

Progress Report of Production Research

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Birdsfoot trefoil information:

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Seed Yields and Selected Agronomic Data from 27 Kentucky Bluegrass
Strains Seeded in 1972 and 10 Strains Seeded in 1973

Two trials include about 35 strains of Kentucky bluegrass. They were seeded in 1972 and 1973, and data collected in 1973, 1974, and 1975, depending on seeding date. The first crop seed yields are lower than second year yields in all cases, and there is a wide range of seed yields for different strains.

The strains also differ for plant height, date of maturity, and lodging resistance. These trials received approximately 100 lbs. of nitrogen (actual N) applied in October each year.

We have reported plant height as cm, 1 inch equals 2.5 cm.

Table 1. Percent heading, height at harvest, lodging at harvest and seed yields for ten Kentucky bluegrass varieties seeded in 1973. Roseau.

Variety	% heading		Height at harvest (cm)		Lodging*	Seed yield (lbs/A)		
	6-13-74	6-17-75	1974	1975	at harvest 1975	1974	1975	2 yr. avg.
Arista	20	98	48	57	2	55	610	333
WWAG 436	7	92	65	67	2	52	464	258
WWAG 463	3	93	63	70	2	68	504	286
Olymprisp	7	93	60	72	3	41	604	323
Fylking	10	97	43	58	2	21	424	223
Golf	7	97	48	63	1	55	577	316
Katla	3	98	40	55	3	9	513	261
Park	77	100	75	85	4	189	502	346
Pennstar	3	97	50	55	3	14	256	135
Sodco	7	93	58	63	2	52	382	217
LSD 5% level						60	158	
1% level						82	216	

* 1 = erect, 5 = badly lodged.

Table 2. Seed yields and selected agronomic data for 27 Kentucky Bluegrass strains seeded in 1972, 1973, 1974 and 1975 data.

Variety	Seed lot no.	% heading			Lodging at harvest*			Harvest date			Height at harvest (cm)			Seed yields (lbs/A)				
		6-21-74	6-6-75	6-6-75	1974	1975	1973	1974	1975	1973	1974	1975	1973	1974	1975	3 yr. avg.		
Sodco		90	23	1	7-9	7-19	7-16	58	70	58	60	401	335	265				
Primo		100	32	2	7-7	7-19	7-14	65	70	70	68	571	564	401				
Sydsport		95	18	1	7-7	7-27	7-16	63	73	55	102	544	270	305				
Deft		100	31	1	6-29	7-11	7-14	63	78	65	64	571	504	379				
Experimental Strain	K-412	85	25	1	7-7	7-19	7-16	50	63	55	34	205	350	196				
Birka	M. 8005	100	23	1	7-7	7-19	7-14	48	58	55	30	357	386	258				
Park		100	37	5	7-3	7-11	7-8	68	83	85	137	651	638	475				
Pennstar		65	20	2	7-8	7-19	7-15	48	58	43	13	152	228	131				
Experimental Strain	K-1-46	100	20	5	7-7	7-23	7-14	50	65	53	60	437	397	298				
"	"	100	17	2	7-3	7-12	7-14	53	70	53	235	767	426	476			<i>erect</i>	
"	"	100	20	1	7-9	7-23	7-16	60	73	68	8	357	252	216			<i>erect</i>	
"	"	45	26	2	7-7	7-21	7-16	53	58	58	13	134	288	145			<i>erect</i>	
"	"	100	19	1	7-9	7-23	7-17	55	58	43	51	660	580	430			<i>erect</i>	
"	"	100	43	5	7-3	7-11	7-11	70	83	70	124	526	386	345			<i>erect</i>	
"	"	100	35	4	7-7	7-11	7-11	65	78	80	13	526	449	329			<i>erect</i>	
"	"	100	31	4	7-7	7-11	7-6	60	83	78	34	500	332	289			<i>erect</i>	
"	"	20	25	1	7-7	7-19	7-16	53	60	53	9	134	234	126			<i>erect</i>	
"	"	85	23	2	7-7	7-23	7-17	65	80	63	60	482	350	297			<i>erect</i>	
"	"	100	29	3	7-3	7-19	7-12	68	83	60	98	294	139	177			<i>erect</i>	
"	"	85	30	1	7-7	7-23	7-17	43	60	50	34	250	257	180			<i>erect</i>	
"	"	100	28	2	7-3	7-12	7-12	58	75	53	124	464	297	295			<i>erect</i>	
"	"	100	32	2	7-7	7-12	7-13	65	80	70	51	401	656	369			<i>erect</i>	
"	"	30	18	1	7-9	7-21	7-14	48	63	48	81	303	167	184			<i>erect</i>	
"	"	100	44	5	6-29	7-8	7-13	73	83	78	90	339	350	260			<i>erect</i>	
"	"	100	35	2	7-7	7-19	7-16	55	68	53	68	393	464	308			<i>erect</i>	
"	"	90	30	2	7-7	7-19	7-14	63	65	50	85	410	295	263			<i>erect</i>	
"	"	85	18	1	7-3	7-25	7-14	53	68	53	175	562	373	370			<i>erect</i>	
LSD 5% level																		
1% level																		

* 1 = erect and 5 = badly lodged.

Interaction of Kentucky Bluegrass Varieties With Residue Management Regimes and Fertilizer Rates

This is a continuation of the residue management studies initiated in 1967. Six Kentucky bluegrass strains were superimposed on three residue management regimes and three fertilizer treatments. The residue treatments were:

- July-burn - the residue was burned in place in July
- Clip-torch - the stubble and aftermath were removed
then the plot area was burned with a torch
- July clip - the stubble and aftermath were mowed and raked off

The three fertilizer treatments were:

50+25+25, 100+50+50, and 150+75+75

Data were collected in 1973, 1974 and 1975, and are reported in table 3.

Several agronomic performance factors appear important. Park and Nugget are earlier in heading than the other four strains. Park is the tallest of the strains, and Nugget is shorter than any of the other five. Park appears to lodge much more than Nugget and more than the four other strains. Nuggets showed very little lodging at any fertility level. If the seed yields of this variety continue good, the lack of lodging at higher fertility levels could be significant.

Park and Nugget produced about the same seed yields in 1974 and 1975. The 1973 yields favor Park over Nugget. The other four strains are significantly lower than these two varieties.

The 100+50+50 fertility level appears to be adequate. Adding another 50 lbs/ac Nitrogen appears to offer little return. 80 to 100 lbs/ac Nitrogen seems to be nearly sufficient, and is in the recommended range for Kentucky bluegrass in Minnesota.

July-burn and clip-torch differ little for influence on seed yield and do not seem to differ for influence on other Agronomic performance. July-clip treatment produced slightly less seed, but in some situations might be a choice. If July-clip is used for commercial production, the stubble should be cut very low and as much material as possible removed from the field.

This seeding has been destroyed, another was seeded in 1975, with four varieties included.

Table 3. Percent heading, plant height at harvest and lodging for six Kentucky bluegrass strains under three residue management regimes and three fertilizer rates. 1973-1975 data.

Variety	Ferti- lizer*	July-Burn			Clip-Torch			July-Clip									
		Percent heading	Plant height at harvest (cm)	Lodging at harvest**	Percent heading	Plant height at harvest (cm)	Lodging at harvest**	Percent heading	Plant height at harvest (cm)	Lodging at harvest**							
											6-13-74	6-7-75	1974	1975	6-13-74	6-7-75	1974
Park	Low	87	80	2	83	65	1	83	85	1	2	53	62	83	82	1	2
	Int.	80	83	5	80	78	4	83	78	4	5	60	75	83	80	4	5
	High	80	62	5	80	45	5	32	77	5	5	58	48	83	77	5	5
Nugget	Low	100	97	1	100	95	1	38	38	1	1	97	88	43	37	1	1
	Int.	100	92	1	100	97	1	38	40	1	1	90	83	50	45	1	2
	High	100	80	3	100	75	1	53	42	1	2	97	85	50	43	1	2
Pennstar	Low	53	45	1	23	40	1	40	40	1	1	43	53	43	48	1	1
	Int.	50	35	2	63	43	1	53	50	1	3	37	32	53	55	1	3
	High	43	43	3	27	35	2	60	48	2	3	33	28	60	53	3	3
Merion	Low	T	50	1	15	47	1	50	53	1	1	T	18	50	55	1	1
	Int.	26	37	1	33	35	1	58	60	1	1	T	20	63	62	1	1
	High	20	5	3	10	32	1	65	60	1	2	T	5	65	58	1	2
Fylking	Low	20	17	1	17	30	1	35	40	1	2	30	43	43	45	1	2
	Int.	37	30	1	47	48	1	48	45	1	3	30	22	55	52	1	4
	High	33	12	3	20	32	2	53	43	2	3	20	10	53	50	3	3
Experimental	Low	4	17	1	T	17	1	40	47	1	1	5	15	50	53	1	1
	Int.	13	12	2	3	20	1	58	55	1	3	17	5	60	58	1	3
	High	17	7	4	10	7	3	63	58	3	4	3	3	63	55	4	4

* Low = 50+25+25, Int. = 100+50+50, High = 150+75+75

** 1 = erect, 5 = badly lodged

Table 3a. Seed yields, for six Kentucky Bluegrass strains under three residue management regimes and three fertilizer rates. 1973-1975 data. Yields are lbs. per acre.

Variety	Fertilizer	July - burn			Clip - torch			July - clip			3-yr Av.
		1973	1974	1975	1973	1974	1975	1973	1974	1975	
		3-yr Av.			3-yr Av.			3-yr Av.			
Park	50+25+25	327	401	479	368	458	435	292	372	387	350
	100+50+50	333	642	504	349	712	440	398	470	481	450
	150+75+75	348	740	528	311	638	577	336	595	468	466
Nugget	50+25+25	324	550	344	167	531	419	190	434	375	333
	100+50+50	253	703	471	224	608	430	258	598	492	449
	150+75+75	297	734	519	270	793	400	269	601	506	459
Pennstar	50+25+25	105	183	207	85	128	169	110	159	184	151
	100+50+50	148	256	238	151	229	189	189	196	232	206
	150+75+75	215	419	351	194	247	241	121	254	269	215
Merion	50+25+25	125	207	318	117	220	300	80	204	223	169
	100+50+50	117	373	443	137	336	394	93	213	331	212
	150+75+75	197	453	395	146	393	341	68	275	297	213
Fyking	50+25+25	61	91	150	85	92	128	71	122	152	115
	100+50+50	144	164	178	155	260	204	85	180	217	161
	150+75+75	123	178	165	178	232	116	93	204	108	135
Experimental Strain	50+25+25	85	232	342	66	223	283	107	245	378	243
	100+50+50	107	283	395	78	309	352	151	394	427	324
	150+75+75	84	294	434	119	327	346	116	367	400	294
LSD	5% level	156	180	121	156	180	121	156	180	121	
	1% level	206	258	160	206	258	160	206	258	160	

Date of Nitrogen Fertilization on Six Kentucky Bluegrass
Varieties with Two Residue Management Regimes

This trial was set up in 1973 with two residue management regimes:

1. July-burn - the residue was burned in place in July.
2. Desiccate-burn - the aftermath was sprayed with a desiccant, let dry and then burned in place with the straw.

and five dates of nitrogen applications:

1. Check - no nitrogen fertilizer was applied
2. 100 lbs/A of nitrogen was applied in October in 1973 and 1974.
3. 100 lbs/A of nitrogen was applied in October each year.
4. 50 lbs/A of nitrogen was applied in October and an additional 50 lbs/A applied in April each year.
5. 50 lbs/A of nitrogen was applied in October and an additional 50 lbs/A applied in May each year.

All plots received 0+40+40 in October, each year.

The yields from check plots are significantly lower than the four fertilizer treatments. There is no significant difference between residue management, although July-burn appears to be slightly higher than desiccate-burn. Park showed considerably more lodging than Nugget, and more than the other four varieties. Park and Nugget produced about the same seed yields, and the other varieties were lower. The October application of nitrogen produced considerably more seed than the three other treatments in 1975, although this was not observed in 1974. We can not explain these differences. The yields from the last three fertilizer treatments were lower than similar treatments in the study reported as Interaction of Kentucky bluegrass varieties with Residue Management Regimes and Fertilizer Rates.

This study was discontinued in 1975.

Table 4. Percent heading, plant height, and lodging for six Kentucky bluegrass varieties under two residue management regimes and five fertilizer treatments.

Variety	July-burn					Desiccate-burn					
	% heading		Plant ht. at harvest (cm)		Lodging at harvest*	% heading		Plant ht. at harvest (cm)		Lodging at harvest*	
	6-14-74	6-7-75	1974	1975	1974	1975	6-14-74	6-7-75	1974	1975	
Check (no fertilizer applied)											
Pennstar	17	32	35	28	1	1	3	23	38	30	1
Fylking	3	42	38	32	1	1	T	8	33	28	1
Merion	30	50	43	40	1	1	3	13	45	33	1
Park	80	72	73	70	1	1	60	41	80	65	1
Experimental	T	35	40	33	1	1	T	8	40	32	1
Nugget	43	87	33	27	1	1	67	83	40	33	1
100 lbs N per acre applied in October											
Pennstar	77	62	55	55	1	2	70	68	60	53	1
Fylking	53	55	53	53	1	2	53	58	53	50	1
Merion	40	53	65	67	1	2	33	67	68	67	1
Park	97	85	88	88	1	4	90	80	90	85	3
Experimental	40	25	63	55	1	3	13	10	68	58	1
Nugget	93	98	48	43	1	2	97	100	50	50	1
100 lbs N per acre applied in April											
Pennstar	53	15	55	48	1	2	53	30	60	53	1
Fylking	50	27	58	50	1	2	37	30	60	53	1
Merion	37	38	70	60	1	2	37	32	68	63	1
Park	100	58	90	83	2	3	93	58	93	85	2
Experimental	37	13	80	57	1	3	23	7	73	53	2
Nugget	90	65	53	40	1	1	87	83	55	48	1
50 lbs per acre N applied in October and additional 50 in April											
Pennstar	67	33	58	47	1	3	63	52	63	50	1
Fylking	53	37	58	47	1	3	70	52	58	55	2
Merion	57	77	73	62	1	1	37	65	75	62	1
Park	100	75	88	85	2	4	100	78	88	88	3
Experimental	47	8	65	53	1	3	23	12	63	52	1
Nugget	93	90	53	45	1	2	90	95	58	38	1
50 lbs per acre N applied in October and additional 50 in May											
Pennstar	70	28	60	52	1	4	70	30	63	50	1
Fylking	63	37	65	52	1	3	63	30	55	48	1
Merion	50	60	73	63	1	2	37	55	68	63	1
Park	100	73	88	82	3	4	90	65	93	83	3
Experimental	40	17	63	53	1	2	30	15	73	53	2
Nugget	97	95	53	48	1	1	97	92	50	45	1

* 1 = erect, 5 = badly lodged

Table 4a. Seed yields for six Kentucky bluegrass varieties under two residue management regimes and five fertilizer treatments.

Varieties	Seed yields (lbs/Acre)					
	July-burn			Desiccate-burn		
	1974	1975	2-yr. ave.	1974	1975	2-yr. ave.
Check (no fertilizer applied)						
Pennstar	83	93	88	65	30	48
Fylking	62	42	52	41	15	28
Merion	143	107	125	103	39	71
Park	285	214	250	306	76	191
Experimental	89	107	98	110	59	85
Nugget	279	187	233	356	205	281
100 lbs N per acre applied in October						
Pennstar	660	267	464	395	291	343
Fylking	380	286	333	318	211	265
Merion	371	378	375	259	274	267
Park	598	589	594	526	494	510
Experimental	473	195	334	250	181	216
Nugget	705	345	525	571	528	550
100 lbs N per acre applied in April						
Pennstar	264	57	161	270	116	193
Fylking	315	140	228	228	44	136
Merion	431	217	324	315	214	265
Park	558	259	409	505	202	354
Experimental	440	116	278	268	83	176
Nugget	565	202	384	598	398	498
50 lbs per acre N applied in October and additional 50 in April						
Pennstar	321	122	222	517	193	355
Fylking	288	170	229	431	166	299
Merion	380	306	343	410	253	332
Park	607	282	445	669	398	534
Experimental	407	178	293	277	68	173
Nugget	723	413	568	755	419	587
50 lbs per acre N applied in October and additional 50 in May						
Pennstar	467	140	304	419	139	279
Fylking	380	104	242	371	69	220
Merion	431	262	347	282	175	229
Park	538	434	486	535	259	397
Experimental	535	169	352	309	143	226
Nugget	698	484	591	591	363	477
LSD 5% level	179	120		179	120	
1% level	239	160		239	160	

Performance of Timothy Varieties

We are reporting data from two trials, one seeded in 1972 included 99 entries, and the other seeded in 1973 included 26 entries. The primary characteristics reported are seed yields per acre, plant height, maturity date and harvest date(maturity). We again collected data on date of bloom, but this is not being reported here.

There was little, if any, winter kill in the Timothy varieties during the winter of 1974-75, although there was a period with little snow and rather severe soil temperatures.

Our data show the striking variation between varieties for maturity date and seed yields. Some varieties appear to consistently yield about 200 lbs/acre, or less, while others consistently yield 400 lbs/acre or more. Some varieties are mature and harvested about August 1, while others are not harvested until August 17, or later. The grower should have information on a variety before he attempts to grow it for seed production in our area. The data suggest that the varieties produce about the same year after year, and there is not a great amount of variation of seed yield between years.

A new variety trial was seeded in 1975, yields will again be harvested from the 1972 seeding. The 1973 seeding has been destroyed.

Table 5. Seed yields, plant height, percent heading, harvest date, and lodging score for timothy strains, Welin F₂, 1973-75. Seeded 1972.

Variety	MSP No.	Seed yields (lbs/Acre)					% heading					Height at harvest (cm)		Lodging at harvest*		Harvest date	
		1973	1974	1975	3 yr. ave.		6-20-73	6-21-74	6-21-75	1973	1974	1975	1973	1974	1973	1974	1975
Asira	448	277	230	437	315	80	25	63	90	100	98	4	7-28	7-31	8-2		
Barmoti	276	272	279	631	394	75	25	70	80	100	103	2	7-28	7-31	8-1		
Bariton	449	112	109	232	151	T	0	3	73	90	98	2	8-8	8-12	8-14		
Barmoti	277	315	375	520	403	75	35	50	85	100	95	2	7-28	7-31	8-2		
Bariton	278	139	161	310	203	10	T	10	80	95	100	3	8-8	8-9	8-14		
Bottnia II	279	421	421	529	457	80	40	65	88	105	98	4	7-28	7-31	8-2		
C. B.	280	107	141	261	170	25	T	25	80	100	93	3	7-30	8-6	8-6		
Champ	281	416	316	408	380	90	45	68	105	105	100	4	7-25	7-31	8-1		
Clair	282	400	281	402	361	100	60	78	93	110	95	3	7-24	7-31	7-29		
Climax	283	283	323	371	326	80	T	28	100	118	98	3	7-28	7-31	8-5		
Climax	284	331	395	462	396	90	25	48	98	108	113	3	7-28	7-31	8-3		
Comet	450	107	56	248	137	0	0	5	73	85	93	3	8-11	8-17	8-19		
Dotema (Pp)	421	139	107	263	170	0	0	T	75	78	98	3	8-17	8-17	8-17		
Drummond	290	133	239	419	264	10	T	8	88	105	115	2	8-1	8-6	8-6		
Dural	291	443	401	449	431	95	20	55	100	108	105	3	7-28	7-31	8-1		
Dural	451	357	404	473	411	95	40	60	98	108	100	4	7-28	7-31	8-2		
Engmo	292	485	533	584	534	90	35	60	98	103	93	4	7-28	7-31	8-4		
Erecta	293	304	368	457	376	75	25	55	90	98	90	4	7-28	7-31	8-4		
Eskimo	294	416	475	578	490	90	40	78	103	105	105	3	7-28	7-31	8-2		
Essex	301	192	268	353	271	55	T	18	95	108	98	3	7-30	8-6	8-6		
Evergreen (WW)	403	208	49	149	135	95	30	68	60	65	68	2	8-8	8-12	8-6		
Evergreen (WW)	452	293	359	571	408	50	T	30	88	90	93	4	8-1	8-9	8-6		
Farol	415	155	145	306	202	T	0	T	75	93	100	3	8-1	8-12	8-14		
Farol	480	176	178	368	241	T	0	3	88	98	100	4	8-8	8-9	8-14		
Gem	306	181	205	290	225	T	0	5	88	95	100	3	8-8	8-7	8-12		
Georgikon	307	411	475	574	487	85	20	53	100	100	100	4	7-28	7-31	8-5		
Glasnevin Gem	453	123	172	245	180	T	0	13	88	100	100	3	8-1	8-7	8-12		
Heidemijs	318	235	250	362	282	T	0	3	80	100	98	2	8-13	8-15	8-19		
Holea	420	165	---	80	---	95	0	70	68	---	70	2	8-8	---	8-15		
Itasca	325	373	292	355	340	100	20	68	108	108	103	3	7-28	7-31	8-2		

*1 = erect, 5 = badly lodged

(cont.)

Timothy strains, Melin Farm, cont.

Variety	MSP No.	Seed yields (lbs/Acre)			% heading			Height at harvest (cm)		Lodging at harvest*	Harvest date				
		1973	1974	1975	3 yr. ave.	6-20-73	6-21-74	6-21-75	1973	1974	1975	1973	1974	1975	
									1973	1974	1975	1973	1974	1975	
Kampe	454	469	477	520	489	100	40	65	98	103	90	4	7-28	8-2	8-3
Kampe II	564	555	428	527	503	100	35	68	103	105	93	4	7-28	8-6	8-4
King		197	169	183	183	T	0	10	85	90	93	4	8-11	8-17	8-17
Lorain	332	427	399	415	414	90	5	33	108	118	95	4	7-28	7-31	8-5
Mahndorfer	419	437	482	633	517	100	15	70	103	110	95	4	7-28	7-31	8-4
Match	406	85	---	40	---	95	--	--	60	---	85	-	7-30	----	8-12
Melusine	414	352	290	433	358	90	25	63	95	108	98	4	7-28	7-31	8-3
Melusine	455	309	288	375	324	95	25	73	100	103	95	3	7-28	7-31	8-4
Milton	338	421	533	569	508	95	35	80	105	110	105	3	7-28	7-31	8-2
Mommersteeg's (WI)	339	197	127	156	160	0	0	3	78	78	93	4	8-17	8-17	8-21
Motterwitzer	340	379	468	624	490	95	30	75	93	103	98	2	7-28	7-31	8-1
Murra	474	251	312	381	315	90	25	65	100	100	95	2	7-28	7-31	7-31
"N"	405	403	341	493	412	100	65	78	80	100	98	3	7-28	7-31	7-30
N1-125	342	347	297	351	332	70	25	53	98	105	103	3	7-28	7-31	8-2
N7-127	344	421	439	487	449	90	20	40	100	110	95	4	7-28	7-31	8-6
Neuga	357	357	426	504	429	90	30	70	90	113	95	4	7-28	7-31	8-4
"O"	404	336	236	370	314	80	25	58	90	100	100	3	7-30	8-6	8-6
Oakmere	418	224	176	277	226	0	0	T	88	80	100	3	8-17	8-17	8-23
Oakmere	456	229	185	281	232	T	0	0	83	75	100	3	8-17	8-17	8-23
Olympia	457	203	163	268	211	0	0	0	78	83	98	4	8-13	8-17	8-12
Omnia	350	571	410	444	475	95	25	60	95	100	95	5	7-28	7-31	8-5
Otofte Topos	351	501	314	524	446	95	20	65	98	98	95	4	7-28	7-31	8-3
Pecora	352	251	190	283	241	45	0	25	95	93	98	4	8-8	8-12	8-16
Pergo	417	427	279	379	362	95	25	60	95	98	98	4	7-28	7-31	8-3
S-48	271	267	207	346	273	T	0	T	75	85	93	4	8-17	8-17	8-17

*1 = erect, 5 = badly lodged

(cont.)

Timothy strains, Melin Farm, cont.

Variety	MSP No.	Seed yields (lbs/Acre)			% heading			Height at harvest (cm)		Lodging at harvest* 1975	Harvest date		
		1973	1974	1975	3 yr. ave.	6-20-73	6-21-74	6-21-75	1973		1974	1973	1974
S-50	274	176	---	65	---	90	T	63	---	3	8-8	---	8-19
S-352	275	395	321	513	410	95	50	95	108	4	7-25	7-31	8-3
Sceempter	356	213	118	190	174	0	0	83	85	4	8-17	8-17	8-19
Sceempter	355	240	158	225	208	T	0	80	85	4	8-17	8-17	8-23
Scotia	357	347	377	513	412	80	25	98	100	3	7-30	7-31	8-6
Sport	458	176	25	94	98	90	T	68	65	3	8-8	8-12	8-19
Swallow	358	480	533	323	445	90	15	100	103	4	7-28	7-31	8-5
T-41	367	421	404	377	401	85	10	103	118	5	7-28	8-6	8-5
Th-71-3	410	139	205	234	193	55	T	80	98	4	7-30	7-31	8-5
Th1-70	411	534	375	522	477	85	40	93	108	4	7-28	7-31	8-2
tt3-70	412	277	281	319	292	T	0	88	93	4	8-16	8-17	8-15
Tw4-70	413	256	183	184	208	T	0	90	95	3	8-13	8-17	8-19
Tiran	416	283	292	399	325	T	5	90	98	4	8-13	8-17	8-14
Tiran	481	293	254	306	284	T	0	90	103	3	8-13	8-17	8-12
Toro	422	464	435	488	462	100	25	100	113	4	7-24	7-31	7-31
Toro	459	475	435	515	475	100	25	103	113	4	7-24	7-31	7-31
Toro	482	619	381	520	507	100	40	105	110	4	7-24	7-31	7-31
Trofolium (early)	365	411	366	393	390	90	25	103	98	4	7-28	8-6	8-5
Trifolium (late)	366	256	178	377	270	T	0	95	105	4	8-8	8-12	8-14
Vanadis	460	453	508	576	512	95	25	103	105	4	7-28	7-31	8-3
Vanadis	368	421	339	362	374	90	35	103	108	5	7-28	7-31	8-5
Verdant	369	181	310	328	273	80	30	103	110	3	7-28	7-31	8-5
WWT-48	461	277	321	473	357	80	20	100	110	4	7-28	7-31	8-5
WWT-49	408	325	504	457	429	75	10	98	105	5	7-30	8-6	8-6
WWT-93	407	485	408	500	464	85	10	98	108	4	7-28	7-31	8-5
WWT-14 (Pn)	409	208	---	92	---	85	T	60	75	3	8-1	8-17	8-17
XT-709	373	363	332	397	364	90	25	98	105	3	7-28	7-31	8-2
Z 2009	477	261	201	337	266	T	0	68	93	4	8-14	8-17	8-15
Z 2010	478	229	178	199	202	T	0	75	88	4	8-14	8-17	8-15
Z 2022	479	149	91	284	175	T	0	80	88	3	8-11	8-12	8-14

* 1 = erect, 5 = badly lodged

(cont.)

Timothy strains, Welin Farm, cont.

Variety	MSP No.	Seed yields (lbs/Acre)			% heading			Height at harvest (cm)		Lodging at harvest	Harvest date				
		1973	1974	1975	3 yr. ave.	6-20-73	6-21-74	6-21-75	1973	1974	1975	1973	1974	1975	
Z 9011	374	469	422	473	455	95	60	80	100	103	98	5	7-28	7-31	8-4
K0-133 (Z 9001)	487	469	424	498	464	95	50	83	105	105	98	4	7-28	7-31	8-3
K0-136 (Topas)	486	459	346	368	391	90	35	78	105	105	98	5	7-28	7-31	8-5
K0-192 (Toro)	485	512	417	493	474	95	45	80	98	110	103	3	7-24	7-31	8-1
K1-53 (Comet)	483	224	136	228	196	T	0	8	88	88	95	4	8-16	8-17	8-21
K1-63 (Z 9006)	489	501	426	409	445	90	30	55	95	105	98	4	7-28	7-31	8-5
K1-67 (Gem)	488	197	178	353	243	T	0	5	88	98	95	3	8-8	8-15	8-9
K2-54 (Z 2010)	490	224	198	154	192	T	0	T	78	88	90	3	8-14	8-17	8-16
K2-55 (Z 2009)	491	299	254	321	291	T	0	T	75	85	93	4	8-14	8-17	8-17
K2-71 (Z 2022)	494	245	107	206	186	T	0	T	90	90	100	3	8-8	8-17	8-16
K9-117	495	283	352	288	308	85	5	28	105	115	95	3	7-30	8-6	8-6
K9-118	493	379	377	381	379	85	T	25	105	118	98	4	7-28	8-6	8-6
N1-45 (Lorain)	494	459	408	355	407	85	5	30	110	125	103	4	7-28	7-31	8-6
N7-128 (Timfor)	492	453	406	348	402	95	5	40	108	123	98	4	7-28	7-31	8-4
LSD at 5% level		160	180	153											
1% level		213	246	203											

* 1 = erect, 5 = badly lodged

Table 6. Seed yields, winter injury ratings, percent heading, height at harvest, and harvest date for 26 timothy varieties seeded in 1973. 1974-1975 data.

Variety	Minn. lot No.	Seed yield (lbs/A)		Winter injury 5-15-74	% heading		Height at harvest (cm)		Harvest date
		1974	1975		2-yr. ave.	6-27-74	6-27-75	1974	
Drummond		419	372	396					
Faro1	634	303	271	287	1	73	108	103	8-10 8-13
Herma	624	491	459	475	2	23	98	98	8-9 8-18
Hokuo	643	486	348	417	2	87	108	100	8-3 8-10
Lischower	632	450	462	456	1	95	110	100	8-4 8-5
					1	100	103	98	8-4 8-6
Milton	646	450	565	508	1	100	105	100	7-31 8-6
Mirage	620	316	223	270	2	33	98	100	8-6 8-17
MLM-7011	644	472	520	496	1	100	110	98	7-31 8-6
Mom T-5	637	352	330	341	1	83	105	100	8-5 8-15
Mom T-6	638	268	320	294	1	83	103	97	8-4 8-16
Mom T-7	639	562	489	526	1	100	103	100	8-3 8-13
Mortel	640	143	95	119	2	100	73	62	8-9 8-22
Oakmere	647	161	263	212	4	0	98	95	8-17 8-23
Odenwalden	673	442	442	442	1	100	98	95	7-31 8-6
Omnia	648	580	554	567	1	100	103	95	8-2 8-9
Pajbjerg-93	623	388	361	375	2	100	103	95	8-5 8-10
Palermo	641	196	119	158	1	100	58	57	8-5 8-18
Pastremo	649	236	232	234	2	0	83	92	8-17 8-23
Romona	642	276	91	184	2	100	55	55	8-6 8-19
Sampoku	650	388	423	406	1	100	108	95	7-31 8-5
Tim-MWF49	621	392	436	414	2	97	103	97	8-6 8-10
Tim-MWF93	622	522	509	516	2	100	105	97	8-2 8-10
Vallo	651	607	620	614	2	100	103	95	8-2 8-6
Winda	625	156	123	140	2	0	83	85	8-17 8-21
Climax	71-72 seed	433	421	427	2	100	115	112	8-2 8-6
KO-177	679	196	128	162	2	90	118	110	8-6 8-15
LSD at 5% level		132	115						
1% level		176	153						

Orchardgrass Studies

We are reporting data from three orchardgrass tests. Two are variety trials, one seeded in 1972, and the other seeded in 1973. The third trial is a residue management-fertilizer study on Nordstern orchardgrass.

The varieties show differences for winter injury and seed yields. These differences are consistent in the variety tests. The yields in 1975 were generally less than in 1974, but generally the weight and viability of the seed was better. The yields in 1975 were generally low enough that seeding orchardgrass for commercial production should be carefully considered.

The residue management trial again gave results quite different from those we have observed for Kentucky bluegrass. Clipping and raking off the residue shows a decrease in seed yields. Burning the residue shows a slight decrease for the two-year average when compared to leaving the stubble and aftermath in the field. The straw was raked from these plots.

These results show very little response to high levels of nitrogen. In older and thicker stands, higher levels of nitrogen might be more beneficial, but in these trials 80 lbs. of nitrogen per acre appear sufficient.

We emphasize that commercial orchardgrass seed production may be questionable until we have better control of quackgrass in the orchardgrass seed fields.

Table 7. Seed yields, winter injury, percent stand, height at harvest and harvest date for 12 orchardgrass strains sowed in 1972. ° 1973-1975 data.

Strains	Winter injury*		% stand		Height at harvest (cm)**		Harvest date		Seed yield (lbs/Acre)				
	4-25-73	5-15-74	5-27-73	5-31-74	1974	1975	1973	1974	1975	1975	3-yr. ave.		
Dayton	3	2	75	90	120	123	7-13	7-20	7-17	69	598	245	
Fala	3	2	100	90	128	125	7-13	7-20	7-18	165	682	255	
Ferdia	4	4	13	35	---	110	7-13	---	7-17	11	---	76	
K0-117	3	2	80	85	123	120	7-13	7-20	7-17	37	294	174	
K8-118	1	1	95	90	128	125	7-13	7-20	7-17	240	856	227	
Latar	3	1	70	90	125	125	7-13	7-20	7-19	37	482	228	
Napier 430	3	2	65	90	123	115	7-13	7-20	7-17	69	379	138	
Napier 467	3	2	80	90	128	118	7-13	7-20	7-17	53	406	139	
Nordstern	2	2	85	90	125	125	7-13	7-20	7-19	133	593	299	
Saborta	5	5	5	0	---	---	---	---	---	---	---	---	
Tardus II	3	2	60	90	118	120	7-13	7-20	7-17	11	214	245	
Tarus	4	3	35	55	70	90	7-13	7-20	7-17	32	107	18	
LSD at 5% level											---	---	
1% level											32	137	136
											48	225	195

* 1 = least injury, 5 = severe injury ** 2.5 cm = 1 inch

Table 8. Winter injury, percent stand, plant height, harvest date, and seed yields for 14 orchardgrass strains sowed in 1973. 1974-1975 data.

Strains	Winter injury*		% stand		Height at harvest (cm)**		Harvest date		Seed yield (lbs/Acre)			
	5-15-74	5-18-75	5-31-74	5-31-74	1974	1975	1974	1975	1974	1975	2-yr. ave.	
Avon	2	4	80	80	108	117	7-16	7-15	219	199	209	
Brace	3	4	73	73	103	118	7-19	7-21	116	79	98	
Frode	2	4	83	83	105	112	7-19	7-20	85	92	88	
Frontier	3	4	83	83	108	125	7-19	7-21	98	77	88	
Hayking	4	3	63	63	100	122	7-23	7-21	71	98	85	
K-117	2	2	77	77	108	132	7-19	7-20	303	247	275	
K-118	1	2	83	83	108	125	7-19	7-20	393	256	325	
K-119	1	4	87	87	108	123	7-19	7-21	196	192	194	
K-120	2	3	83	83	98	118	7-19	7-19	178	190	184	
K-122	3	2	73	73	110	127	7-19	7-19	187	188	188	
Kay	2	2	83	83	110	130	7-16	7-17	330	357	344	
Majestic	3	3	70	70	103	118	7-19	7-20	98	144	121	
Tenderbite	4	4	57	57	---	102	---	7-20	---	33	17	
Nordstern	2	4	73	73	108	130	7-19	7-21	236	283	260	
LSD at 5% level											114	97
1% level											172	131

* 1 = least injury, 5 = severe injury ** 2.5 cm = 1 inch

Table 9. Seed yields, height at harvest, harvest dates and lodging at harvest for orchardgrass under three residue management regimes and three fertility levels. 1974-1975 data.

Residue treatment	Fertilizer	Height at harvest (cm)		Harvest date		Lodging at harvest*	Seed yield† (lbs/A)		
		1974	1975	1974	1975		1974	1975	2-yr. ave.
Clipped	80+40+40	123	137	7-20	7-21	2	401	394	398
	120+60+60	130	125	7-20	7-21	3	517	407	462
	160+80+80	125	127	7-20	7-21	4	419	556	488
Not Clipped	80+40+40	138	132	7-20	7-21	3	642	431	537
	120+60+60	138	132	7-20	7-21	3	598	505	552
	160+80+80	133	128	7-20	7-21	4	526	479	503
Burned	80+40+40	128	133	7-20	7-21	4	419	499	459
	120+60+60	128	128	7-20	7-21	4	464	514	489
	160+80+80	133	127	7-20	7-21	4	526	531	529

* 1 = erect, 5 = badly lodged

† = seed yields not significantly different.

Miscellaneous Items

Several species have been studied in limited varietal trials. These results are reported in this section.

Three Reed canarygrass strains (Table 8) were seeded in 1972, and seed has been harvested three years. The varieties do not differ for seed yield, plant height, lodging or maturity. The 1973 yields were quite low, but 1974 and 1975 yields appear to be adequate. 100 lbs/Acre nitrogen was applied to these plots in October, 1974.

Tables 11 and 12 include data from several orchardgrass, tall fescue and ryegrass varieties. Some varieties winterkilled the first winter, Saborto orchardgrass has been seeded in several trials and has winterkilled each time without producing a seed crop. Nordstern orchardgrass has maintained a stand and produced average seed crops.

The tall fescue varieties have suffered modest winter injury and have shown fair seed yield potential. Note Kentucky 31 strain in the 1972 seeding has an average 860 lbs/Acre, and in the 1973 seeding averaged 1289 lbs/Acre.

The ryegrass strains in this trial and in a strain trial seeded in 1973 indicate that perennial ryegrass will perform as a biennial in northern Minnesota. NK-200 has shown good seed yields the first crop year in several trials, but it, like other varieties, dies during the winter after the first seed crop. We have reports that this is true also in Canada. We have established a trial to study first year production of seed, and also we will try various residue management practices in an attempt to cause this species to overwinter after the first seed crop.

Quackgrass contamination is critical in orchardgrass, tall fescue and ryegrass. Therefore, until adequate control of quackgrass is obtained, growers should be cautious in seeding any of these species for seed production. This work is projected to make information available when quackgrass control is adequate.

Table 10. Winter injury, plant height, lodging, harvest dates and seed yields for three Reed canarygrass varieties seeded in 1972. 1973-1975 data.

Variety	Winter injury 5-15-74	Height at harvest (cm)		Lodging at harvest* 1975	Harvest dates			Seed yields [†] (lbs/A)			
		1974	1975		1973	1974	1975	1973	1974	1975	3 yr. ave.
PSI	1	198	170	2	7-9	7-11	7-8	128	566	584	426
Rise	1	198	170	2	7-9	7-11	7-8	165	482	554	400
Castor	2	185	165	1	7-9	7-11	7-8	101	584	546	410

* 1 = erect to 5 severe lodging

† = seed yields not significantly different.

Table 11. Seed yields, winter injury, percent stand, plant height, lodging and harvest dates for orchardgrass, tall fescue and perennial ryegrass strains seeded in 1972. 1973-1974-1975 data.

Species and Variety	Seed yield (lbs/A)			Winter injury*			% stand			Height at harvest (cm)		Lodging**		Harvest dates				
	1973	1974	1975	3-yr ave.	4-25-73	5-14-74	5-17-75	5-27-73	5-31-74	5-17-75	1974	1975	1975	1975	1973	1974	1975	
Orchardgrass																		
Latar	75	410	384	290	4	4	3	15	50	83	115	128	2	7-13	7-23	7-19		
Nordstern	149	781	321	417	4	2	3	57	87	100	128	125	3	7-13	7-20	7-19		
Saborto	5	---	---	2	5	5	5	0	0	0	---	---	-	---	---	---		
Tall Fescue																		
Rozelle	251	816	663	577	3	2	3	33	77	100	145	120	4	7-11	7-20	7-14		
Festal	347	812	538	566	3	2	3	53	67	100	123	120	2	7-13	7-23	7-16		
Ken. 31	592	1169	819	860	2	2	2	63	87	100	120	120	3	7-11	7-20	7-15		
S-170	155	673	488	439	3	2	3	58	53	70	123	118	3	7-11	7-20	7-14		
Ryegrass																		
Italian tetra	5	---	---	2	5	5	5	0	0	0	---	---	-	---	---	---		
NK-200	582	178	---	380	3	4	5	70	17	3	60	---	-	8-7	8-7	---		
Pelo	112	---	---	37	5	5	5	20	0	0	---	---	-	8-7	---	---		

* 1 = no injury, 5 = very severe injury

** 1 = erect, 5 = severe lodging.

Table 12. Seed yields, winter injury, percent stand, plant height, and harvest dates for orchardgrass, tall fescue and perennial ryegrass strains seeded in 1973. 1974-1975 data.

Species and Variety	Seed yield (lbs/A)		Winter injury*	% stand 5-31-74	Height at harvest (cm)		Harvest date											
	1974	1975			1974	1975												
	2-yr. ave.	5-18-75			1974	1975												
Orchardgrass																		
Latar	89	431	260	37	3	103	117	7-19	7-19	7-19	7-19	7-19						
Nordstern	236	605	421	80	2	113	122	7-19	7-19	7-21	7-21	7-21						
Saborto	---	---	---	0	5	---	---	---	---	---	---	---						
Tall Fescue																		
Rozelle	379	989	684	57	3	105	108	7-19	7-19	7-16	7-16	7-16						
Festal	531	1232	882	53	3	108	113	7-19	7-19	7-20	7-20	7-20						
Ken. 31	1146	1432	1289	80	1	115	115	7-19	7-19	7-17	7-17	7-17						
S-170	357	793	575	63	3	98	112	7-19	7-19	7-16	7-16	7-16						
Ryegrass																		
Italian tetra	---	---	---	0	5	---	---	---	---	---	---	---						
NK-200	1191	---	596	83	2	78	---	8-5	8-5	---	---	---						
Pelo	303	---	152	25	4	78	---	8-7	8-7	---	---	---						

* 1 = no injury, 5 = very severe injury.

Miscellaneous Items
(Continued)

We have made two different seedings of fescue grasses which are used for turf or ground cover. A group of 12 were seeded in 1972. These are primarily strains which are of interest, but not yet in production. Only one of the 12, Festuca ovina, seed lot no. 67135 indicated sufficient seed production to be of interest. None of these items have shown sufficient winter injury to be of concern in a three-year stand.

The second seeding, made in 1973, included mainly named strains which are of more general interest. The 1974 yields were very low, with two exceptions. Durlawn-30 and a Festuca rubra entry produced fair seed yields. Several of these showed sufficient winter injury that caution should be exercised in selecting them for seed production. The maturity is somewhat later than Kentucky bluegrass, but earlier than timothy.

Quackgrass contamination is a major concern with these, as the seed size is similar to quackgrass and the two cannot be separated.

Table 13. Seed yields, plant height, lodging and harvest dates for 11 fescue strains seeded in 1972. 1973-1974-1975 data.

Species	Seed lot no.	Seed yields (lbs/A)			3-yr. ave.	Height at harvest (cm)		Lodging at harvest 1975	Harvest date		
		1973	1974	1975		1974	1975		1973	1974	1975
Festuca ovina	66432	192	272	268	244	75	73	2	7-9	7-20	7-2
"	6643-3252	208	169	272	216	73	83	5	7-9	7-20	7-14
"	67135	267	803	343	471	95	90	2	7-9	7-20	7-8
Festuca rubra	6673	325	125	241	230	78	83	5	7-11	7-20	7-14
"	66111	309	227	241	259	80	78	5	7-11	7-20	7-14
"	66136	203	120	245	189	83	80	5	7-11	7-20	7-14
"	66218	203	134	165	167	80	78	5	7-11	7-20	7-14
"	66223	176	94	143	138	80	73	5	7-11	7-20	7-14
"	6623	123	85	125	111	78	75	5	7-11	7-20	7-14
"	66354	224	62	232	173	78	80	5	7-11	7-20	7-14
"	66123	309	165	116	197	78	75	5	7-11	7-20	7-14

Table 14. Winter injury, plant height, harvest date, lodging and seed yields for 12 fescue strains seeded in 1973. 1974-1975 data.

Strains	Winter injury* 1974	Height at harvest (cm)		Harvest date	Lodging at harvest† 1975	Seed yield (lbs/A)	
		1974	1975			1974	1975
Atlanta	2	63	78	7-19	4	40	260
Dawson	2	68	77	7-19	4	31	258
Durlawn-30	1	78	77	7-19	4	415	378
D-15	3	48	68	-----	4	--	128
H-13	3	63	63	7-23	4	--	119
Halifax	1	60	78	7-19	4	--	229
Hekla	3	38	63	-----	4	--	180
J-3	3	63	60	-----	4	--	123
K-5	4	43	65	-----	4	--	299
Kaldbek	4	50	65	7-19	4	--	152
Nova ruba	1	78	73	7-19	4	134	248
Festuca ruba	2	83	82	7-19	4	357	334
LSD 5% level							112
1% level							152

* 1 = no injury, 5 = very severe injury † 1 = erect, 5 = badly lodged

Birdsfoot Trefoil Information

During the past few years we have conducted limited work on seed production of small seeded legumes. Of these, Birdsfoot trefoil has received the most attention.

Our work indicates that either Simazine or Diuron (Karmex) will give satisfactory volunteer seedling and annual weed control. Simazine also gives control of perennial sowthistle. Neither chemical is cleared for use on Birdsfoot trefoil at this time. We are pursuing the possibility of obtaining a limited clearance for Simazine to be used in Birdsfoot trefoil seed fields of northern Minnesota. Results from this work were summarized in our 1975 report, if you have a copy.

In 1975 we conducted two different trials on desiccation of Birdsfoot trefoil as an aid for direct combining of this crop. We used three chemicals: Diquat, Dinoseb, and Paraquat. The results are quite encouraging, and additional trials are planned for 1976. For those interested in this information, we suggest you contact L. J. Elling. We believe that few would be interested, therefore, we are not reporting results here.