

PROGRESS REPORT ON SEED PRODUCTION RESEARCH

prepared by

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for

**PRESENTATION AT THE GRASS-LEGUME SEED INSTITUTE
Roseau, Minnesota**

March 15, 1990

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Kentucky Bluegrass

Data from the 1985 and 1987 Variety Trials are reported here. The 1988 Variety trial was reported here. The 1988 Variety trial was not harvested in 1989 because of poor growing conditions in 1988 but will be harvested in 1990.

Yields in the 1985 trial were generally low because of the age of the stand and dry early spring. Tolerance to these two factors can be measured in the comparative seed yields in table 2. KO-140, Dormie, Newport and some others yielded well.

The 1987 Variety trial had generally good stands established but several strains were hampered by poor germination and may not have had adequate stands for 1989 seed yields. Some moisture stress was also noted early in the spring and seed yields were only fair overall.

Timothy

1989 was generally a very good year for timothy seed production. Data from 1985, 1987 and 1988 variety trials are reported.

The 1985 variety trial had good yields. Yields had declined because of the stand age (4 years) and because the trial was established on coarse textured soil which lead to moisture stress in 1989.

The 1987 trial had moderate yields overall with some evidence of chlorosis even though 100 lbs. of ammonium nitrate was applied in the fall of 1988.

The 1988 trial had some problems with establishment and was reseeded in the fall of 1988 to achieve a better stand. Seed was harvested in 1989 but a more accurate measure of seed production potential should include data from the subsequent harvests in 1990 and 1991.

Reed Canarygrass

The results of the 1985 reed canarygrass strain trial are reported in Table 8. Overall yields were low due to the age of the stand and early spring moisture stress.

The residue management study, on Venture reed canarygrass is reported in Table 10. The spring burn treatment significantly increased seed yield over other residue treatments at the early harvest date. The fall burn treatment significantly increased seed yield over the rake off residue treatment at the late harvest date. The two burn treatments appear to be superior to the clip/rake and rake off treatments. The earlier maturity of the spring burn plots is reflected in the decreased seed yield at the late harvest date because of seed shattering loss.

The parlay and residue management study results are presented in Tables 11 and 12. The parlay applications did not have a significant enough effect on seed production and other agronomic traits to warrant application to reed canarygrass seed production fields. The residue treatments also had no significant effect on seed yield. However, residue studies generally have indicated fall and spring burn treatments may be superior to other residue management options, especially when moisture stress is present.

Smooth Bromegrass

Data from the 1988 variety trial is presented in table 12. Alpha and Badger did not germinate in the field and Matua does not seem to be a winter hardy variety. All other varieties tested showed good yields in 1989. There were no significant seed yield differences in this trial and all previous smooth bromegrass trials have shown this same trend.

Smooth bromegrass should not be grown where quackgrass is known to be present, as the seed cannot be separated.

Orchardgrass

One variety trial was established in 1988 and data is reported in Table 13. Nordstern was the highest yielder in this trial with 520 lbs/ac. One strain, 0-9, had very poor field germination and data was not collected.

Winter injury is a main concern with orchardgrass. In some winters with little snow cover, complete winter kill or severe winter injury has been observed.

Quackgrass contamination and marketing of seed are also major obstacles for the seed production of orchardgrass.

Warm Season Grasses

In 1987, the first warm season grass trial was seeded on the cenex farm near Roseau. Stand variability due to weather conditions made notes and yields unobtainable.

The same strains were reseeded in 1988 and data is reported in Table 14. It should be noted that all of these grasses are slow and difficult to establish and it usually takes two years to establish adequate stands for seed production.

The hot, dry conditions in 1988 seemed to favor establishment and growth of these grasses and preliminary yields were taken on six strains. 1990 and 1991 should provide a better indication of performance of all species and varieties. Tomahawk indiangrass and Pierre side-oats grama yielded well in the first year and seem adapted for the area. Oto indiangrass, on the other hand, suffered winter injury and is probably not adapted.

Row spacing, fertility, weed control, establishment, threshing, cleaning, and marketing all present special problems in producing these grasses and caution should be used when considering growing them.

Birdsfoot Trefoil

Seed production of birdsfoot trefoil in 1989 was very good. Weather conditions for crop growth and pollination were above average.

Data for the 1988 variety trial is reported in table 15. Norcen, the standard variety in the area was the lowest yielder in this trial which has not normally been the case in the past. Less than average germination of the seed lot planted in this trial may have caused the yield difference. This variety test will be continued in 1990 and 1991.

Table 1. Monthly precipitation and average Park Kentucky bluegrass seed yields at Roseau, MN from 1967 to 1989.

Year	MONTHLY PRECIPITATION (inches)												TOTAL	DEPARTURE FROM NORMAL	Park Seed Yield lbs/A
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC			
1967	1.13	.39	.59	2.89	.89	2.23	4.95	1.69	.83	1.11	.70	1.76	19.16	-.56	650
1968	.62	T	1.25	.63	1.46	6.47	6.13	8.49	2.35	1.26	1.06	.21	29.98	+10.26	488
1969	3.07	.11	.05	1.27	3.31	2.29	3.70	4.28	3.29	1.91	.30	.73	24.31	+4.59	673
1970	.71	.41	1.38	2.56	5.93	4.07	3.55	.83	2.77	1.49	1.21	.37	25.28	+5.56	492
1971	.54	.13	.26	1.50	2.24	2.29	3.58	.69	3.33	2.97	.29	.50	19.02	-.70	405
1972	.68	.76	.50	.70	1.66	5.03	1.92	1.53	4.22	1.4	.38	.32	19.10	-.62	422
1973	.09	.17	1.18	.90	2.46	2.21	4.04	2.09	5.67	1.19	.67	.75	21.40	+1.68	642
1974	.88	.87	.16	2.72	4.12	1.56	2.56	10.97	.42	.66	.15	1.4	26.47	+5.43	504
1975	1.10	.29	.64	1.40	1.52	4.96	2.26	1.75	1.79	1.49	.20	.65	18.05	-2.94	146
1976	1.13	.50	1.05	.77	.54	5.82	1.52	3.72	.34	.07	T	.37	15.83	-5.16	140
1977	.14	.62	1.02	.27	2.43	3.71	2.28	1.74	3.83	.87	2.27	.26	19.44	-1.55	507
1978	.36	.26	.17	1.00	1.97	1.92	6.25	3.25	3.44	.23	.98	.79	20.62	+3.35	415
1979	.50	1.01	1.06	2.77	1.89	1.91	3.7	1.59	.45	1.40	1.02	.16	17.46	-3.53	62
1980	.55	.82	.35	.00	.24	1.75	3.35	5.19	4.12	1.66	.94	.18	19.15	-1.84	625
1981	.27	.16	.66	.56	2.79	6.85	2.63	2.41	3.63	1.75	.90	.99	23.60	+2.61	595
1982	1.30	.45	.74	.24	1.38	2.00	5.53	2.71	1.92	2.91	.46	.57	20.21	-.78	605
1983	1.31	1.26	1.17	.53	2.76	4.03	1.62	3.34	2.81	2.26	.66	.10	21.85	+8.6	613
1984	T	.95	T	.72	.72	4.46	3.78	.99	.37	4.32	.10	1.02	17.18	-3.21	525
1985	.12	.33	.06	1.07	4.35	4.62	1.08	8.72	1.6	1.04	1.68	.38	25.05	+5.06	488
1986	.30	.90	.26	2.96	1.4	2.43	3.59	2.04	2.52	.65	1.97	.36	19.38	-.61	288
1987	.47	.30	.10	.59	4.37	2.25	4.8	2.22	.82	.92	.73	.35	17.92	-2.00	152
1988	.60	.09	1.75	.00	1.74	1.34	5.53	1.70	2.24	.12	.77	1.05	16.81	-3.00	320
1989	3.27	.32	2.86	.10	2.82	5.46	1.60	2.56	1.24	.41	.62	.45	21.71	+1.75	

¹ Park seed yields estimated from Kentucky bluegrass variety trials with a July burn treatment and 80-100 lbs/A of nitrogen.
² * Monthly precipitation data unavailable.

Table 2. Percent heading, mildew reading, plant height, harvest date, and seed yields for 24 Kentucky bluegrass strains seeded in 1985 on the Baumgartner (Welin) farm, Roseau, MN, 1986-1988.^a

Strain	MSP No.	Percent heading		Powdery Mildew Rating ^b	Plant height (in)		Harvest date 1989	Seed Yield (lb/A)						
		1989			1989			1986-1987				1988-1989		
		6-2	6-13		6-8	6-21		1986	1987	2-Yr avg.	1988	3-Yr avg.	1989	4-Yr avg.
Aquila	1915	4	43	R	9	16	7-6	244	68	156	54	122	65	108
Aspen	1039	6	63	MS	11	23	7-5	202	120	161	45	122	134	125
BA69-82	2368	1	65	R	8	20	7-6	285	202	244	56	181	134	169
BA70-131	2369	2	67	R	7	19	7-5	157	169	163	48	125	113	122
BA72-500	2370	2	68	R	9	20	7-6	312	214	263	57	194	187	192
BA72-500	2371	1	77	R	8	20	7-5	244	116	180	48	136	229	159
Banff	2230	65	100	S	19	24	7-4	71	235	153	54	120	190	137
Baron	2178	5	52	S	7	18	7-5	223	363	293	68	218	152	202
Dormie	1303	50	100	VR	16	23	7-4	692	138	415	71	300	256	289
Holiday	1752	7	63	R	12	20	7-5	107	50	79	18	58	101	69
KO-140	1587	63	100	R	21	25	7-4	303	211	257	184	233	372	268
K3-160	2378	1	92	R	14	23	7-5	140	146	143	48	111	119	113
K3-178	1815	28	73	S	11	21	7-5	74	279	177	56	136	158	142
K6-80	1817	85	100	VS	19	28	7-4	27	125	76	172	108	241	141
Kimono	1280	2	62	S	8	16	7-6	175	40	108	33	83	92	87
MomPp 2672	2182	0	57	R	8	19	7-6	252	202	227	27	160	89	142
Monopoly	1711	8	87	R	13	22	7-4	137	172	155	45	118	169	131
N6-106	1588	73	100	R	20	25	7-4	493	107	300	83	228	172	214
Newport	2372	22	88	S	14	22	7-4	398	324	361	80	267	238	260
Parade	1916	52	100	S	18	23	7-4	113	271	192	104	163	190	170
Park	2357	65	100	S	18	22	7-4	151	288	220	152	197	190	198
Plush	1753	40	73	MR	15	21	7-6	175	116	146	68	120	116	119
Rugby	1738	18	78	VS	16	23	7-4	98	279	189	77	151	155	152
Trenton	1810	10	83	VS	13	25	7-4	74	223	149	65	124	140	128
LSD at 5% =		31	18		3	2	1	98	82		40		74	
1% =		37	21		4	3	1	131	193		54		89	

^a Experimental design: RCB with 3 reps

^b Ratings: R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible.

Table 3. Percent stand 1988, mildew reading, percent heading, plant height, harvest data, lodging score and seed yields for 36 Kentucky bluegrass strains seeded in 1987 in the Baumgartner (Welin) farm, Roseau, MN. 1989 data.^a

VARIETY	MSP	Percent stand 4-28-88	Mildew ^b 6-14	Percent Heading			Plant Height (in)		Harvest date 1989	Lodging score ^c 6-27	Seed Yield (lb/A)
				6-2	6-8	6-13	6-8	7-4			
2405	2405	43	0.0	90	92	93	19	31	7-4	2	327
Abbey	2422	67	0.0	0	40	73	13	19	7-4	1.0	360
BAR VP 264	2391	68	0.0	2	32	70	13	22	7-5	1.0	193
BAR VB 534	2392	77	0.0	0	33	78	7	21	7-4	1.0	333
BAR VB 577	2393	38	0.0	16	62	7	11	18	7-6	1.0	235
Baron	2178	63	0.0	0	40	67	11	17	7-5	1.0	372
Challenger	2289	10	0.0	15	68	82	14	26	7-5	1.3	250
Cheri	2258	4	0.0	7	38	72	8	29	7-4	1.3	244
Classic	2314	5	0.0	10	68	83	16	30	7-5	1.0	226
Coventry	2423	45	0.0	0	60	87	10	25	7-6	1.0	401
Enmundi	2512	55	0.0	68	98	100	22	29	7-4	1.7	250
Fortuna	2389	53	0.0	0	32	73	7	20	7-6	1.0	375
Glade	1574	65	0.0	0	30	53	11	21	7-6	1.0	235
K3-179	1816	68	0.7	2	68	82	14	25	7-6	1.3	122
Merit	1838	50	0.0	1	23	73	11	29	7-5	1.0	366
Midnight	2317	2	0.0	18	70	83	17	25	7-5	1.7	113
Monopoly	2515	65	0.0	9	65	90	13	26	7-5	1.0	262
NE 80-110 I	2522	42	0.0	58	92	100	20	31	7-5	1.3	241
NE 80-110 II	2523	47	0.0	23	68	100	18	31	7-4	1.0	211
NE 80-110 III	2524	30	0.0	38	90	97	20	30	7-5	1.0	220
NE 80-14 II	2519	22	2.3	12	80	100	13	29	7-4	1.7	205
NE 80-14 III	2520	20	1.0	13	68	95	13	29	7-4	1.3	247
NE 80-30	2521	10	0.0	57	83	90	20	29	7-5	3.3	339
NE 80-48 I	2516	4	0.0	20	58	78	16	30	7-6	1.3	167
NE 80-48 II	2517	15	0.0	29	57	88	14	28	7-5	1.0	158
NE 80-48 III	2518	12	0.0	5	68	85	17	25	7-6	1.0	187
NE 80-50 I	2525	37	0.0	1	48	77	9	24	7-7	1.0	294
NE 80-50 II	2526	35	0.0	7	58	65	14	25	7-5	1.0	285
NE 80-50 III	2527	35	0.0	7	47	87	11	25	7-6	1.0	303
Newport	2372	43	0.0	48	83	100	16	26	7-5	1.0	449
Nugget	1589	48	0.0	2	47	78	7	18	7-5	1.0	167
Parade	1916	58	0.0	20	78	98	18	31	7-4	1.0	268
Park	2357	63	0.5	67	82	95	18	29	7-5	1.7	181
Park	895	67	0.1	62	92	100	18	29	7-4	1.3	241
Trenton	1810	52	0.0	6	55	73	10	24	7-4	1.0	181
VB-8302	2390	58	0.0	2	40	72	8	18	7-5	1.0	214
LSD at 5% level		16	0.5	22	43	25	7	6	2	1.0	107
1% level		19	0.6	26	51	30	8	7	2	1.0	127

^a Experimental design: RCB with 4 reps

^b 0 = no mildew, 5 = severe infection

^c 1 = no lodging, 5 = severe lodging

Table 4. Percent heading, plant height, harvest date and seed yields for Timothy strains seeded in 1985 on Baumgartner (Welin) Farm, Roseau, MN.

Strain	MSP no.	Percent heading			Plant height (in) ^a	Harvest date	Seed yields (lb/A)					
		6-6	6-13	6-19	1989	1989	1986	1987	2-Yr ave.	1988	1989	3-Yr ^b ave.
Early maturing strains												
Clair	1863	2	47	100	41	7-24	404	482	443	5	455	447
Climax	1743	2	5	88	45	7-28	555	517	536	2	357	476
Kampe II	1699	0	13	95	38	7-24	437	702	570	5	384	508
Kunpu	2358	7	55	100	45	7-24	466	500	483	7	407	458
M-11	2373	1	15	93	47	7-24	478	627	553	1	500	535
M-22	2374	0	5	92	44	7-24	592	561	577	1	410	521
Mohawk	2209	0	5	90	43	7-25	446	648	547	2	390	495
Mom Phi 21	2321	1	55	97	42	7-24	487	556	522	10	538	527
Mom Phi 28	2322	2	48	98	44	7-24	404	553	479	6	360	439
Mom Phi 30	2323	3	38	100	38	7-24	422	491	457	9	303	406
Mom Phi 32	2324	7	48	100	42	7-24	686	604	645	7	517	602
Mom Phi 56	2325	4	57	100	41	7-24	588	696	642	15	413	566
Mom Phi 59	2326	1	35	100	41	7-24	523	488	506	7	354	455
Mom Phi 62	2327	4	57	100	40	7-24	627	523	575	10	630	593
Mom Phi 63	2328	4	75	100	38	7-24	624	669	647	21	583	626
Mom Phi 64	2329	0	22	100	42	7-24	639	711	675	2	461	604
Mom Phi 69	2330	3	37	100	44	7-24	671	574	623	2	339	528
Nosappu	1593	0	28	100	46	7-24	544	642	593	4	538	575
SV-0906	1892	0	10	97	42	7-24	541	657	620	10	559	600
SV-0907	2089	1	13	90	43	7-24	546	633	590	2	500	560
SV-0908	2090	0	17	92	42	7-25	463	651	557	7	333	482
SV-0909	1894	2	10	93	44	7-24	469	633	551	21	458	520
SV-0910	2091	1	20	93	43	7-24	612	657	635	7	514	595
SV-0914	2092	0	15	97	42	7-24	496	681	589	1	443	540
SV-0916	2093	0	4	73	43	7-27	478	523	510	1	348	456
Timfor	992	0	5	88	44	7-25	549	553	551	1	354	485
Intermediate maturing strains												
Alma	2366	0	4	75	42	7-24	454	565	510	2	360	460
Champlain	1745	0	4	45	48	7-30	362	291	327	2	211	288
FFR Syn. S	2210	0	6	52	44	7-28	356	485	421	2	339	394
Goliath	2014	0	5	72	40	7-26	443	437	440	1	354	411
Motim	1702	2	10	23	44	7-28	321	330	326	4	244	299
Php-12	2364	6	3	75	42	7-27	472	562	517	1	327	454
Php-14	2365	0	4	75	42	7-27	496	464	480	1	378	446
WWT-100	2367	1	7	87	39	7-24	621	541	449	1	395	431
WW-Tigo	2363	2	8	90	42	7-24	674	613	644	1	601	630
Tiiti	1704	0	3	67	42	7-29	493	404	449	1	419	439
Late Maturing strains												
Heidemij	1744	2	5	50	40	8-4	30	250	140	9	217	166
Hokushu	1511	0	2	23	43	8-4	160	392	276	5	181	244
LSD	at 5% =	3	21	16	4	3	112	149		13	167	
	at 1% =	4	25	19	5	3	149	198		17	200	

^aExperiment design: RCB with 3 reps.

^bMean yield of 1986, 1987 and 1989.

Table 5. Percent heading, plant height, harvest date and seed yields for Timothy strains seeded in 1987 on Baumgartner (Welin) Farm, Roseau, MN^a.

Strain	MSP no.	Percent Heading			Plant Height (in)		Harvest date	Seed Yield		2-Yr ave.
		1989	1989	1989	1989	1989		1988	1989	
		6-8	6-19	6-27	6-19	7-11	1989	1988	1989	ave.
<u>Early maturity</u>										
Clair	1863	9	91	100	35	45	7-23	169	352	261
Climax	1743	0	66	100	29	47	7-27	127	381	254
Kampe I	1699	2	83	100	30	42	7-24	156	332	244
Mohawk	2209	0	75	100	29	45	7-24	140	261	201
Tiller	2418	22	100	100	32	42	7-23	91	368	230
<u>Intermediate maturity</u>										
Erecta	1070	0	67	100	30	45	7-27	136	408	272
Goliath	2198	0	77	100	30	43	7-28	123	355	239
Motim	1702	1	24	100	25	44	8-1	98	323	211
<u>Late maturity</u>										
Heidemij	1744	0	3	38	18	39	8-6	158	221	190
Hokushu	1511	0	4	76	23	43	8-3	181	227	204
LSD at 5% =		5	18	20	3	3		38	60	
1% =		6	21	25	4	4		51	72	

^aExperimental Design: RDB with 4 reps.

Table 6. Percent heading, plant height, lodging and seed yield for ten timothy varieties seeded in 1988 on Baumgartner (Welin) farm, Roseau, Mn.^a

Stain	MSP No.	Percent Heading			Plant Height (in)		Lodging ^b	Seed Yield (Lb/A)
		6-8	6-19	6-27	6-19	7-11		
Alpha	2564	1	73	100	27	41	2.0	346
Climax	1743	1	64	100	26	40	1.8	250
C PhP 15	2590	0	45	100	28	40	1.5	299
C PhP 16	2591	0	50	100	26	41	1.8	343
C PhP 17	2592	1	53	100	26	39	1.8	294
Goliath	2198	0	43	100	26	41	1.0	332
Heidemij	1744	0	24	71	22	40	1.0	283
Motim	1702	0	30	81	23	42	1.0	335
Mom phi 83	2565	5	50	100	27	41	1.0	290
SenPoku	1703	1	26	86	23	43	1.3	350
LSD at 5% level		3	41	18	5.3	4.3	0.9	N.S.

^a Experimental design: RCB with 4 reps

^b 1 = no lodging, 5 = severe lodging

Table 7. The effect of nitrogen rate, time of application and nitrogen source on seed yields of established Climax timothy fields at two locations in Roseau, MN.^a

	Plant Height (in)			Lodging Score ^b		Seed Yield
	6-6	6-19	6-27	6-27	8-1	lb/A 1989
CENEX - Fall Application (10-18-88)						
Ammonium Nitrate (lbs N/A)						
40	18	31	39	1.0	1.5	683
80	20	30	36	1.5	1.8	787
120	20	30	36	3.0	4.3	640
160	19	28	33	3.5	4.8	672
200	19	30	34	3.3	4.3	610
Urea (lbs N/A)						
40	16	28	37	1.0	1.0	578
80	20	31	38	1.3	2.0	709
120	20	30	36	2.0	2.3	778
160	20	27	35	3.0	4.3	742
200	20	29	35	4.0	5.0	649
CENEX - Spring Application (5-2-89)						
Ammonium Nitrate (lbs N/A)						
40	18	31	39	1.0	1.3	746
80	20	32	37	1.5	2.3	735
120	20	29	35	3.0	4.0	700
160	19	29	36	2.5	3.5	685
200	18	29	35	2.0	4.8	650
Urea (lbs N/A)						
40	18	31	37	1.5	1.8	710
80	19	26	37	1.5	2.3	777
120	20	30	37	3.0	4.3	716
160	19	31	37	1.5	3.3	715
200	18	29	36	2.3	4.3	766
Check (lbs N/A)						
0	13	27	34	1.0	1.0	360
LSD (0.05)	2	4	2	1.5	1.4	91

^aExperimental Design: RCB with 4 replicates

^bLodging score: 1 = no lodging 5= severe lodging

^cSeed yields: means are based on 12 samples per treatment

Table 7. (cont.)

The effect of nitrogen rate, time of application and nitrogen source on seed yields of established Climax timothy fields at two locations in Roseau, MN.^a

	<u>Plant Height (in)</u>		<u>Lodging Score^b</u>		<u>Seed Yield</u>
	6-6	6-19	6-27	8-1	lb/A 1989
GRAHN - Fall Application (10-18-88)					
Ammonium Nitrate (lbs N/A)					
40	19	36	1.0	1.3	509
80	20	36	1.0	1.5	515
120	20	38	1.0	2.3	586
160	22	37	1.0	3.5	599
200	20	35	1.3	4.3	550
Urea (lbs N/A)					
40	19	36	1.0	1.0	438
80	21	38	1.0	1.0	527
120	21	40	1.0	1.8	670
160	21	39	1.0	2.8	578
200	22	38	1.3	4.0	654
GRAHN - Spring Application (5-2-89)					
Ammonium Nitrate (lbs N/A)					
40	20	39	1.0	1.0	576
80	22	39	1.0	1.5	651
120	22	38	1.0	2.0	619
160	20	38	1.0	2.5	466
200	22	38	1.3	3.8	593
Urea (lbs N/A)					
40	18	36	1.0	1.0	475
80	20	37	1.0	1.5	665
120	23	38	1.0	2.0	714
160	21	36	1.0	2.0	643
200	20	38	1.0	2.5	549
Check (lbs N/A)					
0	16	31	1.0	1.0	204
LSD (0.05)					
	2	4	0.3	0.8	90

^aExperimental Design: RCB with 4 replicates

^bLodging score: 1 = no lodging 5= severe lodging

^cSeed yields: means are based on 12 samples per treatment

Figure 1. Seed yield of Climax timothy in response to nitrogen.

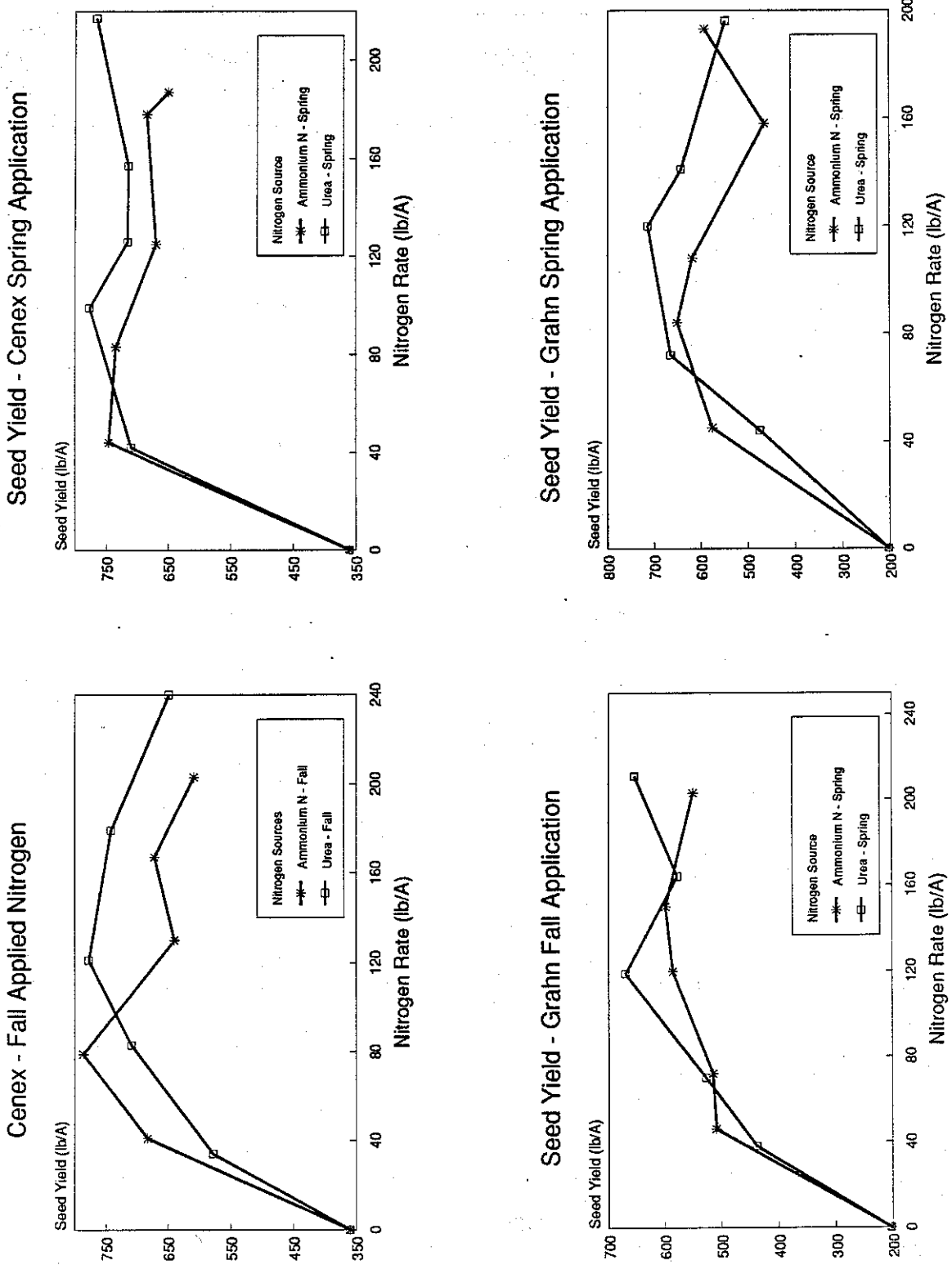
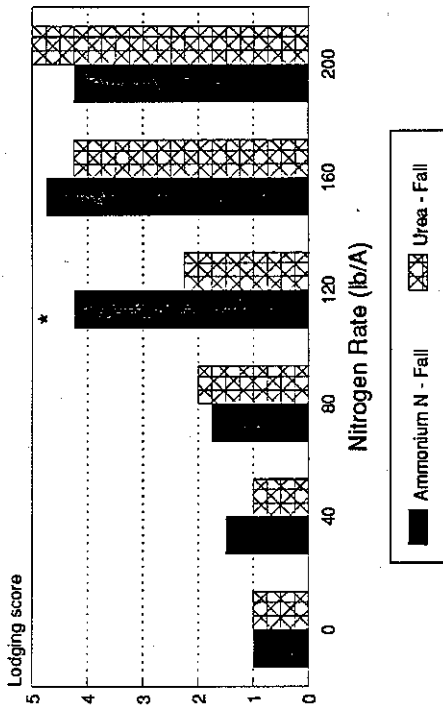
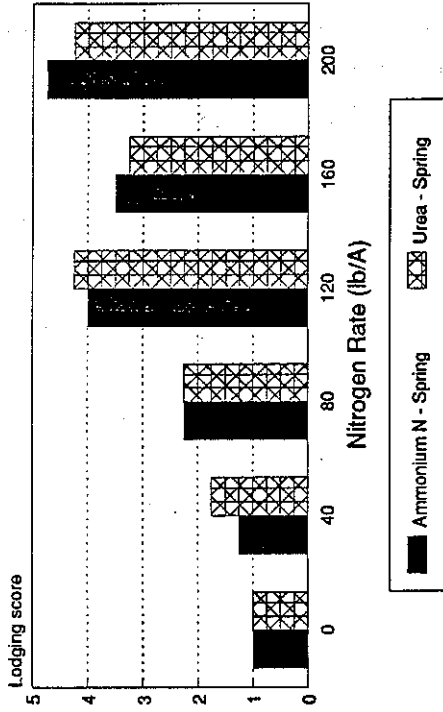


Figure 2. Lodging scores of Climax timothy in response to nitrogen.

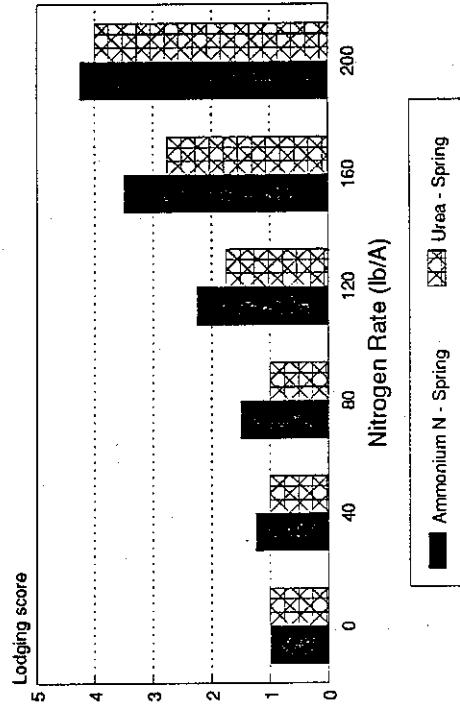
Cenex - Fall Application



Cenex - Spring Application



Grahn - Fall Application



Grahn - Spring Application

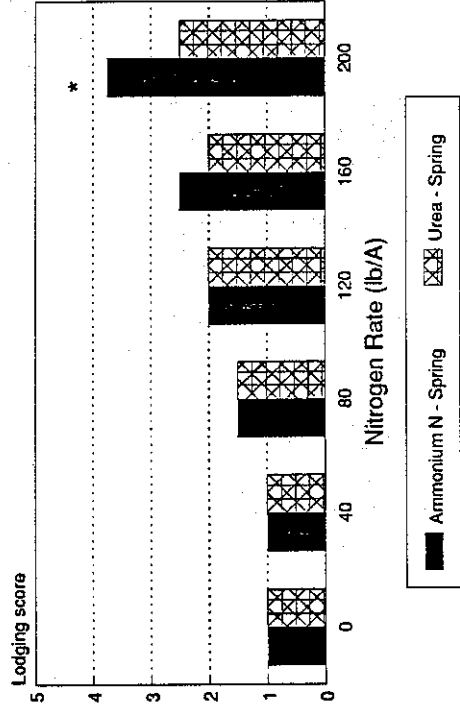


Table 8. Plant height, harvest date, and seed yields for 8 reed canarygrass strains seeded in 1985 on the Baumgartner (Welin) farm, Roseau, MN.^a

Strain	MSP No.	Plant height (in)		Seed yields (lb/A)						
		6-22	7-11	Est. 1986 ^b	1986	1987	1988	3 yr. avg.	1989 ^c	3 yr. avg. ^d
MN-76	1734	36	58	167	56	169	22	82	71	99
NAPB 427901	1851	34	60	450	309	339	57	235	107	252
NAPB 427902	1852	38	60	417	262	526	56	281	175	321
Flare	1983	38	57	417	205	268	39	171	77	183
Palaton (PS-3)	2199	45	61	500	324	392	73	263	202	306
Rise	1615	31	60	350	190	363	39	197	98	217
Vantage	1616	37	59	350	238	404	43	228	119	254
Venture (PS-2A)	2200	46	58	500	232	363	112	236	211	269
LSD at 5% level		7	6	43	145		35		92	
1% level		8	8	60	201		48		ns	

^a Experimental Design: RCB with 3 reps.

^b Harvested 7-7-86 after seed had shattered. Estimate of seed production is given to support seed yield.

^c All harvested 7/9-89.

^d Average of 1986, 1987 and 1989.

Table 9. Residue management on Venture Reed canarygrass.

Treatment	Percent Heading			Plant height (in)		Seed yields		
	6-8	6-13	6-19	6-19	7-12	1988 (lbs/A)	1989 7/9	1989 7/11
Fall Burn	10	92	100	29	49	18	251	326
Spring Burn	4	90	100	27	49	136	338	309
Fall Clip/Rake	3	83	95	24	45	32	210	245
Fall Rake Off	1	42	75	26	44	31	204	230
LSD (0.05)	6	21	5	4	5	12	62	87

¹ Experimental Design: CRD with 3 reps

Table 10. The effect of a growth regulator (Parlay) on seed yield and seed yield components of Palaton reed canarygrass.

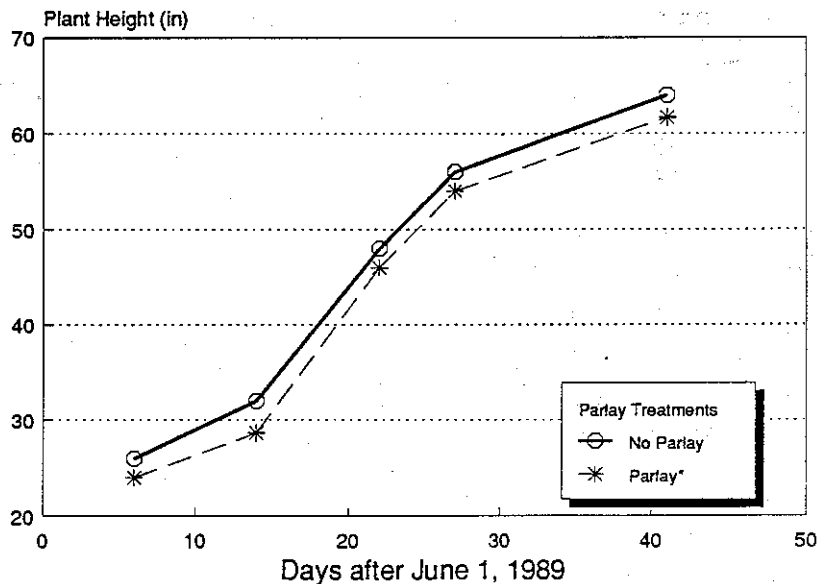
Parlay Treatment	Percent heading		Plant height (in)		DM Yield	Seed Yield	Harvest Index	Seed head number	Seed head length	Maturity ^a
	6/19	6/22	6/14	7/11	lbs/A	lbs/A	%	no./sq. yd	in	
0.0 lbs/A a.i.	53	86	32	63	5379	371	6.9	146	4.1	3.3
0.0 lbs/A a.i. - Fall	43	87	30	62	4946	333	6.6	149	4.2	3.2
0.5 lbs/A a.i. - Spring	37	81	28	61	4957	325	6.4	136	4.1	3.0
1.0 lbs/A a.i. - Spring	38	85	28	61	4962	339	6.6	130	4.4	2.9
LSD (0.05)	6	5	1	1	ns	ns	ns	ns	0.2	0.3

Table 11. The effect of residue management on seed yield and seed yield components of Palaton reed canarygrass.

Residue Treatment	Percent heading		Plant height (in)		DM Yield	Seed Yield	Harvest Index	Seed head number	Seed head length	Maturity ^a
	6/19	6/22	6/14	7/11	lbs/A	lbs/A	%	no./sq. yd	in	
Fall Burn	60	92	31	62	5163	346	6.7	142	4.2	3.4
Clip/Rake off	44	85	29	60	5061	337	6.4	123	4.1	3.3
Rake off	19	75	30	65	4924	345	7.1	160	4.5	2.6
LSD (0.05)	23	11	ns	ns	ns	ns	ns	ns	0.2	0.3

^aMaturity: based on seed color rating where 1 = 0 to 20% dark seed and 5 = 81 to 100% dark seed.

Figure 3. The effect of parlay on reed canarygrass plant height.



*mean of 3 parlay rates

Table 12. Percent stand, percent heading, plant height and seed yield for nine smooth brome grass varieties seeded in 1988 on the Baumgartner (Welin) farm, Roseau, Mn.^a

Strain	MSP No.	Percent Stand 7-20-88	Percent Heading			Plant Height (in) 7-11	Seed Yield (lb/A)
			6-8	6-13	6-19		
Alpha	2559	0	-	-	-	-	NH ^b
B 19 E	2561	87	7	50	100	57	740
B 20 E	2562	85	4	50	100	54	622
Badger	2560	0	-	-	-	-	NH
Barton	1746	80	8	46	99	54	575
Jubilee	1999	80	8	53	96	54	553
Lofar	2596	87	4	45	100	53	749
Matua	2563	80	-	-	-	-	NH
Sac	2577	80	8	65	100	56	629
LSD 5% level			NS	19.9	NS	NS	NS

^a Experimental Design: RCB with 4 reps

^b NH = not harvested; poor field establishment of Alpha and Badger; severe winter injury recorded for Matua.

Table 13. Percent stand, winter injury, percent heading, plant height, and seed yield for six orchardgrass varieties seeded in 1988 on Baumgartner (Welin) farm Roseau, MN.^a

Strain	MSP No.	Percent Stand 7-21-88	Winter Injury ^b 5-10	Percent Heading			Plant Height (in)		Seed Yield (lbs/A)
				6-8	6-10	6-27	6-8	7-11	
Crown	1845	75	4.0	6	19	61	15	46	105
Dawn	2598	85	2.8	11	68	91	21	50	359
Hawk	1846	87	3.5	14	38	90	19	45	192
Nordstern	2603	77	2.5	4	86	100	24	53	520
0-9	2557	2	-	-	-	-	-	-	NH
0-11-C1	2558	90	3.5	9	45	95	19	48	290
LSD at 5% level			0.9	NS	26	24	7	4	152

^a Experimental design: RCB with 4 reps

^b 1 = no injury, 5 = severe winter injury

Table 14. Percent stand and seed yield of thirteen native grass varieties seeded in 1988 on the Baumgartner (Welin) Farm, Roseau, MN.^a

Species	Strain	MSP No.	Percent Stand 7-20-88	Seed Yield lbs/A
Big bluestem	Bison (NDG-4)	2435	100	152
	Bonilla	2434	97	87
	KAW	2433	95	
Little bluestem	Camper	2436	70	
Indiangrass	Holt	2437	86	
	Oto	2426	95	
	Tomahawk (ND-444)	2438	90	582
Side-oats grama	Killdeer	2427	95	265
	Pierre	2428	93	439
	Trailway	2429	90	
Switchgrass	Blackwell	2430	95	
	Dacotah (NDG-965-98)	2431	97	136
	Forestburg (SD-149)	2432	100	

^a Experimental design: RCB with 4 reps

Table 15. Plant height and seed yield for six birdsfoot trefoil varieties seeded in 1988 on Baumgartner (Welin) farm, Roseau, Mn., 1989 data.^a

Variety	MSP No.	Plant height (in) 6-27	Seed yield ^b (lb/A)
Au-Dewey	2567	21	577
Empire	1626	21	638
Mu-81	2414	24	579
Norcen	2412	26	470
Viking	1564	22	587
WIT - 2	2604	27	736
LSD at 5% level		3.2	251
1% level			N.S.

^a Experimental design: RCB with 4 reps

^b All plots harvested 8/2/90.