

Progress Report of Seed Production Research

Prepared by

Laddie J. Elling and Robert L. McGraw
Department of Agronomy and Plant Genetics
University of Minnesota
St. Paul, Minnesota 55108

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Weather:

Table a. Monthly Precipitation at Roseau, 1966-80.

Kentucky Bluegrass:

- Table 1. Performance of Kentucky bluegrass varieties seeded in 1977.
- Table 2. Performance of select Kentucky bluegrass varieties seeded in 1977.
- Table 3. Performance of Park Kentucky bluegrass lines seeded in 1978.
- Table 4. Performance of Kentucky bluegrass varieties seeded in 1979.

Timothy:

- Table 5. Performance of timothy varieties seeded in 1977.
- Table 6. Performance of timothy varieties seeded in 1979.

Other Species:

- Table 7. Performance of fine fescue varieties seeded in 1978.
- Table 8. Performance of meadow fescue varieties seeded in 1978.
- Table 9. Performance of tall fescue varieties seeded in 1978.
- Table 10. Performance of fescue varieties seeded in 1979.
- Table 11. Performance of perennial ryegrass varieties seeded in 1979.
- Table 12. Performance of orchardgrass varieties seeded in 1978.
- Table 13. Performance of orchardgrass varieties seeded in 1979.
- Table 14. Performance of reed canarygrass varieties seeded in 1978.
- Table 15. Performance of reed canarygrass varieties seeded in 1979.
- Table 16. Performance of smooth brome grass varieties seeded in 1978.
- Table 17. Performance of birdsfoot trefoil varieties seeded in 1978.

Table I. Monthly precipitation at Roseau, MN 1966-1980, with some average Kentucky bluegrass seed yields from 1968-1980.

Month	Year															
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Ave.
January	.56	1.13E*	.62	3.07	.71	.54	.68	.09	.88	1.10E	1.13E	.65E	.36	NA*	NA	.84
February	.31	.39	T	.11	.41	.13	.76	.17	.87	.29E	.50	.90E	.26	NA	NA	.39
March	1.70	.59	1.25	.05	1.38	.26E	.50E	1.18	.16	.64E	1.05	1.02	.17	NA	NA	.77
April	1.63	2.89	.63	1.27	2.56	1.50	.70	.90	2.72	1.40	.77	.27	1.00	2.77	0.00	1.41
May	2.04	.89	1.46	3.31	5.93	2.24	1.66	2.46	4.12	1.52	.54	2.43	1.97	2.45	0.24	2.22
June	3.81	2.23	6.47	2.29	4.07	2.99	5.03	2.21	1.56	4.96	5.82	3.71	1.92	1.91	1.75 ⁺	3.35
July	3.71	4.95	6.18	3.70	3.55	3.58	1.92	4.04	2.56E	2.26	1.52	2.28	6.25	3.70	3.55	3.60
August	3.30	1.69	8.49	4.28	.83	.69	1.53	2.09	10.97	1.75	3.72	1.74	3.25	1.59	5.19	3.39
September	.99	.83	2.35	3.29	2.77	3.33	4.22	5.67	.42	1.79	.34	3.83	3.44	.45	4.12	2.51
October	1.17	1.11	1.26	1.91	1.49	2.97	1.40	1.19	.66	1.49	.07	.87	.23	1.40	NA	1.22
November	.62E	.70	1.06	.30	1.21	.29	.38	.65	.15	.20	T	.51E	.98	NA	NA	.55
December	1.70E	1.76E	.21	.73	.37	.50E	.32	.75	1.40	.65E	.37	.85E	.79	NA	NA	.80
Total	21.54	19.16	29.98	24.31	25.28	19.02	19.10	21.40	26.47	18.05	15.83	19.06	20.62	NA	NA	NA
Departure from normal	+1.82	-.56	+10.26	+4.59	+5.56	-.70	-.62	+1.68	+5.48	-2.94	-5.16	-1.93	+.37	NA	NA	NA
Kentucky bluegrass seed yields***			650	448	673	492	405	422	642	504	146	140	507	415	62	

* E = estimated rainfall

** NA = not available

*** All from Park variety, July burn treatment, with 80 to 100 lbs of nitrogen per acre.

+ 1.15 inches last 3 days of the month.

The Weather at Roseau in 1980

The record low rainfall in April, May and June, 1980 was devastating to Grass Seed Production and Grass Seed Production Research. 1980 offered the lowest total rainfall for April, May and June in the past 107 years of northwestern Minnesota. Our records for rainfall on the Welin farm show vividly why this was a very poor year. The snow disappeared on April 6 and 7, with much of the resulting water running off the fields. No rainfall was recorded for April, 0.12 inch of rain fell in May, and this came as two light showers, and 1.60 inches fell in June. .88 inches of this fell the last three days of the month. The U.S. Weather Records (table I) are slightly different, but the results are the same. There was essentially no effective precipitation during April, May and the first 27 days of June. During July, August, September and October we recorded about 15 inches of rainfall, which is above normal for these four months.

Kentucky Bluegrass Data

1980 was a record dry year, and the reader should view the Kentucky bluegrass information accordingly. We observed little to no heading in some trials and in others there was too little seed to warrant harvesting. Instead we recorded visual estimates of the seed production, and harvested only those plots rated as a four (1=best to 5=poor) or better. This was about 10 percent of the plots in the 1977 seeding, and a few more in the 1979 seeding. The seed yields were very low in the samples we harvested. Fall observations indicate that plants in all established seedings have apparently recovered and should produce seed in 1981.

Timothy and Other Grasses

Data from two timothy trials are presented in Tables 5 and 6. These trials were seeded in 1977 and 1979. The 3-year average yields from the 1977 seeding demonstrates the range of seed yields for timothy varieties. Motim and Goliath, relatively new varieties, were the highest yielding varieties. Several varieties in the 1979 seeding appear interesting, although we can make well founded suggestions. Hokushu, a late maturing Japanese variety looks promising. Nosappa, another Japanese variety also appears promising. It is an early variety. Teith and Tiiti also looked good.

Severe winter injury was recorded in the perennial ryegrass trial. Most of the perennial ryegrass strains were so severely injured that they would not have produced sufficient seed for harvest. NK-200, Norlea, Servo and Svea appear most hardy. Seed was not harvested, although the stands for these four were fair.

Three Reed canarygrass strains from northern Norway did not produce heads. We will be alert to these in 1981 to record heading percentages.

Birdsfoot Trefoil and Red Clover

Winter injury ratings and seed yields on 13 Birdsfoot trefoil strains are given in table 17. Varieties differed significantly for winter survival. Six surviving strains produced quite good seed yields in 1980.

The red clover variety trails winter killed.

Table 1. Vigor, Percent Heading, plant height, harvest date, estimated and actual seed yields for 1980 and 1979 Actual seed yields for Kentucky Bluegrass strains. Welin Farm, Roseau, MN Seeded in 1977.

Entry	MSP no.	Vigor* 5/8/80	Percent heading			Plant height(cm)+		Harvest date	Seed yields	
			6/2	6/5	6/10	6/17	6/4		Harvest	1980 Estimate++
Arista	628	3.5	25	20	30	20	18	20	4.3	567
Adelphi	1205	3.7	4	12	15	12	17	18	5.0	425
Aquila	1038	3.0	15	18	20	17	23	25	4.5	624
Baron	917	3.8	2	4	8	10	10	18	4.3	618
Cheri	1107	4.0	T	7	18	12	13	20	4.5	404
Eda	1023	4.2	4	7	10	8	10	18	5.0	193
Emmundi	1147	4.0	2	2	4	2	10	20	5.0	446
Enoble	1148	3.8	5	8	17	8	15	20	4.8	425
Enprima	1207	3.8	2	13	17	12	15	20	4.8	333
EVB-5585	1146	3.5	5	5	10	5	15	22	5.0	247
Fanfare	1011	2.8	12	27	30	27	20	30	4.2	270
Gardi	1106	4.3	2	2	8	2	10	15	5.0	425
Geronimo	1218	3.7	4	4	12	5	18	20	5.0	487
Granada	1194	3.1	4	8	7	7	18	22	4.8	318
Kimono	1219	3.8	5	7	10	7	12	20	5.0	383
Monopoly	863	2.4	2	4	7	4	20	23	5.0	440
Mosa	1220	3.0	10	12	18	12	20	23	4.5	431
Narika	1022	3.1	20	27	37	27	22	23	4.2	327
Newport	722	2.6	25	40	57	43	23	33	3.3	766
Nugget	916	3.7	30	40	37	40	17	23	4.5	392
Olymprisp	1208	2.2	15	22	37	33	25	32	4.1	704
Onar	724	3.3	9	17	17	13	17	22	4.8	431
Parade	1034	3.3	2	14	27	15	17	18	4.5	457

Table 1 (cont.) 1977 Kentucky Bluegrass Variety Trial - 1980 data with 1979 seed yields
 Melin Farm, Roseau, MN.

Entry	MSP no.	Vigor* 5/8/80	Percent heading			Plant height (cm)+		Harvest date	Seed yields			
			6/2	6/5	6/10	6/17	6/4		Harvest	1980 Estimate	1979 lbs/ac	
Park	1209	2.3	35	50	63	50	28	32	6-25	4.1	42	446
RU-128	1149	3.5	5	9	13	9	17	22		5.0		523
RU-154	1150	4.0	7	12	22	27	13	18		4.1		514
RU-178	1151	3.5	4	13	17	17	17	20		4.3		413
Rugby	1007	3.3	4	18	23	18	17	20		4.4		410
Skofti	955	4.7	4	2	2	2	5	13		5.0		270
Tivoli	1105	4.5	T	2	4	2	7	12		5.0		398
Touchdown	934	3.3	2	7	7	4	12	17		5.0		149
Trenton	1032	3.3	5	17	25	17	15	17		4.5		457
Turnier	1031	3.8	2	14	20	20	12	18		4.4		374
Vanessa	1221	3.0	0	4	12	9	12	17		4.5		306
Warrens A-20	953	2.5	7	12	17	12	22	23		4.5		190
Warrens A-34	954	2.4	2	4	7	4	18	22		5.0		472
WWAG 401	1120	4.0	2	5	10	5	10	15		4.5		333
WWAG 452	1121	3.2	0	T	T	T	12	17		5.0		235
WWAG 462	1122	3.5	5	18	22	18	15	18		4.3		541
WWAG 463	1123	3.5	3	20	23	20	13	18		4.5		502
WWAG 467	1124	4.0	2	5	12	5	12	17		4.8		65
WWAG 468	1125	4.2	14	40	50	40	13	27		4.2		327
WWAG 477	1126	3.2	T	17	27	22	15	25		4.3		579
WWAG 478	1127	3.2	3	33	50	37	12	18		4.1		440
WWAG 520	1128	3.3	4	30	37	37	13	18		4.2		535

* read as 1 most vigorous, 5 least vigorous + 2.5 cm = 1 inch, ++ 1 = best yield, 5 = lowest yield

Table 1 (cont.) 1977 Kentucky Bluegrass Variety Trial - 1980 data with 1979 seed yields
 Welin Farm, Roseau, MN.

Entry	MSP no.	Vigor* 5/8/80	Percent heading			Plant height (cm) +		Harvest date	Seed yields	
			6/2	6/5	6/10	6/17	6/4		Harvest	1980 Estimate
<u>NK-Exp.'s</u>										
K1-148	1002	3.2	2	13	15	12	18	22	5.0	333
K1-150	1004	3.0	4	15	17	17	20	22	5.0	232
K1-159	1008	2.6	15	43	43	40	23	40	4.1	255
K1-160	1009	2.3	50	73	80	73	32	43	2.6	546
K1-194	521	3.7	7	27	30	27	10	18	4.3	466
K2-175	791	2.8	2	12	13	13	17	22	5.0	282
K3-45	1036	2.9	2	12	13	10	15	20	5.0	196
K3-166	1015	2.7	7	35	37	38	20	20	4.2	472
K3-204	783	2.7	2	23	32	28	18	28	4.3	460
K3-226	1197	2.7	3	12	13	12	18	22	4.8	140
K3-227	1016	1.9	13	22	30	22	27	30	4.3	416
K4-125	792	3.2	7	13	17	13	18	27	4.4	244
K4-126	793	3.2	17	15	33	20	20	32	4.1	306
K4-127	794	3.5	9	15	27	22	17	28	4.1	157
K4-136	1017	3.2	2	4	10	5	17	23	4.8	267
K4-137	1018	3.3	T	17	22	20	17	23	4.5	457
K4-138	1019	3.2	T	8	8	7	17	18	5.0	169
K4-139	1020	3.5	2	7	12	5	12	18	5.0	345
K5-22	1024	3.0	4	12	10	12	17	18	4.8	398
K5-63	1025	3.3	5	10	12	8	15	18	5.0	365
K5-64	1026	3.4	2	5	4	4	15	18	5.0	181

Table 1 (cont) 1977 Kentucky Bluegrass Variety Trial - 1980 data with 1979 seed yields
 Melin Farm, Roseau, MN.

Entry	MSP no.	Vigor* 5/8/80	Percent heading			Plant height(cm)+		Harvest date	Seed yields			
			6/2	6/5	6/10	6/17	6/4		Harvest	1980 Estimate+Tbs/ac	1979 Tbs/ac	
K5-65	1027	3.4	4	7	7	5	12	15	5.0	383		
K5-66	1028	3.3	8	7	13	9	15	20	4.8	350		
K5-67	1029	3.3	4	7	13	10	13	18	4.8	300		
K6-30	1042	3.6	4	18	27	22	15	22	4.3	484		
K6-31	1043	3.6	5	23	33	27	15	20	4.2	505		
K6-32	1044	3.6	9	22	30	23	17	22	4.2	457		
K6-33	1045	2.5	50	60	60	60	28	32	3.4	33		
K6-34	1046	2.2	67	72	77	65	33	40	3.1	54		
K6-36	1048	1.9	57	70	77	67	38	52	3.1	39		
K6-37	1049	2.2	63	67	77	60	38	52	3.8	39		
K6-79	1198	3.3	5	23	23	20	17	23	4.8	386		
K6-81	1200	3.2	5	28	28	25	17	22	4.5	249		
K6-86	1201	2.7	25	25	33	25	23	28	4.2	451		
K6-87	1202	2.9	60	67	67	67	28	33	3.4	285		
K7-48	1203	2.9	30	28	37	35	23	32	4.0	487		
K8-176	1204	3.4	5	23	17	23	15	23	4.8	419		
N-1213	1211	3.7	7	22	18	20	12	18	4.8	564		
Park	929	2.9	43	65	70	65	33	38	3.3	196		
										62	561	
											32	119
											N.S.	156

* - 1 = best Vigor, 5 = least Vigor
 + - 2.5 cm = 1 inch
 ++ = 1 = best yield, 5 = lowest yield

LSD at 5% level
 1% level

Table 2. Vigor and percent heading data for Potentially High Seed Yielding strains of Kentucky Bluegrass. Melin Farm, Roseau, MN Seeded in 1977 (1980 data plus 1979 seed yields).

Entry	MSP no.	Vigor+		Percent heading								
		5/8	5/19	5/20	5/21	5/23	5/27	5/30	6/2	6/5	6/10	6/17
K1-76	996	3.0	3.0	T	3	13	47	63	60	65	53	65
K1-78	1240	2.2	2.0	8	13	33	68	88	85	85	73	85
K1-80	997	2.2	2.0	T	5	12	28	37	43	57	47	53
K1-83	1241	2.5	2.1	10	20	33	58	72	77	80	77	80
K1-88	998	4.0	4.1	0	0	0	4	7	5	7	18	7
K1-119	999	2.7	2.8	0	0	3	15	28	35	55	60	60
K1-121	1242	2.3	2.0	6	10	17	40	55	53	62	60	62
K1-135	1255	3.5	3.5	0	0	0	5	7	5	5	8	4
K1-138	1243	3.8	3.5	0	0	0	4	20	15	53	70	73
K1-139	1244	2.6	2.4	0	0	T	13	20	22	32	50	32
K1-140	1001	2.7	2.1	0	0	3	12	20	35	40	60	40
K1-141	1245	2.7	2.8	0	0	4	22	33	37	60	67	60
K1-152	1005	3.9	4.0	0	0	0	4	10	7	23	33	37
K2-100	1011	3.3	3.3	0	0	2	5	10	13	33	43	37
K2-161	1012	3.5	3.8	0	0	0	8	15	13	47	53	47
K3-157	1014	3.0	2.8	0	0	T	12	22	27	57	63	57
K3-160	1196	3.2	2.9	0	0	0	5	12	15	40	40	43
K3-161	1246	2.2	1.8	0	0	5	25	47	67	87	93	87
K6-80	1199	2.8	3.2	0	2	9	37	50	52	72	73	70
K0-140	1253	2.3	2.2	T	7	15	38	63	80	93	97	93
N6-106	1252	2.8	2.7	2	6	17	47	67	70	87	93	87
4183-2	1247	3.3	3.1	0	0	2	10	20	17	37	37	42
Nugget	916	4.0	4.0	0	0	3	12	17	15	22	37	22
Park	1209	3.0	2.7	0	0	5	38	55	57	67	73	70
Pennstar	1249	3.7	4.0	0	0	0	5	10	10	10	17	10
Primo	1250	3.0	3.0	2	4	10	40	55	53	77	73	77

+ 1 = best Vigor, 5 = least Vigor

Table 2a. Height, harvest date, estimated and actual seed yields, for 1980, and actual seed yields for 1979 for Potentially High Seed Yielding strains of Kentucky Bluegrass. Melin Farm, Roseau, MN, Seeded in 1977.

Entry	MSP no.	Height(cm)*		Harvest	Harvest date	Seed yield	
		5/8	6/4			1980 Estimate++	1979 lbs/ac
K1-76	996	5.2	28	37	6-25	3.7	116
K1-78	1240	6.2	40	47	6-25	2.4	86
K1-80	997	6.0	32	40	6-25	4.1	55
K1-83	1241	6.0	37	40	6-25	2.8	116
K1-88	998	3.5	17	25	6-25	4.8	28
K1-119	999	5.7	32	40	6-25	3.4	88
K1-121	1242	6.7	35	40	6-25	3.0	83
K1-135	1255	4.5	20	23	6-27	5.0	6
K1-138	1243	3.8	20	28	6-27	3.3	137
K1-139	1244	5.7	28	38	6-25	4.1	65
K1-140	1001	6.2	35	42	6-25	3.9	68
K1-141	1245	5.8	37	43	6-25	3.5	107
K1-152	1005	3.2	13	23	6-29	4.0	36
K2-100	1011	4.5	23	37	6-27	4.1	36
K2-161	1012	3.7	20	27	7-1	3.8	48
K3-157	1014	5.2	28	42	6-25	3.5	77
K3-160	1196	5.0	25	37	6-27	3.9	39
K3-161	1246	6.5	47	58	6-25	2.1	89
K6-80	1199	4.7	35	43	6-25	3.0	122
K0-140	1253	6.3	38	47	6-25	1.7	175
N6-106	1252	5.8	40	48	6-25	2.2	92
4183-2	1247	4.3	20	30	6-27	4.0	43
Nugget	916	3.7	12	18	7-1	4.3	59
Park	1209	5.0	35	45	6-25	2.9	92
Pennstar	1249	3.7	17	23	6-27	4.7	13
Primo	1250	5.2	35	42	6-25	2.7	140
						LSD at 5% level	61
						1% level	NS.

* - 2.5 cm = 1 inch
 ++ 1 = lowest yield, 5 = highest yield

Table 3. Percent heading, height, desirability and 1979 seed yields of 15 Park Kentucky Bluegrass lines. Welin Farm, Roseau, MN, Seeded in July, 1978 (1980 data plus 1979 seed yields).

Entry	MSP no.	% Heading 1980					Height (cm)* 6/4-80	Desirability** 7/1-80	1979 Seed Yield (#/AC)	
		5/19-80	5/21-80	5/23-80	5/27-80	5/30-80				6/2-80
U-8-2-1	1480	0	T	6	33	40	49	30	2.6	462
U-109-1	1481	0	T	7	30	38	48	28	2.8	444
U-109-3	1482	0	2	6	29	38	45	30	2.7	435
U-120-4	1483	0	T	4	24	35	41	30	2.5	491
U-138-3	1484	0	T	6	30	39	48	33	2.5	484
W-122-5	1485	0	T	6	29	38	43	35	2.7	446
W-128-4	1486	0	T	5	29	38	40	30	2.9	475
W-129-2	1487	0	2	5	34	44	50	30	2.5	417
W-130-5	1488	0	T	5	29	39	41	33	2.1	560
W-136-2	1489	0	T	4	25	36	39	31	3.0	442
W-136-6	1490	0	T	6	31	39	43	30	2.9	419
W-144-2	1491	0	T	4	30	38	35	31	2.9	406
W-152-1	1492	0	5	13	38	48	63	33	1.8	564
W-153-1	1493	0	3	11	36	50	48	30	2.5	466
W-155-1	1494	0	2	8	31	43	45	31	2.0	446
Park	895	0	2	10	30	39	40	34	2.6	488
Park	929	0	2	7	30	39	45	33	2.7	468
Park	1461	0	2	5	26	35	43	31	2.6	468

* 2.5 cm = 1 inch

** 1 = most desirable, 5 = least desirable

Table 4. Percent stand, percent heading, plant height, harvest date, and estimated and actual seed yields for Kentucky Bluegrass strains. (1980 data)
 Melin Farm, Roseau, MN Seeded in 1979.

Entry	MSP no.	Percent stand					Percent heading			Plant height (cm) 6/4	Harvest date	Seed yield Estimate++lbs/ac
		5/16/80	5/19	5/23	5/30	6/5	6/10	6/14	Harvest			
Aquila	1345	67	0	2	17	25	20	27	23	27	4.7	119
Arista	1573	63	0	7	62	77	80	83	25	28	3.3	
Aspen	1204	53	0	0	12	25	28	30	18	25	4.4	
Banff	1355	67	0	2	24	43	50	50	25	27	4.2	
Baron	1550	70	0	0	15	53	70	70	18	27	4.1	
Claudia	1545	53	0	2	18	28	32	30	23	28	4.4	
Dormie	1303	67	4	35	95	100	100	100	38	52	1.7	342
Enmundi	1147	63	0	0	5	12	27	37	20	28	4.4	
Entopper	1570	67	0	2	20	50	58	57	23	32	3.9	45
Escort	1571	63	0	0	17	33	37	38	28	38	4.3	
Gardi	1106	40	0	6	53	65	57	67	18	30	3.3	119
Geronimo	1546	63	0	7	43	53	48	53	25	32	4.0	
Glade	1574	67	0	0	5	15	32	30	18	22	4.4	
Granada	1194	30	2	8	10	4	7	7	18	27	5.0	
Holt	1565	73	40	72	90	90	87	90	32	35	3.0	151
Kimono	1547	67	0	7	52	70	73	80	23	28	2.9	98
Mentor	1346	57	0	2	7	12	10	13	22	25	5.0	
MLM-18011	1531	40	0	4	20	30	25	30	20	33	4.4	
Mom-Pp H519	1283	57	0	3	12	18	5	20	20	22	4.8	
Mom-Pp 1417	1543	50	0	10	65	80	80	87	23	30	3.5	110
Mom-Pp 1765	1544	50	0	7	45	44	48	48	15	20	4.4	

Table 4 (cont.) 1979 Kentucky Bluegrass Variety Trial
 Melin Farm, Roseau, MN

Entry	MSP no.	Percent stand				Percent heading			Plant height (cm) ⁺		Harvest date	Seed yield Estimated ⁺⁺ lbs/ac
		5/16/80	5/19	5/23	5/30	6/5	6/10	6/14	6/4	Harvest		
Mosa	1548	50	0	2	28	32	43	38	20	23		4.4
Nugget	1464	57	15	33	57	55	55	54	17	20		4.1
Parade	1347	60	0	5	34	42	55	53	22	23		4.1
Park	1461	73	13	52	87	87	100	90	33	38	6-25	2.6
P-141	1305	8	20	50	63	64	50	67	30	33		4.1
P-143	1356	53	0	0	5	10	20	14	13	25		4.8
Ram I	1551	63	0	T	10	22	35	25	13	17		4.8
NF-1213	1462	60	0	24	65	67	60	73	20	20	7-1	3.6
Rugby	1007	60	0	3	24	35	52	47	22	25		4.1
Tivoli	1105	57	0	7	42	55	53	65	15	22	7-1	3.7
Trenton	1579	47	0	7	42	54	52	62	18	25		4.0
Troy	936	43	37	67	80	80	80	77	40	38	6-25	3.3
Touchdown	934	63	0	13	43	47	38	47	22	27		4.4
Vanessa	1549	57	0	T	22	48	55	53	20	27		4.3
Welcome	1403	80	0	3	27	48	52	57	23	32		4.2

⁺ 2.5 cm = 1 inch, ⁺⁺ 1 = highest seed yield, 5 = lowest seed yield

Table 4 (cont.) 1979 Kentucky Bluegrass Variety Trial
 Melin Farm, Roseau, MN

Entry	MSP no.	Percent stand		Percent heading			Plant height (cm)		Harvest date	Seed yield Estimate+lbs/ac			
		5/16/80	5/19	5/23	5/30	6/5	6/10	6/14			6/4	Harvest	
K-Exp.'s													
K3-162	1575	57	13	50	72	78	67	78	37	35	6-25	3.3	71
K3-167	1401	33	10	38	50	50	57	47	38	37	6-25	3.8	30
K3-168	1576	20	13	33	50	50	43	53	35	37		4.0	
K3-170	1402	22	5	30	47	50	43	40	35	37		4.2	
K3-178	1577	18	0	4	30	55	37	57	28	38		4.3	
K3-179	1578	22	0	3	28	38	28	42	30	38		4.4	
K7-103	1404	33	0	4	22	35	30	33	30	35		4.7	
K7-104	1405	47	2	17	50	67	63	73	35	40	6-25	3.8	79
K7-105	1406	40	4	20	57	80	77	77	40	42	6-25	3.7	89
K7-138	1410	53	0	5	48	75	80	80	23	30	6-27	3.7	45
78033	1411	57	0	10	47	60	50	63	27	27	6-25	3.9	76
78037	1412	50	5	32	83	90	83	90	38	45	6-25	3.2	116
78038	1413	50	20	55	85	98	87	100	40	43	6-25	3.5	80
78053	1414	33	17	48	68	75	60	73	38	43	6-25	3.7	39
78054	1415	43	0	20	53	70	67	67	32	43		4.1	
78055	1416	33	12	48	72	73	70	73	35	37	6-25	3.9	43
78056	1417	37	3	50	70	70	63	70	40	48	6-25	3.8	62
78059	1420	20	0	9	27	43	47	43	33	38		4.5	
78060	1421	37	T	35	60	67	67	70	37	37	6-25	3.9	45
78061	1422	53	0	3	12	33	47	37	30	42		4.3	
78063	1424	30	23	70	98	97	87	100	33	40	6-25	3.2	134
78064	1425	27	15	58	97	97	93	100	38	42	6-25	3.3	104

Table 4 (cont.) 1979 Kentucky Bluegrass Variety Trial
 Melin Farm, Roseau, MN

Entry	MSP no.	Percent stand				Percent heading			Plant height (cm) [†]		Harvest date	Seed yield Estimate† lbs/ac
		5/16/80	5/19	5/23	5/30	6/5	6/10	6/14	6/4	Harvest		
78065	1426	25	0	13	40	47	63	50	42	42	6-25	4.2
78066	1427	33	10	47	73	83	93	87	37	43	6-25	3.5
78067	1428	40	18	73	98	100	100	100	33	40	6-25	2.7
78068	1429	47	17	78	100	100	100	100	33	40	6-25	2.6
78069	1430	37	17	67	97	98	100	100	33	40	6-25	2.6
78070	1431	40	19	65	95	98	100	100	38	42	6-25	2.6
78071	1432	33	12	53	90	93	83	97	42	42	6-25	3.1
78072	1433	37	14	67	93	97	100	97	40	43	6-25	2.9
78073	1434	33	12	53	90	97	93	97	38	40	6-25	3.1
78074	1435	47	10	67	87	90	90	97	37	45	6-25	2.9
78075	1436	33	20	67	95	97	100	97	40	43	6-25	3.0
78076	1437	43	4	47	90	93	93	93	40	40	6-25	3.4
78077	1438	33	13	50	78	83	80	83	38	42	6-25	3.3
78078	1439	43	3	25	63	67	73	83	38	45	6-25	4.0
78079	1440	33	0	15	62	63	87	63	33	43	6-25	4.1
78080	1441	50	3	14	62	63	80	63	37	45	6-25	4.0
78081	1442	43	2	13	58	77	77	77	35	43	6-25	4.0
78082	1443	40	2	13	57	67	83	73	33	42	6-25	4.1
78083	1444	50	0	8	50	60	60	70	28	42	6-25	4.3
78084	1445	47	0	12	50	77	70	80	32	40	6-25	4.3
78085	1446	60	0	12	37	60	70	73	33	40	6-25	4.3
78086	1447	57	0	7	28	53	67	70	32	42	6-25	4.3

Table 5. Percent stand, percent heading, height, lodging, harvest date and seed yields for 19 timothy varieties seeded in 1977 on the Melin Farm, Roseau, MN (1980 data plus 1978 and 1979 seed yields).

Entry	MSP number	Percent stand (5/8/80)	Percent heading				Height \bar{x} at		Harvest date	Seed yields (#'s/AC)				
			5/27	6/4	6/17	6/26	7/10	6/4		7/10	1980	1979	1978	3 year Average
Bd. 3062	1119	55	0	0	T	12	87	25	62	1	190	434	775	466
Climax	933	67	0	2	97	100	100	42	83	1	288	529	520	446
Goliath	1212	63	0	T	73	83	100	30	72	1	270	582	588	480
Heidemij	881	58	0	0	0	5	63	20	62	1	145	309	549	334
Itasca	1144	65	0	5	93	100	100	42	83	1	258	499	502	420
Maris Polka	1159	62	0	7	100	100	100	43	75	1	202	472	582	419
Mom Tim T-6	947	63	0	0	33	67	100	30	73	1	211	484	567	421
Mom Tim W-2	948	58	0	0	0	2	50	25	60	1	160	481	561	401
MoTim	946	67	0	0	28	67	100	28	75	1	273	615	674	521
Exp.'s K2-106	1156	30	T	5	100	77	100	18	30	1	12	119	128	86
K2-107	1157	58	0	0	15	70	100	30	65	1	187	244	502	311
K4-215	1158	72	0	T	73	87	100	40	77	1	160	276	389	275
Palermo	949	65	4	18	100	73	100	27	35	1	65	285	443	264
Ramona	950	82	7	28	100	93	100	30	35	1	80	422	440	314
S-48	1053	60	0	0	0	2	43	22	48	1	107	410	505	341
SC-10	1155	70	0	2	90	100	100	38	70	1	282	570	740	531
Timfor	1160	70	0	12	100	100	100	45	82	1	300	410	671	460
Toro	1143	69	0	10	100	100	100	38	78	1	220	446	618	428
Phewiota	1213	68	0	5	90	93	100	37	75	1	193	419	520	377

LSD at 5% level
1% level

96 N.S. 195
129 N.S. N.S.

+ -2.5 cm = 1 inch
*-1 = no Lodging, 5 = severe lodging

Table 6. Percent stand, desirability, percent heading, percent pollen shedding, height, harvest date and seed yields for 26 timothy varieties seeded in 1979 on the Welin Farm, Roseau, MN (1980 data).

Entry	MSP number	Percent stand (5/7/80)	Desirability (8/12)	Percent heading			Percent Pollen Shedding (7/5)	Height (cm)**		Harvest date	Seed yield (#'s/A)
				6/4	6/14	6/26		7/10	6/4		
Alphage	1532	77	3.0	0	53	87	100	32	63	7-30	151
Basho	1501	78	3.4	5	73	80	100	32	62	7-18	62
Canada 009	1528	70	4.0	5	53	77	100	35	57	7-18	27
Climax	933	73	2.0	0	70	100	100	33	73	7-22	187
Goliath	1472	68	3.0	0	20	73	100	27	58	7-29	226
Heidemij	1076	60	3.0	0	0	7	68	18	53	8-12	226
Hokuo	1473	83	3.4	T	63	97	100	33	60	7-18	122
Hokushu	1511	67	2.7	0	0	23	93	20	62	8-5	143
Itasca	1474	73	1.3	2	87	100	100	38	75	7-21	220
Exp. K7-139	1580	33	4.7	0	57	87	100	10	33	8-7	45
Kampe II	1077	73	2.4	T	60	100	100	33	72	7-18	175
Liam	1537	67	5.0	0	30	87	100	10	27	8-12	53
Liga	1397	57	3.4	0	0	5	47	17	47	8-12	149
Ludor	1535	53	3.3	0	23	77	100	28	62	7-29	110
Melora	1536	67	2.4	0	T	33	100	27	67	8-1	196
MLM-17018	1530	70	2.9	7	80	100	100	37	67	7-18	193
Motim	1319	77	2.2	0	2	33	100	27	68	8-4	264
NAPB-447502	1316	80	2.5	T	70	100	100	37	72	7-18	172
Nosappa	1512	83	3.1	T	70	100	100	35	72	7-18	214
S-48	1052	67	3.1	0	0	5	60	25	60	8-10	166
Senpoku	1513	80	3.2	T	70	90	100	35	70	7-21	160
Teno	1538	43	4.7	0	43	73	100	13	43	8-10	62
Teith	1050	67	2.6	0	43	100	100	33	72	7-27	255
Tiiti	1529	67	3.1	0	37	83	100	32	65	7-27	249
WWT-94	1534	60	3.0	2	57	87	100	33	63	7-22	160
ZW-42-70	1533	73	2.2	T	77	100	100	32	68	7-22	133

LSD at 5% level 106

*-1 = most, 5 = Least desirable seed producer
 ** 2.5 cm = 1.0 inch

Table 7. Percent stand, percent heading, height, harvest date, and seed yields for 40 fine fescue strains seeded in 1978 on the Welin Farm, Roseau, MN (1980 data plus 1979 seed yields).

Species	Entry with company number	MSP number	Percent stand 5/8	Percent heading			Height (cm)*		Harvest date	Seed 1980	Yields 1979	#'s/AC 2 Year Average	
				5/19	5/27	6/5	6/16	6/4					Harvest
Chewings fescue	Agram	1351	73	0	22	67	67	33	50	6-26	110	395	253
	Atlanta	1337	70	0	7	22	23	23	48	6-30	71	339	205
	Cascade K2-36	1366	72	0	15	73	73	38	53	6-29	80	505	293
	Frida	1352	67	0	2	27	30	27	43	6-29	45	401	223
	Jamestown	1307	67	0	15	73	73	33	52	6-27	128	603	366
	Koket	1286	73	0	22	73	80	35	47	6-25	95	517	306
	Mom FRC-12	1284	70	0	2	38	47	28	48	7-1	68	389	229
Mom FRC-62	1285	68	0	17	77	93	35	48	6-27	178	630	404	
Wintergreen K8-12	1367	70	0	17	80	90	35	52	6-27	101	517	309	
Creeping red fescue	Durlawn K0-89	1365	70	0	T	25	50	33	57	7-6	193	1161	677
	Exp. K4-21	1362	65	0	0	10	50	28	47	7-10	252	683	468
	Mom Frr 25	1287	72	0	T	17	17	33	55	7-1	59	698	379
	Pennlawn K5-29	1363	70	0	0	8	15	28	52	7-6	98	998	548
	Ruby K6-9	1364	70	0	2	27	53	33	55	7-7	244	843	544
	Waldorf	1338	77	0	8	70	97	33	53	7-1	232	630	431
	Dawson Exp. K5-47	1336	68	0	2	17	18	28	52	6-30	12	347	180
Red fescue	Exp. K5-47	1361	57	0	4	40	60	32	52	7-7	226	731	479
	K7-133	1357	62	0	T	13	12	25	48	7-1	39	312	176
	Wilton K7-134	1358	65	0	5	37	43	37	55	6-30	53	279	166
	K7-135	1359	63	0	0	8	7	28	50	7-1	27	609	318
	K7-136	1360	55	0	T	7	5	25	47	6-30	12	380	196
	Scarlett	1339	68	0	T	37	53	27	48	7-1	122	514	318
	Dawson Exp. K5-47	1336	68	0	2	17	18	28	52	6-30	12	347	180
Hard fescue	Balmoral K5-18	1373	55	0	65	100	100	27	40	6-24	107	190	149
	Centurion K2-18	1372	70	3	53	97	93	30	47	6-24	163	342	253
	F1-1	1308	65	10	38	80	57	28	42	6-24	104	570	337
	Exp. K5-73	1374	35	40	85	97	97	30	38	6-24	178	252	215
	Mom Fod-10	1289	72	7	37	77	80	25	38	6-24	77	303	190

Table 7 (cont.) Percent stand, percent heading, height, harvest date, and seed yields for 40 fine fescue strains seeded in 1978 on the Melin Farm, Roseau, MN (1980 data plus 1979 seed yields).

Species	Entry with company number	MSP number	Percent stand 5/8	Percent heading			Height (cm)*		Harvest date	Seed 1980	Yields 1979	(#'s/AC) 2 Year Average
				5/19	5/27	6/5	6/16	6/4				
Hard fescue	Mom Fod-11	1290	70	0	28	77	87	27	37	6-26	95	205
	Scaldis	1340	70	7	38	80	83	33	42	6-24	104	371
	Scaldis	1371	70	13	50	87	93	32	40	6-24	134	392
	67135	1118	48	30	72	97	97	38	50	6-24	151	285
	6673	1110	68	0	2	43	67	40	58	7-8	223	1179
	66111	1111	73	0	0	33	57	42	58	7-3	157	808
	66136	1112	65	0	0	27	50	37	55	7-4	160	737
	66218	1113	63	0	2	30	63	35	62	7-3	220	1060
	66223	1114	68	0	0	22	43	38	58	7-4	134	763
	66233	1115	67	0	0	25	40	38	58	7-4	146	882
	66354	1116	70	0	T	60	83	42	63	7-4	217	772
	67123	1117	68	0	0	45	73	40	62	7-1	181	1069
	67135	1118	53	47	83	100	100	38	50	6-24	214	282

*- 2.5 cm = 1 inch

LSD at 5%

81

107

1%

219

289

81

107

1%

219

289

Table 8. Percent stand, vigor, percent heading, height, harvest date, and seed yields for 10 Meadow Fescue strains seeded in 1978 on the Welin Farm, Roseau, MN (1980 data plus 1979 seed yields).

Entry	Company number	MSP number	Percent stand 5/8	Vigor*		% heading		Height(cm)**		Harvest date	Seed 1980	Yield 1979	#'s/AC 2 yr. Ave.
				5/8	6/4	6/10	6/16	6/4 Harvest	6/4 Harvest				
Belimo		1222	58	3.2	7	40	40	27	55	7-10	169	1001	585
Bundy		1341	55	3.5	2	8	15	20	50	7-10	77	647	362
Common	N7-62	1370	65	3.0	5	43	60	32	58	7-10	247	1034	641
Ensign	K2-95	1368	57	2.5	12	50	60	30	58	7-10	282	1191	737
Fiola		1342	63	2.8	10	50	47	27	53	7-10	193	832	513
Exp.	K7-126	1369	58	2.3	8	57	50	30	55	7-10	157	980	569
Largo		1216	68	2.8	7	37	40	28	52	7-10	187	769	478
Remko		1343	67	2.8	3	17	23	28	53	7-10	113	843	478
RVP CH 75.2	M7-9106	1465	68	2.8	4	33	27	30	53	7-10	110	1155	633
Rossa		1350	63	3.2	7	22	23	23	50	7-10	101	1087	594

*-1 = best Vigor, 5 = Least Vigor

**-. 2.5 cm = 1 inch

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

184
252

Table 9. Percent stand, percent heading, height, harvest date, and seed yields for 10 Tall Fescue strains seeded in 1978 on the Melin Farm, Roseau, MN (1980 data plus 1979 seed yields).

Entry	MSP number	Percent stand 5/8	Percent heading		Height(cm)** 6/4 Harvest	Harvest date	Seed 1980	Yield 1979	Seed 1980	Yield 1979	#'s/AC 2-yr. Ave.
			6/4	6/10							
Festa1	1344	58	7	63	40	7-10	428	594	428	594	511
Kentucky 31	683	65	8	73	47	7-10	416	1426	416	1426	921
Kenhy	924	72	10	80	43	7-10	487	1256	487	1256	872
Exp. K2-28	1168	53	2	20	32	7-10	65	1028	65	1028	547
K4-90	1375	60	0	2	38	7-23	184	1081	184	1081	633
K5-27	1169	60	7	37	33	7-10	217	1194	217	1194	706
K5-30	1170	55	7	63	43	7-10	392	832	392	832	612
Monaco	1171	57	0	10	35	7-18	77	535	77	535	306

LSD at 5% level 143 398
1% level 198 N.S.

*- 2.5 cm = 1 inch

Table 10. Percent stand, winter injury, percent heading, height, harvest date and estimated and harvested seed yields for six fescue strains seeded in 1979 on the Welin Farm, Roseau, MN (1980 data).

Species	Entry	MSP number	Percent stand 5/7/80	Winter injury* 5/7/80	% heading			Height(cm)** 6/4 Harvest	Harvest date	Seed yields Estimate*** 7/18/80	Pounds/ Acre
					5/30	6/2	6/4				
Meadow Fescues	Beaumont	1553	68	3.0	0	7	4	35	7-9	2.0	425
	First	1500	78	2.7	0	12	4	40	7-9	2.0	339
Tall Fescues	K2-28	1168	70	3.0	T	3	17	43	7-9	1.3	389
	Hokuryo	1506	52	2.8	0	2	10	50	7-9	2.7	395
	Yamanami	1507	65	3.5	30	47	60	50	6-30	3.9	122
Chewings fescue	Jamestown	1552	52	2.3	10	17	27	27	6-30	5.0	33

LSD at 5% level 108
LSD at 1% level 154

*- 1 = Least injury, 5 = most injury
**- 2.5 cm = 1 inch
***- 1 = highest seed yield, 5 = Lowest estimated yield

Table 11. Winter injury, percent heading, and percent stand for 32 Perennial Ryegrass strains seeded in 1979 on the Melin Farm, Roseau, MN (1980 data).

Entry	Company number	MSP number	Winter 5/6	injury* 5/8	Percent heading 6/14	Percent stand 8/4
Elrod	K3-38	1378	4.3	4.3	0	28
Estel	K3-39	1379	4.7	4.7	10	22
Eton	971	971	3.3	3.5	0	62
Majestic	1278	1278	3.3	3.6	0	57
Mom-Lp-204	1279	1279	3.9	4.0	2	48
NK-200		1256	2.6	2.7	0	73
Norlea		1257	3.2	3.3	2	73
Parmir	7803	1394	4.8	4.8	4	2
Pennfine		964	4.8	4.8	T	4
Servo	K2-740	1187	2.7	2.8	0	83
Svea	K4-102	1383	3.0	3.2	7	80
Verna	K3-28	1377	4.8	4.8	T	12
Yorktown		1309	4.7	4.5	7	20
Yorktown II		1310	4.0	4.0	4	47
Exp.'s	K2-176	1376	5.0	5.0	0	T
	K3-40	1380	4.7	4.7	0	7
	K3-41	1381	4.5	4.8	T	9
	K3-42	1382	4.4	4.7	0	28
	K5-31	1384	2.8	2.5	4	80
Theophano		1239	4.6	4.2	11	28
	K5-88	1385	4.8	4.8	2	4
Exp.'s	K5-90	1386	4.4	4.3	17	29
	K5-92	1387	5.0	4.5	T	13
	K5-94	1388	4.8	4.8	T	8
	K5-683	1389	4.8	4.8	7	2
	K5-684	1390	5.0	5.0	0	2
	K6-78-1	1391	3.8	3.8	22	47
	K6-78-2	1392	4.8	4.8	0	2

Table 11 (cont.) Winter injury, percent heading, and percent stand for 32 Perennial Ryegrass strains seeded in 1979 on the Melin Farm, Roseau, MN (1980 data).

Entry	Company number	MSP number	Winter 5/6	injury* 5/8	Percent heading 6/14	Percent stand 8/4
Diplomat	K6-83-2	1393	4.8	4.8	0	7
		1321	4.1	3.8	7	43
Kiyosato Yatsugane		1508	4.8	4.8	3	3
		1509	4.8	4.8	0	5

*- = Least injury, 5 = severe injury

Table 12. Percent stand, vigor, percent heading, harvest date, and seed yields for 10 Orchardgrass strains seeded in 1977 on the Melin Farm, Roseau, MN (1980 data plus 1978 and 1979 seed yields).

Entry	MSP number	Percent stand 5/8	Vigor* 5/8	Percent heading 6/10	Harvest date	Seed Yield (#'s/AC)		
						1980	1979	1978 3 yr. Ave.
Comet	1176	60	2.7	67	7-10	268	437	882
Crown	1138	48	3.2	47	7-10	85	370	722
Hawk	1139	52	3.2	67	7-10	330	419	858
Nordstern	1177	57	2.7	27	7-10	98	696	653
Exp. K2-8	1172	62	2.5	57	7-10	210	531	754
K3-9	1173	60	2.3	30	7-10	210	691	838
K6-4	1174	57	2.3	43	7-10	183	607	633
K8-118	983	57	2.3	37	7-10	294	687	754
K8-122	1175	43	2.3	43	7-10	366	575	502
Orbit K8-120	1178	57	2.8	43	7-10	161	459	796

LSD at 5% level 88
1% level 127

NS NS
NS NS

*-1 = best vigor, 5 = Least Vigor

Table 13. Percent stand, winter injury, percent heading, height, harvest date, and estimated and harvested seed yields for 6 orchardgrass strains seeded in 1979 on the Welin Farm, Roseau, MN (1980 data).

Entry	MSP number	Percent stand 10/79	Winter injury* 5/7-80	% heading				Height(cm)**		Harvest Date	Seed Yields		
				5/27	5/30	6/2	6/4	6/10	6/4 Harvest		Estimated 7/1	*** #'s/AC	
Akimidori	1502	77	3.3	7	10	10	23	27	55	73	7-4	4.3	30
Aonami	1503	77	3.2	10	17	28	43	47	58	75	7-4	3.9	71
Kitamidori	1504	87	2.8	8	17	23	40	50	55	72	7-4	3.8	81
Okamidori	1505	83	2.4	4	8	20	53	60	55	85	7-2	3.1	211
Piedmont Syn 2	1542	73	3.0	5	12	18	33	37	57	73	7-4	4.2	45
Nordstern	1177	77	2.0	0	T	4	23	33	53	85	7-9	2.0	303

LSD at 5% level 69
1% level 98

*- 1 = Least injury, 5 = most injury overwinter
**- 2.5 cm = 1 inch
***-1 = highest yield, 5 = lowest estimated yield

Table 14. Percent heading, height and seed yields for 10 Reed strains seeded in 1978 on the Welin Farm, Roseau, MN Canarygrass (1980 data plus 1979 seed yields).

Entry	MSP number	Percent heading		Height (cm)* 6/4 harvest	Seed yields (#'s/AC)			1979 2-year Average	
		5/27	6/4		6/16	6/24/80	6/27/80		1980 Ave.
Caster	607	0	13	70	184	181	183	546	365
Commerical	1251	0	10	47	98	62	80	333	207
Flare	1301	T	12	73	157	137	147	475	311
Frontier	172	0	13	60	116	122	119	336	228
MN-72	1108	0	8	47	95	83	89	270	180
MN-76	1109	T	12	40	89	62	76	241	159
NRG-721	867	0	12	60	146	160	153	487	320
PS-2	1302	0	18	77	214	175	195	469	332
Rise	1142	0	15	70	166	143	155	342	249
Vantage	1145	0	10	60	146	131	139	327	233

LSD at 5% level NS NS NS

Table 15. Percent stand, percent heading, height, harvest date and estimated and harvested seed yields for 10 Reed canarygrass strains seeded in 1979 on the Welin Farm, Roseau, MN (1980 data).

Entry	MSP number	Percent stand		Percent heading				Height(cm) 6/4 Harvest	Harvest date	Seed Yields		
		5/8	5/27	5/30	6/2	6/4	6/10			Estimated**	#'s/AC	
Commerical	1251	70	T	8	18	38	60	68	113	6-24	3.4	74
Flare	1301	65	0	5	15	32	53	63	112	6-24	2.9	92
Hansvall	1541	57	0	0	0	0	0	23	---	---	5.0	--
Mn-76	1109	60	2	20	30	67	63	73	115	6-24	3.5	86
Mn-7904	1540	62	0	0	0	0	0	37	---	---	4.8	--
NRG-721	867	70	0	4	13	22	67	58	118	6-24	2.6	131
PS-2	1302	72	T	8	20	40	70	70	117	6-24	2.2	119
Rise	1142	77	0	5	10	23	40	58	115	6-24	3.0	59
Rovik	1539	65	0	2	2	0	T	40	---	---	5.0	--
Vantage	1145	68	0	5	13	28	47	57	113	6-24	3.6	77

LSD at 5% level N.S.

*- 2.5 cm = 1 inch
 **- 1 = highest yield, 5 = Lowest yield

Table 16. Percent heading, height, lodging, harvest date and seed yields for 10 Smooth brome grass strains seeded in 1978 on the Welin Farm, Roseau, MN (1980 data plus 1979 seed yields)

Entry	MSP number	Percent heading		Height(cm)*	Harvest Lodging	Date	Seed		Yields 1979	(#/AC) 2-yr. Ave
		5/27	5/30				6/10	1980		
Exp. K1-105	885	2	4	80	1.7	7-11	496	484	490	
Lincoln	1399	2	5	80	1.7	7-11	508	529	519	
MLM-13010	1292	2	5	80	1.3	7-11	478	478	478	
MLM-13010A	1293	7	12	80	1.3	7-11	469	558	514	
MLM-13011	1294	T	3	80	2.0	7-11	407	662	535	
MLM-13011A	1295	7	10	80	1.3	7-11	526	526	526	
NAPB-407601	1311	T	3	80	1.7	7-11	570	615	593	
NAPB-407602	1312	0	2	80	1.0	7-11	448	653	551	
NAPB-407603	1313	2	7	80	1.3	7-11	472	603	538	
Sac	870	T	7	80	1.0	7-11	591	463	527	

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

* - 2.5 cm = 1 inch

Table 17. Winter injury ratings, seed yields and harvest dates for 13 birdsfoot trefoil varieties seeded in 1978 on the Welin Farm, Roseau, Minnesota.

VARIETY	WINTER INJURY+	WINTER INJURY+	1979 SEED YIELD†	1979 HARVEST DATE	1980 SEED YIELD†	1980 HARVEST DATE
	MAY 8, 1979	JUNE 5, 1980	(kg/ha)	DATE	(kg/ha)	DATE
MACKINAW	1.3 ab	2.0 a	217 cd	8/13	480 ab	7/29
CARROLL	1.0 a	2.2 a	317 abc	8/9	463 ab	7/29
DAWN	1.7 ab	2.7 ab	352 ab	8/11	373 ab	7/30
LEO	1.0 a	2.7 ab	345 bcd	8/10	593 a	7/29
NC-83 (Norcen)	1.2 a	3.0 abc	350 ab	8/10	388 ab	7/29
EMPIRE	1.7 ab	3.2 abc	233 bcd	8/16	350 b	7/29
KENTUCKY ECOTYPE	2.0 b	3.7 bcd	400 a	8/8	--	--
Mo-20	1.0 a	4.0 cde	305 abc	8/10	--	--
CASCADE	2.0 b	4.7 de	297 abc	8/9	--	--
VIKING	1.3 ab	4.7 de	328 abc	8/8	--	--
KALO	2.0 b	4.8 de	243 bcd	8/7	--	--
VEGA II	3.5 c	4.8 de	140 d	8/12	--	--
MANSFIELD	2.1 b	5.0 e	342 abc	8/18	--	--

†1.0 is least injury and 5.0 is most injury, means in the row followed by unlike letters differ significantly at the .01 level.

‡ Means in the row followed by unlike letters differ significantly at the .05 level.