MAKING BETTER DECISIONS
2004 Colorado Winter Wheat Variety Performance Trials
**Acknowledgments:**

The authors are grateful for the funding received from Colorado State University and the Colorado Wheat Administrative Committee. The Colorado Wheat Administrative Committee provides over $100,000 to Colorado State University for wheat research and makes special contributions for improving the quality of this report. We are thankful to John Stromberger, Bruce Clifford, Joshua Butler and Sally Clayshulte (Wheat Breeding Program), Chris Fryrear (Agricultural Research, Development and Education Center), Merle Vigil and Gene Uhler (Central Great Plains Research Center), Jeff Rudolph, Thia Walker, Mike Koch, Terri Randolph, and Dave Poss (Russian Wheat Aphid Program), Lot Robinson and Fred Judson (Western Colorado Research Center staff), and Daniel Dawson (part-time hourly employee) for the hard work and collaboration that make these trials and this report possible. We recognize valuable assistance provided by the Cooperative Extension agents and On-Farm test coordinators who work with local producers in all aspects of these trials. Most important, the authors are humbled by the cooperation and unselfish contributions of land, labor and equipment made by the following Colorado wheat farmers who consent to having winter wheat variety performance trials conducted on their farms: John Stulp (Lamar, Prowers County), Burl Scherler (Sheridan Lake, Kiowa County), Randy Wilks (Burlington, Kit Carson County), Walt Strasser (Julesburg, Sedgwick County), Steve Smith (Haxtun, Phillips County), John Sauter (Bennett, Adams County), Ross Hansen, (Genoa, Lincoln County), Cary Wickstrom (NW Morgan County), Andrews Brothers Seed Inc. (Yuma, Yuma County), and Duane and Darrell Hockett (Hayden, Routt County). We also acknowledge the participation of the Agricultural Research, Development and Education Center (ARDEC) - Fort Collins; Central Great Plains Research Station - Akron; Arkansas Valley Research Center - Rocky Ford; Plainsman Research Center - Walsh; Western Colorado Research Center - Fruita; Southwestern Colorado Research Center - Yellow Jacket.

Funded by the Colorado Wheat Administrative Committee and Colorado State University

**Mention of a trademark proprietary product does not constitute endorsement by the Colorado Agricultural Experiment Station.**

Colorado State University is an equal opportunity/affirmative action institution and complies with all Federal and Colorado State laws, regulations, and executive orders regarding affirmative action requirements in all programs. The Office of Equal Opportunity is located in 101 Student Services. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves.
2004 Wheat Variety Performance Trials

Uniform Variety Trial Locations
Irrigated Trial Locations
Western Dryland Trial Locations
TABLE OF CONTENTS

CONTRIBUTING AUTHORS .................................................................................................................. ii

VALUABLE WHEAT INFORMATION RESOURCES ........................................................................ iii

EASTERN COLORADO COOPERATIVE EXTENSION WHEAT EDUCATORS ........................................ iv

EASTERN COLORADO WINTER WHEAT VARIETY PERFORMANCE TRIALS ........................................ 1
  Introduction ......................................................................................................................................... 1
  Table 1. 2004 Wheat Variety Trial Information by Location .............................................................. 2
  Description of winter wheat varieties in the 2004 Variety Trials .................................................... 3
  Table 2. Colorado winter wheat Uniform Variety Performance Trial summary for 2004 .............. 7
  Table 3. Colorado winter wheat 3-Yr and 2-Yr Uniform Variety Performance Trial summary ........ 8
  Table 4. Winter wheat Uniform Variety Performance Trial at Akron in 2004 ............................. 9
  Table 5. Winter wheat Uniform Variety Performance Trial at Bennett in 2004 ........................... 9
  Table 6. Winter wheat Uniform Variety Performance Trial at Julesburg in 2004 ....................... 10
  Table 7. Winter wheat Uniform Variety Performance Trial at Sheridan Lake in 2004 ............. 10
  Table 8. Winter wheat Uniform Variety Performance Trial at Yuma in 2004 .............................. 11
  Table 9. Protein Content of UVPT Entries at Three Trial Locations for 2004 .............................. 11
  Table 10. Colorado winter wheat Irrigated Variety Performance Trial summary for 2004 .......... 12
  Table 11. Colorado winter wheat 3-Yr and 2-Yr Irrigated Variety Performance Trial summary .... 12
  Table 12. Winter wheat Irrigated Variety Performance Trial at Haxtun in 2004 ....................... 13
  Table 13. Winter wheat Irrigated Variety Performance Trial at Rocky Ford in 2004 ................. 13

2003/2004 COLLABORATIVE ON-FARM TESTS (COFT) ................................................................. 14
  Introduction ....................................................................................................................................... 14
  Table 1. Colorado Collaborative On-Farm Test (COFT) results in 2004 ..................................... 16

WESTERN WINTER WHEAT VARIETY PERFORMANCE TRIAL ....................................................... 17
  Table 1. Description of winter wheat varieties in western trial ...................................................... 17
  Winter Wheat Variety Performance Test at Hayden, Colorado 2004 ........................................... 17
  Table 2. Winter wheat variety performance at Hayden in 2004 ................................................... 19

CONTRIBUTED WHEAT ARTICLES ................................................................................................. 20
  Have pollen, will travel ...................................................................................................................... 20
  CSU Wheat Breeding Program Releases Two New Wheat Cultivars ........................................... 21
  Irrigated Winter Wheat - The Platte Value Program ................................................................... 22
  Making Better Marketing Decisions in 2005 .................................................................................. 23
  Managing new Russian wheat aphid biotypes ................................................................................ 23
CONTRIBUTING AUTHORS

Dr. Jerry Johnson - Research Scientist/Extension Specialist/Crop Production, Colorado State University, Department of Soil and Crop Sciences, C12 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-1454, fax: 970-491-2758, e-mail: jerry.johnson@colostate.edu.

Dr. Scott Haley - Associate Professor/Wheat Breeder, Colorado State University, Department of Soil and Crop Sciences, C136 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-6483, fax: 970-491-0564, e-mail: scott.haley@colostate.edu.


Dr. Frank Peairs - Professor/Extension Specialist/Entomologist, Colorado State University, Department of Bioagricultural Sciences & Pest Management, 102 Insectary, Fort Collins, CO 80523-1177, phone: 970-491-5945, fax: 970-491-6990, e-mail: frank.peairs@colostate.edu.

Dr. Phil Westra - Professor/Extension Specialist/Weed Science, Colorado State University, Department of Bioagricultural Sciences & Pest Management, 112 Weed Research Lab, Fort Collins, CO 80523-1177, phone: 970-491-5219, fax: 970-491-3862, e-mail: philip.westra@colostate.edu.

Dr. Calvin Pearson - Professor/Extension Specialist/New Alternative Crops, Colorado State University, Western Colorado Research Center, 1910 L Road, Fruita, CO 81521, phone: 970-858-3629, fax: 970-858-0461, e-mail: calvin.pearson@colostate.edu.

Dr. Pat Byrne - Associate Professor/Plant Geneticist, Colorado State University, Department of Soil and Crop Sciences, C131 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-6985, fax: 970-491-0564, e-mail: patrick.byrne@colostate.edu.

Dr. Brien Henry - Weed Scientist, USDA-ARS-NPA, Colorado State University, Department of Soil and Crop Sciences, Akron, CO 80720, phone: 970-345-0509, e-mail: brien.henry@ars.usda.gov.

Dr. Scott Nissen - Associate Professor/Extension Specialist/Weed Science, Colorado State University, Department of Bioagricultural Sciences & Pest Management, 115 Weed Research Lab, Fort Collins, CO 80523-1177, phone: 970-491-3489, fax: 970-491-3862, e-mail: scott.nissen@colostate.edu.

Mike Koch - Research Associate, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C129 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-345-0538, fax: 970-491-3862, e-mail: michael.koch@colostate.edu.

Thia Walker - Research Associate, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C129 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-336-7734, fax: 970-491-3862, e-mail: thia.walker@colostate.edu.
Terri Randolph - Research Associate, Colorado State University, Department of Bioagricultural Sciences & Pest Management, 101 Insectary, Fort Collins, CO 80523-1177, phone: 970-491-5676, fax: 970-491-3862, e-mail: terri.randolph@colostate.edu.

Jeff Rudolph - Research Associate, Colorado State University, Department of Bioagricultural Sciences & Pest Management, 101 Insectary, Fort Collins, CO 80523-1177, phone: 970-491-5675, fax: 970-491-3862, e-mail: jrudolph@lamar.colostate.edu.

Bob Hammon - Extension Agent, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C129 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-244-1834, fax: 970-491-3862, e-mail: robert.hammon@colostate.edu.

Todd Gaines - Graduate Student (M.S.), Colorado State University, Department of Soil and Crop Sciences, W04 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-1473, fax: 970-491-0564, e-mail: tgaines@holly.colostate.edu.

Dr. Rollin Sears - AgriPro Wheat/Research and Development, AgriPro Seed Inc., 6515 Ascher Road, Junction City, KS 66441, phone: 785-210-0218, e-mail: rollin.sears@agripro.com.

Rob Bruns - AgriPro Wheat/General Manager, AgriPro Seed Inc., PO Box 30, 806 N 2nd, Berthoud, CO 80513, phone: 970-532-3721, e-mail: rbruns@frii.com.

VALUABLE WHEAT INFORMATION RESOURCES

Kevin Larson - Superintendent/Research Scientist, Colorado State University, Plainsman Research Center, P.O. Box 477, Walsh, CO 81090, phone: 719-324-5643, e-mail: kevin.larson@colostate.edu.

Jim Hain - Research Associate/Crops Testing Program, Colorado State University, Department of Soil and Crop Sciences, Central Great Plains Research Station, 40335 County Road GG, Akron, CO 80720, phone: 970-554-0980, fax: 970-345-2088.

Cynthia Johnson - Research Associate/Crops Testing Program, Colorado State University, Department of Soil and Crop Sciences, C03 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-1914, fax: 970-491-2758, e-mail: cynthia.johnson@colostate.edu.

Casey Yahn - Communications & Marketing Director for Colorado Wheat, Colorado Wheat Administrative Committee, 7700 E Arapahoe Road, Suite 220, Englewood, CO 80112, phone: 303-721-3300, fax: 303-721-7555, e-mail: cyahn@coloradowheat.org.

Dr. Abdel Berrada - Superintendent/Research Scientist, Colorado State University, Arkansas Valley Research Center, 27901 Road 21, Rocky Ford, CO 81067, phone: 719-254-6312, fax: 719-254-6312, e-mail: abdel.berrada@colostate.edu.

Mark Stack - Manager/Research Associate, Colorado State University, Southwestern Colorado Research Center, 16910 County Road Z - Box 233, Yellow Jacket, CO 81335, phone: 970-562-4255, fax: 970-562-4254, e-mail: mark.stack@colostate.edu.
Dr. Howard Schwartz - Professor/Extension Specialist, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C205 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-491-6987, fax: 970-491-3862, e-mail: howard.schwartz@colostate.edu.

Dr. Jessica Davis - Professor/Extension Specialist/Soil, Colorado State University, Department of Soil and Crop Sciences, C09 Plant Science Building, Fort Collins, CO 80523-1170, phone: 970-491-1913, fax: 970-491-2758, e-mail: jessica.davis@colostate.edu.

Merlin Dillon - Extension Agent/Extension Specialist/Agronomy, Rio Grande County, 0249 East Road 9 North, Center, CO 81125, phone: 719-754-3494, fax: 719-754-2619, e-mail: merlin.dillon@colostate.edu.

Dr. Joseph Hill - Associate Professor/Plant Pathologist, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C28 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-491-7463, fax: 970-491-3862, e-mail: joe.hill@colostate.edu.

Ned Tisserat - Professor/Plant Disease Specialist, Colorado State University, Department of Bioagricultural Sciences & Pest Management, C137 Plant Science Building, Fort Collins, CO 80523-1177, phone: 970-491-6527, fax: 970-491-3862, e-mail: ned.tisserat@colostate.edu.

EASTERN COLORADO COOPERATIVE EXTENSION WHEAT EDUCATORS

Bruce Bosley - Extension Agent, Logan County, 508 South 10th Avenue, Suite 1, Sterling, CO 80751-3408, phone: 970-522-3200, fax: 970-522-7856, e-mail: d.bruce.bosley@colostate.edu.

Ron Meyer - Extension Agent, Kit Carson County, 251 16th Street, Suite 101, Burlington, CO 80807-1674, phone: 719-346-5571, fax: 719-346-5660, e-mail: ronald.meyer@colostate.edu.

Dr. Assefa Gebre-Amlak - Extension Agent, Washington County, 181 Birch Avenue, County Courthouse Annex, Akron, CO 80720-1513, phone: 970-345-2287, fax: 970-345-2288, e-mail: assefa.gebre-amlak@colostate.edu.

Dennis Kaan - Extension Agent, Washington County, 181 Birch Avenue, County Courthouse Annex, Akron, CO 80720-1513, phone: 970-345-2287, fax: 970-345-2288, e-mail: dkaan@coop.ext.colostate.edu.

Alan Helm - Extension Agent, Phillips County, 127 E. Denver, PO Box 328, Holyoke, CO 80734-0328, phone: 970-854-3616, fax: 970-854-4347, e-mail: alan.helm@colostate.edu.

Bruce Fickenscher - Extension Agent, Kiowa County, County Courthouse, 1305 Goff, PO Box 97, Eads, CO 81036-0097, phone: 719-438-5321, fax: 719-438-5314, e-mail: bruce.fickenscher@colostate.edu.

Dr. Thaddeus Gourd - Extension Agent, Adams County, 9755 Henderson Road, Brighton, CO 80601-8114, phone: 303-637-8100, fax: 303-637-8125, e-mail: thaddeus.gourd@colostate.edu.
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 streak 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.

<table>
<thead>
<tr>
<th>Locations</th>
<th>Date of Planting 2003</th>
<th>Date of Harvest 2004</th>
<th>Soil Texture</th>
<th>Fertilization (lb/ac)</th>
<th>Type of Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nitrogen N</td>
<td>Phosphorus P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;</td>
</tr>
<tr>
<td>Uniform</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akron</td>
<td>9/22/03</td>
<td>7/06/04</td>
<td>Silty Clay</td>
<td>66</td>
<td>20</td>
</tr>
<tr>
<td>Bennett</td>
<td>9/09/03</td>
<td>7/06/04</td>
<td>Sandy Clay</td>
<td>43</td>
<td>18</td>
</tr>
<tr>
<td>Julesburg</td>
<td>9/17/03</td>
<td>7/08/04</td>
<td>Clay Loam</td>
<td>56</td>
<td>20</td>
</tr>
<tr>
<td>Sheridan Lake</td>
<td>9/10/03</td>
<td>7/03/04</td>
<td>Sandy Loam</td>
<td>56</td>
<td>18</td>
</tr>
<tr>
<td>Yuma</td>
<td>9/16/03</td>
<td>7/07/04</td>
<td>Silty Clay Loam</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Irrigated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haxtun</td>
<td>9/24/03</td>
<td>7/14/04</td>
<td>Loamy Sand</td>
<td>175</td>
<td>75</td>
</tr>
<tr>
<td>Rocky Ford</td>
<td>10/01/03</td>
<td>7/03/04</td>
<td>Clay Loam</td>
<td>118</td>
<td>75</td>
</tr>
</tbody>
</table>
## Description of winter wheat varieties in the 2004 Variety Trials.

<table>
<thead>
<tr>
<th>Name and Pedigree</th>
<th>Origin/Class</th>
<th>RWA</th>
<th>HD</th>
<th>HT</th>
<th>SS</th>
<th>ST</th>
<th>COL</th>
<th>WH</th>
<th>SR</th>
<th>LR</th>
<th>WSMV</th>
<th>TW</th>
<th>PC</th>
<th>MILL</th>
<th>BAKE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above TAM 110*4/FS2</td>
<td>CSU-TX 2001</td>
<td>S 3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>Clearfield* winter wheat developed cooperatively by CSU and Texas A&amp;M-Amarillo. White chaff, early maturing semidwarf. Excellent dryland and irrigated performance record in Colorado. Marginal baking quality characteristics.</td>
<td></td>
</tr>
<tr>
<td>Akron TAM 107/Hail</td>
<td>CSU 1994</td>
<td>S 5</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>Semidwarf, medium-early maturity, vigorous growth pattern, closes canopy early in spring and competes well with weeds. Good dryland performance record in Colorado.</td>
<td></td>
</tr>
<tr>
<td>Alliance Arkan/Colt/Chisholm sib</td>
<td>NEB 1993</td>
<td>S 5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>Medium-early maturing semidwarf, short coleoptile, above average tolerance to root rot and crown rot. Good dryland performance record in Colorado.</td>
<td></td>
</tr>
<tr>
<td>Ankor Akron/Halt/4* Akron</td>
<td>CSU 2002</td>
<td>R* 5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Antelope Pronghorn/Arlin</td>
<td>NEB 2002</td>
<td>S 5</td>
<td>6</td>
<td>2</td>
<td>--</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>AP502 CL TXGH12588-26*4/FS2</td>
<td>AgriPro 2001</td>
<td>S 2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Arrowsmith KS87809-10/Arapahoe</td>
<td>NEB 2002</td>
<td>S 7</td>
<td>8</td>
<td>5</td>
<td>--</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Avalanche KS87H325/Rio Blanco</td>
<td>CSU 2001</td>
<td>S 5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Bond CL Yumar/TXGH12588-120*4/FS2</td>
<td>CSU 2004</td>
<td>R* 5</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Enhancer 1992 Nebraska Bulk Selection</td>
<td>Westbred 1998</td>
<td>S 5</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>Developed and marketed by Westbred. Medium height and medium maturity. Good fall growth, good stripe rust resistance. Poor straw strength and test weight.</td>
<td></td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>Name and Pedigree</th>
<th>Origin/Class</th>
<th>RWA</th>
<th>HD</th>
<th>HT</th>
<th>SS</th>
<th>ST</th>
<th>COL</th>
<th>WH</th>
<th>SR</th>
<th>LR</th>
<th>WSMV</th>
<th>TW</th>
<th>PC</th>
<th>MILL</th>
<th>BAKE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halt Sumner/CO820026,F1//PI372129,F1/3/TAM 107</td>
<td>CSU 1994 Hard red winter</td>
<td>R*</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>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.</td>
</tr>
<tr>
<td>Jagalene Abilene/Jagger</td>
<td>AgriPro 2001 Hard red winter</td>
<td>S</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>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.</td>
</tr>
<tr>
<td>Jagger KS82W418/Stephens</td>
<td>KSU 1994 Hard red winter</td>
<td>S</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>KS02HW34 TREGO/JGR 8W</td>
<td>KSU EXP Hard white winter</td>
<td>S</td>
<td>6</td>
<td>4</td>
<td>--</td>
<td>--</td>
<td>3</td>
<td>--</td>
<td>2</td>
<td>3</td>
<td>--</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>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.</td>
</tr>
<tr>
<td>Lakin Arlin/KS89H130</td>
<td>KSU 2000 Hard white winter</td>
<td>S</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>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.</td>
</tr>
<tr>
<td>Millennium Arapahoe/Abilene//NE86488</td>
<td>NCB 1999 Hard red winter</td>
<td>S</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>--</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>Medium late, tall wheat. Good performance in Nebraska-Panhandle trials. First entered in Colorado Dryland Trials (UVPT) in 2004.</td>
</tr>
<tr>
<td>NuFrontier Undisclosed</td>
<td>General Mills Hard white winter</td>
<td>S</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>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.</td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>Name and Pedigree</th>
<th>Origin/Class</th>
<th>RWA</th>
<th>HD</th>
<th>HT</th>
<th>SS</th>
<th>ST</th>
<th>COL</th>
<th>WH</th>
<th>SR</th>
<th>LR</th>
<th>WSMV</th>
<th>TW</th>
<th>PC</th>
<th>MILL</th>
<th>BAKE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NuHorizon Undisclosed</td>
<td>General Mills 2000 Hard white winter</td>
<td>S 6 1 3 3 7 4 2 9 4 1 2 5 7</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NuPlains Abilene/KS831862</td>
<td>NEB 1999 Hard white winter</td>
<td>S 8 3 4 -- 3 2 8 7 8 4 1 2 5</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ok102 2174/Cimarron</td>
<td>OK 2002 Hard red winter</td>
<td>S 5 1 2 4 4 -- 7 4 -- 3 3 2 3</td>
<td>Medium-maturity, semidwarf. Excellent milling and baking quality characteristics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overley U1275-1-4-2-2/KS85W663-7-4-2/JGR</td>
<td>KSU 2003 Hard red winter</td>
<td>S 2 4 3 7 6 6 1 8 4 5 2 2 2</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platte N84-1104/Abilene</td>
<td>AgriPro 1995 Hard white winter</td>
<td>S 6 1 1 -- 1 5 9 -- 7 3 5 3 1</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prairie Red CO850034/P1372129//5*TAM 107</td>
<td>CSU 1998 Hard red winter</td>
<td>R* 1 2 4 2 8 4 9 9 5 7 3 4 7</td>
<td>Russian wheat aphid resistant version of TAM 107. Bronzecoffed, early maturing semidwarf, medium long coleoptile, good heat and drought tolerance, poor end-use quality reputation. Very susceptible to leaf rust.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prowers 99 CO850060/P1372129//5*Lamar</td>
<td>CSU 1999 Hard red winter</td>
<td>R* 8 8 7 4 9 2 7 6 7 1 1 5 1</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>Name and Pedigree</th>
<th>Origin/Class</th>
<th>RWA</th>
<th>HD</th>
<th>HT</th>
<th>SS</th>
<th>ST</th>
<th>COL</th>
<th>WH</th>
<th>SR</th>
<th>LR</th>
<th>WSMV</th>
<th>TW</th>
<th>PC</th>
<th>MILL</th>
<th>BAKE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thunderbolt Abilene/KS90WGRC10</td>
<td>AgriPro 1999</td>
<td>Hard red winter</td>
<td>5 7 3 7 4 8 8 5 1 1 1</td>
<td>4</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trego KS87H325/Rio Blanco</td>
<td>KSU 1999</td>
<td>Hard white winter</td>
<td>6 4 6 3 4 8 4 5 1 3 2 6</td>
<td>7</td>
<td>Hard white winter wheat (HWW) released by Kansas State. Medium-late maturity, semidwarf, high test weight. Excellent dryland performance record in Colorado.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wesley KS831936-3//Colt/Cody</td>
<td>NEB 1998</td>
<td>Hard red winter</td>
<td>4 1 2 -- 5 3 2 3 7 5 2 3 4</td>
<td>4</td>
<td>Medium-early, short, excellent straw strength. Good winterhardiness and milling and baking quality characteristics. Good stripe rust resistance, good irrigated performance record in Colorado.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yuma NS14/NS25/2/2*Vona</td>
<td>CSU 1991</td>
<td>Hard red winter</td>
<td>5 3 2 5 2 4 7 8 6 5 7 7 3</td>
<td>3</td>
<td>Medium maturity, semidwarf, very good straw strength, short coleoptile, good baking quality characteristics. Good dryland and irrigated performance record in Colorado.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yumar Yuma/PI372129//CO85 0034/3/4*Yuma</td>
<td>CSU 1997</td>
<td>Hard red winter</td>
<td>R 5 4 3 5 2 4 6 8 6 5 5 5 5</td>
<td>3</td>
<td>Russian wheat aphid resistant version of Yuma. Medium-maturing semidwarf. Good straw strength, good baking quality characteristics. Good irrigated performance record in Colorado.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Location</th>
<th>2004 Averages</th>
<th>% of Trial Average</th>
<th>Grain Moisture</th>
<th>Test Wt</th>
<th>Plant Ht</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Akron</td>
<td>Test Wt</td>
<td>Yield (bu/ac)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bennett</td>
<td>Test Wt</td>
<td>Yield (lb/bu)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Julesburg</td>
<td>Test Wt</td>
<td>Yield (bu/ac)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sheridan</td>
<td>Test Wt</td>
<td>Yield (lb/bu)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lake</td>
<td>Test Wt</td>
<td>Yield (bu/ac)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yuma</td>
<td>Test Wt</td>
<td>Yield (lb/bu)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jagalene</td>
<td></td>
<td></td>
<td>69.6</td>
<td>51.4</td>
<td>53.7</td>
<td>50.4</td>
</tr>
<tr>
<td>Above</td>
<td></td>
<td></td>
<td>61.1</td>
<td>57.6</td>
<td>49.9</td>
<td>57.4</td>
</tr>
<tr>
<td>Harry</td>
<td></td>
<td></td>
<td>66.9</td>
<td>52.3</td>
<td>55.6</td>
<td>46.7</td>
</tr>
<tr>
<td>Goodstreak</td>
<td></td>
<td></td>
<td>68.2</td>
<td>59.8</td>
<td>54.5</td>
<td>57.6</td>
</tr>
<tr>
<td>Avalanche</td>
<td></td>
<td></td>
<td>57.9</td>
<td>60.2</td>
<td>56.0</td>
<td>44.0</td>
</tr>
<tr>
<td>Stanton</td>
<td></td>
<td></td>
<td>57.8</td>
<td>59.6</td>
<td>57.2</td>
<td>58.3</td>
</tr>
<tr>
<td>TAM 111</td>
<td></td>
<td></td>
<td>64.9</td>
<td>59.7</td>
<td>52.4</td>
<td>58.4</td>
</tr>
<tr>
<td>W99-194</td>
<td></td>
<td></td>
<td>61.5</td>
<td>57.8</td>
<td>55.5</td>
<td>56.5</td>
</tr>
<tr>
<td>Wahoo</td>
<td></td>
<td></td>
<td>59.2</td>
<td>57.4</td>
<td>53.9</td>
<td>57.5</td>
</tr>
<tr>
<td>Lakin</td>
<td></td>
<td></td>
<td>67.1</td>
<td>59.2</td>
<td>54.0</td>
<td>58.3</td>
</tr>
<tr>
<td>Yumar</td>
<td></td>
<td></td>
<td>66.5</td>
<td>59.6</td>
<td>57.6</td>
<td>56.1</td>
</tr>
<tr>
<td>AP502 CL</td>
<td></td>
<td></td>
<td>55.3</td>
<td>57.2</td>
<td>52.4</td>
<td>55.4</td>
</tr>
<tr>
<td>Bond CL</td>
<td></td>
<td></td>
<td>66.6</td>
<td>57.5</td>
<td>57.9</td>
<td>55.4</td>
</tr>
<tr>
<td>Yuma</td>
<td></td>
<td></td>
<td>66.8</td>
<td>58.3</td>
<td>54.6</td>
<td>54.9</td>
</tr>
<tr>
<td>Hatcher</td>
<td></td>
<td></td>
<td>60.0</td>
<td>59.4</td>
<td>54.7</td>
<td>55.5</td>
</tr>
<tr>
<td>Ankor</td>
<td></td>
<td></td>
<td>54.2</td>
<td>59.0</td>
<td>56.3</td>
<td>58.7</td>
</tr>
<tr>
<td>NuHills</td>
<td></td>
<td></td>
<td>56.4</td>
<td>61.2</td>
<td>50.4</td>
<td>54.6</td>
</tr>
<tr>
<td>Prairie Red</td>
<td></td>
<td></td>
<td>55.5</td>
<td>59.7</td>
<td>53.5</td>
<td>57.4</td>
</tr>
<tr>
<td>Trego</td>
<td></td>
<td></td>
<td>60.7</td>
<td>61.7</td>
<td>54.1</td>
<td>37.5</td>
</tr>
<tr>
<td>Protection</td>
<td></td>
<td></td>
<td>59.1</td>
<td>57.9</td>
<td>52.6</td>
<td>54.9</td>
</tr>
<tr>
<td>NuFrontier</td>
<td></td>
<td></td>
<td>68.1</td>
<td>60.2</td>
<td>51.3</td>
<td>57.5</td>
</tr>
<tr>
<td>Jagger</td>
<td></td>
<td></td>
<td>52.5</td>
<td>59.1</td>
<td>48.0</td>
<td>56.8</td>
</tr>
<tr>
<td>Akron</td>
<td></td>
<td></td>
<td>52.1</td>
<td>59.1</td>
<td>55.0</td>
<td>56.7</td>
</tr>
<tr>
<td>Alliance</td>
<td></td>
<td></td>
<td>64.0</td>
<td>57.7</td>
<td>55.8</td>
<td>54.9</td>
</tr>
<tr>
<td>T81</td>
<td></td>
<td></td>
<td>51.3</td>
<td>60.0</td>
<td>50.8</td>
<td>56.2</td>
</tr>
<tr>
<td>Overley</td>
<td></td>
<td></td>
<td>42.9</td>
<td>60.1</td>
<td>50.6</td>
<td>56.2</td>
</tr>
<tr>
<td>Millennium</td>
<td></td>
<td></td>
<td>62.6</td>
<td>59.2</td>
<td>47.8</td>
<td>59.3</td>
</tr>
<tr>
<td>NuHorizon</td>
<td></td>
<td></td>
<td>51.2</td>
<td>60.3</td>
<td>49.8</td>
<td>58.6</td>
</tr>
<tr>
<td>Thunderbolt</td>
<td></td>
<td></td>
<td>55.7</td>
<td>61.1</td>
<td>48.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Prowers 99</td>
<td></td>
<td></td>
<td>54.4</td>
<td>60.0</td>
<td>49.7</td>
<td>59.6</td>
</tr>
<tr>
<td>Halt</td>
<td></td>
<td></td>
<td>50.3</td>
<td>58.7</td>
<td>52.2</td>
<td>57.2</td>
</tr>
<tr>
<td>Arrowsmith</td>
<td></td>
<td></td>
<td>43.4</td>
<td>58.9</td>
<td>42.3</td>
<td>58.8</td>
</tr>
<tr>
<td>Antelope</td>
<td></td>
<td></td>
<td>47.4</td>
<td>58.9</td>
<td>51.6</td>
<td>57.2</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td>58.5</td>
<td>59.2</td>
<td>52.8</td>
<td>57.0</td>
</tr>
<tr>
<td>CV%</td>
<td></td>
<td></td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD(0.30)</td>
<td></td>
<td></td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Varieties in table ranked by the average yield over five locations in 2004.

2No moisture taken at Akron.
Table 3. Colorado winter wheat 3-Yr and 2-Yr Uniform Variety Performance Trial summary.

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

1Varieties in table ranked based on 3-Yr average yields.
2Varieties rank based on 2-Yr average yields.
### Table 4. Winter wheat Uniform Variety Performance Trial at Akron in 2004\(^1\).

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

\(^1\)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\(^1\).

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

\(^1\)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.

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

**CV%** 10.8

LSD(0.30) 4.5

LSD(0.05) 8.5

---

1Trial conducted on the Walt Strasser farm; seeded 9/17/03 and harvested 7/08/04.

2Days from January 1.

### Table 7. Winter wheat Uniform Variety Performance Trial at Sheridan Lake in 2004.

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

**CV%** 13.2

LSD(0.30) 4.5

LSD(0.05) 8.6

---

1Trial conducted on the Burl Scherler farm; seeded 9/10/03 and harvested 7/03/04.

2Rating scale 0-9, with 0 = no shatter and 9 = severely shatter.
Table 8. Winter wheat Uniform Variety Performance Trial at Yuma in 2004.

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

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

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

<table>
<thead>
<tr>
<th>Trial Locations</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akron</td>
<td>Jagalene 18.1</td>
</tr>
<tr>
<td>Julesburg</td>
<td>Antelope 16.1</td>
</tr>
<tr>
<td>Bennett</td>
<td>NuHills 17.0</td>
</tr>
<tr>
<td></td>
<td>Thunderbolt 17.4</td>
</tr>
<tr>
<td></td>
<td>T81 15.7</td>
</tr>
<tr>
<td></td>
<td>Prowers 99 17.0</td>
</tr>
<tr>
<td></td>
<td>Jagger 17.9</td>
</tr>
<tr>
<td></td>
<td>Lakin 15.9</td>
</tr>
<tr>
<td></td>
<td>NuHorizon 15.9</td>
</tr>
<tr>
<td></td>
<td>Overlay 18.2</td>
</tr>
<tr>
<td></td>
<td>Akron 16.8</td>
</tr>
<tr>
<td></td>
<td>Goodstreak 17.0</td>
</tr>
<tr>
<td></td>
<td>Ankor 16.4</td>
</tr>
<tr>
<td></td>
<td>Halt 16.7</td>
</tr>
<tr>
<td></td>
<td>Prairie Red 16.0</td>
</tr>
<tr>
<td></td>
<td>Trego 16.5</td>
</tr>
<tr>
<td></td>
<td>Jagalene 16.7</td>
</tr>
<tr>
<td></td>
<td>W99-194 16.9</td>
</tr>
<tr>
<td></td>
<td>Avalanche 16.4</td>
</tr>
<tr>
<td></td>
<td>NuFrontier 14.7</td>
</tr>
<tr>
<td></td>
<td>Stanton 15.3</td>
</tr>
<tr>
<td></td>
<td>CO00739 16.0</td>
</tr>
<tr>
<td></td>
<td>Millennium 15.8</td>
</tr>
<tr>
<td></td>
<td>Yumar 15.4</td>
</tr>
<tr>
<td></td>
<td>Wahoo 15.8</td>
</tr>
<tr>
<td></td>
<td>CO991057 15.6</td>
</tr>
<tr>
<td></td>
<td>Above 15.9</td>
</tr>
<tr>
<td></td>
<td>CO00698 15.4</td>
</tr>
<tr>
<td></td>
<td>Hatcher 15.4</td>
</tr>
<tr>
<td></td>
<td>CO99W254 15.2</td>
</tr>
<tr>
<td></td>
<td>CO00016 16.0</td>
</tr>
<tr>
<td></td>
<td>TAM 111 15.4</td>
</tr>
<tr>
<td></td>
<td>Yuma 15.3</td>
</tr>
<tr>
<td></td>
<td>Bond CL 15.1</td>
</tr>
<tr>
<td></td>
<td>AP502 CL 16.1</td>
</tr>
<tr>
<td></td>
<td>CO00796 15.5</td>
</tr>
<tr>
<td></td>
<td>CO00554 16.0</td>
</tr>
<tr>
<td></td>
<td>CO970547-7 15.2</td>
</tr>
<tr>
<td></td>
<td>Protection 16.3</td>
</tr>
<tr>
<td></td>
<td>CO00345 16.4</td>
</tr>
<tr>
<td></td>
<td>CO99W192 15.0</td>
</tr>
<tr>
<td></td>
<td>Alliance 15.4</td>
</tr>
<tr>
<td></td>
<td>CO00347 15.9</td>
</tr>
<tr>
<td></td>
<td>CO99W183 14.9</td>
</tr>
<tr>
<td></td>
<td>Harry 14.3</td>
</tr>
<tr>
<td></td>
<td>CO99W329 15.0</td>
</tr>
<tr>
<td></td>
<td>Average 16.0</td>
</tr>
</tbody>
</table>

Minimum 14.3 8.9 12.6
Maximum 18.2 14.3 16.0

*Protein contents adjusted to 12% moisture.

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

1Varieties 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.

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

1Varieties 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 2004¹.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield</th>
<th>Grain Moisture</th>
<th>Test Weight</th>
<th>Plant Height</th>
<th>Shatter²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bu/ac</td>
<td>%</td>
<td>lb/bu</td>
<td>in</td>
<td></td>
</tr>
<tr>
<td>Yuma</td>
<td>133.5</td>
<td>12.5</td>
<td>57.5</td>
<td>34</td>
<td>0-9</td>
</tr>
<tr>
<td>Bond CL</td>
<td>130.7</td>
<td>11.9</td>
<td>57.6</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>Protection</td>
<td>122.2</td>
<td>11.7</td>
<td>57.6</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>NuHorizon</td>
<td>121.6</td>
<td>12.8</td>
<td>60.3</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>Antelope</td>
<td>121.5</td>
<td>11.7</td>
<td>57.0</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Ankor</td>
<td>120.6</td>
<td>12.4</td>
<td>59.4</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Jagalene</td>
<td>119.9</td>
<td>12.2</td>
<td>59.0</td>
<td>37</td>
<td>1</td>
</tr>
<tr>
<td>Overley</td>
<td>119.7</td>
<td>11.8</td>
<td>58.3</td>
<td>38</td>
<td>2</td>
</tr>
<tr>
<td>Hatcher</td>
<td>118.4</td>
<td>13.1</td>
<td>59.0</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Dumas</td>
<td>113.8</td>
<td>11.8</td>
<td>58.2</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>Wesley</td>
<td>113.8</td>
<td>12.1</td>
<td>58.9</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Ok102</td>
<td>112.3</td>
<td>12.5</td>
<td>59.3</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>NuFrontier</td>
<td>111.7</td>
<td>12.1</td>
<td>56.2</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Nuplains</td>
<td>110.6</td>
<td>13.4</td>
<td>58.6</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Prairie Red</td>
<td>109.1</td>
<td>11.6</td>
<td>56.9</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Platte</td>
<td>107.8</td>
<td>13.4</td>
<td>61.0</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>NuHills</td>
<td>103.8</td>
<td>12.2</td>
<td>58.4</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>Average</td>
<td>117.1</td>
<td>12.3</td>
<td>58.4</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>CV%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.1</td>
</tr>
<tr>
<td>LSD(0.30)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.1</td>
</tr>
<tr>
<td>LSD(0.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.6</td>
</tr>
</tbody>
</table>

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

Table 13. Winter wheat Irrigated Variety Performance Trial at Rocky Ford in 2004¹.

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

¹Trial conducted on at the Arkansas Valley Research Center; seeded 10/01/03 and harvested 7/03/04.
²Rating 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:

- 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.

<table>
<thead>
<tr>
<th>COFT Location*</th>
<th>Variety (Yields in bu/ac @13 % moisture)</th>
<th>Above</th>
<th>Ankor</th>
<th>Jagalene</th>
<th>Avalanche</th>
<th>Trego</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prowers NC</td>
<td></td>
<td>36.1</td>
<td>35.2</td>
<td>42.0</td>
<td>35.7</td>
<td>38.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Baca EC</td>
<td></td>
<td>34.0</td>
<td>27.5</td>
<td>30.2</td>
<td>30.2</td>
<td>25.7</td>
<td>29.5</td>
</tr>
<tr>
<td>Baca NC</td>
<td></td>
<td>3.4</td>
<td>2.9</td>
<td>3.2</td>
<td>3.5</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Kiowa NE</td>
<td></td>
<td>15.8</td>
<td>16.5</td>
<td>14.1</td>
<td>14.7</td>
<td>15.3</td>
<td>15.3</td>
</tr>
<tr>
<td>Morgan SW</td>
<td></td>
<td>35.1</td>
<td>33.8</td>
<td>34.8</td>
<td>36.4</td>
<td>35.6</td>
<td>35.2</td>
</tr>
<tr>
<td>Weld NC</td>
<td></td>
<td>25.6</td>
<td>28.6</td>
<td>35.1</td>
<td>26.0</td>
<td>25.5</td>
<td>28.2</td>
</tr>
<tr>
<td>Adams SE</td>
<td></td>
<td>20.0</td>
<td>24.6</td>
<td>20.4</td>
<td>18.9</td>
<td>18.8</td>
<td>20.5</td>
</tr>
<tr>
<td>SE and FR Average</td>
<td></td>
<td>24.3</td>
<td>24.2</td>
<td>25.7</td>
<td>23.6</td>
<td>23.3</td>
<td>24.2</td>
</tr>
</tbody>
</table>

**LSD(0.30) a a a a a 3.6

<table>
<thead>
<tr>
<th>Variety (Yields in bu/ac @13 % moisture)</th>
<th>Above</th>
<th>Ankor</th>
<th>Jagalene</th>
<th>Avalanche</th>
<th>Trego</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kit Carson SW</td>
<td>39.4</td>
<td>38.9</td>
<td>36.8</td>
<td>49.0</td>
<td>40.7</td>
<td>41.0</td>
</tr>
<tr>
<td>Yuma NW</td>
<td>21.2</td>
<td>20.6</td>
<td>25.2</td>
<td>22.7</td>
<td>28.2</td>
<td>23.6</td>
</tr>
<tr>
<td>Yuma SE</td>
<td>5.8</td>
<td>16.0</td>
<td>3.6</td>
<td>19.4</td>
<td>1.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Lincoln NC</td>
<td>18.3</td>
<td>17.4</td>
<td>20.5</td>
<td>22.3</td>
<td>22.8</td>
<td>20.2</td>
</tr>
<tr>
<td>Sedgwick SE</td>
<td>27.4</td>
<td>27.1</td>
<td>28.3</td>
<td>26.1</td>
<td>34.1</td>
<td>28.6</td>
</tr>
<tr>
<td>Sedgwick SC</td>
<td>27.7</td>
<td>26.5</td>
<td>27.5</td>
<td>25.9</td>
<td>26.9</td>
<td></td>
</tr>
<tr>
<td>Logan NE</td>
<td>28.8</td>
<td>27.6</td>
<td>30.0</td>
<td>31.4</td>
<td>31.4</td>
<td>29.8</td>
</tr>
<tr>
<td>Logan SC</td>
<td>28.0</td>
<td>28.1</td>
<td>29.0</td>
<td>25.8</td>
<td>22.3</td>
<td>26.6</td>
</tr>
<tr>
<td>Logan EC</td>
<td>47.2</td>
<td>45.4</td>
<td>51.8</td>
<td>46.9</td>
<td>50.1</td>
<td>48.3</td>
</tr>
<tr>
<td>Morgan NE</td>
<td>41.9</td>
<td>43.2</td>
<td>45.0</td>
<td>42.7</td>
<td>42.3</td>
<td>43.0</td>
</tr>
<tr>
<td>NE Average</td>
<td>28.6</td>
<td>29.2</td>
<td>29.8</td>
<td>31.6</td>
<td>29.9</td>
<td>29.8</td>
</tr>
</tbody>
</table>

**LSD(0.30) b b ab a ab a 1.7

<table>
<thead>
<tr>
<th>Overall Average</th>
<th>26.8</th>
<th>27.1</th>
<th>28.1</th>
<th>28.3</th>
<th>27.2</th>
<th>27.5</th>
</tr>
</thead>
</table>

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

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

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 outyields 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.
Table 2. Winter wheat variety performance at Hayden in 2004¹.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield (bu/ac)</th>
<th>Grain Moisture (lb/bu)</th>
<th>Test Weight (lb/bu)</th>
<th>Smut Incidence²</th>
<th>Protein (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Spike</td>
<td>41.0</td>
<td>8.3</td>
<td>60.3</td>
<td>1.0</td>
<td>7.09</td>
</tr>
<tr>
<td>Gary</td>
<td>40.6</td>
<td>8.6</td>
<td>60.1</td>
<td>1.0</td>
<td>7.47</td>
</tr>
<tr>
<td>Deloris</td>
<td>40.1</td>
<td>8.8</td>
<td>61.9</td>
<td>1.0</td>
<td>7.40</td>
</tr>
<tr>
<td>Hayden</td>
<td>38.8</td>
<td>8.7</td>
<td>62.4</td>
<td>1.0</td>
<td>7.83</td>
</tr>
<tr>
<td>ID0571</td>
<td>38.1</td>
<td>8.9</td>
<td>62.0</td>
<td>1.0</td>
<td>7.96</td>
</tr>
<tr>
<td>Ankor</td>
<td>37.2</td>
<td>8.7</td>
<td>60.6</td>
<td>2.0</td>
<td>8.05</td>
</tr>
<tr>
<td>NuFrontier</td>
<td>35.8</td>
<td>8.4</td>
<td>61.9</td>
<td>2.0</td>
<td>7.77</td>
</tr>
<tr>
<td>Fairview</td>
<td>35.7</td>
<td>8.8</td>
<td>61.4</td>
<td>1.0</td>
<td>7.60</td>
</tr>
<tr>
<td>Lakin</td>
<td>34.7</td>
<td>8.4</td>
<td>61.0</td>
<td>2.2</td>
<td>8.27</td>
</tr>
<tr>
<td>Hatcher</td>
<td>33.8</td>
<td>9.0</td>
<td>59.8</td>
<td>2.2</td>
<td>8.37</td>
</tr>
<tr>
<td>Bond CL</td>
<td>31.8</td>
<td>8.9</td>
<td>59.9</td>
<td>2.2</td>
<td>7.94</td>
</tr>
<tr>
<td>CO00347</td>
<td>31.3</td>
<td>9.0</td>
<td>59.8</td>
<td>2.2</td>
<td>7.72</td>
</tr>
<tr>
<td>CO00345</td>
<td>31.2</td>
<td>9.0</td>
<td>59.9</td>
<td>2.5</td>
<td>7.74</td>
</tr>
<tr>
<td>Above</td>
<td>31.0</td>
<td>8.9</td>
<td>60.8</td>
<td>1.5</td>
<td>8.15</td>
</tr>
<tr>
<td>CO00739</td>
<td>30.8</td>
<td>8.8</td>
<td>60.5</td>
<td>2.5</td>
<td>7.56</td>
</tr>
<tr>
<td>Avalanche</td>
<td>30.6</td>
<td>8.3</td>
<td>62.0</td>
<td>2.2</td>
<td>8.86</td>
</tr>
<tr>
<td>NuHorizon</td>
<td>27.6</td>
<td>8.4</td>
<td>61.7</td>
<td>2.8</td>
<td>8.37</td>
</tr>
<tr>
<td>Antelope</td>
<td>27.4</td>
<td>8.5</td>
<td>61.2</td>
<td>2.0</td>
<td>8.80</td>
</tr>
<tr>
<td>CO00796</td>
<td>25.8</td>
<td>9.0</td>
<td>59.8</td>
<td>3.0</td>
<td>8.36</td>
</tr>
<tr>
<td>CO99W183</td>
<td>25.8</td>
<td>8.1</td>
<td>60.6</td>
<td>2.2</td>
<td>8.65</td>
</tr>
<tr>
<td>Arrowsmith</td>
<td>25.6</td>
<td>8.0</td>
<td>60.0</td>
<td>2.5</td>
<td>7.88</td>
</tr>
<tr>
<td>CO970547-7</td>
<td>24.4</td>
<td>8.7</td>
<td>61.0</td>
<td>2.0</td>
<td>8.40</td>
</tr>
<tr>
<td>CO99W192</td>
<td>22.6</td>
<td>8.0</td>
<td>59.8</td>
<td>2.8</td>
<td>8.27</td>
</tr>
<tr>
<td>NuHills</td>
<td>19.2</td>
<td>8.2</td>
<td>60.9</td>
<td>2.8</td>
<td>9.53</td>
</tr>
<tr>
<td>Average</td>
<td>31.7</td>
<td>8.6</td>
<td>60.8</td>
<td>2.0</td>
<td>8.08</td>
</tr>
<tr>
<td>CV%</td>
<td>11.5</td>
<td>1.8</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD(0.05)</td>
<td>5.1</td>
<td>0.2</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Entry</th>
<th>03-04 Avg</th>
<th>02-04 Avg</th>
<th>Test Wt Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above</td>
<td>34.5</td>
<td>52.8</td>
<td>51.4</td>
</tr>
<tr>
<td>Hatcher</td>
<td>32.0</td>
<td>56.0</td>
<td>48.3</td>
</tr>
<tr>
<td>Bond CL</td>
<td>31.3</td>
<td>55.2</td>
<td>48.4</td>
</tr>
<tr>
<td>Trego</td>
<td>34.3</td>
<td>52.9</td>
<td>47.7</td>
</tr>
<tr>
<td>Jagalene</td>
<td>35.7</td>
<td>46.6</td>
<td>54.1</td>
</tr>
<tr>
<td>Ankor</td>
<td>33.7</td>
<td>51.8</td>
<td>48.3</td>
</tr>
<tr>
<td>Avalanche</td>
<td>31.6</td>
<td>50.4</td>
<td>50.6</td>
</tr>
<tr>
<td>Yuma</td>
<td>30.0</td>
<td>53.0</td>
<td>48.4</td>
</tr>
<tr>
<td>Stanton</td>
<td>32.6</td>
<td>49.4</td>
<td>50.4</td>
</tr>
<tr>
<td>Prairie Red</td>
<td>34.6</td>
<td>50.2</td>
<td>48.0</td>
</tr>
<tr>
<td>Yumar</td>
<td>30.8</td>
<td>50.3</td>
<td>48.7</td>
</tr>
<tr>
<td>AP502 CL</td>
<td>32.7</td>
<td>48.9</td>
<td>48.6</td>
</tr>
<tr>
<td>Lakin</td>
<td>33.9</td>
<td>47.8</td>
<td>49.0</td>
</tr>
<tr>
<td>Alliance</td>
<td>32.5</td>
<td>50.5</td>
<td>46.4</td>
</tr>
<tr>
<td>Akron</td>
<td>33.2</td>
<td>49.6</td>
<td>46.7</td>
</tr>
<tr>
<td>Jagger</td>
<td>31.7</td>
<td>46.0</td>
<td>47.3</td>
</tr>
<tr>
<td>Halt</td>
<td>34.7</td>
<td>46.7</td>
<td>41.9</td>
</tr>
<tr>
<td>Prowers 99</td>
<td>31.8</td>
<td>45.4</td>
<td>42.2</td>
</tr>
<tr>
<td>Thunderbolt</td>
<td>30.8</td>
<td>39.6</td>
<td>43.0</td>
</tr>
<tr>
<td>Average</td>
<td>32.7</td>
<td>49.5</td>
<td>47.7</td>
</tr>
<tr>
<td>Locations</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

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.

'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
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
- Perry Brothers Seed
- Roggen Certified Seed LLC
- Kenneth Pottorf
- Knievel Seed Co.
- Andrews Bros. Seed, Inc
- Mattson Farms
- Kramer Seed Farms
- Luhrs Certified Seed
- Jirdon Agri Chemicals, Inc.
- Prairie Farms Ltd.
- Grainland Cooperative
- Holyoke Coop Assn.
- Stratton Equity Cooperative
- Frenchman Valley Coop
- Frenchman Valley Coop
- Frenchman Valley Coop

- Crook 970-253-5009
- Otis 970-246-3401
- Roggen 303-849-5339
- Stratton 719-348-5213
- Wiggins 970-483-6166
- Yuma 970-848-0709
- Colby 785-586-2313
- Hugoton 620-544-4330
- Enders 308-882-5917
- Morrill 308-247-2126
- Albin 307-246-3458
- Haxtun 970-774-6166
- Holyoke 970-854-2254
- Stratton 719-348-5396
- Grant 308-352-4295
- Imperial 308-882-3200
- 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 Pearis, 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.

<table>
<thead>
<tr>
<th>Resistant Variety</th>
<th>Breeding Process</th>
<th>Susceptible parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halt</td>
<td>developed through a crossing program</td>
<td>multiple parents</td>
</tr>
<tr>
<td>Prairie Red</td>
<td>resulting from backcross</td>
<td>TAM 107</td>
</tr>
<tr>
<td>Prowers 99</td>
<td>resulting from backcross</td>
<td>Lamar</td>
</tr>
<tr>
<td>Yumar</td>
<td>resulting from backcross</td>
<td>Yuma</td>
</tr>
<tr>
<td>Ankor</td>
<td>resulting from backcross</td>
<td>Akron</td>
</tr>
<tr>
<td>Stanton</td>
<td>developed through a crossing program</td>
<td>multiple parents</td>
</tr>
</tbody>
</table>
**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.

<table>
<thead>
<tr>
<th>Area</th>
<th>Total Sample</th>
<th>Biotype 1</th>
<th>Non-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW &amp; Front Range</td>
<td>35 23 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southeast</td>
<td>40 11 29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Slope</td>
<td>8 8 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nebraska</td>
<td>6 2 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>99 44 45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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\(^1\)

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

\(^1\)Includes data from several states.
Table 2. Treatment guidelines for Russian wheat aphid by crop stage.

<table>
<thead>
<tr>
<th>Crop Stage</th>
<th>Level at which aphids should be treated¹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FALL</strong></td>
<td></td>
</tr>
<tr>
<td>Any growth stage</td>
<td>10-20% damaged plants</td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td></td>
</tr>
<tr>
<td>Regrowth to early boot</td>
<td>5-10% damaged and infested tillers</td>
</tr>
<tr>
<td>Early boot to flowering</td>
<td>10-20% damaged and infested tillers</td>
</tr>
<tr>
<td>After flowering</td>
<td>More than 20% damaged and infested tillers</td>
</tr>
</tbody>
</table>

¹Based 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:

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

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:

<table>
<thead>
<tr>
<th>25% Infested Tillers =</th>
<th>$15.00 x 200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34 x $3.50</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>32% Infested Tillers =</th>
<th>$15.00 x 200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34 x $2.75</td>
</tr>
</tbody>
</table>

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**

## 2005 Wheat Variety Field Day Locations

- **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)

---

**CSU & Invited Program Speakers**

- Breeding and Varieties (Scott Haley)
- Crops Testing (Jerry Johnson)
- CWAC/CAWG/CWRF (Darrell Hanavan & Casey Yahn)
- Weeds and Clearfield Wheat (Phil Westra & Associates)
- RWA and Entomology (Frank Peairs & Associates)
- Colorado Seed Growers (Brad Erker)
- Wheat Diseases (Ned Tisserat)
- BASF, Westbred, General Mills and AgriPro representatives

---

**Putting Knowledge to Work**

---

27
### MAKE NOTES FOR VARIETIES YOU LIKE:

#### 2004-2005 Colorado Winter Wheat UVPT

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

#### 2004-2005 Colorado Winter Wheat IVPT

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

Jerry Johnson, Extension Specialist Crop Production

Department of Soil and Crop Sciences
1170 Campus Delivery
Fort Collins, Colorado 80523-1170

Putting Knowledge to Work