

PROGRESS REPORT ON SEED PRODUCTION RESEARCH

prepared by

N. J. Ehlike and D. J. Vellekson
Department of Agronomy and Plant Genetics
University of Minnesota
St. Paul, Minnesota 55108

for

PRESENTATION AT THE GRASS-LEGUME SEED INSTITUTE Warroad, Minnesota

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Kentucky Bluegrass

Commercial production of Kentucky bluegrass seed was somewhat below average overall in 1994. Only .18" of total precipitation was recorded in April through May in Roseau and was a significant factor in yield reduction.

Many fields were also not burned in a timely manner in the fall of 1993 because of wet weather which also reduced yield potential. Most varieties grown in Minnesota seem to initiate heading much better if burned in July or early August. This also controls capsus bugs which cause silvertop. Reduced incidence of frost damage and cool temperatures were positive factors in seed production.

Experimental plot seed yields were somewhat below average this year. We were unable to burn in 1993 and residue was clipped and baled off. Malathion was applied in late May to control capsus bugs but did not seem to be effective on some of the varieties that had high forage production. This seemed to shield the insects from contact with the chemical that we applied with ground equipment under low pressure. Many insecticides are applied by aerial applicators but it may be important to note that if ground equipment is used, higher than normal pressure may be needed to ensure penetration into the crop canopy.

Visual seed yield estimates are given for variety trials seeded in 1990, 1991, and 1992. This may be used to compensate somewhat for yields reduced by capsus bug injury. Varieties that have actual yields more than 100# below estimates may have some capsus injury. It should be noted that other factors may reduce actual yields over visual estimates as many of you know that have estimated yields on production fields. Data from these trials is in Tables 2, 3, and 4. Table 5 has a nitrogen rate x variety trial. Seed yields are quite low in this trial due largely to the age of the stand that was seeded in 1988. Park and Abbey showed a positive response with 150#/ac. of nitrogen due to this factor. It probably is not economical or advisable to use this high nitrogen rate on Park in most instances. All of these trials will be continued in 1995.

The corn herbicide Beacon has shown promise in controlling quackgrass in Kentucky bluegrass. With this in mind, 2 trials were started at Roseau to study its effects. Yield and other data were collected for the first time in 1994 and is reported in Tables 6 and 7. Quackgrass control seems quite good especially for the spring application. Effects on the bluegrass also seemed greater at this time however, with delayed maturity and height shortening noted. A limited clearance for use was obtained this year in the western U.S. for Kentucky bluegrass seed production for this chemical but cannot be used currently in Minnesota.

Fine Fescue

There has been much interest in the production of fine fescue seed recently. Its use as a low maintenance turf and the resistance to the grass herbicides Poast and Fusilade for quackgrass control have contributed to commercial production in northern Minnesota.

1994 was unfortunately a near disaster for the production of fine fescue seed. The dry early spring was probably largely to blame. Residue management, fertility, and stand renovation are problems that need further study. Their interaction with environmental factors and the different species and varieties being grown make it difficult to make standard recommendations.

Fine fescue variety trials seeded in 1991 and 1992 have data presented in Tables 11 and 12.

Other Species

Weed control is one of the major problems in kura clover. Applying a herbicide in late fall when the crop is dormant is an approach used on many other perennial crops for weed control.

In October 1993 a trial with 3 herbicide applications was initiated. Seed yields for this trial are in Table 13.

Three timothy variety trials have data reported in Tables 8, 9, and 10.

Table 1. Monthly precipitation and average Park Kentucky bluegrass seed yields at Roseau, MN from 1967 to 1994.

Year	MONTHLY PRECIPITATION (inches)												TOTAL	DEPARTURE FROM NORMAL	Park Seed ¹ 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	-1.79	650
1968	.62	T	1.25	.63	1.46	6.47	6.13	8.49	2.35	1.26	1.06	.21	29.98	+9.03	488
1969	3.07	.11	.05	1.27	3.31	2.29	3.70	4.28	3.29	1.91	.30	.73	24.31	+3.36	673
1970	.71	.41	1.38	2.56	5.93	4.07	3.55	.83	2.77	1.49	1.21	.37	25.28	+4.33	492
1971	.54	.13	.26	1.50	2.24	2.29	3.58	.69	3.33	2.97	.29	.50	19.02	-1.93	405
1972	.68	.76	.50	.70	1.66	5.03	1.92	1.53	4.22	1.4	.38	.32	19.10	-1.85	422
1973	.09	.17	1.18	.90	2.46	2.21	4.04	2.09	5.67	1.19	.67	.75	21.40	+0.45	642
1974	.88	.87	.16	2.72	4.12	1.56	2.56	10.97	.42	.66	.15	1.4	26.47	+5.52	504
1975	1.10	.29	.64	1.40	1.52	4.96	2.26	1.75	1.79	1.49	.20	.65	18.05	-2.90	146
1976	1.13	.50	1.05	.77	.54	5.82	1.52	3.72	.34	.07	T	.37	15.83	-5.12	140
1977	.14	.62	1.02	.27	2.43	3.71	2.28	1.74	3.83	.87	2.27	.26	19.44	-1.51	507
1978	.36	.26	.17	1.00	1.97	1.92	6.25	3.25	3.44	.23	.98	.79	20.62	-0.33	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	-3.49	62
1980	.55	.82	.35	.00	.24	1.75	3.35	5.19	4.12	1.66	.94	.18	19.15	-1.80	625
1981	.27	.16	.66	.56	2.79	6.85	2.63	2.41	3.63	1.75	.90	.99	23.60	+2.65	595
1982	1.30	.45	.74	.24	1.38	2.00	5.53	2.71	1.92	2.91	.46	.57	20.21	-0.74	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	+0.90	613
1984	T	.95	T	.72	.72	4.46	3.78	.99	.37	4.32	.10	1.02	17.18	-3.77	525
1985	.12	.33	.06	1.07	4.35	4.62	1.08	8.72	1.6	1.04	1.68	.38	25.05	+4.10	488
1986	.30	.90	.26	2.96	1.4	2.43	3.59	2.04	2.52	.65	1.97	.36	19.38	-1.57	288
1987	.47	.30	.10	.59	4.37	2.25	4.8	2.22	.82	.92	.73	.35	17.92	-3.03	152
1988	.60	.09	1.75	.00	1.74	1.34	5.53	1.70	2.24	.12	.77	1.05	16.81	-4.14	320
1989	3.27	.32	2.86	.10	2.82	5.46	1.60	2.56	1.24	.41	.62	.45	21.71	+0.76	160
1990	.55	.20	1.12	1.09	.47	3.19	2.48	.62	.91	.16	.18	.72	11.69	-9.26	210
1991	.56	.64	.58	2.87	3.19	5.94	3.40	1.99	7.42	1.64	1.36	.70	30.29	+9.34	630
1992	.61	.68	.45	2.27	1.99	2.36	2.72	4.51	2.76	.12	1.27	.88	20.62	-0.33	490
1993	.68	.05	.27	1.01	1.63	5.06	5.87	4.69	.72	.71	.45	.65	21.79	+0.84	230
1994	.21	.33	.46	.02	.16	2.54	3.03	3.48	3.94	1.38	2.72	.32	18.59	-2.20	

¹ Seed yield estimates of Park Kentucky bluegrass on 2-4 year old stands at Roseau with 100 lbs/A of nitrogen.

Table 1. Percent heading, plant height, harvest date, lodging, and seed yield for 28 Kentucky bluegrass strains seeded in 1990 on Baumgart farm - Roseau, MN².

Variety	MSP No.	Percent Heading		Plant height (in.) at harvest	Harvest date	Lodging ¹ at harvest	Seed Yield (lb/A)			Visual Estimate 1994	3 yr. avg.
		5-28	6-7				1992	1993	1994		
Abbey	2606	0	55	22	7-6	1.0	1204	686	523	588	804
Argyle	2694	16	80	29	7-6	1.5	781	463	216	388	487
Aspen	2608	1	43	23	7-9	1.0	707	278	178	425	388
Baron	2514	0	48	20	7-9	1.0	1050	597	506	538	718
Classic	2695	2	38	22	7-8	1.0	818	537	332	363	562
Columbia	2696	0	30	27	7-8	1.0	560	350	187	413	366
Compact	2652	5	40	25	7-6	1.0	781	470	287	500	513
Coventry	2423	0	43	22	7-11	1.0	814	347	341	438	501
Cynthia	2642	0	30	20	7-9	1.0	939	439	376	400	585
Rutgers (H86-526)	2641	5	30	23	7-8	1.0	582	383	96	169	354
Haga	2653	5	48	27	7-8	1.0	644	383	207	400	411
Hessen	2697	9	50	22	7-9	1.0	583	474	287	425	448
Julia	2698	4	60	28	7-11	1.0	702	359	276	463	446
Midnight	2611	0	25	20	7-12	1.0	1032	412	298	438	581
Minstrel	2643	0	10	17	7-12	1.0	488	160	80	138	243
Virginia	2659	3	18	24	7-6	1.0	473	203	80	163	252
Opal	2654	1	33	24	7-6	1.0	874	372	343	475	530
Park	2556	33	88	31	6-30	1.0	636	379	234	438	416
Park OT-1	2601	30	68	29	6-30	4.5	528	163	80	88	257
Park OT-2	2602	25	75	29	6-30	3.8	522	180	114	175	272
R-740	2665	1	48	20	7-9	1.0	999	666	541	562	735
R-751A	2666	0	65	20	7-6	1.0	1065	628	584	550	759
Rugby	2609	1	50	24	7-8	1.0	651	334	216	375	400
NK60 PRI	2760	15	60	26	7-6	1.0	410	134	143	175	229
Sophia	2644	5	58	21	7-8	1.0	662	459	314	388	478
Sydsport	2655	8	58	21	7-8	1.0	705	419	263	438	462
YO-88	2667	15	68	23	7-8	1.0	593	312	245	413	383
Minnfine (2405)	2692	48	95	28	6-30	1.0	676	588	363	525	542
LSD at 5% level		10	26	2	3	.6	144	105	97	91	

¹ = no lodging; 9 = severe lodging.

² = experimental design: RCB with 4 reps

Table 3. Powdery mildew, percent heading, height, harvest date, lodging and seed yield for 24 Kentucky bluegrass varieties seeded on the Baumgartner farm, Roseau 1991.

Variety	MSP#	Mildew 6/17/93	% heading		Height (in.) at harvest	Harvest Date	Lodging ^b at harvest 1993	Seed yield (#/A)		2 yr. Avg.	
			5-27	6-7				Visual Estimate 1994	1993		1994
Abbey	2606	0	0	20	22	7-9	1.0	438	989	388	689
Aspen	2608	0	2	35	24	7-8	1.5	288	470	172	321
BA-13	2822	0.3	0	20	19	7-8	1.3	413	644	512	578
Baron	2514	0	0	23	20	7-11	1.3	425	708	410	559
Blacksburg	2568	0	0	9	19	7-12	1.0	100	390	85	238
Challenger	2569	0.3	0	30	23	7-8	1.3	238	789	198	494
Cheri	2607	0	0	20	23	7-9	1.0	388	662	343	503
Columbia	2570	0.7	1	33	27	7-6	1.3	325	555	187	371
Compact	2652	0	0	15	23	7-8	1.0	275	677	192	435
CPP86-14-5	2825	0	0	10	21	7-11	1.0	250	548	145	347
CPP86-36-6	2826	0	0	20	21	7-12	1.0	125	194	100	147
Donna (Lucia)	2566	0	0	43	23	7-12	1.0	450	608	557	583
Four Aces (RE-88)	2823	0	1	43	25	7-8	1.0	325	503	212	358
Midnight	2611	0	0	9	21	7-11	1.5	325	686	292	489
Minnfine (2405)	2692	0	48	78	30	6-30	1.8	288	508	245	377
Miracle (CPP141)	2594	0	16	83	21	7-9	1.0	500	717	595	656
Newport	2372	0	5	73	27	7-8	1.3	425	570	354	462
Opal	2654	0	0	15	23	7-6	1.0	288	519	180	350
Park	2556	1.3	16	68	31	6-30	3.0	300	548	196	372
Rugby	2609	0.3	0	38	27	7-6	1.0	363	579	183	381
Silvia (CPP139)	2593	0	2	45	26	7-9	2.0	238	604	183	394
Unique (C-76)	2824	0	0	19	22	7-12	1.0	450	486	287	387
LSD at 5% level		0.4			2	3	1	68	242	98	

^a 0 = no powdery mildew, 5 = severe powdery mildew.

^b 1 = no lodging, 10 = severe lodging.

Experimented Design: RCB with 4 reps.

Table 4. Vigor, powdery mildew, percent heading, height, harvest date, lodging and seed yield for 16 Kentucky bluegrass varieties seeded on the Baumgartner farm Roseau, August 12, 1992.

Variety	MSP#	Spring Vigor ³ 5-4-94	Powdery mildew ¹		Percent heading		Height (in.) harvest	Harvest Date	Lodging ² at harvest	Seed yield #/A			
			6-17-93	6-15-94	5-27	6-3				6-10	1993	1994	Visual Estimate
Abbey	2606	3.5	1.6	0.5	0	9	50	21	7-6	1.3	180	337	394
Aspen	2608	3.5	1.3	0.8	0	18	50	24	7-10	4.8	176	288	131
BA73-366	2716	3.5	1.5	0.5	0	5	45	21	7-9	1.0	250	350	359
Bar VB 1184	2860	3.8	1.8	3.5	0	18	45	23	7-9	2.5	140	238	118
Baritia	2862	3.0	1.6	3.8	2	10	38	22	7-9	3.5	165	237	100
Barmax	2861	2.8	0.3	0	3	58	98	22	7-6	2.3	584	625	407
Blacksburg	2857	3.0	1.3	2.2	0	10	35	24	7-11	4.0	107	188	74
Midnight	2858	3.8	3.8	2.8	0	6	43	23	7-11	1.5	163	388	374
Minnifine (2405)	2692	4.3	0.3	0	44	78	100	32	6-30	6.0	521	438	296
Newport	2852	3.5	0.6	2.0	4	60	98	28	7-6	1.3	559	538	379
Opal	2654	2.5	0	0	0	8	28	24	7-6	5.3	274	212	71
Park OT 433	2601	7.0	0	0	53	80	100	32	6-30	5.3	408	375	102
Park	2556	4.5	3.4	2.0	11	68	100	33	6-30	4.3	307	463	250
Park OT 442	2602	5.8	0	0	58	85	100	32	6-30	5.0	499	375	134
Rugby	2609	3.5	3.0	2.5	0	18	58	27	7-7	3.8	241	325	187
Unique	2859	3.8	0.1	0	0	3	40	20	7-11	1.3	272	488	412
LSD at 5% level		1.2	0.8	1.7	6	7	11	2	2	2.3	128	80	87

Experiment design: RCB 4 reps.

¹ 0 = no mildew, 5 = severe mildew; ² 1 = no lodging, 10 = severe lodging; ³ 1 = least vigor, 10 = best vigor.

Table 5. The effect of nitrogen treatments on percent heading, plant height, lodging, harvest date, and seed yield for five Kentucky bluegrass varieties seeded in 1988 on the Baumgartner farm Roseau, MN.

Variety	Nitrogen ¹ Treatment	Percent Heading 6-5	Plant Height (in.) at harvest	Lodging ² at harvest 1993	Harvest date	Yield (lb/Ac)		
						1993	1994	2 yr. Avg.
Abbey	50#	16	13	1.0	7-7	553	262	408
	100#	23	15	1.0	7-10	663	393	528
	150#	4	16	1.0	7-11	755	403	579
	200#	1	15	1.0	7-11	858	444	651
Aspen	50#	8	16	1.0	7-11	148	53	101
	100#	4	17	1.0	7-11	285	79	182
	150#	3	19	1.0	7-11	230	69	150
	200#	2	18	8.0	7-11	297	58	178
Midnight	50#	3	15	1.0	7-11	375	164	270
	100#	2	16	1.0	7-11	341	194	268
	150#	1	18	1.0	7-12	259	180	220
	200#	0	17	1.5	7-12	451	180	316
Park	50#	53	23	1.3	7-5	248	87	168
	100#	58	25	4.0	7-5	436	97	267
	150#	60	27	8.5	7-5	614	150	382
	200#	53	24	8.0	7-5	530	146	338
Rugby	50#	21	18	1.0	7-7	190	110	150
	100#	24	21	1.0	7-11	382	118	250
	150#	17	23	1.5	7-11	380	102	241
	200#	2	20	5.0	7-12	188	105	147
LSD at 5% level						193	126	

¹ Ammonium nitrate applied in October.

² Lodging score: 1 = no lodging; 10 = severe lodging.

Table 6. Effect of Primisulfuron 'Beacon'¹ on Park Kentucky Bluegrass - Cenex Farm - Roseau, 1994.

Application Date	Height (in.) at harvest	Seed Yield (#/Ac)	Quackgrass Suppression at Harvest
--	26	36	0
fall	23	42	85
spring	23	30	93

Table 7. Effect of Primisulfuron 'Beacon'¹ on 5 Kentucky bluegrass varieties on the Baumgartner farm. Roseau - 1994.

Treatment ² Date	Variety	% heading 6/5	Harvest Date	Harvest Height (in.)	Seed yield (#/Ac)
--	Park	39	7-5	27	120
fall		46	7-5	27	147
spring		31	7-5	22	82
--	Midnight	1	7-11	19	169
fall		0	7-12	18	117
spring		0	7-12	15	101
--	Aspen	2	7-11	19	75
fall		1	7-11	19	74
spring		1	7-13	15	43
--	Rugby	4	7-11	24	95
fall		4	7-11	23	102
spring		2	7-12	18	67
--	Abbey	3	7-11	17	385
fall		2	7-11	16	227
spring		1	7-11	15	234

¹ .02 #/Ac/Ai + .25% nonionic surfactant.

² fall - 9/15/93
spring 5/26/94.

Table 8. Height, lodging, harvest date, and seed yield for 9 Timothy varieties seeded on the Baumgartner farm. Roseau, May 1990.^a

Variety	MSP no.	Plant Height (in.) at harvest	Harvest date	Lodging ^b at Harvest 1993	Seed Yield (lb/A)			4 yr. Avg.
					1991	1992	1993	
Climax	1743	41	8-9	3.0	830	401	258	420
Comtal	2674	39	8-9	6.5	763	419	323	440
Goliath	2758	39	8-9	7.0	816	276	243	391
Heidemij	1744	40	8-18	8.0	553	325	298	396
Sigma (Mom phl 65)	2658	40	8-9	3.8	749	365	167	366
Chazy (NY 83-1)	2656	42	8-9	2.3	846	463	218	431
Tupper (NY83-2)	2657	43	8-9	1.3	740	423	198	397
TM 8601	2634	41	8-9	1.5	760	463	232	413
TM 8501	2649	42	8-9	3.5	818	347	207	398
LSD at 5% level		3	1	1.7	130	92	109	

^a Experimental design: RCB with 4 reps.

^b 1 = no lodging, 10 = severe lodging.

^c Poor spring burn may have reduced seed yield.

Table 9. Plant height, lodging, harvest date and seed yield for 11 timothy strains seeded in August 1990 on Baumgartner farm, Roseau, MN.^a

Variety	MSP No.	Plant Height (in.) at Harvest	Lodging ^b at Harvest	Harvest Date	Seed Yield (lb/A)			3 yr. Avg.
					1992	1993	1994	
Climax	2713	42	1.0	8-2	691	642	414	582
FFR-TM 8501	2766	43	1.0	7-30	700	463	383	515
FFR-TM 8601	2767	41	1.8	7-30	520	546	301	456
Goliath	2758	38	1.5	8-8	778	497	347	541
Heidemij	2715	39	3.8	8-18	714	361	441	505
Motim	1595	40	2.5	8-18	687	568	241	499
SV 8406	2746	40	2.0	8-8	698	468	276	481
SV 8407	2747	41	1.8	7-27	823	646	561	677
SV 8414	2748	39	2.5	7-30	767	526	495	596
SV 8423	2749	40	2.8	7-30	841	477	474	597
SV 8505	2750	40	1.8	7-30	725	546	528	600
LSD at 5% level		2	1.1		121	144	137	

^a Experimental design: RCB with 4 reps.

^b 1 = lodging, 10 = severe lodging.

Table 10. Percent heading, height, harvest date and seed yield for 5 timothy strains seeded in August, 1993 on Baumgartner farm, Roseau, MN 1994.^a

Variety	MSP No.	Percent heading				Harvest Height (in.)	Harvest Date	Seed Yield (#/Ac)
		6-7	6-14	6-18	6-24			
Climax	2713	2	32	53	95	43	8-13	359
Goliath	2851	3	35	53	88	39	8-13	488
Heidemij	2715	0	1	6	23	40	8-18	575
Tarmo	2923	4	53	70	100	41	8-8	526
Timfor	2876	5	48	68	98	43	7-27	577
LSD at 5% level		3	10	13	12	1	8	108

^a Experimental design: RCB with 4 reps.

Table 11. Percent heading, plant height, harvest date, lodging and seed yield for 13 fine fescue varieties seeded on the Baumgartner farm 1992.

Variety	Species	MSP No.	spring color ¹	% heading		Height (in.) at harvest	Harvest Date	Lodging ² at harvest	Seed yield (#/A)		
				5-27	6-7				1994	1993	2 yr. Ave.
Aurora	hard	2780	5	58	98	27	7-5	1.0	606	356	481
Big Horn	sheep	2779	5	58	95	27	7-5	1.3	719	267	493
Dawson	slender creeping red	2762	4	1	29	28	7-7	1.8	478	29	254
Dustin	creeping red	2753	3	0	18	30	7-11	2.3	1013	192	603
Fortress	creeping red	2781	4	2	15	30	7-10	3.8	730	107	419
Mary	chewings	2853	4	1	43	31	7-6	2.3	679	241	460
Pascal	creeping red	2754	3	0	6	28	7-10	2.5	519	11	265
Pennlawn	creeping red	2768	4	0	11	30	7-11	3.8	512	69	291
Shade master	creeping red	2782	5	2	30	30	7-11	3.0	868	123	496
Shadow	chewings	2783	4	6	73	33	7-6	3.5	677	394	536
Sylvester	creeping red	2854	4	2	35	32	7-10	2.8	936	225	581
Victor	creeping red	2855	4	0	18	29	7-11	2.0	717	98	408
67135	sheep	2765	6	18	75	32	7-6	2.8	673	180	427
			1.4	9	16	2	2	1.8	132	264	

LSD at 5% level

¹ Color - 1=light green, 9 = dark green, ² Lodging - 1 = no lodging, 10 = severe lodging; Experimental design: RCP with 4 reps.

Table 12. Percent heading, plant height, lodging and seed yield for 9 fine fescue varieties seeded in 1991 on Baumgartner farm. 1993 data.

Variety	MSP	Species	% heading	Height (in.) at harvest	Lodging ¹ at harvest	Harvest Date	Seed yield (#/A)		
							6-3	6-7	1993
67135	2765	sheep	57	28	1.7	7-6	437	104	271
Aurora	2780	hard	43	22	1.0	7-6	841	83	462
Big Horn	2779	sheep	50	24	1.0	7-6	701	101	401
Dawson	2762	slender creeping red	23	29	1.0	7-8	214	62	138
Dustin	2753	creeping red	23	28	2.0	7-12	398	205	302
Pascal	2754	creeping red	4	22	3.3	7-12	80	9	45
Pennlawn	2768	creeping red	12	28	4.7	7-12	50	30	40
Rapid	1988	creeping red	40	30	2.3	7-12	588	297	443
Ruby	1364	creeping red	40	27	2.3	7-12	546	172	359
			17	2	1.4	2	239	104	

LSD at 5% level

¹ 1 = no lodging, 5 = severe lodging; Experimental design RCB 3 reps.

Table 13. Fall dormant applied herbicides on 'Rhizo' kura clover. Mike Baumgartner farm - Roseau, MN 10/10/93 - 1994 data^a

Product	Chemical	Rate (#Ai/Ac)	Seed Yield (#/A)
Kerb	Pronamide	1.75	209
Sencor	Metribuzin	.75	201
Pursuit + Prowl	Imazethapyr + Pendimethalin	.063 1.5	268
No Treatment			184
LSD at 5% level			49

^a Experimental design: RCB with 3 reps.