus americanus</i>	0.27	0.66	2.67	1.06	1.72
<i>Lygodesmia juncea</i>	0.07	0.17	0.67	0.27	0.44
<i>Neslia paniculata</i>	0.13	0.33	1.33	0.53	0.86
<i>Petalostemon purpureum</i>	0.13	0.33	1.33	0.53	0.86
<i>Phlox hoodii</i>	0.07	0.17	0.67	0.27	0.44
<i>Psoralea argophylla</i>	0.07	0.17	0.67	0.27	0.44
<i>Solidago missouriensis</i>	0.13	0.33	1.33	0.53	0.86
<i>Solidago mollis</i>	0.07	0.17	0.67	0.27	0.44
<i>Rosa arkansana</i>	0.13	0.33	1.33	0.53	0.86
<i>Symphoricarpos occidentalis</i>	0.07	0.17	0.67	0.27	0.44
Lichen spp.	3.07	7.62	22.00	8.75	16.37
Litter	40.47		94.67		
Sod	4.13		18.67		
Furrow	10.47		42.67		
Soil	4.67		24.67		
Rock	0.00		0.00		

Table 8. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 5 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	0.60	1.00	6.00	1.92	2.92
<i>Bouteloua gracilis</i>	22.80	38.04	75.33	24.09	62.13
<i>Calamovilfa longifolia</i>	0.07	0.11	0.67	0.21	0.32
<i>Koeleria pyramidata</i>	12.00	20.02	52.67	16.84	36.86
<i>Muhlenbergia cuspidata</i>	2.67	4.45	16.67	5.33	9.78
<i>Munroa squarrosa</i>	0.13	0.22	1.33	0.43	0.65
<i>Stipa comata</i>	3.40	5.67	24.67	7.89	13.56
<i>Stipa viridula</i>	2.27	3.78	16.00	5.12	8.90
<i>Carex eleocharis</i>	0.33	0.56	2.67	0.85	1.41
<i>Carex filifolia</i>	5.40	9.01	36.00	11.51	20.52
<i>Carex heliophila</i>	2.73	4.56	20.00	6.40	10.96
<i>Antennaria parvifolia</i>	0.07	0.11	0.67	0.21	0.32
<i>Artemisia dracunculus</i>	0.20	0.33	2.00	0.64	0.97
<i>Artemisia frigida</i>	0.07	0.11	0.67	0.21	0.32
<i>Artemisia ludoviciana</i>	0.07	0.11	0.67	0.21	0.32
<i>Chrysopsis villosa</i>	0.20	0.33	1.33	0.43	0.76
<i>Convolvulus arvensis</i>	0.07	0.11	0.67	0.21	0.32
<i>Echinacea angustifolia</i>	0.20	0.33	2.00	0.64	0.97
<i>Euphorbia dictyosperma</i>	0.07	0.11	0.67	0.21	0.32
<i>Euphorbia geyeri</i>	0.20	0.33	0.67	0.21	0.54
<i>Grindelia squarrosa</i>	0.07	0.11	0.67	0.21	0.32
<i>Hedeoma hispida</i>	0.33	0.56	2.67	0.85	1.41
<i>Lactuca oblongifolia</i>	0.13	0.22	1.33	0.43	0.65
<i>Lepidium densiflorum</i>	0.13	0.22	1.33	0.43	0.65
<i>Liatris punctata</i>	0.13	0.22	1.33	0.43	0.65
<i>Lotus americanus</i>	0.47	0.78	4.67	1.49	2.27
<i>Lygodesmia juncea</i>	0.07	0.11	0.67	0.21	0.32
<i>Neslia paniculata</i>	0.07	0.11	0.67	0.21	0.32
<i>Petalostemon purpureum</i>	0.13	0.22	1.33	0.43	0.65
<i>Phlox hoodii</i>	1.80	3.00	14.67	4.69	7.69
<i>Plantago purshii</i>	0.07	0.11	0.67	0.21	0.32
<i>Potentilla pensylvanica</i>	0.07	0.11	0.67	0.21	0.32
<i>Sphaeralcea coccinea</i>	0.20	0.33	2.00	0.64	0.97
<i>Vicia americana</i>	0.07	0.11	0.67	0.21	0.32
<i>Rosa arkansana</i>	0.07	0.11	0.67	0.21	0.32
<i>Selaginella densa</i>	0.27	0.44	0.67	0.21	0.65
Lichen	2.33	3.89	16.67	5.33	9.22
Litter	23.73		79.33		
Sod	4.33		14.67		
Furrow	9.27		40.67		
Soil	2.73		16.67		
Rock	0.00		0.00		

Table 9. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 8 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
Agropyron smithii	0.53	1.01	4.67	1.61	2.62
Bouteloua gracilis	16.53	31.23	58.00	20.00	51.23
Buchloe dactyloides	0.07	0.13	0.67	0.23	0.36
Calamagrostis montanensis	0.07	0.13	0.67	0.23	0.36
Calamovilfa longifolia	0.53	1.01	4.67	1.61	2.62
Koeleria pyramidata	8.13	15.37	48.00	16.55	31.92
Muhlenbergia cuspidata	0.47	0.88	2.67	0.92	1.80
Stipa comata	3.47	6.55	26.67	9.20	15.75
Stipa viridula	2.20	4.16	14.67	5.06	9.22
Carex eleocharis	1.27	2.39	9.33	3.22	5.61
Carex filifolia	7.73	14.61	38.67	13.33	27.94
Carex heliophila	1.93	3.65	16.67	5.75	9.40
Achillea millefolium	0.07	0.13	0.67	0.23	0.36
Antennaria parvifolia	0.27	0.50	2.00	0.69	1.19
Artemisia dracunculus	0.53	1.01	4.67	1.61	2.62
Artemisia ludoviciana	0.07	0.13	0.67	0.23	0.36
Aster ericoides	0.20	0.38	2.00	0.69	1.07
Chrysopsis villosa	0.07	0.13	0.67	0.23	0.36
Echinacea angustifolia	0.07	0.13	0.67	0.23	0.36
Euphorbia geyeri	0.13	0.25	1.33	0.46	0.71
Liatris punctata	0.13	0.25	1.33	0.46	0.71
Lotus americanus	0.40	0.76	4.00	1.38	2.14
Phlox hoodii	0.27	0.50	2.00	0.69	1.19
Plantago purshii	0.07	0.13	0.67	0.23	0.36
Psoralea argophylla	0.07	0.13	0.67	0.23	0.36
Solidago missouriensis	0.33	0.63	2.00	0.69	1.32
Solidago mollis	0.07	0.13	0.67	0.23	0.36
Rosa arkansana	0.13	0.25	1.33	0.46	0.71
Lichen spp.	7.13	13.48	39.33	13.56	27.04
Litter	33.80		96.00		
Sod	3.07		13.33		
Furrow	6.40		28.67		
Soil	3.80		23.33		
Rock	0.00		0.00		

Table 10. Basal Cover, Relative Basal Cover, Frequency, Relative Frequency, and Importance Value of Species as Sampled by Points for Alfalfa Inter-seeding, Row Spacing 10 Feet, 1983

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
<i>Agropyron smithii</i>	0.87	1.30	8.67	2.52	3.82
<i>Agropyron trachycaulum</i>	0.20	0.30	0.67	0.19	0.49
<i>Bouteloua gracilis</i>	26.73	40.18	78.00	22.72	62.90
<i>Calamovilfa longifolia</i>	1.07	1.60	5.33	1.55	3.15
<i>Koeleria pyramidata</i>	9.13	13.73	56.67	16.50	30.23
<i>Muhlenbergia cuspidata</i>	1.40	2.10	8.67	2.52	4.62
<i>Panicum oligosanthos</i>	0.13	0.20	1.33	0.39	0.59
<i>Poa pratensis</i>	0.07	0.10	0.67	0.19	0.29
<i>Stipa comata</i>	4.00	6.01	26.67	7.77	13.78
<i>Stipa viridula</i>	2.40	3.61	14.00	4.08	7.69
<i>Carex eleocharis</i>	0.20	0.30	2.00	0.58	0.88
<i>Carex filifolia</i>	9.53	14.33	47.33	13.79	28.12
<i>Carex heliophila</i>	1.20	1.80	11.33	3.30	5.10
<i>Androsace occidentalis</i>	0.13	0.20	1.33	0.39	0.59
<i>Antennaria parvifolia</i>	0.07	0.10	0.67	0.19	0.29
<i>Artemisia dracunculus</i>	0.20	0.30	2.00	0.58	0.88
<i>Artemisia frigida</i>	0.13	0.20	0.67	0.19	0.39
<i>Aster ericoides</i>	0.80	1.20	6.00	1.75	2.95
<i>Aster oblongifolius</i>	0.07	0.10	0.67	0.19	0.29
<i>Commandra umbellata</i>	0.13	0.20	1.33	0.39	0.59
<i>Echinacea angustifolia</i>	0.13	0.20	1.33	0.39	0.59
<i>Erysimum asperum</i>	0.13	0.20	1.33	0.39	0.59
<i>Euphorbia geyeri</i>	0.13	0.20	1.33	0.39	0.59
<i>Grindelia squarrosa</i>	0.27	0.40	2.00	0.58	0.98
<i>Gutierrezia sarothrae</i>	0.07	0.10	0.67	0.19	0.29
<i>Hedeoma hispida</i>	0.13	0.20	1.33	0.39	0.59
<i>Helianthus annuus</i>	0.13	0.20	1.33	0.39	0.59
<i>Helianthus rigidus</i>	0.07	0.10	0.67	0.19	0.29
<i>Liatris punctata</i>	0.13	0.20	1.33	0.39	0.59
<i>Linum rigidum</i>	0.07	0.10	0.67	0.19	0.29
<i>Lithospermum incisum</i>	0.07	0.10	0.67	0.19	0.29
<i>Lotus americanus</i>	0.27	0.40	2.67	0.78	1.18
<i>Neslia paniculata</i>	0.07	0.10	0.67	0.19	0.29
<i>Penstemon albidus</i>	0.07	0.10	0.67	0.19	0.29
<i>Petalostemon purpureum</i>	0.13	0.20	1.33	0.39	0.59
<i>Phlox hoodii</i>	0.87	1.30	8.00	2.33	3.63
<i>Plantago purshii</i>	0.13	0.20	1.33	0.39	0.59
<i>Polygala alba</i>	0.07	0.10	0.67	0.19	0.29
<i>Potentilla pensylvanica</i>	0.07	0.10	0.67	0.19	0.29
<i>Psoralea argophylla</i>	0.27	0.40	2.67	0.78	1.18
<i>Ratibida columnifera</i>	0.07	0.10	0.67	0.19	0.29
<i>Solidago missouriensis</i>	0.20	0.30	2.00	0.58	0.88
<i>Sphaeralcea coccinea</i>	0.13	0.20	1.33	0.39	0.59
<i>Vicia americana</i>	0.20	0.30	2.00	0.58	0.88
<i>Rosa arkansana</i>	0.07	0.10	0.67	0.19	0.29

Table 10. (Continued):

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Frequency	Importance Value
Selaginella densa	0.13	0.20	1.33	0.39	0.59
Lichen spp.	4.00	6.01	30.00	8.74	14.75
Litter	16.07		68.00		
Sod	3.93		12.00		
Furrow	6.33		24.67		
Soil	7.13		35.33		
Rock	0.00		0.00		

Table 11. Mean Percent Basal Cover for the Alfalfa Inter-seeding Row Spacing Trial at the Dickinson Experiment Station – 1983

Row Spacing	Grass	Sedge	Forbs	Shrubs	Club Moss	Lichen	Litter	Sod	Furrow	Soil	Rock
0 Feet	27.13	9.86	2.21	0.00	0.33	2.87	47.00	0.00	0.00	10.47	0.13
2 Feet	30.65	7.73	3.64	0.00	0.00	0.47	17.40	14.07	23.27	2.80	0.00
3 Feet	35.80	6.80	3.70	0.00	0.07	1.53	22.33	10.33	15.87	3.60	0.00
4 Feet	24.66	9.87	2.48	0.20	0.00	3.07	40.47	4.13	10.47	4.67	0.00
5 Feet	43.94	8.46	4.89	0.07	0.27	2.33	23.73	4.33	9.27	2.73	0.00
8 Feet	32.00	10.93	2.75	0.13	0.00	7.13	33.80	3.07	6.40	3.80	0.00
10 Feet	46.00	10.93	5.41	0.07	0.13	4.00	16.07	3.93	6.33	7.13	0.00

Table 12. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, Control, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.19	1.00	5.71	1.26	2.26
<i>Androsace occidentalis</i>	0.13	0.70	8.57	1.89	2.59
<i>Antennaria parvifolia</i>	0.74	4.02	5.71	1.26	5.28
<i>Artemisia dracunculus</i>	0.31	1.70	10.00	2.21	3.91
<i>Artemisia frigida</i>	0.20	1.08	7.14	1.58	2.66
<i>Artemisia ludoviciana</i>	0.09	0.46	2.86	0.63	1.09
<i>Aster ericoides</i>	5.50	29.75	32.86	7.26	37.01
<i>Aster laevis</i>	0.67	3.63	14.29	3.15	6.78
<i>Astragalus canadensis</i>	0.01	0.08	1.43	0.32	0.40
<i>Chenopodium album</i>	0.01	0.08	1.43	0.32	0.40
<i>Chrysopsis villosa</i>	0.01	0.08	1.43	0.32	0.40
<i>Commandra umbellata</i>	0.09	0.46	7.14	1.58	2.04
<i>Echinacea angustifolia</i>	0.16	0.85	8.57	1.89	2.74
<i>Erysimum asperum</i>	0.01	0.08	1.43	0.32	0.40
<i>Euphorbia geyeri</i>	0.33	1.78	17.14	3.79	5.57
<i>Galium boreale</i>	0.07	0.39	5.71	1.26	1.65
<i>Gaura coccinea</i>	0.14	0.77	10.00	2.21	2.98
<i>Hedeoma hispida</i>	1.29	6.96	38.57	8.52	15.48
<i>Helianthus annuus</i>	0.34	1.85	7.14	1.58	3.43
<i>Helianthus rigidus</i>	0.33	1.78	17.14	3.79	5.57
<i>Kochia scoparia</i>	0.01	0.08	1.43	0.32	0.40
<i>Lepidium densiflorum</i>	0.14	0.77	8.57	1.89	2.66
<i>Liatris punctata</i>	0.34	1.85	7.14	1.58	3.43
<i>Linum rigidum</i>	0.14	0.77	11.43	2.52	3.29
<i>Lithospermum incisum</i>	0.01	0.08	1.43	0.32	0.40
<i>Lotus americanus</i>	0.59	3.17	38.57	8.52	11.69
<i>Lygodesmia juncea</i>	0.04	0.23	2.86	0.63	0.86
<i>Melilotus officinalis</i>	0.06	0.31	2.86	0.63	0.94
<i>Musineon divaricatum</i>	0.04	0.23	4.29	0.95	1.18
<i>Neslia paniculata</i>	0.09	0.46	8.57	1.89	2.35
<i>Oxytropis lambertii</i>	0.10	0.54	1.43	0.32	0.86
<i>Penstemon albidus</i>	0.01	0.08	1.43	0.32	0.40
<i>Petalostemon purpureum</i>	0.24	1.31	5.71	1.26	2.57
<i>Phlox hoodii</i>	0.14	0.77	5.71	1.26	2.03
<i>Plantago purshii</i>	1.06	5.72	24.29	5.36	11.08
<i>Polygala alba</i>	0.01	0.08	1.43	0.32	0.40
<i>Polygonum convolvulus</i>	0.01	0.08	1.43	0.32	0.40
<i>Psoralea argophylla</i>	0.24	1.31	17.14	3.79	5.10
<i>Solidago missouriensis</i>	0.31	1.70	12.86	2.84	4.54
<i>Sphaeralcea coccinea</i>	0.06	0.31	4.29	0.95	1.26
<i>Vicia americana</i>	0.30	1.62	8.57	1.89	3.51
<i>Arctostaphylos uva-ursi</i>	0.06	0.31	4.29	0.95	1.26
<i>Rosa arkansana</i>	0.11	0.62	10.00	2.21	2.83
<i>Symphoricarpos occidentalis</i>	0.01	0.08	1.43	0.32	0.40
Lichen spp.	3.70	20.02	61.43	13.56	33.58

Table 13. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 2 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.01	0.14	1.33	0.32	0.46
<i>Antennaria parvifolia</i>	0.08	0.83	1.33	0.32	1.15
<i>Artemisia dracunculus</i>	0.80	8.28	24.00	5.83	14.11
<i>Artemisia frigida</i>	0.01	0.14	1.33	0.32	0.46
<i>Artemisia ludoviciana</i>	0.03	0.28	2.67	0.65	0.93
<i>Aster ericoides</i>	0.47	4.83	14.67	3.56	8.39
<i>Aster laevis</i>	0.03	0.28	1.33	0.32	0.60
<i>Astragalus canadensis</i>	0.03	0.28	1.33	0.32	0.60
<i>Chenopodium album</i>	0.01	0.14	1.33	0.32	0.46
<i>Chrysopsis villosa</i>	0.51	5.24	9.33	2.27	7.51
<i>Conyza canadensis</i>	0.11	1.10	4.00	0.97	2.07
<i>Echinacea angustifolia</i>	0.04	0.41	4.00	0.97	1.38
<i>Erysimum asperum</i>	0.03	0.28	2.67	0.65	0.93
<i>Euphorbia dictyosperma</i>	0.08	0.83	8.00	1.94	2.77
<i>Gaura coccinea</i>	0.03	0.28	1.33	0.32	0.60
<i>Grindelia squarrosa</i>	0.04	0.41	2.67	0.65	1.06
<i>Hedeoma hispida</i>	0.96	9.93	33.33	8.09	18.02
<i>Lactuca oblongifolia</i>	0.08	0.83	4.00	0.97	1.80
<i>Lepidium densiflorum</i>	0.36	3.72	16.00	3.88	7.60
<i>Liatis punctata</i>	0.32	3.31	17.33	4.21	7.52
<i>Linum rigidum</i>	0.28	2.90	20.00	4.85	7.75
<i>Lithospermum incisum</i>	0.03	0.28	2.67	0.65	0.93
<i>Lotus americanus</i>	1.17	12.14	57.33	13.92	26.06
<i>Lygodesmia juncea</i>	0.08	0.83	6.67	1.62	2.45
<i>Medicago falcata</i>	0.43	4.41	21.33	5.18	9.59
<i>Neslia paniculata</i>	0.05	0.55	5.33	1.29	1.84
<i>Oxytropis lambertii</i>	0.03	0.28	2.67	0.65	0.93
<i>Penstemon albidus</i>	0.03	0.28	1.33	0.32	0.60
<i>Petalostemon purpureum</i>	0.09	0.97	2.67	0.65	1.62
<i>Phlox hoodii</i>	0.48	4.97	18.67	4.53	9.50
<i>Plantago purshii</i>	1.17	12.14	26.67	6.47	18.61
<i>Polygala alba</i>	0.61	6.34	14.67	3.56	9.90
<i>Psoralea argophylla</i>	0.52	5.38	38.67	9.39	14.77
<i>Psoralea esculenta</i>	0.03	0.28	2.67	0.65	0.93
<i>Sphaeralcea coccinea</i>	0.21	2.21	6.67	1.62	3.83
<i>Vernonia fasciculata</i>	0.01	0.14	1.33	0.32	0.46
<i>Vicia americana</i>	0.32	3.31	22.67	5.50	8.81
<i>Rosa arkansana</i>	0.04	0.41	2.67	0.65	1.06
Lichen spp.	0.07	0.69	5.33	1.29	1.98

Table 14. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 3 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
Androsace occidentalis	0.09	0.68	1.33	0.30	0.98
Artemisia dracunculus	0.67	4.82	16.00	3.63	8.45
Artemisia frigida	0.11	0.77	4.00	0.91	1.68
Artemisia ludoviciana	0.12	0.87	6.67	1.51	2.38
Aster ericoides	1.77	12.83	21.33	4.83	17.66
Astragalus canadensis	0.03	0.19	2.67	0.60	0.79
Chrysopsis villosa	0.09	0.68	2.67	0.60	1.28
Commandra umbellata	0.07	0.48	5.33	1.21	1.69
Conyza canadensis	0.03	0.19	2.67	0.60	0.79
Echinacea angustifolia	0.20	1.45	10.67	2.42	3.87
Erysimum asperum	0.01	0.10	1.33	0.30	0.40
Euphorbia dictyosperma	0.11	0.77	8.00	1.81	2.58
Euphorbia geyeri	0.01	0.10	1.33	0.30	0.40
Gaura coccinea	0.08	0.58	5.33	1.21	1.79
Glycyrrhiza lepidota	0.05	0.39	5.33	1.21	1.60
Grindelia squarrosa	0.20	1.45	10.67	2.42	3.87
Gutierrezia sarothrae	0.21	1.54	4.00	0.91	2.45
Hedeoma hispida	0.97	7.04	44.00	9.97	17.01
Helianthus rigidus	0.05	0.39	4.00	0.91	1.30
Lactuca oblongifolia	0.04	0.29	2.67	0.60	0.89
Lepidium densiflorum	0.19	1.35	13.33	3.02	4.37
Liatris punctata	0.28	2.03	12.00	2.72	4.75
Linum rigidum	0.12	0.87	8.00	1.81	2.68
Lithospermum incisum	0.07	0.48	5.33	1.21	1.69
Lotus americanus	1.00	7.23	70.67	16.01	23.24
Lygodesmia juncea	0.05	0.39	5.33	1.21	1.60
Neslia	0.07	0.48	6.67	1.51	1.99
Oenothera biennis	0.01	0.10	1.33	0.30	0.40
Oxytropis lambertii	0.04	0.29	1.33	0.30	0.59
Petalostemon purpureum	0.23	1.64	10.67	2.42	4.06
Phlox hoodii	0.25	1.83	12.00	2.72	4.55
Plantago purshii	3.79	27.39	46.67	10.57	37.96
Psoralea argophylla	0.27	1.93	18.67	4.23	6.16
Solidago missouriensis	0.31	2.22	9.33	2.11	4.33
Taraxacum officinale	0.03	0.19	2.67	0.60	0.79
Vernonia fasciculata	0.35	2.51	4.00	0.91	3.42
Vicia americana	0.24	1.74	9.33	2.11	3.85
Rosa arkansana	0.13	0.96	5.33	1.21	2.17
Symphoricarpos occidentalis	0.19	1.35	6.67	1.51	2.86
Selaginella densa	0.04	0.29	1.33	0.30	0.59
Lichen spp.	1.27	9.16	30.67	6.95	16.11

Table 15. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 4 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	% Frequency	Importance Value
<i>Androsace occidentalis</i>	0.09	0.66	4.00	0.84	1.50
<i>Antennaria parvifolia</i>	0.59	4.13	4.00	0.84	4.97
<i>Arabis holboellii</i>	0.01	0.09	1.33	0.28	0.37
<i>Artemisia dracunculus</i>	0.20	1.41	9.33	1.96	3.37
<i>Artemisia frigida</i>	0.19	1.31	8.00	1.68	2.99
<i>Artemisia ludoviciana</i>	0.51	3.56	10.67	2.23	5.79
<i>Aster ericoides</i>	0.53	3.75	14.67	3.07	6.82
<i>Aster laevis</i>	0.28	1.97	8.00	1.68	3.65
<i>Aster oblongifolius</i>	0.07	0.47	2.67	0.56	1.03
<i>Chrysopsis villosa</i>	0.05	0.38	4.00	0.84	1.22
<i>Commandra umbellata</i>	0.03	0.19	2.67	0.56	0.75
<i>Echinacea angustifolia</i>	0.61	4.32	37.33	7.82	12.14
<i>Erysimum asperum</i>	0.03	0.19	2.67	0.56	0.75
<i>Euphorbia geyeri</i>	0.19	1.31	9.33	1.96	3.27
<i>Galium boreale</i>	0.08	0.56	4.00	0.84	1.40
<i>Gaura coccinea</i>	0.41	2.91	8.00	1.68	4.59
<i>Glycyrrhiza lepidota</i>	0.32	2.25	13.33	2.79	5.04
<i>Hedeoma hispida</i>	0.45	3.19	20.00	4.19	7.38
<i>Helianthus annuus</i>	0.05	0.38	2.67	0.56	0.94
<i>Helianthus rigidus</i>	0.36	2.53	17.33	3.63	6.16
<i>Lepidium densiflorum</i>	0.05	0.38	4.00	0.84	1.22
<i>Liatris punctata</i>	0.09	0.66	6.67	1.40	2.06
<i>Linum rigidum</i>	0.09	0.66	9.33	1.96	2.62
<i>Lithospermum incisum</i>	0.07	0.47	6.67	1.40	1.87
<i>Lotus americanus</i>	1.47	10.32	53.33	11.17	21.49
<i>Lygodesmia juncea</i>	0.08	0.56	5.33	1.12	1.68
<i>Medicago falcata</i>	0.01	0.09	1.33	0.28	0.37
<i>Melilotus officinalis</i>	0.01	0.09	1.33	0.28	0.37
<i>Neslia paniculata</i>	0.05	0.38	5.33	1.12	1.50
<i>Opuntia fragilis</i>	0.01	0.09	1.33	0.28	0.37
<i>Oxytropis lambertii</i>	0.13	0.94	9.33	1.96	2.90
<i>Penstemon albidus</i>	0.04	0.28	4.00	0.84	1.12
<i>Petalostemon purpureum</i>	0.81	5.72	26.67	5.59	11.31
<i>Phlox hoodii</i>	0.33	2.35	13.33	2.79	5.14
<i>Plantago purshii</i>	0.25	1.78	8.00	1.68	3.46
<i>Polygala alba</i>	0.04	0.28	4.00	0.84	1.12
<i>Psoralea argophylla</i>	0.25	1.78	13.33	2.79	4.57
<i>Psoralea esculenta</i>	0.15	1.03	5.33	1.12	2.15
<i>Solidago missouriensis</i>	0.57	4.03	17.33	3.63	7.66
<i>Solidago mollis</i>	0.04	0.28	1.33	0.28	0.56
<i>Sphaeralcea coccinea</i>	0.01	0.09	1.33	0.28	0.37
<i>Vicia americana</i>	0.16	1.13	8.00	1.68	2.81
<i>Viola pedatifida</i>	0.01	0.09	1.33	0.28	0.37
<i>Arctostaphylos uva-ursi</i>	0.11	0.75	5.33	1.12	1.87
<i>Rosa arkansana</i>	0.29	2.06	13.33	2.79	4.85
<i>Symphoricarpos occidentalis</i>	0.01	0.09	1.33	0.28	0.37
Lichen spp.	3.99	28.05	65.33	13.69	41.74

Table 16. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 5 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.01	0.08	1.33	0.29	0.37
<i>Allium textile</i>	0.01	0.08	1.33	0.29	0.37
<i>Androsace occidentalis</i>	0.19	1.16	4.00	0.87	2.03
<i>Artemisia dracunculus</i>	0.67	4.15	12.00	2.62	6.77
<i>Artemisia frigida</i>	0.03	0.17	2.67	0.58	0.75
<i>Aster ericoides</i>	0.81	5.06	17.33	3.79	8.85
<i>Aster laevis</i>	0.36	2.24	8.00	1.75	3.99
<i>Chrysopsis villosa</i>	0.27	1.66	6.67	1.46	3.12
<i>Commandra umbellata</i>	0.19	1.16	10.67	2.33	3.49
<i>Conyza canadensis</i>	0.01	0.08	1.33	0.29	0.37
<i>Echinacea angustifolia</i>	0.17	1.08	10.67	2.33	3.41
<i>Erysimum asperum</i>	0.03	0.17	2.67	0.58	0.75
<i>Euphorbia geyeri</i>	0.25	1.58	18.67	4.08	5.66
<i>Gaura coccinea</i>	0.08	0.50	4.00	0.87	1.37
<i>Glycyrrhiza lepidota</i>	0.13	0.83	9.33	2.04	2.87
<i>Grindelia squarrosa</i>	0.13	0.83	6.67	1.46	2.29
<i>Hedeoma hispida</i>	0.23	1.41	10.67	2.33	3.74
<i>Helianthus rigidus</i>	0.59	3.65	26.67	5.83	9.48
<i>Lactuca oblongifolia</i>	0.08	0.50	4.00	0.87	1.37
<i>Lepidium densiflorum</i>	0.12	0.75	9.33	2.04	2.79
<i>Liatris punctata</i>	0.17	1.08	6.67	1.46	2.54
<i>Linum rigidum</i>	0.07	0.41	6.67	1.46	1.87
<i>Lithospermum incisum</i>	0.01	0.08	1.33	0.29	0.37
<i>Lotus americanus</i>	2.19	13.61	77.33	16.91	30.52
<i>Lygodesmia juncea</i>	0.08	0.50	5.33	1.17	1.67
<i>Medicago falcata</i>	0.08	0.50	5.33	1.17	1.67
<i>Neslia paniculata</i>	0.15	0.91	9.33	2.04	2.95
<i>Oxytropis lambertii</i>	0.01	0.08	1.33	0.29	0.37
<i>Petalostemon purpureum</i>	0.69	4.32	18.67	4.08	8.40
<i>Phlox hoodii</i>	1.19	7.39	37.33	8.16	15.55
<i>Plantago purshii</i>	3.83	23.82	38.67	8.45	32.27
<i>Potentilla pensylvanica</i>	0.01	0.08	1.33	0.29	0.37
<i>Psoralea argophylla</i>	0.08	0.50	4.00	0.87	1.37
<i>Psoralea esculenta</i>	0.09	0.58	6.67	1.46	2.04
<i>Solidago missouriensis</i>	0.11	0.66	6.67	1.46	2.12
<i>Sphaeralcea coccinea</i>	0.09	0.58	5.33	1.17	1.75
<i>Taraxacum officinale</i>	0.01	0.08	1.33	0.29	0.37
<i>Vicia americana</i>	0.36	2.24	14.67	3.21	5.45
<i>Arctostaphylos uva-ursi</i>	0.03	0.17	2.67	0.58	0.75
<i>Rosa arkansana</i>	0.07	0.41	5.33	1.17	1.58
<i>Symphoricarpos occidentalis</i>	0.04	0.25	1.33	0.29	0.54
<i>Selaginella densa</i>	0.08	0.50	1.33	0.29	0.79
<i>Lichen spp.</i>	2.27	14.11	30.67	6.71	20.82

Table 17. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 8 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.01	0.09	1.33	0.30	0.39
<i>Androsace occidentalis</i>	0.03	0.18	2.67	0.59	0.77
<i>Antennaria parvifolia</i>	0.83	5.63	8.00	1.78	7.41
<i>Arabis holboellii</i>	0.01	0.09	1.33	0.30	0.39
<i>Artemisia dracuncululus</i>	0.99	6.72	24.00	5.33	12.05
<i>Artemisia frigida</i>	0.16	1.09	13.33	2.96	4.05
<i>Artemisia ludoviciana</i>	0.08	0.54	4.00	0.89	1.43
<i>Aster ericoides</i>	0.79	5.36	16.00	3.55	8.91
<i>Aster laevis</i>	0.24	1.63	1.33	0.30	1.93
<i>Aster ptarmicoides</i>	0.01	0.09	1.33	0.30	0.39
<i>Chrysopsis villosa</i>	0.09	0.64	4.00	0.89	1.53
<i>Commandra umbellata</i>	0.11	0.73	5.33	1.18	1.91
<i>Conyza canadensis</i>	0.01	0.09	1.33	0.30	0.39
<i>Convolvulus sepium</i>	0.01	0.09	1.33	0.30	0.39
<i>Echinacea angustifolia</i>	0.17	1.18	8.00	1.78	2.96
<i>Erysimum asperum</i>	0.04	0.27	4.00	0.89	1.16
<i>Euphorbia dictyosperma</i>	0.03	0.18	2.67	0.59	0.77
<i>Euphorbia geyeri</i>	0.51	3.45	24.00	5.33	8.78
<i>Galium boreale</i>	0.01	0.09	1.33	0.30	0.39
<i>Gaura coccinea</i>	0.09	0.64	5.33	1.18	1.82
<i>Hedeoma hispida</i>	0.41	2.82	14.67	3.25	6.07
<i>Helianthus annuus</i>	0.23	1.54	13.33	2.96	4.50
<i>Lactuca oblongifolia</i>	0.01	0.09	1.33	0.30	0.39
<i>Lepidium densiflorum</i>	0.07	0.45	6.67	1.48	1.93
<i>Liatris punctata</i>	0.21	1.45	9.33	2.07	3.52
<i>Linum rigidum</i>	0.08	0.54	6.67	1.48	2.02
<i>Lithospermum incisum</i>	0.03	0.18	2.67	0.59	0.77
<i>Lotus americanus</i>	1.59	10.81	64.00	14.20	25.01
<i>Medicago falcata</i>	0.05	0.36	1.33	0.30	0.66
<i>Musineon divaricatum</i>	0.03	0.18	2.67	0.59	0.77
<i>Neslia paniculata</i>	0.01	0.09	1.33	0.30	0.39
<i>Oxytropis lambertii</i>	0.01	0.09	1.33	0.30	0.39
<i>Petalostemon purpureum</i>	0.15	1.00	8.00	1.78	2.78
<i>Phlox hoodii</i>	0.23	1.54	6.67	1.48	3.02
<i>Plantago purshii</i>	1.61	10.99	38.67	8.58	19.57
<i>Potentilla pensylvanica</i>	0.04	0.27	1.33	0.30	0.57
<i>Psoralea argophylla</i>	0.19	1.27	16.00	3.55	4.82
<i>Ratibida columnifera</i>	0.01	0.09	1.33	0.30	0.39
<i>Solidago missouriensis</i>	0.64	4.36	22.67	5.03	9.39
<i>Sphaeralcea coccinea</i>	0.23	1.54	12.00	2.66	4.20
<i>Vernonia fasciculata</i>	0.36	2.45	5.33	1.18	3.63
<i>Vicia americana</i>	0.08	0.54	4.00	0.89	1.43
<i>Viola pedatifida</i>	0.01	0.09	1.33	0.30	0.39
<i>Rosa arkansana</i>	0.33	2.27	18.67	4.14	6.41
<i>Selaginella densa</i>	0.04	0.27	1.33	0.30	0.57
Lichen spp.	3.80	25.89	57.33	12.72	38.61

Table 18. Density, Relative Density, Frequency, Relative Frequency, and Importance Value per 0.1 Sq. Meter on the Alfalfa Inter-seeding Trial, 10 Ft. Row Spacing, at the Dickinson Experiment Station, 1983

Species	Density	Relative % Density	% Frequency	Relative % Frequency	Importance Value
<i>Achillea millefolium</i>	0.01	0.13	1.33	0.36	0.49
<i>Amaranthus retroflexus</i>	0.03	0.27	1.33	0.36	0.63
<i>Androsace occidentalis</i>	0.03	0.27	1.33	0.36	0.63
<i>Artemisia dracunculus</i>	0.61	6.12	18.67	5.02	11.14
<i>Artemisia frigida</i>	0.27	2.66	13.33	3.58	6.24
<i>Aster ericoides</i>	1.77	17.69	28.00	7.53	25.22
<i>Aster laevis</i>	0.05	0.53	4.00	1.08	1.61
<i>Aster ptarmicoides</i>	0.01	0.13	1.33	0.36	0.49
<i>Chrysopsis villosa</i>	0.12	1.20	2.67	0.72	1.92
<i>Commandra umbellata</i>	0.01	0.13	1.33	0.36	0.49
<i>Conyza canadensis</i>	0.01	0.13	1.33	0.36	0.49
<i>Echinacea angustifolia</i>	0.09	0.93	8.00	2.15	3.08
<i>Erysimum asperum</i>	0.04	0.40	4.00	1.08	1.48
<i>Euphorbia geyeri</i>	0.07	0.66	4.00	1.08	1.74
<i>Gaura coccinea</i>	0.04	0.40	2.67	0.72	1.12
<i>Grindelia squarrosa</i>	0.20	1.99	14.67	3.94	5.93
<i>Gutierrezia sarothrae</i>	0.13	1.33	5.33	1.43	2.76
<i>Hedeoma hispida</i>	0.64	6.38	20.00	5.38	11.76
<i>Helianthus annuus</i>	0.01	0.13	1.33	0.36	0.49
<i>Helianthus rigidus</i>	0.01	0.13	1.33	0.36	0.49
<i>Lactuca oblongifolia</i>	0.01	0.13	1.33	0.36	0.49
<i>Lactuca serriola</i>	0.01	0.13	1.33	0.36	0.49
<i>Lepidium densiflorum</i>	0.39	3.86	13.33	3.58	7.44
<i>Liatis punctata</i>	0.21	2.13	9.33	2.51	4.64
<i>Linum rigidum</i>	0.08	0.80	5.33	1.43	2.23
<i>Lotus americanus</i>	0.88	8.78	37.33	10.04	18.82
<i>Lygodesmia juncea</i>	0.09	0.93	6.67	1.79	2.72
<i>Medicago falcata</i>	0.01	0.13	1.33	0.36	0.49
<i>Neslia paniculata</i>	0.01	0.13	1.33	0.36	0.49
<i>Opuntia fragilis</i>	0.03	0.27	1.33	0.36	0.63
<i>Oxytropis lambertii</i>	0.03	0.27	1.33	0.36	0.63
<i>Penstemon albidus</i>	0.01	0.13	1.33	0.36	0.49
<i>Petalostemon purpureum</i>	0.27	2.66	10.67	2.87	5.53
<i>Phlox hoodii</i>	0.31	3.06	12.00	3.23	6.29
<i>Plantago purshii</i>	1.43	14.23	34.67	9.32	23.55
<i>Polygala alba</i>	0.03	0.27	1.33	0.36	0.63
<i>Psoralea argophylla</i>	0.36	3.59	24.00	6.45	10.04
<i>Psoralea esculenta</i>	0.01	0.13	1.33	0.36	0.49
<i>Ratibida columnifera</i>	0.01	0.13	1.33	0.36	0.49
<i>Solidago missouriensis</i>	0.20	1.99	2.67	0.72	2.71
<i>Solidago rigida</i>	0.01	0.13	1.33	0.36	0.49
<i>Sphaeralcea coccinea</i>	0.11	1.06	9.33	2.51	3.57
<i>Vernonia fasciculata</i>	0.09	0.93	2.67	0.72	1.65
<i>Vicia americana</i>	0.20	1.99	10.67	2.87	4.86
<i>Viola pedatifida</i>	0.05	0.53	2.67	0.72	1.25
<i>Symphoricarpos occidentalis</i>	0.16	1.60	8.00	2.15	3.75
<i>Selaginella densa</i>	0.07	0.66	1.33	0.36	1.02
Lichen spp.	0.77	7.71	30.67	8.24	15.95