PROJECT TITLE: Studies on alternate cereal crops, speltz and triticales: crop yields and quality.

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PROJECT LOCATION: MSU - Southern Agricultural Research Center, Huntley, MT 59037

OBJECTIVES:

The primary objective was to evaluate crops which could be used for non-compliance cropping managements. Considerations are being given to production costs, feasibility of utilization for grain production. To evaluate speltz and triticale varieties and selections for maximum yield and quality (protein).

SUMMARY AND RESULTS:

Triticale selections were grown as winter and spring crops on dryland and as a spring crop on irrigated management. The speltz selections were grown as a winter crop on dryland only. NOTE: Most speltz selections were obtained from the USDA Germplasm Center, Beltsville, Maryland from the world collection. However, at this time we are not sure if the species we're testing are miss-labeled and may be instead Emmer species.

Eleven triticale selections were compared to Newana hard red spring wheat for yield and quality. Wapiti was the only triticale selection to yield significantly greater than Newana while 6 other triticale selections produced higher non-significant yields under irrigation (Table 2). All triticale selections were significantly lower in protein as compared to Newana. Table 1 describes the yields and protein under dryland management. There were no significant yield differences, and once again Newana had a higher protein content as compared to the triticale selections. The 1989 winter triticale selection data are described in Table 3. The winter selections produced higher yields 51 to 15 bu/Ac as compared to dryland spring selections, 33 to 21 bu/Ac (Table 1). The percent protein was lower in the winter selections (16.2-15.3) as compared to (18.8-17.4) for the spring selections.

The speltz data are described in Table 4. Seventeen speltz selections were compared to 4 barley, two oat and 5 triticale selections. The 17 speltz selections were selected from approximately 50 selections grown for the past 2 years at SARC

and the University of Idaho, Aberdeen, Idaho. Eight speltz selections produced yields and protein levels comparable to the barley selections. The test weights of the speltz as to be expected, averaged significantly lower than barley. However the speltz produced comparable total weight of production per acre. The higher yielding speltz selections significantly out-yielded both Monida and Otana oats.

FUTURE PLANS:

To continue to evaluate emmer/speltz selections for yield and quality compared to barley, oats, or triticale on dryland production.

TABLE 1 . *1989 DRYLAND SPRING TRITICALE TRIAL, SARC, HUNTLEY, MT.*

VARIETY		YIELD BU/AC	YIELD CWT/A	TESTWT LB/BU	PLANTHT INCHES	HEAD DATE	PROTEIN %
TRITOT61	IRA/BGL//DRIRA/KANG(	33.2	16.60	47.77	36.33	170.00	17.9
TRITOT54	7431A-154B/7634-292B	31.6	15.81	46.47	35.67	176.00	18.4
TRITKRAM	KRAMER	29.8	14.91	43.83	34.83	170.00	17.5
CI 17430	NEWANA HARD RED W.W.	23.2	13.89	51.60	25.50	177.00	19.3
TRITOT44	WAPITI	27.3	13.65	46.10	36.83	172.33	18.4
TRITCARM	CARMAN	26.3	13.13	45.10	37.00	172.00	18.7
TRITBEAG	BEAGLE 82	25.9	12.93	45.27	35.83	175.67	18.8
TRITJUAN	JUAN	25.4	12.71	45.63	36.00	177.00	19.1
TRITKARL	KARL	25.1	12.57	42.23	27.33	170.00	18.0
TRITWELS	WELSH	25.1	12.56	45.53	36.00	173.00	19.5
TRITOSUN	SUNLAND	21.7	10.84	51.27	34.33	176.67	17.4
TRITMARV	MARVAL	21.5	10.75	39.70	36.67	172.33	17.9

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

	YIELD BU/AC	YIELD CWT/A	TESTWT LB/BU	PLANTHT INCHES	HEAD DATE
EXPERIMENTAL MEANS		13.36	45.88	34.36	173.50
TOTAL OBSERVATIONS		36.00	36.00	36.00	36.00
NO. OF REPLICATIONS		3.00	3.00	3.00	3.00
NO. OF VARIETIES		12.00	12.00	12.00	12.00
REP. MEAN SQUARE		9.20	1.06	13.59	1.58
VAR. MEAN SQUARE		9.38	33.42	43.54	23.85
ERROR MEAN SQUARE		9.78	.26	2.78	.52
ERROR DEGREES OF FREEDOM		22.00	22.00	22.00	22.00
F TEST FOR REPS.		.94	4.07	4.89	3.03
F TEST FOR VAR.		.96	128.94	15.66	45.62
STANDARD ERROR		3.13	.51	1.67	.72
STANDARD ERROR OF THE MEAN		1.81	.29	.96	.42
C.V. 1: (S/MEAN)*100		23.40	1.11	4.85	.42
C.V. 2: (S OF MEAN/MEAN)*100		13.51	.64	2.80	.24
LSD (0.05)		5.30	.86	2.82	1.22

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TABLE 2 . *1989 IRRIGATED SPRING TRITICALE TRIAL, SARC, HUNTLEY, MT.*

VARIETY	YIELD BU/AC	YIELD CWT/A	TESTWT LB/BU	PLANTHT INCHES	HEAD DATE	PROTEIN %
TRITOT44 WAPITI	100.0	50.06	50.30	42.33	191.00	12.70
TRITOT61 IRA/BGL//DRIRA/KANG(	85.8	42.89	48.03	36.33	188.00	12.30
TRITJUAN JUAN	85.7	42.87	45.07	42.00	192.67	12.50
TRITWELS WELSH	84.7	42.35	48.10	42.33	191.00	12.80
TRITOSUN SUNLAND	84.3	42.14	51.87	38.33	192.00	12.70
TRITOT54 7431A-154B/7634-292B	81.7	40.86	49.33	41.33	191.33	12.80
TRITBEAG BEAGLE 82	81.5	40.77	47.17	41.00	191.33	13.40
TRITCARM CARMAN	78.5	39.26	47.10	40.67	191.00	13.30
CI 17430 NEWANA	60.8	36.45	58.57	33.00	191.67	14.30
TRITMARV MARVAL	72.8	36.38	43.87	41.33	191.67	12.50
TRITKRAM KRAMER	70.8	35.38	45.10	36.67	188.00	12.50
TRITKARL KARL	51.3	25.63	42.20	31.00	188.00	12.90

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

EXPERIMENTAL MEANS	39.59	48.06	38.86	190.64
TOTAL OBSERVATIONS	36.00	36.00	36.00	36.00
NO. OF REPLICATIONS	3.00	3.00	3.00	3.00
NO. OF VARIETIES	12.00	12.00	12.00	12.00
REP. MEAN SQUARE	40.84	2.43	6.03	.53
VAR. MEAN SQUARE	104.03	55.33	44.09	8.27
ERROR MEAN SQUARE	20.34	5.61	4.15	.38
ERROR DEGREES OF FREEDOM	22.00	22.00	22.00	22.00
F TEST FOR REPS.	2.01	.43	1.45	1.40
F TEST FOR VAR.	5.12	9.86	10.63	21.98
STANDARD ERROR	4.51	2.37	2.04	.61
STANDARD ERROR OF THE MEAN	2.60	1.37	1.18	.35
C.V. 1: (S/MEAN)*100	11.39	4.93	5.24	.32
C.V. 2: (S OF MEAN/MEAN)*100	6.58	2.85	3.03	.19
LSD (0.05)	7.64	4.01	3.45	1.04

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TABLE 3 . *1989 DRYLAND WINTER TRITICALE VARIETY TRIAL, SARC, HUNTLEY, MT.*

VARIETY	YIELD BU/AC	YIELD cwt/A	TEST WT LB/BU	PLANTHT INCHES	HEAD DATE	%WINTER KILL	PROT %
I18	51.0	25.50	49.77	44.50	157.67	.00	13.77
WHITMAN	47.9	23.93	45.23	36.67	157.67	.00	14.93
VT087501	46.5	23.23	39.80	32.67	155.33	.00	15.97
239	46.3	23.17	47.30	49.33	158.67	.00	15.97
VT086497	45.3	22.67	41.57	27.00	158.00	.00	16.20
DECADE	43.4	21.70	40.93	39.17	158.33	.00	15.77
WAPITI	42.8	21.40	48.83	36.00	155.00	11.67	14.03
FLORA	42.4	21.20	36.47	30.00	159.00	.00	16.50
T59	41.5	20.77	54.00	34.00	158.33	80.00	13.93
DOUBLE CROP	40.9	20.47	49.97	46.00	161.33	33.33	15.43
T54	39.8	19.90	51.43	40.00	158.67	80.00	13.67
WINTREE	39.2	19.60	47.60	51.00	164.00	.00	15.60
81DE01002	37.6	18.80	49.00	51.00	164.33	.00	15.30
81DE01021	37.5	18.77	49.10	50.33	165.33	.00	15.37
81DE01012	35.8	17.90	49.83	51.33	165.00	.00	15.27
CARMAN	32.9	16.43	48.47	33.83	158.67	73.33	14.20
81DE01015	28.9	14.43	48.53	51.17	165.67	.00	15.47
T61	14.9	7.47	55.47	31.67	158.33	91.67	13.77
***** *STATISTICAL TABLE* *****							
EXPERIMENTAL MEANS		19.85	47.41	40.87	159.96	20.56	15.06
TOTAL OBSERVATIONS		54.00	54.00	54.00	54.00	54.00	54.00
NO. OF REPLICATIONS		3.00	3.00	3.00	3.00	3.00	3.00
NO. OF VARIETIES		18.00	18.00	18.00	18.00	18.00	18.00
C.V. 1: (S/MEAN)*100		23.14	3.81	6.96	.99	46.52	4.36
C.V. 2: (S OF MEAN/MEAN)*100		13.36	2.20	4.02	.57	26.86	2.52
LSD (0.05)		7.62	3.00	4.72	2.63	15.87	1.09

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TABLE 4 . *1989 DRYLAND ALTERNATE CROP TRIAL, SARC, HUNTLEY, MT.*

VARIETY	YIELD B/A	YIELD CWT/A	TESTWT LB/BU	PLANTHT INCHES	HEAD DATE	LODG PREV	LODG SEVER	LODG INDEX	PROTEIN %
STEPTOE BARLEY	45.8	21.99	38.20	26.00	177.00	.00	.00	.00	16.4
LEWIS BARLEY	33.9	16.25	42.90	25.67	183.00	16.67	2.00	11.10	20.0
HAYBET BARLEY	32.9	15.81	36.47	26.83	181.00	16.67	.67	3.70	17.2
CRYSTAL BARLEY	27.9	13.37	43.53	24.17	184.00	.00	.00	.00	16.8
PI 254148 SPELTZ	58.9	18.84	25.93	24.83	175.00	56.67	1.67	15.57	17.2
PI 355478 SPELTZ	52.1	16.67	29.57	31.67	180.00	61.33	2.33	24.63	16.7
PI 101971 SPELTZ	31.8	15.92	31.33	26.33	174.00	.00	.00	.00	15.2
PI 254162 SPELTZ	49.0	15.68	28.40	29.50	181.67	25.00	1.33	11.10	18.0
PI 94664 EARLY SPELT	47.5	15.19	32.27	25.00	178.67	63.00	1.67	17.33	18.3
PI 254158 SPELTZ	43.9	14.05	24.20	27.83	183.33	93.00	2.67	27.33	18.8
*PI 306535 SPELTZ	41.7	13.35	29.27	30.17	186.00	.00	.00	.00	16.4
PI 94614 SPELTZ	39.7	12.71	28.53	27.67	185.33	30.00	.67	6.67	18.3
PI 94626 SPELTZ	38.8	12.43	25.70	26.33	182.33	33.00	1.33	14.67	15.8
PI 254146 SPELTZ	37.6	12.04	27.40	21.67	180.00	.00	.00	.00	18.5
CI 4573 SPELTZ	29.5	9.45	29.10	28.17	186.33	.00	.00	.00	14.7
SPRING SPELTZ	29.1	9.32	29.47	28.50	185.67	.00	.00	.00	15.4
PI 350000 SPELTZ	27.2	8.69	27.17	24.17	187.67	.00	.00	.00	19.2
CI 7686 SPELTZ	12.3	3.94	31.77	30.67	192.00	.00	.00	.00	18.0
*PI 272527 SPELTZ	8.9	2.85	32.47	34.17	194.67	.00	.00	.00	15.7
PI 190921 SPELTZ	6.0	1.91	41.20	25.50	194.00	.00	.00	.00	17.2
*PI 355474 SPELTZ	1.4	.45	-----	20.33	198.33	.00	.00	.00	14.6
VERNAL EMMER(CI1524	57.7	18.45	30.93	26.50	174.00	.00	.00	.00	14.6
YAROSLAV EMMER(CI15	41.9	13.40	27.90	29.50	185.33	.00	.00	.00	18.5
MONIDA OATS	40.8	13.07	25.00	25.67	184.00	46.67	7.33	37.80	18.1
OTANA OATS	38.6	12.36	27.50	29.83	184.00	23.33	4.67	19.23	18.2
FLORIDA 201 TRIT	22.2	11.11	44.83	34.50	179.67	.00	.00	.00	16.7
88Y-MERINOS-J10TRIT	18.9	9.45	48.03	29.83	183.33	.00	.00	.00	16.0
CENEX 96190 TRIT	18.7	9.34	46.43	36.83	182.00	.00	.00	.00	15.1
VTO82478 TRIT	9.0	4.50	41.47	26.00	187.67	.00	.00	.00	17.5
*WHITMAN TRITICALE	8.8	4.38	38.73	25.00	187.33	.00	.00	.00	18.9

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

EXPERIMENTAL MEANS	11.57	31.27	27.63	183.91	15.51	.88	6.30
TOTAL OBSERVATIONS	90.00	90.00	90.00	90.00	90.00	90.00	90.00
NO. OF REPLICATIONS	3.00	3.00	3.00	3.00	3.00	3.00	3.00
NO. OF VARIETIES	30.00	30.00	30.00	30.00	30.00	30.00	30.00
C.V.1:(S/MEAN)*100	10.73	14.77	6.48	.56	165.44	156.59	182.11
C.V.2:(S OF MEAN/MEAN)*100	6.20	8.53	3.74	.32	95.52	90.41	105.14
LSD (0.05)	2.03	7.55	2.93	1.68	41.94	2.25	18.76

*THESE VARIETIES HAD GREEN HEADS AT HARVEST.
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