

ALFALFA INTERSEEDING FURROW WIDTH TECHNIQUES TRIAL

This trial was designed to evaluate alfalfa interseeding into rangeland with different widths of the furrow openings. The intended purpose of the data will be primarily to assist in the determination of a recommended furrow width for alfalfa interseeding into rangeland for pasture use in western North Dakota.

These plots were established on 0.60 acres 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 was vebar fine sandy loam. The range site was 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 three foot row spacing was used. Two inch straight, three inch twisted and four inch twisted chisel plow shovels were used as the furrow openers. A control plot of no interseeding 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 meter square quadrats.

The above ground herbage production was sampled by clipping the vegetation to ground level in two $\frac{1}{4}$ m² quadrats for each plot on 22 June 1984. 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 average herbage production for each category and the total production for each plot were determined. 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 27 June 1984.

Quantitative species composition data for each plot was collected on 10 August 1984. The herbacious 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 28 August 1984. 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 Interseeding Furrow Width Techniques Trial

Location:	Dickinson Experiment Station Ranch Headquarters NE¼, NW¼, SW¼ Sec. 23, T. 143 N., R. 96 W.
Replications:	Three Randomized Block Design
Study Size:	183' x 142' 0.60 acres
Plot Size:	33' x 50' 0.04 acres
Perimeter border:	10' on east and south, 3' on north and 0' on west
Alleys:	10'
Soil:	Vebar
Range Site:	Sandy with a few thin claypen sites
Seedling Date:	21 Apr 1983
Seedling Rate:	0.50 lbs. PLS/row/acre
Alfalfa Variety:	Travois
Row Spacing:	3'
Chisel Plow Shovels:	0", 2", 3" twisted and 4" twisted

Figure 2: Alfalfa Interseeding Furrow Width Techniques Trial

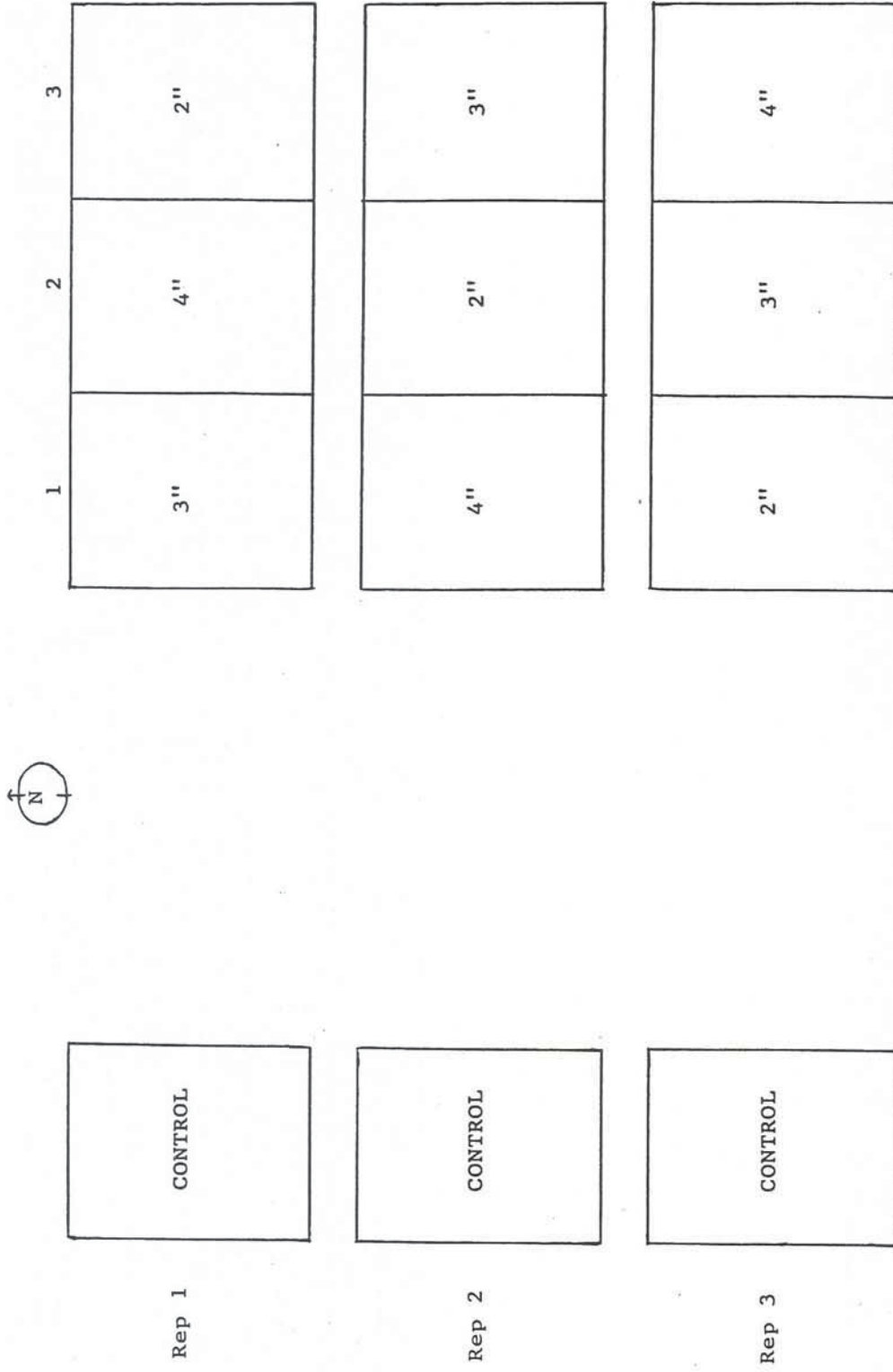


Figure 2 . Alfalfa interseeding furrow width techniques trial using 2, 3 and 4 inch chisel plow shovels, seeded 21 Apr 1983.

Table 20. Mean Above Ground Herbage Production by Category in Lbs/Acre For the Alfalfa Interseeding Furrow Width Techniques Trial at the Dickinson Experiment Station, 1984

Clip Categories	Furrow Width			
	0 Inch	2 Inch	3 Inch	4 Inch
Cool Short	126.7	133.2	217.1	178.4
Warm Short	130.8	197.4	331.8	93.4
Cool Mid	144.0	180.8	208.7	330.6
Western Wheatgrass	14.2	5.4	12.5	31.5
Warm Mid	16.7	0.6	1.8	17.8
Warm Tall	25.0	0.0	4.2	22.0
Sedge	196.8	135.6	143.3	140.9
Total Grass	714.2	652.9	919.4	814.7
Forbs	75.5	79.1	97.5	73.7
Shrubs	0.0	0.0	7.7	16.1
Total	789.7	732.0	1024.6	904.5

Table 21. Alfalfa Plant Count per Meter of Row for the Alfalfa Interseeding Furrow Width Techniques Trial
At the Dickinson Experiment Station, 27 Jun 1984

Furrow Width	Rep 1			Rep 2			Rep 3			Mean		
	Seedling	Adult	Total	Seedling	Adult	Total	Seedling	Adult	Total	Seedling	Adult	Total
Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 inch	0.04	1.33	1.38	0.08	0.50	0.58	0.08	0.25	0.33	0.07	0.69	0.76
3 inch	0.17	0.42	0.58	0.21	1.00	1.21	0.29	0.13	0.42	0.22	0.51	0.74
4 inch	0.00	0.59	0.58	0.08	0.38	0.46	0.17	0.67	0.83	0.08	0.54	0.63

Table 22. Alfalfa Plant Count per Foot of Row for the Alfalfa Interseeding Furrow Width Techniques Trial
At the Dickinson Experiment Station, 27 Jun 1984

Furrow Width	Rep 1			Rep 2			Rep 3			Mean		
	Seedling	Adult	Total	Seedling	Adult	Total	Seedling	Adult	Total	Seedling	Adult	Total
Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 inch	0.01	0.41	0.42	0.02	0.15	0.18	0.02	0.08	0.10	0.02	0.21	0.23
3 inch	0.05	0.13	0.18	0.06	0.30	0.37	0.09	0.04	0.13	0.07	0.16	0.23
4 inch	0.00	0.18	0.18	0.02	0.12	0.14	0.06	0.20	0.25	0.02	0.16	0.19

Table 23. Points Analysis of the 0 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Percent Frequency	Importance Value
Agropyron smithii	0.20	0.63	2.00	0.89	1.52
Bouteloua gracilis	11.27	35.73	56.00	24.93	60.66
Calamovilfa longifolia	1.73	5.50	16.00	7.12	12.62
Koeleria pyramidata	1.13	3.59	9.33	4.15	7.74
Muhlenbergia cuspidate	0.47	1.48	4.67	2.08	3.56
Panicum oligosanthes	0.13	0.42	0.67	0.30	0.72
Stipa comata	3.47	10.99	26.67	11.87	22.86
Carex filifolia	3.60	11.42	29.33	13.06	24.48
Carex heliophila	3.20	10.15	22.67	10.09	20.24
Achillea millefolium	0.20	0.63	2.00	0.89	1.52
Antennaria parvifolia	0.47	1.48	2.67	1.19	2.67
Artemisia dracunculus	0.40	1.27	4.00	1.78	3.05
Artemisia frigida	0.27	0.85	2.67	1.19	2.04
Aster ericoides	0.20	0.63	2.00	0.89	1.52
Echinacea angustifolia	0.20	0.63	2.00	0.89	1.52
Glycyrrhiza lepidota	0.20	0.63	2.00	0.89	1.52
Grindelia squarrosa	0.20	0.63	2.00	0.89	1.52
Haplopappus spinulosus	0.27	0.85	2.67	1.19	2.04
Hedeoma hispida	0.13	0.42	1.33	0.59	1.01
Liatris punctata	0.07	0.21	0.67	0.30	0.51
Lygodesmia juncea	0.07	0.21	0.67	0.30	0.51
Opuntia fragilis	0.13	0.42	1.33	0.59	1.01
Petalostemon purpureum	0.13	0.42	1.33	0.59	1.01
Phlox hoodii	0.53	1.69	4.67	2.08	3.77
Psoralea argophylla	0.13	0.42	1.33	0.59	1.01
Psoralea esculenta	0.07	0.21	0.67	0.30	0.51
Solidago missouriensis	0.07	0.21	0.67	0.30	0.51
Solidago rigida	0.07	0.21	0.67	0.30	0.51
Taraxacum officinale	0.07	0.21	0.67	0.30	0.51
Rosa arkansana	0.33	1.06	3.33	1.48	2.54
Symphoricarpos occidentalis	0.07	0.21	0.67	0.30	0.51
Lichen spp.	2.07	6.55	17.33	7.72	14.27
Furrow	0.00		0.00		
Litter	65.33		100.00		
Rock	0.67		4.00		
Sod	0.00		0.00		
Soil	2.47		11.33		

Table 24. Points Analysis of the 2 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Percent Frequency	Importance Value
Agropyron smithii	0.07	0.23	0.67	0.36	0.59
Bouteloua gracilis	16.07	55.53	72.00	39.13	94.66
Koeleria pyramidata	0.87	3.00	7.33	3.99	6.99
Muhlenbergia cuspidata	0.40	1.38	3.33	1.81	3.19
Stipa comata	2.40	8.29	22.00	11.96	20.25
Stipa viridula	0.27	0.92	2.67	1.45	2.37
Carex filifolia	2.87	9.91	21.33	11.59	21.50
Carex heliophila	2.67	9.22	24.67	13.41	22.63
Achillea millefolium	0.13	0.46	1.33	0.72	1.18
Antennaria parvifolia	0.13	0.46	1.33	0.72	1.18
Artemisia dracunculus	0.27	0.92	2.67	1.45	2.37
Artemisia frigida	0.27	0.92	2.67	1.45	2.37
Artemisia ludoviciana	0.07	0.23	0.67	0.36	0.59
Echinacea angustifolia	0.07	0.23	0.67	0.36	0.59
Gaura coccinea	0.07	0.23	0.67	0.36	0.59
Liatis punctata	0.07	0.23	0.67	0.36	0.59
Phlox hoodii	0.60	2.07	4.00	2.17	4.24
Rosa arkansana	0.20	0.69	2.00	1.09	1.78
Lichen spp.	1.47	5.07	13.33	7.25	12.32
Furrow	11.53		52.00		
Litter	48.07		100.00		
Rock	0.00		0.00		
Sod	11.00		39.33		
Soil	0.47		2.67		

Table 25. Points Analysis of the 3 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Percent Frequency	Importance Value
Agropyron smithii	0.73	2.44	6.67	3.60	6.04
Andropogon scoparius	0.07	0.22	0.67	0.36	0.58
Bouteloua gracilis	13.07	43.56	50.67	27.34	70.90
Calamovilfa longifolia	0.20	0.67	2.00	1.08	1.75
Koeleria pyramidata	1.47	4.89	12.00	6.47	11.36
Muhlenbergia cuspidata	0.67	2.22	5.33	2.88	5.10
Stipa comata	4.80	16.00	34.67	18.71	34.71
Stipa viridula	0.27	0.89	2.00	1.08	1.97
Carex filifolia	2.67	8.89	19.33	10.43	19.32
Carex heliophila	2.80	9.33	22.67	12.23	21.56
Achillea millefolium	0.07	0.22	0.67	0.36	0.58
Antennaria parvifolia	0.07	0.22	0.67	0.36	0.58
Artemisia dracunculus	0.27	0.89	2.67	1.44	2.33
Artemisia frigida	0.13	0.44	1.33	0.72	1.16
Chrysopsis villosa	0.07	0.22	0.67	0.36	0.58
Echinacea angustifolia	0.27	0.89	2.00	1.08	1.97
Glycyrrhiza lepidota	0.07	0.22	0.67	0.36	0.58
Liatris punctata	0.07	0.22	0.67	0.36	0.58
Petalostemon purpureum	0.13	0.44	1.33	0.72	1.16
Phlox hoodii	0.60	2.00	4.00	2.16	4.16
Psoralea argophylla	0.13	0.44	1.33	0.72	1.16
Rosa arkansana	0.33	1.11	3.33	1.80	2.91
Lichen spp.	1.07	3.56	10.00	5.40	8.96
Furrow	12.73		51.33		
Litter	42.80		98.67		
Rock	0.00		0.00		
Sod	14.13		38.67		
Soil	0.33		2.00		

Table 26. Points Analysis of the 4 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Basal Cover	Relative Basal Cover	Percent Frequency	Relative Percent Frequency	Importance Value
Agropyron smithii	0.47	1.79	4.67	2.52	4.31
Bouteloua gracilis	9.20	35.38	40.00	21.58	56.96
Calamovilfa longifolia	0.13	0.51	1.33	0.72	1.23
Koeleria pyramidata	1.20	4.62	12.00	6.47	11.09
Muhlenbergia cuspidata	0.27	1.03	2.67	1.44	2.47
Stipa comata	4.07	15.64	30.00	16.19	31.83
Stipa viridula	0.67	2.56	6.67	3.60	6.16
Carex filifolia	1.73	6.67	15.33	8.27	14.94
Carex heliophila	3.47	13.33	31.33	16.91	30.24
Antennaria parvifolia	0.60	2.31	5.33	2.88	5.19
Artemisia dracunculus	0.33	1.28	2.67	1.44	2.72
Artemisia frigida	0.40	1.54	3.33	1.80	3.34
Artemisia ludoviciana	0.07	0.26	0.67	0.36	0.62
Aster ericoides	0.20	0.77	2.00	1.08	1.85
Erysimum asperum	0.07	0.26	0.67	0.36	0.62
Oxytropis lambertii	0.13	0.51	1.33	0.72	1.23
Phlox hoodii	0.27	1.03	2.67	1.44	2.47
Psoralea argophylla	0.07	0.26	0.67	0.36	0.62
Psoralea esculenta	0.07	0.26	0.67	0.36	0.62
Sphaeralcea coccinea	0.20	0.77	2.00	1.08	1.85
Rosa arkansana	0.27	1.03	2.67	1.44	2.47
Symphoricarpos occidentalis	0.07	0.26	0.67	0.36	0.62
Lichen spp.	2.07	7.95	16.00	8.63	16.58
Furrow	14.13		56.67		
Litter	40.40		99.33		
Rock	0.00		0.00		
Sod	19.27		49.33		
Soil	0.20		1.33		

Table 27. Mean Percentage of Basal Cover for the Alfalfa Interseeding Furrow Width Trial
At the Dickinson Experiment Station, 1984

Furrow Width	Club										
	Grass	Sedge	Forbs	Shrubs	Moss	Lichen	Furrow	Litter	Rock	Sod	Soil
0 inch	18.40	6.80	3.88	0.40	0.00	2.07	0.00	65.33	0.67	0.00	2.47
2 inch	20.08	5.54	1.68	0.20	0.00	1.47	11.53	48.07	0.00	11.00	0.47
3 inch	21.28	5.47	1.88	0.33	0.00	1.07	12.73	42.80	0.00	14.13	0.33
4 inch	16.01	5.20	2.41	0.34	0.00	2.07	14.13	40.40	0.00	19.27	0.20

Table 28. Density Analysis per 0.1 Sq. Meter of the 0 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Density	Relative Percent Density	Percent Frequency	Relative Percent Frequency	Importance Value
<i>Achillea millefolium</i>	0.15	3.34	5.33	2.61	5.95
<i>Antennaria parvifolia</i>	0.01	0.30	1.33	0.65	0.95
<i>Artemisia dracunculoides</i>	0.24	5.47	17.33	8.50	13.97
<i>Artemisia frigida</i>	0.05	1.22	4.00	1.96	3.18
<i>Artemisia ludoviciana</i>	0.13	3.04	4.00	1.96	5.00
<i>Aster ericoides</i>	1.28	29.18	28.00	13.73	42.91
<i>Chrysopsis villosa</i>	0.04	0.91	4.00	1.96	2.87
<i>Echinacea angustifolia</i>	0.17	3.95	10.67	5.23	9.18
<i>Erysimum asperum</i>	0.13	3.04	10.67	5.23	8.27
<i>Gaura coccinea</i>	0.17	3.95	9.33	4.58	8.53
<i>Glycyrrhiza lepidota</i>	0.01	0.30	1.33	0.65	0.95
<i>Grindelia squarrosa</i>	0.56	12.77	17.33	8.50	21.27
<i>Gutierrezia sarothrae</i>	0.03	0.61	2.67	1.31	1.92
<i>Haplopappus spinulosus</i>	0.04	0.91	4.00	1.96	2.87
<i>Hedeoma hispida</i>	0.08	1.82	2.67	1.31	3.13
<i>Helianthus rigidus</i>	0.29	6.69	13.33	6.54	13.23
<i>Liatis punctata</i>	0.19	4.26	10.67	5.23	9.49
<i>Linum rigidum</i>	0.03	0.61	2.67	1.31	1.92
<i>Lygodesmia juncea</i>	0.01	0.30	1.33	0.65	0.95
<i>Oxytropis lambertii</i>	0.04	0.91	4.00	1.96	2.87
<i>Petalostemon purpureum</i>	0.27	6.08	14.67	7.19	13.27
<i>Phlox hoodii</i>	0.09	2.13	4.00	1.96	4.09
<i>Psoralea argophylla</i>	0.04	0.91	4.00	1.96	2.87
<i>Psoralea esculenta</i>	0.05	1.22	5.33	2.61	3.83
<i>Solidago missouriensis</i>	0.01	0.30	1.33	0.65	0.95
<i>Solidago rigida</i>	0.03	0.61	1.33	0.65	1.26
<i>Sphaeralcea coccinea</i>	0.03	0.61	2.67	1.31	1.92
<i>Rosa arkansana</i>	0.19	4.26	14.67	7.19	11.45
<i>Symphoricarpos occidentalis</i>	0.01	0.30	1.33	0.65	0.95

Table 29. Density Analysis per 0.1 Sq. Meter of the 2 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Density	Relative Percent Density	Percent Frequency	Relative Percent Frequency	Importance Value
<i>Antennaria parvifolia</i>	0.03	0.93	1.33	0.70	1.63
<i>Artemisia dracuncululus</i>	0.28	9.81	22.67	11.89	21.70
<i>Artemisia frigida</i>	0.08	2.80	8.00	4.20	7.00
<i>Artemisia ludoviciana</i>	0.04	1.40	2.67	1.40	2.80
<i>Aster ericoides</i>	0.51	17.76	18.67	9.79	27.55
<i>Chrysopsis villosa</i>	0.12	4.21	9.33	4.90	9.11
<i>Echinacea angustifolia</i>	0.17	6.07	13.33	6.99	13.06
<i>Erysimum asperum</i>	0.09	3.27	8.00	4.20	7.47
<i>Euphorbia geyeri</i>	0.01	0.47	1.33	0.70	1.17
<i>Gaura coccinea</i>	0.13	4.67	12.00	6.29	10.96
<i>Grindelia squarrosa</i>	0.27	9.35	13.33	6.99	16.34
<i>Haplopappus spinulosus</i>	0.03	0.93	2.67	1.40	2.33
<i>Hedeoma hispida</i>	0.01	0.47	1.33	0.70	1.17
<i>Liatris punctata</i>	0.17	6.07	10.67	5.59	11.66
<i>Linum rigidum</i>	0.01	0.47	1.33	0.70	1.17
<i>Lotus americanus</i>	0.03	0.93	2.67	1.40	2.33
<i>Lygodesmia juncea</i>	0.05	1.87	5.33	2.80	4.67
<i>Oxytropis lambertii</i>	0.04	1.40	2.67	1.40	2.80
<i>Petalostemon purpureum</i>	0.04	1.40	2.67	1.40	2.80
<i>Phlox hoodii</i>	0.29	10.28	16.00	8.39	18.67
<i>Psoralea argophylla</i>	0.07	2.34	6.67	3.50	5.84
<i>Ratibida columnifera</i>	0.01	0.47	1.33	0.70	1.17
<i>Solidago missouriensis</i>	0.01	0.47	1.33	0.70	1.17
<i>Sphaeralcea coccinea</i>	0.04	1.40	2.67	1.40	2.80
<i>Vicia americana</i>	0.01	0.47	1.33	0.70	1.17
<i>Rosa arkansana</i>	0.29	10.28	21.33	11.19	21.47

Table 30. Density Analysis per 0.1 Sq. Meter of the 3 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Density	Relative Percent Density	Percent Frequency	Relative Percent Frequency	Importance Value
<i>Achillea millefolium</i>	0.03	1.10	2.67	1.52	2.62
<i>Artemisia dracuncululus</i>	0.07	2.75	6.67	3.79	6.54
<i>Artemisia frigida</i>	0.03	1.10	2.67	1.52	2.62
<i>Artemisia ludoviciana</i>	0.03	1.10	1.33	0.76	1.86
<i>Aster ericoides</i>	0.16	6.59	8.00	4.55	11.14
<i>Aster oblongifolius</i>	0.01	0.55	1.33	0.76	1.31
<i>Astragalus crassicaulus</i>	0.01	0.55	1.33	0.76	1.31
<i>Chrysopsis villosa</i>	0.03	1.10	2.67	1.52	2.62
<i>Commandra umbellata</i>	0.01	0.55	1.33	0.76	1.31
<i>Echinacea angustifolia</i>	0.17	7.14	16.00	9.09	16.23
<i>Erysimum asperum</i>	0.03	1.10	2.67	1.52	2.62
<i>Gaura coccinea</i>	0.08	3.30	6.67	3.79	7.09
<i>Gutierrezia sarothrae</i>	0.03	1.10	2.67	1.52	2.62
<i>Haplopappus spinulosus</i>	0.03	1.10	1.33	0.76	1.86
<i>Hedeoma hispida</i>	0.11	4.40	8.00	4.55	8.95
<i>Helianthus rigidus</i>	0.44	18.13	20.00	11.36	29.49
<i>Liatis punctata</i>	0.17	7.14	10.67	6.06	13.20
<i>Linum rigidum</i>	0.03	1.10	2.67	1.52	2.62
<i>Lotus americanus</i>	0.07	2.75	6.67	3.79	6.54
<i>Lygodesmia juncea</i>	0.09	3.85	8.00	4.55	8.40
<i>Opuntia fragilis</i>	0.01	0.55	1.33	0.76	1.31
<i>Petalostemon purpureum</i>	0.13	5.49	12.00	6.82	12.31
<i>Phlox hoodii</i>	0.13	5.49	8.00	4.55	10.04
<i>Psoralea argophylla</i>	0.03	1.10	2.67	1.52	2.62
<i>Psoralea esculenta</i>	0.07	2.75	6.67	3.79	6.54
<i>Ratibida columnifera</i>	0.03	1.10	2.67	1.52	2.62
<i>Solidago missouriensis</i>	0.08	3.30	4.00	2.27	5.57
<i>Sphaeralcea coccinea</i>	0.12	4.95	10.67	6.06	11.01
<i>Rosa arkansana</i>	0.20	8.24	13.33	7.58	15.82
<i>Symphoricarpos occidentalis</i>	0.01	0.55	1.33	0.76	1.31

Table 31. Density Analysis per 0.1 Sq. Meter of the 4 Inch Furrow Width Treatment for the Alfalfa Interseeding Techniques Trial at the Dickinson Experiment Station, 1984

Species	Density	Relative Percent Density	Percent Frequency	Relative Percent Frequency	Importance Value
<i>Achillea millefolium</i>	0.01	0.41	1.33	0.69	1.10
<i>Antennaria parvifolia</i>	0.12	3.69	8.00	4.17	7.86
<i>Artemisia dracunculoides</i>	0.21	6.56	13.33	6.94	13.50
<i>Artemisia frigida</i>	0.12	3.69	10.67	5.56	9.25
<i>Artemisia ludoviciana</i>	0.09	2.87	4.00	2.08	4.95
<i>Aster ericoides</i>	0.81	25.00	21.33	11.11	36.11
<i>Chrysopsis villosa</i>	0.04	1.23	4.00	2.08	3.31
<i>Commandra umbellata</i>	0.01	0.41	1.33	0.69	1.10
<i>Echinacea angustifolia</i>	0.35	10.66	25.33	13.19	23.85
<i>Erysimum asperum</i>	0.01	0.41	1.33	0.69	1.10
<i>Gaura coccinea</i>	0.04	1.23	2.67	1.39	2.62
<i>Grindelia squarrosa</i>	0.04	1.23	2.67	1.39	2.62
<i>Haplopappus spinulosus</i>	0.03	0.82	2.67	1.39	2.21
<i>Hedeoma hispida</i>	0.01	0.41	1.33	0.69	1.10
<i>Helianthus rigidus</i>	0.03	0.82	1.33	0.69	1.51
<i>Liatris punctata</i>	0.12	3.69	8.00	4.17	7.86
<i>Linum rigidum</i>	0.08	2.46	8.00	4.17	6.63
<i>Lotus americanus</i>	0.01	0.41	1.33	0.69	1.10
<i>Lygodesmia juncea</i>	0.03	0.82	1.33	0.69	1.51
<i>Medicago falcata</i>	0.01	0.41	1.33	0.69	1.10
<i>Opuntia fragilis</i>	0.04	1.23	2.67	1.39	2.62
<i>Oxytropis lambertii</i>	0.05	1.64	4.00	2.08	3.72
<i>Petalostemon purpureum</i>	0.09	2.87	8.00	4.17	7.04
<i>Phlox hoodii</i>	0.01	0.41	1.33	0.69	1.10
<i>Psoralea argophylla</i>	0.05	1.64	4.00	2.08	3.72
<i>Psoralea esculenta</i>	0.05	1.64	5.33	2.78	4.42
<i>Ratibida columnifera</i>	0.03	0.82	2.67	1.39	2.21
<i>Solidago missouriensis</i>	0.16	4.92	9.33	4.86	9.78
<i>Solidago rigida</i>	0.05	1.64	1.33	0.69	2.33
<i>Sphaeralcea coccinea</i>	0.21	6.56	14.67	7.64	14.20
<i>Rosa arkansana</i>	0.29	9.02	16.00	8.33	17.35
<i>Symphoricarpos occidentalis</i>	0.01	0.41	1.33	0.69	1.10

Table 32. Mean Density per 0.1 Sq. Meter for the Alfalfa Interseeding Furrow Width Techniques Trial at the Dickinson Experiment Station, 1984

Furrow Width	Forbs	Shrubs
0 inch	4.17	0.20
2 inch	2.54	0.29
3 inch	2.23	0.21
4 inch	2.91	0.30

Table 33. Area in Square Feet and Percentage per Acre of Seed Bed Prepared by an Interseeder For Six Row Spacings and Four Furrow Widths

Row Spacing		Area of Seed Bed per Acre In Square Feet				Percentage of Seed Bed per Acre			
Spacings In Feet	# Rows Per Rod	Furrow Width 2 Inch	Furrow Width 3 Inch	Furrow Width 4 Inch	Furrow Width 12 Inch	Furrow Width 2 Inch	Furrow Width 3 Inch	Furrow Width 4 Inch	Furrow Width 12 Inch
2	8.25	3703	5445	7187	21780	8.50	12.50	16.50	50.00
3	5.50	2468	3630	4792	14520	5.67	8.34	11.00	33.34
4	4.13	1854	2726	3598	10904	4.26	6.25	8.26	25.00
5	3.30	1481	2178	2875	8712	3.40	5.00	6.60	20.00
8	2.06	925	1362	1795	5446	2.12	3.13	4.12	12.50
10	1.65	741	1089	1437	4356	1.70	2.50	3.30	10.00