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Extension



MAKING BETTER
DECISIONS

2008 Colorado Winter Wheat
Variety Performance Trials

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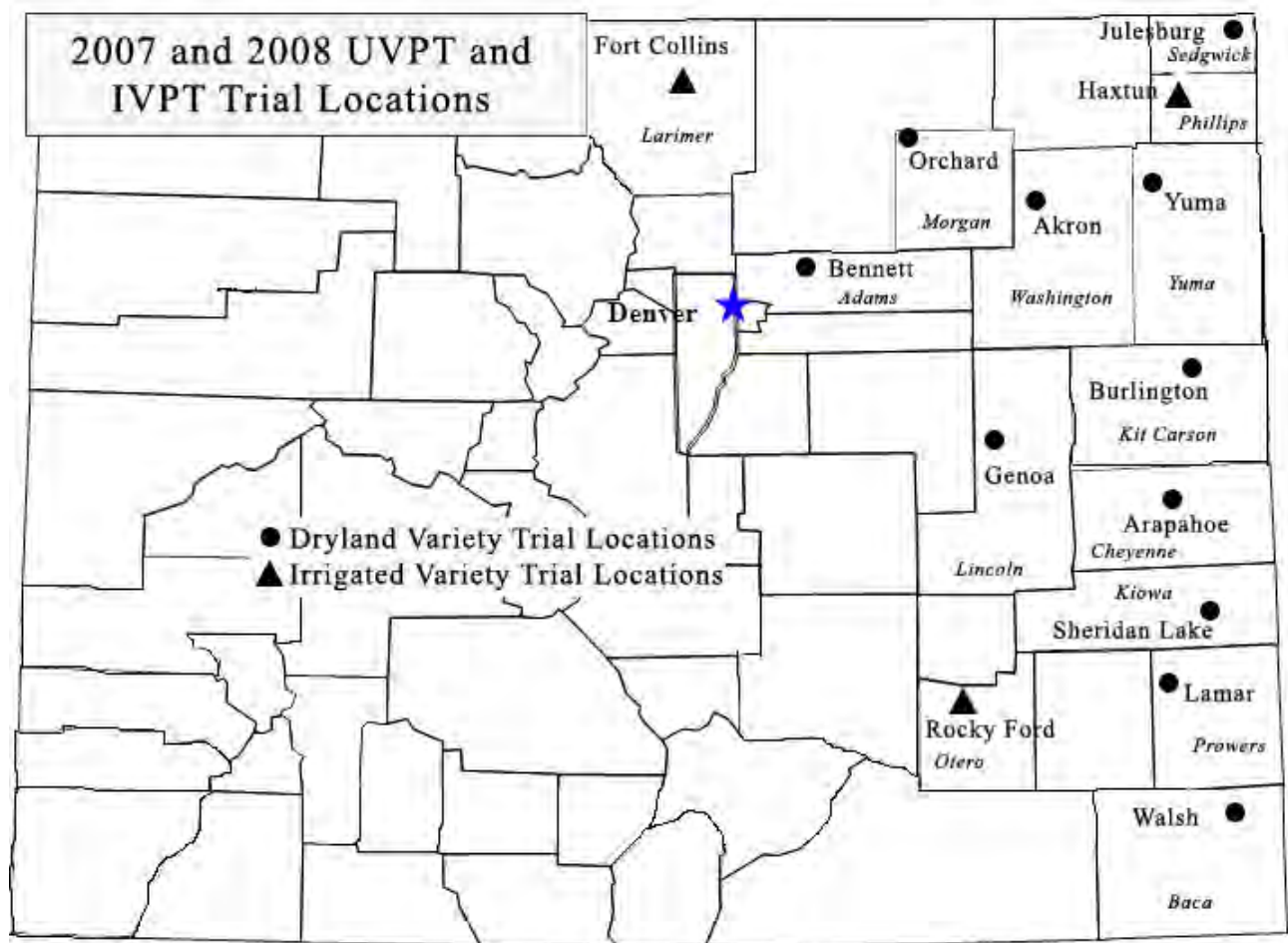
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2008 Eastern Colorado Winter Wheat Variety Performance Trials

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. Colorado State University 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.

Planting and emergence conditions in the 2008 trials were unfavorable at some locations due to light, scattered, untimely, and isolated rainfall events. Poor emergence, often combined with continued dry fall weather conditions and wind erosion, led to low and variable stands in many dryland trials. The Uniform Variety Performance Trial (UVPT) locations at Walsh, Bennett, and Lamar never recovered from poor or no fall emergence and the results from these trials could not be reported. The dryland trials at Sheridan Lake and Burlington had acceptable-to-good stand establishment but a combination of drought, hail, spring freeze, and brown wheat mite infestations created highly variable yields. The results from these trials are reported on the CSU Crops Testing website, but the yield data had too much unexplained variability to be useful for making variety decisions and could not be combined with trial data from the other six acceptable trials.

The results from the UVPT at Akron, Arapahoe, Genoa, Julesburg, Orchard, and Yuma were included in the summary of variety performance for the 2008 season. Drought stress affected yield variability at Orchard and Genoa. Adequate spring moisture was received at Akron, Arapahoe, Julesburg and Yuma but hail affected the yields in the Yuma trial and leaf rust, stem rust, tan spot and bacterial blight affected yields at Julesburg. Unlike 2006 and 2007 when trial results from all eleven dryland trials contributed to the annual summary of variety performance, in 2008 there was not a single trial that was not affected by one or more combinations of the following: fall drought and poor emergence, wind erosion, hail, insect or disease infestation, spring freeze, or spring drought.

The growing conditions in the Irrigated Variety Performance Trial (IVPT) at Fort Collins, Haxtun, and Rocky Ford were generally favorable for high yields. Yields at Rocky Ford were

affected by a combination of high temperature during pollination and spring freeze in early kernel development. The growing conditions at Haxtun were excellent but led to lush late spring vegetation and severe lodging of many varieties. Yields were reduced for heavily lodged varieties. The Fort Collins irrigated trial yields were reduced by spring drought conditions due to inadequate early season irrigation which culminated with the destruction of the linear move irrigation system by a tornado on May 22.

2008 Trials

There were 40 different entries in the dryland performance trials (UVPT) and 32 entries in the irrigated performance trials (IVPT). In the UVPT, the varieties RonL (KSU) and Avalanche (CSU), were planted but could not be used. KSU mistakenly sent Danby seed instead of RonL (we already had Danby in the trials) and the Avalanche seed had very poor germination. All trials included a combination of public and private varieties 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 160 ft² and all varieties were planted at 500,000 viable seeds per acre for dryland trials and 1.2 million viable seeds per acre for irrigated trials (viable seed was determined by a germination test prior to planting). Yields are corrected to 12% moisture. Eight dryland and three irrigated variety performance trials were harvested but only six dryland trial results could be used for yield. Test weight information was obtained from cleaned grain samples of one or two replicates at all trials except Arapahoe and Yuma which were measured on the combine equipped with a Harvest Master measuring system.

Complete individual trial performance result tables (including experimental lines) were published on the Crops Testing website, www.csucrops.com. Dryland, irrigated, and COFT trial 2008, 2-yr, and 3-yr summaries were published on the website and distributed in various hard-bound publications.

Summary of 2008 Dryland Variety Performance Results

Origin ¹ Release Year	Variety ²	Yield 2008 <u>bu/ac</u>	Test Weight 2008 <u>lb/bu</u>
NE 2008	Settler CL	49.0	60.4
CSU 2006	Ripper	48.9	59.9
CSU exp	CO03W054	48.0	60.6
AP 2005	NuDakota	47.4	59.1
OK 2004	Endurance	46.2	61.1
WB 2007	Winterhawk	46.2	61.6
CSU 2007	Bill Brown	45.8	61.1
CSU-TX 2001	Above	45.5	60.2
KSU 1999	Trego	45.2	62.0
CSU 2004	Hatcher	44.9	61.2
AP 2006	Hawken	44.9	61.2
TX/W 2005	TAM 112	44.7	60.8
CSU exp	CO03064	44.7	59.3
NE 2004	Infinity CL	44.5	60.6
WB 2006	Smoky Hill	44.5	61.3
NE 2008	Camelot	43.8	60.9
KSU 2006	Fuller	43.5	61.1
CSU exp	CO03W043	43.4	60.2
OK 2006	Duster	43.3	60.6
WB 2006	Aspen	43.0	60.1
TX/A 2002	TAM 111	42.9	61.0
CSU 1998	Prairie Red	42.9	60.1
WB 2005	Keota	42.7	59.7
CSU 2004	Bond CL	42.6	60.2
KSU 1994	Jagger	42.6	59.9
CSU 1991	Yuma	42.4	60.9
CSU 1994	Akron	41.9	60.6
AP 2001	Jagalene	41.2	61.2
NE 2006	Overland	41.2	60.5
CSU exp	CO03W139	41.2	61.0
OK 2008	OK Rising	41.0	59.8
KSU 2005	Danby	40.9	62.4
OK exp	OK05737W	40.9	59.8
AP 2005	Postrock	40.8	60.9
NE 2002	Goodstreak	40.2	61.1
CSU exp	CO02W237	39.8	61.3
CSU 2002	Ankor	39.6	60.1
CSU exp	CO03W239	39.4	60.5
Average		43.5	60.6

¹Variety 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.

²Varieties ranked according to average yield in 2008.

Summary of 2-Yr and 3-Yr Dryland Variety Performance Results

2-Yr Average ¹			3-Yr Average ¹		
Variety ²	Yield	Test Weight	Variety ²	Yield	Test Weight
	2007-08	2007-08		2006-08	2006-08
	<u>bu/ac</u>	<u>lb/bu</u>		<u>bu/ac</u>	<u>lb/bu</u>
NuDakota	56.9	58.2	NuDakota	45.5	57.3
Hatcher	55.5	60.0	Hatcher	44.1	59.2
Hawken	53.4	59.5	Ripper	42.8	57.7
Fuller	52.8	59.6	Infinity CL	42.5	58.6
Ripper	52.6	58.3	Endurance	42.5	59.1
Endurance	52.4	59.7	Bill Brown	42.3	59.4
Smoky Hill	52.4	59.8	Keota	42.1	59.3
Infinity CL	52.3	59.3	Bond CL	41.6	57.9
Bill Brown	52.2	60.0	CO03W239	41.6	58.4
TAM 112	52.1	59.3	Jagger	41.5	58.5
Keota	51.9	59.9	Above	41.1	58.3
TAM 111	51.9	59.8	Yuma	41.1	58.7
Bond CL	51.8	59.0	TAM 111	41.0	59.4
Duster	51.8	60.0	Danby	40.3	60.9
Jagger	51.4	59.2	Trego	40.2	60.2
Above	51.2	58.8	Akron	39.7	58.6
Overland	50.9	59.3	Jagalene	39.6	59.7
Yuma	50.7	59.5	Ankor	39.1	58.1
CO03W239	50.6	59.3	Prairie Red	39.1	58.1
Danby	50.0	61.4	Postrock	39.0	59.5
Jagalene	49.4	60.4	Goodstreak	38.0	59.6
Trego	49.3	60.6	Average	41.2	58.9
Postrock	49.2	60.1			
Akron	48.7	59.1			
Prairie Red	48.5	58.6			
Ankor	47.5	58.7			
Goodstreak	44.9	60.2			
Average	51.2	59.5			

¹2-yr and 3-yr average yield and test weight are based on six 2008 trials, eleven 2007 trials, and eleven 2006 trials.

²Varieties ranked according to average 2-yr yield and according to average 3-yr yield.

2008 Collaborative On-Farm Test (COFT) Results

Much of Colorado's 2008 wheat acreage was planted to winter wheat varieties that have been tested in the COFT program which is in its 10th year of operation. In the fall of 2007, twenty-three eastern Colorado wheat producers planted COFT trials in Baca, Prowers, Kiowa, 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.

The objective of the 2008 COFT was to compare performance and adaptability of popular and newly-released CSU varieties (Hatcher, Ripper, and Bill Brown), and promising commercial varieties (Keota and NuDakota) 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 21 test results, the 2008 COFT results can be extremely useful to farmers making variety decisions. Grain yields of all five varieties in 2008, averaged over a wide range of agroclimatic conditions, were about the same, which is not overly surprising as all five varieties have passed through rigorous selection processes and were chosen because of strong performance records in Colorado dryland variety trials. Ripper and NuDakota proved to be statistically slightly higher yielding than Bill Brown, Hatcher, and Keota.

Both Ripper and NuDakota had significantly lower test weight than Bill Brown and Hatcher, which in turn, had lower test weight than Keota. Seemingly small differences in average test weight for different varieties resulted in remarkably large differences in the probability of obtaining at least 60 lb/bu test weight: Keota 57%, Bill Brown 49%, Hatcher 48%, Ripper 28%, and NuDakota 21%.

The largest differences in 2008 COFT yields were from farm to farm (three tests averaged below 10 bu/ac and four tests averaged above 60 bu/ac) which was indicative of highly variable climatic conditions. This variability resulted from wide differences in stand establishment due to dry seeding conditions, variable winter and spring moisture availability, duration of drought conditions, wind erosion, and hail. In 2008, farmers who practiced no-till farming were able to capture and keep more moisture in the soil. Yields from no-till fields were sometimes far superior to those from tilled fields.

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2008 Collaborative On-Farm Tests Results

County/Town	2008 Varieties										Test	
	Ripper		NuDakota		Bill Brown		Hatcher		Keota		Average	
	Yield bu/ac ¹	Test Wt lb/bu	Yield bu/ac ¹	Test Wt lb/bu	Yield bu/ac ¹	Test Wt lb/bu	Yield bu/ac ¹	Test Wt lb/bu	Yield bu/ac ¹	Test Wt lb/bu	Yield bu/ac ¹	Test Wt lb/bu
Adams/Bennett N.	39.5	58.3	35.4	55.5	31.7	57.8	29.4	57.6	33.0	58.5	33.8	57.5
Adams/Brighton E.	45.3	57.8	48.2	55.8	50.8	59.0	50.8	59.0	51.0	60.2	49.2	58.4
Adams/Last Chance	6.2	55.7	6.4	56.4	11.3	59.3	8.1	58.7	6.4	58.6	7.7	57.7
Baca/Walsh	5.2	55.8	4.7	55.7	4.8	58.2	2.7	56.3	4.5	57.9	4.4	56.8
Kiowa/Haswell	4.9	59.1	6.7	57.4	7.1	60.7	8.3	60.1	4.3	59.3	6.3	59.3
Kit Carson/Burlington	42.7	61.0	39.9	60.0	44.0	60.0	45.2	60.0	41.4	61.3	42.6	60.5
Kit Carson/Stratton	24.0	55.1	17.4	55.9	21.3	56.9	12.4	58.3	14.0	59.9	17.8	57.2
Logan/Fleming	46.6	61.0	42.3	60.6	45.7	63.2	39.9	62.4	37.9	62.8	42.5	62.0
Logan/Peetz	28.0	55.8	31.8	57.0	21.1	55.6	33.6	59.5	26.9	58.9	28.0	57.4
Logan/Sterling W.	21.7	59.4	24.3	58.9	17.9	60.3	18.9	60.2	21.8	60.9	20.9	59.9
Phillips/Haxtun S.	71.9	60.8	71.7	61.3	66.6	61.3	65.3	61.3	71.7	61.3	69.4	61.2
Phillips/Paoli	70.0	56.3	77.2	58.0	58.4	53.9	64.2	57.1	65.9	57.4	67.1	56.5
Prowers/Lamar	25.6	60.2	27.6	59.3	27.5	62.2	25.7	62.3	23.0	61.6	25.9	61.1
Prowers/Two Buttes	56.0	62.5	53.2	61.1	55.8	63.9	53.4	62.6	51.9	62.6	54.0	62.5
Washington/Akron	32.0	60.3	30.7	59.8	30.6	61.7	29.4	60.9	29.2	61.1	30.4	60.8
Washington/Woodlin	31.3	58.8	37.7	59.5	37.7	60.6	33.3	58.5	35.5	60.0	35.1	59.5
Washington/Woodrow	65.3	58.8	70.0	58.0	68.1	61.0	65.2	59.9	60.6	60.4	65.8	59.6
Washington/Yuma	64.5	61.0	67.5	60.3	58.1	60.0	61.0	59.9	62.8	59.5	62.8	60.1
Weld/Hudson E.	35.3	57.5	28.4	56.7	29.4	58.5	31.0	59.0	29.7	59.2	30.8	58.2
Weld/New Raymer	34.6	58.8	33.5	58.3	31.2	60.4	35.8	60.2	32.1	60.9	33.5	59.7
Weld/Nunn	30.1	58.8	28.2	57.8	29.8	61.0	27.9	61.1	26.3	61.1	28.5	60.0
Average yield	37.2	58.7	37.3	58.3	35.7	59.8	35.3	59.8	34.7	60.2	36.0	59.3

Significance Yield	a		a		b		b		b		a	
Significance Test Wt		c		d		b		b		a		

LSD_(0.30) for yield = 1.0 bu/ac LSD_(0.30) for test weight = 0.3 lb/bu

Comparison of Hatcher and Ripper Yield Performance in 2-yr Combined COFT (2007 & 2008, 43 tests)

Avg Hatcher yield	41.1	bu/ac	
Avg Ripper yield	40.1	bu/ac	LSD _(0.30) is 1.05 bu/ac which indicates no significant difference in yield between Hatcher and Ripper

¹Yield corrected to 12% moisture

Summary of 2008 Irrigated Variety Performance Results

Origin ¹ Release Year	Variety ²	Yield 2008	Test Weight 2008	Heading days different from trial average at Ft. Collins ³	Lodging Haxtun 2008
		<u>bu/ac</u>	<u>lb/bu</u>	<u>days +/- ave</u>	<u>1-9⁴</u>
AP 2005	NuDakota	99.5	60.3	-1	5
CSU exp	CO03W239	97.3	60.2	0	3
CSU exp	CO04393	95.3	61.0	1	8
CSU exp	CO04W210	94.9	60.5	0	9
AP 2001	Jagalene	94.8	61.2	1	7
CSU exp	CO04W320	94.8	61.5	0	6
CSU 2004	Bond CL	93.1	58.4	-1	7
CSU 1991	Yuma	91.7	60.1	1	7
WB 2005	Keota	91.4	60.2	1	9
CSU 2004	Hatcher	91.3	60.5	2	8
OK 2008	Ok Rising	91.2	60.7	0	2
CSU exp	CO04551	91.2	60.1	-2	6
CSU exp	CO04W369	91.2	59.8	1	6
CSU 1998	Prairie Red	91.1	60.1	-2	7
TX/A 2002	TAM 111	91.0	61.1	2	6
AP 2006	Hawken	90.6	60.8	-2	7
CSU exp	CO04W323	90.6	61.1	0	6
CSU exp	CO04575	89.6	61.5	-2	9
CSU exp	CO03W054	88.6	60.2	1	9
CSU exp	CO02W237	88.2	61.3	1	8
OK exp	OK05737W	87.9	60.4	0	6
CSU exp	CO04025	87.0	59.9	-1	9
CSU 2007	Bill Brown	86.9	60.0	0	7
CSU exp	CO04499	85.4	61.1	-1	8
CSU exp	CO03W139	85.0	60.6	0	8
CSU exp	CO04448	84.1	60.3	2	7
NE 2008	Anton	84.0	62.0	1	1
CSU exp	CO04549	82.7	60.8	-3	9
WB 2006	Aspen	82.6	58.4	-1	8
TX/W 2005	TAM 112	82.5	62.2	-2	9
CSU exp	CO03064	82.1	59.2	2	8
NE 2008	Camelot	81.0	60.6	-2	9
	Average	89.3	60.5	0	7

¹Variety 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; OK=Oklahoma State University.

²Varieties ranked according to average yield in 2008.

³Negative differences indicate heading before trial average heading date, positive differences indicate later than trial average.

⁴Lodging score: 1=completely erect, 9=completely lodged.

Summary of 2-Yr and 3-Yr Irrigated Variety Performance Results

2-Yr Average ¹			3-Yr Average ¹		
Variety ²	Yield 2007-08	Test Weight 2007-08	Variety ²	Yield 2006-08	Test Weight 2006-08
	<u>bu/ac</u>	<u>lb/bu</u>		<u>bu/ac</u>	<u>lb/bu</u>
NuDakota	97.1	59.0	Bond CL	89.3	58.1
CO03W239	94.4	59.7	NuDakota	87.9	57.7
Bond CL	94.3	59.1	TAM 111	87.6	60.0
Yuma	92.9	59.5	Bill Brown	87.6	59.7
Bill Brown	91.3	60.0	Keota	86.7	59.6
TAM 112	91.0	61.5	Yuma	85.9	59.0
Hatcher	90.4	60.3	CO03W239	85.8	59.1
Jagalene	90.2	60.5	Jagalene	84.0	60.0
TAM 111	89.0	60.4	Hatcher	83.9	59.7
Keota	88.5	60.1	<u>Prairie Red</u>	<u>79.8</u>	<u>59.3</u>
Hawken	88.3	60.3	Average	85.9	59.2
Prairie Red	84.1	59.6			
Aspen	81.8	58.5			

¹2-yr and 3-yr average yield and test weight are based on three 2008 trials, three 2007 trials, and three 2006 trials.

²Varieties ranked according to average 2-yr yield and according to average 3-yr yield.

Winter Wheat Variety Selection in Colorado for Fall 2008

Choosing a variety is a personal decision made by every farmer for every field before planting every year. Variety performance summary tables from CSU are intended to provide reliable and unbiased information to farmers, seed producers, and wheat industry representatives. 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 consider multiple-year summary yield results

- Over time the best buffer against making bad 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.
- Our testing system is designed to predict variety performance of one variety relative to performance of other varieties but not to predict actual expected differences in grain yield. It is designed to provide relative variety performance information for the whole state so an individual farmer should not expect to have the exact same results on their farms each year.
- It is really not possible to predict the general or region-specific climatic conditions for next year and in some years trials are able to predict relative variety performance with more precision than in other years.
- Yield is difficult to measure exactly, and to predict, compared to other traits like test weight, protein content, height, disease tolerance or resistance and insect resistance.

Producers should not use yield as the sole criteria for variety selection

- Wheat is part of a cropping and livestock system and non-yield traits may be more important to individual farmers than yield, because each farmer has a different combination of crop rotation, tillage system, risk of wheat pests, expected rainfall, manure, residue, etc. Non-yield traits that might complement individual Colorado cropping systems include maturity, plant height, test weight, lodging, herbicide tolerance, disease resistance, insect resistance and wheat quality for milling and baking.
- Non-yield traits that are meaningful to your farm are useful to spread your risk due to the unpredictability of next year's climatic conditions and pest problems, or especially if two varieties under consideration are expected to be about equal yielding.
- Variety selection can be constrained by practical considerations like seed availability and the timing of seed delivery.
- All varieties available for planting this fall are susceptible to prevalent races of RWA and thus resistance to the original RWA biotype should not be a consideration for fall of 2008.

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, specific traits they possess, and whether they were planted on a significant number of acres in Colorado this last fall. Only six of eleven 2008 dryland trials are included in the three-year summary, so three-year variety averages depend more upon 2006 (eleven trials included) and 2007 (eleven trials included). Hard red (HRW), hard white (HWW), and

Clearfield* varieties are identified as such but listed together by their yield performance rank in the three year UVPT summary table. We recognize that HWW varieties, and to some degree, Clearfield* varieties, will need to be competitive with HRW varieties for yield and other non-yield traits in order to gain acceptance by Colorado farmers.

Dryland winter wheat varieties to consider

NuDakota (HWW) – A medium-maturity 2005 Agripro hard white wheat (HWW) variety that has high yield, excellent resistance to both leaf and stripe rust, but is a shorter variety and has low test weight. NuDakota has not yet been planted on many Colorado acres.

Hatcher – This medium maturing, high yielding 2004 CSU HRW variety was planted on more Colorado wheat acres in Fall 2007 than any other variety. It has good stress tolerance, good test weight and resistance to stripe rust but is a shorter variety.

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 low test weight, and is susceptible to both leaf and stripe rust. Certified seed will be available for planting this fall for the first time.

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.

Bill Brown – The latest CSU HRW release (2007) can be compared to Hatcher and Ripper: It is earlier maturing than 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. It has superior test weight to Hatcher and other varieties, especially Ripper (low). It has better baking quality than Hatcher but not quite as good as Ripper. Certified seed will be available for planting in fall 2009.

Bond CL – A medium maturing taller HRW CSU release (2004) with high yields and good baking quality in addition to the Clearfield* trait. It has lower test weight and is susceptible to stripe rust and wheat streak mosaic virus. It was planted on 2% of Colorado's acres last year and we expect it to become increasingly popular, especially under irrigation where it has been tough to beat.

Above – This HRW (2001) release and Ripper are the earliest maturing varieties on this list. In addition to the Clearfield* trait it is the same height as Ripper and has better test weight than Ripper but has not yielded as well as Ripper and Hatcher. It is susceptible to leaf and stripe rust and has low baking quality. It was planted on 5% of Colorado acreage in 2007 and 2008 but may become less popular as Bond CL becomes more widely adopted.

TAM 111 – A later maturing HRW variety released in 2002 by Texas A&M University marketed by AgriPro. It has yielded less than Ripper and Hatcher in Colorado trials but is as tall as Ripper with good stripe rust resistance and better test weight. Grown on 9% of Colorado acres last year.

Danby (HWW) – A KSU 2005 release is a later maturing variety with good test weight, good stripe rust resistance, and good sprout tolerance. It was planted on more than 1% of Colorado acreage in fall 2007.

Jagalene – HRW has been a popular variety to plant in Colorado although Jagalene acreage decreased by 3% last fall. Yield performance has dropped as well over time and it has a tendency to shatter but it has excellent test weight and good resistance to stripe rust.

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

Hawken – A HRW 2006 early maturing release from AgriPro with high yields, good test weight, and good leaf and stripe rust resistance.

TAM 112 - A HRW 2005 release from Texas A&M and marketed by Watley Seed Company was planted on 2% of Colorado acreage last year, concentrated in Baca and Prowers counties. It 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.

Irrigated winter wheat varieties to consider

The most important variety selection criteria for irrigated varieties are yield, straw strength, and stripe rust resistance. Varieties to consider are ranked by performance in the IVPT trials in the 3-yr summary. Note that all of the varieties listed below for consideration as irrigated varieties have been listed for consideration as dryland varieties above.

Bond CL – highest yielding irrigated variety. Low test weight is more manageable and less of a concern in irrigated conditions. It has average straw strength but lodged significantly in the high yielding IVPT trial at Haxtun this year. It is susceptible to stripe rust.

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.

TAM 111 – high yielding irrigated variety with good straw strength, excellent resistance to stripe rust, and good test weight.

Bill Brown – high yielding irrigated variety with good straw strength, good resistance to leaf and stripe rust, and good test weight.

2008 Climatic Conditions and Specific Trial Comments

Very lush summer 2007. High risk of green bridge problems. Very dry, warm fall – 70 degree days common into November. Poor stands reported in many areas in the fall with stands going backwards due to dry fall. Early December wet snows across NE Colorado but missed SE Colorado. Dry spring, not too warm though in March. Excellent rains in early April with snow also across NE Colorado and temperatures still very cool. Still relatively cool through the end of April. Freezes in early May might have caused some damage, particularly with early planted wheat in the southeast. Temperatures started to get hot in mid-May, wheat was mid-joint in the northeast and late boot in the southeast. Still stayed dry from early to mid-late May. Drought stress at Fort Collins due to irrigation problems came on between late-joint and early-boot which coincided with warmer temperatures (high 80's). Nice rains across northeast in early June and stayed relatively cool after that. Leaf rust found virtually everywhere by mid-June, but only at trace levels. Stripe rust much less widespread, but it was found at some locations at trace levels. Stem rust prevalent in irrigated and high-yielding dryland fields mostly in northeast Colorado. Brown wheat mite damage severe in southeast Colorado but much less in northeast Colorado. Russian wheat aphid damage at Rocky Ford in mid-May. Bird cherry-oat aphid populations higher than normal, but no visible barley yellow dwarf virus effects observed. Wheat streak mosaic virus damaging in northeast Colorado production fields.

Specific comments on individual 2008 dryland trials

Akron – good fall stand establishment, adequate winter moisture and good spring moisture conditions. Minor damage from two early May freezes. Noticeable drought stress symptoms by late May relieved by excellent rains in early June. Mild temperatures throughout grain filling. Stripe rust and leaf rust both present at very low levels.

Arapahoe – marginal fall planting moisture, some stand problems due to poor emergence. Decent fall subsoil moisture. Adequate winter and early spring moisture. Significant drought stress symptoms developed by mid-May.

Burlington – excellent fall stand establishment, lush fall growth but minimal winter moisture and severe drought stress symptoms noted by late March. Minimal spring rains and continued drought stress into early-May reduced plant height. Some damage from early May freezes. Excellent early June rains and mild temperatures throughout grain filling. Trace levels of leaf rust.

Genoa – good fall stand establishment and growth, adequate winter and early spring precipitation. Noticeable winter injury/desiccation on some entries and probably compounded by dry late spring. Marginal spring rains led to noticeable height reduction by late-May and significant drought stress symptoms by mid-June.

Julesburg - good fall stand establishment, adequate winter moisture conditions. Bird cherry-oat aphid infestation in the fall but no barley yellow dwarf virus noted in the spring. Excellent early and late spring precipitation. Leaf rust at moderate levels by mid-June. Stem rust a negative factor in very susceptible entries. Good moisture and mild temperatures during grain filling. Some lodging noted.

Orchard – good fall establishment and growth. Good snow cover during winter followed by good early spring moisture. Good topsoil moisture and relatively lush growth in mid-April. Dry

spring led to significant drought stress developing by early May. Brown wheat mite populations heavy. Continued lack of moisture in mid-May, significant drought stress symptoms quite evident.

Sheridan Lake – decent fall stand establishment, fairly dry winter, severe brown wheat mite infestation by early March (dimethoate applied mid-March). Damaging hail storm (with good moisture) on April 23rd affected earlier entries more than later maturing entries. Early May freezes caused damage to later maturing entries and significant drought stress continued into late May. Much freeze damage evident by early June. No leaf or stripe rust found.

Yuma – good fall stand establishment and growth, good early spring moisture, very lush growth by mid-April. Spotty stands in places. Some minor drought stress symptoms developed by early May with lower leaf die back. No evidence of freeze damage from early May freezes. Plentiful late May rains. Damaging hail (50-70% damage estimated) in early June had a greater affect on later maturing entries (with exceptions). Leaf rust found at trace levels by mid-June, stem rust at trace levels by early July.

Specific comments on individual 2008 irrigated trials

Fort Collins - good fall stand establishment with sprinkler irrigation, good winter moisture, lush growth in the spring. Inadequate irrigation due to system malfunctions in early May led to severe drought stress symptoms that were quite evident by mid-May. Much needed moisture arrived on May 22 but irrigation system was totally destroyed by the accompanying tornado. Plot finished on one good rain in early June. Mild temperatures throughout grain filling, no disease noted.

Haxtun – good stand establishment and spring tillering. Plots extremely lush by late May with severe lodging by early July. No leaf or stripe rust found due to fungicide application. Stem rust came in late and was severe on very susceptible entries.

Rocky Ford – excellent stand establishment and lush in early spring. Very high plant populations. Russian wheat aphids severe enough to treat (mid-May). Likely damage from early May freezes, though not visually evident. The damage was due to floret sterility in the head (i.e., reduced kernel number). Evidence of barley yellow dwarf virus evident, with firing/yellowing of some leaves, but it was not severe. No Bird cherry-oat aphids or greenbug found. Minor lodging noted in only a few plots.

Description of winter wheat varieties in eastern trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	WH	SR	LR	WSMV	TW	MILL	BAKE	Comments
Above Hard red winter TAM 110*4/FS2	CSU-TX 2001	S	3	4	3	7	4	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*	6	5	3	5	3	8	9	9	5	6	5	CSU release (2002). Backcross derivative of Akron with slightly higher grain yield under dryland conditions and improved straw strength. Leaf and stripe rust susceptible.
Anton Hard white winter WA691213-27/N86L177//Platte	NE-USDA 2008	S	6	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
Aspen Hard white winter TAM 302/B1551W	Westbred 2006	S	4	2	1	6	--	4	2	5	7	6	6	Westbred release (2006). Hard white winter wheat (HWW), excellent 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	5	5	4	5	4	8	8	5	2	2	5	CSU release (2001). Hard white winter wheat (HWW), sister selection to Trego. High test weight, excellent dryland yield in CO and Western KS. Leaf and stripe rust susceptible.
Bill Brown Hard red winter Yumar/Arlin	CSU 2007	R*	4	4	3	2	5	4	2	6	2	4	3	CSU release (2007). Excellent 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*	5	5	4	5	4	8	5	8	7	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.
Camelot Hard red winter KS91H184/Arlin SIB//KS91HW29/3/NE82761/Redland/4/VBF0168	NE 2008	S	4	7	7	6	--	--	2	--	5	6	6	Nebraska release (2008). Medium-early, taller. Good leaf rust resistance. First entered in CSU dryland trials in 2008.
CO03W239 Hard white winter KS01-5539/CO99W165	CSU EXP	R*	5	4	3	5	5	3	5	4	5	5	2	CSU release fall 2008 (to be named). Hard white Clearfield* wheat. Excellent dryland yield in CO, excellent baking quality, moderate resistance to stripe rust and wheat streak mosaic virus, moderate sprout susceptibility.
Danby Hard white winter TREGO/JGR 8W	KSU 2005	S	6	4	5	4	4	4	5	5	2	2	7	KSU-Hays release (2005). Hard white wheat (HWW), similar to Trego, with improved stripe rust resistance and preharvest sprouting tolerance.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter potential (SH), coleoptile length (COL), winterhardiness (WH), stripe rust resistance (SR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), protein content (PC), milling quality (MILL), and baking quality (BAKE). Rating scale: 0 - very good, very early, or very short to 9 - very poor, 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 biotype of RWA

Description of winter wheat varieties in eastern trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	WH	SR	LR	WSMV	TW	MILL	BAKE	Comments
Duster Hard red winter WO405D/HGF112/W7469C/HCF012	OK 2006	S	6	5	--	2	--	8	2	7	5	3	5	Oklahoma State release (2006). Good yield performance in western Plains breeder trials, first tested in CSU trials in 2007. Leaf rust resistant, stripe rust susceptible.
Endurance Hard red winter HBY756A/Siouxland//2180	OK 2004	S	5	5	2	5	4	7	2	--	4	5	5	Oklahoma State release (2004). Dual-purpose (grain and grazing) wheat, excellent re-growth following grazing. Moderately susceptible to stripe rust, resistant to leaf rust. Good performance in CSU dryland trials.
Fuller Hard red winter Bulk selection (Jagger type)	KSU 2006	S	5	2	--	4	--	2	2	5	4	6	5	KSU-Manhattan release (2006). First tested in CSU trials in 2007. Average test weight, good leaf and stripe rust resistance.
Goodstreak Hard red winter SD3055/KS88H164//NE89646 (=COLT*2/PATRIZANKA)	NE 2002	S	7	8	3	9	5	5	5	8	3	2	8	Nebraska release (2002). Tall, long coleoptile, medium-late maturing. Good test weight, marginal baking quality.
Hatcher Hard red winter Yuma/PI 372129//TAM-200/3/4*Yuma/4/KS91H184/Vista	CSU 2004	R*	5	3	5	5	4	4	8	8	4	2	4	CSU release (2004). Medium maturing semidwarf. Good test weight, good stripe rust resistance, leaf rust susceptible. Excellent dryland and irrigated yield across the High Plains, good milling and baking quality.
Hawken Hard red winter Rowdy/W96-427	Agripro 2006	S	3	4	2	5	--	2	4	7	3	5	6	Agripro release (2006). Targeted for northeast Colorado and further north, first tested in CSU trials in 2007. Good yields in 2007 and 2008, average test weights. Good leaf and stripe rust resistance.
Infinity CL Hard red winter Windstar/3/NE94481//TXGH125888-120*4/FS2	NE 2004	S	6	5	4	6	2	4	3	--	4	--	--	Nebraska release (2005). Clearfield* winter wheat. Good dryland yield in CSU trials, better baking quality than Above.
Jagalene Hard red winter Abilene/Jagger	Agripro 2001	S	5	4	2	4	3	3	9	4	3	2	5	Agripro release (2001). Good test weight, good stripe rust resistance. Good dryland and irrigated yield in CO, has been observed to shatter in CO and KS trials. Very leaf rust susceptible.
Jagger Hard red winter KS82W418/Stephens	KSU 1994	S	2	5	5	5	8	2	9	4	5	5	3	KSU-Manhattan release (1994). Early maturing semidwarf, excellent baking quality, good WSMV tolerance and stripe rust resistance, very leaf rust susceptible. Breaks dormancy very early in the spring.
Keota Hard red winter Custer/Jagger	Westbred 2005	S	6	6	4	5	5	2	9	5	5	6	6	Westbred release (2005). First tested in CSU trials in 2005. Good stripe rust resistance, leaf rust susceptible. Good dryland yields in CSU trials. Slightly taller plant stature, maintains height under stress.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter potential (SH), coleoptile length (COL), winterhardiness (WH), stripe rust resistance (SR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), protein content (PC), milling quality (MILL), and baking quality (BAKE). Rating scale: 0 - very good, very early, or very short to 9 - very poor, 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 biotype of RWA

Description of winter wheat varieties in eastern trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	WH	SR	LR	WSMV	TW	MILL	BAKE	Comments
NuDakota Hard white winter Jagger/Romanian	Agripro 2005	S	5	3	3	4	3	2	2	4	8	7	5	Agripro release (2005). Hard white wheat (HWW), excellent dryland yield record in CSU dryland trials, low test weight. Good leaf and stripe rust resistance. Moderate sprouting susceptibility.
OK Rising Hard white winter KS96WGRC39/Jagger	OK 2008	S	4	5	1	3	--	3	4	--	5	2	2	Oklahoma State release (2008). Hard white reselection from OK Bullet. Excellent straw strength and quality, first entered in CSU dryland and irrigated trials in 2008.
Overland Hard red winter Millennium 'S'/ND8974	NE 2006	S	6	7	--	5	--	3	2	--	6	5	8	Nebraska release (2006) as "Husker Genetics Brand Overland", tested in NE trials as NE01643. First tested in CSU trials in 2007. Moderate stripe rust resistance, good leaf rust resistance. Poor baking quality.
Postrock Hard red winter Ogallala/KSU94U261//Jagger	Agripro 2005	S	4	4	3	5	5	2	2	4	3	3	4	Agripro release (2005), first tested in CSU trials in 2006. Good leaf and stripe rust resistance, good test weight. Below average yields in CSU dryland variety trials.
Prairie Red Hard red winter CO850034/PI372129//5*TAM 107	CSU 1998	R*	3	3	3	6	4	9	9	5	6	4	7	CSU release (1998). Backcross derivative of TAM 107. Excellent stress tolerance, poor end-use quality reputation.
Ripper Hard red winter CO940606 (PI 220127/P5//TAM-200/KS87H66)/TAM107R-2	CSU 2006	R*	3	4	3	7	4	9	9	7	6	2	2	CSU release (2006). Excellent stress tolerance, high dryland yields in CO, excellent milling and baking quality. Leaf and stripe rust susceptible, lower test weights. Resistant to Ug-99 race of stem rust from Africa.
RonL Hard white winter Trego/CO960293	KSU 2006	S	6	2	--	4	--	7	9	2	2	2	2	KSU-Hays release (2006). Hard white wheat (HWW), first tested in CSU trials in 2006. High test weight, excellent resistance to wheat streak mosaic virus. Very drought susceptible.
Settler CL Hard red winter N95L164/3/MILLENNIUM SIB//TXGH125888-120*4/FS2	NE 2008	S	5	4	--	6	--	--	4	--	5	4	6	Nebraska release (2008). Clearfield* winter wheat. First entered in CSU dryland trials in 2008.
Smoky Hill Hard red winter 97 8/64 MASA	Westbred 2006	S	6	2	--	4	--	2	2	8	5	5	2	Westbred release (2006). First tested in CSU trials in 2007. Good yield in 2007 CO dryland trials, average test weight. Good leaf and stripe rust resistance.
TAM 111 Hard red winter TAM-107//TX78V3630/CTK78/3/TX87V1233	TX 2002	S	6	6	3	6	5	2	9	5	3	3	4	Texas A&M release (2002), marketed by Agripro. High test weight, good straw strength, good milling and baking quality characteristics. Leaf rust susceptible, good stripe rust resistance. Best adapted to irrigated production conditions.

Russian wheat aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter potential (SH), coleoptile length (COL), winterhardiness (WH), stripe rust resistance (SR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), protein content (PC), milling quality (MILL), and baking quality (BAKE). Rating scale: 0 - very good, very early, or very short to 9 - very poor, 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 biotype of RWA

Description of winter wheat varieties in eastern trials.

Name, Class, and Pedigree	Origin	RWA*	HD	HT	SS	COL	WH	SR	LR	WSMV	TW	MILL	BAKE	Comments
TAM 112 Hard red winter U1254-7-9-2-1/TXGH10440	TX 2005	S	4	5	7	7	--	9	9	2	3	6	6	Texas A&M release (2005), marketed by Watley Seed. Good dryland performance in Western KS trials, first tested in CSU trials in 2007. Susceptible to leaf and stripe rust, very good WSMV tolerance.
Trego Hard white winter KS87H325/Rio Blanco	KSU 1999	S	6	3	4	5	4	8	9	5	2	2	6	KSU release (1999). Hard white winter wheat (HWW), medium-late maturity, semidwarf, high test weight. Susceptible to both leaf and stripe rust.
Winterhawk Hard red winter 474S10-1/X87807-26//HBK0736-3	Westbred 2007	S	4	5	--	--	--	--	5	5	2	2	4	Westbred release (2007). First tested in CSU dryland trials in 2008. Good yield and test weight in western Plains in regional breeder trials. Good leaf rust resistance.
Yuma Hard red winter NS14/NS25//2*Vona	CSU 1991	S	5	3	3	2	4	6	4	6	5	7	3	CSU release (1991). Medium maturity, semidwarf, 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), shatter potential (SH), coleoptile length (COL), winterhardiness (WH), stripe rust resistance (SR), leaf rust resistance (LR), wheat streak mosaic virus tolerance (WSMV), test weight (TW), protein content (PC), milling quality (MILL), and baking quality (BAKE). Rating scale: 0 - very good, very early, or very short to 9 - very poor, 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 biotype of RWA

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Wheat Information Resources on the Web:

Colorado Wheat Breeding and Genetics Program (Scott Haley.) New Wheat Varieties. Colorado Wheat Variety Performance Database. Information Resources. <http://wheat.colostate.edu/>

CSU Crops Testing. Variety Performance results for wheat, corn, sunflower, dry beans, soybeans, and oilseeds. www.csucrops.com

Colorado Wheat Administrative Committee (CWAC), Colorado Association of Wheat Growers (CAWG), and Colorado Wheat Research Foundation (CWRF) website. www.coloradowheat.org

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