

Progress Report of Seed Production Research

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Kentucky Bluegrass Studies

We are reporting data from two studies here, with reference to two older seedings. These are variety trials seeded in 1972, 1973, and 1975, and a cultural management trial seeded in 1975.

Samples were collected from the 1972 and 1973 seedings, but because the yields were very low due to drought, we are not including data. The highest yields were from "Park", and these averaged less than 150 lbs. per acre. Most other plots were considerably lower than this.

The 1975 variety trial seeding included 47 strains. Several factors appear to be significant for these data. First, the severe drought depressed seed yields; second, a heavy epidemic of mildew may have depressed seed yields of some varieties; and thirdly, these are first year data and the yields may be more valid another year. There was a wide range of reaction to mildew infection when this reaction was read on June 1. However, this reading is not correlated with the resultant seed yields. The date of harvest ranges from June 30 to July 12; 12 days. We had not observed this range previously. There is some question concerning the validity of these data. For general interpretation they may be valid but, for good evaluation, we certainly need additional information is needed.

In the seeding of four varieties for studying cultural management and fertilizer rates, the yields were fair. "Sydsport", "Sodco", "Nugget" and "Park" yielded 288, 277, 245, and 198 lbs. per acre for average yields, respectively. Fertilizer treatments did not affect the seed yields significantly, and of course the cultural management regimes were not established. There may be a question whether the yields of "Park" were significantly affected by the mildew infection observed in this variety in 1975.

Table 1. Percent Stand, Vigor, Mildew Reaction, Plant Height, Harvest Date, and Estimated and Actual Seed Yields for 47 Kentucky Bluegrass Strains Seeded in 1975 on the Weilin Farm, Roseau, MN. 1976 Data.

Variety	MSP#	% Stand		Mildew		% Heading		Plant Height (cm)		Height at Harvest (cm)*	Harvest Date	Estimated Seed Yield**	Actual Seed Yield (#/AC.)
		T1-2-75	Vigor 4-15	6-1	6-1	6-1	6-10	6-1	6-11				
Arista	628	57	3	2.4	80	93	25	40	43	7-4	1.7	261	
Adelphi	902	55	3	2.1	17	20	20	35	50	7-9	4.3	74	
Aquilla	719	57	3	1.0	57	67	35	45	52	7-4	3.2	151	
K8-145	804	50	3	3.0	28	33	18	30	38	7-6	3.4	92	
Baron	907	57	3	1.0	25	40	23	38	45	7-3	4.0	74	
Birka	908	45	4	1.8	7	17	17	30	47	7-12	4.7	18	
Bonnie	861	43	3	2.3	30	67	22	38	48	7-3	2.3	196	
Blue	805	33	3	1.3	18	43	27	38	45	7-8	2.8	149	
Cheri	904	33	3	2.1	70	60	33	45	57	6-30	3.1	163	
Cougar	825	60	3	2.4	15	50	25	40	52	7-5	3.8	131	
Delft	826	77	3	4.3	63	67	23	35	48	7-4	3.8	62	
Enmundi	827	43	3	1.7	40	70	20	37	50	7-2	2.1	324	
Enoble	720	43	3	2.3	77	90	38	53	70	6-30	2.4	160	
Enprima	862	63	3	3.0	47	37	28	38	48	7-10	4.0	53	
Fanfare	913	33	3	2.8	40	40	30	40	52	7-10	3.8	71	
K2-100	721	55	3	2.2	T	15	18	25	40	7-6	4.4	65	
Fyking	882	47	3	2.8	12	37	17	32	45	7-5	3.3	149	
Galaxy	427	40	3	1.0	20	20	22	35	43	7-10	4.0	48	
Glade	909	50	3	2.8	33	47	18	38	47	7-6	3.2	77	
K2-80	806	43	3	3.4	30	63	25	43	52	6-30	2.8	101	
Golf	863	70	2	1.1	62	83	35	53	67	7-6	2.3	273	
Monopoly	722	57	2	3.5	73	97	40	55	62	6-30	1.8	273	
Merion	868	37	4	1.0	73	60	15	31	42	7-12	3.1	140	
Monport	723	60	3	3.1	70	67	35	55	63	6-30	3.2	181	
Nugget	868	37	4	1.0	73	60	15	31	42	7-12	3.1	140	
Olympriisp	723	60	3	3.1	70	67	35	55	63	6-30	3.2	181	
Onar	724	60	3	1.4	63	70	27	50	60	7-5	2.8	199	

Table 1-Bluegrass Strains, Melin Farm, cont.

Variety	MSP#	% Stand 11-2-75	Vigor 4-15	Mildew 6-1	% Heading 6-1 6-10	Plant Height (cm) 6-1 6-11	Height at Harvest (cm)*	Harvest Date	Estimated Seed Yield**	Actual Seed Yield (#/AC.)
Parade										
K1-192	725	50	3	3.3	57 83	30 50	58	7-4	2.1	137
Park	895	60	2	3.8	77 77	45 55	60	6-30	3.1	146
Pennstar	529	43	3	2.9	43 30	25 37	45	7-10	4.1	36
Prato	905	18	4	2.4	43 17	22 38	55	7-6	3.8	45
Primo	906	67	3	1.8	73 87	38 52	60	6-30	2.6	258
P-66										
K8-176	808	40	4	2.8	35 47	28 45	52	7-12	3.0	59
Ram I	914	50	3	1.0	37 53	22 35	48	7-4	3.1	86
Ram II	872	50	4	1.0	20 23	25 37	52	7-6	3.9	74
RU-128	828	40	3	2.4	27 40	28 43	53	6-30	3.4	151
RU-178	829	40	4	1.0	25 27	18 37	45	7-12	3.8	48
Sodco	423	20	4	1.8	33 30	25 45	57	7-6	3.5	86
Sydsport	912	50	3	1.4	50 80	23 45	52	6-30	2.2	232
Touchdown	873	40	3	1.0	45 25	32 47	58	6-30	3.8	92
Trampas										
K3-32	726	43	4	1.1	53 43	18 32	42	7-10	3.3	98
WW AG 436	627	40	3	2.4	27 53	25 48	63	7-8	3.4	33
WW AG 463	626	63	3	3.3	30 77	28 45	55	7-6	2.4	86
Vantage	727	40	3	3.5	47 37	35 57	63	6-30	3.8	45
Victa	728	53	3	2.5	5 27	17 33	42	7-1	3.9	86
Park	895	53	3	3.0	77 80	40 52	65	6-30	2.4	211
K9-49-P124										
(Funk)	145	35	3	2.8	43 60	27 50	55	7-6	2.0	116
K9-53-P129										
(Funk)	146	18	4	1.0	37 27	25 42	52	7-6	3.7	77
K9-181-P76										
(Funk)	147	13	3	1.3	30 37	23 43	58	7-9	3.1	110

LSD 5% level
LSD 1% level

* 2.5 cm = 1 inch

** 1 = best seed yield, 5 = poorest seed yield

Table 2. Mildew Reaction, Plant Height, Harvest Date and Seed Yields for four Kentucky Bluegrass varieties with three fertilizer rates seeded in 1975 on the Melin Farm, Roseau, MN. 1976 Data.

Variety	Fertilizer	Mildew* 6-1	Plant Height (cm)** $\frac{6-1}{6-18}$	Harvest Date	Seed Yield (#/AC.)
Nugget	75 + 38 + 38	1	17	7-7	247
	125 + 63 + 63	1.1	19	7-7	248
	175 + 88 + 88	1.2	18	7-7	241
Park	75 + 38 + 38	3.4	44	Ave.	245
	125 + 63 + 63	3.5	45	6-30	190
	175 + 88 + 88	3.5	43	6-30	201
Sodco	75 + 38 + 38	1.9	34	Ave.	204
	125 + 63 + 63	1.9	33	7-1	198
	175 + 88 + 88	1.8	35	7-1	268
Sydsport	75 + 38 + 38	1.1	26	Ave.	274
	125 + 63 + 63	1.3	26	7-1	288
	175 + 88 + 88	1.3	30	7-1	277
				Ave.	265
				7-3	297
				7-3	302
				Ave.	288

LSD 5% level

LSD 1% level

* 1 = least mildew, 5 = severe infection

** 2.5 cm = 1 inch

49.0

66.0

Timothy Studies

We are including information on three different Timothy studies in this group of data. The first, (Table 3) is a summary of four years of information for 99 entries in a strain trial. The 1976 yields are lower than for other years, except possibly 1973. The dry weather seemed to place considerable stress on the plants. However, early June rains seemed to give the plants a new lease on life and yields were better than earlier expected. The late varieties appeared to recover better than the early ones.

Tables 4 and 5 include data collected on strains seeded in 1975. The yields are not entirely satisfactory, but in general offer fair evaluations of the varietal performance. As for the strains in the preceding table, the late varieties appeared to recover from the drought better than the early varieties. E.g., Heidemij produced 511 lbs. of seed per acre, and Climax produced only 315. Normally, we have seen Climax produce more than Heidemij in trials of this type. Variety yields are quite variable, but there seems to be valid differences between some varieties. Table 5b presents the date of bloom for these varieties. These data give a very good indication of maturity, and the variability of maturity within a variety.

Table 6 shows information from a new seeding of four varieties (Climax, Timfor, Heidemij, and S-48) which was established to study effects of seeding rates, cultural practices and fertilizer applications on early vs. late Timothy varieties. The data indicate the thin seeding produced more seed than the thick seeding; Heidemij was the high yielding variety and S-48 the low one; Fertilizer applications had little effect on yield as the soil was fallowed in 1974, prior to seeding in 1975. This study will be continued and information for effect of cultural management residue, fertilizer applications and rate of seeding on early vs. late varieties.

Table 3. Seed yields, plant height, percent heading, harvest dates, and lodging score for Timothy Strains, Melin Farm, 1973 - 1976. Seeded 1972.

Variety	MSP No.	Seed Yields (lbs./Acre)				4-yr. Ave.	% heading				Height at harvest (cm)				Lodging at harvest **	Harvest date					
		1974		1975			1976		1977		1978		1979			1980		1981		1982	
		1973	1974	1975	1976		1976	1977	1978	1979	1980	1981	1982	1983		1984	1985	1986	1987	1988	1989
Astra	448	277	230	437	165	277	80	25	63	70	90	100	98	95	4	7-28	7-31	8-2	8-1		
Barmoti	276	272	279	631	178	340	75	25	70	60	80	100	103	90	2	7-28	7-31	8-1	7-28		
Bariton	449	112	109	232	165	155	T	0	3	T	73	90	98	87	2	8-8	8-12	8-14	8-9		
Barmoti	277	315	375	520	259	367	75	35	50	65	85	100	95	95	2	7-28	7-31	8-2	7-30		
Bariton	278	139	161	310	178	197	10	T	10	10	80	95	100	90	3	8-8	8-9	8-14	8-4		
Bothnia II	279	421	421	529	294	416	80	40	65	45	88	105	98	90	4	7-28	7-31	8-2	7-29		
C. B.	280	107	141	261	129	160	25	T	25	32	80	100	93	92	3	7-30	8-6	8-6	7-29		
Champ	281	416	316	408	232	343	90	45	68	90	105	105	100	97	4	7-25	7-31	8-1	7-21		
Clair	282	400	281	402	201	321	100	60	78	100	93	110	95	95	3	7-24	7-31	7-29	7-21		
Climax	283	283	323	371	268	311	80	T	28	90	100	118	98	107	3	7-28	7-31	8-5	7-27		
Climax	284	331	395	462	357	386	90	25	48	90	98	108	113	105	3	7-28	7-31	8-3	7-24		
Comet	450	107	56	248	214	156	0	0	5	T	73	85	93	92	3	8-11	8-17	8-19	8-11		
DoIema (Pp)	421	139	107	263	98	152	0	0	T	T	75	78	98	95	3	8-17	8-17	8-17	---		
Drummond	290	133	239	419	259	263	10	T	8	40	88	105	115	97	2	8-1	8-6	8-6	7-30		
Dural	291	443	401	449	268	390	95	20	55	75	100	108	105	95	3	7-28	7-31	8-1	7-23		
Dural	451	357	404	473	259	373	95	40	60	80	98	108	100	95	4	7-28	7-31	8-2	7-23		
Engmo	292	485	533	584	410	503	90	35	60	80	98	103	93	97	4	7-28	7-31	8-4	7-29		
Erecta	293	304	368	457	263	348	75	25	55	60	90	98	90	95	4	7-28	7-31	8-4	7-27		
Eskimo	294	416	475	578	245	429	90	40	78	75	103	105	105	90	3	7-28	7-31	8-2	7-26		
Essex	301	192	268	353	227	260	55	T	18	35	95	108	98	100	3	7-30	8-6	8-6	8-1		
Evergreen (MW)	403	208	49	149	120	132	95	30	68	---	60	65	68	---	2	8-8	8-12	8-6	8-9		
Evergreen (MW)	452	293	359	571	433	414	50	T	30	40	88	90	93	95	4	8-1	8-9	8-6	8-6		
Farol	415	155	145	306	303	227	T	0	T	5	75	93	100	97	3	8-1	8-12	8-14	8-7		
Farol	480	176	178	368	259	245	T	0	3	T	88	98	100	95	4	8-8	8-9	8-14	8-7		
Gem	306	181	205	290	290	242	T	0	5	10	88	95	100	97	3	8-8	8-7	8-12	8-2		
Georgikon	307	411	475	574	419	470	85	20	53	90	100	100	100	105	4	7-28	7-31	8-5	7-26		
Glasnevin Gem	453	123	172	245	196	184	T	0	13	15	88	100	100	102	3	8-1	8-7	8-12	7-29		
Heidemij	318	235	250	362	335	296	T	0	3	5	80	100	98	95	2	8-13	8-15	8-19	8-7		
Heilea	420	165	---	80	---	---	95	0	70	---	68	---	70	60	2	8-8	---	8-15	---		
Itasca	325	373	292	355	245	316	100	20	68	95	108	108	103	105	3	7-28	7-31	8-2	7-24		

* 2.5 cm = 1 inch
 ** 1 = erect, 2 = badly lodged
 (cont.)

Table 3. b.
Timothy Strains, Welin Farm, cont.

Variety	MSP No.	Seed Yields (lbs/Acre)				4-yr. Ave.	% heading				Lodging at harvest**		Harvest date					
		1973	1974	1975	1976		6-20-73	6-21-74	6-21-75	6-19-76	1975	1976	1973	1974	1975	1976		
		Height at harvest (cm) *					Lodging at harvest**				Harvest date							
Kampe	454	469	477	520	459	481	40	65	100	98	103	90	102	4	7-28	8-2	8-3	7-29
Kampe II	564	555	428	527	464	494	35	68	100	103	105	93	107	4	7-28	8-6	8-4	7-29
King		197	169	183	219	192	0	10	0	85	90	93	90	4	8-11	8-17	8-17	8-11
Lorain	332	427	399	415	388	407	5	33	95	108	118	95	112	4	7-28	7-31	8-5	7-27
Mahndorfer	419	437	482	633	428	495	15	70	80	103	110	95	102	4	7-28	7-31	8-4	7-24
Match	406	85	---	40	---	---	---	---	---	60	---	85	---	-	7-30	---	8-12	---
Melusine	414	352	290	433	259	334	25	63	80	95	108	98	100	4	7-28	7-31	8-3	7-27
Melusine	455	309	288	375	352	331	25	73	80	100	103	95	97	3	7-28	7-31	8-4	7-27
Milton	338	421	533	569	491	504	35	80	95	105	110	105	100	3	7-28	7-31	8-2	7-24
Mommersteeg's (WI)	339	197	127	156	174	164	0	3	T	78	78	93	77	4	8-17	8-17	8-21	8-11
Motterwitzer	340	379	468	624	326	449	30	75	90	93	103	98	97	2	7-28	7-31	8-1	7-24
Murra	474	251	312	381	219	291	25	65	60	100	100	95	85	2	7-28	7-31	7-31	7-25
"N"	405	403	341	493	277	379	65	78	55	80	100	98	85	3	7-28	7-31	7-30	7-24
N7-125	342	347	297	351	259	314	25	53	55	98	105	103	102	3	7-28	7-31	8-2	7-27
N7-127	344	421	439	487	392	435	20	40	100	100	110	95	110	4	7-28	7-31	8-6	7-26
Neuga	357	357	426	504	281	392	30	70	100	90	113	95	100	4	7-28	7-31	8-4	7-26
"O"	404	336	236	370	210	288	25	58	70	90	100	100	92	3	7-30	8-6	8-6	7-30
Oakmere	418	224	176	277	187	216	0	T	0	88	80	100	90	3	8-17	8-17	8-23	8-12
Oakmere	456	229	185	281	98	198	0	0	0	83	75	100	90	3	8-17	8-17	8-23	8-12
Olympia	457	203	163	268	272	227	0	0	0	78	83	98	87	4	8-13	8-17	8-12	8-11
Olympia	350	571	410	444	388	453	25	60	80	95	100	95	92	5	7-28	7-31	8-5	7-27
Otofte Topos	351	501	314	524	294	408	20	65	80	98	98	95	100	4	7-28	7-31	8-3	7-26
Pecora	352	251	190	283	263	247	0	25	40	95	93	98	95	4	8-8	8-12	8-16	8-1
Pergo	417	427	279	379	245	333	25	60	70	95	98	98	95	4	7-28	7-31	8-3	7-27
S-48	271	267	207	346	268	272	0	T	0	75	85	93	87	4	8-17	8-17	8-17	8-12

* 2.5 cm = 1 inch

** 1 = erect, 5 = badly lodged

(cont.)

Table 3. c.
Timothy Strains, Melin Farm, cont.

Variety	MSP No.	Seed Yields (lbs/Acre)				4-yr. Ave.	% heading				Lodging at harvest		Harvest date				
		1973	1974	1975	1976		6-20-73	6-21-74	6-21-75	6-19-76	1975	1976	1973	1974	1975	1976	
		4-yr. Ave.					6-20-73	6-21-74	6-21-75	6-19-76	1973	1974	1973	1974	1975	1976	
S-50	274	176	---	65	---	90	T	60	30	63	---	68	---	3	8-8	---	8-19
S-352	275	395	321	513	152	345	50	83	75	95	108	95	92	4	7-25	7-31	8-3
Sceempter	356	213	118	190	205	182	0	T	T	83	85	98	97	4	8-17	8-17	8-23
Sceempter	355	240	158	225	183	202	0	T	0	80	85	100	90	4	8-17	8-17	8-23
Scotia	357	347	377	513	250	372	25	55	65	98	100	95	100	3	7-30	7-31	8-6
Sport	458	176	25	94	---	---	T	30	---	68	65	75	---	3	8-8	8-12	8-19
Swallow	358	480	533	323	357	423	15	55	85	100	103	90	100	4	7-28	7-31	8-5
T-41	367	421	404	377	339	385	10	45	95	103	118	98	105	5	7-28	8-6	8-5
Th-71-3	410	139	205	234	232	203	T	13	90	80	98	100	107	4	7-30	7-31	8-5
Th1-70	411	534	375	522	455	472	40	50	90	93	108	100	95	4	7-28	7-31	8-2
tt3-70	412	277	281	319	321	300	0	T	T	88	93	100	97	4	8-16	8-17	8-15
Tw4-70	413	256	183	184	245	217	0	0	T	90	95	95	95	3	8-13	8-17	8-19
Tiran	416	283	292	399	401	344	5	8	T	90	98	103	102	4	8-13	8-17	8-14
Tiran	481	293	254	306	352	301	0	5	T	90	103	103	105	3	8-13	8-17	8-12
Toro	422	464	435	488	437	456	25	78	100	100	113	103	105	4	7-24	7-31	7-31
Toro	459	475	435	515	401	457	25	75	100	103	113	105	105	4	7-24	7-31	7-31
Toro	482	619	381	520	442	491	40	78	100	105	110	100	102	4	7-24	7-31	7-31
Trifolium (early)	365	411	366	393	397	392	25	68	95	103	98	93	97	4	7-28	8-6	8-5
Trifolium (late)	366	256	178	377	361	293	0	5	55	95	105	95	100	4	8-8	8-12	8-14
Vanadis	460	453	508	576	366	476	25	73	80	103	105	100	100	4	7-28	7-31	8-3
Vanadis	368	421	339	362	281	351	35	68	80	103	108	98	97	5	7-28	7-31	8-5
Verdant	369	181	310	328	299	280	30	55	75	103	110	95	100	3	7-28	7-31	8-5
WWT-48	461	277	321	473	428	375	20	40	85	100	110	93	105	4	7-28	7-31	8-5
WWT-49	408	325	504	457	540	457	10	35	90	98	105	93	100	5	7-30	8-6	8-6
WWT-93	407	485	408	500	477	468	10	30	95	98	108	98	102	4	7-28	7-31	8-5
WWT-14 (Pn)	409	208	---	92	---	---	T	50	70	60	75	70	---	3	8-1	8-17	8-17
XT-709	373	363	332	397	277	342	25	60	90	98	105	103	100	3	7-28	7-31	8-2
Z 2009	477	261	201	337	285	271	0	T	T	68	93	95	92	4	8-14	8-17	8-15
Z 2010	478	229	178	199	152	190	0	3	0	75	88	95	95	4	8-14	8-17	8-15
Z 2022	479	149	91	284	192	179	0	5	T	80	88	93	85	3	8-11	8-12	8-14

* **2.5 cm = 1 inch

1 = erect, 5 = badly lodged

(cont.)

Table 3. d.
Timothy Strains, Welin Farm, cont.

Variety	MSP No.	Seed Yields (lbs/Acre)			4-yr. Ave.	% heading				Height at harvest (cm)*			Lodging at harvest**			Harvest date			
		1973	1974	1975		1976	6-20-73	6-21-74	6-21-75	6-19-76	1973	1974	1975	1976	1975	1976	1973	1974	1975
Z 9011	374	469	422	473	370	434	60	80	90	100	103	98	97	5	7-28	7-31	8-4	7-23	
K0-133 (Z 9001)	487	469	424	498	450	460	50	83	95	105	105	98	102	4	7-28	7-31	8-3	7-23	
K0-136 (Topas)	486	459	346	368	392	391	35	78	90	105	105	98	105	5	7-28	7-31	8-5	7-29	
K0-192 (Toro)	485	512	417	493	343	441	45	80	90	98	110	103	97	3	7-24	7-31	8-1	7-21	
K1-53 (Comet)	483	224	136	228	165	188	0	8	T	88	88	95	87	4	8-16	8-17	8-21	8-11	
K1-63 (Z 9006)	489	501	426	409	392	432	30	55	95	95	105	98	100	4	7-28	7-31	8-5	7-27	
K1-67 (Gem)	488	197	178	353	268	249	0	5	35	88	98	95	97	3	8-8	8-15	8-9	8-6	
K2-54 (Z 2010)	490	224	198	154	232	202	0	T	0	78	88	90	97	3	8-14	8-17	8-16	8-11	
K2-55 (Z 2009)	491	299	254	321	401	319	0	T	T	75	85	93	97	4	8-14	8-17	8-17	8-11	
K2-71 (Z 2022)	494	245	107	206	290	212	0	T	25	90	90	100	102	3	8-8	8-17	8-16	8-7	
K9-117	495	283	352	288	348	318	5	28	100	105	115	95	117	3	7-30	8-6	8-6	7-30	
K9-118	493	379	377	381	455	398	T	25	95	105	118	98	117	4	7-28	8-6	8-6	7-29	
N1-45 (Lorain)	494	459	408	355	375	399	5	30	100	110	125	103	117	4	7-28	7-31	8-6	7-29	
N7-128 (Timfor)	492	453	406	348	442	412	5	40	100	108	123	98	112	4	7-28	7-31	8-4	7-23	
LSD at 5% level		160	180	153	248	310 ⁵⁶													
1% level		213	246	203	329	94													

* 2.5 cm = 1 inch

** 1 = erect, 5 = badly lodged

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Table 4. Winter injury, percent heading, plant height, lodging, harvest date and seed yields for 24 Timothy Varieties seeded in 1975 on the Melin Farm, Roseau, MN. 1976 data.

Variety	MSP#	Winter* Injury	% Stand		% Heading			Plant Height (cm)**			Lodging at Harvest	Harvest + Date	Seed yield (#/AC)	
			11-2-75	%	6/10	6/19	6/26	6/1	6/11	6/18				6/26
Castella	896	2	77	0	T	50	28	32	52	70	88	3	8/9	571
Champ	874	2	87	73	97	100	43	62	80	97	102	1	7/22	375
Climax	880	2	47	30	100	100	42	58	80	98	108	1	7/28	315
Fleamar	897	2	77	27	97	100	30	45	65	88	88	1	7/27	303
Gusto	875	2	83	T	T	T	28	28	47	63	88	3	8/21	285
Heidemij	881	1	87	T	2	47	28	35	55	68	85	3	8/9	511
Heilbrink	876	2	77	70	100	100	42	60	75	85	90	1	7/21	229
HJA-1160	865	2	83	30	100	100	38	53	77	87	100	2	7/30	473
Lischower	877	2	87	70	100	93	37	58	78	92	95	1	7/24	470
Megas	898	2	83	2	63	97	37	43	63	85	100	2	8/1	282
Meson	899	2	73	0	3	37	33	32	48	70	87	3	8/11	476
Mom Tim H7	866	2	83	23	100	100	43	50	67	87	93	1	7/29	574
Murra	878	2	80	50	100	100	42	57	75	87	92	1	7/22	282
NK. Exp. K2-105	796	2	73	11	90	93	23	30	47	57	67	2	8/11	175
NK. Exp. K2-106	797	1	67	50	97	100	20	32	52	65	68	2	8/9	184
NK. Exp. K2-107	798	2	83	0	57	87	33	32	50	63	83	2	8/10	357
Pedion	900	1	73	0	T	13	27	33	48	70	92	3	8/10	416
Pet	809	2	87	47	100	100	40	55	70	88	88	1	7/22	479
Piccolo	901	2	50	53	97	100	22	32	52	62	65	1	8/3	265
Resant	810	2	83	83	97	100	42	60	73	85	78	1	7/21	309
Toro	459	2	83	72	100	100	38	58	77	88	87	1	7/21	279
Winda	879	2	67	0	0	T	22	25	40	62	70	3	8/11	223
Mino M4-9329	871	2	87	2	50	77	32	38	55	78	100	1	7/31	339
Verdant NK N7-25-2	369	2	80	23	90	93	37	50	73	90	97	1	7/29	178

LSD at 5% level 156
1% level 208

* 1 = least injury; 5 = severe injury

** 2.5 cm = 1 inch

+ 1 = erect; 5 = badly lodged

Table 5. Percent bloom by dates for 24 Timothy varieties seeded in 1975 on the Melin Farm, Roseau, MN. 1976 data.

Variety	MSP#	Dates												
		6/20	6/23	6/28	6/30	7/3	7/5	7/14	7/17	7/21	7/27	7/29		
Castella	896						T	67	60	20	T			
Champ	875	10	30	90	93	14	2							
Climax	880	T	3	33	97	83	33							
Fleamar	897		T	23	75	88	60							
Gusto	875				T			13	37	47	33	27		
Heidemij	881													
Heilbrink	876		73	90	T	T	2	73	57	27	T			
HJA-1160	865	30	2	17	90	10	5							
Lischower	877	20	63	87	97	73	50							
Megas	898			T	20	83	53	T						
Meson	899													
Mom Tim H7	866			12	83	100	83	63	67	53	2			
Murra	878	17	33	80	93	27	7							
NK. Exp. K2-105	796	T	3	12	63	90	50	T						
NK. Exp. K2-106	797	7	15	40	90	93	57							
N.K. Exp. K2-107	798	10		T	T	T	2	60	17	2				
Pedion	900							47	67	67	8	2		
Pet	809	7	17	70	90	63	10							
Piccolo	901		12	27	97	93	60							
Resant	810	90	93	27	23	2	T							
Toro	459	63	87	53	60	T	T	17	63	80	27	10		
Winda	879							10	3	T				
Mino M4-9329	871				5	33	33	10	3	T				
Verdant NK N7-25-2	369		3	23	77	67	30	5	17	3				

Table 6. Percent heading, plant height, lodging, harvest date, and seed yields for four Timothy varieties seeded at two rates and fertilized with three fertilizer levels. Melin Farm, Roseau, MN. Seeded in 1975. 1976 Data.

Variety	Fertilizer Rate		Seeding Rate	% heading 6/19	Plant height (cm) *		Lodging ** at harvest	Harvest date	Seed yield (#/AC)	
	50 + 25	+ 25			6/1	6/18 6/26				
Climax	50 + 25	+ 25	Thin	100	41	81	107	1	7-29	633
	50 + 25	+ 25	Thick	100	42	78	108	1	7-29	618
	100 + 50	+ 50	Thin	100	40	78	103	1	7-29	596
	100 + 50	+ 50	Thick	100	40	75	103	1	7-29	597
	150 + 75	+ 75	Thin	100	41	75	105	1	7-29	629
	150 + 75	+ 75	Thick	100	41	73	100	1	7-29	571
	Ave. - 607									
Timfor	50 + 25	+ 25	Thin	100	44	88	113	1	7-26	624
	50 + 25	+ 25	Thick	100	38	83	109	1	7-26	523
	100 + 50	+ 50	Thin	100	41	83	108	2	7-26	586
	100 + 50	+ 50	Thick	100	38	78	108	3	7-26	562
	150 + 75	+ 75	Thin	100	43	86	111	2	7-26	639
	150 + 75	+ 75	Thick	100	43	82	109	3	7-26	566
	Ave. - 583									
Heidemij	50 + 25	+ 25	Thin	50	20	58	82	1	8-9	752
	50 + 25	+ 25	Thick	50	23	54	81	2	8-9	709
	100 + 50	+ 50	Thin	50	21	53	86	1	8-9	745
	100 + 50	+ 50	Thick	50	23	57	88	3	8-9	630
	150 + 75	+ 75	Thin	50	23	58	88	1	8-9	784
	150 + 75	+ 75	Thick	50	24	57	80	4	8-9	632
	Ave. - 709									
S-48	50 + 25	+ 25	Thin	T	23	48	72	4	8-12	453
	50 + 25	+ 25	Thick	T	25	53	73	4	8-12	466
	100 + 50	+ 50	Thin	T	23	49	73	5	8-12	489
	100 + 50	+ 50	Thick	T	25	52	68	5	8-12	451
	150 + 75	+ 75	Thin	T	26	53	68	5	8-12	454
	150 + 75	+ 75	Thick	T	28	52	68	5	8-12	378
	Ave. - 449									

Thin seeding rate significantly better than thick seeding rate.

* 2.5 cm = 1 inch

** 1 = erect, 5 = badly lodged

LSD at 5% level 283
LSD at 1% level N.S.

Orchardgrass Strain Trial

In 1975 we seeded 52 strains of Orchardgrass in two-row plots on the Welin Farm at Roseau. These strains show varied reaction to the environment of northern Minnesota. Some winter-killed 100% while others appear to have suffered moderate but not severe winter injury. Some produced relatively good seed yields, others produced no seed.

Seed production of Orchardgrass in northern Minnesota appears to suffer from several factors -

1. Some strains winter-kill and others are injured (few fail to suffer injury through the winter).
2. Seed yields appear to be relatively low, although some strains produce nearly adequate yields.
3. Quackgrass seeds cannot be separated from Orchardgrass seed and unless a field is quackgrass free, it is unwise to seed this species.

We will not commit rather extensive studies to this species until we have more assurance of adequate and quack free seed production in northern Minnesota. We will continue to seed strain tests, and will add other types of work as soon as this seems to be warranted.

Table 7. Percent stand, winter injury, percent heading, plant height (cm), harvest date, and seed yields for 52 Orchard-grass strains seeded in 1975 on Welin Farm, Roseau, MN. 1976 data.

Variety	MSP#	% stand		Winter injury*		% stand		% heading		Plant height (cm)**		Harvest date	Seed Yield (#/AC.)
		11-2-75	4-15	4-15	5-1	6-1	6-10	6-1	6-18	at harvest			
Avon	656	70	4	4	3	67	52	70	63	83	93	7-5	271
Brace	657	67	4	4	3	55	5	53	42	82	92	7-13	235
Chinook	886	67	3	3	3	60	77	77	67	82	85	7-5	378
Dart	818	63	4	4	3	60	23	38	58	88	88	7-9	205
Dayton	431	70	4	4	3	60	27	37	53	83	90	7-9	146
Fala	465	67	3	3	3	63	25	93	62	92	98	7-8	610
Ferdia	466	50	5	4	4	15	2	10	28	70	85	7-14	89
Felco-LO'L Dart	702	67	4	4	3	63	23	40	57	87	90	7-6	208
Felco-LO'1 DS-3	703	67	4	4	3	68	22	60	60	93	102	7-5	321
Felco-LO'1 DS-4	704	73	4	4	3	67	18	60	53	88	105	7-10	256
Frode	658	67	4	4	3	42	5	38	42	80	92	7-11	83
Frontier	659	50	4	4	3	43	8	43	47	90	100	7-11	208
Hay King	660	67	3	3	2	57	2	43	47	83	102	7-16	330
Ina (K-88)	708	67	4	4	3	60	13	60	48	85	105	7-13	217
Sumas	864	67	3	3	3	63	12	77	55	90	100	7-8	387
Iowa Exp. 1-G	819	70	4	4	3	60	17	67	48	83	87	7-9	190
Iowa Exp. 2-P	699	63	4	4	3	60	30	77	53	87	90	7-7	256
Iowa Exp. 2-P	820	70	3	3	3	68	43	87	58	83	85	7-5	399
Iowa Exp. 2-PR	701	73	4	4	3	67	23	53	48	80	87	7-8	170
Iowa Exp. 2-PR	821	70	3	3	3	67	30	63	52	82	88	7-8	324
Kay	661	63	3	3	3	57	10	83	57	92	105	7-8	482
Latar	496	63	4	4	3	57	8	50	52	92	95	7-10	208
Majestic	662	63	4	4	4	60	15	43	50	87	102	7-11	247
Napier	430	70	4	4	3	60	20	60	53	85	93	7-5	235
Nordstern N1-77-G	709	73	3	3	2	70	1	67	52	88	107	7-16	283
NAPB Exp. 41.0060	838	57	4	4	3	47	37	63	55	93	102	7-7	300
NAPB Exp. 41.0074	839	67	4	4	3	50	2	17	42	82	102	7-9	223
NAPB Exp. 41.0080	840	63	4	4	4	40	4	5	32	58	75	7-14	---
NAPB Exp. 41.0087	841	47	4	4	3	33	47	43	57	85	78	7-8	170
NAPB Exp. 41.0088	842	20	4	4	4	15	35	50	50	83	82	7-10	187

Table 7 (cont.). Percent stand, etc. for 52 Orchardgrass strains seeded in 1975 on Melin Farm, Roseau, MN. 1976 Data.

Variety	MSP#	% stand		Winter injury*		% stand		% heading		Plant height (cm)**		Harvest date	Seed Yield (#/AC.)
		11-2-75	5-1	4-15	5-1	6-1	6-10	6-1	6-18	at harvest			
NAPB Exp. 41.0089	843	57	43	4	3	18	27	47	83	87	7-8	247	
NAPB Exp. 41.0090	844	43	30	3	3	53	60	55	82	88	7-8	363	
NAPB Exp. 41.0092	845	22	10	4	4	23	30	32	80	82	7-9	181	
NAPB Exp. 41.0104	846	67	17	4	4	T	7	23	67	98	7-14	42	
NAPB Exp. 41.0105	847	60	3	5	5	--	--	--	--	--	---	---	
NAPB Exp. 41.0106	848	68	13	5	5	--	--	25	55	--	---	---	
NAPB Exp. 41.0107	849	30	3	5	5	--	--	--	--	--	---	---	
NAPB Exp. 41.0108	850	60	28	4	4	7	7	45	80	--	7-11	39	
NK. Exp. K2-7	710	60	50	3	2	3	63	50	88	102	7-14	348	
NK. Exp. K2-8	711	67	57	3	2	4	83	58	95	98	7-14	351	
NK. Exp. K2-101	887	57	60	3	3	8	70	53	95	92	7-12	253	
NK. Exp. K2-9	888	57	57	4	3	T	80	53	92	112	7-14	336	
NK. Exp. K8-117	712	53	57	3	2	7	83	57	93	102	7-13	333	
NK. Exp. K8-118	713	63	63	3	3	7	77	52	90	100	7-14	452	
NK. Exp. K8-119	714	53	50	4	3	32	87	58	90	98	7-7	440	
NK. Exp. K8-122	715	53	43	3	3	2	60	52	85	92	7-14	253	
Orbit (K8-120)	716	67	60	4	3	15	42	52	90	97	7-7	250	
Saborto	498	53	2	5	5	--	--	--	--	--	---	---	
Sterling	822	73	60	4	3	30	83	58	85	98	7-8	351	
Tardus II	468	60	60	4	3	8	30	50	83	108	7-9	176	
Tarus	469	67	18	5	5	T	3	25	68	100	---	---	
Tenderbite	663	43	33	4	4	2	12	37	78	93	7-14	68	

* 1 = least injury, 5 = severe injury
 **2.5 cm = 1 inch
 --- = Notes not recorded, not harvested

LSD at 5% level 183
 LSD at 1% level 243

Perennial Ryegrass Trials

We harvested two Perennial Ryegrass trials in 1976. The first of these included 18 strains seeded in three replications in two row plots in 1975. As noted in the table, all showed some indication of winter injury and some winter-killed severely. While apparently all showed some winter injury, several produced fair seed yields. Norlea at 934, NK-200 at 919 and KO-15 at 865 were the better seed yielding entries. Dates of harvest, etc., are given in Table 8.

In 1975 we seeded two varieties, NK-200 and Norlea, under wheat and flax and without a companion crop. The wheat yielded about 35 bushels per acre and the flax a little over 20 bushels per acre in 1976. There appeared to be little if any winter injury in this seeding and the yields were fair. The companion crop nor lack of companion crop changed the resulting yields of the perennial ryegrass. The thick seeding consistently produced more seed than the thin seeding. The difference in seeding was width of row. The thick seeding was in rows about 9 inches apart and the thin seeding in rows about 18 inches apart. We applied about 100 lbs. of Nitrogen per acre on this seeding in the fall of 1975.

In the past, Perennial Ryegrass has winter-killed severely, if not completely, after the seed production year. We have imposed several cultural practices on this seeding in an effort to obtain some suggestions of how we can influence the plants for better winter survival. Some of these are burning vs. no burning, height of clipping, frequency of clipping, etc.

If we cannot find a cultural practice which will enhance the survival of this crop, it will be produced only as a one year seed crop. This may be feasible at times, but may be undesirable for most growers.

Table 8. Percent stand, winter injury, percent heading, plant height, harvest date, and seed yield for eighteen perennial ryegrass varieties seeded in 1975 on Melin Farm, Roseau, MN. 1976 data.

Variety	MSP#	% stand 11-2-75	Winter injury* 4-15	% stand 5-1	% heading 6-10	Plant height (cm)** 6-11 at harvest	Lodging + at harvest	Harvest date	Seed Yield (#/AC)
Derby	823	80	4	50	47	33	1	7-23	393
Ditana KO-42	803	83	5	0	--	--	--	----	----
Ensporta	824	83	4	23	0	13	3	7-30	443
Lamora	911	90	4	40	T	18	3	8-3	610
NAPB Exp. 46.0011	851	80	5	0	--	--	--	----	----
NAPB Exp. 48.0026	852	90	5	0	--	--	--	----	----
NAPB Exp. 48.0027	853	90	5	7	--	--	--	----	----
NAPB Exp. 48.0028	854	83	5	2	--	--	--	----	----
NK. Exp. KO-10	889	77	4	57	T	23	2	7-30	827
NK. Exp. KO-12	802	83	4	45	2	18	3	7-25	405
NK. Exp. KO-15	890	83	3	73	T	25	3	7-30	865
NK. Exp. N7-133	801	87	4	27	2	23	1	7-25	298
NK. Exp. NK-200	800	83	3	67	T	23	4	7-30	919
NorTea	652	83	3	77	0	23	4	7-30	934
NK. Exp. KO-10	889	80	3	53	T	22	2	8-3	720
Game	915	87	4	27	19	27	2	8-3	265
VR0 1412	655	83	4	50	4	20	3	7-30	699
NK. Exp. KO-15	890	80	3	67	0	20	3	7-30	708

* - 1 = Least injury, 5 = severe injury
 ** - 2.5 cm = inch
 + - 1 = erect, 5 = badly lodged
 ---- = Not harvested

LSD at 5% level
 LSD at 1% level

Table 9. Plant height, percent heading, harvest date, and seed yield for two strains of perennial ryegrass underseeded in two companion crops at two seeding rates. Seeded on Welin Farm, Roseau, MN. in 1975. 1976 Data.

Companion Crop	Crop	Seeding rate	Plant Height (cm) *				% heading 6-10	Harvest date	Seed Yield (#/AC)
			6-1	6-11	6-18	6-26			
Check	NK-200	Thin	20	26	46	66	6	7-30	992
		Thick	18	23	45	68	10	7-30	1055
	Norlea	Thin	25	39	55	69	25	7-23	1135
		Thick	21	30	51	65	16	7-23	1227
Flax	NK-200	Thin	15	24	40	59	T	7-30	863
		Thick	16	26	41	63	4	7-30	1050
	Norlea	Thin	21	38	55	73	33	7-23	1050
		Thick	19	38	54	71	23	7-23	1171
Wheat	NK-200	Thin	18	29	48	65	7	7-30	963
		Thick	16	26	41	63	5	7-30	1039
	Norlea	Thin	23	34	55	75	28	7-23	1131
		Thick	16	35	53	74	23	7-23	1204

LSD at 5% level
LSD at 1% level

* - 2.5 cm = 1 inch

Thick seeding 1121, significantly higher than thin seeding, 1020.

Reed Canarygrass Seed Production

The only Reed Canarygrass seed production work we had in 1976 was a seeding of 10 strains for variety evaluation. The severe drought caused very low seed yields which are of doubtful validity. None of the yields are high enough to warrant serious consideration for commercial seed production, although several of these have shown good yields in the past.

We will continue these for seed yields in 1977, but the dry conditions of the 1976 fall may have already caused considerable stress on the plants. Phalaris tuberosa Syn 1 is an import which needed evaluation for winter survival. Obviously it is probably not sufficiently hardy for northern Minnesota.

Table 10. Winter injury, percent heading, plant height (cm), harvest date, and seed yield for 10 strains of Reed Canarygrass seeded in 1975 on the Welin Farm, Roseau, MN. 1976 Data.

Variety	MSP#	Winter	%	% stand	Plant			Harvest date	Seed yield (#/AC)
		injury*	heading		Height (cm)**				
		4-15	6-10	11-2-75	6-1	6-11	6-18		
Caster	607	2	48	80	53	98	113	7-3	179
Common	171	1	25	37	50	103	118	7-2	54
Frontier	172	1	23	37	43	93	108	7-3	62
Minnesota Mn-72	811	2	27	90	52	97	113	7-3	65
NRG 721	867	1	40	60	43	102	115	7-4	173
PSI	817	1	27	67	52	103	117	7-5	92
Phalaris Tuberosa Syn 1	857	5	--	90	--	--	---	---	---
Rise	855	2	22	77	52	95	117	7-3	92
Iowa RC-1 (Vantage)	856	2	27	83	48	98	113	7-3	80
Iowa RC-2	76	1	35	57	50	100	115	7-3	161

* 1 = least injury, 5 = severe injury

N.S.

**2.5 cm - 1 inch

N.S.

Smooth Bromegrass Strain Trial

In 1976 we harvested only the one trial of smooth bromegrass. This included 10 strains from various sources. In general, the yields appear quite satisfactory, but we do not suggest these data are without some flaws. Our method of cleaning small samples is hardly adequate. While we believe the relative yields variety to variety are reliable, the actual yield may be decreased in order to produce a high quality product for this species. The low yield of Lincoln is probably due to poor stand, rather than variety difference. The seed lot for this variety had very poor germination and did not establish an adequate stand.

Table 11. Percent stand, winter injury, percent heading, plant height, harvest date and seed yields for ten Smooth Bromegrass strains seeded in 1975 on the Welin Farm, Roseau, MN.

Variety	MSP#	% stand 11-2-75	Winter injury*		Plant height (cm)**			Harvest date	Seed yield (#/AC)	
			4-15	% heading 6-1 6-10	6-1	6-18	at harvest			
Barton	815	63	1	10	100	68	127	132	7-19	725
Baylor	831	77	1	17	100	73	123	130	7-19	986
Beacon	816	73	1	10	100	73	118	130	7-19	855
Blair	830	70	1	9	100	67	122	133	7-19	731
Brigand	858	30	1	T	100	57	103	117	7-19	772
BSI	475	80	1	15	100	73	123	127	7-19	947
Fox	718	77	1	9	100	73	123	130	7-19	817
NK Exp. K1-105	885	77	1.3	12	100	68	118	127	7-19	725
Lincoln	717	8	1	33	100	57	118	118	7-19	493
Sac	531	38	1	5	100	65	120	130	7-19	618

* 1 = no injury

**2.5 cm = 1 inch

LSD at 5% level 280

LSD at 1% level 384

Fescue Trials

Fine Fescues. Seed yields and other data were obtained for 23 strains of fine fescue strains in 1976. Some of these are names varieties and others are strains being evaluated for possible use as land cover. Although there seemed to be little, if any, winter-kill, the stands were quite poor in some entries and adequate in others. Seed quality may have influenced establishment. Seed yields are variable, and only three or four of the entries appear to be adequate. Seed size is near quackgrass size, and where quackgrass is a problem, some control measures must be available in order to produce a quality product. There seems to be a demand for some of the fine fescues and some of Dr. Wyse's work indicates that the red fescues may possess tolerance, if not resistance, to Glyphosphate.

Meadow Fescues. Seven meadow fescue strains were seeded in 1969, harvested in 1970, and again seeded in 1975, and harvested in 1976. Canada Common produced well both times. The other strains were significantly lower. We need additional work on this species but there seems to be interest in production of meadow fescue.

Tall Fescues. Fourteen strains of tall fescue were harvested in 1976. They varied greatly for seed yield and to some extent for winter injury. Kentucky 31 was the highest yielding strain, as it has been in previous tests. We are not optimistic concerning tall fescue seed production in Minnesota because (1) other areas apparently can produce the required seed supply, and (2) quackgrass cannot be separated from this species, and the two bloom and mature at nearly the same time.

Table 12. Winter injury, percent heading, plant height, harvest date, estimated and actual seed yields for 23 Fine Fescue strains seeded in 1975 on the Welin Farm, Roseau, MN. 1976 data.

Variety	MSP#	Winter injury* 4-15	% stand 11-2-75	% heading		Plant height (cm)**			Harvest date	Est. seed yield +	Seed yield (#/AC)
				5-19	6-10	6-1	6-11	6-18			
Festuca ovina 6643-3252	444	2	13	0	43	47	52	65	67	3.4	181
Festuca rubra 6673	443	2	40	0	90	50	58	65	80	2.0	470
Festuca rubra 66111	442	2	40	0	83	48	53	68	78	2.7	443
Festuca rubra 66136	441	2	27	0	60	47	52	67	75	3.2	259
Festuca rubra 66218	440	1	35	0	63	45	57	70	75	2.4	449
Festuca rubra 66223	439	2	40	0	50	47	55	72	80	3.5	345
Koket (Chewings)	910	2	60	0	83	48	50	65	73	3.5	292
Festuca rubra 66354	437	2	47	0	90	52	52	70	77	2.0	547
Festuca ovina 66432	436	1	13	33	40	38	48	58	55	3.6	128
Festuca rubra 66123	435	1	45	0	47	40	52	63	75	3.0	375
Festuca ovina 67135	434	1	17	37	62	52	50	70	73	3.5	253
Festuca rubra commutata	859	1	47	0	43	43	50	63	73	3.7	193
Festuca rubra-nova rubra	860	2	40	0	67	47	50	70	77	2.8	354
Festuca nova rubra	675	3	60	0	53	38	48	67	73	3.5	229
Festuca nova rubra											
NAPB 16.0004	832	2	13	0	15	28	43	53	60	4.7	92
Atlanta	696	1	40	0	15	32	45	60	67	3.8	158
D-15	669	2	18	0	7	12	25	45	58	5.0	---
Dawson	697	2	50	0	38	52	50	63	75	4.3	190
H-13	670	1	25	0	13	17	35	53	73	4.1	95
J-3	672	2	18	0	5	11	32	40	48	4.8	33
Hek1a	671	1	20	0	5	14	25	32	52	4.7	---
K-5	673	1	15	0	30	12	25	40	48	5.0	---
NAPB-12.004	869	1	47	0	57	38	43	57	65	3.9	235

* 1 = least injury, 5 = severe injury
 + 1 = best seed, 5 = least seed
 ** 2.5 cm - 1 inch
 ---- = Insufficient seed to harvest.

LSD at 5% level 243
 LSD at 1% level 326

Table 13. 1970 seed yields and 1976 winter injury, % heading, plant height, harvest date readings, seed yields from varieties of Meadow Fescue seeded on Melin Farm in 1970 and 1975.

Variety	MSP#	Company number	1970 seed yields	Seed yields	Winter injury*	1976 Data				Harvest date
						% heading 6-10	Plant height (cm)** 6-11	Plant height (cm)** 6-18	at harvest	
Bergamo	149	N8-184	429	366	3	57	37	73	82	7-13
Bundy	148	N8-155	759	485	3	63	40	73	88	7-12
Canada Common	152	N7-62	1058	967	3	90	47	77	93	7-8
S-53	150	N-69	443	268	3	23	35	68	92	7-14
S-215	151	N4-56	629	604	3	87	48	78	93	7-8
Trader	64			437	3	63	42	80	93	7-13
				LSD at 5% level						
				LSD at 1% level						

* 1 = least injury, 5 = severe injury

** 2.5 cm = 1 inch

1970 data harvested from single row plots seeded in 1969.

1976 data from two row plots, replicated three times, seeded in 1975.

The same seed lots were seeded both times. Seed had been stored in a temperature-humidity controlled room to maintain viability. Stands appeared adequate in both seedings.

Table 14. Winter injury, percent stand, plant height, percent heading, height at harvest, harvest date and seed yields for 14 Tall Fescue strains seeded in 1975 on the Welin Farm, Roseau, MN.

Variety	MSP#	Winter injury*		% stand 11-2-75	% stand 5-1	Plant height (cm)**	% heading 6-10	Height at harvest**	Harvest date	Seed yield (#/AC)
		4-15	5-1							
Alta	383	4	3	70	60	45	80	100	7-12	584
Festa I	503	4	3	67	60	43	60	93	7-14	548
HG-8031	385	3	3	77	55	43	35	113	7-14	317
NK-Exp. -K8-108	386	3	2	73	70	50	95	90	7-12	865
Kentucky 31	397	3	2	70	60	53	90	105	7-12	1177
Kenwell	537	2	3	63	50	45	95	93	7-12	758
NAPB-43.0043	833	3	3	60	45	43	55	103	7-14	241
NAPB-43.0064	834	3	3	67	60	50	60	90	7-8	339
NAPB-43.0070	835	3	3	77	65	48	80	108	7-12	335
NAPB-43.0071	836	4	4	67	40	55	50	80	7-12	237
NAPB-43.0073	837	3	3	87	70	48	95	83	7-9	731
Rozeille	502	4	3	53	45	63	85	78	7-8	451
S-170	505	4	3	67	55	48	45	83	7-8	326
Kentucky 31	683	3	3	63	50	50	85	98	7-12	972

LSD at 5% level 430
LSD at 1% level 600

* 1 = least injury, 5 = severe injury

** 2.5 cm = 1 inch