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MAKING BETTER DECISIONS

1998 Colorado Wheat Variety Performance Trials

Agricultural Experiment Station

Colorado State University

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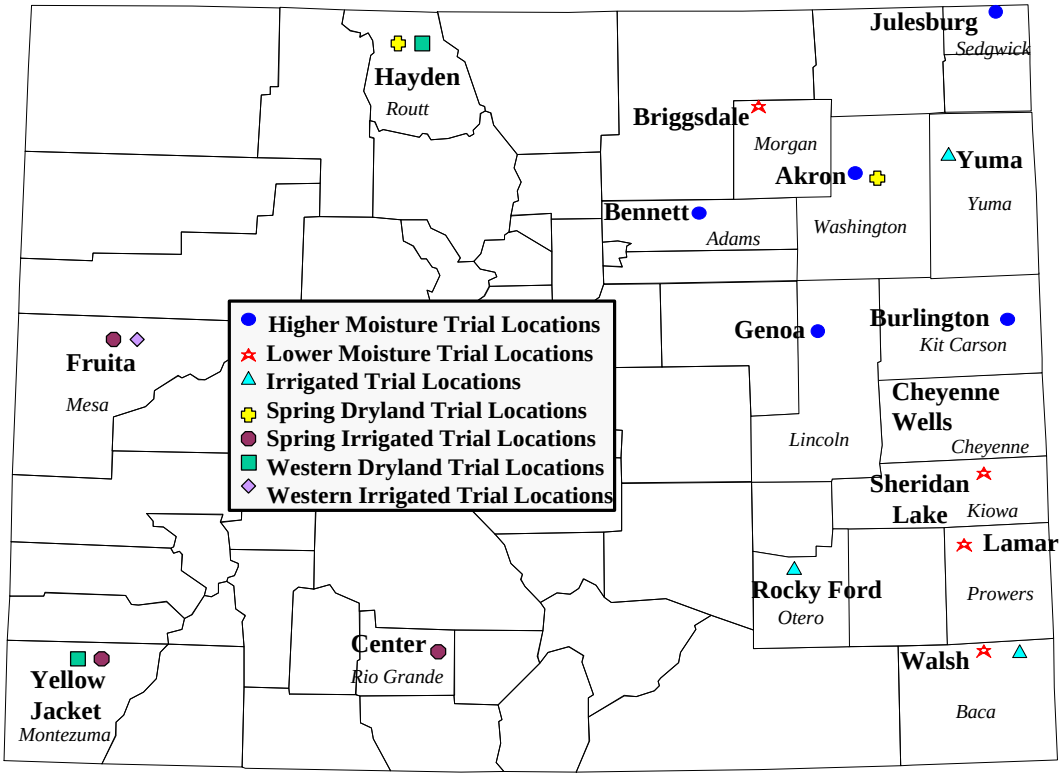
1998 Wheat
Variety Performance Trials



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1998 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 most timely manner to Colorado wheat producers. Better use of performance trial results by Colorado wheat producers can lead to better variety selection and earlier adoption of higher yielding varieties.

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 Grower*
2) Variety trial results are put up on DTN (Data Transmission Network)
3) Variety trial results are available on the Crops Testing Internet page **(http://www.colostate.edu/Depts/SoilCrop/extension/CropVar/index.html)**
4) Results are published in *From the Ground Up*, a Soil and Crop Science Extension publication.
5) Selected results are published in *The Colorado Farmer Stockman*

Trial Conditions and Methods - 1997/98

Moist planting conditions in the fall of 1997 led to good plant stands with the exception of dry planting conditions in parts of Adams, Arapahoe, Washington and Lincoln counties. An October blizzard covered most of eastern Colorado, providing fall moisture to counties that had experienced dry planting conditions, and had a profound effect on the 1997/98 cropping season. Neither mites nor Russian wheat aphids were found in most of eastern Colorado. Wheat streak mosaic, vectored by the wheat curl mite, was equally absent in 1998. Drought conditions prevailed through the spring in parts of Adams, Arapahoe, Washington, and Lincoln counties, leading to below average yields. However, wheat yields in southeastern Colorado were well above normal and elsewhere yields were at or near normal. Jointed goatgrass and other weeds were less problematic in 1998 than in previous years, although wild rye infestations were serious in some areas.

Colorado winter wheat variety trials are conducted according to moisture group, with different varieties in each group, except for some varieties that are common to all three groups. In 1998, **lower moisture** variety trials were harvested at Orchard (formerly Briggsdale), Sheridan Lake, Lamar, Walsh, and Cheyenne Wells (new trial location added in 1997/98). Successful **higher moisture** trials were conducted at Burlington and Ovid. Problems were encountered at Bennett (due to field irregularities only data from two replicates could be used), Akron (severe drought led to large yield variation that could not be attributed to variation among varieties or replications), and Genoa (most plant emergence occurred in early spring). Three successful **irrigated** winter wheat variety trials were conducted at Rocky Ford, Yuma, and Walsh. Trials include public, private, and experimental varieties. Testing **Colorado numbered lines** is very important for identification of varieties with wide adaptability to our highly variable growing conditions. Each year, more than a million new genetic combinations are created by the wheat breeding team in Fort Collins. After heavy screening, the most promising of these lines are tested in the Colorado variety trials throughout eastern Colorado. A summary table showing performance of the Colorado experimental lines in their second and third year of testing is included in this report.

A randomized complete block field design with four replicates is used in all trials. Four 12 inch-spaced rows, 44 feet long, are harvested from each plot. All trials are seeded at 600,000 seeds/acre, except for the irrigated trials that are planted at 750,000 seeds/acre. Grain yields were adjusted to 12% moisture. The least significant difference (LSD) value, alpha=0.30, is reported for yields. Carmer[1] (1976) found that producers' risk of economic loss was minimized by using LSD alpha values of 0.20 to 0.40.

All lower moisture trials were excellent in 1998 with average yields of 53 bu/ac and average test weights of 59 lb/bu. In the higher moisture trials, low fall and spring precipitation at Bennett, Genoa, and Akron caused low yields and test weights at these locations. Hail reduced yields at the Yuma irrigated trial but very good results were obtained at Rocky Ford where the variety, Yuma, averaged 120 bu/ac. Variety planting suggestions, based on these trial results, are found in the revised "Decision Tree for Winter Wheat Variety Selection in Colorado." The on-farm test results should also be consulted before making a variety selection as Halt, Prowers, and Yumar, three varieties resistant to the Russian wheat aphid, were compared to TAM 107 in 20 eastern Colorado on-farm tests. The new name for TAM 107-R3, released in 1998, is 'Prairie Red'.

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[1]Reference: Carmer, S.G. 1976. Optimal significance levels for application of the least significant difference in crop performance trials. Crop Sci. 16:95-99.

Table 1. 1998 variety performance trial information.

Locations	Entries #	Date of Planting 1997	Date of Harvest 1998	Soil Texture	Previous Crop	Fertilization (lb/A) Nitrogen, N	Fertilization (lb/A) Phosphorus P_2O_5	Type of Irrigation
Higher Moisture								
Akron	44	9/19/97	7/13/98	Silt Loam	Corn	0	0	None
Bennett	44	9/16/97	7/13/98	Sandy Clay	Fallow	40	20	None
Burlington	44	9/15/97	7/6/98	Silt Loam	Sunflowers	0	40	None
Genoa	44	9/12/97	7/21/98	Sandy Clay	Fallow	46	20	None
Julesburg	44	9/17/97	7/15/98	Silt Loam	Wheat	0	0	None
Lower Moisture								
Briggsdale	40	9/15/97	7/15/98	Sandy Clay	Fallow	40	35	None
Cheyenne Wells	40	9/11/97	7/6/98	Silt Loam	Fallow	6	20	None
Lamar	40	9/12/97	6/30/98	Silt Loam	Fallow	40	35	None
Sheridan Lake	40	9/11/97	7/2/98	Silt Loam	Fallow	6	20	None
Walsh	40	9/24/97	7/1/98	Sandy Clay Loam	Fallow	8	28	None
Irrigated								
Rocky Ford	24	9/24/97	7/11/98	Silty Clay Loam	Onions	170	50	Furrow
Walsh	24	9/23/97	7/2/98	Sandy Clay Loam	Fallow	83	28	
Yuma	24	9/29/97	7/17/98	Sandy Loam	Sugarbeets	120	0	Sprinkler

Descriptions of winter wheat varieties in trials:

2137 Kansas State release (1995), originating from the Pioneer program. Semidwarf, medium-early maturity, high test weight and yield. Good winterhardiness, leaf disease resistance, below-average protein.

Akron Colorado State release (1994), from a TAM 107/Hail cross. Semidwarf, medium maturity, excellent performance record in recent years.

Alliance Univ. Nebraska release (1993), from Arkan/Colt//Chisholm sib cross. Medium-early maturity, below-average protein, short coleoptile, above average tolerance to root rot and crown rot.

Arapahoe Univ. Nebraska release (1988), from cross with 50% Brule parentage. Medium maturity, excellent winterhardiness, average straw strength, short coleoptile.

Arlin Hard white Kansas State release (1992), marketed through American White Wheat Producers Association. Very marginal winterhardiness, very sprout susceptible.

Baca Colorado State release (1973), from a Scout selection. Early maturing, tall, long coleoptile, historically stable performance under drought stress conditions.

Buckskin Univ. Nebraska release (1973), from cross with 50% Scout parentage. Medium maturity, tall wheat, adaptation area in north central Colorado.

Halt Colorado State release (1994), from cross with 50% TAM 107 parentage. Russian wheat aphid resistant, semidwarf, early maturity, very good quality characteristics.

Hawk Agripro release (1994), from cross with 50% Baca parentage. Russian wheat aphid resistant, semidwarf, early maturity, very good quality characteristics.

Jagger Kansas State release (1994), from a cross with 50% parentage of a Karl sister selection. Bronze-chaffed, strong straw, early maturing semidwarf. Breaks dormancy very early in spring, marginal winterhardiness.

Lamar Colorado State release (1988), from a cross with 50% Vona parentage. Tall, medium maturity, very good quality. Long coleoptile, historically stable performance under drought stress conditions.

Laredo Agripro release (1992), from Colt/Victory cross. Early maturing semidwarf, good straw strength, excellent leaf rust resistance.

Longhorn Agripro release (1991), from a cross with 50% Thunderbird parentage. Awnless (beardless) wheat, vigorous fall and spring growth, well-adapted for grazing situations.

Niobrara Univ. Nebraska release (1994), from a cross with 50% parentage of a Brule sister selection. Tall, medium-late, good winterhardiness.

Ogallala Agripro release (1993), from a TX81V6187/Abilene cross. Medium-early, semidwarf, short coleoptile, good quality characteristics.

Prairie Red Colorado State release (1998), from CO850034/PI372129//5*TAM 107 backcross. Russian wheat aphid resistant, semidwarf, early maturity. Similar to TAM 107 in all respects, except for its RWA resistance.

Prowers Colorado State release (1997), from the backcross of CO850060/PI372129//5*Lamar. Russian wheat aphid resistant, tall, medium maturity, very good quality characteristics. Similar to Lamar, except RWA resistant.

QT 542 Hybritech release (1988), winter wheat hybrid. Medium maturity, medium-tall, very good winterhardiness.

Rawhide Univ. Nebraska release (1991), from a complex cross. Early maturity, semidwarf, short coleoptile, good performance under irrigated conditions.

Sandy Colorado State release (1981), from a cross with 50% Centurk parentage. Tall, medium-late, good stand establishment characteristics and above average tolerance to root rot and crown rot.

Scout 66 Univ. Nebraska release (1966), derived from selections from Scout. Tall, early, very long coleoptile, excellent fall stand establishment, high test weight.

TAM 107 Texas A&M release (1984), from the cross TAM 105*4/Amigo. Bronze-chaffed, early semidwarf, medium long coleoptile, excellent heat tolerance, resistant to some wheat curl mite (transmits wheat streak mosaic virus) biotypes.

TAM 110 Texas A&M release (1995), from the cross (TX71A562-6*4/Amigo) *4/Largo. Early semidwarf, resistant to Greenbug biotypes C and E.

TAM 200 Texas A&M release (1987), from a cross with 50% Centurk parentage. Medium early semi-dwarf, good straw strength, marginal winterhardiness and quality characteristics.

Thunderbird Agripro release (1985), from unknown pedigree. Medium-tall, medium-early, long coleoptile, good test weight characteristics.

Thunderbolt Agripro release (1999), from the cross Abilene/KS90WGRC10. Bronze chaffed, early maturing semidwarf, good straw strength.

Tomahawk Agripro release (1991), from unknown pedigree. Early, semidwarf, good straw strength, short coleoptile.

Turkey Landrace introduction from Russia. (Long-term check variety)

Vista Univ. Nebraska release (1992), from a cross with 50% Brule parentage. Medium maturity, semidwarf, average straw strength, very short coleoptile, good test weight and quality characteristics.

Vona Colorado State release (1976), from the cross II21183/C0652363/2/Lancer. Medium-early, semidwarf, marginal winterhardiness, short coleoptile.

Wichita Kansas State release (1944), from the cross Early Blackhull/Tenmarq. Tall, early, very long coleoptile, very poor straw strength. (Long-term check variety)

Yuma Colorado State release (1991), from the cross NS14/NS25/2*Vona. Medium-early semidwarf, good straw strength, short coleoptile, good quality characteristics.

Yumar Colorado State release (1997), from crosses and backcrosses with Yuma as recurrent parent. Medium-early semidwarf, good straw strength. Similar to Yuma except for its RWA resistance.

Table 2. Winter wheat high moisture performance summary for 1998.

	Location***										Averages			
	Akron		Bennett		Burlington		Genoa		Julesburg		1998			3-Yr
Variety*	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	% Yield of TAM 107	1996/97/98
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu		bu/ac
Akron	46.9	56.8	72.1	59.4	52.3	56.2	45.6	54.2	66.1	59.9	56.6	57.3	106	50.7 [1]
QAP7406	50.6	55.8	68.4	59.5	52.9	54.9	45.1	53.7	60.1	59.5	55.4	56.7	104	------
Jagger	51.3	56.0	64.0	57.7	58.5	54.8	41.6	52.8	55.7	58.1	54.2	55.9	102	48.1 [6]
H1881	41.6	54.3	68.1	57.0	55.8	53.6	35.1	51.1	68.4	59.4	53.8	55.1	101	------
Alliance	37.5	55.5	64.6	59.3	55.2	55.4	44.3	53.3	66.6	58.7	53.6	56.4	100	49.3 [3]
TAM 107	47.6	55.8	66.2	57.7	55.2	55.8	42.7	53.2	55.4	59.6	53.4	56.4	100	50.4 [2]
G12017	47.1	54.4	69.2	58.4	50.2	54.5	40.3	52.4	60.1	59.1	53.4	55.8	100	------
Halt	42.1	54.4	58.0	57.7	57.2	55.2	41.8	53.5	67.2	59.6	53.3	56.1	100	48.3 [4]
TAM 110	37.0	56.4	63.1	58.2	57.4	55.4	44.2	52.5	61.9	59.4	52.7	56.4	99	------
2137	39.7	55.3	63.6	58.3	56.4	55.0	44.1	53.4	59.3	59.8	52.6	56.4	99	------
Yuma	37.8	56.0	64.9	58.4	52.1	54.5	38.9	53.1	66.9	59.4	52.1	56.3	98	47.5
QAP7510	38.5	56.7	56.6	58.6	57.3	57.2	42.6	54.3	63.8	60.0	51.8	57.4	97	------
Yumar	44.8	58.3	61.9	59.0	50.6	54.8	37.8	53.3	58.4	61.0	50.7	57.3	95	48.2 [5]
QAP7501	44.6	56.7	58.4	58.6	54.2	55.7	42.4	54.3	53.3	59.7	50.6	57.0	95	------
AgriPro Laredo	42.8	56.1	58.5	57.8	55.4	57.2	40.7	53.7	54.2	59.6	50.3	56.9	94	42.0
Arapahoe	39.2	56.0	62.9	57.7	49.3	53.6	38.5	52.8	59.6	58.7	49.9	55.8	93	42.4
Prairie Red**	30.5	56.4	59.7	57.7	56.9	55.5	40.8	52.8	58.7	59.1	49.3	56.3	92	------
G1594	40.9	56.3	55.8	59.9	50.7	57.3	37.7	53.9	57.1	60.4	48.4	57.6	91	------
Arlin	40.2	58.2	61.7	58.6	54.5	58.8	35.6	53.3	48.6	59.5	48.1	57.7	90	44.9
T834	38.8	56.4	58.6	58.4	54.4	56.1	37.8	52.6	50.4	59.5	48.0	56.6	90	------
Prowers	37.4	57.9	59.5	61.3	41.6	55.4	36.8	54.3	63.8	61.5	47.8	58.1	90	------
Sandy	38.0	58.2	63.2	59.6	40.3	55.4	41.2	55.0	56.2	61.3	47.8	57.9	89	47.2
AgriPro Ogalalla	33.5	57.3	55.5	59.2	50.1	57.6	31.5	53.6	62.3	60.6	46.6	57.7	87	41.0
Lamar	37.7	56.9	57.1	60.1	43.3	55.7	38.3	55.4	55.1	60.4	46.3	57.7	87	46.0
G1878	34.2	58.8	49.4	60.6	51.7	58.9	39.6	54.8	54.0	61.5	45.8	58.9	86	------
Wichita	22.5	44.1	49.4	59.0	35.1	56.7	32.8	54.3	49.1	60.0	37.8	54.8	71	37.0
Average	**40.1**	**56.0**	**61.2**	**58.8**	**51.9**	**55.8**	**39.9**	**53.5**	**58.9**	**59.8**	**50.4**	**56.8**	**94**	
CV%	18.1		6.4		10.3		10.3		16.2					
$LSD_{(3)}$	5.5		4.1		4.0		3.0		6.9					

* Varieties ranked by the average yield over five locations in 1998.

** Tested as CO940623-R3 and also TAM 107-R3.

*** Bennett and Genoa grain yields are adjusted to 12% moisture content.

[1,.....6] Variety rank based on 3-Yr average yields.

Table 3. High moisture experimental performance summary for 1997-98.*

	Average Yields	
Variety	1998	2-Yr
	bu/ac	bu/ac
Akron	56.6	48.5
TAM 107	53.4	48.3
CO940611	51.8	49.3
CO940610	51.7	51.8
CO940615	51.5	49.8
CO940024	49.7	46.5
CO940595	46.7	45.9
Lamar	46.3	41.9
CO940607	45.1	45.8

*Only experimentals included in both years are reported.

Table 4. Winter wheat lower moisture performance summary for 1998.

	Location***										Averages			
	Briggsdale		Cheyenne Wells		Lamar		Sheridan Lake		Walsh		1998			3-Yr
Variety*	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	% Yield of TAM 107	1996/97/98
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu		bu/ac
Alliance	48.1	59.0	55.4	59.2	81.3	61.8	63.6	57.9	51.5	56.6	60.0	58.9	104	62.0 [1]
TAM 107	48.9	57.0	49.8	58.1	78.9	60.7	57.6	57.0	53.3	57.2	57.7	58.0	100	52.9 [4]
Yuma	49.0	58.5	50.8	58.5	77.1	62.2	53.3	56.8	52.7	57.3	56.6	58.7	98	51.3 [6]
Akron	45.9	59.7	47.8	58.6	76.1	61.5	55.6	57.3	54.1	56.4	55.9	58.7	97	58.1 [2]
TAM 110	45.8	57.8	51.7	58.0	78.5	60.9	53.0	57.6	50.4	56.7	55.9	58.2	97	54.6 [3]
Windstar	44.9	58.0	48.8	58.4	76.6	61.6	55.6	57.9	50.6	54.6	55.3	58.1	96	49.2
G12017	44.1	59.4	46.0	59.1	77.8	61.6	55.6	57.5	49.7	54.2	54.6	58.4	95	------
T812	44.0	59.0	47.2	59.5	74.8	61.9	52.6	59.1	50.7	57.1	53.9	59.3	93	------
Sandy	48.2	60.3	48.2	58.7	69.7	63.2	56.4	57.2	43.9	57.3	53.3	59.3	92	50.2
Prairie Red**	46.0	58.3	47.7	57.9	65.7	61.3	57.0	57.9	49.7	55.6	53.2	58.2	92	------
Lamar	44.8	59.9	47.7	59.8	73.2	63.0	55.8	58.5	44.3	57.0	53.1	59.6	92	48.6
Niobrara	45.6	57.1	50.3	57.0	67.6	60.1	52.8	57.2	48.7	55.8	53.0	57.5	92	51.6 [5]
Halt	49.9	58.4	47.2	58.5	70.0	61.5	50.0	57.9	46.7	56.9	52.8	58.6	91	50.6
Prowers	45.0	60.6	49.4	60.5	68.7	62.0	55.4	59.4	43.5	57.5	52.4	60.0	91	48.6
2137	42.0	58.7	41.9	59.1	71.2	61.2	53.6	59.1	48.0	54.9	51.3	58.6	89	------
Baca	43.7	59.5	49.1	60.1	63.3	61.7	51.7	58.7	46.2	57.5	50.8	59.5	88	48.1
Arlin	43.6	59.1	44.1	59.7	68.7	63.0	45.0	58.6	51.1	59.9	50.5	60.1	88	45.4
Pronghorn	42.4	58.8	49.5	59.0	63.6	61.3	53.1	57.9	43.7	56.4	50.5	58.7	87	47.0
Yumar	41.1	59.3	42.8	59.1	65.6	62.7	51.7	58.3	49.3	57.0	50.1	59.3	87	49.2
Buckskin	43.0	59.7	46.8	58.5	61.7	61.3	52.7	57.9	45.4	55.1	49.9	58.5	87	48.1
G1878	36.4	59.9	42.3	59.7	64.4	62.7	50.4	57.7	48.6	59.6	48.4	59.9	84	------
Wichita	34.4	59.1	39.7	58.8	52.5	62.9	40.9	58.3	36.7	60.0	40.8	59.8	71	38.5
Average	**44.4**	**59.0**	**47.5**	**58.9**	**70.3**	**61.8**	**53.3**	**58.0**	**48.1**	**56.9**	**52.7**	**58.9**		
CV%	7.9		10.1		9.7		8.0		7.9					
LSD $_{(.3)}$	2.8		3.5		5.9		3.2		2.8					

* Varieties ranked by the average yield over five locations in 1998.

**Tested as CO940623-R3 and also TAM 107-R3

*** Briggsdale, Cheyenne Wells Lamar, and Sheridan Lake grain yields are adjusted to 12% moisture content.

[1.....6] Variety rank based on 3-Yr average yields.

Table 5. Lower moisture experimental performance summary for 1997-98.*

	Average Yields	
Variety	1998	2-Yr
	bu/ac	bu/ac
TAM 107	57.7	52.9
CO940128	56.4	53.3
Akron	55.9	52.3
Lamar	53.1	48.6
CO940287	52.7	50.1
CO930948	50.7	48.9

*Only experimentals included in both years are reported.

Table 6. Winter wheat irrigated performance summary for 1998.

	Location***						Averages			
	Rocky Ford		Walsh		Yuma		1998			3-Yr
Variety*	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	% Yield of TAM 107	1996/97/98
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu		bu/ac
QAP7406	116.4	58.6	86.4	60.7	98.9	56.3	100.6	58.5	111	------
QAP7501	116.5	59.3	81.4	59.7	97.7	57.3	98.5	58.8	109	86.6 [2]
Yuma	119.6	59.1	85.7	60.2	89.5	55.6	98.2	58.3	109	85.1 [3]
QAP7510	115.3	59.6	80.8	60.3	96.8	57.2	97.7	59.0	108	87.3 [1]
Yumar	109.3	58.8	77.7	60.2	101.1	57.8	96.0	58.9	106	------
2137	109.8	58.5	79.1	59.8	98.5	57.5	95.8	58.6	106	------
Arlin	116.9	59.4	73.1	60.9	94.1	57.3	94.7	59.2	105	------
T81	107.0	60.2	76.2	60.4	98.2	57.7	93.8	59.4	104	------
Prairie Red**	110.2	58.2	73.1	59.3	95.8	56.9	93.1	58.1	103	------
Agri. Laredo	113.8	59.1	66.1	59.7	96.0	57.9	92.0	58.9	102	80.4
Agri. Rowdy	108.8	58.9	81.3	60.7	86.0	56.9	92.0	58.8	102	81.3
Halt	107.0	58.2	69.2	59.8	94.9	55.9	90.4	58.0	100	75.6
TAM 107	100.6	58.9	72.7	59.3	97.8	57.5	90.4	58.5	100	83.1 [5]
Custer	102.5	59.8	69.8	59.3	98.1	58.2	90.1	59.1	100	83.2 [4]
TAM 110	108.4	59.2	66.9	59.6	94.4	56.6	89.9	58.5	99	------
Akron	92.1	58.0	81.6	59.4	95.5	57.4	89.7	58.2	99	82.2 [6]
Jagger	92.3	58.4	68.4	59.7	96.9	56.3	85.9	58.1	95	78.5
Average	**108.6**	**59.0**	**75.9**	**59.9**	**95.9**	**57.1**	**93.5**	**58.7**		
CV%	9.7		8.4		8.7					
$LSD_{(.3)}$	8.7		4.8		6.0					

* Varieties ranked by the average yield over three locations in 1998.

** Tested as CO940623-R3 and also TAM 107-R3

*** Rocky Ford and Yuma grain yields are adjusted to 12% moisture contents.

[1.....6] Variety rank based on 3-Yr average yields.

http://www.colostate.edu/Depts/SoilCrop/extension/CropVar/index.html

Crops Testing Page

Crop Variety Performance for Colorado Crops

Winter Wheat
see 1998 results

Dry Beans
see 1998 results and 1999 entry forms

Corn
see 1998 results and 1999 entry forms

Sunflower
see 1998 results and 1999 entry forms

Alfalfa
see 1998 results and 1999 entry forms

Spring Wheat Barley, & Oats
see 1998 results and 1999 entry forms

Table 7. Winter wheat variety average agronomic, pest, and quality traits.

			Agronomic Traits[1]					Resistance or Tolerance to[1]					Relative Quality[3]		
Variety	Origin	1999 Acreage[2]	Height (in)	Maturity[1]	Straw[1]	Winter-hardiness[1]	Coleoptile (mm)	RWA[4]	Leaf Rust	Stem Rust	Hess. Fly	WSMV	Milling	Mixing	Baking
2137	KS-95	--	30	3	2	3	75	9	1	8	-	2	4	2	2
Akron	CO-94	19.1	32	3	2	3	80	9	1	3	5	3	2	3	2
Alliance	NE-93	--	32	3	2	2	75	9	1	1	5	3	2	2	2
Arapahoe	NE-88	1.8	39	4	4	2	75	9	1	1	5	8	2	2	2
Baca	CO-73	1.4	47	2	6	3	120	9	5	5	-	7	2	0	3
Buckskin	NE-73	1.0	47	4	5	3	120	9	-	5	-	-	-	-	-
Fairview	CO/ID-91	--	40	4	5	3	-	9	-	-	-	-	2	3	3
Halt	CO-94	3.9	30	2	2	3	75	1	8	1	-	3	2	3	2
Hawk	AP-80	0.8	29	3	4	3	75	9	7	5	8	6	2	0	3
Jagger	KS-94	1.2	32	3	2	8	75	9	1	1	-	2	2	2	2
Lamar	CO-88	7.5	41	4	4	2	110	9	7	2	8	6	2	3	2
Laredo	AP-92	--	30	3	3	3	80	9	1	2	8	-	2	2	6
Longhorn	AP-91	0.9	35	3	3	3	110	9	-	-	8	-	2	3	6
Niobrara	NE-94	--	37	4	4	3	75	9	5	1	-	-	2	2	2
Ogallala	AP-93	--	31	3	3	3	75	9	2	2	8	3	2	2	2
Prairie Red	CO-98	--	31	2	3	3	80	1	9	1	-	2	2	4	6
Prowers	CO-97	--	41	4	4	2	110	1	7	2	8	6	2	3	2
QT 542	HT-88	--	41	4	4	1	110	9	7	6	-	-	-	-	-
Rawhide	NE-91	--	32	3	4	3	80	9	7	2	-	7	2	2	3
Sandy	CO-81	--	43	5	5	2	120	9	3	-	8	-	2	0	4
Scout(s)	NE-64/66	1.2	47	2	6	3	120	9	5	5	7	7	2	0	3
TAM 107	TX-84	39.7	31	2	3	3	80	9	9	1	8	2	2	4	6
TAM 110	TX-95	--	31	2	4	3	80	9	9	2	-	-	2	4	6
TAM 200	TX-87	0.8	27	3	1	8	75	9	1	1	8	2	8	3	6
Thunderbird	AP-85	--	39	3	4	5	110	9	2	1	8	5	-	-	-
Tomahawk	AP-91	1.3	30	3	2	3	75	9	3	1	8	7	2	2	2
Turkey	Introduction	--	59	8	9	1	120	9	8	8	9	7	2	3	2
Vista	NE-92	--	31	3	4	3	70	9	5	3	5	6	2	0	3
Vona	CO-76	1.0	29	3	3	6	70	9	7	3	5	8	4	2	2
Wichita	KS-44	--	51	1	8	5	120	9	5	8	8	-	2	8	6
Yuma	CO-91	7.3	30	3	2	5	70	9	5	1	-	7	4	2	2
Yumar	CO-97	1.0	32	3	3	5	70	1	5	1	-	7	4	2	2

[1]Rated on a scale of 0 to 9; 0 is best and 9 poorest except for maturity (where 0 is earliest and 9 latest). A dash indicates insufficient data.

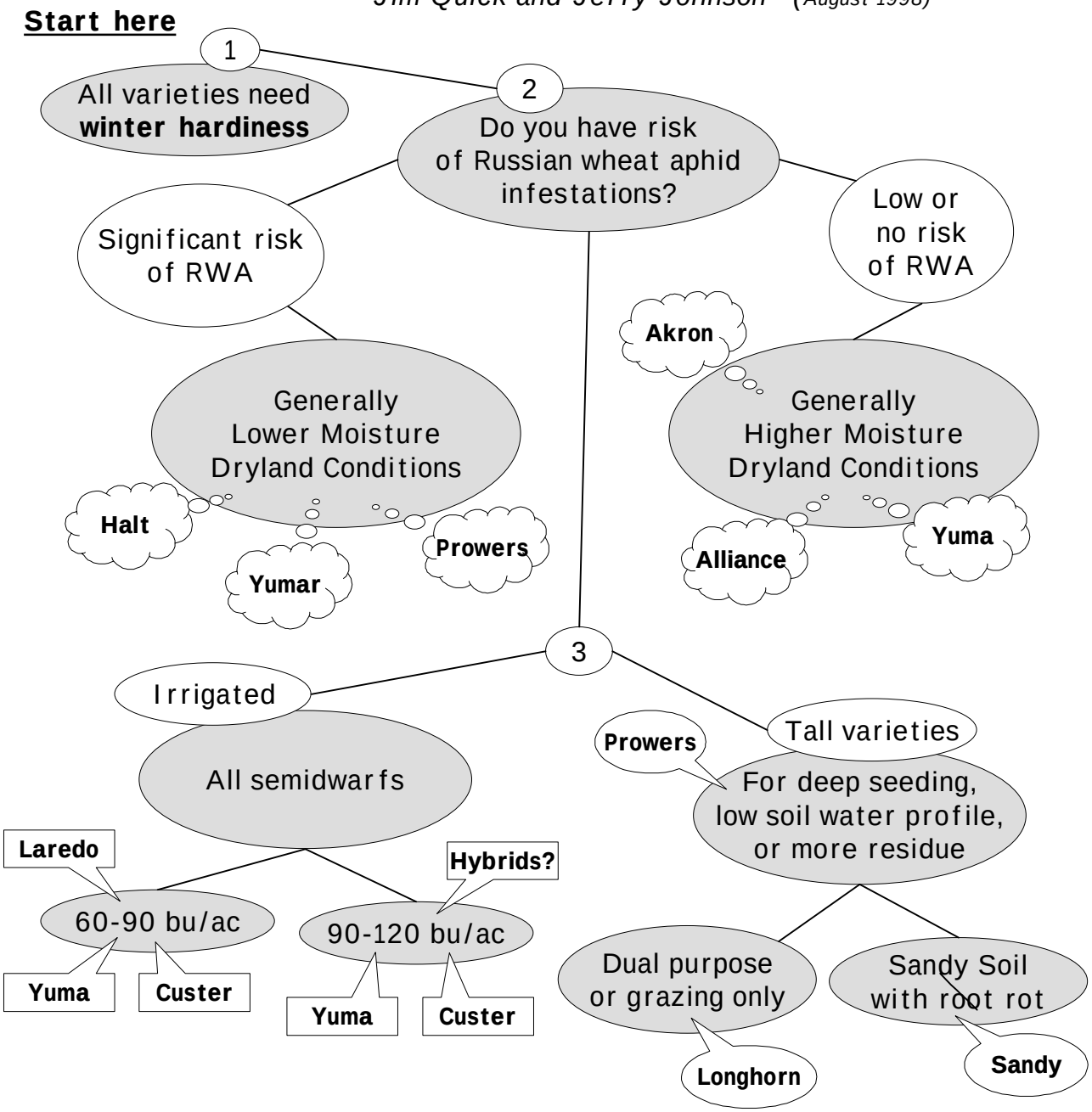
[2]Includes most varieties grown on at least 0.5% of acreage for 1998 harvest, based on Colorado Crop & Livestock Reporting Service survey.

[3]Rated on a scale of 0-9; 0 is best and 9 poorest. A zero rating means long mixing time. Varieties with a 0 rating are particularly good for blending with mellow or weak wheats. Mixing time and baking quality will vary with the environmental conditions under which the varieties are grown.

[4]Russian wheat aphid.

Decision Tree for Winter Wheat Variety Selection in Colorado

Jim Quick and Jerry Johnson (August 1998)



The best choice of a winter wheat variety in Colorado depends upon production conditions that vary across locations and years. Performance trial results are informative but cannot capture all the variation that needs to be taken into account in selecting the best variety for so many different production conditions. The decision tree is our way of trying to combine many years of empirical knowledge of wheat variety performance with the quantitative performance of varieties compared in experimental conditions. Varieties listed in the decision tree are not recommendations of the authors nor CSU, but rather varieties that the authors think growers should consider for the production conditions specified in the tree. Production conditions taken into account when formulating the decision tree include: stand establishment under dry conditions; winter hardiness; maturity; potential for spring frost damage; resistant to Russian wheat aphids; and yield performance across locations. Production risks can be significantly reduced by planting more than one variety and it should be remembered that avoiding poor variety decisions may be as important as choosing the winner among winners. To reduce the risk of loss of yield due to environmental stresses, wheat producers should plant more than one variety.

1998 Collaborative On-Farm Testing Results

Jerry J. Johnson and Jessica G. Davis

In the fall of 1997, eastern Colorado wheat producers planted twenty-three collaborative on-farm tests in Baca, Prowers, Kiowa, Cheyenne, Kit Carson, Adams, Arapahoe, Washington, and Weld counties. The objective was to compare the performance of the newly-released, Russian Wheat Aphid-resistant varieties; Halt, Prowers, and Yumar, with the performance of Colorado's most popular, but susceptible variety, TAM 107. The varieties were planted by the collaborating growers in long, side-by-side, strips. Most producers planted additional varieties, e.g., Akron, beside the test strips.

Most of Colorado had good fall seeding conditions that led to good plant stands. However, parts of Adams, Arapahoe, Washington and Lincoln counties suffered from dry fall planting conditions and dry spring growing conditions as well. The October blizzard provided late fall moisture and resulted in the disappearance of Russian wheat aphids and mites. Without the wheat curl mite, there was little or no wheat streak mosaic disease.

The results below reflect the yield potential of the Russian wheat aphid resistant varieties without any aphid pressure. Note that not all varieties were planted in all locations (see Table 1). Table 2 summarizes average yield performance over the maximum number of test results with common varieties, e.g., 19 tests with Halt, TAM 107, and Prowers. As in previous years without Russian wheat aphid, Halt and TAM 107 yields were very similar. The average Prowers yield was 5 bu/ac lower than TAM 107 but many of the tests were conducted in locations where Prowers (and parent Lamar) would not be recommended for use. The average performance of Yumar was similar to Halt and TAM 107 without any RWA pressure and is expected to be significantly better than TAM 107 if RWA were present.

New in 1997/98 were four locations where each variety was planted twice, once with phosphate fertilizer, and once without. See Tables 3-5 for results.

Table 1. 1998 collaborative on-farm test results.

Test County and Description	Variety			
	Halt	Prowers	TAM 107	Yumar
	bu/ac	bu/ac	bu/ac	bu/ac
Baca SE	28.7	32.9	32.9	----
Baca SC	23.4	20.2	19.5	----
Baca WC	26.6	28.9	29.7	25.6
Baca EC	51.4	48.7	57.7	53.5
Baca NC	64.8	66.2	64.5	----
Prowers NE1	41.0	46.7	49.2	43.8
Prowers NC	37.8	42.0	42.6	----
Prowers NE2	55.9	49.7	51.8	----
Kiowa NE	54.3	47.1	55.2	53.7
Cheyenne NC	50.8	47.3	59.6	44.7
Cheyenne NE	43.3	39.0	45.1	47.7
Lincoln WC	28.6	17.0	27.0	27.6
Lincoln NC	36.9	46.4	40.8	41.3
Kit Carson NC	67.8	48.8	69.1	64.8
Washington SW	37.1	31.9	36.8	32.8
Adams SE	16.7	14.0	13.2	11.6
Adams CE	23.2	21.9	24.3	25.1
Weld SC	30.3	26.2	32.4	27.8
Weld NE	30.8	41.0	34.1	31.8
Weld NW	22.4	16.1	----	18.3

Table 2. Average variety performance over locations.

Group of tests with common varieties	Variety			
	Halt	Prowers	TAM 107	Yumar
	bu/ac	bu/ac	bu/ac	bu/ac
19 tests: Halt, Prowers, TAM 107	39.4	37.7	41.3	----
14 tests: Halt, Prowers, TAM 107, Yumar	38.5	36.1	41.0	38.0

Phosphorus On-Farm Tests

On four of the collaborative on-farm test sites (COFT), we compared phosphorus fertilizer application (based on CSU soil test recommendations) with no phosphorus fertilizer for each of the four test varieties. Three of the sites tested Low in phosphorus, and one tested Medium (Table 3). The Low testing sites have a high probability of getting a yield response to P fertilizer, and the Medium site has a moderate probability of yield increase.

Table 3. Soil test P levels and P fertilizer recommendations.

Test Location	Sodium Bicarb Soil Test P (ppm)	Application Rate (lb P_2O_5/A)
Baca	4 (Low)	40
Lincoln	8 (Medium)	20
Morgan	4 (Low)	40
Prowers	4 (Low)	40

We used 18-46-0 (DAP) to supply P except at the Baca County site where 10-34-0 was used. In all cases, a small amount of N was applied with the P fertilizer, in addition to any farmer applied N. Yields were significantly increased for all four varieties with an average yield increase of four bushels per acre (Table 4).

Table 4. Impact of P fertilizer on wheat yields.

Variety	*With* P Fertilizer	*Without* P Fertilizer	Increase
	bu/ac	bu/ac	bu/ac
Halt	34	30	4
Prowers	38	34	4
TAM 107	38	34	4
Yuma	37	31	6
Average	**36**	**32**	**4**

The fertilizer cost varied with the application rate and product used ($280/ton for 10-34-0 and $310/ton for 18-46-0). With the wheat price as low as it is this year, the yield increases due to P fertilizer were generally not enough to pay for the additional fertilizer (Table 5). On average across these test sites, a wheat price of $3.22/bu would be just enough to pay for the fertilizer without paying for the spreading costs (fuel, labor, etc.). However, there are additional benefits due to P fertilizer such as the additional N which reduces N fertilizer costs and the improved weed competition and subsequent reduction in herbicide costs. These benefits were not factored into these calculations. Each farmer should weigh the costs and benefits of P fertilizer for their own conditions (soil fertility, weed population, and price).

Table 5. Economics of P fertilizer costs and wheat return.

Variety	Fertilizer Cost	Wheat Price Which Would Pay for Fertilizer
	($/A)	$/bu
Baca	$16.47	$4.22
Lincoln	$6.74	$1.73
Morgan	$13.48	$3.46
Prowers	$13.48	$3.46
Average	$12.54	$3.22

The Cooperative Extension Agents who make on-farm testing work:

Tim Macklin - Baca County; Dick Scott - Prowers County; George Ellicott - Kiowa County; Ron Meyer - Kit Carson County; Kurt Jones - Lincoln County; Bruce Bosley - Morgan County; Ron Jepson - Adams County; Jerry Alldredge - Weld County

Eastern Colorado Extension Wheat Educators

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Making Better Marketing Decisions in 1999

Darrell Hanavan

Three years ago, U.S. and worldwide wheat stocks were the lowest in history which resulted in record-high wheat prices. U.S. stocks are now projected to exceed the 10-year average by 67 percent and climbs to the highest level since May 31, 1988. Consequently, wheat prices are at their lowest level in eight years, falling over 20 percent this past marketing year.

Projected plantings of all U.S. wheat in 1999 is expected to be down approximately 5%- the lowest planted acreage since 1988. Actual acres harvested and yield will be the keys to the price of wheat in the 1999-2000 marketing year. Although U.S. wheat stocks are presently high, world wheat stocks are low. As world demand reduces U.S. stocks in the coming year, prices should rise.

Understanding historical market trends can help Colorado wheat producers make better marketing decisions. Only 33 percent of the state's winter wheat production is marketed during the months of December to February when the highest price is typically received for the lowest carrying cost (storage plus interest). Forty-seven percent (47%) of Colorado's wheat production is sold prior to December when market prices have been the lowest. On average, there has been a 58 cents per bushel price advantage by selling after November instead of in 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 November might consider options or futures contracts to manage financial risk.

Current wheat market fundamentals strongly suggest that prices will increase by substantially more than the 10-year historic average of 58 cents per bushel after November in the 1999-2000 marketing year. The price of wheat during the 1998-99 marketing year has been erratic and uncharacteristic of long-term trends. 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 November.

Colorado Average Wheat Prices, 1988-98 (July-June)

Marketing Year	July Average $/Bu.	Highest Monthly Average $/Bu.	$/Bushel Gain	Month of Highest Price	12-Month Average
1988-89	3.25	4.08	+.83	April	3.73
1989-90	3.73	3.81	+.08	December	3.59
1990-91	2.69	2.69	0.00	July	2.45
1991-92	2.47	3.88	+1.41	February	3.28
1992-93	3.06	3.36	+.30	January	3.12
1993-94	2.70	3.58	+.88	January	3.15
1994-95	3.02	3.71	+.69	January	3.53
1995-96	4.20	5.67	+1.47	April	4.92
1996-97	4.78	4.78	0.00	July	4.20
1997-98	3.20	3.33	.13	August	3.14
10-Year Average	**3.31**	**3.89**	**.58**		**3.51**

Weed Science Advances for Winter Wheat in Colorado

Phil Westra, Tim D'Amato, Todd Pester, Mack Thompson

New herbicides for 1999

Aim (FMC Chemical Co.), labeled for use in winter wheat, is a contact, or burn-down type herbicide with no residual activity. It is labeled for control of kochia and other broadleaf weeds.

Maverick (Monsanto Chemical Co.) which should be labeled in winter wheat by spring 1999 for control of annual brome species (downy brome, cheatgrass, Japanese brome), flixweed, pennycress, and suppression of blue mustard. Maverick provides most effective weed control when applied in the fall. The initial label will be for use in wheat/fallow rotations only.

Paramount (BASF Chemical Co.) should be labeled early in 1999 for use in fallow with rotation to wheat, pre-emergence to wheat, and in-crop sorghum for control of field bindweed, barnyardgrass, and foxtail species. Paramount has excellent residual activity.

Starane (United Agri Products) is a post

emergence herbicide for use in small grains for control of kochia. Starane has excellent crop safety in wheat, barley, and oats and, in a pre-mix with 2,4-D or MCPA, controls the spectrum of susceptible broadleaf weeds.

IMI Wheat™

Imazamox (American Cyanamid Co.) is a member of the imidazolinone family of herbicides from Cyanamid, commonly called the "IMIs." It provides good control of winter annual grasses as evidenced in field trials last year where Imazamox controlled over 95% of jointed goatgrass, bromes, and volunteer rye with 0.032, 0.040 and 0.048 lb ai/ac. Imazamox is toxic to common wheat so CSU's wheat breeders are developing locally adapted herbicide-resistant winter and spring wheat varieties.

Integrated Management Systems

A large-scale experiment near Platner, CO, is evaluating the effects of cultural practices (variety, tillage system, plant density, date of planting, and nitrogen) on severity of jointed goatgrass infestation. No-tillage increased jointed goatgrass reproductive tillers over that of conventional-tillage or reduced-tillage. Increasing a planting rate from 40 to 60 lb/ac decreased jointed goatgrass growth characteristics. Delayed planting resulted in lower winter wheat production and higher jointed goatgrass production. The variety 'Akron' yielded the highest while 'TAM 107' produced the lowest jointed goatgrass infestation.

Implementation of Best Management Practices for Management of Jointed Goatgrass

The National Jointed Goatgrass Research Program has funded the establishment of four large-scale, on-farm trials in the Great Plains for economic analysis and demonstration of current practices compared to new integrated approaches. Called Best Management Practice sites (BMPs), practices to be studied include crop rotations, fertilizer placement, and winter wheat planting date. The crop rotations and cropping systems have been adapted to the environmental conditions and surrounding cultural practices of each area. Cooperators keep detailed records for economic analysis and researchers analyze soil cores and seedling counts to determine effects on the jointed goatgrass population. Although data from these sites is not yet available, field days will be held at several of the BMP sites this spring and summer.

Can Spring Grazing Pay in Northern Colorado?

Tom McBride, Marlin Eisenach, John Adams, Kipp Nye, Paul Ayers, Frank Peairs

Grazing wheat is an accepted practice in the Southern Plains where mild winters permit fall or spring grazing with little loss in grain yield and quality. Grazing is attractive to wheat producers because it allows them to derive additional value from land and crop production investments. Wheat grazing has been limited mostly to southeastern Colorado where Southern Plains practices can be easily adopted. A recent 4-year study on the northern Front Range (Adams County) compared the benefits of intensive cow-calf spring grazing to several potential risks, including grain yield and quality losses, soil compaction and pest problems. These results allow northern Colorado producers to make better decisions concerning this new opportunity to add value to their wheat production system.

The study

Two 20-acre fields with silt loam soil on a rolling terrain were selected as study sites. These belong to the grower-cooperator, Zeb Eldringhoff of Deer Trail. Treatments included: 1) no grazing; 2) spring grazing of growing wheat; 3) spring grazing followed by pastured stubble; and 4) spring grazing followed by pastured stubble and a second spring grazing two years later. Grazing pressure was 1-2 cow-calf units per acre for 1-2 weeks prior to jointing. Data were taken on surface compaction, N and P levels, wheat yield and protein, animal weight gain (first year only), forage yield and quality, and pest activity.

What Expected Risks Were Confirmed?

- **Surface soil compaction** was increased by livestock traffic in grazed areas. This effect seemed to be alleviated over time by soil freeze-thaw cycles. Soil compaction is known to be detrimental to wheat yields.
- **Phosphorus availability** was reduced by grazing but not by pasturing. This can easily be compensated for with phosphorus fertilizer at planting.

What Expected Risks Were Not Confirmed?

- **Wheat yield and quality** were not consistently influenced by grazing. Yields of grazed and ungrazed wheat were similar in 3 out of 4 years. In the 4th comparison, the grazed wheat yielded more than the ungrazed wheat perhaps because the less mature grazed wheat was less affected by a hail storm.

- **Nitrate** levels in the soil were not affected.

- **Crop residues** were not affected.

What Were the Benefits?

- **Feed costs were reduced** by an estimated $1.00 per cow-calf unit per day of grazing.

- **Two insect pests were suppressed** by grazing. Russian wheat aphid and army cutworm population densities were lowered by 60 - 70% in 1996. This would be a permanent reduction in the case of army cutworm, but Russian wheat aphid would be expected to rebound eventually to the same levels as in nearby ungrazed wheat. Russian wheat aphid infestations were severe in 1997 and suppression from grazing was less than in the previous year.

Conclusions

It is possible to graze winter wheat intensively for a short period in the spring in northern Colorado without affecting grain yield, quality or crop residue. The estimated additional value is $1.00 per cow-calf unit per day of grazing (per acre in this study). Insect pest suppression was also observed. Tradeoffs include increased soil compaction and reduced soil phosphorus levels.

Wheat producers might consider some small-scale testing of this system. It seems to be a good opportunity to add value to your production system without greatly increasing risk or management requirements.

Dryland Root Rot

Linnea G. Skoglund

Common (dryland) root rot is the most common, yet least recognized, disease of wheat in Colorado. It often goes undiagnosed because the symptoms are non-specific. Plants appear stunted and chlorotic to varying degrees and are distributed at random or in irregular patches. They mature early, have shriveled grain, and may appear as "whiteheads." Severely infected plants die prematurely. The fungal species involved are dependent upon the local climate and soils with *Fusarium* spp. dominating some areas (or some years) while *Bipolaris sorokiniana* dominates at other times. A dark brown or blackened subcrown internode is typical of infection with *B. sorokiniana*. This may extend into the crown and up the culm. There may be discoloration of primary and secondary roots. When infected with *Fusarium* spp., roots, crowns and lower nodes and internodes turn brown. Infection can extend two to three internodes above soil level.

Disease Cycle: These fungi are found on most small grains, corn and numerous grasses. Debris colonized before plant death is the primary source of inoculum. *Fusarium* spp. survive as hyphae and chlamydospores in debris and as chlamydospores in soil. *B. sorokiniana* survives as hyphae in debris and as conidia in soil. Primary infections occur on coleoptiles and subcrown internodes. Primary and secondary roots also are avenues for infection. Root rot symptoms do not appear if growth of new roots keeps pace. However, drought, high temperatures and other stresses increase disease severity.

Management: Shallow seeding and late fall planting reduce infection. While fertility should be adequate and balanced, excessive nitrogen favors disease by encouraging vegetative growth. Rotation with spring crops can reduce inoculum, but spring wheat, oats and barley should be avoided. Varieties that tolerate drought or low-moisture stress also may be more tolerant to common root rot.

Heat and Drought Tolerance Research

*Pat Byrne**

Improved heat and drought tolerance for Colorado wheat

Developing wheat varieties better able to withstand the high temperatures and low moisture conditions of Colorado's Eastern Plains is a long-term challenge requiring contributions from a variety of disciplines. CSU and USDA scientists are collaborating to identify genes that control heat and drought tolerance and utilize those genes in improved varieties. Climate analysis will help to develop a better understanding of the nature and frequency of stress conditions in Eastern Colorado. The timing of heat and drought stress is

critical because stress conditions have distinctly different effects on the wheat plant at different developmental stages.

Selection criteria for stress tolerance

Direct field selection for stress tolerance by selecting the best yielding lines grown under stress conditions is very difficult to accomplish because of the unpredictable occurrence of stress in a given year and location, and the expense of growing large, multi location yield trials. Two laboratory-measured traits that appear especially useful are membrane thermostability (MTS) and tetrazolium reduction (TR). Wheat lines with more heat-stable membranes may be better able to withstand stress at the whole-plant level. The TR assay evaluates the viability of mitochondrial enzymes after stress. One research objective is to evaluate the relationships among MTS, TR, and a variety of field-measured characters, including yield.

Mapping stress tolerance genes

Based on a better understanding of the stress environment and appropriate traits, we will initiate "quantitative trait locus" (QTL) mapping for heat and drought tolerance in one winter wheat and one spring wheat population to detect the chromosomal locations of genes responsible for heat and drought tolerance and the magnitude of their effects. Locating and characterizing those genes will facilitate their use in breeding programs through DNA-marker assisted selection.

*Dr. Byrne teaches courses in quantitative genetics and in applying molecular genetic techniques to crop improvement at CSU. His research focuses on the use of molecular markers to determine the genes controlling heat and drought tolerance in wheat and disease resistance in dry beans.

Pat joined CSU's Soil and Crop Science faculty in 1997. He obtained his M.S. (1978) and Ph.D. (1987) from the University of Missouri-Columbia. He was a Peace Corps Volunteer in Nepal from 1973-1975 and worked for USAID in Washington and Cape Verde Islands from 1979 to 1982. From 1987 to 1992 he headed the International Maize Testing unit at CIMMYT in Mexico and, from 1992 until joining the CSU faculty, was Assistant Curator, Maize Genome Database, USDA-ARS Plant Genetics Research Unit, Columbia, MO.

Descriptions of spring varieties in trials:

Variety Name	Class	Origin
2375	Hard Red	North Dakota
AC Teal	Hard Red	Canada
Blanca	Soft White	Colorado
Butte 86	Hard Red	North Dakota
CA876	Hard Red	California
Centennial	Soft White	Idaho
Cortez	Durum	Western Plant Breeders
Forge	Hard Red	South Dakota
Grandin	Hard Red	North Dakota
Hamer	Hard Red	Agripro Biosciences, Inc.
ID377S	Hard White	Idaho
ID462	Hard Red	Idaho
ID469	Hard Red	Idaho
ID474	Soft White	Idaho
ID476	Hard Red	Idaho
ID488	Soft White	Idaho
ID502	Hard Red	Idaho
ID505	Soft White	Idaho
ID506	Soft White	Idaho
ID523	Hard Red	Idaho
ID524	Soft White	Idaho
Klasic	Hard White	California
Lloyd	Durum	North Dakota
MT RWA116	Hard Red	Montana
N93-0119	Hard Red	Agripro Biosciences, Inc.
N93-0211	Hard Red	Agripro Biosciences, Inc.
Norlander	Hard Red	Agripro Biosciences, Inc.
OR492092	Hard White	Oregon
Oslo	Hard Red	Agripro Biosciences, Inc.
Owens	Soft White	Idaho
Oxen	Hard Red	South Dakota State Univ.
Pomerelle	Soft White	Idaho
Russ	Hard Red	South Dakota
Saxon	Hard Red	Agripro Biosciences, Inc.
SDM 50031	Hard Red	Sunstar Seeds
SDM 50032	Hard Red	Sunstar Seeds
Sharp	Hard Red	South Dakota State Univ.
Spillman	Hard Red	Washington
Sylvan	Hard Red	Colorado
Trenton	Hard Red	North Dakota
UT2868	Hard Red	Utah
UT3172	Hard Red	Utah
WB 881	Durum	Western Plant Breeders
Whitebird	Soft White	Idaho
Yecora Rojo	Hard Red	California

Table 8. Dryland spring wheat performance trial summary at Akron 1996-98.

	1996		1997		1998		Average	
Variety	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt	Yield	Test Wt
	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu	bu/ac	lb/bu
Oxen	28.4	59.9	25.4	50.4	19.0	52.6	24.3	54.3
ID488*	36.1	59.7	20.8	53.9	15.7	44.0	24.2	52.5
Russ	29.7	59.7	23.1	57.5	17.3	51.8	23.4	56.3
Butte 86	29.2	60.6	22.8	51.9	17.4	50.7	23.1	54.4
2375	29.1	59.9	22.4	53.8	17.7	54.8	23.1	56.2
Grandin	34.9	60.0	17.8	50.6	15.9	51.1	22.9	53.9
ID377S*	31.9	60.4	21.0	52.6	15.2	50.0	22.7	54.3
N93-0119	33.4	59.9	18.3	50.5	14.2	52.4	22.0	54.3
Trenton	29.9	60.8	20.7	51.7	14.7	51.5	21.8	54.7
Norlander	27.5	60.0	19.6	53.1	17.3	52.2	21.5	55.1
Sharp	25.6	61.5	24.0	56.1	14.5	50.3	21.4	56.0
Forge	22.8	61.0	24.3	53.6	16.5	50.7	21.2	55.1
MT RWA116	30.1	59.1	19.1	51.9	14.3	48.0	21.2	53.0
AC Teal	27.7	58.8	19.6	52.2	15.2	50.2	20.8	53.7
N93-0211	27.6	60.0	18.4	52.5	14.9	50.2	20.3	54.2
Oslo	24.7	57.9	18.3	50.9	17.6	50.0	20.2	52.9
Hamer	26.3	60.5	19.7	51.5	13.5	52.2	19.8	54.7

*White grain

Planting Date: March 10
Harvest Date: July 27
Previous Crop: Proso millet

Comments: Growing conditions were extremely dry.

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Table 9. Dryland spring wheat variety, fertilizer, and Agro performance at Hayden, CO in 1998.

Variety	Yield	Test Wt	Grain Moist.	Plant Height
	bu/ac	lb/bu	%	inches
2375	23.3	62.4	11.28	22.2
Grandin	21.5	61.7	11.22	22.8
Butte 86	21.1	62.8	11.10	24.2
Sharp	20.9	62.6	11.42	26.2
Forge	20.8	63.2	11.70	22.5
Oxen	18.7	62.3	11.20	20.3
Average	**21.0**	**62.5**	**11.32**	**23.0**
CV%	21.6			
$LSD_{(0.05)}$	NS			
Fertilizer				
34-0-0 + Agro	40.2	58.6	12.05	24.4
18-46-0 + Agro	39.0	59.4	11.30	25.1
34-0-0	36.5	58.8	11.75	23.6
11-52-0	36.3	58.8	11.88	24.4
18-46-0	34.4	59.0	11.95	24.0
11-52-0 + Agro	32.6	58.8	12.32	22.6
Check	28.3	59.4	11.80	22.8
Agro only	24.3	58.4	12.10	22.1
Average	**34.0**	**58.9**	**11.89**	**23.6**
CV%	10.7			
$LSD_{(0.05)}$	5.3			

Planting Date: May 8, 1998
Harvest Date: September 9, 1998
Variety used in fertilizer and Agro experiment was Blanca.
Fertilizer: Nitrogen @ 30 lbs $acre^{\sim 1}$ + Phosphourus varied
Agro is a formulation of polyacrylamide (super absorbent polymer) and was applied with the seed at planting at a rate of 4 lbs $acre^{\sim 1}$. Fertilizer was not applied to the variety trial.

Comments: Growing conditions during 1998 were favorable. Soil conditions at planting in the plot area had varying amounts of soil clods and wheat residue clumps. No lodging occurred in any plot.

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Table 10. Irrigated hard red spring and durum wheat variety trial, SLV Research Center, Center, CO in 1998.

Variety	Yield*	Test Wt	Heading Date	Plant Height	Grain Protein	Grain Hardness
	bu/ac	lb/bu	**	inches	%	***
ID523	139.9	61.2	42.0	36.3	10.6	64.7
Lloyd	136.1	62.4	38.2	36.0	10.4	90.7
ID377S	136.0	62.7	35.5	40.2	12.2	66.3
ID502	136.0	61.0	37.0	38.4	11.8	73.3
Klasic	135.6	61.3	29.0	28.2	11.6	50.7
Centennial	133.1	62.3	35.2	37.2	11.6	5.7
Cortez	129.8	61.6	33.5	32.1	12.0	103.3
Yecora Rojo	129.5	61.2	31.0	28.2	12.4	52.3
Oslo	129.4	59.9	34.2	37.8	12.8	53.9
Blanca	128.0	59.9	37.0	39.5	10.9	18.5
Owens	126.6	61.2	38.0	38.7	11.5	11.7
OR492092	120.9	60.1	36.8	37.5	11.3	60.7
WB 881	118.7	61.4	35.2	35.4	12.3	79.3
ID476	118.6	60.8	33.0	36.3	13.1	61.3
SDM 50032	118.6	62.0	34.5	36.6	12.5	59.0
Saxon	115.4	60.1	36.0	40.8	12.6	75.3
Nora	113.0	61.8	36.0	33.6	14.0	67.3
UT2868	108.4	61.0	34.2	45.6	12.2	76.7
Average	**133.2**	**61.2**	**35.4**	**36.6**	**12.0**	**59.0**
$LSD_{(0.05)}$	9.7					

*Bushel yield based on 60 lbs/bushel and 12% moisture.
**Date 50% of the plants headed; days after June 1.
***Grain hardness > 40 = hard wheat; < 40 = soft wheat.

Planting Date: April 21
Harvest Date: September 9
Fertilizer: Nitrogen @ variable lbs. $acre^{-1}$ was precision applied to all parts of the field and exact amounts are not known.
Herbicide: Bronate

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Table 11. Irrigated soft white spring wheat trial, yield and agronomic characteristics, SLV Research Center, Center, CO in 1998.

Cultivar	Yield*	Test Wt	Heading Date	Plant Height	Grain Protein	Grain Hardness
	bu/ac	lb/bu	**	inches	%	***
ID505	141.4	62.1	40.7	41.0	10.6	11.8
ID474	139.2	61.8	36.2	40.0	11.4	17.5
Centennial	136.7	61.6	33.3	36.4	11.7	15.2
ID524	135.8	60.9	38.3	37.8	11.8	7.5
Blanca	134.8	59.3	34.8	38.4	11.6	12.0
Whitebird	132.6	62.0	40.0	40.0	10.9	22.0
Owens	128.2	60.5	37.2	38.2	11.9	8.3
ID469	116.9	59.3	30.3	33.4	11.6	21.2
Average	**133.2**	**60.9**	**36.4**	**38.1**	**11.5**	**14.4**
CV%	3.7					
$LSD_{(0.05)}$	5.8					

*Bushel yield based on 60 lbs/bushel and 12% moisture.
**Date 50% of the plants headed; days after June 1.
***Grain Hardness: soft wheats should be below 50.

Planting Date: April 21, 1998
Harvest Date: September 9, 1998
Fertilizer: variable; precision applied to all parts of the field and exact amounts are not known.
Herbicide: Bronate
Previous Crop: potatoes
Soil Type: sandy loam
Irrigation: center pivot as needed

Note: Lodging is usually a problem in this soft white wheat trial. Cerone was applied to 5 reps to prevent lodging; however, there was almost no lodging in the other replication. Harvest was unusually early this year.

Comments: Several experimental lines performed very well this year. However, none of the potential new varieties out yielded Centennial. Also, none seemed to offer other advantages such as shorter height, earlier maturity, lower protein, etc. Centennial is still the best soft white spring variety for this area.

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Table 12. Irrigated spring wheat variety performance at Fruita, Colorado in 1998.

Variety	Yield	Test Wt	Grain Moist.
	bu/ac	lb/bu	%
2375	44.3	57.0	9.52
Lloyd	41.0	52.6	9.32
Klasic	40.5	55.9	9.48
ID377S	39.6	56.4	9.52
Blanca	37.4	53.3	9.28
Sylvan	25.9	52.2	9.68
Average	**38.1**	**54.6**	9.47
CV%	12.2		
$LSD_{(0.05)}$	7.0		

Planting Date: April 22, 1998
Harvest Date: August 10, 1998
Fertilizer: (1-52-0 disced in) Phosphate @ 104 lbs. acre^{-1} +Nitrogen @ 22 lbs. acre^{-1} + (top-dressed) Ammonium nitrate @ 100 lbs. acre^{-1}
Herbicide: Harmony Extra + 2,4-D + Weedone 638
Insecticide: Lorsban
Previous Crop: sweet corn
Irrigation: Five applications

Comments: No lodging occurred in any plot.

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Table 13. Irrigated hard red spring wheat variety trial, Southwestern Colorado Research Center, Yellow Jacket, CO in 1998.

Variety	Yield*	Test Wt	Plant Height	Heading Date
	bu/ac	lb/bu	inches	**
Pomerelle	104.5	59.5	29	Jun 29
Sylvan	103.2	63.0	32	Jul 1
Blanca	101.2	59.0	31	Jun 29
ID474	98.0	63.0	30	Jul 1
ID377S	97.6	63.0	31	Jun 29
ID506	93.5	61.5	32	Jun 29
UT3172	91.0	60.0	32	Jun 29
Spillman	90.7	60.0	30	Jun 29
SDM 50031	88.2	64.0	31	Jun 29
CA876	86.4	62.0	28	Jun 29
ID462	86.1	63.0	28	Jun 29
SDM 50032	85.8	63.5	31	Jun 29
Oslo	78.1	61.5	29	Jul 1
MT RWA116	71.0	62.0	28	Jun 29
Average	**91.1**			
CV%	5.0			
$LSD_{(0.05)}$	6.5			

*Grain yield based on 60 lbs/bushel and not adjusted for moisture. Grain was air-dried to below 12% moisture prior to weighing and calculating yields.
**50% of the plants headed.

Planting Date: April 23, 1998
Harvest Date: September 1, 1998
Fertilizer: Nitrogen @ 120 lbs. acre^{-1} + Phosphorus @ 40 lbs. acre^{-1} (urea and 11-52-0)
Herbicide: Harmony Extra + 2,4-D amine
Insecticide: Lorsban
Previous crop: Dry beans (fall chisel plowed)
Soil Type: Wetherill silty clay loam
Irrigation: 6 sprinkler applications

Comments: The 1998 growing season was drier than normal, however, temperatures were not unusually hot (highest recorded temperature was 95 F with only six days above 90 F). The trial was sprayed for Russian Wheat Aphid on June 18. Spillman had 5% off-type plants while UT3172 had 1% red-chaffed heads. Pomerelle, SDM50031, and SDM50032 still had some green heads at harvest. Lodging was noted in Pomerelle (20% in one plot), MT RWA116 (10 to 50%), ID377S (50% in one plot), and ID474 (5% in one plot). The lodging was confined to areas in proximity to the sprinkler wheel line during the last irrigation set. At harvest, Pomerelle and Blanca were the only entries with grain moisture above 12% (15 and 14% respectively) at harvest.

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Descriptions of winter varieties in western trials:

Variety Name	Class	Origin
82CAM097	Hard White	Camas
95CAM012	Hard Red	Camas
Blizzard	Hard Red	Idaho
Fairview	Hard Red	Colorado
Halt	Hard Red	Colorado
ID355	Hard White	Idaho
ID455	Hard Red	Idaho
ID465	Hard Red	Idaho
ID468	Hard Red	Idaho
ID479	Hard Red	Idaho
ID498	Hard Red	Idaho
ID501	Hard Red	Idaho
ID509	Hard Red	Idaho
ID510	Hard Red	Idaho
ID511	Hard Red	Idaho
ID512	Hard Red	Idaho
ID514	Hard White	Idaho
Jeff	Hard Red	Idaho
2137	Hard Red	Kansas
Malcolm	Soft White	Washington
Manning	Hard Red	Utah
OR850513H	Hard Red	Oregon
OR889128	Hard White	Oregon
Presto	Triticale	Colorado
Prowers	Hard Red	Colorado
Stephens	Soft White	Oregon
Survivor	Hard Red	Utah
TAM 107	Hard Red	Texas
UT150	Hard Red	Utah
UT182064	Hard Red	Utah
UT199847	Hard Red	Utah
UT201971	Hard Red	Utah
UT203032	Hard Red	Utah
UT944158	Hard White	Utah
UT944151	Hard Red	Utah
UT944157	Hard White	Utah

Table 14. Dryland winter wheat variety performance at Hayden, CO in 1998.

Variety	Yield	Test Wt	Grain Moist.	Plant Height	Lodging
	bu/ac	lb/bu	%	inches	0.2-9.0
UT203032	54.0	59.0	11.75	28.2	0.9
UT199847	52.6	60.4	11.73	31.8	3.0
OR889128	50.5	57.7	11.58	28.2	0.9
UT201971	50.2	60.4	11.70	29.6	1.4
ID511	49.2	59.6	11.73	26.8	0.9
UT182064	47.6	57.4	11.82	27.9	0.9
UT944151	46.9	59.0	11.45	29.1	1.4
ID498	46.8	58.7	11.65	27.2	2.4
Fairview	46.8	59.8	11.40	28.0	0.8
ID512	46.5	58.9	11.63	28.2	0.8
95CAM012	44.9	59.7	11.70	26.2	1.0
Manning	43.1	58.9	11.73	25.8	2.0
ID479	43.0	59.7	11.43	26.2	1.2
Prowers	42.9	60.8	11.50	29.7	2.4
UT944157	42.5	59.0	11.68	26.7	0.9
82CAM097	42.0	56.7	12.90	26.4	0.6
Jeff	37.8	59.0	12.18	29.1	3.4
ID514	37.7	58.1	11.98	28.2	1.2
ID355	34.9	60.8	12.77	25.0	0.8
Presto	33.4	54.1	12.68	28.0	0.8
Average	**44.7**	**58.9**	**11.85**	**27.8**	**1.4**
CV%	16.2				
$LSD_{(0.05)}$	10.3				
Blizzard	48.7	59.2	11.73	30.2	1.0
UT944158	48.1	57.2	11.68	27.5	1.1
Survivor	47.9	58.9	11.60	27.9	1.0
UT150	47.6	58.0	11.23	28.8	0.6
ID465	44.1	58.5	11.18	29.4	0.5
Average	**47.3**	**58.4**	**11.48**	**28.8**	**0.8**
CV%	8.5				
$LSD_{(0.05)}$	NS				

*0.2 = no lodging, 9.0 = totally area lodged flat.

Planting Date: October 20, 1997
Harvest Date: August 9, 1998
Herbicides : Ally + 2,4-D

Comments: Climatic conditions were favorable for wheat production in 1998.

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Table 15. Dryland hard red winter wheat variety trial at Southwestern Colorado Research Center, Yellow Jacket, CO 1997-98.

Variety	Yield*	Test Wt	Plant Height	Heading Date
	bu/ac	lb/bu	inches	**
Presto (Triticale)	33.2	54.0	31	6/05
ID479	32.2	56.0	25	6/12
UT201971	31.4	58.0	28	6/16
UT203032	31.1	55.0	27	6/12
TAM 107	31.1	56.5	24	6/05
UT944151	30.9	54.0	27	6/17
ID511	30.5	56.0	24	6/16
Fairview	30.0	57.0	27	6/12
UT944157 (Hard White)	29.9	60.0	28	6/12
UT199847	28.9	58.5	27	6/16
ID498	28.4	55.0	26	6/10
ID512	28.3	58.5	25	6/17
Prowers	28.1	56.5	26	6/12
OR88912 (Hard White)	27.9	58.0	27	6/16
Manning	27.6	58.5	25	6/12
ID514 (Hard White)	27.4	59.0	26	6/17
Jeff	27.4	59.0	28	6/12
ID355 (Hard White)	26.6	58.0	24	6/17
82CAM097 (Hard White)	26.4	52.5	25	6/17
95CAM012	25.8	60.0	24	6/17
UT182064	25.4	54.0	25	6/17
Average	**29.0**			
CV%	11.1			
$LSD_{(0.05)}$	4.8			

*Bushel yield based on 60 lb/bu and was not adjusted for moisture
**Heading date: 50% of the plants headed

Planting Date: October 10, 1997
Harvest Date: August 5, 1998
Fertilizer: Nitrogen @ 50 lbs. $acre^{-1}$ (NH_4NO_3)
Herbicide: Harmony Extra + 2,4-D Amine
Previous Crop: fallow
Soil Type: Wetherill silty clay loam

Comments: Grain yields (29.0 bu/acre average) were higher than expected. Precipitation in 1998 was below normal although planting on fallow ground that received above normal precitation in 1997 probably played a significant role in the 29.0 bu/acre average yields. Russian Wheat Aphid (RWA) was not a problem for winter wheat in 1997-98. Prowers, a RWA resistant variety, did not show any yield advantage. Dwarf bunt was not observed to any extent in any of the varieties. No other disease or insect problems were noted.

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Table 16. Irrigated winter wheat variety performance at Fruita, CO in 1998.

Variety	Yield	Test Wt	Grain Moist.	Heading Date
	bu/ac	lb/bu	%	*
Malcolm	151.3	57.5	10.27	140
ID501	150.3	61.8	10.10	137
Stephens	144.7	56.5	9.60	142
OR850513H	141.9	60.4	9.72	140
2137	134.0	59.2	9.75	138
ID468	132.3	57.7	9.52	142
TAM 107	125.8	60.7	9.87	136
ID455	120.8	54.9	9.10	142
Halt	116.2	59.0	10.02	136
ID510	106.3	58.1	9.45	142
UT944157	96.5	59.2	8.92	142
ID509	94.7	57.3	9.12	142
Average	**126.2**	**58.5**	**9.62**	**140**
CV%	14.1			
$LSD_{(0.05)}$	25.5			

*From Jan 1 to heading.

Planting Date: October 22, 1997
Harvest Date: August 6, 1998
Fertilizer: (11-52-0 disced in) Phosphourus @ 91 lbs. $acre^{-1}$ + Nitrogen @ 19 lbs. $acre^{-1}$ + (top-dressed) Ammonium nitrate @ 100 lbs. $acre^{-1}$
Herbicide: Harmony Extra
Previous Crop: sweet corn
Irrigation: Five applications

Comments: Production year was excellent for winter wheat. Lodging was not evaluated.

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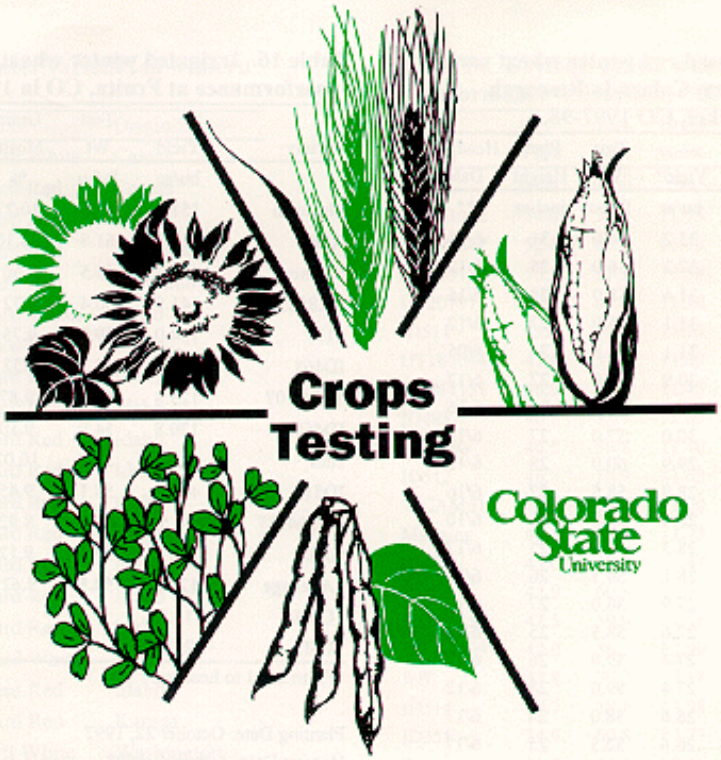

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