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Colorado State University

Knowledge to Go Places

Agricultural Experiment Station

College of Agricultural Sciences

Department of Soil and Crop Sciences

Cooperative Extension

MAKING BETTER DECISIONS

2004 Colorado Winter Wheat Variety Performance Trials

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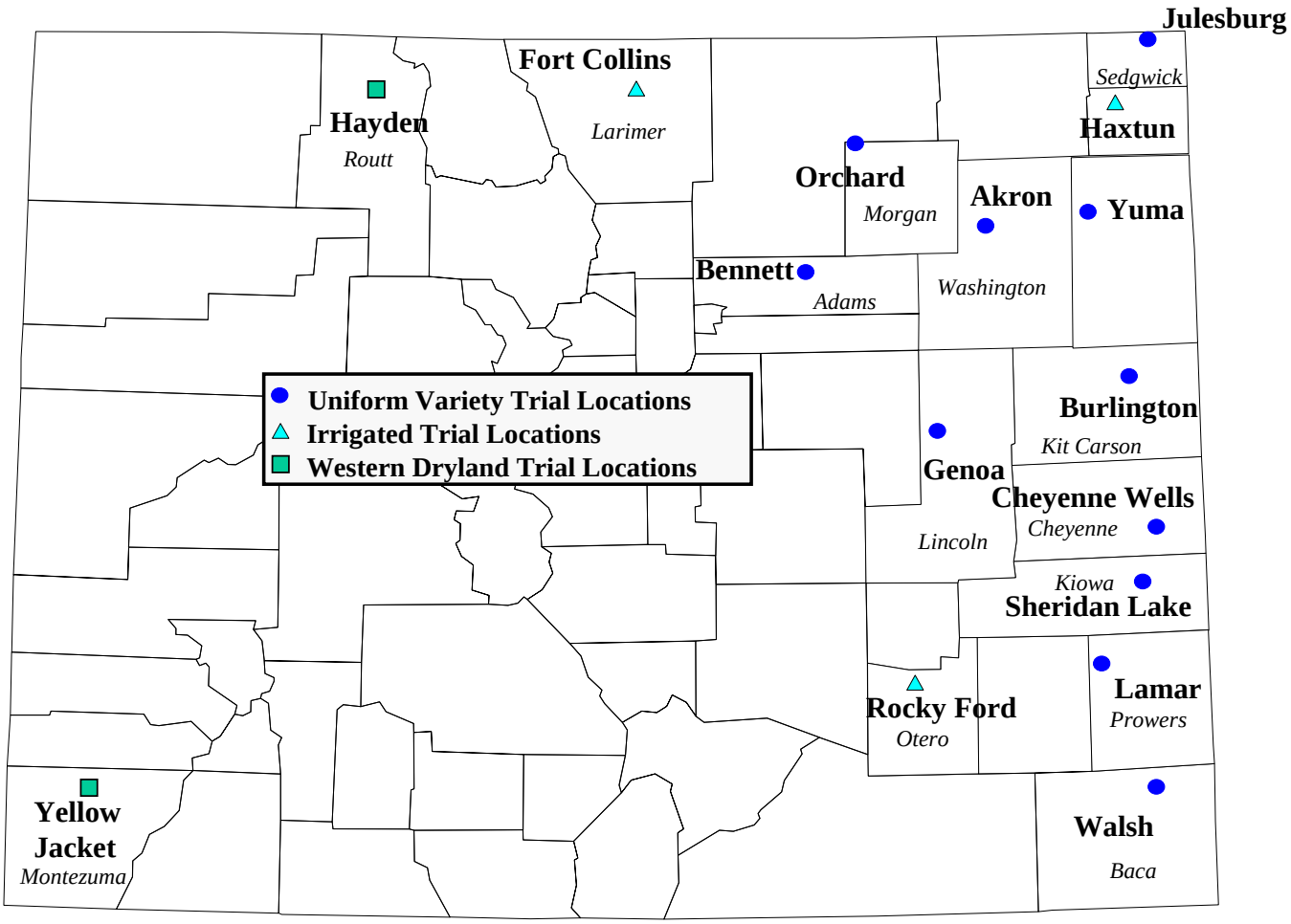
2004 Wheat
Variety Performance Trials



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EASTERN COLORADO WINTER WHEAT VARIETY PERFORMANCE TRIALS

Introduction

Making Better Decisions is a publication of Colorado State University. We are committed to providing the best information, in an appealing form, and in the timeliest manner to Colorado wheat producers. Colorado State University conducts variety performance trials to obtain unbiased and reliable information for Colorado wheat producers to make better variety decisions.

Immediately after harvest, and prior to fall planting, CSU's Crops Testing program publishes current trial results in different media forms:

1) Results are published in CWAC's *Wheat Farmer.*
2) Variety trial results are available on the Crops Testing Internet page www.csucrops.com.
3) Results are published in *From the Ground Up*, a Soil and Crop Science Extension publication.
4) E-mail copies of results are sent to Cooperative Extension agents and producers who request them.
5) Results are incorporated into the Colorado wheat variety performance database http://wheat.colostate.edu/vpt.html/.

Trial Conditions and Methods - 2003/04

Colorado State University, with the support and cooperation of the Colorado wheat industry, conducts annual dryland (UVPT) and irrigated (IVPT) variety performance trials to obtain unbiased and reliable information for Colorado wheat producers to make better wheat variety decisions. Good variety decisions can save Colorado wheat producers millions of dollars each year.

The 2004 dryland UVPT was comprised of 46 entries grown at 11 locations. Of the 46 entries in this trial, 29 were named varieties and 17 were experimental lines. In addition to CSU varieties and experimental lines, the trial included public varieties from Nebraska, Kansas, and Texas, and private varieties from General Mills, AgriPro, and Trio Research Inc. A randomized complete block design with three replicates was used in all trials. Dryland trials were seeded at 600,000 seeds per acre, planted in 9 inch-spaced rows at Akron, Burlington, and Julesburg, 12 inch-space rows at Walsh, and 10 inch-spaced rows at the other locations.

The irrigated IVPT was conducted at Rocky Ford, Haxtun, and Fort Collins. The irrigated trials are managed for maximum yield and are seeded at 1.2 million seeds per acre with fertilization and water management necessary to obtain or exceed 100 bushels per acre. The Haxtun and Fort Collins trials were grown under sprinkler irrigation and the Rocky Ford trial was furrow-irrigated. The Haxtun and Rocky Ford trials are seeded in eight rows on 7-inch spacing while the Fort Collins trial is seeded in six rows on 9-inch spacing. Both the Haxtun and Rocky Ford trials provided excellent results while the Fort Collins location was compromised due to irrigation management problems on a farm recently acquired by the research station.

Dryland planting conditions in fall of 2003 were generally poor due to dry soil conditions. These conditions led to extremely narrow planting windows at most locations to plant and obtain good stands. Inadequate fall and winter precipitation was followed by a dry spring (with the exception of some timely rains in April) and moderate drought stress conditions at many locations. The spring drought was aggravated by very short sub-soil moisture conditions. Uneven and incomplete

fall emergence was observed at Lamar, Cheyenne Wells, Genoa, and Orchard and led to these trials being abandoned (Genoa and Orchard) or yield data that were too variable to be useful for variety comparisons (Lamar and Cheyenne Wells). The trial at Walsh was lost to severe hail damage on the eve of harvest and the trial at Burlington was lost to spring drought and a severe spring freeze at flowering in mid-May. Rains beginning during the third week in June and continuing into early July provided very moderate temperatures during grain filling as well as leading to serious weed pressure in trials and production fields alike. The rain made it difficult to get into fields for harvest and led to reports of sprouting in both hard white and hard red varieties.

Russian wheat aphid pressure was high again this year, especially in east-central and southeastern Colorado. The new Russian wheat aphid biotypes overcome the resistance in all RWA-resistant varieties released to date. These new biotypes were found throughout eastern Colorado in 2004 in conjunction with the original RWA biotype. Recent findings suggesting that additional biotypes may be present in Colorado and other areas of the Great Plains could present formidable challenges to our entomology and wheat breeding programs. Wheat steak mosaic virus and high plains disease were not problematic in 2004 while barley yellow dwarf virus, due to high greenbug infestation levels, was observed at the IVPT at Rocky Ford. Both leaf rust and stripe rust were identified in late-maturing wheat (due to poor stands) at some locations but infestations were generally very light and too late in the grain filling period to cause significant damage.

Table 1. 2004 Wheat Variety Trial Information by Location.

Locations	Date of Planting 2003	Date of Harvest 2004	Soil Texture	Fertilization (lb/ac)		Type of Irrigation
				Nitrogen N	Phosphorus P_2O_5	
Uniform						
Akron	9/22/03	7/06/04	Silty Clay	66	20	None
Bennett	9/09/03	7/06/04	Sandy Clay	43	18	None
Julesburg	9/17/03	7/08/04	Clay Loam	56	20	None
Sheridan Lake	9/10/03	7/03/04	Sandy Loam	56	18	None
Yuma	9/16/03	7/07/04	Silty Clay Loam	6	18	None
Irrigated						
Haxtun	9/24/03	7/14/04	Loamy Sand	175	75	Sprinkler
Rocky Ford	10/01/03	7/03/04	Clay Loam	118	75	Furrow

Description of winter wheat varieties in the 2004 Variety Trials.

Name and Pedigree	Origin/Class	RWA	HD	HT	SS	ST	COL	WH	SR	LR	WSMV	TW	PC	MILL	BAKE	COMMENT
Above TAM 110*4/FS2	CSU-TX 2001 Hard red winter	S	3	2	3	3	8	4	8	9	5	6	6	4	7	*Clearfield** winter wheat developed cooperatively by CSU and Texas A&M-Amarillo. White chaff, early maturing semidwarf. Excellent dryland and irrigated performance record in Colorado. Marginal baking quality characteristics.
Akron TAM 107/Hail	CSU 1994 Hard red winter	S	5	5	6	3	8	3	8	8	9	6	2	7	6	Semidwarf, medium-early maturity, vigorous growth pattern, closes canopy early in spring and competes well with weeds. Good dryland performance record in Colorado.
Alliance Arkan/Colt//Chisholm sib	NEB 1993 Hard red winter	S	5	5	5	4	4	2	5	8	9	4	9	6	7	Medium-early maturing semidwarf, short coleoptile, above average tolerance to root rot and crown rot. Good dryland performance record in Colorado.
Ankor Akron/Halt//4*Akron	CSU 2002 Hard red winter	R*	5	5	4	3	7	3	8	8	9	6	3	6	5	Russian wheat aphid resistant derivative of Akron, though with higher yield in 2002-2004 dryland trials. Semidwarf, medium-early maturity, vigorous growth pattern, closes canopy early in spring and competes well with weeds.
Antelope Pronghorn/Arlin	NEB 2002 Hard white winter	S	5	6	2	--	3	3	2	7	8	5	1	7	7	Hard white winter wheat (HWW) released by USDA-ARS breeding program in Nebraska. Medium height, medium-late maturity. Excellent straw strength, good stripe rust resistance, good irrigated performance record in Colorado.
AP502 CL TXGH12588-26*4/FS2	AgriPro 2001 Hard red winter	S	2	1	4	3	8	3	8	9	5	7	7	7	7	*Clearfield** winter wheat marketed by AgriPro. Red chaff, early maturing, semidwarf. Low test weight relative to TAM 110 and Above. Marginal milling and baking quality.
Arrowsmith KS87809-10/Arapahoe	NEB 2002 Hard white winter	S	7	8	5	--	7	3	2	4	8	2	1	4	5	Hard white winter wheat (HWW) released by USDA-ARS breeding program in Nebraska. Tall, medium-late maturity. First entered in Colorado Dryland Trials (UVPT) in 2004.
Avalanche KS87H325/Rio Blanco	CSU 2001 Hard white winter	S	5	5	4	3	5	4	8	6	5	1	4	2	5	Hard white winter wheat (HWW), sister selection to Trego HWW. Two days earlier than Trego in Colorado. High test weight, good stand establishment and fall growth. Good dryland performance record in Colorado and Kansas.
Bond CL Yumar//TXGH12588-120*4/FS2	CSU 2004 Hard red winter	R*	5	5	3	2	6	4	6	7	8	8	7	7	3	*Clearfield** winter wheat developed by CSU. Slightly later maturity and slightly taller than Above. Resistant to RWA biotype 1. Low test weight and low protein content, excellent baking quality.
Dumas WI90-425//N84-0758//WI81-297-3	AgriPro 2000 Hard red winter	S	5	4	1	--	2	4	6	6	7	3	7	1	6	Developed and marketed by AgriPro. Medium-height, medium-maturity. Targeted for irrigated production in the western Great Plains. Excellent straw strength and test weight.
Endurance HBY756A/Siouxland//2180	OK 2004 Hard red winter	S	5	5	--	--	8	--	3	4	--	--	--	5	5	Oklahoma State University release (2004). Dual-purpose wheat, excellent re-growth following grazing. First entered in Colorado Dryland Variety Trials (UVPT) in 2005.
Enhancer 1992 Nebraska Bulk Selection	Westbred 1998 Hard red winter	S	5	5	8	4	3	5	3	8	6	5	4	7	6	Developed and marketed by Westbred. Medium height and medium maturity. Good fall growth, good stripe rust resistance. Poor straw strength and test weight.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter (ST), Coleoptile length (COL), winterhardiness (WH), stripe rust (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; WH-winterhardiness; WSMV - wheat streak mosaic virus tolerance.

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

Name and Pedigree	Origin/Class	RWA	HD	HT	SS	ST	COL	WH	SR	LR	WSMV	TW	PC	MILL	BAKE	COMMENT
Goodstreak SD3055/KS88H164// NE89646(=COLT*2/ PATRIZANKA)	NEB 2002 Hard red winter	S	6	8	5	--	9	5	--	5	8	2	3	2	8	University of Nebraska release (2002). Tall, medium-maturing wheat. Good performance in Nebraska-Panhandle trials. First entered in Colorado Dryland Trials (UVPT) in 2004.
Halt Sumner/CO820026,F1// PI372129,F1/3/TAM 107	CSU 1994 Hard red winter	R*	3	1	3	5	4	4	8	9	7	8	2	3	2	RWA resistant, semidwarf, early maturity, below average test weight, very good milling and baking quality characteristics. Similar dryland yield record in as TAM 107 seen at higher yield levels.
Harry NE90614/NE87612	NEB 2002 Hard red winter	S	6	4	5	--	8	5	--	5	8	9	9	7	7	University of Nebraska release (2002). Very good performance in Nebraska-Panhandle trials. First entered in Colorado Dryland Trials (UVPT) in 2004. Very low test weight.
Hatcher Yuma/PI 372129//TAM 200/3/4*Yuma/4/KS91 H184/Vista	CSU 2004 Hard red winter	R*	5	2	5	2	6	4	6	7	8	4	6	2	4	Medium maturity, semidwarf (similar to Halt height). Good test weight, medium-long coleoptile. Excellent milling and good baking quality characteristics and dryland performance record in Colorado. Average straw strength.
Infinity CL WINDSTAR/3/NE94481// TXGH125888-120*4/FS2	KSU 2004 Hard red winter	S	7	7	4	--	8	--	--	--	--	--	--	--	--	Clearfield* winter wheat developed by Univ. Nebraska. Medium-late, tall. First entered in Colorado Dryland Trials (UVPT) in 2005.
Jagalene Abilene/Jagger	AgriPro 2001 Hard red winter	S	5	5	4	7	6	3	2	5	4	1	4	2	5	Developed and marketed by AgriPro. Medium height, medium maturity. Excellent winterhardiness, leaf and stripe rust resistance, and test weight. Has been observed to shatter severely in Colorado dryland trials. Excellent yield record in CSU Irrigated trials.
Jagger KS82W418/Stephens	KSU 1994 Hard red winter	S	2	4	6	5	7	8	2	8	4	5	2	5	3	Bronze-chaffed, early maturing semidwarf. High grain protein content and good baking quality, good WSMV tolerance, good stripe rust resistance. Below average straw strength. Prone to spring freeze injury, breaks dormancy very early in the spring.
KS02HW34 TREGO/JGR 8W	KSU EXP Hard white winter	S	6	4	--	--	3	--	2	3	--	2	--	--	--	Experimental hard white wheat from the Kansas State University-Hays breeding program. Targeted for release fall 2005. Similar to Trego, except with better resistance to stripe rust, higher preharvest sprouting tolerance (similar to Jagger), and slightly better baking quality.
Lakin Arlin/KS89H130	KSU 2000 Hard white winter	S	5	5	4	4	6	4	9	9	5	5	2	3	6	Hard white winter wheat (HWW) released by Kansas State. Medium height, medium maturity. Suitable for both domestic (bread) and export (Asian noodles) uses. Slightly lower yield than Prairie Red in Colorado Dryland Trials.
Millennium Arapahoe/Abilene// NE86488	NEB 1999 Hard red winter	S	6	5	3	--	4	5	3	2	8	5	5	2	6	Medium late, tall wheat. Good performance in Nebraska-Panhandle trials. First entered in Colorado Dryland Trials (UVPT) in 2004.
NuFrontier Undisclosed	General Mills 2000 Hard white winter	S	7	6	5	3	6	4	2	7	8	4	4	4	5	Hard white winter wheat (HWW) marketed under contract with General Mills. Medium-late maturing, tall semidwarf. Good stripe rust resistance. Very susceptible to pre-harvest sprouting. Best adapted to dryland conditions.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter (ST), Coleoptile length (COL), winterhardiness (WH), stripe rust (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; WH-winterhardiness; WSMV - wheat streak mosaic virus tolerance.

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

Name and Pedigree	Origin/Class	RWA	HD	HT	SS	ST	COL	WH	SR	LR	WSMV	TW	PC	MILL	BAKE	COMMENT
NuHills Undisclosed	General Mills 2003 Hard white winter	S	5	5	2	--	4	--	2	5	--	5	1	--	--	Hard white winter wheat (HWW) marketed under contract with General Mills. Sister selection to Jagalene. First entered in Colorado Dryland Trials (UVPT) in 2004.
NuHorizon Undisclosed	General Mills2000 Hard white winter	S	6	1	3	3	7	4	2	9	4	1	2	5	7	Hard white winter wheat (HWW) marketed under contract with General Mills. Medium maturing semidwarf, excellent test weight. Good stripe rust resistance. Best adapted to irrigated conditions.
Nuplains Abilene/KS831862	NEB 1999 Hard white winter	S	8	3	4	--	3	2	8	7	8	4	1	2	5	Hard white winter wheat (HWW) released by USDA-ARS program in Nebraska. Medium-late maturity, semidwarf, excellent straw strength, good test weight. High protein, very good milling and baking quality characteristics. Best adapted to irrigated conditions.
Ok102 2174/Cimarron	OK 2002 Hard red winter	S	5	1	2	4	4	--	7	4	--	3	3	2	3	Medium-maturity, semidwarf. Excellent milling and baking quality characteristics. Targeted toward irrigated production in the High Plains.
Overley U1275-1-4-2-2/ KS85W663-7-4-2//JGR	KSU 2003 Hard red winter	S	2	4	3	7	6	6	1	8	4	5	2	2	2	New release from Kansas State University (Manhattan). Excellent milling and baking quality characteristics. First entered in Colorado Dryland Trials (UVPT) in 2004. Has been observed to shatter severely across the High Plains.
Platte N84-1104/Abilene	AgriPro 1995 Hard white winter	S	6	1	1	--	1	5	9	--	7	3	5	3	1	Developed by AgriPro and marketed under identity-preserved contracts with ConAgra. Excellent test weight and milling and baking quality. Targeted specifically for irrigated production. Very susceptible to stripe rust.
Prairie Red CO850034/PI372129// 5*TAM 107	CSU 1998 Hard red winter	R*	1	2	4	2	8	4	9	9	5	7	3	4	7	Russian wheat aphid resistant version of TAM 107. Bronze-chaffed, early maturing semidwarf, medium long coleoptile, good heat and drought tolerance, poor end-use quality reputation. Very susceptible to leaf rust.
Prowers 99 CO850060/PI372129// 5*Lamar	CSU 1999 Hard red winter	R*	8	8	7	4	9	2	7	6	7	1	1	5	1	Developed from reselection within Prowers for improved RWA resistance. Tall, long coleoptile, medium-late maturity, high test weight, good milling and baking quality characteristics. Very similar to Lamar and Prowers.
Stanton PI220350/KS87H57// TAM-200/KS87H66/3/ KS87H325	KSU 2000 Hard red winter	R*	5	6	5	4	7	4	5	2	5	2	4	2	6	RWA biotype 1 resistant (different resistance gene from CSU varieties), medium-tall, medium maturity. Good leaf rust resistance. Very good dryland performance record in Colorado.
T81 TAM 107/T213 sib	TRIO 1995 Hard red winter	S	3	2	4	--	4	4	2	7	6	6	1	3	3	Developed by Trio Research. First entered in Colorado Dryland Trials (UVPT) in 2004. Good performance record in Western Kansas Trials.
TAM 111 TAM-107//TX78V3630/ CTK78/3/TX87V1233	TX 2002 Hard red winter	S	5	6	4	4	8	5	2	9	5	1	7	3	4	Release from Texas A&M-Amarillo, marketed by AgriPro. Medium height, medium maturity. Good milling and baking quality characteristics, good stripe rust resistance, good straw strength, high test weight. Good dryland performance record in Colorado.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter (ST), Coleoptile length (COL), winterhardiness (WH), stripe rust (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; WH-winterhardiness; WSMV - wheat streak mosaic virus tolerance.

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

Name and Pedigree	Origin/Class	RWA	HD	HT	SS	ST	COL	WH	SR	LR	WSMV	TW	PC	MILL	BAKE	COMMENT
Thunderbolt Abilene/KS90WGRC10	AgriPro 1999 Hard red winter	S	7	5	3	7	7	4	8	8	5	1	1	1	4	Developed and marketed by AgriPro. Bronze chaffed, medium height, medium maturity, high test weight, good milling and baking quality and leaf rust resistance. Has been observed to shatter severely in Colorado trials.
Trego KS87H325/Rio Blanco	KSU 1999 Hard white winter	S	6	4	6	3	5	4	8	4	5	1	3	2	6	Hard white winter wheat (HWW) released by Kansas State. Medium-late maturity, semidwarf, high test weight. Excellent dryland performance record in Colorado.
Wahoo Arapahoe/Abilene// Arapahoe	NEB 2000 Hard red winter	S	6	4	5	--	6	3	--	5	8	5	5	6	7	University of Nebraska release (2000). Very good performance in Nebraska-Panhandle trials. First entered in Colorado Dryland Trials (UVPT) in 2004.
Wesley KS831936-3//Colt/Cody	NEB 1998 Hard red winter	S	4	1	2	--	5	3	2	3	7	5	2	3	4	Medium-early, short, excellent straw strength. Good winterhardiness and milling and baking quality characteristics. Good stripe rust resistance, good irrigated performance record in Colorado.
Yuma NS14/NS25/2/2*Vona	CSU 1991 Hard red winter	S	5	3	2	5	2	4	7	8	6	5	7	7	3	Medium maturity, semidwarf, very good straw strength, short coleoptile, good baking quality characteristics. Good dryland and irrigated performance record in Colorado.
Yumar Yuma/PI372129//CO85 0034/3/4*Yuma	CSU 1997 Hard red winter	R*	5	4	3	5	2	4	6	8	6	5	5	5	3	Russian wheat aphid resistant version of Yuma. Medium-maturing semidwarf. Good straw strength, good baking quality characteristics. Good irrigated performance record in Colorado.

*Russian Wheat Aphid resistance (RWA), heading date (HD), plant height (HT), straw strength (SS), shatter (ST), Coleoptile length (COL), winterhardiness (WH), stripe rust (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; WH-winterhardiness; WSMV - wheat streak mosaic virus tolerance.

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

Table 2. Colorado winter wheat Uniform Variety Performance Trial summary for 2004.

	Location										2004 Averages				
	Akron		Bennett		Julesburg		Sheridan Lake		Yuma						
Variety[1]	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	% of Trial Average	Grain Moisture[2]	Test Wt	Plant Ht
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	%	%	lb/bu	in
Jagalene	69.6	60.2	51.4	56.6	53.7	59.7	50.4	57.4	45.3	56.3	54.1	114	11.2	58.0	25
Above	61.1	59.1	57.6	54.7	49.9	57.4	43.4	55.8	45.0	56.2	51.4	108	11.1	56.6	23
Harry	66.9	57.4	52.3	55.6	46.7	54.6	49.0	51.9	41.3	51.8	51.2	108	9.9	54.3	25
Goodstreak	68.2	59.8	54.5	57.0	50.7	59.4	42.6	58.1	39.1	56.1	51.0	108	11.2	58.1	29
Avalanche	57.9	60.2	56.0	57.8	44.0	58.9	50.7	58.0	44.5	56.2	50.6	107	11.3	58.2	25
Stanton	57.8	59.6	57.2	58.3	51.3	58.3	41.6	57.6	44.1	55.7	50.4	106	11.5	57.9	24
TAM 111	64.9	59.7	52.4	58.4	46.1	56.9	46.9	57.6	40.9	55.9	50.2	106	11.3	57.7	26
W99-194	61.5	57.8	55.5	56.5	47.2	57.2	42.6	57.7	39.1	55.5	49.2	104	11.4	57.0	26
Wahoo	59.2	57.4	53.9	57.5	47.1	56.9	47.4	55.3	37.7	54.7	49.1	103	11.1	56.4	25
Lakin	67.1	59.2	54.0	58.3	47.9	57.3	41.4	57.8	34.9	57.1	49.0	103	11.6	57.9	24
Yumar	66.5	59.6	57.6	56.1	48.3	58.5	40.0	56.6	31.0	55.1	48.7	103	11.1	57.2	25
AP502 CL	55.3	57.2	52.4	55.4	50.0	56.7	46.0	55.9	39.4	54.8	48.6	103	10.7	56.0	24
Bond CL	66.6	57.5	57.9	55.4	45.8	57.0	37.6	54.8	34.2	51.9	48.4	102	10.6	55.3	25
Yuma	66.8	58.3	54.6	54.9	50.4	57.1	38.6	57.1	31.6	54.7	48.4	102	10.9	56.4	24
Hatcher	60.0	59.4	54.7	55.5	44.2	57.2	41.7	57.6	40.8	55.9	48.3	102	11.1	57.1	23
Ankor	54.2	59.0	56.3	58.7	43.9	57.0	48.2	56.5	38.8	56.1	48.3	102	11.2	57.5	23
NuHills	56.4	61.2	50.4	54.6	46.4	58.2	44.0	56.3	43.2	54.6	48.1	101	11.1	57.0	24
Prairie Red	55.5	59.7	53.5	57.4	45.0	57.6	43.5	56.1	42.6	54.8	48.0	101	11.2	57.1	22
Trego	60.7	61.7	54.1	59.7	37.5	59.8	48.8	58.9	37.3	56.3	47.7	101	11.8	59.3	23
Protection	59.1	57.9	52.6	54.9	54.2	55.3	38.1	54.9	34.1	53.4	47.7	101	10.3	55.3	27
NuFrontier	68.1	60.2	51.3	57.5	40.3	57.2	39.1	57.1	37.9	55.4	47.3	100	11.3	57.5	25
Jagger	52.5	59.1	48.0	56.8	56.1	56.6	38.5	56.1	41.5	54.1	47.3	100	10.6	56.6	23
Akron	52.1	59.1	55.0	56.7	43.6	57.4	40.5	56.6	42.4	55.8	46.7	99	11.2	57.1	23
Alliance	64.0	57.7	55.8	54.9	49.1	56.6	35.9	57.1	26.9	55.0	46.4	98	11.1	56.3	24
T81	51.3	60.0	50.8	56.2	46.5	58.2	43.7	57.5	35.2	55.3	45.5	96	11.6	57.5	23
Overley	42.9	60.1	50.6	56.2	54.4	57.6	41.1	55.6	36.7	55.9	45.1	95	10.9	57.1	25
Millennium	62.6	59.2	47.8	59.3	49.8	57.8	32.9	55.1	32.4	55.7	45.1	95	11.4	57.4	28
NuHorizon	51.2	60.3	49.8	58.6	39.2	57.6	44.0	57.6	34.3	56.0	43.7	92	11.3	58.0	22
Thunderbolt	55.7	61.1	48.0	58.0	46.7	58.1	34.2	59.5	30.3	57.2	43.0	91	11.5	58.8	25
Prowers 99	54.4	60.0	49.7	59.6	44.2	57.5	26.8	57.3	35.8	55.0	42.2	89	11.8	57.9	27
Halt	50.3	58.7	52.2	57.2	49.3	56.2	32.4	57.3	25.6	54.4	41.9	88	10.9	56.8	22
Arrowsmith	43.4	58.9	42.3	58.8	49.7	59.4	36.0	56.2	35.2	56.2	41.3	87	11.9	57.9	27
Antelope	47.4	58.9	51.6	57.2	45.2	57.6	32.2	55.6	28.5	53.9	41.0	87	11.1	56.6	24
Average	58.5	59.2	52.8	57.0	47.4	57.5	41.2	56.7	37.2	55.2	47.4		11.1	57.1	24
CV%	10.0		7.3		10.8		13.2		13.7						
$LSD_{(0.30)}$	5.0		3.3		4.5		4.5		4.3						

[1]Varieties in table ranked by the average yield over five locations in 2004.
[2]No moisture taken at Akron.

Table 3. Colorado winter wheat 3-Yr and 2-Yr Uniform Variety Performance Trial summary.

	Averages							
Variety[1]	3-Yr	2-Yr		2004	2003	2002	3-Yr	2-Yr
	----------Yield (bu/ac)----------						--Twt (lb/bu)--	
Above	48.4	52.2	(2)	51.4	52.8	34.5	58.2	57.9
Hatcher	48.1	52.5	(1)	48.3	56.0	32.0	58.8	58.7
TAM 111	48.0	51.6	(4)	50.2	52.6	35.0	59.1	59.1
Bond CL	47.7	52.1	(3)	48.4	55.2	31.3	57.3	57.0
Trego	47.0	50.5		47.7	52.9	34.3	60.2	60.2
Jagalene	46.9	50.0		54.1	46.6	35.7	59.4	59.2
Ankor	46.7	50.2		48.3	51.8	33.7	58.2	58.3
Avalanche	46.5	50.5		50.6	50.4	31.6	59.7	59.5
Yuma	46.4	50.9	(5)	48.4	53.0	30.0	58.2	58.0
Stanton	46.2	49.8		50.4	49.4	32.6	59.1	59.0
Protection	46.1	49.5		47.7	51.0	33.6	57.4	57.2
Prairie Red	46.1	49.2		48.0	50.2	34.6	58.2	58.1
Yumar	45.6	49.6		48.7	50.3	30.8	58.6	58.6
AP502 CL	45.3	48.8		48.6	48.9	32.7	57.7	57.6
Lakin	45.3	48.4		49.0	47.8	33.9	58.8	58.6
Alliance	45.2	48.6		46.4	50.5	32.5	58.2	58.0
Akron	45.1	48.3		46.7	49.6	33.2	58.2	58.2
Jagger	43.4	46.6		47.3	46.0	31.7	58.2	58.0
Halt	42.4	44.5		41.9	46.7	34.7	58.0	57.8
Prowers 99	41.3	43.9		42.2	45.4	31.8	59.4	59.4
Thunderbolt	38.9	41.1		43.0	39.6	30.8	59.7	59.7

[1]Varieties in table ranked based on 3-Yr average yields.
[1.....5]Varieties rank based on 2-Yr average yields.

Table 4. Winter wheat Uniform Variety Performance Trial at Akron in 2004[1].

Variety	Yield	Test Weight	Plant Height
	bu/ac	lb/bu	in
Jagalene	69.6	60.2	24
Goodstreak	68.2	59.8	29
NuFrontier	68.1	60.2	25
Lakin	67.1	59.2	24
Harry	66.9	57.4	24
Yuma	66.8	58.3	23
Bond CL	66.6	57.5	24
Yumar	66.5	59.6	24
TAM 111	64.9	59.7	27
Alliance	64.0	57.7	24
Millennium	62.6	59.2	27
W99-194	61.5	57.8	25
Above	61.1	59.1	22
Trego	60.7	61.7	24
Hatcher	60.0	59.4	23
Wahoo	59.2	57.4	25
Protection	59.1	57.9	25
Avalanche	57.9	60.2	24
Stanton	57.8	59.6	24
NuHills	56.4	61.2	24
Thunderbolt	55.7	61.1	26
Prairie Red	55.5	59.7	21
AP502 CL	55.3	57.2	23
Prowers 99	54.4	60.0	26
Ankor	54.2	59.0	24
Jagger	52.5	59.1	23
Akron	52.1	59.1	24
T81	51.3	60.0	22
NuHorizon	51.2	60.3	21
Halt	50.3	58.7	22
Antelope	47.4	58.9	22
Arrowsmith	43.4	58.9	25
Overley	42.9	60.1	25
Average	58.5	59.2	24
CV%	10.0		
$LSD_{(0.30)}$	5.0		
$LSD_{(0.05)}$	9.5		

[1]Trial conducted at the Central Great Plains Research Center; seeded 9/22/03 and harvested 7/06/04.

Table 5. Winter wheat Uniform Variety Performance Trial at Bennett in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Plant Height
	bu/ac	%	lb/bu	in
Bond CL	57.9	10.3	55.4	26
Above	57.6	10.1	54.7	23
Yumar	57.6	10.5	56.1	25
Stanton	57.2	10.6	58.3	24
Ankor	56.3	11.1	58.7	24
Avalanche	56.0	10.8	57.8	25
Alliance	55.8	10.2	54.9	23
W99-194	55.5	10.7	56.5	24
Akron	55.0	10.9	56.7	25
Hatcher	54.7	10.5	55.5	22
Yuma	54.6	9.9	54.9	23
Goodstreak	54.5	10.6	57.0	26
Trego	54.1	11.4	59.7	24
Lakin	54.0	10.9	58.3	24
Wahoo	53.9	10.6	57.5	24
Prairie Red	53.5	10.5	57.4	21
Protection	52.6	9.8	54.9	27
TAM 111	52.4	11.2	58.4	26
AP502 CL	52.4	10.0	55.4	23
Harry	52.3	9.9	55.6	25
Halt	52.2	10.3	57.2	21
Antelope	51.6	10.7	57.2	25
Jagalene	51.4	10.5	56.6	26
NuFrontier	51.3	10.8	57.5	23
T81	50.8	10.7	56.2	24
Overley	50.6	10.3	56.2	24
NuHills	50.4	10.2	54.6	22
NuHorizon	49.8	11.1	58.6	21
Prowers 99	49.7	11.8	59.6	28
Jagger	48.0	10.4	56.8	23
Thunderbolt	48.0	10.9	58.0	25
Millennium	47.8	11.1	59.3	29
Arrowsmith	42.3	11.3	58.8	26
Average	52.8	10.6	57.0	24
CV%	7.3			
$LSD_{(0.30)}$	3.3			
$LSD_{(0.05)}$	6.3			

[1]Trial conducted on the John Sauter farm; seeded 9/09/03 and harvested 7/06/04.
*No shattering.

Table 6. Winter wheat Uniform Variety Performance Trial at Julesburg in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Plant Height	Days to Head[2]
	bu/ac	%	lb/bu	in	days
Jagger	56.1	11.0	56.6	28	138
Overley	54.4	12.0	57.6	27	138
Protection	54.2	11.2	55.3	29	138
Jagalene	53.7	12.3	59.7	25	141
Stanton	51.3	13.3	58.3	28	142
Goodstreak	50.7	11.6	59.4	32	144
Yuma	50.4	12.3	57.1	23	141
AP502 CL	50.0	11.5	56.7	26	138
Above	49.9	12.1	57.4	25	138
Millennium	49.8	12.2	57.8	29	144
Arrowsmith	49.7	12.8	59.4	29	146
Halt	49.3	11.1	56.2	25	138
Alliance	49.1	11.4	56.6	27	141
Yumar	48.3	12.2	58.5	26	142
Lakin	47.9	13.1	57.3	25	141
W99-194	47.2	11.6	57.2	28	141
Wahoo	47.1	12.0	56.9	27	143
Harry	46.7	11.4	54.6	28	144
Thunderbolt	46.7	11.5	58.1	27	142
T81	46.5	13.0	58.2	25	139
NuHills	46.4	12.4	58.2	25	140
TAM 111	46.1	11.2	56.9	27	142
Bond CL	45.8	11.4	57.0	27	141
Antelope	45.2	11.9	57.6	26	143
Prairie Red	45.0	11.6	57.6	26	139
Hatcher	44.2	11.6	57.2	24	141
Prowers 99	44.2	11.1	57.5	30	144
Avalanche	44.0	12.0	58.9	25	143
Ankor	43.9	11.3	57.0	25	140
Akron	43.6	11.3	57.4	26	141
NuFrontier	40.3	12.4	57.2	26	144
NuHorizon	39.2	12.0	57.6	23	143
Trego	37.5	11.5	59.8	22	142
Average	47.4	11.9	57.5	26	141
CV%	10.8				
$LSD_{(0.30)}$	4.5				
$LSD_{(0.05)}$	8.5				

[1]Trial conducted on the Walt Strasser farm; seeded 9/17/03 and harvested 7/08/04.
[2]Days from January 1.

Table 7. Winter wheat Uniform Variety Performance Trial at Sheridan Lake in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Plant Height	Shatter[2]
	bu/ac	%	lb/bu	in	0-9
Avalanche	50.7	11.9	58.0	22	1
Jagalene	50.4	11.4	57.4	22	0
Harry	49.0	9.0	51.9	23	0
Trego	48.8	13.1	58.9	21	0
Ankor	48.2	11.5	56.5	21	0
Wahoo	47.4	11.0	55.3	23	0
TAM 111	46.9	12.1	57.6	21	1
AP502 CL	46.0	11.2	55.9	20	0
NuHills	44.0	11.7	56.3	21	0
NuHorizon	44.0	11.7	57.6	20	0
T81	43.7	12.0	57.5	21	0
Prairie Red	43.5	12.0	56.1	20	0
Above	43.4	11.5	55.8	21	0
Goodstreak	42.6	11.5	58.1	26	0
W99-194	42.6	12.1	57.7	23	0
Hatcher	41.7	11.8	57.6	19	0
Stanton	41.6	11.7	57.6	21	0
Lakin	41.4	11.8	57.8	24	1
Overley	41.1	10.8	55.6	24	0
Akron	40.5	11.7	56.6	21	0
Yumar	40.0	11.0	56.6	23	0
NuFrontier	39.1	11.5	57.1	23	0
Yuma	38.6	11.0	57.1	22	0
Jagger	38.5	11.1	56.1	21	1
Protection	38.1	9.9	54.9	23	0
Bond CL	37.6	11.2	54.8	23	0
Arrowsmith	36.0	11.8	56.2	26	0
Alliance	35.9	11.9	57.1	21	1
Thunderbolt	34.2	12.2	59.5	21	2
Millennium	32.9	11.0	55.1	25	2
Halt	32.4	11.3	57.3	21	2
Antelope	32.2	10.7	55.6	22	0
Prowers 99	26.8	12.3	57.3	22	0
Average	41.2	11.5	56.7	22	
CV%	13.2				
$LSD_{(0.30)}$	4.5				
$LSD_{(0.05)}$	8.6				

[1]Trial conducted on the Burl Scherler farm; seeded 9/10/03 and harvested 7/03/04.
[2]Rating scale 0-9, with 0 = no shatter and 9 = severely shatter.

Table 8. Winter wheat Uniform Variety Performance Trial at Yuma in 2004[1].

Variety	Yield	Grain Moisture	Test Weigh t	Plant Height	Shatter[2]
	bu/ac	%	lb/bu	in	0-9
Jagalene	45.3	10.5	56.3	26	1
Above	45.0	10.9	56.2	22	1
Avalanche	44.5	10.5	56.2	29	1
Stanton	44.1	10.6	55.7	25	1
NuHills	43.2	10.2	54.6	25	1
Prairie Red	42.6	10.5	54.8	24	1
Akron	42.4	10.7	55.8	21	1
Jagger	41.5	10.0	54.1	22	1
Harry	41.3	9.2	51.8	24	1
TAM 111	40.9	10.9	55.9	27	1
Hatcher	40.8	10.7	55.9	25	1
AP502 CL	39.4	10.1	54.8	25	1
W99-194	39.1	11.0	55.5	27	0
Goodstreak	39.1	11.0	56.1	30	1
Ankor	38.8	10.7	56.1	23	1
NuFrontier	37.9	10.3	55.4	28	1
Wahoo	37.7	11.0	54.7	25	1
Trego	37.3	11.3	56.3	25	1
Overley	36.7	10.5	55.9	24	2
Prowers 99	35.8	11.9	55.0	28	1
T81	35.2	10.7	55.3	24	1
Arrowsmith	35.2	11.6	56.2	27	1
Lakin	34.9	10.7	57.1	25	2
NuHorizon	34.3	10.6	56.0	25	1
Bond CL	34.2	9.6	51.9	26	1
Protection	34.1	10.1	53.4	28	1
Millennium	32.4	11.2	55.7	30	1
Yuma	31.6	10.3	54.7	27	2
Yumar	31.0	10.6	55.1	25	2
Thunderbolt	30.3	11.2	57.2	27	3
Antelope	28.5	10.9	53.9	24	1
Alliance	26.9	10.8	55.0	27	1
Halt	25.6	10.6	54.4	21	3
Average	37.2	10.6	55.2	25	
CV%	13.7				
$LSD_{(0.30)}$	4.3				
$LSD_{(0.05)}$	8.1				

[1]Trial conducted on the Andrew Brothers' farm; seeded 9/16/03 and harvested 7/07/04.
[2]Rating scale 0-9, with 0 = no shatter and 9 = severely shatter.

Table 9. Protein Content of UVPT Entries at Three Trial Locations for 2004.

Variety	Trial Locations			Average
	Akron	Julesburg	Bennett	
Arrowsmith	18.1	15.7	14.3	16.0
Antelope	16.1	16.6	12.9	15.2
NuHills	17.0	15.3	13.2	15.2
Thunderbolt	17.4	16.0	11.2	14.8
T81	15.7	15.1	13.3	14.7
Prowers 99	17.0	15.4	11.7	14.7
Jagger	17.9	15.8	10.1	14.6
Lakin	15.9	16.7	11.1	14.6
NuHorizon	15.9	15.6	12.2	14.6
Overley	18.2	14.8	10.3	14.4
Akron	16.8	15.7	10.6	14.4
Goodstreak	17.0	14.4	11.2	14.2
Ankor	16.4	15.3	10.7	14.1
Halt	16.7	15.1	10.5	14.1
Prairie Red	16.0	14.2	12.1	14.1
Trego	16.5	15.6	10.0	14.0
Jagalene	16.7	14.0	11.1	13.9
W99-194	16.9	14.7	10.0	13.9
Avalanche	16.4	15.1	10.1	13.9
NuFrontier	14.7	14.7	12.2	13.8
Stanton	15.3	13.7	12.2	13.8
CO00739	16.0	14.4	10.8	13.7
Millennium	15.8	15.0	10.3	13.7
Yumar	15.4	14.8	10.9	13.7
Wahoo	15.8	14.9	10.4	13.7
CO991057	15.6	14.7	10.4	13.6
Above	15.9	14.5	10.2	13.5
CO00698	15.4	14.0	11.1	13.5
Hatcher	15.4	13.7	11.3	13.5
CO99W254	15.2	14.4	10.8	13.5
CO00016	16.0	14.7	9.5	13.4
TAM 111	15.4	14.4	10.3	13.4
Yuma	15.3	14.7	10.1	13.4
Bond CL	15.1	14.8	10.0	13.3
AP502 CL	16.1	14.4	9.3	13.3
CO00796	15.5	14.0	10.2	13.3
CO00554	16.0	13.5	10.2	13.2
CO970547-7	15.2	13.6	10.8	13.2
Protection	16.3	14.1	9.2	13.2
CO00345	16.4	13.0	10.2	13.2
CO99W192	15.0	14.7	9.8	13.2
Alliance	15.4	13.8	9.5	12.9
CO00347	15.9	13.2	9.5	12.9
CO99W183	14.9	13.5	10.1	12.8
Harry	14.3	14.0	10.1	12.8
CO99W329	15.0	14.0	8.9	12.6
Average	16.0	14.7	10.8	13.8
Minimum	14.3	13.0	8.9	12.6
Maximum	18.2	16.7	14.3	16.0

*Protein contents adjusted to 12% moisture.

Table 10. Colorado winter wheat Irrigated Variety Performance Trial summary for 2004.

	Location				2004 Averages				
	Haxtun		Rocky Ford						
Variety[1]	Yield	Test Weight	Yield	Test Weight	Yield	% of Trial Average	Grain Moisture	Test Weight	Plant Height
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	%	%	lb/bu	in
Yuma	133.5	57.5	95.8	55.9	114.6	111	11.9	56.7	34
Bond CL	130.7	57.6	95.0	55.1	112.9	109	11.4	56.4	38
Ankor	120.6	59.4	97.3	53.9	108.9	105	11.6	56.6	38
Prairie Red	109.1	56.9	106.0	55.2	107.6	104	11.1	56.1	34
Protection	122.2	57.6	92.9	54.3	107.6	104	11.1	56.0	36
Ok102	112.3	59.3	99.9	57.7	106.1	103	12.3	58.5	35
NuHills	103.8	58.4	102.1	55.5	102.9	99	11.6	56.9	34
Overley	119.7	58.3	85.6	56.8	102.7	99	11.7	57.5	39
NuFrontier	111.7	56.2	92.2	57.4	101.9	98	11.9	56.8	38
Hatcher	118.4	59.0	84.8	57.0	101.6	98	12.3	58.0	37
Dumas	113.8	58.2	88.2	58.0	101.0	98	11.7	58.1	35
Jagalene	119.9	59.0	81.5	57.0	100.7	97	12.2	58.0	37
Antelope	121.5	57.0	79.6	54.8	100.6	97	11.2	55.9	36
Nuplains	110.6	58.6	89.1	57.0	99.9	96	12.5	57.8	37
NuHorizon	121.6	60.3	77.4	56.4	99.5	96	12.4	58.3	35
Wesley	113.8	58.9	83.3	54.2	98.6	95	11.2	56.5	33
Platte	107.8	61.0	77.2	53.2	92.5	89	12.0	57.1	33
Average	117.1	58.4	89.9	55.9	103.5		11.8	57.1	36
CV%	6.1		8.9						
$LSD_{(0.30)}$	6.1		6.8						

[1]Varieties in table ranked by the average yield over two locations in 2004.

Table 11. Colorado winter wheat 3-Yr and 2-Yr Irrigated Variety Performance Trial summary.

	Averages						
Variety	3-Yr	2-Yr	2004	2003	2002	3-Yr	2-Yr
	----------Yield (bu/ac)----------					--Twt (lb/bu)--	
Yuma	105.1	110.1 (1)	114.6	107.1	92.6	57.8	57.9
Jagalene	104.5	109.4 (2)	100.7	115.1	92.5	59.0	58.7
Prairie Red	104.4	108.1 (3)	107.6	108.5	94.9	57.1	56.6
Wesley	100.1	103.7 (4)	98.6	107.1	91.0	58.2	57.8
Antelope	97.0	101.1	100.6	101.5	86.9	58.0	57.6
Ankor	96.9	100.1	108.9	94.3	88.8	56.7	57.0
Platte	96.2	96.3	92.5	98.8	95.8	57.8	56.8
Dumas	95.9	100.6	101.0	100.3	84.3	59.1	58.3
Nuplains	88.8	88.5	99.9	81.0	89.5	58.5	57.9
Hatcher	----	101.4 (5)	101.6	101.4	----	----	58.2
Ok102	----	100.2	106.1	96.2	----	----	58.1

[1]Varieties in table ranked based on 3-Yr average yields.
[1.....5]Varieties rank based on 2-Yr average yields.

Table 12. Winter wheat Irrigated Variety Performance Trial at Haxtun in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Plant Height	Shatter[2]
	bu/ac	%	lb/bu	in	0-9
Yuma	133.5	12.5	57.5	34	0
Bond CL	130.7	11.9	57.6	38	0
Protection	122.2	11.7	57.6	35	0
NuHorizon	121.6	12.8	60.3	35	0
Antelope	121.5	11.7	57.0	37	0
Ankor	120.6	12.4	59.4	40	0
Jagalene	119.9	12.2	59.0	37	1
Overley	119.7	11.8	58.3	38	2
Hatcher	118.4	13.1	59.0	39	0
Dumas	113.8	11.8	58.2	36	1
Wesley	113.8	12.1	58.9	31	0
Ok102	112.3	12.5	59.3	37	0
NuFrontier	111.7	12.1	56.2	40	0
Nuplains	110.6	13.4	58.6	37	0
Prairie Red	109.1	11.6	56.9	34	0
Platte	107.8	13.4	61.0	32	0
NuHills	103.8	12.2	58.4	35	0
Average	117.1	12.3	58.4	36	
CV%	6.1				
$LSD_{(0.30)}$	6.1				
$LSD_{(0.05)}$	11.6				

[1]Trial conducted on the Steve Smith farm; seeded 9/24/03 and harvested 7/14/04.
[2]Rating scale 0-9, with 0 = no shatter and 9 = severely shatter.

Table 13. Winter wheat Irrigated Variety Performance Trial at Rocky Ford in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Plant Height	(6/24/04) Lodging[2]	(7/03/04) Lodging
	bu/ac	%	lb/bu	in	0-9	0-9
Prairie Red	106.0	10.7	55.2	35	2	2
NuHills	102.1	11.0	55.5	34	2	0
Ok102	99.9	12.0	57.7	34	1	0
Ankor	97.3	10.9	53.9	36	4	2
Yuma	95.8	11.3	55.9	35	3	2
Bond CL	95.0	10.9	55.1	38	3	2
Protection	92.9	10.4	54.3	36	2	1
NuFrontier	92.2	11.7	57.4	36	3	0
Nuplains	89.1	11.6	57.0	36	2	0
Dumas	88.2	11.6	58.0	34	2	0
Overley	85.6	11.6	56.8	40	2	0
Hatcher	84.8	11.5	57.0	35	4	2
Wesley	83.3	10.4	54.2	34	1	1
Jagalene	81.5	12.3	57.0	36	4	2
Antelope	79.6	10.7	54.8	35	2	1
NuHorizon	77.4	11.9	56.4	35	1	0
Platte	77.2	10.6	53.2	34	1	0
Average	89.9	11.2	55.9	35		
CV%	8.9					
$LSD_{(0.30)}$	6.8					
$LSD_{(0.05)}$	13.1					

[1]Trial conducted on at the Arkansas Valley Research Center; seeded 10/01/03 and harvested 7/03/04.
[2]Rating scale 0-9, with 0 = no lodging and 9 = completely lodged. Some lodging was first observed on 14 May. Lodging was exacerbated by the hail storm of 20 June.

2003/2004 COLLABORATIVE ON-FARM TESTS (COFT)

Jerry Johnson, Tim Macklin, Bruce Bosley, Ron Meyer, Alan Helm,
Bruce Fickenscher and Gary Lancaster

Introduction

Over half of Colorado's 2004 wheat acreage was planted to winter wheat varieties that have been tested in the COFT program which is in its' seventh year of testing. With on-farm testing, wheat producers get to evaluate new varieties on their own farms before seed of the new varieties is available on the market to all farmers. On-farm testing directly involves agents and producers in the variety development process, thereby speeding adoption of superior, new varieties.

Colorado State University Cooperative Extension agents have a large responsibility for the success of this program - recruiting volunteer growers, delivering seed, planning test layout and operations, helping with planting, keeping records, coordinating visits, communicating with growers and campus coordinators, coordination of weighing plot and measuring yields and collecting grain samples for quality analyses. COFT would not be possible without the collaboration of so many dedicated wheat producers throughout eastern Colorado.

In the fall of 2003, twenty-three eastern Colorado wheat producers planted collaborative on-farm tests (COFT) in Baca, Prowers, Kiowa, Cheyenne, Lincoln, Kit Carson, Phillips, Sedgwick, Logan, Morgan, Adams, and Weld counties. Working alongside local Extension agents, each producer/collaborator received 100 pounds seed of each variety and planted the five varieties in side-by-side strips. The objective was to compare performance and adaptability of newly-released varieties. Comparisons of interest were:

- Compare high yielding KSU hard white wheat, **Trego**, with CSU sister line selection, **Avalanche**.
- Ascertain relative performance and adaptability of high yielding *CLEARFIELD** wheat variety, **Above**.
- Ascertain relative performance and adaptability of high yielding RWA resistant hard red winter wheat variety, **Ankor**.
- Ascertain relative performance and adaptability of high yielding AgriPro hard red winter wheat variety, **Jagalene**.

Results

Only seventeen of the twenty-three tests planted in the fall of 2003 were harvested this summer due to the widespread and prolonged effects of drought during last fall and winter. The effective window for planting to achieve satisfactory plant stands last fall was just too small for many eastern Colorado growers. It is estimated by our state agricultural statistics services that approximately 23% of planted wheat acreage in the state was abandoned and our rate of COFT failure was 26% (17/23). In general, low overall yields (27.5 bu/ac) can be attributed to poor stand establishment in the fall followed by droughty winter and spring conditions further causing reduced stands, reduced tillering, small plants, and abnormally early maturity. Diseases were generally not problematic this year but late rains (and hail) beginning in mid-June and continuing through harvest did little to improve yields but led to rapid weed development and grain sprouting in the head. This was the only year in the last 10 years that sprouting has been an issue in Colorado. Sprouting seemed to result from the coincidence of early wheat maturity (10 days to 2 weeks earlier than normal) and unusual mid- and late-June and early July (pre-monsoon) rains. With the wet harvest weather and shorter-than-normal wheat, producers had a hard time getting combines into their fields and getting the wheat to dry down before the

next rain shower arrived and the weeds grew even taller. We really need to work with our biotechnologists to see if we might be able to transfer some of those genes from Russian thistle to wheat or corn.

However, even with a lower-than-target COFT success rate, only 74% when we can generally expect an 80% success rate or better, and below average yields, we were still able to make some meaningful variety comparisons, especially in northeastern Colorado (see 2004 COFT Results Table 1).

Avalanche vs. Trego. The White Wheat Variety Comparison. There was no significant difference between these two in the SE/FR and overall groups. Avalanche was significantly higher yielding than all varieties in the NE group where Trego was significantly higher yielding than Avalanche in 2003. Our conclusion is that there is no predictable superiority in yield for one of these varieties over the other. Perhaps the most important difference is in maturity with Trego heading, on the average, 1-3 days later than Avalanche. This becomes important for producers seeking to reduce their overall risk to drought, freeze, and hail damage by planting varieties of different maturities. Avalanche would be considered a medium maturing variety like Ankor while Trego would be considered a medium-late maturing variety. Since, for all intents and purposes they are equal yielding under dryland conditions, choosing one or the other would depend on whether the producer already has a medium maturing variety or a medium late maturing variety and then he/she would select the maturity group that is missing and reduce the overall risk.

Adaptability of high yielding *CLEARFIELD** wheat variety, **Above**. Something to remember when looking at the performance of varieties in the COFT trials is that these five varieties are among the top all-time top yielding varieties in the state. Unfortunately, there is not a low yielding variety in the group so the fact that no significant performance differences were found among them is not unexpected. For Above, it means that there is no yield penalty to be paid for incorporation of the *CLEARFIELD** trait and, of course it is our most powerful tool to combat the deleterious effects of winter annual grasses like jointed goatgrass, downy brome, and volunteer rye. Above has shown consistently high yields the last few years in Colorado and would even be a good choice for high yields in areas that have lower risk of grassy weed infestation - and remember, there is no requirement to spray Above with Beyond herbicide in the event that weeds are not a problem. Above is early-maturing and could fill the early-maturing variety niche for producers seeking to reduce overall risk by planting varieties of different maturities. However, Above seed must be purchased annually and cannot be saved for use on the farm or sale to neighbors.

Adaptability of high yielding RWA resistant hard red winter wheat variety, **Ankor**. Stand up! Isn't Ankor a beautiful variety? Ankor has yielded well under good and poor environmental conditions and, when compared to Akron, has showed a 2-3 bu/a yield advantage in CSU trials as well as trials in Kansas and Nebraska. Lack of significant differences among COFT varieties this year means that Ankor will yield along with top performers under droughty, low yield conditions and was significantly higher yielding than some varieties last year under average yield conditions. It is important that Ankor is medium maturing and should be considered by all Colorado producers in this medium role with an early and a later-maturing mix of varieties. As producers are not able to determine which biotype of RWA will infest their fields, the RWA resistance bred into Ankor will continue to be a useful management tool for RWA infestation in the near future. See page 24 for a discussion of RWA management strategies.

Adaptability of high yielding AgriPro hard red winter wheat variety, **Jagalene**. This was the first year that Jagalene has been in the

COFT program and appears to have done better relative to other varieties in the NE group where it topped three tests in Logan and Morgan counties. Again, Jagalene yielded along with the best yielding varieties in Colorado and would fill the medium maturity category for producers trying to spread their risk by planting varieties of different maturities.

Table 1. Colorado Collaborative On-Farm Test (COFT) results in 2004.

	Variety (Yields in bu/ac @13 % moisture)					
COFT Location*	**Above**	**Ankor**	**Jagalene**	**Avalanche**	**Trego**	**Avg**
Prowers NC	36.1	35.2	42.0	35.7	38.5	37.5
Baca EC	34.0	27.5	30.2	30.2	25.7	29.5
Baca NC	3.4	2.9	3.2	3.5	3.4	3.3
Kiowa NE	15.8	16.5	14.1	14.7	15.3	15.3
Morgan SW	35.1	33.8	34.8	36.4	35.6	35.2
Weld NC	25.6	28.6	35.1	26.0	25.5	28.2
Adams SE	20.0	24.6	20.4	18.9	18.8	20.5
SE and FR Average	**24.3**	**24.2**	**25.7**	**23.6**	**23.3**	**24.2**
**$LSD_{(0.30)}$	a	a	a	a	a	3.6
Kit Carson SW	39.4	38.9	36.8	49.0	40.7	41.0
Yuma NW	21.2	20.6	25.2	22.7	28.2	23.6
Yuma SE	5.8	16.0	3.6	19.4	1.1	9.2
Lincoln NC	18.3	17.4	20.5	22.3	22.8	20.2
Sedgwick SE	27.4	27.1	28.3	26.1	34.1	28.6
Sedgwick SC	27.7	26.5	27.5	26.7	25.9	26.9
Logan NE	28.8	27.6	30.0	31.4	31.4	29.8
Logan SC	28.0	28.1	29.0	25.8	22.3	26.6
Logan EC	47.2	45.4	51.8	46.9	50.1	48.3
Morgan NE	41.9	43.2	45.0	42.7	42.3	43.0
NE Average	**28.6**	**29.2**	**29.8**	**31.6**	**29.9**	**29.8**
$LSD_{(0.30)}$	b	b	ab	a	ab	1.7
Overall Average	**26.8**	**27.1**	**28.1**	**28.3**	**27.2**	**27.5**
$LSD_{(0.30)}$	a	a	a	a	a	2.0

*NC = North Central; EC = East Central; SC = South Central; NE = Northeastern; NW = Northwestern; SE = Southeastern; SW = Southwestern.

**Varieties with different letters indicate statistically different mean yields using a Least Significant Difference test with alpha = 0.30.

WESTERN WINTER WHEAT VARIETY PERFORMANCE TRIAL

Table 1. Description of winter wheat varieties in western trial.

Variety Name	Class	Origin
Above	Hard Red	Colorado/Texas
Ankor	Hard Red	Colorado
Antelope	Hard White	Nebraska
Arrowsmith	Hard White	Nebraska
Avalanche	Hard White	Colorado
Bond CL	Hard Red	Colorado
CO00345	Hard Red	Colorado
CO00347	Hard Red	Colorado
CO00739	Hard Red	Colorado
CO00796	Hard Red	Colorado
CO970547-7	Hard Red	Colorado
CO99W183	Hard White	Colorado
CO99W192	Hard White	Colorado
Deloris	Hard White	Utah
Fairview	Hard Red	Colorado/Idaho
Gary	Hard White	Idaho
Golden Spike	Hard White	Utah
Hatcher	Hard Red	Colorado
Hayden	Hard Red	Colorado/Idaho
IDO571	Hard Red	Idaho
Lakin	Hard White	Kansas
NuFrontier	Hard White	General Mills
NuHills	Hard White	General Mills
NuHorizon	Hard White	General Mills

Winter Wheat Variety Performance Test at Hayden, Colorado 2004

Calvin Pearson

Summary

Each year small grain variety performance tests are conducted in the Hayden, Colorado area to identify varieties that are adapted for commercial production in northwest Colorado. Growing conditions during the 2004 growing season were more favorable for wheat production than in the past few years. The 2004 results provide information about the performance of wheat varieties under moderate, dryland stress conditions. Grain yields in the winter wheat variety performance test averaged 31.7 bu/acre. The highest yielding entry in the winter wheat test was Golden Spike at 41.0 bu/acre with six entries outyielding other varieties.

Introduction

Growers in northwest Colorado are limited to only a few crops to grow because of constraints created by dryland production conditions, a short growing season, limited precipitation, and isolation to markets for their crops. The principal cash crop grown in northwest Colorado is wheat. Alternative crops are of interest to growers in northwest Colorado. Alternative small grains, such as malting barley, triticale, and specialty wheats (i.e., hard white wheats) are of interest to growers because these crops are often sold into specialty markets which command a premium selling price. New crop production inputs and practices are also of interest to growers in northwest Colorado if these inputs and practices are determined to be profitable and environmentally sound. Growers in this region of Colorado are supportive of agronomic research that provides them with science-based information. They can use this information to assist them in making crop production decisions. During 2004, we conducted winter variety tests that included not only traditional small grains but also some of these specialty wheats.

Materials and Methods

Winter Wheat Variety Performance Test

Twenty-four winter wheat varieties and experimental lines were evaluated during the 2004 growing season. The experiment design was a randomized complete block with four replications. Plot size was 4-ft. wide by 40-ft. long with six seed rows per plot. The seeding rate was 56 lbs/acre and harvested using a Hege small plot combine. Grain samples were

cleaned in the laboratory using a small Clipper cleaner to remove plant tissue that remained in the grain following combining. Grain moisture and test weight were determined with a Seedburo GMA-128 seed analyzer. Grain yields were calculated at 12% moisture content.

Results and Discussion

The summer of 2004 in the Craig/Hayden area was more favorable for small grain production than in many other years. The average maximum temperature in July 2004 at Hayden, Colorado was 85.2° F (Fig. 1). Precipitation at Hayden during the 2004 growing season for the months of January through October totaled 14.62 inches. The highest amount of precipitation occurred during September at 3.09 inches and the least amount of precipitation was received during March at only 0.54 inches (Fig. 2). Precipitation in the Craig/Hayden area varies considerably from month to month and year to year and is a highly limiting factor for small grain production. The monthly precipitation in 2004 illustrates the variability that often occurs in the area (Fig. 2). If timely precipitation occurs, grain yields of small grains can be increased significantly. If precipitation does not occur in a timely fashion then grain yields of wheat can be low. Because precipitation is so variable during the growing season in the Craig/Hayden area wheat yields vary considerably from year to year.

Winter Wheat Variety Performance Test

Grain moisture in the winter wheat variety performance test at Hayden averaged 8.6% (Table 2). Grain moisture content ranged from a high of 9.0% for CO00345, CO00347, CO00796, and Hatcher to a low of 8.0% for Arrowsmith and CO99W192. Grain yields of the winter wheat varieties averaged 31.7 bu/acre. Grain yields ranged from a high of 41.0 bu/acre for Golden Spike to a low of 19.2 bu/acre for NuHills. Seven varieties outyielded other entries. Test weights averaged 60.8 lbs/bu. Test weights ranged from a high of 62.4 lbs/bushel for Hayden to a low of 59.8 lbs/bu. for CO00347, CO00796, Hatcher, and CO99W192. There was no lodging in the winter wheat variety performance test in 2004. Protein concentration averaged 8.08%. Overall, protein concentrations in this year's trial were considerably lower compared to those obtained in most years. Protein concentration ranged from a high of 9.53% for NuHills to a low of 7.09% for Golden Spike.

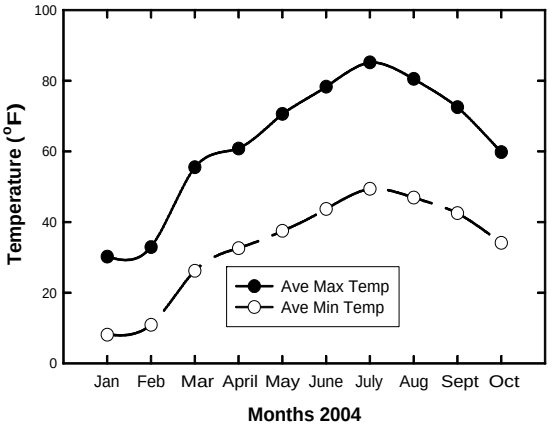


Fig. 1. Average maximum monthly and average minimum monthly temperatures for January through

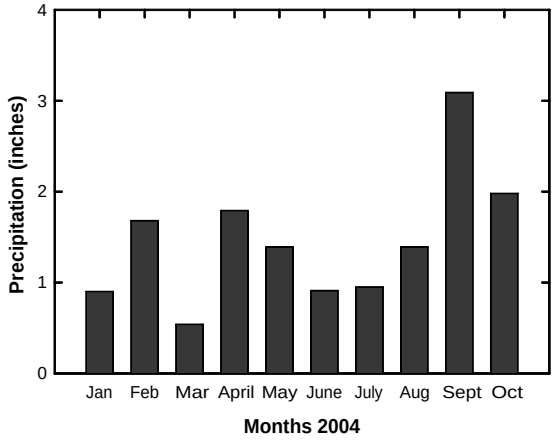


Fig. 2. Monthly precipitation for January through October 2004 at Hayden, Colorado.

Table 2. Winter wheat variety performance at Hayden in 2004[1].

Variety	Yield	Grain Moisture	Test Weight	Smut Incidence[2]	Protein
	bu/ac	%	lb/bu	1-3	%
Golden Spike	41.0	8.3	60.3	1.0	7.09
Gary	40.6	8.6	60.1	1.0	7.47
Deloris	40.1	8.8	61.9	1.0	7.40
Hayden	38.8	8.7	62.4	1.0	7.83
IDO571	38.1	8.9	62.0	1.0	7.96
Ankor	37.2	8.7	60.6	2.0	8.05
NuFrontier	35.8	8.4	61.9	2.0	7.77
Fairview	35.7	8.8	61.4	1.0	7.60
Lakin	34.7	8.4	61.0	2.2	8.27
Hatcher	33.8	9.0	59.8	2.2	8.37
Bond CL	31.8	8.9	59.9	2.2	7.94
CO00347	31.3	9.0	59.8	2.2	7.72
CO00345	31.2	9.0	59.9	2.5	7.74
Above	31.0	8.9	60.8	1.5	8.15
CO00739	30.8	8.8	60.5	2.5	7.56
Avalanche	30.6	8.3	62.0	2.2	8.86
NuHorizon	27.6	8.4	61.7	2.8	8.37
Antelope	27.4	8.5	61.2	2.0	8.80
CO00796	25.8	9.0	59.8	3.0	8.36
CO99W183	25.8	8.1	60.6	2.2	8.65
Arrowsmith	25.6	8.0	60.0	2.5	7.88
CO970547-7	24.4	8.7	61.0	2.0	8.40
CO99W192	22.6	8.0	59.8	2.8	8.27
NuHills	19.2	8.2	60.9	2.8	9.53
Average	31.7	8.6	60.8	2.0	8.08
CV%	11.5	1.8	0.73		
$LSD_{(0.05)}$	5.1	0.2	0.6		

[1]Trial conducted on the Duane and Darrell Hockett farm, seeded 9/26/03 and harvested 8/17/04.
[2]Smut incidence - 1= no smut, 2 = moderate smut, 3=severe smut.

CONTRIBUTED WHEAT ARTICLES

Have pollen, will travel

Pat Byrne, Phil Westra, Scott Nissen, Brien Henry, and Todd Gaines

How far does wheat pollen travel and how often does it cross-pollinate other wheat plants or jointed goatgrass? Answers to those questions are important to seed producers needing to maintain genetic purity in their seed, and to weed scientists interested in goatgrass ecology and management. Gene flow may also affect export markets in the event that genetically engineered wheat is approved in the U.S., but not in importing countries.

In our USDA-funded project, we are using herbicide tolerance as a marker trait to estimate the amount of cross-pollination that takes place in commercial scale winter wheat plantings in eastern Colorado. Samples of wheat grain were collected just prior to harvest in the summers of 2003 and 2004. All samples were from fields adjacent to the *CLEARFIELD** variety 'Above', which is tolerant to the herbicide 'BEYOND' (imazamox). The distance and direction of each sample relative to Above were recorded. Evaluation of the 2003 samples is complete, and those results will be discussed here.

We evaluated the samples by planting them in replicated field trials. Approximately 15,000 seeds of each sample were planted in October, 2003 and the following spring the plants were sprayed with BEYOND. Surviving plants displaying a distinctive hybrid phenotype for herbicide tolerance were counted 2 to 3 weeks after spraying, and pollen drift percentages were calculated. Our assumption is that plants with tolerance to imazamox must have picked up that trait through cross-pollination with Above.

The average level of cross-pollination in the 124 samples was 0.21%, with a range of 0.00 to 5.34%. The farthest distance at which we detected cross-pollination was 120 feet. Of 11 varieties represented, 'Jagger' had by far the highest rate of cross-pollination (average of 1.22% in 14 samples), but this was heavily influenced by a large number of survivors in samples from one specific field. Prairie Red had the next highest level of outcrossing (average of 0.24% in 11 samples). A partial summary of results for the samples closest to Above is presented in Fig. 1. These should be considered preliminary data, pending results from 2004 and 2005 samples.

Samples collected in 2004 are currently in the field, and another set of samples will be collected in summer of 2005. Graduate student Todd Gaines is seeking additional fields from which to collect seed samples just prior to harvest this year. Growers who have fields of Above planted next to non- *CLEARFIELD** varieties and who would like to participate in this study are requested to contact Todd by email at tgaines@holly.colostate.edu or by phone at 970-217-8604.

Fig. 1. Average cross-pollination observed in 11 varieties for samples collected from 0.5 to 15 feet from Above in 2003.

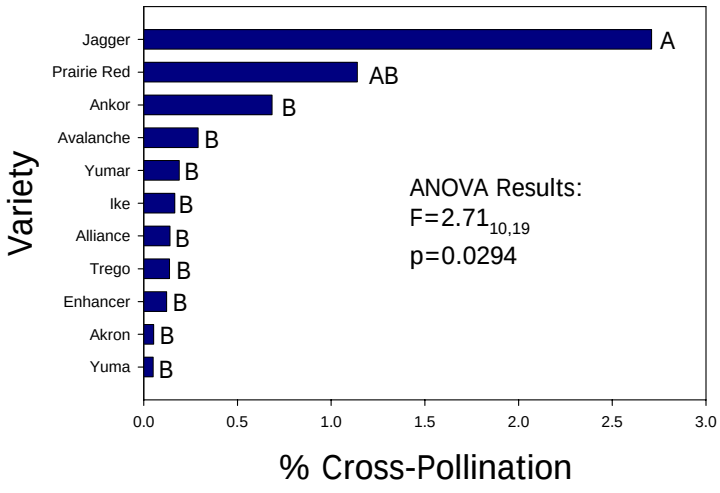


Fig. 1.

CSU Wheat Breeding Program Releases Two New Wheat Cultivars

In Fall 2004, the Colorado State University (CSU) Agricultural Experiment Station approved the release of two new winter wheat cultivars developed by CSU wheat breeder, Scott Haley and the Wheat Breeding and Genetics Program. These new cultivars are the most recent additions to the group of wheat cultivars developed by CSU and marketed by the Colorado Wheat Research Foundation.

The first of the new cultivars, named **'Hatcher'**, is a high-yielding hard red winter wheat with good milling and baking properties and resistance to the original biotype of RWA ("biotype 1"). Hatcher is positioned primarily as a replacement for other CSU-bred varieties with RWA resistance, particularly 'Prairie Red' and 'Yumar'. In three years of statewide testing in the dryland Colorado Uniform Variety Performance Trial (UVPT), Hatcher had slightly lower yield than 'Above' but greater than all other varieties in the trials (**see table below**). 'Hatcher' was named in honor of the late E.L. "Shug" Hatcher, a former Colorado Wheat Industry leader who farmed near Lamar, CO.

The second of the new cultivars, named **'Bond CL'**, is a high-yielding hard red winter wheat that combines resistance to the original biotype of RWA ("biotype 1"), excellent baking quality, and the *Clearfield** herbicide tolerance gene for winter annual grassy weed control with BEYOND herbicide from BASF. In three years of statewide testing in the dryland UVPT, 'Bond CL' was slightly lower yielding than 'Above' and 'Hatcher' but higher yielding than all other varieties in the trials (**see table below**). 'Bond CL' was named to highlight the "bonding" of the *Clearfield** herbicide tolerance trait with RWA resistance and improved baking quality relative to 'Above'.

Yield and test weight from CSU Dryland Uniform Variety Performance Trial (UVPT). Data are ranked by 3-year average (bolded).

Entry	2002	2003	2004	03-04 Avg	02-04 Avg	Test Wt Avg
Above	34.5	52.8	51.4	52.2	**48.4**	58.2
Hatcher	**32.0**	**56.0**	**48.3**	**52.5**	**48.1**	**58.1**
Bond CL	**31.3**	**55.2**	**48.4**	**52.1**	**47.7**	**57.3**
Trego	34.3	52.9	47.7	50.5	**47.0**	60.2
Jagalene	35.7	46.6	54.1	50.0	**46.9**	59.4
Ankor	33.7	51.8	48.3	50.2	**46.7**	58.2
Avalanche	31.6	50.4	50.6	50.5	**46.5**	59.7
Yuma	30.0	53.0	48.4	50.9	**46.4**	58.2
Stanton	32.6	49.4	50.4	49.8	**46.2**	59.1
Prairie Red	34.6	50.2	48.0	49.2	**46.1**	58.2
Yumar	30.8	50.3	48.7	49.6	**45.6**	58.6
AP502 CL	32.7	48.9	48.6	48.8	**45.3**	57.7
Lakin	33.9	47.8	49.0	48.4	**45.3**	58.8
Alliance	32.5	50.5	46.4	48.6	**45.2**	58.2
Akron	33.2	49.6	46.7	48.3	**45.1**	58.2
Jagger	31.7	46.0	47.3	46.6	**43.4**	58.2
Halt	34.7	46.7	41.9	44.5	**42.4**	58.0
Prowers 99	31.8	45.4	42.2	43.9	**41.3**	59.4
Thunderbolt	30.8	39.6	43.0	41.1	**38.9**	59.7
Average	**32.7**	**49.5**	**47.7**	**48.6**	**45.2**	**58.6**
Locations	**3**	**6**	**5**	**11**	**14**	**14**

'Hatcher' Hard Red Winter Wheat

- Bearded, white-chaffed, medium maturity, semidwarf
- Heading one day later than 'Yumar', plant height similar to 'Halt'
- Intermediate coleoptile length, good shattering tolerance, average straw strength
- Test weight similar to 'Yumar', superior to 'Prairie Red' and 'Ankor'
- Moderately susceptible to both leaf rust and stripe rust, resistant to "biotype 1" RWA
- Excellent milling properties, good baking properties

'Bond CL' Clearfield* Wheat

- Bearded, white-chaffed, medium-early maturity, tall-semidwarf
- Heading two days later and plant height two inches taller than 'Above'
- Intermediate coleoptile length, good shattering tolerance, average straw strength
- Relatively low test weight, slightly lower than 'AP502 CL'
- Moderately susceptible to both leaf rust and stripe rust, resistant to "biotype 1" RWA and greenbug
- Acceptable milling properties, excellent baking properties

RWA resistance denotes resistance to the original strain (biotype 1) of RWA. All available wheat varieties are susceptible to the new strains of RWA. "Resistance" means a wheat variety expected to suffer less loss to RWA biotype 1 than susceptible varieties under similar infestation and growing conditions. It does not mean no aphid infestation will occur. Losses associated with infestation will vary by variety and growing conditions.

Irrigated Winter Wheat - The Platte Value Program

Rollin Sears and Rob Bruns

AgriPro's "Platte" variety is exclusively licensed to the Grain Processing Group of ConAgra Food Ingredients Company, and ConAgra contracts directly with High Plains producers to produce Platte and deliver it to assigned local country elevators or the ConAgra flour mill. This identity-preserved (IP) program, entering its ninth year in Colorado, links seed suppliers, producers, country elevators, a processor and bakers together to add value to each other's businesses. The producer benefit is based upon a grain pricing schedule, available at planting time and backed by a ConAgra Foods contract, that offers a basic premium over local hard red wheat markets, plus protein premiums which are commonly attainable under proper management. Producers know their premium potential prior to planting and they understand the crop's overall return potential if targets are achieved.

The Platte Value Program process starts when producers sign up with a local AgriPro Seed Associate to buy certified Platte seed in the fall. Producers agree to deliver all their Platte production the following year to specified local delivery points spread out across NE Colorado and SW Nebraska. ConAgra markets the flour milled from Platte to a variety of customers to whom Platte delivers increased value over flour milled from "commodity" wheat such as Hard Red Winter or Hard Red Spring.

Platte has been a consistent top performer under irrigated trials and has an excellent test weight pattern. Platte's parentage includes Abilene and experimental white wheat from Spain. It has shown the following characteristics in past years:

Height	- short semidwarf
Stem & leaf rust	- good
Straw strength	- excellent
Wheat Streak Virus	- above average
Test Weight	- excellent
Stripe rust	- susceptible
Protein potential	- excellent
Mildew	- susceptible
Maturity	- medium
RWA	- susceptible
Winter hardiness	- similar to Akron
Shatter	- average

In 2001 and 2003 stripe rust reduced yields of all susceptible varieties, including Platte. Because of this and powdery mildew, AgriPro is recommending a standard fungicide application on all high yield potential irrigated wheat and scouted high yield dryland acres. Participation in the Platte Value Program also allows a producer to be eligible to participate in the USDA's White Wheat Incentive Program, the details of which are available at local FSA offices. If you're interested in more information about participating in the Platte Value Program, contact Mike Martin with ConAgra's Grain Processing Group at 303-289-6141, or AgriPro Wheat at 785-667-2335, or any of the following AgriPro Associates that are growing the certified seed:

Terry Ring	Crook	970-253-5009
Perry Brothers Seed	Otis	970-246-3401
Roggen Certified Seed LLC	Roggen	303-849-5339
Kenneth Pottorff	Stratton	719-348-5213
Knievel Seed Co.	Wiggins	970-483-6166
Andrews Bros. Seed, Inc	Yuma	970-848-0709
Mattson Farms	Colby	785-586-2313
Kramer Seed Farms	Hugoton	620-544-4330
Luhrs Certified Seed	Enders	308-882-5917
Jirdon Agri Chemicals, Inc.	Morrill	308-247-2126
Prairie Farms Ltd.	Albin	307-246-3458
Grainland Cooperative	Haxtun	970-774-6166
Holyoke Coop Assn.	Holyoke	970-854-2254
Stratton Equity Cooperative	Stratton	719-348-5396
Frenchman Valley Coop	Grant	308-352-4295
Frenchman Valley Coop	Imperial	308-882-3200
Frenchman Valley Coop	McCook	308-345-3615

Making Better Marketing Decisions in 2005

Darrell Hanavan

China may well be the wild card in the 2005-06 marketing year. China has drawn down its huge stocks of wheat and will need to import large quantities of wheat, especially if it has a smaller-than-average wheat crop in 2005. The world stocks-to-use ratio projected to end the 2004-05 marketing year at 24.3 percent, which is significantly below the 10-year average of 31.1 percent (despite an all-time record world wheat crop). The U.S. wheat stocks-to-use ratio is projected to end the 2004-05 marketing year at 24.2 percent, which is considerably below the 10-year average of 28.6 percent.

Projected planting of all U.S. wheat in 2005 is expected to be down approximately 2 percent from 2004, but down 10 percent from the 10-year average and the lowest planted acreage since 1972. However, the actual acres harvested, yield and production will be the keys to the price of wheat in the 2005-06 marketing year and could also be favorably influenced by below average world wheat production (especially in China).

Understanding historical market trends can help Colorado wheat producers make better marketing decisions. Only 35 percent (35%) of the state's winter wheat production is marketed during the months of October to January when the highest price is typically received for the lowest carrying cost (storage plus interest). Thirty-six percent (36%) of Colorado's wheat production is sold prior to October when market prices have been the lowest. On average, there has been a 41-cent per bushel (but as high as $1.47 per bu.) price advantage by selling after September instead of July. The estimated monthly carrying cost for storage and interest is five to six cents per bushel. Producers who are unable to take advantage of this historic rise in prices after September might consider options or futures contracts to manage financial risk.

Current wheat market fundamentals suggest that prices may increase by more than the 10-year average of 41 cents per bushel after September in the 2005-06 marketing year. The price of wheat during the 2004-05 marketing year was lower than it should have been based upon strong fundamentals of tight stocks-to-use ratios in the U.S. and world (and the price was definitely constrained by the negative psychology of an all-time record world wheat crop). Colorado wheat producers should strongly consider long-term price trends when making decisions to sell wheat early in the market season as they may miss out on upward price movement that historically occurs after September.

Managing new Russian wheat aphid biotypes

Frank Peairs, Terri Randolph, Scott Haley, Jerry Johnson, Jeff Rudolph, Thia Walker, Mike Koch, Bob Hammon

Background

Starting with Halt, wheat varieties resistant to Russian wheat aphid have been available in Colorado for about 10 years. The resistance in the following varieties is conferred by the gene Dn4 except for Stanton, a wheat variety from Kansas, which carries a different source of resistance. Together, Russian wheat aphid resistant varieties accounted for approximately 25% of Colorado's wheat acres in the 2002 and 2003 crop years, with higher percentages in counties with more consistent infestations.

	Resistant Variety	Breeding Process	Susceptible parent
•	Halt	developed through a crossing program	multiple parents
•	Prairie Red	resulting from backcross	TAM 107
•	Prowers 99	resulting from backcross	Lamar
•	Yumar	resulting from backcross	Yuma
•	Ankor	resulting from backcross	Akron
•	Stanton	developed through a crossing program	multiple parents

New Biotypes

In 2003 we were soon able to confirm that damage to RWA resistant varieties was caused by a new Russian wheat aphid biotype. We conducted a statewide survey in 2003 (results below) and, also in 2004, a USDA researcher identified at least three additional biotypes – two from Texas and one from Wyoming. To avoid confusion, we present our survey results to show the number and location of Biotype 1 and non-1 samples. We use the term "Biotype 1" to refer to the original aphid for which the resistant varieties were developed and "Biotypes non-1" to refer to the new aphid population that is able to overcome the resistance in available resistant varieties. Our survey resulted in a collection of over 100 Russian wheat samples from Colorado and the southern Nebraska Panhandle and roughly half (47%) of the samples were classified as Biotype 1. Biotypes non-1 were found throughout eastern Colorado but were not found in the West Slope samples. The range of Biotype 2 clearly has expanded since it was first observed in southeast Colorado last spring. However, it does not seem to have displaced Biotype 1, and it is unknown whether this pattern will change over the next few years. Varieties resistant to Biotype 1 therefore remain an important Russian wheat aphid management tool.

Area	Total Samples	Biotype	
		1	Non-1
NW & Front Range	35	23	12
Southeast	40	11	29
West Slope	8	8	0
Nebraska	6	2	4
Totals	99	44	45

Developing New Resistant Varieties

A common question is how soon will varieties resistant to both Biotype 1 and the new biotype(s) be available? This depends on where we find new sources of resistance. If resistance is found in advanced breeding material with good quality and agronomic traits, then the development period would be relatively short. We have screened over 350 elite breeding lines from Great Plains programs and failed to identify any useful resistance. Good news is that effective resistance to Biotypes non-1 has been identified in a few breeding lines from CSU and the USDA-ARS in Stillwater, Oklahoma, and a collection of germplasm from the National Small Grains Collection (Aberdeen, Idaho). Agronomic and quality evaluation of these materials is underway. However, no screening has been conducted with any of the newly discovered types so it is uncertain which, if any, of these accessions found to be resistant to multiple biotypes within Biotypes non-1.

We also have begun to screen for new sources of resistance. Most of the sources known to be resistant to Biotype 1 have proven to be susceptible to Biotypes non-1. A promising exception is Dn7, which confers high resistance to both biotypes, but was transferred to wheat from rye and is generally associated with poor baking quality. Also some of the newly discovered biotypes are virulent to Dn7. In addition, we have evaluated more than 700 Biotype 1 resistant lines and have identified several promising new sources. We are screening an additional 12,000 lines from the National Small Grains Collection. Lines resistant to Biotypes non-1 will be rescreened with Biotype 1 and with a Dn7-virulent type to identify promising lines for use in the development of varieties with broad resistance to as many Russian wheat aphid biotypes as possible.

Management of the New Biotypes

The resistant varieties mentioned above are still the most economical and effective management option for Biotype 1 but new biotypes must be managed with the methods developed before resistant varieties were available. These include biological control, cultural controls, and judicious insecticide treatments based on appropriate scouting and economic threshold information.

Biological controls consist of (1) native

natural enemies, such as lady beetles, lacewings, and spiders, which feed on a variety of insects including aphids; (2) exotic natural enemies collected from the Russian wheat aphid's native range and imported specifically for its control; and (3) commercially available natural enemies, which can be purchased and released in large numbers to control Russian wheat aphid. Each of these approaches may provide some control benefit in certain situations, but overall, biological control has not been sufficiently effective against Russian wheat aphid.

Cultural controls are changes in crop production practices that result in a crop environment that is less favorable for the pest or more favorable for natural enemies. Several cultural controls are known to provide some control benefit for Russian wheat aphid. Delayed planting of winter wheat and early planting of spring grains can help reduce initial aphid infestations. Crop diversification by producing winter wheat in rotation with summer crops is thought to enhance biological control activity, as well as providing a number of other economic and pest management benefits. Finally, any practice that results in a healthier and more vigorous crop should help minimize Russian wheat aphid problems, which often are worse in stressed portions of the field.

The important consideration in chemical control of Russian wheat aphid is what product to use and when to use it. We have tested a number of insecticide treatments since Russian wheat aphid first appeared in Colorado. It is convenient to compare treatments based on their consistency in achieving very good control (better than 90% control at three weeks after treatment). These results, summarized in Table 1, indicate that one pint of Lorsban 4E has been our most consistent treatment. Other available treatments, which we have not tested as extensively, include Cruiser and Gaucho seed treatments, Di-Syston and Furadan soil treatments, and Mustang Max foliar treatment.

The presence of other pests may have a bearing on the most appropriate treatment choice. For example, if cutworms are present in addition to Russian wheat aphid, a pyrethroid insecticide such as Mustang Max or Warrior would be a better choice than Lorsban 4E. The pyrethroids are highly effective against cutworms and moderately effective against Russian wheat aphid, while Lorsban is highly effective against the aphid but not effective against cutworms at the label rate.

See Table 2 for simple treatment guidelines for deciding whether a Russian wheat aphid treatment should be made. If one tiller shows damage, then the plant should be considered damaged. Aphids can be very difficult to find during cold weather, so base treatment decisions on damage alone under such conditions.

Table 1. Control of Russian wheat aphid with hand-applied insecticides in winter wheat, 1986-2003[1]

PRODUCT	LB (AI)/ACRE	TESTS WITH > 90% CONTROL	TOTAL TESTS	% TESTS
LORSBAN 4E	0.50	23	39	59
DI-SYSTON 8E	0.75	16	41	39
LORSBAN 4E	0.25	7	21	33
DIMETHOATE 4E	0.375	7	33	21
DI-SYSTON 8E	0.50	2	10	20
PENNCAP M	0.75	3	19	17
WARRIOR 1E	0.03	2	12	17

[1]Includes data from several states.

Table 2. Treatment guidelines for Russian wheat aphid by crop stage.

Crop Stage	Level at which aphids should be treated[1]
FALL	
Any growth stage	10-20% damaged plants
SPRING	
Regrowth to early boot	5-10% damaged and infested tillers
Early boot to flowering	10-20% damaged and infested tillers
After flowering	More than 20% damaged and infested tillers

[1]Based on a 100 plant or tiller sample.

An alternative threshold for the period from spring regrowth to heading, which takes into consideration control costs and expected crop value, is as follows:

$$\%\ \text{Infested Tillers} = \frac{\text{Control Costs (\$/acre)} \times 200}{\text{Expected yield (bu/acre)} \times \text{Expected price (\$/bu)}}$$

For example, the % infested tillers above which treatment should be considered for $15 control costs, 34 bu/acre expected yield and $3.50 would be calculated as follows:

$$25\%\ \text{Infested Tillers} = \frac{\$15.00 \times 200}{34 \times \$3.50}$$

Increases in crop value or reduced control costs result in less infestation required to justify treatment, while the reverse is true for decreased crop value or increased control costs. For example, if the price of wheat were lower it would take more aphid damage to justify an insecticide expenditure.

$$32\%\ \text{Infested Tillers} = \frac{\$15.00 \times 200}{34 \times \$2.75}$$

If the percentage of infested tillers calculated in this manner is less than the percentage of infestation observed in a 100-tiller sample from the field being evaluated, then a treatment should be considered. After heading, use a factor of 500 rather than 200 in the numerator.

Further Information

The ***High Plains Integrated Pest Management Guide for Colorado, western Nebraska, Wyoming, and Montana*** provides on-line management information for Russian wheat aphid and the other pests and diseases of small grains, as well as most other crops grown in the region.

http://www.highplainsipm.org/

The Colorado State University fact sheet ***Aphids in Small Grains*** summarizes management information for Russian wheat aphid as well as other aphids that attack wheat and similar crops in Colorado.

http://www.ext.colostate.edu/pubs/insect/05568.pdf/

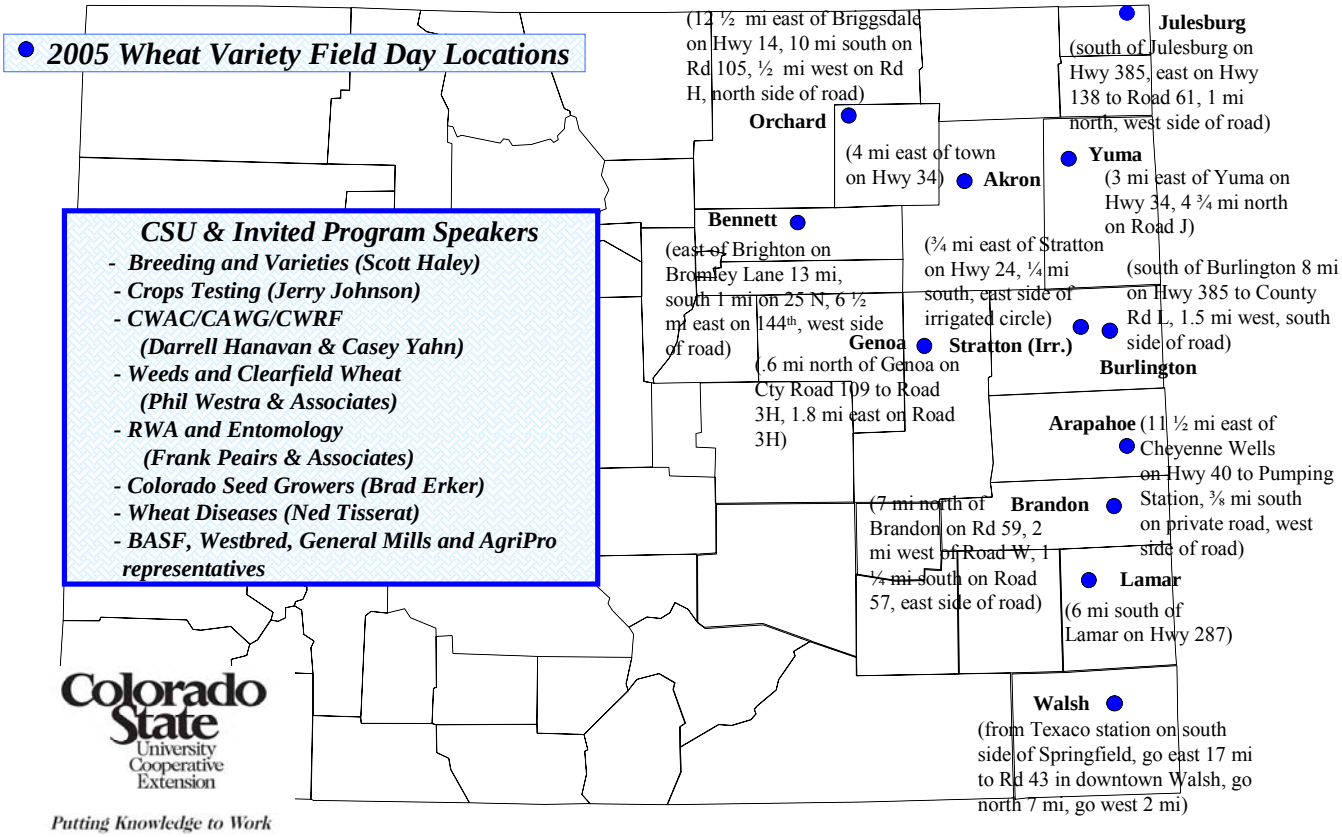
Areawide Pest Management for Wheat: Management of Greenbug and Russian Wheat Aphid is a cooperative project between USDA-ARS and several states, including Colorado. This project is designed to improve the management of these key wheat pests through diversified cropping, resistant varieties, remote sensing, and other pest management tools. New pest management information is being developed through economic surveys, field research, and grower focus groups. Colorado research sites are located at Walsh, Lamar, and Briggsdale.

http://www.ars.usda.gov/Business/docs.htm?docid=6556

Colorado Wheat Field Days 2005

*Walsh (*CM)*	*June 13 (Mon)*	*11 a.m. at Plainsman Research Center, Baca County*
*Lamar (*CM)*	*June 13 (Mon)*	*6 p.m. at John Stulp's house, Prowers County*
Brandon	*June 14 (Tues)*	*9 a.m. at Burl Scherler Farm, Kiowa County*
*Arapahoe (*CM)*	*June 14 (Tues)*	*12 p.m. at Dennis & Matt Campbell Farm, Cheyenne County*
*Burlington (*CM)*	*June 14 (Tues)*	*4 p.m. at Randy Wilks Farm, Kit Carson County*
*Akron (*CM)*	*June 15 (Wed)*	*8 a.m. at Central Great Plains Res. Station, Washington County*
*Yuma (*CM)*	*June 15 (Wed)*	*4 p.m. at Andrews Brothers Farm, Yuma County*
*Julesburg (*CM)*	*June 16 (Thurs)*	*8 a.m. at David Deden Farm, Sedgwick County*
*Orchard (*CM)*	*June 16 (Thurs)*	*12:30 p.m. at Cary Wickstrom Farm, NW Morgan County*
Stratton (Irrigated)	*June 20 (Mon)*	*9:30 a.m. at Pautler Bros. Farm, Kit Carson County*
*Genoa (*CM)*	*June 20 (Mon)*	*12 p.m. at Ross Hansen Farm, Lincoln County*
*Bennett (*CM)*	*June 20 (Mon)*	*5 p.m. at John Sauter Farm, Adams County*

*(*CM = Complimentary Meal at the Field Day)*



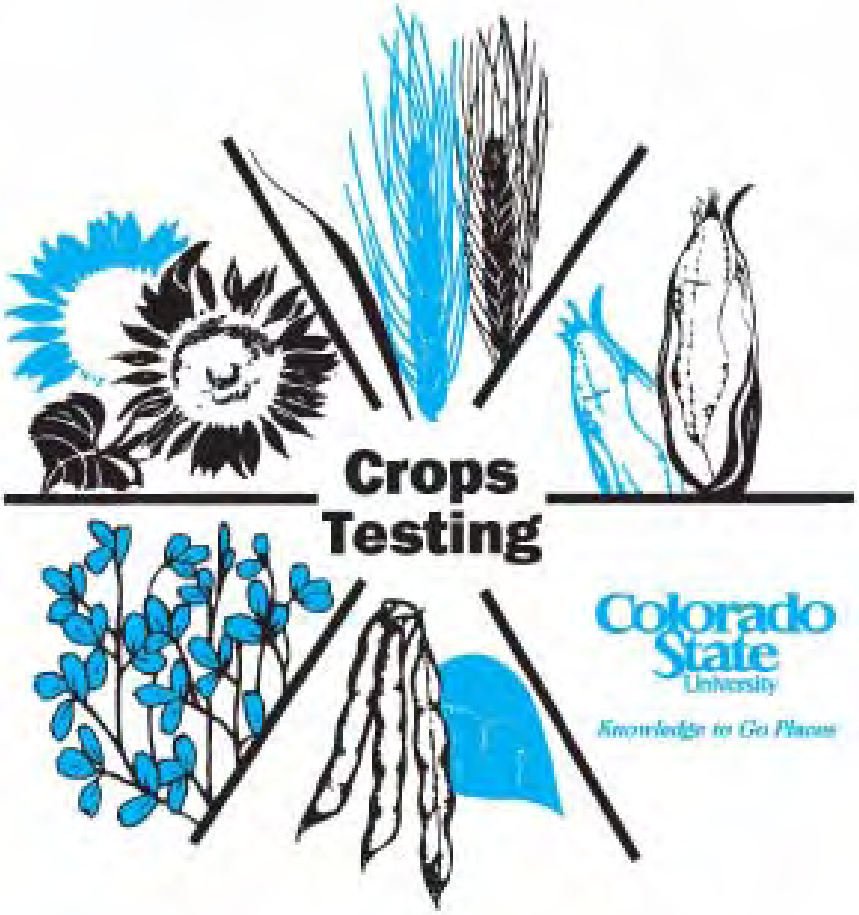
MAKE NOTES FOR VARIETIES YOU LIKE:

2004-2005 Colorado Winter Wheat UVPT

Variety Name	Plot #	Comments
Prowers 99	101	
Prairie Red	102	
Stanton	103	
Hatcher	104	
Ankor	105	
Akron	106	
Yuma	107	
Above	108	
Bond CL	109	
Infinity CL	110	
Jagger	111	
Overley	112	
G980143	113	
Alliance	114	
Harry	115	
Goodstreak	116	
Avalanche	117	
Trego	118	
KS02HW34	119	
NuFrontier	120	
NuHills	121	
GM10006	122	
Jagalene	123	
TAM 111	124	
Enhancer	125	
Endurance	126	
AP502 CL	127	
Thunderbolt	128	
NuHorizon	129	
Yumar	130	
Wahoo	131	
Millennium	132	
Lakin	133	

2004-2005 Colorado Winter Wheat IVPT

Variety Name	Plot #	Comments
Yuma	101	
Wesley	102	
Antelope	103	
Platte	104	
Jagalene	105	
Dumas	106	
W04-417	107	
TAM 111	108	
NuFrontier	109	
NuHorizon	110	
NuHills	111	
Hatcher	112	
Bond CL	113	
Ankor	114	
Prairie Red	115	
Overley	116	
Ok102	117	
GM10006	118	



Colorado State University

Knowledge to Go Places

Jerry Johnson, Extension Specialist Crop Production

Colorado State University Cooperative Extension

Putting Knowledge to Work

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