

I. PROJECT TITLE: Evaluation of alternative spring cereal crops: awnless triticale, emmer, einkorn and spring spelt.

II. PROJECT LEADERS: G.F. Stallknecht, K.M. Gilbertson

III. PROJECT PERSONNEL: Don Salmon, Ag Canada, Lacombe, Alberta, Darrell Wesenberg, USDA, ARS, Aberdeen, ID.

IV. OBJECTIVE: To evaluate alternative spring cereals for use as forages, or cereal grains for livestock and human food uses.

V. RESULTS: Awnless spring triticale - In 1993, we received only a teaspoon of nine triticale breeders selection from Don Salmon, triticale breeder in Alberta. The objective to evaluate awnless spring triticale was for use as a cereal forage crop, in comparison to hay barley or spring oats. Todate these are the first reduced awned triticale which could be harvested as a hay crop. In 1994 we increased the nine awnless lines and recorded grain yields and plant heights, (Table 1). These awnless triticale lines will be evaluated for forage yield and quality in 1995.

Emmers - Approximately five acres of dryland emmer was grown at SARC in 1994, from a increase lot of PI 148. The plants were observed to separate into white and into black hull seed heads. These white and black hull selections will be increased separately in 1995. A increased interest in the use of emmer as human food has been observed in 1994. However, little is known about the flour quality of the emmers available.

Einkorn - 88 plant introductory selections (PI) have been grown for observation at SARC in 1992, 93 and 94 (Table 2). Twenty einkorn selections will be increased in 1995. The selections were based on yield and straw strength. Considerations for einkorn use, would be as a alternative cereal grain flour for human use.

Spring spelt - Presently there is no true spring spelt grown in the U.S. However, in 1994, we planted 339 Plant Introduction lines from the World Collection, which originated from collections in Spain. These spelt lines are considered winter types in the mild Mediterranean region, and did not survive winter planting in the U.S. All but one selection were awned types, which we do not consider awned types desirable for forage uses. However, 100 (PI) selections will be increased in 1995 for observation and yield evaluation.

VI. SUMMARY: The awnless triticale selections will be evaluated for cereal forage production under dryland and irrigated cropping, yield and quality. Studies on einkorn, emmer, and spring spelt with concentration on adaption of a few selected

varieties which could be marketed as alternative cereal grains for flour production in human food uses.

VII. FUTURE PLANS: To continue, but greatly reduce the number of alternate cereal crop selections, for evaluation as livestock or human food uses when compared to the common bread wheats, with regard to yield, quality and bread flavors.

TABLE 1 . 1994 DRYLAND AWNLESS SPRING TRITICALE TRIAL,
SARC, HUNTLEY, MT.

	VARIETY	YIELD TEST WT PLANT HT HEAD			
		LB/AC	LB/BU	INCHES	DATE
9	88L023002	2535.61	52.30	36.25	166.00
8	88L012013	2442.27	49.20	40.00	164.50
2	88L003008	2304.78	50.70	42.25	162.00
7	88L012003	2299.17	49.60	36.00	164.50
5	88L011006	2046.65	51.60	41.50	162.50
1	88L003007	2033.40	50.10	36.75	163.00
3	88L010002	1977.19	50.40	39.00	162.50
4	88L010003	1951.86	51.00	38.75	163.00
6	88L011008	1950.31	50.60	41.25	160.00
10	PI 148 EMMER SELECTION	395.88	29.10	22.25	160.00

***** STATISTICAL TABLE *****

	YIELD	PLANT	HT	HEAD
	LB/AC	INCHES		DATE
EXPERIMENTAL MEANS	1993.71	37.40		162.80
F TEST FOR REPS.	3.03	.26		.00
F TEST FOR VAR.	25.69	12.60		10.87
C.V. 1: (S/MEAN)*100	11.89	8.69		.50
C.V. 2: (S OF MEAN/MEAN)*100	5.94	4.35		.35
LSD (0.05)	343.85	4.72		1.85

DATE PLANTED: 4/11/94
DATE HARVESTED: 8/08/94

TABLE 2 . 1994 DRYLAND EINKORN VARIETY, INCREASE TRIAL,
SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT.

VARIETY		YIELD LB/AC	TEST WT LB/BU	PLANTHT INCHES	HEAD DATE
5	BOWMAN	3210.46	50.00	30.00	160.00
PI190947	3872 (SPAIN)	2902.81	34.60	38.00	174.00
3	LEWIS	2897.15	48.40	31.00	163.00
PI362616	VII/8-X21 (YUGOSLAV	2835.24	32.70	36.00	169.00
PI167615	HARLAN J R 3304 (TU	2802.49	30.70	35.00	170.00
PI272560	I-1-3516 (HUNGARY)	2763.05	30.40	37.00	170.00
4	OTANA	2742.30	29.30	39.00	164.00
PI377662	984 (YUGOSLAVIA)	2703.03	32.90	37.00	169.00
PI190945	3962 (SPAIN)	2681.07	32.70	40.00	174.00
PI355526	PI355526 (BELGIUM)	2667.87	29.50	40.00	174.00
PI272563	I-1-3515 (HUNGARY)	2650.89	26.70	37.00	168.00
PI355528	69Z5.17 (GERMANY)	2601.16	28.30	43.00	166.00
PI355538	69Z5.28 (GERMANY)	2500.50	32.20	36.00	170.00
PI167627	HARLAN J R 3412 (TU	2497.75	31.10	36.00	173.00
PI377666	PI377666 (YUGOSLAVI	2473.23	32.70	38.00	172.00
PI167611	HARLAN J R 3281 (TU	2462.25	30.50	35.00	172.00
PI167591	HARLAN J R 3094 (TU	2453.68	30.30	36.00	172.00
PI265008	PI265008 (YUGOSLAVI	2434.82	27.10	38.00	166.00
PI355523	PI355523 (GERMANY)	2430.53	29.30	38.00	174.00
PI362610	VII/7-X21 (YUGOSLAV	2416.98	32.80	37.00	169.00
PI167634	HARLAN J R 3465 (TU	2381.14	29.00	41.00	173.00
PI272558	I-1-1914 (HUNGARY)	2366.22	31.20	36.00	175.00
CI 13964	W 49-1-3 (USA)	2359.19	29.10	35.00	164.00
PI 94740	DICKSON J G 287 (SP	2348.04	28.20	36.00	168.00
PI355516	PI355516 (GERMANY)	2343.41	25.70	41.00	170.00
PI266844	PI266844 (UNITED KI	2325.40	31.00	36.00	175.00
PI286068	PI286068 (POLAND)	2310.49	28.20	36.00	173.00
PI418582	VIR 18105 (USSR)	2310.14	28.90	39.00	172.00
PI221393	PI221393 (YUGOSLAVI	2294.88	32.00	39.00	173.00
PI290508	V J 388 (HUNGARY)	2288.36	25.60	40.00	173.00
PI290509	BLAUER KAHLER (HUNG	2268.47	27.70	42.00	166.00
PI306543	PI306543 (ROMANIA)	2207.59	27.20	35.00	169.00
PI355549	PI355549 (AUSTRIA)	2180.32	32.20	35.00	170.00
PI221329	PI221329 (YUGOSLAVI	2123.22	30.00	37.00	174.00
PI225164	KAPLOUTRAS (GREECE)	2121.67	28.20	40.00	174.00
PI428158	PI428158 (UNITED KI	2108.30	30.70	35.00	174.00
1	NEWANA	2102.47	56.40	31.00	165.00
PI168804	SANDO 2 (USA)	2100.24	26.80	38.00	166.00
PI306544	PI306544 (ROMANIA)	2065.08	30.60	33.00	180.00
PI167589	HARLAN J R 3072 (TU	2058.05	29.40	40.00	169.00
PI289605	162 (UNITED KINGDOM	2041.76	26.70	41.00	174.00
PI393496	EIKORN (ISRAEL)	2039.53	28.10	44.00	166.00
PI119423	WESTOVER H L 1277 (	2019.47	30.70	37.00	172.00
PI168805	SANDO 3 (USA)	2004.38	28.10	37.00	173.00
PI190942	2492 (SPAIN)	2004.38	30.00	35.00	173.00
CI 13963	W 49-23 (USA)	1999.57	28.40	35.00	168.00
PI277133	A TRI 1509/58 (EURO	1997.86	28.70	40.00	172.00
PI168803	SANDO 1 (USA)	1991.00	27.80	38.00	167.00

TABLE 2. CONT. 1994 EINKORN VARIETY TRIAL

PI538722	PI538722	(TURKEY)	1957.56	30.30	38.00	174.00
PI355529	69Z5.18	(BELGIUM)	1947.95	32.60	32.00	175.00
PI277138	A TRI 3409/56	(GERM)	1929.09	27.20	36.00	172.00
PI428166	PI428166	(TURKEY)	1919.66	25.50	38.00	166.00
PI352483	T-1600	(SPAIN)	1905.60	28.30	40.00	174.00
PI170196	HARLAN J R 2498	(TU)	1885.02	31.10	37.00	172.00
CI 17655	MONOCOCCUM MUTANT 6		1854.49	28.70	37.00	165.00
PI119435	WESTOVER H L 2592	(	1852.95	28.40	36.00	174.00
PI377648	982	(YUGOSLAVIA)	1848.66	27.20	37.00	179.00
PI352482	G 81	(TURKEY)	1846.60	29.10	37.00	175.00
CI 14520	G68-2915	(CANADA)	1832.20	28.80	40.00	174.00
PI538723	PI538723	(TURKEY)	1829.11	29.30	38.00	174.00
2	AMIDON		1767.20	56.30	37.00	163.00
PI168806	DOUBLE EINKON	(USA)	1725.36	26.70	43.00	165.00
PI264935	PI264935	(GREECE)	1712.33	27.60	36.00	177.00
PI277135	A TRI 1986/56	(EURO)	1698.27	27.10	36.00	176.00
CI 2433	EINKORN	(GERMANY)	1662.42	27.40	33.00	170.00
PI306547	PI306547	(ROMANIA)	1659.85	30.30	33.00	180.00
PI518452	PI518452	(SPAIN)	1620.07	28.40	35.00	174.00
PI167526	HARLAN J R 2485	(TU)	1581.48	29.30	35.00	173.00
CI 17662	MONOCOCCUM MUTANT 29		1575.82	27.20	34.00	172.00
PI355547	PI355547	(AUSTRIA)	1548.55	29.00	33.00	179.00
PI355548	PI355548	(AUSTRIA)	1518.89	29.10	33.00	178.00
PI306542	PI306542	(ROMANIA)	1467.95	30.30	34.00	179.00
PI355544	PI355544	(GERMANY)	1353.57	28.90	32.00	179.00
PI306540	PI306540	(ROMANIA)	1340.19	20.00	37.00	176.00
PI182461	HARLAN J R 6518	(TU)	* 1213.63	52.80	35.00	170.00
PI306545	PI306545	(ROMANIA)	1068.73	26.10	36.00	180.00
PI378469	1744	(YUGOSLAVIA)	1065.12	21.40	40.00	174.00
PI182462	PI182462	(TURKEY)	* 1059.29	55.60	34.00	170.00
PI355517	69Z5.4	(GERMANY)	1055.69	22.90	41.00	171.00
PI272561	I-1-3508	(HUNGARY)	968.40	25.80	35.00	179.00
PI221414	PI221414	(YUGOSLAVI)	868.25	28.80	34.00	181.00
PI221413	PI221413	(YUGOSLAVI)	850.25	27.20	37.00	180.00
PI277131	A TRI 616/59	(EUROP)	796.06	22.80	30.00	174.00
PI355537	69Z5.27	(TURKEY)	789.71	21.30	36.00	176.00
CI 7686	SPRING SPELTZ		779.77	24.10	37.00	174.00
PI277130	A TRI 613/59	(EUROP)	769.48	25.70	34.00	181.00
PI306546	PI306546	(ROMANIA)	768.79	24.70	29.00	181.00
PI326317	K-18140	(USSR)	548.77	24.00	36.00	177.00
PI290511	SPANICHES EINKORN	(	410.72	23.40	34.00	154.00
6	KAMUT		365.96	45.20	36.00	166.00

* Variety has no hull, looks like wheat.

94EINKRN.EKD
EINKORN.STT

DATE PLANTED: 4/01/94
DATE HARVESTED: 8/08/94