UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS


Nursery Coordinator:
D.F. Garvin, Research Geneticist, USDA-ARS

Report prepared by D.F. Garvin and Z. Blankenheim

This is a joint progress report of cooperative investigations underway in the State Agricultural Experiment Stations and the Agricultural Research Service of the U.S. Department of Agriculture. It contains preliminary data which have not been sufficiently confirmed to justify general release, and interpretations may be modified after additional experimentation. Confirmed results will be published through established channels. This report is primarily a tool for use by cooperators and their official staffs, and for those persons having direct and special interest in the development of agricultural research programs.

This report includes data furnished by the State Agricultural Experiment Stations as well as by the Agricultural Research Service of the U.S. Department of Agriculture. This report is not intended for publication and should not be referred to in literature citations, nor quoted in publicity or advertising. Accuracy of information within this report is not guaranteed by the U.S. Government.

Use of the data may be granted for certain purposes upon written request to the agency or agencies involved.

Agricultural Research Service
U.S. Department of Agriculture
Midwest Area
St. Paul, Minnesota
January 7, 2011
2010 HARD RED SPRING WHEAT UNIFORM REGIONAL NURSERY REPORT

CONTENTS

Cooperating Agencies, Stations and Personnel 2
Provisional Policy for Protected or Patented Genes 3
2010 Spring Wheat Production Statistics 4
Description and Summary of 2010 HRSWURN 5
Figure 1. Geographic Locations of 2010 HRSWURN 6
Table 1. List of Entries in the 2010 HRSWURN 7
Table 2. Nursery Locations and Comparative Plot Management Data 8
Tables 3-17. Nursery Data by Individual Location 9-23
Table 18. Summary of Trait Means Across Locations 24
Table 19. Yield Rankings by Location 25
Table 20. Summary of 2-Year Means Combined Over 2009-2010 26
Table 21. Leaf Rust Reactions, St. Paul, MN 27
Table 22. Adult Plant Stripe Rust Reactions, Pullman, WA 28
Table 23. Adult Plant Stem Rust Reactions, St. Paul, MN 29
Table 24. Fusarium Head Blight (Scab) Reactions, St. Paul, MN 30
Table 25. Fusarium Head Blight (Scab) Reactions, Crookston, MN 31
Table 26. Molecular Marker Data for Agronomic Trait/Disease Resistance Genes 32
COOPERATING AGENCIES, STATIONS, AND PERSONNEL FOR THE 2009 HRSWURN

USDA-AGRICULTURAL RESEARCH SERVICE
National Program Leader
K. Simmons
Midwest Area Director
L. Chandler
Nursery Coordinator, Plant Science Research Unit, St. Paul, MN
D.F. Garvin
Quality Investigations, Cereal Crops Research Unit, Fargo, ND
G. Hareland
Molecular Marker Analysis, Cereal Crops Research Unit, Fargo, ND
S. Chao
Disease Evaluations
Cereal Disease Laboratory, St. Paul, MN
J. Kolmer
Wheat Genetics, Physiology, Quality, and Disease
Y. Jin
Research Unit, Pullman, WA
X. Chen

MINNESOTA AGRICULTURAL EXPERIMENT STATION
St. Paul, University of Minnesota
Agronomy and Plant Genetics
J. Anderson
Plant Pathology
R. Dill-Macky
Morris, West Central Experiment Station
G. Nelson
Crookston, Northwestern Experiment Station
J. Wiersma

AGRICULTURE AND AGRI-FOOD CANADA
Winnipeg, Cereal Research Centre
Breeding and Genetics
G. Humphreys
Cereal Diseases
T. Fetch
Swift Current, Semiarid Prairie Agricultural Research Centre
B. McCallum
R. DePauw

NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
Fargo, North Dakota State University, Plant Sciences
M. Mergoum
Hettinger Research Extension Center
E. Eriksmoen
Langdon Research Extension Center
B. Hanson
Williston Research Extension Center
N. Riveland
Carrington Research Extension Center
B. Schatz

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION
Brookings, South Dakota State University
K. Glover

MONTANA AGRICULTURAL EXPERIMENT STATION
Bozeman, Montana State University
L. Talbert
Sidney, Eastern Ag Research Center
J. Eckhoff

WYOMING AGRICULTURAL EXPERIMENT STATION
Powell, University of Wyoming
M. Killen

WASHINGTON AGRICULTURAL EXPERIMENT STATION
Pullman, Washington State University
M. Pumphrey
Entering Lines with Protected or Patented Genes into the Hard Red Spring Wheat Uniform Regional Nursery

The following information details the Hard Winter Wheat Regional Program position on this issue. Basically, the same situation exists in the Spring Wheat Region, and it is therefore suggested that these guidelines are appropriate and thus accepted for the Hard Red Spring Wheat Uniform Regional Nursery as well, until such a time as the participants agree to deviate from it:

----------------------------------------------------------------------------------------------------------------------------

From: Robert Graybosch, Coordinator of Hard Winter Wheat Region

A question has arisen as to whether wheat germplasm lines carrying protected or patented genes may be entered in the HWW regional program. We have decided to allow such submissions, on a provisional basis, for the 2001 nurseries. Submissions must adhere to the provisions below, and submissions of such lines after the 2001 year will depend upon the adoption of formal guidelines. We are in the process of drafting a formal plan, hopefully one that will be approved at the 2001 Hard Winter Wheat Workers Conference.

Provisional plan for the submission of lines with patented or protected genes:

Definition: "protected" gene = a gene whose use is restricted by patents, Material Transfer Agreements, or other types of research agreements.

Wheat lines carrying such traits may be entered in the 2001 HWW Regional nurseries (RGON, SRPN, NRPN) under the following conditions:

1. Cooperators may cross with the line in question. Thereafter, the cooperator making such crosses must either have their own research agreement with the trait owner, or, if such an agreement is lacking, they must remove the trait from breeding populations by selection.
2. The owner of the trait has been informed of the submission, and that they agree to the conditions set forth in #1.
3. All other uses of the line are governed by the Wheat Workers Code of Ethics.
4. The trait may not have been inserted into the wheat genome by genetic engineering. In other words, the wheat line in question may not be transgenic.

At this point in time, transgenics may not be entered in the program. I am certain this question will arise in the near future, so I have contacted USDA-APHIS regarding this point. If you are interested in the details, the attached file contains the pertinent points of our e-mail exchange (note by HRSW coordinator: this file is not included in this report). The APHIS responses are in bold. To make a long story short - transgenic wheat lines will be allowed in the regional program only if they have been granted permanent non-regulated status. Non-regulated status is granted only after the originator files a formal petition to de-regulate a line with APHIS.

----------------------------------------------------------------------------------------------------------------------------
U.S. SPRING WHEAT PRODUCTION, 2010

SPRING WHEAT (OTHER THAN DURUM): Growers produced an estimated 626,937 million bushels of spring wheat. This production estimate is approximately 7.3 percent higher than year 2009 production. Yield averaged nearly 47 bushels per acre, an increase of 4 bushels per acre from year 2009. Area harvested totaled approximately 13.3 million acres, which is approximately 3.3% higher than the acreage harvested in 2009.

<table>
<thead>
<tr>
<th></th>
<th>Acres Harvested (x1000)</th>
<th>Production (x1000 Bushels)</th>
<th>Yield (Bushels/Acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota</td>
<td>1,800</td>
<td>1,550</td>
<td>1,550</td>
</tr>
<tr>
<td>Montana</td>
<td>2,480</td>
<td>2,350</td>
<td>2,750</td>
</tr>
<tr>
<td>North Dakota</td>
<td>6,400</td>
<td>6,300</td>
<td>6,300</td>
</tr>
<tr>
<td>South Dakota</td>
<td>1,520</td>
<td>1,470</td>
<td>1,410</td>
</tr>
<tr>
<td>USA</td>
<td>13,517</td>
<td>12,955</td>
<td>13,379</td>
</tr>
</tbody>
</table>

The Hard Red Spring Wheat Uniform Regional Nursery (HRSWURN) was planted for the 82nd year in 2010. The nursery contained 32 entries submitted by 7 different scientific or industry breeding programs, and 5 checks (Table 1). Trials were conducted as randomized complete blocks with three replicates except where noted. The HRSWURN was planted at 16 locations in 6 different states in the USA (MN, ND, SD, MT, WY, and WA), and two Canadian provinces (Manitoba and Saskatchewan). All locations but one provided data included in this report (Figure 1, Table 2). Data summaries for each of these locations are presented in individual tables. For each location summary, entries are listed in descending order of yield. Overall means across locations for a set of core traits are summarized in Table 18, and yield rankings for individual locations are found in Table 19. Two-year means for entries entered previously in the 2009 HRSWURN are presented in Table 20. Entries were also evaluated for various diseases at different locations; these can be found by looking at individual location data summaries. Leaf rust and stem resistance was evaluated in St. Paul, MN, and stripe rust evaluations were completed at two field locations in WA. These rust data are presented in Tables 21-23. Entries were evaluated in *Fusarium* head blight nurseries at Crookston and St. Paul, MN; these results are provided in Tables 24 and 25. Molecular marker genotyping for select traits was also performed; this information is presented in Table 26. The highest average yielding location was Powell, WY, with 110 Bu/Ac, while the lowest yielding location was Williston, ND, with 39 Bu/Ac.
Figure 1. Hard Red Spring Wheat Uniform Regional Nursery Reporting Locations, 2010