

Technical Report TR09-05 August 2009



# *Agricultural Experiment Station*

College of  
Agricultural Sciences

Department of  
Soil and Crop Sciences

Extension



MAKING BETTER  
**DECISIONS**

2009 Colorado Winter Wheat  
Variety Performance Trials

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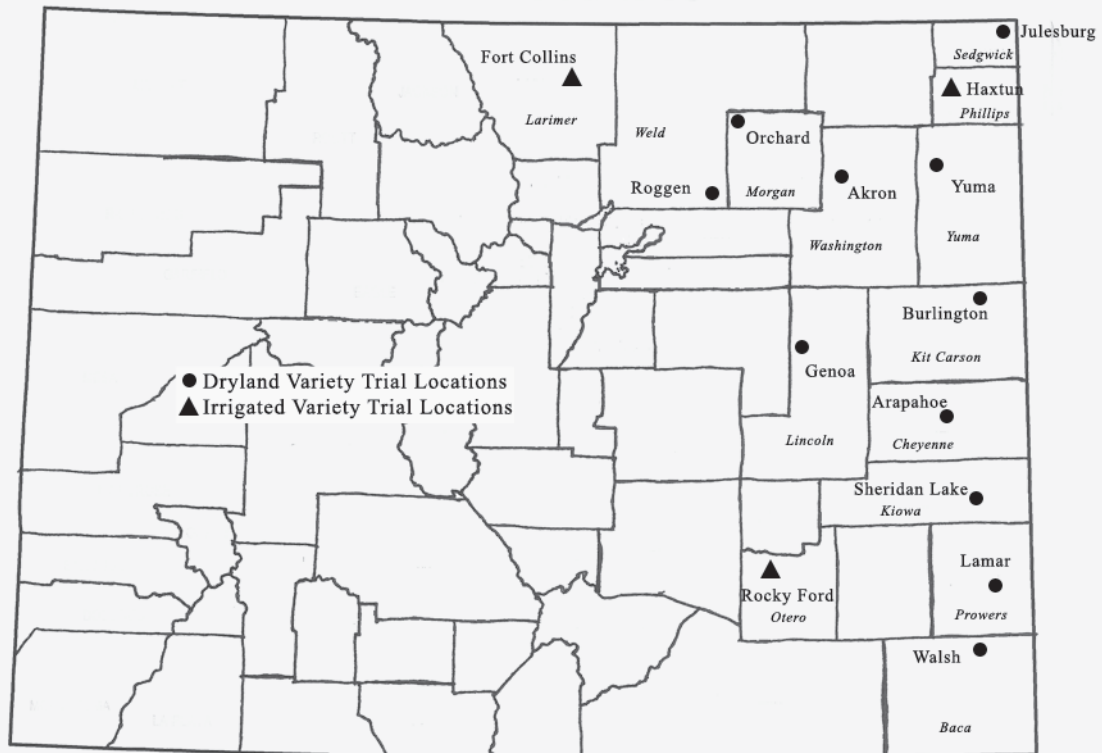
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2009 UVPT (Dryland) and IVPT (Irrigated)  
Trial Locations



## 2009 Eastern Colorado Winter Wheat Variety Performance Trials

Jerry Johnson and Scott Haley

Colorado State University provides unbiased and reliable information to Colorado wheat producers to help them make better wheat variety decisions. It provides excellent research faculty and staff, a focused breeding program, graduate and undergraduate students, and dedicated agricultural extension specialists. However, wheat improvement in Colorado would not be possible without the support and cooperation of the entire Colorado wheat industry. On-going and strong support for a public breeding program is critical because variety development and testing is a long process, especially under the highly variable climatic conditions in Colorado.

Our wheat variety performance trials, and collaborative on-farm testing, represent the final stages of a wheat breeding program where promising experimental lines are tested under an increasingly broad range of environmental conditions. Variation in precipitation, as well as variable fall, winter, and spring temperature regimes, hail and spring freeze events, interact with disease and insect pests and variety maturity to affect wheat yields. As a consequence of large environmental variation, Colorado State University annually conducts a large number of performance trials, which serve to guide producer variety decisions and to assist our breeding program to more reliably select and advance the most promising lines toward release as new varieties.

### 2009 Trials

Planting and emergence conditions in the 2009 dryland (UVPT) trials were favorable at many locations due to timely August and September rainfall events. Variety trial emergence was satisfactory to good across locations. Winter and spring drought characterized many trials to the degree that in May we were unsure if we would even be able to harvest several of the trials. Fortunately, May and June rains saved all of the trials except Akron where the moisture arrived too late and in too little quantity. Diseases (leaf rust, tan spot, viruses), Russian wheat aphids, and hail affected several of the trials. Finally, many trials, like many farmer fields, were rained on after maturity and it was difficult to find a dry weather window that allowed harvest. Akron was the only location where the data could not be used, nor combined with other location data, because of extreme field variation.

The growing conditions in the Irrigated Variety Performance Trials (IVPT) at Fort Collins, Haxtun, and Rocky Ford were conducive to medium level irrigated wheat yields. Cloudy May and June weather reduced the yield potential through reduced growing degree-days. Emergence and stand establishment were good although Rocky Ford was planted very late by comparison to other years. The Fort Collins irrigated trial yields were reduced partially due to winter drought that could not be abated via irrigation until late spring. Like the dryland trials, diseases, insects, hail and wet harvest conditions affected the irrigated trials as well.

There were 40 different entries in the dryland performance trials (UVPT) and 28 entries in the irrigated performance trials (IVPT). All trials included a combination of public and private variet-

ies and experimental lines from Colorado and surrounding states. All dryland and irrigated trials were planted in a randomized complete block design with three replicates. Plot size was approximately 180 ft<sup>2</sup> and all varieties were planted at 700,000 viable seeds per acre for dryland trials and 1.3 million viable seeds per acre for irrigated trials. Yields are corrected to 12% moisture. Test weight information was obtained from a combine equipped with a Harvest Master measuring system except Burlington and Haxtun where test weight was measured from a cleaned grain sample of one replicate.

## Summary of 2009 Dryland Variety Performance Results

Origin <sup>1</sup>	Release Year	Variety <sup>2</sup>	Yield <u>bu/ac</u>	Test Weight <u>lb/bu</u>	Height <u>in</u>
CSU exp		CO04393	59.2	60.8	30
CSU exp		CO04499	58.5	60.8	30
CSU exp		CSU Blend09	58.4	59.6	28
CSU 2004		Bond CL	57.8	58.9	30
CSU exp		CO03W054-2	57.6	60.7	30
TX/A 2002		TAM 111	57.3	61.3	30
CSU 2006		Ripper	57.3	59.5	28
TX/W 2005		TAM 112	57.1	61.6	28
CSU-TX 2001		Above	57.1	59.8	28
NE 2008		Settler CL	56.9	59.8	28
AP 2005		NuDakota	56.4	58.9	27
CSU 2007		Bill Brown	56.2	60.6	28
CSU 1998		Prairie Red	56.2	59.7	27
CSU 2004		Hatcher	56.1	60.0	27
OK 2006		Duster	56.0	59.8	30
WB 2007		Winterhawk	55.7	61.1	29
NE 2004		Infinity CL	55.3	59.7	30
WB 2006		Smoky Hill	55.2	60.1	28
KSU 2005		Danby	55.0	60.6	28
NE 2006		Overland	54.5	59.9	31
AP exp		AP00x0100-51	54.4	60.3	29
NE 2008		Camelot	54.2	59.9	30
CSU 1994		Ankor	54.0	59.8	30
CSU 2008		Thunder CL	53.8	59.6	28
KSU 1999		Trego	53.7	60.2	28
WB 2008		Armour	53.5	59.0	25
AP 2006		Hawken	53.4	60.0	27
NE 2002		Goodstreak	53.4	60.5	34
CSU 2001		Avalanche	53.3	61.1	29
WB 2005		Keota	52.3	58.6	30
KSU 2006		Fuller	52.1	58.8	28
CSU 1981		Sandy	52.0	59.4	29
AP 2001		Jagalene	51.7	60.1	29
KSU 1994		Jagger	51.2	59.7	28
CSU 1991		Yuma	51.0	59.0	28
OK 2008		OK Rising	50.5	59.3	28
NE-USDA 2007		Mace	49.9	58.2	28
CSU 1999		Prowers 99	47.7	60.6	32
CSU 1973		Baca	47.5	60.2	33
Average			54.5	59.9	29

<sup>1</sup>Variety origin code: CSU=Colorado State University; CSU-TX=Colorado State University/Texas A&M University; WB=WestBred, LLC; AP=AgriPro COKER; TX/A=Texas A&M release, marketed by AgriPro COKER; TX/W=Texas A&M release, marketed by Watley Seed Co.; KSU=Kansas State University; NE=University of Nebraska; OK=Oklahoma State University.

<sup>2</sup>Varieties ranked according to average yield in 2009.

## Summary of 2-Yr Dryland Variety Performance Results

Origin <sup>1</sup>	Release Year	Variety <sup>2</sup>	2-Yr Average <sup>3</sup>	
			Yield 2008-09 <u>bu/ac</u>	Test Weight 2008-09 <u>lb/bu</u>
CSU	2006	Ripper	54.1	59.7
CSU	exp	CO03W054-2	54.0	60.7
NE	2008	Settler CL	53.9	60.0
AP	2005	NuDakota	53.0	59.0
CSU-TX	2001	Above	52.7	60.0
TX/W	2005	TAM 112	52.4	61.3
CSU	2007	Bill Brown	52.3	60.8
CSU	2004	Bond CL	52.1	59.3
WB	2007	Winterhawk	52.1	61.2
TX/A	2002	TAM 111	51.9	61.2
CSU	2004	Hatcher	51.9	60.4
OK	2006	Duster	51.2	60.0
NE	2004	Infinity CL	51.2	60.0
CSU	1998	Prairie Red	51.2	59.8
WB	2006	Smoky Hill	51.1	60.5
KSU	1999	Trego	50.5	60.8
NE	2008	Camelot	50.2	60.2
AP	2006	Hawken	50.2	60.4
KSU	2005	Danby	49.7	61.2
NE	2006	Overland	49.5	60.1
KSU	2006	Fuller	48.9	59.6
WB	2005	Keota	48.7	59.0
CSU	1994	Ankor	48.6	59.9
NE	2002	Goodstreak	48.4	60.7
CSU	2008	Thunder CL	48.3	59.9
KSU	1994	Jagger	47.9	59.7
AP	2001	Jagalene	47.7	60.4
CSU	1991	Yuma	47.7	59.6
OK	2008	OK Rising	46.9	59.5
		Average	50.6	60.2

<sup>1</sup>Variety origin code: CSU=Colorado State University; CSU-TX=Colorado State University/Texas A&M University;

WB=WestBred, LLC; AP=AgriPro COKER; TX/A=Texas A&M release, marketed by AgriPro COKER;

TX/W=Texas A&M release, marketed by Watley Seed Co.; KSU=Kansas State University;

NE=University of Nebraska; OK=Oklahoma State University.

<sup>2</sup>Varieties ranked according to average 2-yr yield

<sup>3</sup>2-yr average yield and test weight are based on ten 2009 trials and six 2008 trials.

## Summary of 3-Yr Dryland Variety Performance Results

Origin <sup>2</sup>	Market		Yield	Test Weight
Release year	Class <sup>3</sup>	Variety <sup>4</sup>	2007-09	2007-09
			bu/ac	lb/bu
AP 2005	HWW	NuDakota	56.7	58.5
CSU 2004	HRW	Hatcher	55.7	60.0
CSU 2006	HRW	Ripper	54.3	58.8
CSU 2004	HRW	Bond CL	54.0	58.9
TX/W 2005	HRW	TAM 112	54.0	60.2
TX/A 2002	HRW	TAM 111	53.9	60.4
CSU 2007	HRW	Bill Brown	53.7	60.0
WB 2006	HRW	Smoky Hill	53.5	59.9
CSU-TX 2001	HRW	Above	53.4	59.2
NE 2004	HRW	Infinity CL	53.4	59.5
AP 2006	HRW	Hawken	53.4	59.7
OK 2006	HRW	Duster	53.4	59.9
KSU 2006	HRW	Fuller	52.5	59.3
NE 2006	HRW	Overland	52.3	59.5
WB 2005	HRW	Keota	52.1	59.4
KSU 2005	HWW	Danby	51.9	61.1
CSU 2008	HWW	Thunder CL	51.7	59.4
CSU 1998	HRW	Prairie Red	51.4	59.0
KSU 1994	HRW	Jagger	51.3	59.4
KSU 1999	HWW	Trego	50.9	60.4
CSU 1991	HRW	Yuma	50.8	59.3
AP 2001	HRW	Jagalene	50.2	60.3
CSU 1994	HRW	Ankor	49.9	59.1
NE 2002	HRW	Goodstreak	48.0	60.3
Average			52.6	59.6

<sup>1</sup>2-yr and 3-yr average yield and test weight are based on ten 2009 trials, six 2008 trials, and eleven 2007 trials.

<sup>2</sup>Variety origin code: CSU=Colorado State University; KSU=Kansas State University; OK=Oklahoma State University; WB=WestBred, LLC; AP=AgriPro COKER;

TX/A=Texas A&M release, marketed by AgriPro COKER; TX/W=Texas A&M release, marketed by Watley Seed Co.;

NE=University of Nebraska.

<sup>3</sup>Market class: HRW=Hard Red Winter Wheat; HWW=Hard White Winter Wheat

<sup>4</sup>Varieties ranked according to average 3-yr yield.



## 2009 Collaborative On-Farm Test (COFT) Results

Much of Colorado's 2009 wheat acreage was planted to winter wheat varieties that have been tested in the COFT program which is in its 11th year of operation. In the fall of 2009, twenty-four eastern Colorado wheat producers planted COFT trials in Baca, Prowers, Kiowa, Cheyenne, Kit Carson, Washington, Phillips, Logan, Adams, and Weld counties. Each collaborator planted five varieties in side-by-side strips (approximately 1.25 acres per variety) at the same time and at the same seeding rate as they seeded their own wheat. Viable harvest results were obtained from 19 of the 24 tests- most of the failed tests were lost to severe hail damage.

The objective of the 2009 COFT was to compare performance and adaptability of popular and newly-released CSU varieties (Hatcher, Ripper, and Bill Brown), and promising commercial varieties from WestBred (Keota) and AgriPro (Hawken) under unbiased testing conditions. The COFT trial results are intended to be interpreted based on the average across all tests within a year and not on the basis of a single variety comparison on a single farm in one year. Interpreted as an average of 19 test results, the 2009 COFT results can be useful to farmers making variety decisions.

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## 2009 Collaborative On-Farm Tests (COFT) Variety Performance Results

County/Town	2009 Varieties <sup>1</sup>												COFT	
	Ripper		Hatcher		Bill Brown		Hawken		Keota		Average		Yield	Test Wt
	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	Yield bu/ac <sup>2</sup>	Test Wt lb/bu	bu/ac <sup>2</sup>	lb/bu
Adams/Bennett N.	35.6	60.5	40.4	61.5	38.5	60.0	38.2	60.5	37.2	60.5	38.0	60.6		
Adams/Brighton E.	59.1	60.5	49.3	61.5	54.9	62.5	49.9	62.0	51.0	60.5	52.9	61.4		
Baca/Walsh	26.7	63.0	27.4	62.0	25.3	63.0	22.4	62.0	24.4	63.0	25.2	62.6		
Baca/Springfield	23.1	59.0	20.2	59.0	19.1	58.0	19.0	58.0	16.4	58.0	19.6	58.4		
Baca/Vilas	28.2	60.0	28.1	60.0	23.1	63.0	20.3	60.0	22.7	60.0	24.5	60.6		
Kiowa/Haswell	48.4	62.0	48.7	63.0	49.4	65.0	46.8	64.0	48.6	63.0	48.4	63.4		
Cheyenne/Arapahoe	55.4	58.0	57.7	59.0	57.0	60.0	48.9	58.0	50.2	59.0	53.8	58.8		
Logan/Sterling W	54.6	57.5	61.8	59.5	60.1	60.5	51.4	59.0	51.3	60.0	55.8	59.3		
Logan/Fleming	30.7	55.0	34.9	56.5	38.0	58.0	29.3	56.5	30.7	57.0	32.7	56.6		
Logan/Peetz	29.3	58.5	28.2	60.0	28.1	60.6	22.3	61.0	27.3	61.5	27.0	60.3		
Phillips/Haxtun W.	51.8	60.0	56.4	61.0	49.4	60.0	56.8	58.0	54.7	60.0	53.8	59.8		
Phillips/Haxtun S.	43.7	60.0	56.1	60.0	53.3	60.0	45.1	59.0	45.7	59.0	48.8	59.6		
Phillips/Central	66.0	60.0	65.4	60.0	72.0	60.0	64.9	60.0	67.7	57.0	67.2	59.4		
Prowers/Lamar	20.1	61.0	18.1	60.0	20.5	62.0	23.8	62.0	19.8	61.0	20.5	61.2		
Washington/Akron	51.7	58.5	46.4	59.0	48.9	60.0	47.9	59.0	42.5	60.5	47.5	59.4		
Washington/Woodlin	73.4	59.0	43.3	59.0	43.4	58.5	53.2	59.0	54.0	59.0	53.5	58.9		
Washington/Woodrow	41.1	58.0	48.4	59.0	34.7	58.0	42.9	58.5	35.4	58.5	40.5	58.4		
Weld/New Raymer	44.0	63.5	48.1	62.5	53.1	63.0	43.6	63.5	43.9	63.0	46.5	63.1		
Yuma/Yuma	50.4	57.0	31.4	54.0	33.1	60.0	34.3	57.0	36.4	54.0	37.1	56.4		
Average Yield/Test Wt	43.9	59.5	42.6	59.8	42.2	60.6	40.1	59.8	40.0	59.7	41.7	59.9		
Significance <sup>3</sup> Yield	a		ab		b		c		c					
Significance <sup>3</sup> Test Wt		b		b		a		b		b				

LSD<sub>(0.30)</sub> for yield = 1.5 bu/ac    LSD<sub>(0.30)</sub> for test weight = 0.3 lb/bu

<sup>1</sup>Varieties are ranked left to right according to yield in 2009

<sup>2</sup>Yield corrected to 12% moisture

<sup>3</sup>Significance: Varieties with different letters are significantly different from one another based on the LSD values (1.5 bu/ac for yield and 0.3 lb/bu for test weight)

## Summary of 2009 Irrigated Variety Performance Results

Origin <sup>1</sup> Release Year	Variety <sup>2</sup>	Yield	Weight	Height	Lodging Rocky Ford 2009	Lodging Haxtun 2009	BYDV Rocky Ford scale 1-9 <sup>4</sup>	Heading days different from trial average at Fort Collins
		<u>bu/ac</u>	<u>lb/bu</u>	<u>in</u>	<u>scale 1-9<sup>3</sup></u>	<u>scale 1-9<sup>3</sup></u>		<u>days +/- ave<sup>5</sup></u>
NE 2008	Settler CL	94.5	60.3	37	1	1	1	1
TX/A 2002	TAM 111	92.5	59.5	38	4	1	3	1
CSU exp	CO04393	92.0	59.2	38	5	3	3	-1
WB 2006	Aspen	92.0	57.1	34	2	1	4	-1
CSU 2006	Ripper	88.0	56.9	36	6	2	3	-1
WB 2008	Armour	88.0	58.1	32	5	1	2	-1
CSU 1998	Prairie Red	87.9	58.6	35	8	2	1	0
CSU 2008	Thunder CL	87.9	57.8	37	4	1	2	0
KSU 2005	Danby	87.3	60.8	38	9	2	3	0
AP 2001	Jagalene	87.3	59.1	37	3	1	4	0
CSU 2004	Bond CL	86.7	58.5	38	5	2	3	0
WB 2008	Hitch	85.7	58.3	35	4	1	4	1
NE 2008	Anton	84.1	59.7	36	4	1	4	1
AP 2005	NuDakota	83.0	57.2	34	3	1	6	0
TX/W 2005	TAM 112	83.0	60.1	38	8	3	2	-1
CSU 2002	Ankor	82.7	57.6	37	7	2	3	0
WB 2005	Keota	82.4	57.6	38	4	2	1	1
CSU exp	CO03W054-2	81.4	58.5	38	8	8	3	0
CSU exp	CO04499	81.3	59.0	41	6	4	2	-1
CSU 2007	Bill Brown	80.9	59.0	34	7	1	6	-1
AP exp	AP00x0100-51	79.4	58.4	36	3	1	4	0
KSU 2006	Fuller	78.0	57.4	35	6	1	4	0
CSU 2004	Hatcher	76.2	57.4	36	8	4	3	1
CSU 1991	Yuma	75.7	57.3	36	5	2	6	1
NE 2007	Mace	75.4	58.5	35	2	1	5	2
AP 2006	Hawken	74.9	58.1	33	6	1	5	-1
OK 2008	OK Rising	70.2	57.2	35	1	1	3	1
Average		83.6	58.4	36.1	4.9	1.9	3.4	0

<sup>1</sup>Variety origin code: CSU=Colorado State University; WB=WestBred, LLC; AP=AgriPro COKER; TX/A=Texas A&M release, marketed by AgriPro COKER; TX/W=Texas A&M release, marketed by Watley Seed Co.; KSU=Kansas State University; NE=University of Nebraska; OK=Oklahoma State University.

<sup>2</sup>Varieties are ranked according to average yield in 2009.

<sup>3</sup>Lodging score: 1=completely erect, 9=completely lodged.

<sup>4</sup>Barley yellow dwarf virus symptom score: 1=no symptoms, 9=severe symptoms

<sup>5</sup>Negative differences indicate heading before trial average heading date, positive differences indicate later than trial average.

## Summary of 2-Yr Irrigated Variety Performance Results

Origin <sup>2</sup> Release Year	Variety <sup>3</sup>	Yield 2008-09 <u>bu/ac</u>	Test Weight 2008-09 <u>lb/bu</u>	Height 2008-09 <u>in</u>	Lodging 2008-09 <u>scale 1-9<sup>4</sup></u>	Heading days different from trial average at Fort Collins 2008-09 <u>days +/- ave<sup>5</sup></u>
CSU exp	CO04393	93.7	60.2	35	5	1
CSU 2008	Thunder CL	92.6	58.9	33	3	0
TX/A 2002	TAM 111	91.7	60.4	34	4	1
AP 2005	NuDakota	91.3	58.8	31	3	-1
AP 2001	Jagalene	91.1	60.2	34	4	1
CSU 2004	Bond CL	89.9	58.1	34	5	-1
CSU 1998	Prairie Red	89.5	59.3	31	5	-2
WB 2006	Aspen	87.3	57.4	30	4	-1
WB 2005	Keota	86.9	59.0	35	5	1
CSU exp	CO03W054-2	85.0	59.5	35	8	1
NE 2008	Anton	84.1	60.7	33	2	2
CSU 2007	Bill Brown	83.9	59.3	31	5	0
CSU 2004	Hatcher	83.7	59.1	32	7	2
CSU 1991	Yuma	83.7	58.6	33	5	1
CSU exp	CO04499	83.3	60.2	36	6	-1
AP 2006	Hawken	82.8	59.2	29	5	-2
TX/W 2005	TAM 112	82.8	61.2	33	7	-2
OK 2008	OK Rising	80.7	59.0	32	1	0
Average		86.9	59.4	33	5	0

<sup>1</sup>2-yr averages in the table above are based on three 2008 trials and three 2009 trials.

<sup>2</sup>Variety origin code: CSU=Colorado State University; WB=WestBred, LLC; AP=AgriPro COKER;

TX/A=Texas A&M release, marketed by AgriPro COKER; TX/W=Texas A&M release, marketed by Watley ;

NE=University of Nebraska; OK=Oklahoma State University.

<sup>3</sup>Varieties ranked according to average 2-yr yield.

<sup>4</sup>Lodging score: 1=completely erect, 9=completely lodged.

<sup>5</sup>Negative differences indicate heading before trial average heading date, positive differences indicate later than trial average.

## Summary of 3-Yr Irrigated Variety Performance Results

Origin <sup>2</sup> Release Year	Variety <sup>3</sup>	Yield 2007-09 <u>bu/ac</u>	Test Weight 2007-09 <u>lb/bu</u>	Height 2007-09 <u>in</u>	Lodging 2007-09 <u>scale 1-9<sup>4</sup></u>	Heading days different from trial average at Fort Collins 2007-09 <u>days +/- ave<sup>5</sup></u>
AP 2005	NuDakota	92.4	58.4	31	4	-1
CSU 2008	Thunder CL	92.2	59.1	33	3	-1
CSU 2004	Bond CL	91.7	58.7	35	4	-1
TX/A 2002	TAM 111	90.2	60.2	34	4	1
AP 2001	Jagalene	89.3	60.1	33	4	1
CSU exp	CO03W054-2	88.4	59.7	35	7	1
TX/W 2005	TAM 112	88.3	61.0	33	6	-2
CSU 2007	Bill Brown	87.8	59.6	32	5	0
CSU 1991	Yuma	87.2	58.8	33	4	1
WB 2005	Keota	86.4	59.4	35	5	1
CSU 2004	Hatcher	85.6	59.5	33	7	1
CSU 1998	Prairie Red	85.3	59.3	31	5	-2
WB 2006	Aspen	85.2	57.9	31	3	-1
NE 2008	Anton	84.1	60.7	33	2	3
AP 2006	Hawken	83.8	59.4	30	4	-2
Average		87.9	59.4	33	4	0

<sup>1</sup>2-yr averages in the table above are based on three trials in 2007, 2008 and 2009.

<sup>2</sup>Variety origin code: CSU=Colorado State University; WB=WestBred, LLC; AP=AgriPro COKER;

TX/A=Texas A&M release, marketed by AgriPro COKER; TX/W=Texas A&M release, marketed by Watley Seed Co.;  
NE=University of Nebraska.

<sup>3</sup>Varieties ranked according to average 3-yr yield.

<sup>4</sup>Lodging score: 1=completely erect, 9=completely lodged.

<sup>5</sup>Negative differences indicate heading before trial average heading date, positive differences indicate

## Winter Wheat Variety Selection in Colorado for Fall 2009

Variety performance summary tables from CSU are intended to provide reliable and unbiased information to farmers, seed producers, and wheat industry representatives but choosing a variety is a personal decision made by every farmer for every field before planting every year. This section is designed to provide guidance to farmers so they can weigh the advantages and disadvantages of different varieties and choose the variety that best fits their farm conditions.

- Producers should focus on multiple-year summary yield results when selecting a new variety. Over time the best buffer against making poor variety decisions has been to select varieties based on three year average performance and not on performance in a single year, especially not to select a variety based upon performance at a single location in one year.
- Producers should consider planting more than one variety based on different maturity, disease or insect resistance, test weight, lodging, herbicide resistance, coleoptile length, height, or end-use quality characteristics. These non-yield traits are useful to spread your risk due to the unpredictability of next year's climatic conditions and pest problems.
- All varieties available for planting this fall are considered to be susceptible to prevalent races of Russian Wheat Aphid (RWA) and thus resistance to the original RWA biotype should not be a consideration for fall of 2009.
- Producers should control volunteer wheat and weeds to avoid the negative effects of a green bridge that could lead to serious virus disease infestations vectored by the wheat curl mite or other insects. High presence of virus in 2009, coupled with wet weather conditions of early summer 2009, are of special concern as a possible source of virus for infection in the 2010 crop.
- Producers should soil sample to determine optimum fertilizer application rates. In the absence of soil sampling, grain protein levels should be monitored closely. If protein levels in a field fall below 12%, nitrogen fertilizer was likely insufficient to meet demands for yield and yield was lost (consult <http://wheat.colostate.edu/00555.pdf>).

Although many new varieties possessing valuable traits and with high potential are in the breeding and selection process, emphasis here is placed on variety yield performance over the past three years and the specific traits they possess.

### Dryland wheat varieties to consider based on the order of relative performance for three years

NuDakota (HWW) – A medium-maturity 2005 Agripro hard white wheat (HWW) variety that has high yield and excellent resistance to both leaf and stripe rust. NuDakota is a shorter variety, has low test weight, and relatively poor baking quality characteristics. NuDakota will probably not be planted on many Colorado acres due to current marketing issues with HWW. On a 3-yr average NuDakota is also the highest yielding irrigated variety.

Hatcher – This medium maturing, high yielding 2004 CSU HRW variety was planted on more Colorado wheat acres in fall 2008 than any other variety. It has good stress tolerance, good test weight and resistance to stripe rust. Hatcher is also relatively short and develops a “speckling” condition on the leaves in the spring in the absence of any apparent disease. Hatcher is extremely stable, having been in the top three of the three year yield averages every year since 2003. Hatcher remains the most highly recommended HRW wheat variety based on 3-yr average yield, stress tolerance, and resistance to stripe rust.

Ripper – An early maturing HRW 2006 CSU release that is high yielding in low yield environments, taller than Hatcher, and has excellent baking quality. It has relatively lower test weight, and is susceptible to both leaf and stripe rust. Like Hatcher, Ripper has also shown extremely stable yields, being in the top three of the three year yield averages ever year since 2005.

Bond CL – A medium maturing taller 2004 HRW CSU release with high yields and good baking quality in addition to the Clearfield\* trait. It has lower test weight and is susceptible to stripe rust. We expect it to become increasingly popular under irrigation where it has been tough to beat and test weight is less of an issue.

TAM 112 – A HRW 2005 release from Texas A&M and marketed by Watley Seed Company has good dryland adaptation and is distinguished by excellent *Wheat streak mosaic virus* tolerance, long coleoptile, early maturity, and good test weight and baking quality. It is susceptible to leaf and stripe rust and has poor straw strength.

TAM 111 – A HRW 2002 release from Texas A&M and marketed by AgriPro has good test weight, good straw strength and good stripe rust resistance making it well adapted to irrigated conditions. TAM 111 also has good milling and baking characteristics but is susceptible to leaf rust.

Bill Brown – CSU HRW release (2007) can be compared to Hatcher and Ripper: It is similar in maturity to Hatcher and later maturing than Ripper. Like Ripper it is slightly taller than Hatcher. It has good resistance to stripe rust like Hatcher, which is much better than Ripper, and also very good resistance to leaf rust (unlike Hatcher and Ripper). It has superior test weight to Hatcher and other varieties, especially Ripper (low) and better baking quality than Hatcher but not quite as good as Ripper. Bill Brown is susceptible to stem rust. Certified seed will be available for planting in fall 2009.

Above – This CSU Clearfield\* HRW (2001) release and Ripper are the earliest maturing varieties on this list. On a 3-yr average, Above is the second highest yielding Clearfield\*variety in our trials. It has average test weight but is susceptible to leaf and stripe rust and has relatively poor baking quality.

Infinity CL – A later maturing, taller HRW variety released in 2004 from the University of Nebraska that has, in addition to the Clearfield\* herbicide tolerance trait, a good combination

of high yield, average test weight, and good stripe rust resistance. Although later maturing than Above, it is taller, has much better stripe rust resistance, and is similar to Above for yield.

#### Dryland varieties to watch in the future that have been in Colorado variety trials for two years

CO03W054-2 – This CSU experimental hard white will be released in fall 2009 (final naming pending). It is a medium maturing, taller semidwarf with excellent milling and baking quality. It has good resistance to *Wheat streak mosaic virus* and stripe rust and moderate sprouting tolerance. CO03W054-2 has relatively poor straw strength and will not be recommended for high-yield irrigated conditions. CO03W054-2 will be handled in CWRP ConAgra Mills Ultragrain® Premium Program for hard white wheat (HWW).

Settler CL – This 2008 Nebraska release is a HRW Clearfield\* winter wheat that has performed well in 2 years of testing and has good test weight. It is later maturing, medium height, and moderately susceptible to leaf and stripe rust.

Winterhawk – This WestBred release in 2007 is medium maturing, medium tall, longer coleoptile with good stripe rust resistance. It has good test weight and good baking quality but is susceptible to leaf rust.

#### Irrigated wheat varieties to consider based on the order of relative performance for three years

The most important variety selection criteria for irrigated varieties are yield, straw strength, and stripe rust resistance.

NuDakota (HWW) – high yielding irrigated variety with better straw strength than Bond CL. It has low test weight that is more manageable and less of a concern in irrigated conditions. Good resistance to both leaf and stripe rust.

Thunder CL is a CSU 2008 hard white Clearfield\* wheat release with excellent irrigated yield, good straw strength, and excellent baking quality. It has moderate resistance to stripe rust and *Wheat streak mosaic virus* but is moderately susceptible to pre-harvest sprouting. Thunder CL will be handled in CWRP ConAgra Mills Ultragrain® Premium Program for hard white wheat (HWW).

Bond CL – A medium maturing taller HRW CSU release (2004) with high yields, average straw strength, but susceptible to stripe rust. It has lodged significantly in some high yielding irrigated trials. It has low test weight that is more manageable and less of a concern in irrigated conditions.

TAM 111 – A HRW 2002 release from Texas A&M and marketed by AgriPro that is a high yielding irrigated variety with good straw strength, excellent resistance to stripe rust, and good test weight.



## 2009 Climatic Conditions and Specific Trial Comments

After a dry, low-yielding, 2008 crop there were widespread and often heavy rains throughout much of eastern Colorado in August and September 2008. This allowed most producers to plant into good soil moisture and to have moisture in the soil profile for fall plant establishment. These conditions, however, also created green bridge conditions which were exacerbated by later than normal dryland corn harvest that allowed mites to migrate from late-harvested corn to newly planted wheat. With few exceptions, the fall of 2008 and winter of 2009 was windy and dry with relatively small amounts of snow. Russian Wheat Aphid (RWA) were endemic in SE Colorado, along I-70 and on the Front Range causing producers to spray tens of thousands of acres in spring 2009. Brown mites were widespread in SE Colorado, in addition to localized Hessian fly outbreaks which are extremely rare for Colorado. *Wheat streak mosaic virus* (WSMV), *High plains virus* (HPV), and *Triticum mosaic virus* were found alone or together in many parts of the state. *Barley Yellow Dwarf virus* (BYDV) infestations, vectored by the Bird cherry oat aphid, were especially evident in SE Colorado on large acreages. Late leaf and stripe rust infections were observed mostly in Northeast Colorado, and, in many instances, were accompanied by leaf spotting diseases (both tan spot and Septoria leaf blotch) as a result of the high moisture conditions. The most remarkable climatic effects of 2009 were the extremely cool temperatures throughout the growing season and the high incidence of hail throughout eastern Colorado, often accompanied by high winds. Overcast, cool, wet, and cloudy weather dominated the harvest season.

### **Specific comments on individual 2009 dryland and irrigated trials**

#### **Dryland locations**

Walsh - Planted 9/17/2008 into clean-tilled summer fallow. GPS Coordinates: N 37 25.913 W 102 18.601. Satisfactory plant stands after a 7" rain. Winter and spring drought relatively severe. Early April moisture then rain in late May and June. Sprayed for RWA infestation but still some damage. BYDV also present. Hailed 6/14 and estimated more than 10% loss. Harvested 6/30/2009. Trial average yield = 27.0 bu/ac; test weight = 57.4 lb/bu.

Lamar - Planted 9/10/08 into no-till wheat stubble. GPS Coordinates: N 37 45.605 W 102 29.535. Good and uniform plant stands. Brown wheat mites in low levels in October, field sprayed for mites and RWA March 16. Obvious drought stress in winter and spring. Plants defoliated by early June perhaps due to a combination of drought, brown mites, and RWA. Harvested 7/2/2009. Trial average yield = 38.0 bu/ac; test weight = 59.7 lb/bu.

Sheridan Lake - Planted 9/10/08 into no-till sorghum stalks about 1.5" deep due to poor surface moisture but received 0.5" rain on 9/13. GPS Coordinates: N 38 32.490 W 102 28.925. Good uniform stands. Dry winter and early spring. Trial very droughty in mid-May but late May and June rains completely turned this trial around. Harvested 7/2/2009. Trial average yield = 37.1 bu/ac; test weight = 61.8 lb/bu.

Arapahoe - Planted 9/11/08 into tilled 3" dry mulch onto good moisture. Seed

bed a little rough but had much better than expected emergence. In mid-May, RWA were present throughout the trial. BYDV and WSMV both present in the trials, but levels not severe. Trial received some early May moisture followed by late May and June rains. GPS Coordinates: N 38 50.253 W 7.705. Harvested 7/3/2009. Trial average yield = 51.3 bu/ac; test weight = 61.5 lb/bu.

Burlington - Planted 9/11/08 into no-till wheat stubble with great soil moisture. GPS Coordinates: N 39 11.160 W 102 18.375. Emergence satisfactory but not quite as good as expected given great soil moisture at planting. Some crusting and hard ground. Drought stress and unevenness in trial plots observed by mid-May. Late May and June precipitation turned this trial around and it became a very good trial. Leaf and stripe rust present at very low levels. Harvested 7/17/2009. Trial average yield = 59.7 bu/ac; test weight = 59.4 lb/bu.

Genoa - Planted 9/11/08 into dry clean till, put seed down onto moisture ~2 in. Average emergence and stands. No moisture from August to early October. Dry fall, winter, and early spring. Heavy infestation of RWA that were sprayed after they caused significant damage. Light hail damage in early June. Harvested 7/21/2009. Trial average yield = 45.3 bu/ac; test weight = 60.9 lb/bu.

Roggen - New location in 2009. Planted 9/19/08 into clean till and good soil moisture under 2" dry mulch. Good stands. Dry winter and early spring. RWA infestation evident late April and plots sprayed by plane. Surprising amount of waviness in plots due to lack of early spring moisture but partially remediated with strong late May and June precipitation. Harvested 7/13/2009. Trial average yield = 56.5 bu/ac; test weight = 62.1 lb/bu.

Orchard - Planted 9/19 into near perfect soil moisture conditions and short wheat stubble. Emergence and plant stands were very good but trial compromised by severe winter and early spring drought. Trial bounced back with timely late May and June precipitation. Harvested 7/13/2009. Trial average yield = 67.7 bu/ac; test weight = 60.3 lb/bu.

Yuma - Planted 9/18/08 into clean till summer fallow. GPS Coordinates: N 40 11.458 W 102 39.684. Very good emergence and stand establishment. This was like an irrigated trial from the beginning of the season to harvest. The average plant height in the trial was 37 inches and there was significant lodging. Leaf and stem rust observed at relatively low levels. Harvested 7/18/2009. Trial average yield = 78.8 bu/ac; test weight = 57.8 lb/bu.

Julesburg - Planted 9/24/08 into clean till, 2" dry mulch but good moisture. GPS Coordinates: N 40 54.021 W 102 13.705. Stands not as uniform as hoped but warm temps and good GDD compensated via good tillering to fill in plots. Excellent fall soil moisture. Trial received timely and sufficient moisture throughout the growing season. Significant, leaf rust, tan spot, Septoria leaf blotch, and stem rust observed on susceptible entries. Harvested 7/18/2009. Trial average yield = 82.2 bu/ac; test weight = 59.0 lb/bu.

## **Irrigated locations**

Haxtun - Planted 9/24/08 into tilled sandy soil following dry beans. Good soil moisture at planting. GPS Coordinates: N 40 39.737 W 102 39.862. Good uniform stands but not over planted. Trial hailed on multiple times causing shattering and broken heads. Lower GDD in 2009 with many cool and cloudy days were not conducive to high irrigated wheat yields. Powdery mildew and stem rust observed at relatively high levels despite timely fungicide application. Harvested 7/18/2009. Trial average yield = 90.9 bu/ac; test weight = 59.7 lb/bu.

Rocky Ford - Planted late 10/7/08 but emergence was good and stands were solid and uniform. Spring RWA and green bug infestation. Serious infestation of BYDV. Lodging significant. Lower GDD in 2009 with many cool and cloudy days were not conducive to high irrigated wheat yields. Harvested 7/13/2009. Trial average yield = 87.2 bu/ac; test weight = 56.5 lb/bu.

Fort Collins - Planted 9/15/08 into clean tilled summer fallow. Good fall emergence. Late irrigation in spring following dry winter and early spring conditions. Lower GDD in 2009 with many cool and cloudy days were not conducive to high irrigated wheat yields. Some High Plains virus and leaf rust identified, though at relatively low levels. Harvested 7/23/2009. Trial average yield = 71.5 bu/ac; test weight = 58.8 lb/bu.

## Description of winter wheat varieties in eastern Colorado trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	YR	LR	WSMV	TW	MILL	BAKE	Comments
Above Hard red winter TAM 110*4/FS2	CSU-TX 2001	S	5	5	3	7	9	9	5	5	4	7	CSU/Texas A&M release (2001). Clearfield*, winter wheat. Early maturing semidwarf, excellent dryland yield in CO. Leaf and stripe rust susceptible. Marginal baking quality.
Ankor Hard red winter Akron/Halt/4*Akron	CSU 2002	R*	5	6	5	5	8	9	5	5	6	5	CSU release (2002). Backcross derivative of Akron with resistance to RWA biotype 1.
Anton Hard white winter WA691213-27/N86L177//Platte	NE-USDA 2008	S	9	2	1	4	7	6	--	3	7	7	University of Nebraska-USDA release (2008), first entered in CSU irrigated trials in 2008. Short semidwarf, medium maturing, hard white winter wheat (HWW). Excellent straw strength, best adapted to irrigated production.
AP00X0100-51 Hard red winter W95-301/W98-151	Agripro EXP	S	4	5	5	4	3	3	--	3	--	--	Unreleased Agripro hard red experimental line. First entered in CSU trials in 2009, no prior testing in regional breeder trials.
Armour Hard red winter B151-WH/KS94U326	Westbred 2008	S	1	1	1	7	2	8	--	7	5	5	Westbred release (2008). First entered in CSU trials in 2009. Early maturing semidwarf, stripe rust resistance.
Aspen Hard white winter TAM 302/B1551W	Westbred 2006	S	3	2	1	6	4	3	5	7	6	6	Westbred release (2006). Hard white winter wheat (HWW), good sprouting tolerance. Short semidwarf, good leaf and stripe rust resistance. First tested in CSU irrigated trials in 2007 and dryland trials in 2008.
Avalanche Hard white winter KS87H325/Rio Blanco	CSU 2001	S	6	6	5	5	8	8	5	2	2	5	CSU release (2001). Hard white winter wheat (HWW), sister selection to Trego, high test weight. Leaf and stripe rust susceptible. Moderate sprout susceptibility.
Baca Hard red winter Scout Selection	CSU 1973	S	5	9	9	9	6	4	7	4	3	3	CSU release (1973). Developed from a selection from Scout. Early maturing, tall, long coleoptile, good emergence and fall growth and stand establishment characteristics. Low yield relative to modern wheat varieties.
Bill Brown Hard red winter Yumar/Arlin	CSU 2007	R*	5	3	4	2	4	2	6	2	4	3	CSU release (2007). Good dryland and irrigated yield record in CSU trials. High test weight, good leaf and stripe rust resistance. Stem rust susceptible. Good baking quality, short coleoptile.
Bond CL Hard red winter Yumar//TXGH12588-120*4/FS2	CSU 2004	R*	6	6	6	5	8	6	8	8	7	3	CSU release (2004). Clearfield* winter wheat. Slightly later, slightly taller than Above. Excellent dryland yield in CO, very high irrigated yields, excellent baking quality, lower test weight. Leaf and stripe rust susceptible.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), coleoptile length (COL), stripe rust resistance (LR), leaf rust resistance (LRR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), milling quality (MILL), and baking quality (BAKE). Rating scale: 1 - very good, very resistant, very early, or very short to 9 - very poor, very susceptible, very late, or very tall.

\* RWA rating denotes resistance to the original biotype (biotype 1) of RWA. All available cultivars are susceptible to the new biotypes of RWA.

## Description of winter wheat varieties in eastern Colorado trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	YR	LR	WSMV	TW	MILL	BAKE	Comments
Camelot Hard red winter KS91H184/Arilin SIB//KS91HW29/3/NE82761/Redland/4/VBF0168	NE 2008	S	3	7	7	6	7	2	--	6	6	6	Nebraska release (2008). Medium-early, taller wheat. Good leaf rust resistance, moderately susceptible to stripe rust. First entered in CSU dryland trials in 2008.
CO03W054-2 Hard white winter KS96HW94//Trego/CO960293	CSU EXP	S	7	6	8	5	4	5	2	4	2	2	CSU experimental hard white, targeted for release fall 2009. Medium-maturing, taller semidwarf. Good resistance to wheat streak mosaic virus and stripe rust, moderate sprouting tolerance, excellent milling and baking quality.
CSU Blend09 Hard red winter Hatcher-Ripper Blend	CSU 2004/2006	R*	3	4	4	--	6	8	--	6	--	--	50:50 blend of Hatcher and Ripper. First entered into CSU Dryland Variety Trial (UVPT) in 2009.
Danby Hard white winter TREGO//GR 8W	KSU 2005	S	4	5	4	4	4	6	5	2	2	7	KSU-Hays release (2005). Hard white wheat (HWW), very high test weight. Similar to Trego with improved stripe rust resistance and preharvest sprouting tolerance.
Duster Hard red winter WO405D/HGF112//W7469C/HCF012	OK 2006	S	8	8	3	2	8	2	7	4	3	5	Oklahoma State release (2006). Good yield performance in western Plains breeder trials, first tested in CSU trials in 2007. Medium tall, medium late, short coleoptile, leaf rust resistant, stripe rust susceptible.
Fuller Hard red winter Bulk selection	KSU 2006	S	2	3	8	4	2	2	5	5	6	5	KSU-Manhattan release (2006). First tested in CSU trials in 2007. Early maturing semidwarf. Average test weight, good leaf and stripe rust resistance. Lower straw strength.
Goodstreak Hard red winter SD3055/KS88H164//NE89646 (=COLT*2/PATRZANKA)	NE 2002	S	6	9	8	9	5	5	8	3	2	8	Nebraska release (2002). Later maturing tall wheat. Long coleoptile, good test weight, marginal baking quality.
Hatcher Hard red winter Yuma/PI 372129//TAM-200/3/4*Yuma/4/KS91H184/Vista	CSU 2004	R*	6	2	6	5	4	8	8	4	2	4	CSU release (2004). Medium maturing semidwarf. Good test weight, good stripe rust resistance. Excellent dryland yield across the High Plains, good milling and baking quality. Develops "leaf speckling" condition.
Hawken Hard red winter Rowdy/W96-427	Agriprio 2006	S	2	2	2	5	2	2	8	4	5	6	Agriprio release (2006). First tested in CSU trials in 2007. Medium maturing, short semidwarf. Good leaf and stripe rust resistance, good straw strength, good quality.
Hitch Hard red winter 53/3/ABL/11113//K92/4/JAG/5/KS891808	Westbred 2008	S	6	2	2	2	3	8	--	4	6	8	Westbred release (2008). First entered in CSU trials in 2009, positioned for High Plains irrigated production. Good straw strength, good stripe rust resistance, marginal baking quality.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), coleoptile length (COL), stripe rust resistance (LR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), milling quality (MILL), and baking quality (BAKE). Rating scale: 1 - very good, very resistant, very early, or very short to 9 - very poor, very susceptible, very late, or very tall.

\* RWA rating denotes resistance to the original biotype (biotype 1) of RWA. All available cultivars are susceptible to the new biotypes of RWA.

## Description of winter wheat varieties in eastern Colorado trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	YR	LR	WSMV	TW	MILL	BAKE	Comments
Infinity CL	NE 2004	5	5	7	6	6	4	3	--	4	4	4	Nebraska release (2005). Clearfield* winter wheat. Medium maturing, taller wheat. Improved baking quality relative to Above. Develops "leaf speckling" similar to Hatcher.
Hard red winter Windstar/3/NE94481/TTXGH125888-120*4/FS2													
Jagalene	Agripro 2001	5	5	5	5	4	3	9	4	3	2	5	Agripro release (2001). Good test weight, good stripe rust resistance, good wheat streak mosaic virus tolerance. Observed to shatter in CO and KS trials. Very leaf rust susceptible.
Hard red winter Abilene/Jagger													
Jagger	KSU 1994	5	3	5	5	5	2	9	4	5	5	3	KSU-Manhattan release (1994). Early maturing semidwarf, good baking quality, good WSMV tolerance and stripe rust resistance, very leaf rust susceptible. Breaks dormancy very early in the spring.
Hard red winter KS82W418/Stephens													
Keota	Westbred 2005	5	5	6	5	5	2	8	8	6	6	6	Westbred release (2005). First tested in CSU trials in 2005. Good stripe rust resistance, leaf rust susceptible. Taller plant stature, maintains height under stress.
Hard red winter Custer/Jagger													
Mace	NE-USDA 2007	5	8	3	2	1	2	4	1	9	6	3	Nebraska release (2008). First entered in CSU trials in 2009. Later maturing, medium height. Excellent resistance to wheat streak mosaic virus but low yield in absence of wheat streak. Low test weight, very short coleoptile.
Hard red winter YUMA/TT-57/3/CO850034/4/4*YUMA/5/(KS91H184/ARLIN 5/KS91HW29//NE89526)													
NuDakota	Agripro 2005	5	5	2	3	4	2	2	4	9	7	5	Agripro release (2005). Hard white wheat (HWW). Medium maturing, short semidwarf. Very good dryland and irrigated yields, good leaf and stripe rust resistance. Moderate sprouting tolerance, very low test weight.
Hard white winter Jagger/Romanian													
OK Rising	OK 2008	5	4	5	2	3	3	8	--	6	2	2	Oklahoma State release (2008). Hard white reselection from OK Bullet. First entered in CSU dryland and irrigated trials in 2008. Excellent straw strength and quality, good stripe rust resistance, good sprout tolerance.
Hard white winter KS96WGRCS9/Jagger													
Overland	NE 2006	5	9	8	4	5	3	2	--	7	5	8	Nebraska release (2006) as "Husker Genetics Brand Overland". First tested in CSU trials in 2007. Taller, later maturing. Good leaf and stripe rust resistance, lower test weight, poor baking quality.
Hard red winter Millennium 'S'/ND8974													
Prairie Red	CSU 1998	R*	4	3	3	6	9	9	5	6	4	7	CSU release (1998). Backcross derivative of TAM 107, resistant to RWA biotype 1. Good stress tolerance, poor end-use quality reputation, lower yields relative to more recent wheat releases.
Hard red winter CO850034/P1372129//5*TAM 107													
Prowers 99	CSU 1999	R*	9	8	8	8	5	6	7	2	5	1	CSU release (1999), reselection from Prowers. Tall, long coleoptile, medium-late maturity, high test weight, excellent milling and baking quality characteristics.
Hard red winter CO850060/P1372129//5*Lamar													

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), coleoptile length (COL), stripe rust resistance (LR), leaf rust resistance (LRR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), milling quality (MILL), and baking quality (BAKE). Rating scale: 1 - very good, very resistant, very early, or very short to 9 - very poor, very susceptible, very late, or very tall.

\* RWA rating denotes resistance to the original biotype (biotype 1) of RWA. All available cultivars are susceptible to the new biotypes of RWA.

## Description of winter wheat varieties in eastern Colorado trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	YR	LR	WSMV	TW	MILL	BAKE	Comments
Ripper Hard red winter CO940606/TAM107R-2	CSU 2006	R*	2	4	4	7	9	9	7	7	2	2	CSU release (2006). Excellent stress tolerance, high dryland yields in Colorado, excellent milling and baking quality. Very good recovery from stand reduction. Leaf and stripe rust susceptible, lower test weights.
Sandy Hard red winter Mexican spring semi-dwarf/Trapper/Centurk	CSU 1981	S	5	8	6	8	8	8	--	4	3	4	CSU release (1981). Tall, medium-late, good stand establishment, good tolerance to root rot and crown rot. Low yield relative to modern wheat varieties.
Settler CL Hard red winter N95L164/3/MILLENNIUM SIB//TXGH125888-120*4/FS2	NE 2008	S	8	5	3	6	7	8	--	4	4	6	Nebraska release (2008). Clearfield* winter wheat. First entered in CSU dryland trials in 2008, good dryland yield on two-year average. Later maturing, medium height. Moderately susceptible to leaf and stripe rust.
Smoky Hill Hard red winter 97 8/64 MASA	Westbred 2006	S	6	3	4	4	2	2	8	5	5	2	Westbred release (2006). First tested in CSU trials in 2007. Medium late, shorter semi-dwarf. Good leaf and stripe rust resistance, good baking quality.
TAM 111 Hard red winter TAM-107//TX78V3630/CTK78/3/TX87V1233	TX 2002	S	6	7	3	6	2	8	5	2	3	4	Texas A&M release (2002), marketed by Agripro. Medium maturing, taller wheat. Good test weight, good milling and baking quality, good straw strength. Leaf rust susceptible, good stripe rust resistance.
TAM 112 Hard red winter U1254-7-9-2-1/TXGH10440	TX 2005	S	2	4	7	7	9	9	2	2	6	6	Texas A&M release (2005), marketed by Watley Seed. First tested in CSU trials in 2007. Good test weight, good quality, excellent wheat streak mosaic virus tolerance. Susceptible to leaf and stripe rust, lower straw strength.
Thunder CL Hard white winter KS01-5539/CO99W165	CSU 2008	R*	4	4	3	5	3	5	4	4	5	2	CSU release (2008). Hard white Clearfield* wheat. Good straw strength, top yields under irrigation. Excellent baking quality, moderate resistance to stripe rust and wheat streak mosaic virus, moderate sprout susceptibility.
Trigo Hard white winter KS87H325/Rio Blanco	KSU 1999	S	6	4	6	5	8	7	5	2	2	6	KSU release (1999). Hard white winter wheat (HWW), medium-late maturity, semi-dwarf, high test weight. Susceptible to both leaf and stripe rust.
Winterhawk Hard red winter 474510-1/X87807-26//HBK0736-3	Westbred 2007	S	5	5	5	7	3	8	5	2	2	4	Westbred release (2007). First tested in CSU dryland trials in 2008. Medium maturing, medium tall, longer coleoptile. Good stripe rust resistance, susceptible to both leaf and stem rust. Good test weight, good quality.
Yuma Hard red winter NS14/NS25//2*Vona	CSU 1991	S	6	3	3	2	6	5	6	6	7	3	CSU release (1991). Medium maturity, semi-dwarf, short coleoptile, good baking quality characteristics. Good yields under dryland conditions and especially under irrigation.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), coleoptile length (COL), stripe rust resistance (LR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), milling quality (MILL), and baking quality (BAKE). Rating scale: 1 - very good, very resistant, very early, or very short to 9 - very poor, very susceptible, very late, or very tall.

\* RWA rating denotes resistance to the original biotype (biotype 1) of RWA. All available cultivars are susceptible to the new biotypes of RWA.



## Wheat Information Resources

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Additional Wheat Information Resources on the Web:

<http://wheat.colostate.edu/vpt.html> - Colorado Wheat Variety Performance Database (CSU Wheat Breeding Program).

<http://www.coloradowheat.org> - Colorado Wheat Administrative Committee (CWAC), Colorado Association of Wheat Growers (CAWG), and Colorado Wheat Research Foundation (CWRF) website.



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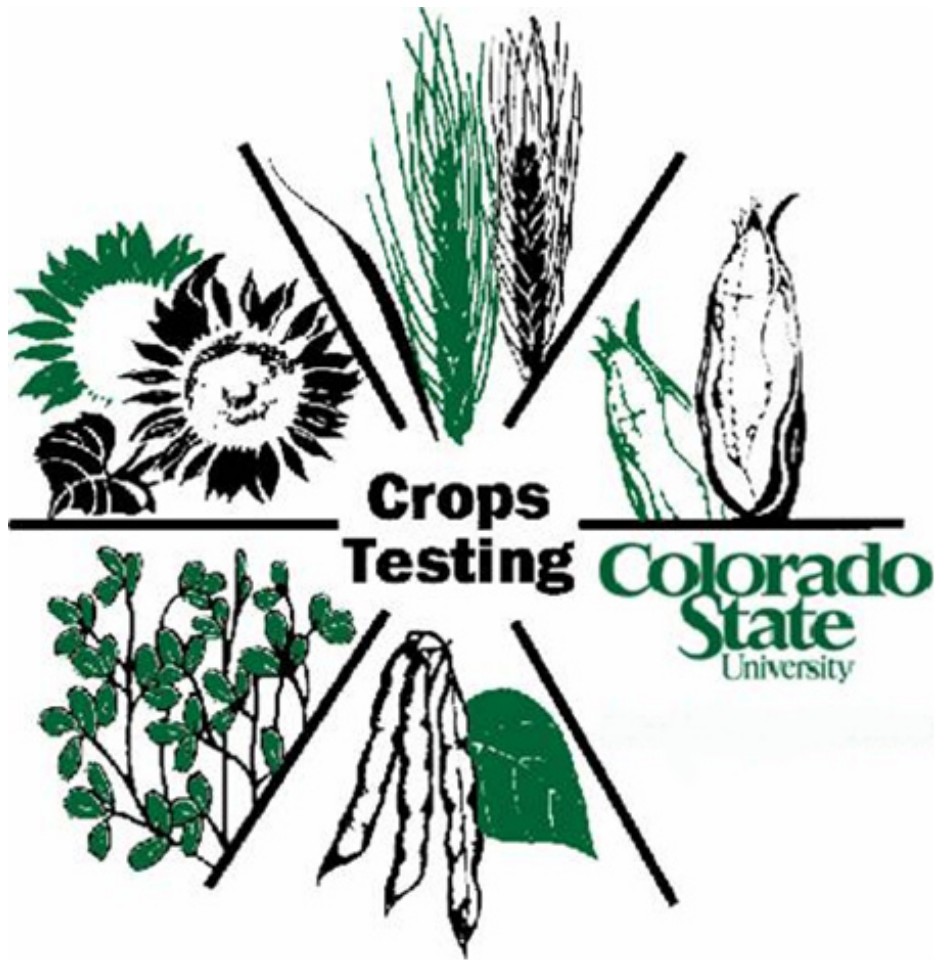
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