

Progress Report of Seed Production Research

prepared by

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Kentucky Bluegrass

The 1978 Kentucky Bluegrass seed yields were generally good. After two near-disaster years, 1976 and 1977, the 1978 yields were normal or above.

Two variety tests, seeded in 1975 and 1976, indicate the differences in varietal seed yields. Both of these trials were fertilized with 100 lbs of N in 1977 and yields were generally good. Some varieties, however, were quite low. A few plots had very poor stands, and this will explain yields for some varieties, but generally the stands were entirely adequate to produce satisfactory yields.

In Tables 3 and 4 we report information on two trials including fertilizer rates and methods of handling residue. In both, the clipping and rake off method produced more than the July-burn. We offer no explanation for this as it is the first time we have seen this occur. The plants on these plots were clipped low ($1\frac{1}{2}$ inches) and all material raked off the plots. We had handled residue in a like manner in the past and did not observe the higher yields for the clip-rake method.

A careful study of the information in Table 4 indicates that some varieties do better with the higher levels of N while some seem to reach the maximum at 100 lbs/ac. Note especially, Enmundi. In the clip-rake treatment, the variety produced about 150 lbs more seed than at the 50 or 100 lb level. Also, this variety produced more seed under high level N application in the July-burn treatment. Most varieties respond in a similar manner, but not so strikingly. Park, to the contrary, produced about the same amount of seed with the three nitrogen levels.

Table 1. Plant height, harvest dates, and 1976, 1977, 1978, and 3-year average seed yields for 43 Kentucky Bluegrass varieties seeded in 1975 on the Welin Farm, Roseau, MN.

Variety	MSP No.	Plant Height (6-21) (cm)	Harvest Date		Seed Yields (#'s/ac)			
			1977	1978	1976	1977	1978	3-yr average
Arista	628	47	7-7	7-5	261	59	535	285
Adelphi	902	55	7-7	7-5	74	51	359	161
Aquila	719	50	7-7	7-5	151	24	199	125
Baron	804	47	7-7	7-5	92	95	639	275
Birka	907	45	---	7-5	74	---	309	128
Bonnie blue	908	52	---	7-7	18	---	273	97
Cheri	861	55	7-7	7-5	196	101	535	277
Cougar	805	47	---	7-5	149	---	475	208
Delft	904	65	6-28	7-5	163	30	627	273
Emundi	825	50	7-7	7-5	131	9	353	164
Enoble	826	52	7-7	7-6	62	15	434	170
Enprima	827	55	7-1	7-5	324	86	852	421
Fanfare	720	65	6-30	7-6	160	89	416	222
Fylking	862	47	6-25	7-6	53	9	146	69
Galaxy	913	50	7-7	7-3	71	15	413	166
Glade	721	38	6-28	7-5	65	---	199	88
Golf	882	43	7-7	7-5	149	83	538	257
K-412	427	45	---	7-5	48	---	342	130
Majestic	909	48	7-7	7-5	77	15	303	132
Merton	806	62	---	7-5	101	---	413	171
Monopoly	863	67	---	7-5	273	---	472	248
Newport	722	67	7-7	7-6	273	172	621	355
Nugget	868	37	7-7	7-7	140	56	342	179
Olympriisp	723	67	7-7	7-7	181	175	520	292
Onar	724	52	---	7-6	199	---	347	182

Table 1. (cont.) Plant height, harvest dates, and 1976, 1977, 1978, and 3-year average seed yields for 43 Kentucky Bluegrass varieties seeded in 1975 on the Melin Farm, Roseau, MN.

Variety	MSP No.	Plant Height (6-21) (cm)	Harvest Date		Seed Yields (#'s/ac)		
			1977	1978	1977	1978	3-yr average
Parade	725	63	7-7	7-5	92	517	249
Park	895	72	6-24	7-2	190	582	306
Pennstar	529	47	---	7-6	---	333	123
Prato	905	63	---	7-3	---	493	179
Primo	906	72	6-25	6-30	48	677	328
P-66	808	58	---	7-7	---	270	110
Ram I	914	45	---	7-7	---	279	122
Ram II	872	47	---	7-7	---	371	148
RU-128	828	55	---	7-6	---	493	215
RU-178	829	53	---	7-6	---	350	133
Sodco	423	57	---	7-5	---	315	134
Sydsport	912	52	7-7	7-5	113	419	256
Touchdown	873	60	---	7-5	---	333	142
Trampas	726	45	6-28	7-5	36	380	171
WW AG 436	627	62	---	7-5	---	252	95
WW AG 463	626	58	7-7	7-5	33	362	160
Vantage	727	67	7-3	7-5	21	255	107
Victa	728	48	7-7	7-5	104	621	270
					84	49	47 140
					110	66	549 186

LSD at 5% level
1% level

Table 2. Percent stand, plant color, plant height, lodging, harvest date and seed yields for 1978 on 100 Kentucky Bluegrass strains seeded in 1976 on Welin Farm, Roseau, MN, 1978 data.

Variety	Company Number	MSP No.	Percent Stand 5/11/78	Plant Color* 5/11/78	Plant height at harvest (cm)	Lodging** 6/20/78	Harvest Date	Seed yield (#'s/ac)
Arista		628	85	3.0	48	1	7-8	647
Adelphi		902	85	2.5	63	1	7-8	508
Aquila		719	90	3.0	55	1	7-6	928
Baron		804	75	3.0	48	1	7-8	781
Birka		907	80	3.0	60	1	7-6	535
Bonnie blue		908	65	3.0	60	1	7-8	348
Cheri		861	75	3.0	50	1	7-4	620
Cougar		805	50	3.0	45	1	7-2	665
Delft		904	60	3.0	58	1	7-4	482
Eda	K5-9	1023	70	3.0	38	1	7-8	250
Emmundi		935	75	3.0	55	1	7-8	660
Enoble		826	80	3.0	60	2	7-8	638
Enprima		827	55	3.0	68	2	7-8	883
Fanfare	K2-100	1011	85	2.0	73	2	7-8	419
Fylking		862	75	3.5	48	1	6-30	446
Galaxy		913	60	3.0	53	1	7-8	397
Glade		721	85	3.0	53	1	7-8	620
Golf		882	85	3.0	50	1	7-6	923
Enoble	K1-46	1033	55	3.0	63	2	7-6	714
Majestic		909	80	2.5	48	1	7-8	584
Merion		806	55	3.0	53	3	6-30	580
Monopoly		863	70	3.0	65	3	7-6	669
Narika	K5-7	1022	60	3.0	60	1	7-6	361
Newport		722	75	2.5	65	2	7-6	633
Nugget		916	50	3.0	38	1	7-8	245

Table 2. (cont.) Percent stand, plant color, plant height, lodging, harvest date and seed yields for 1978 on 100 Kentucky Bluegrass strains seeded in 1976 on Welin Farm, Roseau, MN. 1978 data.

Variety	Company Number	MSP No.	Percent Stand 5/11/78	Plant Color* 5/11/78	Plant height at harvest (cm)	Lodging** 6/20/78	Harvest Date	Seed yield (#'s/ac)
Olympriasp		723	70	2.5	68	1	7-4	589
Onar		724	50	3.0	58	1	7-8	442
Parade		725	70	3.0	63	2	7-2	785
Park		895	90	4.0	75	3	6-30	638
Pennstar		529	70	3.5	53	1	7-4	638
Prato		905	25	3.0	38	1	6-30	250
Primo		906	75	3.2	60	2	6-30	589
P-66	K8-176	1039	65	2.0	68	2	7-3	633
Ram I		914	70	3.0	45	1	7-6	535
Ram II		872	90	3.0	48	1	7-6	602
RU-128		828	65	3.0	60	2	6-30	892
RU-187		829	55	2.5	58	1	7-8	433
Sodco		423	80	3.0	60	2	7-8	522
Skofti		955	10	3.0	30	1	7-8	62
Sydsport		912	50	3.0	48	1	7-2	620
Touchdown		920	70	3.0	58	2	7-8	526
Trampas	K3-32	726	70	3.0	45	1	7-8	629
Troy		936	75	3.7	83	2	6-29	718
Turnier	K5-86	1031	80	3.0	55	1	7-8	517
Vantage		727	70	3.2	70	3	7-4	361
Victa		728	90	3.0	53	1	7-8	954
Warren's	A-20	953	10	3.0	50	1	7-8	112
Warren's	A-34	954	75	3.0	63	3	7-4	522
NK-Exp	K1-76	996	75	3.5	78	2	6-29	803
	K1-80	997	90	2.2	70	2	6-29	638
	K1-88	998	75	3.0	70	2	6-30	767
	K1-119	999	85	3.7	68	3	6-29	602

Table 2. (cont.) Percent stand, plant color, plant height, lodging, harvest date and seed yields for 1978 on 100 Kentucky Bluegrass strains seeded in 1976 on Welin Farm, Roseau, MN. 1978 data.

Variety	Company Number	MSP No.	Percent Stand 5/11/78	Plant Color* 5/11/78	Plant height at harvest (cm)	Lodging** 6/20/78	Harvest Date	Seed yield (#'s/ac)
NK-Exp	K1-120	1000	50	3.0	58	2	7-4	397
	K1-140	1001	50	2.5	70	2	6-30	669
	K1-148	1002	70	3.0	55	1	7-4	517
	K1-149	1003	35	3.0	50	1	7-4	250
	K1-150	1004	50	3.0	55	1	7-2	700
	K1-152	1005	70	2.5	60	2	6-30	723
	K1-153	1006	80	3.0	65	3	7-4	517
	K1-155	1007	75	3.0	65	2	7-2	776
	K1-159	1008	80	2.4	70	3	7-6	629
	K1-160	1009	80	3.5	70	3	6-30	660
	K2-46	1010	10	3.0	43	1	7-4	174
	K2-100	1011	80	2.5	73	2	7-4	669
	K2-161	1012	15	3.0	65	1	6-30	602
	K3-34	1035	45	4.0	35	1	7-8	112
	K3-45	1036	75	3.0	55	1	7-6	254
	K3-52	1013	70	3.0	58	1	7-6	392
	K3-157	1014	80	2.5	75	2	7-2	642
	K3-160	757	75	3.0	75	2	7-2	687
	K3-166	1015	50	3.0	65	1	6-30	656
	K3-227	1016	80	4.0	63	1	6-30	535
	K4-135	1037	85	3.0	48	1	7-6	642
	K4-136	1017	75	3.0	63	4	7-6	491
	K4-137	1018	80	2.5	65	2	7-3	972
	K4-138	1019	75	3.0	55	1	6-30	522
	K4-139	1020	60	3.0	38	1	7-4	357

Table 2. (cont.) Percent stand, plant color, plant height, lodging, harvest date and seed yields for 1978 on 100 Kentucky Bluegrass strains seeded in 1976 on Welin Farm, Roseau, MN. 1978 data.

Variety	Company Number	MSP No.	Percent Stand 5/11/78	Plant Color* 5/11/78	Plant height at harvest (cm)	Lodging** 6/20/78	Harvest Date	Seed yield (#'s/ac)
NK-Exp	K5-2	1021	60	3.2	70	3	6-30	638
	K5-9	1023	75	3.0	35	1	7-8	232
	K5-22	1024	90	2.9	53	1	7-8	727
	K5-63	1025	85	3.0	65	3	6-30	789
	K5-64	1026	75	3.4	58	4	7-6	477
Skofth Turnier	K5-65	1027	45	3.0	43	1	7-4	308
	K5-66	1028	85	3.2	43	1	7-8	112
	K5-67	1029	85	3.2	40	1	7-4	125
	K5-85	1030	18	3.2	25	1	7-6	80
	K5-86	1031	80	3.0	53	1	7-8	401
NK-Exp	K6-29	1041	75	4.0	68	3	6-30	584
	K6-30	1042	65	3.0	58	2	7-2	812
	K6-31	1043	45	2.7	58	1	6-30	562
	K6-32	1044	60	3.0	60	1	6-30	758
	K6-33	1045	25	3.0	50	2	7-2	495
	K6-34	1046	55	3.0	70	2	6-29	696
	K6-35	1047	85	4.0	70	3	6-30	607
	K6-36	1048	85	2.3	75	5	6-30	785
	K6-37	1049	85	2.3	78	5	6-30	861
	K2-80	517	85	3.0	45	1	7-8	669
	K1-47	510	70	3.0	58	2	7-8	852
	K1-139	514	75	3.2	70	3	7-4	638
	K1-192	527	90	2.7	63	2	7-6	660
LSD 5% level								
1% level								
* 1 = Dark green color, 5 = light green.								
** 1 = No lodging, 5 = severely lodged.								

Table 3. Percent heading, plant height, lodging at harvest, harvest date, and seed yields for four Kentucky bluegrass varieties with three fertilizer rates, and two residue management regimes, seeded in 1975 on Welin Farm, Roseau, MN. 1977-78 data.

Variety	Fertilizer rate	Plant height (cm)		Harvest		Seed yields (#'s/Ac)		
		6/3/78	at harvest	Lodging	date	1977	1978	2 yr. ave.
----- July burn -----								
Nugget	50+25+25	17	38	1	7-7	43	277	160
	100+50+50	23	45	1	7-6	42	513	278
	150+75+75	27	48	1	7-7	27	476	252
Park	50+25+25	52	73	1	6-30	141	482	312
	100+50+50	60	80	3	7-1	126	626	376
	150+75+75	57	75	5	7-7	117	566	342
Sodco	50+25+25	28	55	1	7-3	25	204	115
	100+50+50	35	58	1	7-3	18	415	217
	150+75+75	47	68	4	7-7	12	430	221
Sydsport	50+25+25	23	48	1	7-3	113	311	212
	100+50+50	35	62	1	7-2	65	532	299
	150+75+75	35	60	2	7-7	48	690	369
----- July clip rake off -----								
Nugget	50+25+25	13	28	1	7-7	45	308	117
	100+50+50	18	38	1	7-6	43	407	225
	150+75+75	20	38	1	7-7	34	471	253
Park	50+25+25	43	68	1	6-30	107	534	321
	100+50+50	48	73	3	7-2	73	719	396
	150+75+75	53	78	5	7-7	86	605	346
Sodco	50+25+25	15	43	1	7-4	21	256	139
	100+50+50	20	52	1	7-7	16	300	158
	150+75+75	23	53	1	7-7	19	300	160
Sydsport	50+25+25	15	37	1	7-3	91	387	239
	100+50+50	18	47	1	7-7	37	575	306
	150+75+75	25	55	1	7-5	31	708	370

Table 4. Plant height, lodging, harvest date and seed yields for 10 Kentucky bluegrass varieties grown with two residue managements, and three fertilizer rates, seeded on Welin Farm, Roseau, MN in 1976. 1978 data.

Fertilizer	Variety	July burn			Clip rake-off				
		Plant height at harvest (cm)	Lodging* at harvest	Harvest date	Seed yield (#'s/Ac)	Plant height at harvest (cm)	Lodging* at harvest	Harvest date	Seed yield (#'s/Ac)
Low	Aquila	48	1	7-5	534	55	1	7-5	666
	Baron	35	1	7-6	726	35	1	7-5	928
	Emmundi	42	1	7-6	330	40	1	7-6	503
	K1-155	58	1	7-4	482	55	1	7-5	494
	Nugget	38	1	7-6	461	38	1	7-7	453
	Parade	60	1	7-3	607	55	2	7-4	593
	Park	72	3	6-30	557	68	2	7-1	660
	P-66	57	1	7-5	457	53	1	7-5	476
	P-115	60	1	7-4	489	53	1	7-4	541
	Touchdown	62	1	7-4	317	65	2	7-5	446
				Ave. 496				Ave. 576	
Int.	Aquila	48	2	7-5	645	53	2	7-6	680
	Baron	42	1	7-6	900	37	1	7-5	1067
	Emmundi	48	1	7-6	415	42	1	7-6	549
	K1-155	62	2	7-4	675	53	1	7-4	488
	Nugget	42	1	7-7	436	37	1	7-7	427
	Parade	60	1	7-4	773	58	1	7-4	691
	Park	65	3	7-2	507	68	4	7-3	657
	P-66	57	1	7-4	547	50	1	7-5	589
	P-115	60	2	7-4	639	62	1	7-4	672
	Touchdown	68	3	7-5	418	67	2	7-4	506
				Ave. 596				Ave. 632	
High	Aquila	50	3	7-5	547	57	3	7-5	804
	Baron	45	1	7-6	861	42	1	7-6	1091
	Emmundi	52	1	7-6	446	47	1	7-6	691
	K1-155	60	2	7-4	616	55	1	7-6	611
	Nugget	43	1	7-7	505	37	1	7-7	532
	Parade	57	2	7-4	725	60	2	7-6	721
	Park	63	4	7-4	491	67	4	7-4	670
	P-66	57	1	7-6	562	57	1	7-5	686
	P-115	58	2	7-5	568	67	3	7-5	773
	Touchdown	65	4	7-6	419	63	3	7-6	499
				Ave. 574				Ave. 707	

*1 = no lodging, 5 = severe lodging.

Timothy

Timothy yields, like those of Kentucky bluegrass, were normal or above again in 1978. Several points are noted in this regard. The seed yields were higher than recorded for several years. Also, during the past two years, 1976 and 1977, the later maturing varieties produced relatively better than the earlier maturing ones. We suggested that the late varieties were able to better utilize the May and June rainfall in 1976 and 1977. In 1978 we recognize that the earlier varieties again produced more seed than the late varieties.

The varieties do differ in the amount of seed produced. We believe it is paramount that the grower have some reference for the inherent capacity of a variety to produce seed, before he agrees to grow that variety. Climax has been the standard. Now we see a number of varieties which seem to consistently produce more seed than Climax. A careful study of Tables 5 and 6 will give a better understanding of some of the varieties.

We now have two years of data on the residue management-fertilizer trial seeded in 1975 (Table 7). These data clearly suggest the value of burning residue over leaving the stubble in the field. Other studies have indicated the same results, but with considerably less emphasis. For two years we have applied 50 lbs of N in the fall and an additional 50 lbs in the spring as one treatment. So far, we do not see an advantage in this application. However, it should be studied for a longer period before conclusions are drawn.

The thick seeding rate (9 inch vs 18 inch rows) shows some advantage in 1977 and 1978 results. This has not been so striking in other trials and other years.

Table 5. Percent stand, vigor, plant height, lodging, harvest date, and seed yields for 24 Timothy varieties seeded in 1976 on Melin Farm, Roseau, MN. 1978 data.

Variety	Company number	MSP no.	Percent stand (5/11/78)	Vigor* 5/11/78	Plant height at harvest (cm)	Lodging** at harvest	Harvest date	Seed yields (#'s/Ac)
Evergreen		403	70	2.0	90	3	8-2	633
NK-Exp	K0-136	486	50	3.2	60	2	8-16	62
NK-Exp	K2-106	987	18	3.5	60	2	8-16	125
Nodora		926	17	3.1	62	2	8-16	92
S-50		988	30	3.3	57	2	8-10	169
Goliath		925	87	2.3	93	3	8-1	695
Gusto		932	77	2.4	95	4	8-16	472
Climax		933	73	2.0	110	1	7-27	650
Heidemij		881	60	2.8	95	3	8-14	573
Teith		1050	73	2.0	103	2	8-2	683
Timfor		992	77	2.0	112	1	7-25	668
NK-Exp	K2-107	989	70	2.7	83	4	8-14	466
NK-Exp	K4-216	990	67	2.3	113	1	8-1	630
NK-Exp	N7-126	991	67	2.3	113	2	8-1	772
Marcia		993	28	2.7	95	2	8-3	446
Rali	K4-181	927	27	3.4	60	1	8-2	217
Goliath		944	80	2.7	87	2	8-1	728
Mortel		945	18	3.3	60	3	8-16	65
Motim		946	67	2.3	100	2	8-4	523
Mom Tim. T-6		947	57	2.2	93	2	8-1	579
Mom Tim. W-2		948	37	2.7	92	3	8-16	472
Palermo		949	27	3.0	42	2	7-21	214
Ramona		950	43	3.0	43	2	7-21	244

LSD 5% level
1% level

*1 = best vigor, 5 = least vigor

**1 = no lodging, 5 = severe lodging.

Table 6. Percent stand, vigor, plant height, lodging, harvest date and seed yields for 19 Timothy Varieties seeded in 1977 on Weilin Farm, Roseau, MN. 1978 data.

Variety	Company number	MSP no.	Percent stand (5/11/78)	Vigor* 5/11/78	Plant height at harvest (cm)	Lodging** at harvest	Harvest date	Seed yields (#'s/Ac)
BD 3062		1119	53	3.4	105	2	8-17	775
Climax		933	63	2.1	122	1	7-31	520
Goliath		1212	63	2.4	105	2	8-1	588
Heidemij		881	63	3.5	97	2	8-16	549
Itasca		1144	57	2.4	122	1	8-1	502
Maris Polka	K5-42	1159	53	1.2	113	2	8-1	582
Mom Tim. T-6		947	43	2.0	103	3	8-4	567
Mom Tim. W-2		948	53	3.0	98	3	8-17	561
Motim		946	57	3.0	103	2	8-5	674
NK-Exp	K2-106	1156	18	4.0	60	1	8-16	128
NK-Exp	K2-107	1157	53	2.9	93	3	8-16	502
NK-Exp	K4-215	1158	63	2.1	120	2	8-1	389
Palermo		949	57	3.4	62	1	7-22	443
Ramona		950	73	3.2	60	1	7-22	440
SC-48		1053	53	3.3	97	3	8-17	505
SC-10		1155	60	1.9	107	2	7-29	740
Timfor		1160	70	1.6	123	1	7-21	671
Toro		1143	63	1.2	123	1	7-21	618
Phewiola		1213	53	2.9	113	1	7-25	520
							LSD 5% level	195
							1% level	261

*1 = best vigor, 5 = least vigor

**1 = no lodging, 5 = severe lodging

Table 7a. 1977, 1978 and two-year average seed yields from four Timothy varieties grown under two management regimes, three fertilizer levels and two seeding rates at Roseau, MN.

Variety	Fertilizer ⁺	Seed rates	Fall burn*		Rake off straw**		
			1977	1978	1977	1978	
Climax	Split	Thin	348	653	247	290	269
		Thick	405	645	324	438	381
		Thin	265	528	192	349	271
	Int.	Thick	400	647	290	350	320
		Thin	253	657	239	317	278
		Thick	503	712	326	302	314
Timfor	Split	Thin	292	473	286	344	315
		Thick	348	549	354	427	391
		Thin	314	601	264	339	302
	Int.	Thick	360	617	289	357	323
		Thin	405	566	231	262	247
		Thick	436	686	332	355	344
Heidemij	Split	Thin	298	471	201	250	226
		Thick	428	617	357	321	339
		Thin	304	388	222	239	231
	Int.	Thick	458	484	403	354	379
		Thin	382	445	216	131	174
		Thick	471	439	406	204	305
S-48	Split	Thin	308	449	198	208	203
		Thick	397	546	324	382	353
		Thin	232	412	162	189	176
	Int.	Thick	384	519	363	289	326
		Thin	326	327	210	198	204
		Thick	430	388	407	293	350

* Fall burn = straw and stubble burned off after harvest.

** Rake off straw = straw raked off, stubble and aftermath left standing.

+ Fertilizer: Split = 50+25+25 applied in fall, and again in spring; Intermediate = 100+50+50 applied in fall; High = 150+75+75 applied in fall.

Table 7b. Plant height, percent heading, lodging and harvest dates for 4 Timothy varieties under three fertilizer treatments, two residue management regimes and two seeding rates at Roseau, MN. 1978 data.

Variety	Fertilizer ⁺	Seeding rate	Plant height (cm)						Percent heading		Lodging**		Harvest dates	
			June 3		at harvest		June 17		Fall burn	Clip rake	Fall burn	Clip rake	Fall burn	Clip rake
			Fall burn	Clip rake	Fall burn	Clip rake	Fall burn	Clip rake	Fall burn	Clip rake	Fall burn	Clip rake	Fall burn	Clip rake
Climax	Split	Thin	48	47	122	118	118	4	25	1	1	7-28	8-1	
		Thick	45	45	120	118	118	2	20	1	1	7-28	8-1	
	Int.	Thin	52	48	127	120	120	2	17	1	1	7-30	8-3	
		Thick	52	47	127	120	120	T	15	1	1	7-30	8-3	
	High	Thin	57	48	122	118	118	T	13	1	1	8-2	8-3	
		Thick	60	45	127	120	120	T	8	1	1	8-2	8-3	
Timfor	Split	Thin	48	50	118	118	118	40	7	1	1	7-25	7-27	
		Thick	47	47	115	115	115	33	7	1	1	7-25	7-27	
	Int.	Thin	53	45	118	117	117	30	2	1	1	7-26	7-27	
		Thick	50	47	120	117	117	27	2	1	1	7-26	7-27	
	High	Thin	57	50	120	117	117	27	2	1	1	7-27	7-29	
		Thick	58	48	118	118	118	20	2	1	1	7-27	7-29	
HeidemiJ	Split	Thin	33	38	97	95	95	8	3	1	1	8-16	8-15	
		Thick	32	33	98	97	97	4	3	2	1	8-16	8-14	
	Int.	Thin	33	42	97	88	88	8	7	1	2	8-14	8-16	
		Thick	35	40	98	93	93	4	4	1	2	8-14	8-17	
	High	Thin	45	43	102	92	92	12	8	3	2	8-19	8-19	
		Thick	45	42	97	93	93	8	4	3	3	8-19	8-19	
S-48	Split	Thin	33	32	95	92	92	4	T	2	2	8-24	8-24	
		Thick	32	32	92	95	95	T	T	2	2	8-24	8-24	
	Int.	Thin	40	42	97	87	87	4	T	1	2	8-19	8-24	
		Thick	33	37	93	90	90	T	T	1	2	8-19	8-24	
	High	Thin	42	37	95	85	85	4	T	4	3	8-24	8-24	
		Thick	38	38	95	88	88	T	T	5	2	8-24	8-24	

⁺ Fertilizer treatments = Split - 50+25+25 in fall, and again in May; Intermediate - 100+50+50 applied in fall, High - 150+75+75 applied in fall.

** Lodging = 1 = no lodging, 2 = severe lodging.

Fescue Trials

Fine Fescue. We harvested yields on several strains of Fine Fescues in 1978. Some of these were seeded in 1976 and the others were seeded in 1977. Varieties differ significantly for seed yields. Several of the named varieties produced more seed than we have seen on these items in Minnesota.

The data reported in Table 8 was collected in the 1976 seeding. The yields appear sufficient to warrant field production. However, it must be recognized that seed of these grasses cannot be separated from quackgrass seed, and until or unless the grower has a clean field, he should not consider production of these strains.

The strains reported in Table 9 have been established to study the residue management and fertilizer applications effects on fine fescue seed production. This study was "set up" in 1978 and yields to show management and fertilizer differences will be harvested in 1979.

Meadow Fescues. There has been considerable interest in production of European strains of Meadow fescues. Several of the entries in this trial are included in this interest. The yields are good for most and very good for some. However, quackgrass is a major hindrance in the production of this species. Winter injury was not severe on these strains.

Tall Fescues. The six strains included in this trial differ significantly for seed yields. Kentucky 31, one of the high yielding strains, has been relatively high in each trial, with yields similar to those observed in this study. We doubt that this species will warrant seed production in Minnesota as other areas appear able and interested in producing their own seed. Quackgrass is a major hindrance.

Table 8. Percent stand, vigor, color, percent heading, plant height, lodging, harvest date, and seed yields for 18 Fine Fescue Varieties seeded in 1976 on WeIn Farm, Roseau, MN. 1978 Data.

Variety	Company Number	MSP No.	% Stand 5/11	Vigor* 5/11	Plant color** 5/11	% heading			Plant height harvest	Lodging ⁺ 6/20	Harvest date	Seed yield (#/Ac)
						5/24	5/26	6/3 6/8				
Atlanta		696	80	3.0	2.4	0	0	33	63	4	7-6	496
Banner		957	83	3.0	3.0	0	0	47	77	5	7-6	830
Boreal		958	87	3.0	3.3	0	0	27	67	4	7-6	714
Checker		959	77	3.1	2.7	T	33	70	93	4	7-5	508
Durlawn		668	87	2.7	3.0	0	0	12	37	4	7-7	392
Koket		910	83	3.0	2.1	2	47	77	97	3	7-5	825
Menuet		960	90	3.0	3.0	0	7	63	87	4	7-6	735
Dawson		697	83	3.0	2.7	0	10	53	73	3	7-6	413
Festuca rubra commutata		859	87	3.0	2.9	T	34	73	93	3	7-5	912
Festuca rubra		860	83	2.7	2.9	0	0	30	60	4	7-7	557
NAPB Exp	12.004	869	80	3.3	1.9	0	23	63	83	3	7-5	656
NAPB Exp	16.0004	832	73	3.0	2.8	4	27	70	92	3	7-5	533
Festuca ovina												
durin scula	67135	434	53	2.9	1.0	63	70	90	100	2	7-5	812
Festuca ovina	66432	436	50	3.3	1.7	73	90	87	100	2	7-5	825
Festuca rubra	6673	443	87	2.7	3.0	0	T	20	63	3	7-7	592
Festuca rubra	66111	442	80	2.7	2.7	0	0	23	60	4	7-6	562
Festuca rubra	66223	439	87	3.0	3.7	0	0	17	33	4	7-7	301
Festuca rubra	67123	956	90	2.7	2.7	0	0	23	60	4	7-6	522
												156
												208

LSD 5% level
LSD 1% level

* = 1 - best vigor, 5 - least
 ** = 1 - dark green, 5 - light green
 + = 1 - no lodging, 5 - severe lodging

Table 9. Percent stand and seed yield on 24 Fine Fescue strains seeded in 1977 on Welin Farm, Roseau, MN. 1978 data.

Variety	Company number	MSP No.	Percent stand 5/9	Seed yield #/Ac
Agram	666000377	1129	40	330
Atlanta	K8-151	1164	43	486
Dawson	K8-73	1165	35	227
Diamond		1223	50	388
Ensylva		1154	58	919
Festuca ovina	6673	1110	35	999
Festuca rubra	66111	1111	50	749
Festuca rubra	66136	1112	48	1084
Festuca rubra	66218	1113	33	801
Festuca rubra	66223	1114	50	908
Festuca rubra	66233	1115	48	867
Festuca rubra	66354	1116	45	1124
Festuca rubra	67123	1117	45	1039
Fidelimo		1224	20	74
Koket		1225	50	582
Mom-Fod. 11		1226	38	241
Moncorde		1227	38	1102
NK-Exp	K4-21	1161	25	638
	K5-28	1162	55	948
	K5-29	1163	50	1180
Pennlawn		1237	60	930
Ruby	N-65	1166	45	738
Simone		1228	24	464
Illahee		59	4	22
			LSD 5% level	280
			LSD 1% level	372

Table 10. Winter injury, vigor, percent stand, plant height, percent heading, and seed yields for 1978 on 8 Meadow Fescue varieties seeded in 1977 on the Melin Farm, Roseau, MN.

Variety	Company number	MSP no.	Winter injury* 4/28/78	5/9/78	Vigor** 5/9/78	% Stand 5/9/78	Plant height (cm) 6/19/78	Harvest date	Seed yield (#'s/Ac)
Barkag	NL-564-02149	1095	3.0	1.3	2.7	43	95	7-6	1414
Belimo		1222	2.8	1.0	2.7	47	97	7-6	1595
Bundy		1214	3.1	1.4	2.6	47	90	7-6	1117
Ensign		1233	2.3	1.5	3.0	30	93	7-6	1328
Fiola		1215	3.0	1.7	2.4	43	92	7-6	1634
NK-Exp	K2-28	1236	2.3	1.3	2.7	37	95	7-6	1571
Largo		1216	3.2	2.0	2.7	47	93	7-6	1746
Remko		1217	3.0	1.3	3.2	47	90	7-6	1681
LSD 5% level									N.S.

*1 = least injury, 5 = severe injury

**1 = best vigor, 5 = least vigor

Table 11. Winter injury, vigor, percent stand, plant height, percent heading, lodging, harvest date and seed yields for 1978 on 6 Tall Fescue varieties seeded in 1977 on the Melin Farm, Roseau, MN.

Variety	Company number	MSP no.	Winter injury* 4/28/78	Winter injury* 5/9/78	Vigor** 5/9/78	% Stand 5/9/78	Plant height (cm) 6/19/78	Lodging ⁺ 6/20/78	Harvest date	Seed yield (#'s/Ac)
Kenhy		924	2.8	2.3	3.0	60	98	1	7-10	939
Kentucky 31		683	3.3	2.0	3.1	57	103	2	7-10	1268
Monaco		1171	2.7	1.4	3.4	50	88	1	7-10	624
NK-Exp	K2-28	1168	2.8	1.7	2.3	58	92	4	7-8	1467
NK-Exp	K5-27	1169	3.1	2.1	3.4	47	88	2	7-10	1313
KN-Exp	K5-30	1170	3.1	2.5	2.8	33	95	1	7-10	838
									LSD 5% level	374
									1% level	532

* 1 = least injury, 5 = severe injury

** 1 = best vigor, 5 = least vigor

+ 1 = no lodging, 5 = severe lodging

Orchardgrass Trial

Ten orchardgrass strains were included in the 1977 seeding. The 1978 yields from these items were quite good. Several had previously shown good yields. There is question whether orchardgrass production will gain favor in northern Minnesota. First, the northwest U.S.A. can do a very good job in producing this crop. Secondly, quackgrass is a very serious deterrent. During favorable years our yields are good, but some years due to winter injury and other factors, the yields are poor.

Perennial Ryegrass

The seed yields from 20 Perennial ryegrass strains were encouraging. However, in spite of good yields in 1978, there are problems in producing Perennial ryegrass seed. First, quackgrass will be a major hindrance as quack seeds cannot be separated from Perennial ryegrass. Secondly this species performs as a biennial in northern Minnesota. It will survive the first winter, produce a seed crop and will not survive the second winter. To date, we have been unable to develop a procedure which will ensure survival through the second winter.

Table 12. Winter injury, vigor, percent stand, plant height, percent heading, harvest date, and seed yield for 1978 on 10 Orchardgrass varieties seeded in 1977 on the Welin Farm, Roseau, MN.

Variety	Company number	MSP no.	Winter injury* 4/28/78	Winter injury* 5/9/78	Vigor** 5/9/78	% Stand 5/9/78	Plant height (cm) 6/19/78	Harvest date	Seed yield (#'s/Ac)	
Comet		1176	3.1	2.1	2.3	60	120	7-6	882	
Crown		1138	2.8	2.0	2.3	67	123	7-6	722	
Hawk		1139	2.6	2.4	2.3	57	122	7-6	858	
Nordstern		1177	2.1	1.7	2.3	53	127	7-6	653	
NK-Exp	K2-8	1172	2.1	1.4	2.4	60	125	7-6	754	
	K3-9	1173	2.1	1.7	2.4	43	122	7-6	838	
	K6-4	1174	2.1	1.4	2.8	33	117	7-6	633	
	K8-118	983	2.1	1.3	2.8	37	113	7-6	754	
	K8-122	1175	2.1	1.0	2.9	33	118	7-6	502	
Orbit	K8-120	1178	2.0	1.3	2.3	56	122	7-6	796	
									LSD 5% level	242
									1% level	332

* 1 = least injury, 5 = severe injury

** 1 = best vigor, 5 = least vigor

Table 13. Winter injury, vigor, percent stand, plant height, percent heading, lodging, harvest dates, and seed yields for 1978 on 20 Perennial Ryegrass varieties seeded in 1977 on the Welin Farm, Roseau, MN.

Variety	Company number	MSP no.	Winter injury* 4/28/78	Vigor** 5/9/78	% Stand 5/9	Plant height (cm)		% heading		Lodging 6/20	Harvest date	Seed yield (#'s/Ac)
						harvest	6/3	6/17				
Derby		1152	3.1	2.7	77	75	10	70	5	7-16	1262	
Eton	K9-124	1185	2.1	2.9	73	85	0	17	3	7-25	1191	
Fineleaf	R-32	1130	3.1	2.6	82	82	10	83	5	7-16	1669	
Fineleaf	R-33	1131	2.4	2.8	73	77	10	83	4	7-16	1363	
Fineleaf	R-34	1132	3.1	3.2	67	80	T	53	4	7-25	1019	
Majestic		1229	2.7	3.2	67	80	0	7	3	7-26	971	
Monarch		1230	2.7	3.0	67	77	0	50	4	7-24	1363	
Norlea	894	894	2.3	2.2	73	90	0	17	4	7-24	1690	
NK-EXP	K5-88	1179	2.3	2.6	60	82	30	90	5	7-16	751	
NK-EXP	K5-90	1180	2.7	2.7	70	75	27	93	3	7-16	1140	
NK-EXP	K5-92	1181	2.4	2.3	72	73	4	73	4	7-18	1143	
NK-EXP	K5-683	1182	2.1	2.9	63	72	23	87	3	7-16	1429	
NK-EXP	K0-15	1183	2.3	2.0	73	85	0	13	3	7-25	1241	
NK-200		1184	2.7	2.4	57	85	0	10	3	7-26	1268	
Pennfine	K0-184	1186	3.4	2.7	77	77	23	83	5	7-16	1233	
Regal	13.0014	1141	3.3	3.3	27	73	47	100	2	7-16	995	
Royal	K2-174	1231	2.7	3.0	77	82	17	73	5	7-16	1188	
Servo		1187	2.2	2.2	70	90	0	17	3	7-24	1387	
Tetrelite		1153	4.3	2.0	77	105	0	27	2	7-22	1123	
Hazel	Festuca lolium	1238	2.9	2.1	47	110	T	57	1	7-16	538	

LSD 5% level
1% level

* 1 = least injury, 5 = severe injury
** 1 = best vigor, 5 = least vigor

Reed Canarygrass

Table 14 reports the information for 10 Reed canarygrass varieties harvested in 1978. There is a major difference in production for the 10 strains. We recognize that some varieties e.g., Vantage and Frontier, differ for shattering. We have not previously obtained similar information for several of the other strains. During 1978 we failed to obtain good information on exact date of maturity and shattering. Therefore, we are reluctant to suggest why some of the strains are so low in seed production. Did they mature earlier and shatter, or did they simply not produce as much seed? We do not have information to define the cause, but we do plan to exercise more care in 1979 and observe these entries much closer. Also, a 1978 seeding will be producing seed and we will record data in that seeding as well.

Smooth Bromegrass

The smooth bromegrass yields in 1978 were average to good. There is interest in producing bromegrass seed in northern Minnesota, but at present it is a very hazardous venture due to quackgrass contamination. It is impractical to separate quackgrass seed out of smooth bromegrass. We believe the yields recorded in 1978 indicate that production is feasible when other problems are overcome.

Table 14. Percent stand, vigor, plant height, percent heading, harvest date, seed shattering, yield estimate and seed yields for 1978 on 10 Reed canarygrass varieties seeded in 1977 on Melin Farm, Roseau, MN.

Variety	Company number	MSP no.	Vigor* 5/9	% Stand 5/9	Plant height (cm) 6/19	% Heading 6/3 6/8	Harvest date	Seed shattering**	Seed yields Visual estimate ⁺ (#/Ac)
Castor	M2-8021	607	2.0	43	147	8 50	7-5	3.1	2.0 517
Commercial		1251	1.7	60	152	10 53	7-5	4.0	1.8 253
Flare		817	2.3	50	152	8 47	7-5	2.1	1.8 468
Frontier		172	2.0	30	154	20 63	7-5	4.0	2.2 235
Mn 72	7521	1108	1.3	70	152	13 40	7-5	4.1	2.7 297
Mn 76	7614	1109	2.3	47	158	30 73	7-5	4.3	2.7 131
NRG 721		867	2.4	53	148	8 47	7-5	2.4	1.9 465
Rise	42.0064	1142	1.7	60	157	10 40	7-5	2.5	2.4 486
Vantage	42.0060	1145	2.0	50	155	10 53	7-5	1.8	2.2 426
Iowa RC-2	Syn-2	76	2.4	37	145	8 33	7-5	2.0	2.8 369

* 1 = most vigor, 5 = least vigor

** 1 = least shattering, 5 = most shattering

+ 1 = most seed, 5 = least seed

LSD 5% level
1% level

Table 15. Vigor, percent stand, plant height, and seed yields for 1978 on 8 Smooth brome grass varieties seeded in 1977 on Welin Farm, Roseau, MN.

Variety	Company number	MSP no.	Vigor* 5/11	% Stand 5/11	Plant height (cm) 6/19	Harvest date	Seed yield (#'s/Ac)
Baylor	40.0073	1136	2.0	57	123	7-21	950
Blair	40.0072	1137	2.3	43	127	7-21	665
Fox		718	1.7	63	123	7-21	713
NK-Exp (Bromex)	K1-105	1167	2.0	73	123	7-21	659
Sac		870	2.0	50	125	7-21	612
407601	40.0077	1133	1.7	60	125	7-21	852
407602	40.0078	1134	1.7	67	127	7-21	582
407603	40.0079	1135	1.3	63	128	7-21	612
						LSD 5% level	254
						1% level	358

* 1 = best vigor, 5 = least vigor

Clover Trial

Seven Red clover and one Ladino strain were seeded in 1977 and seed yields harvested in 1978. The plants were clipped during early June, and permitted to set seed on the second crop. The Ladino strain was significantly lower than the Red clover strains. The Red clover strains did not differ significantly. Honeybees were available on the Welin Farm for pollination.

Table 16. Percent stand, vigor and seed yields for Arcadia Ladino clover and seven Red clover strains seeded in 1977 on the Welin Farm, Roseau, MN. 1978 data.

Strain	MSP no.	% stand (5/15/78)	Vigor ⁺ (5/15/78)	Seed yield (#'s/Ac)
Arcadia*	1188	53	3.8	181
Arlington	630	67	2.9	488
Florex	1193	73	3.2	424
Florie	1192	60	3.7	449
NK-K4-182	1189	60	3.1	385
NK-K4-183	1190	53	3.3	346
NK-K4-184	1191	63	3.8	406
Lakeland	631	67	3.8	401

⁺ 1 = best vigor, 5 = least vigor

* Arcadia is a Ladino clover; the other 7 are Red clovers. Arcadia is significantly lower than the Red clovers. The Red clovers do not differ statistically.