Project Title: Evaluation of spring wheat cultivar performance under continuous-crop and crop-crop-fallow systems in central Montana

Project Leader: D. M. Wichman CARC Research Agronomist, Moccasin, MT

Project Personnel: L.E. Talbert MAES Spr. Wheat Breeder, Bozeman, MT
Hwa-young Heo MAES Res Assoc. SW Brdr, Bozeman, MT
Shabeg Briar CARC Research Associate, Moccasin, MT

Objective:
Evaluate relative performance spring wheat cultivars and development lines in central Montana crop environments.

Results:
2015 Central Montana crop year was generally good. Above average precipitation was received in Sep-Oct 2014 and May 2015 while the CARC crop year total was 1.40 inches below average. The CARC average crop year temperature was 2.5^{o} F above the 103y average. Growing season precipitation was more plentiful at the Denton and Geraldine on-farm locations. 2015 On-Farm spring wheat performance trials were established at CARC-Moccasin, Denton and Geraldine. The CARC and Denton sites were on continuous crop after lentils, and the Geraldine location was in C-C-F system following winter wheat. Sawfly was not a major factor at any of the locations. The Geraldine stand was thinner than desired due in part to heavy residue.

All three On-Farm locations had near average spring wheat yields (Tables 1-3). Oneal produced the high yield at the CARC with 33.4 bu/a followed by ExpHRS14-01 and HRS 3419. MT 1316 followed by Sy Soren top the Denton trial at 36.8 and 33.4 bu/a, respectively. Brennan and Vida were the high yielding named cultivars at Geraldine with 42.5 and 41.6 bu/a yield, respectively. MT 1338 had the high test weight at the CARC and Denton sites and ranked second to Brennan at Geraldine. The CARC location had 16.3% protein compared to 15.5% for Denton and 13.7% for Geraldine. Redstone produced the CARC high protein content at 17.8% followed by Orange blossom midge resistant Egan, then McNeal. Egan produced the Geraldine high protein at 15.7% followed by SY Soren. The Denton site proteins are suspect, as the last six entries of Range 1-Rep1, all had much higher protein contents than the other trial entries and this trend occurred only at the Denton location. Those six entries were the Croplan Genetics and Pulse USA entries.

Summary:
Vida continues to be top grain producer in central Montana On-Farm trials over the last three years. For test weight there were not any consistently high or low performers for the same three sites. Mott was the most frequent high protein content cultivar. Sawfly was not a major problem at any of the three sites in this time period. However, it is not the standard bearer for test weight and protein content. Volt is a consistent high test weight producer. Mott and Redstone were generally had higher protein content. MSU-MAES Spring Wheat Breeder Luther Talbert and associate breeder Hwa-young Heo coordinated the selection of entries and the preparation of seed for the on-farm cultivar trials. An additional six entries were added at the request of plant breeding companies.

Funding Summary:
Expenditure information to be provided by OSP. No other grant support was provided.

MWBC FY2011 Grant Submission Plans:
It is planned to submit this project for funding consideration in the next fiscal year.

Table 1 2015 No-Till Recrop spring wheat cultivar performance evaluations after barley.
Exp159970 Central Agricultural Research Center. Moccasin, Montana.

ID	Cultivar / Pedigree	Entry	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content
			Julian	cm	bu/ac	lbs/bu	%
BZ999592	ONEAL	9	176	70	33.4	59.0	15.6
Croplan	ExpHRS14-01	25	177	67	32.4	55.1	15.4
Croplan	HRS 3419	24	177	69	31.7	55.2	16.5
PI642366	VIDA	5	176	67	30.9	56.1	16.1
PI660981	DUCLAIR	6	174	72	30.8	56.0	16.2
BZ92413R	WB GUNNISON	11	175	65	30.7	57.6	16.4
CI 13596	FORTUNA	1	177	89	30.5	57.1	16.3
CAP400-1	Egan	15	177	67	29.9	56.5	17.7
MT 1316	MT 1316	17	172	69	29.2	55.9	15.6
Croplan	HRS 3361	26	177	70	29.1	57.6	15.5
Pulse USA	Prestige	22	172	75	28.6	57.9	14.9
Croplan	HRS 3530	23	177	77	28.6	56.2	15.4
MT 1219	MT 1219	16	175	69	28.5	56.9	16.1
AGRIPR10	BRENNAN	12	174	68	28.2	59.2	15.6
BZ996434	CORBIN	8	174	70	27.8	56.5	16.3
WB9879CLP	WB9879CLP	10	175	64	27.7	58.2	15.9
PI633974	CHOTEAU	4	175	71	27.6	57.2	16.6
PI574642	MCNEAL	2	175	67	27.2	55.8	17.6
ND 695	REEDER	3	176	71	27.1	58.2	16.5
MT 1337	MT 1337	18	173	72	26.9	56.5	16.6
MT 1338	MT 1338	19	174	72	26.7	59.2	16.5
AGRIPR12	SY TYRA	13	176	63	25.7	58.7	16.3
NDSW0449	MOTT	7	177	69	24.6	58.5	16.9
AGRIPR14	SY SOREN	14	177	67	24.6	56.9	18.2
Pulse USA	Redstone	21	177	66	24.1	56.9	17.8
WPSP2-VIDA1	WPSP2-VIDA1	20	177	68	23.9	57.4	16.0
	Mean		175.4	69.6	28.32	57.14	16.33
	P-value		0.00	0.00	0.35	0.00	
	CV1		0.42	5.81	14.62	0.91	
	LSD (0.05)		1.22	6.63	6.79	1.07	

Seeded April 10, 2015. Soil: 2" temp:10^{o}C Moist Probe depth 20" .
Harvest: August 12, 2015. Fertilizer: 10-15-10-5 NPKS w/seed + 90 N top dress.

Table 2 2015 Denton spring wheat cultivar evaluations under NTCC after lentils.
Exp159971 Central Agricultural Research Center. Moccasin, Montana.

ID	Cultivar / Pedigree	Entry	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content
			Julian	cm	bu/ac	lbs/bu	%
MT 1316	MT 1316	17	175	69	36.8	60.2	14.6
AGRIPR14	SY SOREN	14	177	68	33.4	58.3	16.0
MT 1338	MT 1338	19	177	72	33.0	61.0	14.8
WB9879CLP	WB9879CLP	10	180	66	32.9	59.8	15.1
CAP400-1	Egan	15	178	69	32.7	58.1	15.8
AGRIPR10	BRENNAN	12	176	71	31.9	58.6	15.7
Pulse USA	Prestige	22	174	74	31.7	58.3	15.5
PI642366	VIDA	5	179	68	31.6	58.2	13.8
BZ999592	ONEAL	9	178	68	31.4	60.4	14.8
MT 1337	MT 1337	18	177	75	31.3	58.0	15.1
BZ996434	CORBIN	8	177	68	30.4	59.0	14.9
MT 1219	MT 1219	16	178	63	30.3	59.1	13.9
WPSP2-VIDA1	WPSP2-VIDA1	20	179	66	30.3	58.7	14.3
Croplan	HRS 3530	23	178	73	29.9	56.4	17.4
PI633974	CHOTEAU	4	178	68	29.4	58.8	14.2
ND 695	REEDER	3	179	69	29.3	58.3	14.2
Croplan	HRS 3361	26	178	70	28.8	57.5	18.2
PI574642	MCNEAL	2	177	68	28.5	58.8	15.0
Pulse USA	Redstone	21	180	70	28.3	58.1	16.9
PI660981	DUCLAIR	6	176	70	28.0	57.7	14.1
NDSW0449	MOTT	7	180	67	26.3	59.7	14.9
Croplan	HRS 3419	24	179	67	26.3	57.0	18.0
CI 13596	FORTUNA	1	177	82	26.0	60.3	14.6
AGRIPR12	SY TYRA	13	178	63	25.0	57.0	16.1
Croplan	ExpHRS14-01	25	179	63	24.9	56.6	18.2
BZ92413R	WB GUNNISON	11	178	66	22.8	57.2	14.8
	Mean		178	69	29.7	58.6	15.5
	P-value		0	0	0.6	0.4	
	CV1		0	7	19.5	2.7	
	LSD (0.05)		1	8	9.5	3.3	

Seeded: April 17, 2015. Soil: 2" temp 9^{o}C. Moist Probe depth 36".
Harvest: August 11, 2015. Fertilizer: 10-15-10-5 NPKS w/seed + 90 N top dress.

Table 3 2015 Geraldine spring wheat cultivar RC performance evaluation.
Exp159972 Central Agricultural Research Center. Moccasin, Montana.

ID	Cultivar / Pedigree	Entry	Head Date	Plant Height	Grain Yield	Test Weight	Sawfly Cut stem	Protein Content
			Julian	cm	bu/ac	lbs/bu	#	%
AGRIPR10	BRENNAN	12	177	64	42.5	63.3	no	13.6
PI642366	VIDA	5	178	70	41.6	60.8	stem	13.4
CAP400-1	Egan	15	178	65	41.5	59.0	c	15.7
Croplan	ExpHRS14-01	25	179	62	41.3	59.3	u	13.2
MT 1316	MT 1316	17	176	74	40.4	61.6	t	13.7
ND 695	REEDER	3	178	73	40.3	61.3	t	13.8
BZ999592	ONEAL	9	178	72	40.3	60.8	i	13.6
PI574642	MCNEAL	2	176	74	40.3	59.5	n	13.4
WPSP2-VIDA1	WPSP2-VIDA1	20	178	71	39.5	61.6	g	12.0
Pulse USA	Prestige	22	176	74	39.4	61.4		14.0
MT 1338	MT 1338	19	177	69	39.4	62.4	in	14.8
WB9879CLP	WB9879CLP	10	179	68	39.4	61.6		14.0
NDSW0449	MOTT	7	180	73	39.3	62.3	2	14.0
PI660981	DUCLAIR	6	177	70	38.7	59.6	0	13.5
AGRIPR14	SY SOREN	14	178	68	37.9	60.4	1	14.5
AGRIPR12	SY TYRA	13	179	63	37.8	61.5	5	12.5
BZ92413R	WB GUNNISON	11	178	67	37.6	60.9		13.7
PI633974	CHOTEAU	4	178	71	37.3	60.9		14.3
MT 1219	MT 1219	16	178	65	37.0	60.0		13.9
MT 1337	MT 1337	18	176	73	36.5	60.2		14.0
Croplan	HRS 3419	24	181	68	36.5	58.8		13.0
CI 13596	FORTUNA	1	176	79	36.3	61.8		13.0
BZ996434	CORBIN	8	178	70	36.3	60.8		13.8
Croplan	HRS 3361	26	178	67	35.7	60.0		13.5
Croplan	HRS 3530	23	178	76	35.7	58.9		13.6
Pulse USA	Redstone	21	181	67	32.7	59.4		14.2
	Mean		177.9	69.8	38.51	60.68		13.7
	P-value		0.00	0.00	0.00	0.00		
	CV1		0.59	5.36	6.59	0.96		
	LSD (0.05)		1.71	6.14	4.16	1.20		

Seeded: April 23, 2015. Soil: 2" temp:11°C Moist Probe depth 20"
Harvest: August 12, 2015. Fertilizer: 10-15-10-5 NPKS w/seed + 90 N top dress.

Table 4 Three year NTCC spring wheat performance summary.
Exp3870 Central Agricultural Research Center. Moccasin, Montana.

	Grain Yield (bu/a)				Test Weight (lbs/bu)				Grain Protein (%)				Plant Height (inches)			
Cultivar	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Choteau	27.6	29.3	31.2	29.3	57.2	57.7	57.8	57.6	16.5	16.6	16.4	16.5	71	66	n	69
Corbin	27.8	34.9	25.4	29.4	56.5	58.3	57.7	57.5	16.3	15.6	18.2	16.7	70	76	o	73
Duclair	30.8	35.2	26.5	30.8	56.0	56.0	56.8	56.2	16.2	15.9	17.5	16.5	72	81		77
Fortuna	30.5	31.0	29.2	30.2	57.1	59.5	60.6	59.1	16.3	17.1	16.1	16.5	89	86	h	88
WB9879CLP	27.7	32.7	26.7	29.0	58.2	58.3	58.5	58.3	15.9	16.5	16.7	16.4	64	82	t	73
McNeal	27.2	27.9	27.1	27.4	55.8	57.3	57.7	56.9	17.6	17.2	16.0	16.9	67	79		73
Mott	24.6	29.1	26.1	26.6	58.5	58.5	59.1	58.7	16.9	17.5	18.3	17.6	69	69	d	69
Oneal	33.4	29.6	25.1	29.4	59.0	59.5	58.6	59.0	15.6	16.9	17.5	16.7	70	71	a	71
Reeder	27.1	29.6	34.0	30.3	58.2	58.4	59.1	58.6	16.5	17.3	16.4	16.7	71	72	t	72
SY Tyra	25.7	25.2	23.0	24.6	58.7	58.1	57.0	57.9	16.3	15.8	17.2	16.4	63	66	a	64
Vida	30.9	37.5	29.6	32.7	56.1	58.1	58.1	57.4	16.6	16.0	16.5	16.4	67	77		72
WB Gunnison	30.7	32.6	29.2	30.8	57.6	57.1	59.6	58.1	16.4	17.5	17.0	17.0	65	69		67
Trial ave.	28.3	31.2	27.8	29.2	57.1	58.1	58.4	57.9	16.3	16.7	17.0	16.7	69.6	74.7		72.2

Table 5 Three year Denton NTCC spring wheat performance summary.
Exp3871 Central Agricultural Research Center. Moccasin, Montana.

	Grain Yield (bu/a)				Test Weight (lbs/bu)				Grain Protein (%)				Plant Height (cm)			
Cultivar	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Choteau	29.4	18.9	31.2	26.5	58.8	59.2	62.6	60.2	14.2	13.7	14.3	14.1	68	57	58	61
Corbin	30.4	18.3	26.3	25.0	59.0	59.5	62.8	60.4	14.9	12.8	13.6	13.8	68	61	64	64
Duclair	28.0	18.1	27.1	24.4	57.7	58.7	61.5	59.3	14.1	12.5	13.0	13.2	70	61	64	65
Fortuna	26.0	19.4	29.9	25.1	60.3	58.7	62.6	60.5	14.6	13.7	14.0	14.1	82	70	76	76
WB9879CLP	32.9	18.7	26.9	26.2	59.8	59.8	63.1	60.9	15.1	13.8	14.6	14.5	66	58	61	62
McNeal	28.5	18.5	27.7	24.9	58.8	59.1	62.2	60.0	15.0	13.6	13.0	13.9	68	63	66	66
Mott	26.3	19.1	26.4	23.9	59.7	59.4	63.1	60.7	14.9	13.8	13.3	14.0	67	71	66	68
Oneal	31.4	18.3	26.5	25.4	60.4	61.0	62.7	61.4	14.8	13.4	12.6	13.6	68	61	58	62
Reeder	29.3	19.2	33.9	27.5	58.3	59.4	63.3	60.3	14.2	13.5	13.7	13.8	69	60	61	63
SY Tyra	25.0	20.2	23.6	22.9	57.0	59.5	63.9	60.1	16.1	11.9	11.9	13.3	63	62	58	61
Vida	31.6	22.5	29.5	27.9	58.2	59.1	62.7	60.0	13.8	11.9	12.4	12.7	68	65	61	65
WB Gunnison	22.8	20.2	30.8	24.6	57.2	60.9	63.0	60.3	14.8	12.2	13.2	13.4	66	65	58	63
Trial ave.	29.7	18.8	28.5	25.4	58.6	59.4	62.7	60.3	15.5	13.1	13.1	13.7	69.0	59.5	60.3	64.7

Table 6 Three year Geraldine NT C-C-F spring wheat performance summary.
Exp3872 Central Agricultural Research Center. Moccasin, Montana.

	Grain Yield (bu/a)				Test Weight (lbs/bu)				Grain Protein (%)				Plant Height (cm)			
Cultivar	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.	2015	2014	2013	3y Ave.
Choteau	37.3	31.4	32.2	33.7	60.9	60.0	62.7	61.2	14.3	12.8	12.1	13.1	61	64	66	64
Corbin	36.3	32.6	33.3	34.1	60.8	59.0	62.5	60.8	13.8	13.1	10.8	12.6	61	66	66	64
Duclair	38.7	33.3	36.0	36.0	59.6	58.0	61.8	59.8	13.5	12.6	11.2	12.4	60	67	71	66
Fortuna	36.3	31.0	27.1	31.5	61.8	60.0	62.8	61.5	13.0	13.5	12.6	13.0	62	84	84	77
WB9879CLP	39.4	42.3	34.3	38.7	61.6	61.0	63.2	61.9	14.0	12.6	11.2	12.6	62	64	26	51
McNeal	40.3	28.8	27.5	32.2	59.5	58.0	62.1	59.9	13.4	12.7	11.9	12.7	60	71	69	66
Mott	39.3	31.3	33.1	34.6	62.3	60.0	63.4	61.9	14.0	13.3	12.0	13.1	62	74	71	69
Oneal	40.3	28.8	33.8	34.3	60.8	60.0	63.0	61.3	13.6	12.6	10.9	12.4	61	72	71	68
Reeder	40.3	32.3	33.2	35.3	61.3	60.5	63.2	61.7	13.8	12.1	11.9	12.6	61	69	71	67
SY Tyra	37.8	35.5	32.1	35.1	61.5	61.5	64.0	62.3	12.5	10.8	11.2	11.5	62	61	61	61
Vida	41.6	35.2	40.0	38.9	60.9	59.0	62.9	60.9	13.4	11.9	10.8	12.0	61	65	74	66
WB Gunnison	37.6	32.5	29.4	33.1	60.9	59.5	62.9	61.1	13.7	12.1	12.3	12.7	61	65	64	63
Trial ave.	38.8	32.9	32.7	34.8	61.0	59.7	62.9	61.2	13.58	12.5	11.6	12.6	61.0	68.6	66.1	65.2