

PROJECT TITLE: The evaluation of winter and spring spelt varieties and germplasm for yield and quality under dryland cropping.

PROJECT LEADER: G.F. Stallknecht

PROJECT COOPERATORS: Darrell Wesenberg, Harold Bockelman, USDA ARS, Small Grain Germplasm Center, Aberdeen, Idaho
Hal Lafever, Plant Breeder, Sunbeam Extracts, Wooster, Ohio
Pierre Hucl, Plant Geneticist, Crop Dev. Center, Plant Science Dept., Univ. of Saskatchewan, Saskatoon, Canada
Joe Vavrovsky, Technician, CARC

OBJECTIVES: To identify for release and variety recommendations, winter and spring spelt cultivars which are adapted to Montana, for use as livestock grain, as forage, and for human food uses.

RESULTS: GENERAL

Beginning in 1992, we evaluated 650 of the 1150 plant introduction (PI) selections of spelt from the world collection stored in the USDA cereal germplasm center, Aberdeen, Idaho. These selections are considered primitive grains since most have existed over several thousands of years, and were selected from mixed wild populations for adaptation to certain geographic locations in Europe and the Near East regions. The majority of the spelt PI selections in the world collection have not been improved by conventional breeding programs for agronomic yield and quality traits. These selections have been compared to a Montana common spelt selection grown by Mr. Dover Sindelar, Billings, MT.

The Montana common spelt is a mixture of dark and light colored straw and chaff plant types. When separated, the light colored selection consistently out-yields the dark selection, however, the light plants have weak straw which tends to lodge, whereas the dark plants have strong straw which does not lodge. When compared for winter hardiness to the PI selections from the world collection, or to spelt varieties developed in Europe, and recently in the U.S., the Montana common spelt is among the most winter hardy tested at the SARC. The Montana common spelt has also consistently yielded in the top 25 percent of the selections, in all the trials conducted in both Montana and North Dakota.

RESULTS: WINTER SPELT 1996

In 1996, the top yielding PI selections, European varieties and the more recent varieties developed for release in Ohio, were compared to Montana common spelt for yield and winter hardiness at the Moccasin research center (CARC), and in a producer field near Moore Montana. With the exception of 5 selections, the survival of winter spelt was 90 percent or greater at the Moore site, while only 6 spelt selections including Montana common (93 percent) had a survival of 90 or above, and 13 selections had a survival of 80 percent or above (table 1). Two varieties developed for consideration of release by Dr. Hal Lafever in Ohio, Tora (a true spelt) and Solo (a wheat spelt cross) yielded well in comparison to the winter wheat checks (Norstar, Agassiz, Roughrider) at both locations (tables 1,2). Tora was the high yielder (non-significant) at the Moccasin center with a 43 percent winter survival rating. Four PI selections produced good yields with winter survival ratings of 90 percent or above at Moccasin. Two European selections (Lueq and Uberkulmer/Rottkorn) yielded among the top 30 percent, however both exhibited marginal winter hardiness. The Ohio selection GR 900, which is presently under contract in Montana, yielded in the top 25 percent with a 40 percent survival rating.

RESULTS: SPRING SPELT 1996

Three hundred and fifty spring spelt selections have been evaluated in Montana in 1995 and 1996. The first objective is to identify selections which produce consistently good yields and which are resistant to lodging. All data in the U.S. is preliminary and incomplete at this time (Tables 3,4). However, Dr. Pierre Hucl, crop development center and Dept. Crop Science, Univ. of Saskatchewan, has released a spring spelt variety, Barvaria, the origin of which is unknown. Barvaria has been evaluated at Moccasin in 1996, and produced one of the higher yields in the trial (Table 5).

SUMMARY: High yielding winter spelt selections with resistance to lodging will be evaluated for winter hardiness and grain and forage quality. Spelt lines recently developed in Ohio, and not yet released as identified varieties, have exhibited excellent yield and agronomic traits, when compared to standard European varieties. Also, several PI selections have exhibited high yields and winter hardiness. The Montana common spelt, while being among the top yielders, and having very good winter hardiness, is a mixture, which shifts in ratio due to yield differences between the dark and light plant types and is susceptible to lodging.

Preliminary studies are in progress to identify spring spelt types for adaptation to Montana, for production in environments where winter spelt does not survive.

FUTURE PLANS: The "covered wheats" spelt, emmer, and einkorn have the potential to contribute to livestock forage and grain feeding management in Montana, and to offer Montana producers an alternative niche market crop for human food uses. The forage and grains of the covered wheats are considered to be more easily digested, and preliminary data supports the validity of these claims. Spring spelt selections are in reality winter types in the Mediterranean region, which express late maturing, facultative spring growth habits, and to date only two selections have been awnless. These awnless selections will be evaluated for use as a spring cereal forage in comparison to traditional hay barleys or spring oats.

The studies at MSU are being directed to identify and release as varieties selections which exhibit agronomic quality with the potential to produce positive economic returns to the producers as livestock rations or for human consumption.

Table 1 1996 Moccasin Dryland Winter Spelt Trial
Exp.96WNSP01 Central Agricultural Research Center, Moccasin, MT.

ID#	Variety	Head Date	Plant Ht.	Grain Yield	Winter Survival
		day	"	lbs/a	%
107	TORA	180.00	30.50	2986.65	42.50
142	NORSTAR W/WHEAT	179.50	41.00	2928.50	100.00
105	SOLO	178.50	31.00	2639.45	90.00
146	AGASSIZ W/WHEAT	176.00	37.00	2632.95	100.00
147	ROUGH RIDER W/WHEAT	176.50	34.00	2556.35	100.00
81	PI 355671 BRAUNSCHWE	190.50	30.00	2391.00	65.00
141	PI 347888-69Z6.40-SW	185.00	39.50	2307.90	85.00
97	PI 355617 WARTENSEAR	186.00	36.50	2115.85	90.00
5	PI 338366 ARDENNE BE	185.00	37.50	2038.25	52.50
114	SINDELAR MIX	187.00	36.00	2013.30	92.50
139	PI 348337-69Z6.508-B	187.00	35.00	1997.60	80.00
38	PI 348156 GERMANY	186.50	33.00	1916.35	60.00
69	PI 355632 LIESTALER	186.50	35.50	1899.75	40.00
59	PI 355585 SWITZERLAN	191.50	36.00	1861.85	1.00
95	PI 355606 ETTISWIL 2	187.50	32.00	1820.30	87.50
43	PI 348206 GERMANY	190.00	29.00	1819.40	85.00
136	PI 348421-69Z6.594-B	185.50	34.50	1803.65	25.00
11	PI 347878 SWITZERLAN	187.50	37.00	1800.90	80.00
113	PI 348109-69Z6.270-G	188.50	35.50	1798.15	45.00
116	SINDELAR LT	190.00	33.50	1789.80	55.00
83	PI 355684 BP 6 SWITZ	186.50	37.00	1779.65	50.00
111	LUEG	185.00	30.50	1774.10	65.00
48	PI 348264 GERMANY	182.50	37.50	1771.35	97.50
68	PI 355631 THURIG 4 S	185.50	38.00	1736.25	20.00
27	PI 348025 GERMANY	187.50	37.00	1727.00	50.00
34	PI 348093 GERMANY	191.50	30.00	1714.10	55.00
62	PI 355609 BANGERTER	186.50	36.50	1713.20	50.00
46	PI 348228 GERMANY	186.50	38.00	1694.70	77.50
37	PI 348148 GERMANY	188.00	33.50	1674.35	70.00
74	PI 355650 SPELTA 44	183.00	34.00	1656.85	92.50
30	PI 348067 GERMANY	192.00	33.50	1642.05	40.00
115	SINDELAR DK	183.00	35.00	1641.15	40.00
9	PI 347871 SWITZERLAN	189.00	36.50	1635.55	60.00
102	SAMMY	185.00	34.50	1624.50	47.50
67	PI 355630 HN 19 SWIT	185.50	38.00	1606.95	70.00
93	PI 355603 LENZBURGER	187.50	34.00	1580.20	65.00
100	PI 355703 GERMANY	187.00	40.50	1546.00	100.00
19	PI 347946 SWITZERLAN	190.00	35.50	1538.65	50.00
140	PI 355647-STRICKHOF-	184.50	34.00	1535.85	65.00
137	GR 900	185.50	37.50	1532.20	40.00
73	PI 355646 ROTHENBURG	184.50	32.50	1530.30	67.50
91	PI 348159 GERMANY	188.50	32.00	1515.55	100.00
125	PI 347850-ALTGOLD-SW	190.00	37.00	1498.00	25.00
41	PI 348180 GERMANY	191.00	36.00	1496.15	60.00
150	SYMK SPELT	186.50	39.00	1493.35	45.00
49	PI 348297 GERMANY	187.00	34.00	1483.20	82.50
90	PI 348145 GERMANY	189.00	35.00	1475.85	52.50
130	PI 348157-69Z6.320-G	191.00	31.50	1468.45	30.00
92	PI 355601 OBERAMMENT	190.00	31.00	1463.85	45.00
21	PI 347969 SWITZERLAN	190.50	35.50	1448.15	50.00
36	PI 348131 GERMANY	185.00	37.00	1398.25	72.50
45	PI 348215 GERMANY	189.50	30.00	1386.25	72.50
39	PI 348168 GERMANY	191.00	33.50	1377.95	50.00
29	PI 348047 GERMANY	191.00	30.50	1371.50	40.00
12	PI 347892 SWITZERLAN	190.00	29.50	1332.65	45.00

Continued

Table 1 1996 Moccasin Dryland Winter Spelt Trial
Exp.96WNSP01 (Continued)

ID#	Variety	Head Date	Plant Ht.	Grain Yield	Winter Survival
		day	"	lbs/a	%
24	PI 347983 SWITZERLAN	185.00	34.50	1328.05	22.50
28	PI 348026 GERMANY	192.00	33.50	1283.75	47.50
76	PI 355655 ROTWEILER	187.00	35.00	1253.25	60.00
50	PI 348347 BELGIUM	191.00	33.50	1242.15	60.00
82	PI 355678 NORDLINGER	186.50	33.00	1168.30	20.00
108	ZORBA	176.50	33.50	1164.60	45.00
64	PI 355616 RINIKER SW	188.00	37.00	1153.55	52.50
75	PI 355653 ROTWEILER	187.00	37.50	1144.30	30.00
33	PI 348091 GERMANY	192.00	29.50	1136.90	45.00
104	SHANA	179.00	34.00	1131.35	25.00
77	PI 355658 BRAUNSCHWE	187.00	38.00	1117.55	45.00
89	PI 347921 SWITZERLAN	188.50	33.00	1083.35	25.00
72	PI 355644 BATTIG N1	185.00	37.00	1045.45	50.00
122	SP 949	187.00	35.50	1020.55	60.00
65	PI 355619 GEMBLoux 2	191.50	33.50	1001.15	25.00
99	PI 355669 BRAUNSCHWE	189.00	33.50	996.55	50.00
47	PI 348234 GERMANY	192.00	34.50	982.70	55.00
109	OBBERKULMER/ROTKORN-	187.50	39.00	981.75	47.50
15	PI 347910 SWITZERLAN	183.50	38.50	969.80	62.50
80	PI 355668 OE 39 SWIT	185.50	41.00	962.35	52.50
138	PI 355618-BRAUNSCHWE	190.50	31.50	949.45	75.00
22	PI 347970 SWITZERLAN	186.50	33.50	923.60	32.50
63	PI 355613 GERMANY	190.00	37.00	894.95	45.00
117	VITA II	180.50	31.00	871.85	25.00
106	SUBA	181.00	31.00	845.10	52.50
84	PI 355697 GEMBLoux 2	192.00	32.50	841.40	25.00
42	PI 348197 GERMANY	186.50	31.50	810.00	42.50
120	PI 347991-69Z6.147-S	94.50	16.00	801.65	.00
58	PI 355581 SWITZERLAN	191.00	36.50	789.65	2.50
103	SAVA	183.00	31.00	787.80	7.50
127	PI 347952-69Z6.107-S	92.50	17.00	779.50	35.00
13	PI 347895 SWITZERLAN	183.00	38.00	754.60	50.00
96	PI 355610 ZUGGER 15A	92.00	18.00	738.90	47.50
20	PI 347960 SWITZERLAN	191.00	33.50	737.05	42.50
56	PI 355554 GERMANY	.00	.00	736.10	.00
31	PI 348074 GERMANY	193.00	35.50	730.55	20.00
110	ROGUIN-(LAFEVER)	179.50	34.50	729.65	45.00
88	PI 347877 SWITZERLAN	190.00	37.00	713.95	12.50
132	PI 347887-69Z6.39-SW	187.00	34.50	712.10	15.00
7	PI 347863 SWITZERLAN	193.00	39.00	704.70	7.50
54	PI 348599 SPAIN	94.50	14.00	701.95	.00
66	PI 355628 SANDMEIER	190.00	30.50	695.45	37.50
134	PI 272574-I-1-3540-H	190.50	35.00	689.95	10.00
60	PI 355588 SWITZERLAN	183.50	39.00	689.00	7.50
23	PI 347980 SWITZERLAN	193.00	36.00	653.90	5.00
94	PI 355605 VORENVALDE	190.50	33.50	642.85	22.50
10	PI 347875 SWITZERLAN	191.00	31.50	640.05	30.00
14	PI 347897 SWITZERLAN	186.50	38.50	638.20	45.00
71	PI 355642 BELGIUM	186.00	35.50	633.60	40.00
17	PI 347926 SWITZERLAN	192.00	32.00	616.95	42.50
35	PI 348123 GERMANY	95.00	33.00	616.05	55.00
32	PI 348077 GERMANY	91.50	16.00	604.95	12.50
40	PI 348177 GERMANY	190.50	33.00	575.40	77.50
85	PI 361813 DENMARK	186.50	35.00	556.00	30.00
112	PI 168682-ALSTROUM-U	183.00	35.00	528.30	20.00

Continued

Table 1 1996 Moccasin Dryland Winter Spelt Trial
Exp.96WNSP01 (Continued)

ID#	Variety	Head Date	Plant Ht.	Grain Yield	Winter Survival
		day	"	lbs/a	%
61	PI 355592 SWITZERLAN	93.50	19.00	446.15	5.00
25	PI 348000 SWITZERLAN	189.50	37.50	398.10	7.50
52	PI 348409 BELGIUM	192.00	35.50	375.95	35.00
44	PI 348211 GERMANY	194.50	31.50	291.00	25.00
26	PI 348004 SWITZERLAN	186.50	33.50	242.05	7.50
78	PI 355661 ITALY	186.00	33.50	228.20	10.00
1	CI 3264 WHITE SPELT	185.00	36.50	1.00	48.50
149	NE90701 W/BARLEY	179.50	24.50	1.00	10.00
148	SCHUYLER W/BARLEY	.00	.00	1.00	.00
101	LOBO	93.00	17.00	1.00	15.00
119	CI 1772-RED WINTER-U	.00	.00	1.00	.00
70	PI 355638 OBERKULMER	189.50	37.00	1.00	15.00
98	PI 355660 GAILBERG G	92.00	17.00	1.00	5.00
143	CANADA BULK	93.50	18.50	1.00	5.00
133	PI 347971-69Z6.127-S	192.50	32.50	1.00	7.50
57	PI 355574 SWITZERLAN	92.50	.00	1.00	2.50
123	PI 295059-DEUTCHLAND	185.00	32.50	1.00	2.50
121	PI 355556-T112-GERMA	190.00	33.00	1.00	2.50
129	PI 330559-UNITED KIN	191.00	33.50	1.00	5.00
16	PI 347913 SWITZERLAN	189.00	33.50	1.00	12.50
128	PI 355579-SK 30-SWIT	193.50	34.50	1.00	5.00
145	FRANCKENKORN	187.50	32.00	1.00	5.00
4	PI 306551 ROMANIA	94.00	16.50	1.00	1.00
79	PI 355664 ROTER KOLB	.00	.00	1.00	.00
86	PI 471924 USA	188.50	35.50	1.00	5.00
131	PI 347948-69Z6.103-S	190.00	38.00	1.00	7.50
18	PI 347932 SWITZERLAN	191.00	36.50	1.00	15.00
8	PI 347869 SWITZERLAN	192.00	35.50	1.00	10.00
87	PI 520066 MEXICO	185.00	35.00	1.00	5.00
6	PI 347851 SWITZERLAN	192.00	36.00	1.00	15.00
118	PI 347954-69Z6.109 S	188.50	36.00	1.00	7.50
126	PI 290513-FUGGERS-BA	190.00	38.00	1.00	17.50
55	PI 355552 GERMANY	93.50	15.00	1.00	.00
2	PI 290516 LOHNAUER H	.00	.00	1.00	.00
53	PI 348426 BELGIUM	96.50	18.00	1.00	2.50
51	PI 348407 BELGIUM	190.50	36.00	1.00	5.00
135	PI 272573-I-1-599-HU	189.00	37.00	1.00	37.50
144	ROGUIN-(WILLIE)	188.50	34.00	1.00	2.50
124	PI 348528-69Z6.706-S	190.50	29.50	1.00	5.00
3	PI 295060 HINDUCUSCH	.00	.00	1.00	.00
EXPERIMENTAL MEANS		171.24	31.59	983.33	37.89
F TEST FOR VAR. df=149		2.42	2.90	2.37	1.76
C.V. 1: (S/MEAN)*100		23.70	23.46	69.10	80.28
LSD (0.05)		80.21	14.64	1342.65	60.10

Planted: 9-27-1995 on fallow ground.

Fertilizer: 60 units N as Urea applied & incorporated preplant.

Growing Season Precipitation (April-July): 5.66".

88 yr. ave. = 8.68".

Table 2 1996 Moore Dryland Winter Spelt Trial
Exp.96WNSP03 Central Agricultural Research Center, Moccasin, MT.

ID#	Variety	Grain Yield lbs/a	Winter Survival %
94	PI 355605 VORENVALDE	2112.30	100.00
110	ROGUIN-(LAFEVER)	2032.65	97.50
111	LUEG	1919.90	55.00
119	CI 1772-RED WINTER-U	1901.95	97.50
124	PI 348528-69Z6.706-S	1872.40	100.00
16	PI 347913 SWITZERLAN	1861.70	50.00
74	PI 355650 SPELTA 44	1850.10	100.00
105	SOLO	1799.05	90.00
23	PI 347980 SWITZERLAN	1798.15	100.00
91	PI 348159 GERMANY	1770.45	97.50
145	FRANCKENKORN	1769.55	95.00
141	PI 347888-69Z6.40-SW	1733.75	100.00
98	PI 355660 GAILBERG G	1731.95	97.50
106	SUBA	1715.80	97.50
99	PI 355669 BRAUNSCHWE	1670.20	95.00
104	SHANA	1663.90	97.50
85	PI 361813 DENMARK	1662.10	97.50
140	PI 355647-STRICKHOF-	1656.75	90.00
15	PI 347910 SWITZERLAN	1655.85	52.50
112	PI 168682-ALSTROUM-U	1654.05	97.50
69	PI 355632 LIESTALER	1649.55	97.50
75	PI 355653 ROTTWEILER	1646.00	97.50
28	PI 348026 GERMANY	1627.20	92.50
107	TORA	1625.45	95.00
11	PI 347878 SWITZERLAN	1625.40	97.50
88	PI 347877 SWITZERLAN	1622.75	95.00
89	PI 347921 SWITZERLAN	1620.05	100.00
132	PI 347887-69Z6.39-SW	1613.75	97.50
9	PI 347871 SWITZERLAN	1608.45	45.00
120	PI 347991-69Z6.147-S	1601.25	90.00
134	PI 272574-I-1-3540-H	1591.45	100.00
43	PI 348206 GERMANY	1587.85	95.00
60	PI 355588 SWITZERLAN	1585.15	95.00
123	PI 295059-DEUTCHLAND	1585.15	97.50
13	PI 347895 SWITZERLAN	1585.15	100.00
96	PI 355610 ZUGGER 15A	1583.35	100.00
81	PI 355671 BRAUNSCHWE	1574.40	95.00
46	PI 348228 GERMANY	1551.10	97.50
109	OBERKULMER/ROTTKORN-	1547.55	95.00
139	PI 348337-69Z6.508-B	1547.55	97.50
136	PI 348421-69Z6.594-B	1541.30	97.50
38	PI 348156 GERMANY	1532.35	97.50
70	PI 355638 OBERKULMER	1526.95	92.50
34	PI 348093 GERMANY	1524.30	95.00
90	PI 348145 GERMANY	1511.75	97.50
113	PI 348109-69Z6.270-G	1509.10	95.00
14	PI 347897 SWITZERLAN	1507.30	97.50
71	PI 355642 BELGIUM	1497.45	97.50
142	NORSTAR W/WHEAT	1494.75	100.00
54	PI 348599 SPAIN	1493.85	95.00
24	PI 347983 SWITZERLAN	1482.20	92.50
100	PI 355703 GERMANY	1464.35	90.00
129	PI 330559-UNITED KIN	1462.55	92.50
116	SINDELAR LT	1458.95	100.00
126	PI 290513-FUGGERS-BA	1450.90	100.00

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Table 2 1996 Moore Dryland Winter Spelt Trial
Exp.96WNSP03 (Continued)

ID#	Variety	Grain Yield	Winter Survival
		lbs/a	%
150	SYMK SPELT	1450.00	100.00
114	SINDELAR MIX	1446.45	95.00
56	PI 355554 GERMANY	1439.25	95.00
76	PI 355655 ROTTWEILER	1437.45	95.00
118	PI 347954-69Z6.109 S	1436.60	97.50
30	PI 348067 GERMANY	1436.55	97.50
87	PI 520066 MEXICO	1433.00	95.00
86	PI 471924 USA	1426.75	95.00
97	PI 355617 WARTENSEAR	1423.15	97.50
47	PI 348234 GERMANY	1422.30	95.00
77	PI 355658 BRAUNSCHWE	1420.45	95.00
39	PI 348168 GERMANY	1414.20	92.50
45	PI 348215 GERMANY	1411.55	95.00
130	PI 348157-69Z6.320-G	1400.80	92.50
68	PI 355631 THURIG 4 S	1399.90	95.00
67	PI 355630 HN 19 SWIT	1397.20	95.00
2	PI 290516 LOHNAUER H	1392.75	90.00
6	PI 347851 SWITZERLAN	1381.10	95.00
12	PI 347892 SWITZERLAN	1365.85	95.00
103	SAVA	1360.50	97.50
147	ROUGH RIDER W/WHEAT	1360.50	97.50
8	PI 347869 SWITZERLAN	1357.80	95.00
146	AGASSIZ W/WHEAT	1355.15	97.50
31	PI 348074 GERMANY	1353.35	97.50
7	PI 347863 SWITZERLAN	1348.90	97.50
29	PI 348047 GERMANY	1348.00	97.50
17	PI 347926 SWITZERLAN	1339.00	92.50
66	PI 355628 SANDMEIER	1339.00	95.00
101	LOBO	1333.65	55.00
35	PI 348123 GERMANY	1328.30	95.00
80	PI 355668 OE 39 SWIT	1317.55	92.50
27	PI 348025 GERMANY	1314.90	100.00
73	PI 355646 ROTHENBURG	1313.95	95.00
122	SP 949	1313.95	97.50
108	ZORBA	1313.10	95.00
63	PI 355613 GERMANY	1303.20	92.50
84	PI 355697 GEMBLOUX 2	1300.55	95.00
72	PI 355644 BATTIG N1	1297.85	97.50
20	PI 347960 SWITZERLAN	1296.05	95.00
62	PI 355609 BANGERTER	1289.80	97.50
53	PI 348426 BELGIUM	1288.00	90.00
42	PI 348197 GERMANY	1277.25	97.50
51	PI 348407 BELGIUM	1263.85	92.50
82	PI 355678 NORDLINGER	1254.85	97.50
52	PI 348409 BELGIUM	1236.10	90.00
133	PI 347971-69Z6.127-S	1234.30	92.50
144	ROGUIN-(WILLIE)	1232.55	92.50
48	PI 348264 GERMANY	1224.45	95.00
135	PI 272573-I-1-599-HU	1221.80	97.50
143	CANADA BULK	1208.35	97.50
4	PI 306551 ROMANIA	1199.45	97.50
58	PI 355581 SWITZERLAN	1197.60	92.50
49	PI 348297 GERMANY	1189.60	92.50
33	PI 348091 GERMANY	1188.65	92.50
32	PI 348077 GERMANY	1184.20	97.50

Continued

Table 2 1996 Moore Dryland Winter Spelt Trial
Exp.96WNSP03 (Continued)

ID#	Variety	Grain	Winter
		Yield	Survival
		lbs/a	%
83	PI 355684 BP 6 SWITZ	1172.55	92.50
125	PI 347850-ALTGOLD-SW	1171.65	97.50
26	PI 348004 SWITZERLAN	1158.25	97.50
22	PI 347970 SWITZERLAN	1152.00	100.00
121	PI 355556-T112-GERMA	1148.40	97.50
138	PI 355618-BRAUNSCHWE	1142.15	97.50
95	PI 355606 ETTISWIL 2	1138.55	50.00
131	PI 347948-69Z6.103-S	1137.65	95.00
44	PI 348211 GERMANY	1133.20	92.50
21	PI 347969 SWITZERLAN	1128.70	85.00
5	PI 338366 ARDENNE BE	1109.90	97.50
50	PI 348347 BELGIUM	1106.35	92.50
3	PI 295060 HINDUCUSCH	1099.20	95.00
117	VITA II	1095.60	97.50
149	NE90701 W/BARLEY	1094.70	90.00
128	PI 355579-SK 30-SWIT	1092.90	97.50
19	PI 347946 SWITZERLAN	1084.85	95.00
78	PI 355661 ITALY	1081.30	95.00
102	SAMMY	1074.10	92.50
127	PI 347952-69Z6.107-S	1065.15	52.50
18	PI 347932 SWITZERLAN	1059.80	97.50
55	PI 355552 GERMANY	1054.40	97.50
25	PI 348000 SWITZERLAN	1010.55	62.50
92	PI 355601 OBERAMMENT	985.50	47.50
10	PI 347875 SWITZERLAN	945.25	97.50
36	PI 348131 GERMANY	923.75	95.00
65	PI 355619 GEMBLoux 2	897.75	95.00
79	PI 355664 ROTER KOLB	894.25	52.50
40	PI 348177 GERMANY	860.20	97.50
1	CI 3264 WHITE SPELT	839.60	2.50
59	PI 355585 SWITZERLAN	804.70	52.50
148	SCHUYLER W/BARLEY	758.15	100.00
37	PI 348148 GERMANY	734.90	95.00
57	PI 355574 SWITZERLAN	670.45	50.00
93	PI 355603 LENZBURGER	626.60	100.00
41	PI 348180 GERMANY	616.75	97.50
61	PI 355592 SWITZERLAN	590.80	92.50
64	PI 355616 RINIKER SW	580.10	45.00
137	GR 900	570.20	95.00
115	SINDELAR DK	487.90	100.00
EXPERIMENTAL MEANS		1345.26	91.38
F TEST FOR VAR. df=149		.99	1.20
C.V. 1: (S/MEAN)*100		32.45	20.94
LSD (0.05)		862.65	37.81

Table 3 1996 Spring Spelt Trial
Exp.96SS07 Central Agricultural Research Center, Moccasin, MT.

ID#	Variety	Head Date	Plant Ht.	Grain Yield
		day	"	lbs/a
1	LEWIS	181.33	23.67	2102.50
31	PI 348760	189.67	29.67	1619.17
2	NEWANA	185.00	21.00	1508.37
3	OTANA	185.67	25.33	1483.73
38	PI 348486	190.67	36.00	1477.60
42	PI 355580	191.67	22.33	1422.17
29	PI 348498	191.33	32.67	1339.07
33	PI 348593	190.67	30.00	1339.07
25	PI 348763	190.33	30.00	1314.47
32	PI 348633	190.67	31.33	1308.30
10	PI 348636	190.00	28.00	1280.57
24	PI 348727	191.00	34.00	1277.50
36	PI 348719	191.00	30.33	1268.27
41	PI 190962	195.00	24.33	1262.10
8	PI 348436	191.00	30.33	1212.87
40	PI 348465	190.33	33.33	1172.83
30	PI 348568	192.33	33.67	1160.53
16	PI 348766	190.67	29.00	1157.47
20	PI 348444	188.33	29.67	1142.07
14	PI 348757	190.00	29.33	1111.27
27	PI 348660	191.33	26.00	1098.37
18	PI 348630	190.33	26.00	1077.43
19	PI 348671	189.33	26.00	1071.23
5	PI 348571	188.00	29.67	1062.03
37	PI 348466	190.67	31.33	1031.27
22	PI 348704	191.00	28.33	1000.43
28	PI 348740	189.00	29.00	991.23
12	PI 348450	189.67	28.33	988.13
15	PI 348688	190.67	29.67	941.97
26	PI 348574	190.33	29.00	929.67
4	PI 348769	189.67	27.33	923.50
21	PI 348680	191.00	24.00	920.43
6	PI 348778	190.33	24.00	917.37
11	PI 348751	189.33	27.33	914.27
23	PI 348742	189.67	28.33	880.40
34	PI 348711	190.33	28.67	861.97
13	PI 348755	190.33	28.00	861.93

Continued

Table 3 1996 Spring Spelt Trial
Exp.96SS07 (Continued)

ID#	Variety	Head Date	Plant Ht.	Grain Yield
		day	"	lbs/a
39	PI 348599	193.67	31.00	831.13
35	PI 348665	192.00	26.67	812.67
9	PI 348776	193.33	26.00	775.73
7	PI 348582	191.67	27.33	763.43
17	PI 348733	192.00	27.67	708.03
EXPERIMENTAL MEANS		190.25	28.42	1126.73
TOTAL OBSERVATIONS		126.00	126.00	126.00
NO. OF REPLICATIONS		3.00	3.00	3.00
NO. OF VARIETIES		42.00	42.00	42.00
REP. MEAN SQUARE		1.10	179.91	*****
VAR. MEAN SQUARE		15.07	30.24	*****
ERROR MEAN SQUARE		.57	7.84	*****
ERROR DEGREES OF FREEDOM		82.00	82.00	82.00
F TEST FOR REPS.		1.92	22.95	36.33
F TEST FOR VAR.		26.23	3.86	3.03
STANDARD ERROR		.76	2.80	272.10
STANDARD ERROR OF THE MEAN		.44	1.62	157.09
C.V. 1: (S/MEAN)*100		.40	9.85	24.15
C.V. 2: (S OF MEAN/MEAN)*100		.23	5.69	13.94
LSD (0.05)		1.23	4.55	441.96

NOTE: PI 355580 is awnless selection from Canada
PI 190962 is awnless selection from SARC

Table 4 1996 Spring Spelt Trial
Exp.96SS08 Southern Agricultural Research Center, Huntley, MT.

ID#	Variety	Plant Ht.	Grain Yield
		"	lbs/a
1	LEWIS	29	2494
3	OTANA	36	2441
21	PI 348680	36	1509
42	PI 355580	29	1462
14	PI 348757	30	1400
6	PI 348778	28	1292
2	NEWANA	23	1261
10	PI 348636	31	1221
15	PI 348688	33	1213
12	PI 348450	29	1137
13	PI 348755	30	1047
20	PI 348444	32	1024
16	PI 348766	31	1005
17	PI 348733	32	1001
9	PI 348776	30	918
41	PI 190962	33	866
4	PI 348769	28	855
37	PI 348466	36	855
18	PI 348630	38	804
23	PI 348742	36	780
11	PI 348751	29	755
5	PI 348571	35	752
19	PI 348671	32	725
8	PI 348436	26	709
7	PI 348582	33	706
30	PI 348568	33	671
29	PI 348498	36	652
28	PI 348740	32	651
33	PI 348593	30	644
36	PI 348719	31	641
25	PI 348763	29	545
32	PI 348633	40	534
35	PI 348665	36	529
27	PI 348660	35	504
40	PI 348465	34	494
22	PI 348704	34	478
31	PI 348760	33	468
24	PI 348727	30	447
26	PI 348574	32	354
34	PI 348711	35	348
38	PI 348486	34	280
39	PI 348599	29	226

Data is from 1 rep

NOTE: PI 355580 is awnless selection from Canada
PI 190962 is awnless selection from SARC

Table 5 Evaluation of Canadian Spring Spelt Selections
(P. Hucl) Grown at CARC, 1996

Selection	Yield (lbs/A)	Plant Ht.(in.)	Head Date
KYLE	1000	25	184
KATEPWA	1117	28	182
BARVARIA	1092	31	190
PI 348 686M	800	29	188
PI 348 461	789	26	191
PI 348 478	973	30	187
PI 348 668	800	29	188
PI 348 756	1063	32	185
PI 348 754M	965	28	187
PI 348 616	894	32	189
PI 355 580	979	27	191

- Note: 1. KYLE and KATEPWA are hard red spring wheats.
 2. BARVARIA is a variety designation given to a spring spelt selection of unknown origin, released in 1996.
 3. PI 355 580, awnless section.