

Michigan State Wheat Performance Trials: 2010

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August 3, 2010

Comments on the 2010 Wheat Crop

Many wheat fields were planted late in 2009 due to repeated rain events. Mild winter conditions resulted in minimal losses over the winter across Michigan. Unusually warm temperatures in the spring resulted in an early growing season in Michigan and throughout the Eastern United States. Several diseases were evident this year including powdery mildew, leaf blotches (see below for more information), barley yellow dwarf virus, leaf rust, glume blotch, stripe rust (observed in Sanilac County) and Fusarium head blight (observed in Lenawee County). Army worms and sawflies were observed, but were not a great concern in 2010. Moderate lodging was observed at the Ingham and Lenawee sites. Timing of flowering was condensed throughout the state this year due to a very hot week at the end of May. Conditions during harvest were dry for most of the state, and some cooperators reported high falling numbers (associated with a lack of preharvest sprouting). The USDA/NASS office reported on July 1 a state wide average yield projection of 74 bushels per acre. This would be a increase of six bushels per acre from 2009.

Multi-Year Performance Summary (Tables 1 - 5)

Tables 1 through 5 summarize performance of the trial. The full trial included 76 entries (26 of which were experimental lines) from 16 organizations, including Michigan State University, and data analyses were conducted using all of these entries. For ease of viewing, two versions of the report are available. The “commercial only” version (available online and in the “Michigan Farm News” publication) includes the data of 50 commercially available varieties from 15 organizations only. The “including experimentals” version (online only) includes all 76 commercial and experimental lines. Attached to this narrative is a list of the names and contact information for those organizations. Each line in these tables has data for a single entry. The columns contain averages for a given trait and time period. Data for all of the entries in this trial are not presented here. However, the averages and statistical parameters in this report are based on the entire set of evaluated materials. **Comparisons among entries are only valid within a column.** Tables 1 through 5 are sorted first by entry grain color, and then in descending order by yield for 2010. In some instances (e.g. yield), data columns to the right of the 2010 data columns are multi-year averages. Only data for entries included in all of the relevant years’ tests are found here. Not all entries have been tested in all years, so the tables have several blank cells. See the section titled ‘Experimental’ for details on how the trials were conducted and for more detail on what the data in each column represents.

At the bottom of most columns in both tables is the average (mean), LSD (least significant difference), and CV (coefficient of variation) for data in that column. LSD values vary among traits and data sets (combinations of sites and years). Differences between the means for two entries that are greater than the LSD for that column are very likely to reflect a genuine difference between the two varieties. If the difference between two means is smaller than the LSD for that column, one should conclude that there is **no evidence that those entries are different for that trait** in the years and sites considered. The CV is indicative of a trial’s precision. Trials with low levels of error variation have lower CV values. Traits for which scores on a 0-9 scale are employed generally have very high CV values.

Single Site Yield Performance Summary (Table 6)

Table 6 contains yield, test weight, and harvest moisture data from each of the five sites harvested for yield in 2010. Each row in the table represents a single entry in the test. It is recommended that single site / single year data should not be used to make variety choice decisions. Table 6 is sorted first by organization and then by variety or brand name. The Ingham County MSU yield trial site showed very poor yield and test weight values. Abiotic stresses at the Ingham site are expected to be responsible (disease diagnostics on symptoms observed early in the season did not identify a disease pathogen).

Choosing Varieties

Growers should be aware that the grain of varieties with equal yield and test weight are not necessarily of equal value when delivered for sale. DON content and shriveled grain can result in significant discounts at the point of sale. This report provides across site and single site data for test weight which gives some indication of the degree to which a variety avoided shriveled grain. It is, however, possible for two varieties to have identical and acceptable test weight but differ in degree of grain shriveling.

Although wheat producers are always interested in how varieties perform in a given year and location, performance in a single year and location should never be used in selecting a variety to plant. It is best to select a variety on the basis of data from at least three years of testing. Varieties selected with such comparisons are more likely to perform well under a wide range of conditions. In any given year or at any given site, several varieties will usually fall into the group of 'highest yielding' varieties. The composition of that group, and the identity of the absolute "winner", can and does change from location to location and year to year. This means that the single best variety cannot be determined in advance for a specific site. However, you can identify a group of varieties that is likely to contain the winners in the upcoming season. We recommend that you plant two or more varieties, and where possible, choose varieties which will flower at different times in order to reduce the risk of scab infection which is most likely to occur when rain coincides with flowering.

Disclaimer: *MSU makes no endorsement of any wheat variety or brand.*

Experimental

The 2010 State Wheat Performance Trial entries were planted at seven sites in 6 counties: Huron, Lenawee, Tuscola, Sanilac, Midland and Ingham (2). Appendix A (below) presents information on each of these sites. Uneven winter damage to the Midland County MSU yield trial site resulted in the site being unsuitable for inclusion in this report. Each plot was 6 rows at 7.5" row spacing and was planted to a length of 18 feet. Plots were trimmed to a length of 12 feet long in the spring for harvesting purposes. The trial was designed and executed as four replication alpha-lattice (20 blocks of 4 plots each) at all sites. All seed was treated, but the chemicals and rates used varied according to the preferences of the originating organization. Seeding rates per linear foot of row were standardized to the rate that would equate with a stand of 2.0 million seeds per acre in a solid stand planted in 7.5" rows. Fall fertilizer application varied with cooperators practice. Spring nitrogen was applied as urea (90 lbs/acre actual N) at green-up. No foliar fungicides were applied at any site. Weeds were chemically controlled as needed. All plots at a site were harvested on a single day. For all sites, yield was calculated using the entire area of the plot including the wheel tracks between plots. This approach tends to underestimate yield. Data reported as scores are based on a 0-9 scale, where 0 is the best possible score.

Table 1 contains data for yield, test weight, and grain moisture. These data were acquired electronically on the plot combine at the time of harvest. Yield data is standardized to **13.5%**

moisture (In previous years data was standardized to 13% moisture, and we have changed to 13.5% as this value is more common). In addition, grain color, chaff color and degree of awnedness are indicated. For degree of awnedness, “tip awned” (known as “apically awnletted” elsewhere, awns only present at the tip of the spike), “awnletted” (short awns on the spike), or “awned” (long awns on the entire spike) were indicated. Prior to 2009, “tip awned” and “awnletted” were recorded as “awnless”.

Table 2 contains data for lodging, flowering date, plant height, powdery mildew and leaf blotch. The lodging score is based on 0=plants fully erect; 9=plot completely lodged. The flowering date indicates the average number of days past January 1st that a given entry reached the point where ½ of its heads were flowering. Plant height is reported as the distance in inches from the ground to the tip of average heads in a plot. Powdery mildew and leaf blotch scores are recorded as “0 = no visual symptoms of disease present”. Powdery mildew scores are based on observations of the entire plant including the flag leaf. The causal organism(s) of the leaf blotching were not identified, but were likely a combination of *Stagonospora tritici*, (formerly known as *Septoria tritici*), and *S. nordorum*.

Table 3 contains data for stripe rust, leaf rust, stem rust, in head sprouting and black point. Although leaf rust was observed in 2010, scoring was not conducted since high levels of leaf blotch would have confounded the scores. Thus, data prior to 2010 are reported for leaf rust. Stem rust, in head sprouting and black point data reported are also from prior years. Stripe rust, leaf rust, stem rust and in head sprouting are recorded as “0 = no visual symptoms of disease present”. Stripe, leaf and stem rust scores are based primarily on infection observations on the flag leaf. In head sprouting data reported here is based on a greenhouse evaluation of 5 heads from each plot for entries included in 2008 and prior. Heads were collected within 6 hours of harvest. Following harvest, heads were dried for 3 and 5 days. Scores were taken after the heads were subjected to near-continuous misting for 3 to 4 days. A score of zero indicates that sprouting was not present. A score of 9 indicates many shoots and roots observed in the heads during scoring. In 2009 and 2010 a new methodology of sprouting evaluation was started. Three to four days following physiological maturity of the plot, ~ 100 heads are collected and placed upright in tubes in the greenhouse. The following morning, the heads are misted. Following misting, plants are air-dried overnight in the greenhouse and then dried at 90°F. After all samples are sufficiently dry (~10.4% moisture), they are threshed and sent to the USDA-ARS Soft Wheat Quality Laboratory, Wooster, Ohio, for falling number and alpha amylase analysis. We plan to report these data using the new methodology (2009 and 2010) of sprouting evaluation when the data from 2010 are completed (so that consistency across two years can be considered). Black point is the discoloration of the embryo (germ) end and surrounding areas of the wheat kernel. The embryo tip shows a black to brown discoloration that may extend into the crease of the kernel. Visual observations consisted of 500 seed lots from one rep at each location observed. The data presented is the average percent of kernels discolored from the 2008 and prior harvest seasons. The 2009 black point data will be collected this fall and will be available online.

Table 4 Contains data for Fusarium head blight (FHB, scab) and the associated mycotoxin deoxynivalenol (DON, VOM). Data on Fusarium head blight (FHB, scab) were obtained from the Ingham misted/inoculated scab screening nursery. The Ingham scab nursery was inoculated (from lab-produced infected grain spread onto the field), and artificial misting was employed throughout the entire flowering period. Each wheat head (i.e., ‘spike’) is comprised of roughly 14-22 “spikelets”, which bear the developing seed. Spikelets that prematurely die because of scab infection are called “scabby” spikelets. Field symptom data reported here are based on: 1) the percent of spikes showing any scabby spikelets (incidence); 2) the percent of scabby spikelets within infected spikes (severity); and 3) the percent of scabby spikelets considering all spikes (scab index). The scab index is derived from multiplying the incidence and severity, and is a measure of the extent of damage to entire plots due to scab infection.

Deoxynivalenol data is from harvested grain in the inoculated, mist irrigated, scab screening nursery and is reported in parts per million (ppm). The grain was analyzed for DON at the University of Minnesota using gas chromatography mass spectrometry, DON data is from the 2009 and prior crop years.

Table 5 contains data for milling quality. All data in table 5 is from the 2009 harvest season and prior. The milling and baking quality data were generated by the USDA Eastern Soft Wheat Quality Laboratory in Wooster, Ohio, and are based on grain harvested from the State Variety trial each year. Flour yield is the ratio of the weight of extractable flour to the weight of milled grain, expressed as a percentage. Lactic Acid Retention is used by some soft wheat processors as a measure of protein strength. Higher “softness equivalent percents” indicate softer grained wheats.

Six of our experimental sites are on private farmland. We are extremely grateful to those growers for accommodating our work and all of the associated inconveniences. Questions and comments regarding the research reported here should be directed to Janet Lewis (517-355-0271 ext. 1185). This information, along with results from previous years, may also be accessed through the Web at http://www.css.msu.edu/varietytrials/wheat/Variety_Results.html.

2010 Michigan State University Wheat Performance Trials

Appendix A. Trial Site Descriptions for 2010 MSU Wheat Performance Trials.

	HURON COUNTY	INGHAM COUNTY		LENAWEE COUNTY	MIDLAND COUNTY	SANILAC COUNTY	TUSCOLA COUNTY
		YIELD TRIAL	SCAB NURSERY				
COOPERATOR	Darwin Sneller	Charles Dietz	Michigan State University	Woods Seed Farm	Fred Siler	Stoutenburg Farms	Stuart Bierlein
NEAREST CITY	Sebewaing	Webberville	East Lansing	Britton	Laporte	Sandusky	Richville
PLANTING DATE	Sept. 25, 2009	Oct. 19, 2009	OCT. 22, 2009	Oct. 20, 2009	Oct. 15, 2009	Sept. 25, 2009	Oct. 1, 2009
HARVEST DATE	July 6, 2010	July 14, 2010	N / A	July 7, 2010	N / A	July 11, 2010	July 5, 2010
PRE-PLANT FERTILIZER	200 # 6-15-36 + 3%S	150# 19-19-19	150# 6-24-24	300 # 9-23-30	225# 9-10-30	200# 5.4-18-34.3 + 4.5% S + 0.5%Zn	200 # 7-12-28 + 1%Zn + 0.5%Mn + 6%S + 0.1%Cu
COMMENTS	Powdery Mildew & Leaf Blotch	Fusarium Head Blight, Lodging, Powdery Mildew, & Leaf Blotch	Inoculated / Misted Fusarium Head Blight Screening Nursery	Fusarium Head Blight, Lodging, Powdery Mildew, & Leaf Blotch	Severe Water & Ice Damage	Powdery Mildew, Leaf Blotch, & Stripe Rust	Powdery Mildew, & Leaf Blotch
AVERAGE YIELD (BUSHEL / ACRE)	95.5	62.3	N / A	80.1	N / A	92.7	93.4
AVERAGE TEST WEIGHT (LBS. / BUSHEL)	60.5	52.4	N / A	58.4	N / A	57.2	59.7
AVERAGE PERCENT GRAIN MOISTURE	14.4	15.0	N / A	12.1	N / A	14.0	15.0
2010 DATA RECORDED (NUMBER OF REPS)	PM (3)	FD (4); LODGE (4)	FHBI% (4); FHBS% (4); FHBX (4)	LODGE (4); PL_HT (4)		SRUST (4); PM (2); SEPT (2)	FD (4); PLHT (4)

*OTHER DATA: **FD** – Flowering Date (Days Past Jan. 01), **PL_HT** - Plant Height in Inches, **SRUST** - Stripe Rust Score (0-9), **LODGE** - Lodging Score (0-9), **PM** - Powdery Mildew Score (0-9), **SEPT** - Septoria Leaf Blotch Complex Scores (0-9), **FHBI%** - Fusarium Head Blight Incidence Percent (0-100%), **FHBS%** - Fusarium Head Blight Severity Percent (0-100%), **FHBX** - Fusarium Head Blight Index Percent (0-100%)

** SCORING INFORMATION: Score of 0 = Best Rating - Score of 9 = Poor Rating

**ORGANIZATIONS PARTICIPATING IN THE 2010
MICHIGAN STATE UNIVERSITY WHEAT PERFORMANCE TRIALS**

AgriProWheat / Syngenta Seeds
P.O. Box 411, 520 E. 1050 South
Brookston, IN 47923
Phone: 765-563-3111

Cooperative Elevator Company
P.O. Box 619, 7211 Michigan Ave.
Pigeon, MI 48755
Phone: 989-453-4500

D.F. Seeds, Inc.
P.O. Box 159, 905 S. Jackson
Dansville, MI 48819
Phone: 517-623-6161

Dyna-Gro Seed
6221 Riverside Drive, Suite One
Dublin, OH 43017
Phone: 614-761-4110

Excel Brand Seed
257 East Hail
Bushnell, IL 61422
Phone: 800-969-6717

Farmers Cooperative Grain Company
P.O. Box 246, 338 Main Street
Kinde, MI 48445
Phone: 989-874-4200

Harrington Seeds, Inc.
2586 Bradleyville Road
Reese, MI 48757
Phone: 989-868-4750

Hyland Seeds
2 Hyland Drive
Blenheim, Ontario N0PIA0
Phone: 519-676-7056

Michigan Crop Improvement Association
P.O. Box 21008, 2905 Jolly Road
Lansing, MI 48909
Phone: 517-332-3546

Ohio Seed Improvement Association
6150 Avery Road, P.O. Box 477
Dublin, OH 43017
Phone: 614-889-1136

Pioneer Hi-Bred, Int'l. Inc.
59 Greif Parkway – Suite 200
Delaware, OH 43015
(740) 657-6121

Platinum Genetics, LLC
3490 Belle Chase Way, Suite 210
Lansing, MI 48911
Phone: 517-272-1514

Rupp Seeds, Inc.
17919 Co Rd. B
Wauseon, OH 43567
Phone: 419-337-1841

Wellman Seeds, Inc.
23778 Delphos Jennings Road
Delphos, OH 45833
800-717-7333

Virginia Polytechnic Institute and State University / Virginia Crop Improvement
Association / Eastern Virginia Agricultural Research & Extension Center
2229 Menokin Road
Warsaw, VA 22572
Phone: 804-333-3485

2010 Michigan State University Wheat Performance Trials (Commercial Only)

Table 1 : Multi-Year Performance Summary (Note: Tables sorted by 2010 Yield, red wheats grouped before white)

Multi-year data are the most informative.
MSU makes no endorsement of any variety or brand.

Name	Grain Color	Chaff Color	Awns	Yield: Bushels/Acre (Adjusted to 13.5% Moisture)				Test Weight: lbs/Bushel				Percent Grain Moisture at Harvest				Organization
				Multi-Year Averages				Multi-Year Averages				Multi-Year Averages				
				2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	
MCIA Red Devil	Red	White	Awned	95.0	-----	-----	-----	58.7	-----	-----	-----	14.0	-----	-----	-----	Michigan Crop Improvement Association
RS967	Red	White	Awned	93.3	-----	-----	-----	59.1	-----	-----	-----	13.7	-----	-----	-----	Rupp Seeds, Inc.
AgriPro/Syngenta Branson	Red	White	Awnletted	91.9	94.0	91.6	91.5	57.7	57.9	58.8	58.6	13.7	14.2	14.2	13.9	AgriPro Wheat / Syngenta Seeds
Pioneer Brand 25R47	Red	White	Awned	91.6	94.5	94.2	94.6	57.1	56.8	58.0	57.9	14.2	14.5	14.7	14.4	Pioneer Hi-Bred International, Inc.
RS935	Red	White	Awned	91.6	-----	-----	-----	57.0	-----	-----	-----	13.1	-----	-----	-----	Rupp Seeds, Inc.
Dyna-Gro 9922	Red	White	Awned	91.5	-----	-----	-----	58.5	-----	-----	-----	14.3	-----	-----	-----	Dyna-Gro Seed
Red Ruby	Red	White	Awned	89.9	93.9	94.1	93.9	58.4	58.2	59.5	59.5	14.3	14.9	14.8	14.5	Michigan Crop Improvement Association
Sunburst	Red	White	Tip Awned	89.7	93.3	90.7	90.8	60.5	60.5	60.9	60.7	15.3	15.8	15.7	15.2	Wellman Seeds, Inc.
AgriPro/Syngenta W1104	Red	White	Awnletted	89.7	-----	-----	-----	56.7	-----	-----	-----	13.6	-----	-----	-----	AgriPro Wheat / Syngenta Seeds
AgriPro/Syngenta W1566	Red	White	Awnletted	89.7	90.8	-----	-----	57.4	57.3	-----	-----	14.0	14.5	-----	-----	AgriPro Wheat / Syngenta Seeds
Genesis R085	Red	White	Tip Awned	89.5	90.9	89.8	-----	59.2	58.9	59.8	-----	15.3	15.6	15.8	-----	Platinum Genetics LLC
Hopewell	Red	Bronze	Awnletted	89.3	91.9	91.5	91.9	57.7	57.8	58.7	58.7	14.0	14.1	14.2	13.9	Michigan Crop Improvement Association
Dyna-Gro 9042	Red	White	Awnletted	88.0	-----	-----	-----	58.0	-----	-----	-----	13.9	-----	-----	-----	Dyna-Gro Seed
MCIA Butch	Red	White	Awnletted	87.9	90.1	91.4	91.9	55.5	56.0	57.1	57.1	13.1	13.4	13.7	13.5	Michigan Crop Improvement Association
Dyna-Gro V9723	Red	White	Awnletted	87.8	91.6	91.8	-----	57.0	57.1	58.2	-----	13.4	13.7	13.9	-----	Dyna-Gro Seed
MCIA Oasis	Red	White	Awnletted	87.7	91.3	91.0	92.2	57.1	57.0	58.3	58.0	14.1	15.1	15.1	14.6	Michigan Crop Improvement Association
R055	Red	White	Tip Awned	87.6	91.1	89.3	90.0	58.0	58.5	59.3	59.1	14.0	14.6	14.9	14.5	D.F. Seeds, Inc.
Malabar	Red	White	Awnletted	87.3	90.5	90.5	-----	58.4	58.3	59.1	-----	13.9	14.1	14.2	-----	Ohio Seed Improvement Association
RS978	Red	White	Tip Awned	87.3	90.7	91.4	-----	57.3	57.2	58.2	-----	13.3	13.6	13.7	-----	Rupp Seeds, Inc.
RS934	Red	White	Awnletted	86.9	-----	-----	-----	59.8	-----	-----	-----	14.1	-----	-----	-----	Rupp Seeds, Inc.
Hyland Emmit	Red	White	Awnletted	86.2	90.4	90.4	90.6	57.6	57.8	58.8	58.8	14.7	15.1	15.1	14.8	Hyland Seeds
AG2738	Red	White	Awnletted	85.8	89.5	-----	-----	55.5	56.2	-----	-----	13.3	13.8	-----	-----	Michigan Crop Improvement Association
W123	Red	White	Awnletted	85.2	-----	-----	-----	57.2	-----	-----	-----	13.4	-----	-----	-----	Wellman Seeds, Inc.
Milton	Red	White	Awned	84.8	-----	-----	-----	59.8	-----	-----	-----	14.1	-----	-----	-----	Michigan Crop Improvement Association
Pioneer Brand 25R39	Red	White	Tip Awned	82.7	87.8	-----	-----	56.7	57.5	-----	-----	14.2	14.7	-----	-----	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25R62	Red	White	Awned	82.6	88.7	89.9	-----	55.7	56.0	57.2	-----	13.0	13.2	13.2	-----	Pioneer Hi-Bred International, Inc.
R075	Red	White	Awnletted	81.9	88.6	90.4	-----	57.7	58.4	59.4	-----	13.8	14.6	14.7	-----	D.F. Seeds, Inc.
Excel 234	Red	White	Awnletted	81.2	88.5	-----	-----	59.6	59.6	-----	-----	14.6	15.2	-----	-----	Excel Brand Seed
R045	Red	White	Tip Awned	80.6	87.7	89.7	91.0	57.8	58.3	59.4	59.1	13.9	14.6	14.9	14.5	D.F. Seeds, Inc.
Merl	Red	White	Awnletted	80.6	87.7	-----	-----	58.9	59.2	-----	-----	14.4	15.1	-----	-----	Virginia Tech / VCIA
AgriPro/Syngenta W1377	Red	White	Tip Awned	80.3	84.0	85.4	-----	60.7	60.3	61.0	-----	14.3	14.9	15.1	-----	AgriPro Wheat / Syngenta Seeds
Excel 242	Red	White	Awnletted	80.3	-----	-----	-----	57.4	-----	-----	-----	13.9	-----	-----	-----	Excel Brand Seed
Roane	Red	White	Awnletted	80.2	85.1	84.8	84.7	59.9	60.0	60.7	60.7	14.2	15.0	15.2	14.9	Michigan Crop Improvement Association
R065	Red	White	Awnletted	80.2	87.0	88.4	-----	58.0	58.3	59.4	-----	13.9	14.8	14.9	-----	D.F. Seeds, Inc.
Pioneer Brand 25R56	Red	White	Tip Awned	79.5	-----	-----	-----	55.8	-----	-----	-----	13.0	-----	-----	-----	Pioneer Hi-Bred International, Inc.
Excel 209	Red	White	Awnletted	72.9	-----	-----	-----	59.2	-----	-----	-----	13.4	-----	-----	-----	Excel Brand Seed
Aubrey	White	White	Awnletted	90.4	91.1	89.5	89.4	59.1	58.8	59.6	59.6	14.3	14.4	14.5	14.2	D.F. Seeds/Co-op Elevator Co./Farmers Co-op Grain Co.
Ambassador	White	White	Awnletted	89.6	93.6	93.3	93.5	56.8	56.3	57.1	57.2	13.4	13.3	13.3	13.0	D.F. Seeds, Inc. / Cooperative Elevator Co.
Envoy	White	White	Awned	89.6	91.2	89.9	89.9	58.5	58.4	59.4	59.5	13.9	14.3	14.3	14.0	D.F. Seeds, Inc. / Cooperative Elevator Co.
MSU D8006	White	White	Awned	86.7	89.4	89.6	90.8	57.8	57.4	58.4	58.3	13.5	14.0	14.1	13.7	Michigan Crop Improvement Association
MSU D6234	White	White	Tip Awned	85.2	87.9	88.6	88.2	57.8	57.8	58.8	59.0	14.2	14.6	14.8	14.4	Michigan Crop Improvement Association
Coral	White	Bronze	Awnletted	84.2	89.0	88.5	89.0	56.9	57.3	58.4	58.5	15.3	15.1	14.9	14.7	Michigan Crop Improvement Association
AgriPro/Syngenta W1062	White	White	Tip Awned	84.1	87.5	88.3	89.0	56.6	56.4	57.7	57.6	15.5	15.7	15.5	15.1	AgriPro Wheat / Syngenta Seeds
Linebacker 180	White	White	Awnletted	83.9	86.0	-----	-----	55.7	55.9	-----	-----	17.3	16.6	-----	-----	D.F. Seeds, Inc.
Pioneer Brand 25W36	White	White	Awnletted	83.6	88.4	88.6	-----	57.9	58.0	58.8	-----	13.5	13.9	14.0	-----	Pioneer Hi-Bred International, Inc.
Hyland Ava	White	White	Awnletted	83.2	89.9	90.3	-----	56.0	56.6	58.0	-----	16.2	15.9	15.6	-----	Hyland Seeds
AC Mountain	White	White	Awnletted	83.0	88.0	87.6	87.7	57.5	57.0	58.0	57.8	13.5	13.5	13.6	13.4	Michigan Crop Improvement Association
Pioneer Brand 25W43	White	White	Tip Awned	82.4	88.5	88.2	-----	56.9	56.7	57.7	-----	13.6	13.9	14.2	-----	Pioneer Hi-Bred International, Inc.
Crystal	White	White	Awned	81.5	86.9	87.7	89.1	56.7	56.6	57.8	57.8	12.9	13.2	13.3	13.0	Michigan Crop Improvement Association
Saftey 10	White	White	Awnletted	80.8	86.2	-----	-----	57.0	57.2	-----	-----	14.5	14.7	-----	-----	D.F. Seeds, Inc.
Caledonia	White	White	Awnletted	80.5	85.4	84.7	84.6	56.3	56.3	57.7	57.7	14.2	14.4	14.3	14.0	Harrington Seeds, Inc.
Abbey	White	White	Awnletted	79.3	-----	-----	-----	56.1	-----	-----	-----	18.5	-----	-----	-----	Harrington Seeds, Inc.
MEAN (2010 = 76 Entries)				84.8	89.2	89.8	90.2	57.6	57.6	58.7	58.6	14.1	14.5	14.5	14.2	
LSD (0.05)				2.1	4.9	4.2	3.2	0.4	1.0	0.8	0.7	0.3	0.9	0.6	0.5	
CV (%)				4.0	2.7	2.8	2.5	1.2	0.8	0.9	0.8	3.2	3.2	2.6	2.6	

2010 Michigan State University Wheat Performance Trials (Commercial Only)

Multi-year data are the most informative.
MSU makes no endorsement of any variety or brand.

Table 2 : Multi-Year Performance Summary (Note: Tables sorted by 2010 Yield, red wheats grouped before white)

Name	Grain Color	Lodging Score (0-9) (0=none)		Flowering Date (Days Past Jan. 1) Multi-Year Averages				Plant Height (Inches) Multi-Year Averages				Powdery Mildew Score (0-9) Multi-Year Averages				Leaf Blotch Score (0-9) Multi-Year Averages		
		2010	09-10	2010	09-10	08-10	07-10	2010	09-10	08-10	07-10	2010	09-10	08-10	07-10	2010	09-10	08-10
				2 YR	3 YR													
MCIA Red Devil	Red	2.0	----	146.8	----	----	----	34.2	----	----	----	0.2	----	----	----	2.0	----	----
RS967	Red	1.7	----	147.1	----	----	----	35.6	----	----	----	2.0	----	----	----	1.8	----	----
AgriPro/Syngenta Branson	Red	3.4	5.0	146.9	151.0	151.9	151.3	33.0	35.7	34.4	33.7	1.1	1.4	1.6	1.5	1.3	1.7	2.1
Pioneer Brand 25R47	Red	3.4	4.1	146.9	151.7	152.5	151.9	33.7	35.2	33.9	33.0	3.5	3.5	3.8	3.9	2.2	2.6	2.8
RS935	Red	3.8	----	146.9	----	----	----	32.8	----	----	----	2.3	----	----	----	2.8	----	----
Dyna-Gro 9922	Red	1.6	----	147.5	----	----	----	35.0	----	----	----	0.4	----	----	----	1.9	----	----
Red Ruby	Red	1.5	4.0	148.7	153.2	153.9	153.2	36.1	38.0	36.5	35.6	2.6	2.6	2.4	2.7	1.3	2.1	2.4
Sunburst	Red	1.6	3.0	149.1	153.6	154.1	153.4	31.7	32.8	31.6	31.0	0.9	0.7	0.6	0.6	3.5	3.5	3.0
AgriPro/Syngenta W1104	Red	3.3	----	147.5	----	----	----	34.7	----	----	----	2.2	----	----	----	1.7	----	----
AgriPro/Syngenta W1566	Red	3.5	5.4	147.6	152.2	----	----	39.6	43.1	----	----	0.4	0.5	----	----	2.8	2.7	----
Genesis R085	Red	2.3	4.8	147.9	152.7	153.3	----	38.8	41.9	40.0	----	3.4	3.2	3.1	----	2.9	2.9	2.9
Hopewell	Red	1.3	2.9	148.0	152.8	153.6	152.7	35.8	37.8	36.5	36.1	2.6	2.5	2.8	2.9	1.8	2.1	2.4
Dyna-Gro 9042	Red	1.7	----	147.9	----	----	----	31.8	----	----	----	2.4	----	----	----	1.8	----	----
MCIA Butch	Red	1.3	3.9	147.8	152.8	153.5	152.7	32.5	33.9	32.5	32.0	1.9	2.0	2.0	2.0	3.1	3.0	2.9
Dyna-Gro V9723	Red	3.7	4.8	146.8	151.2	151.9	----	37.5	40.7	39.1	----	3.4	3.1	3.3	----	1.7	2.1	2.1
MCIA Oasis	Red	1.9	3.7	148.5	153.3	153.7	152.8	38.6	41.5	39.9	39.2	2.0	1.6	1.4	1.6	1.6	1.7	1.6
R055	Red	4.5	6.5	147.8	152.4	153.1	152.4	35.0	38.0	36.0	35.0	1.4	1.5	1.7	1.8	2.6	2.8	2.8
Malabar	Red	1.1	2.9	148.5	152.7	153.1	----	37.2	39.4	37.4	----	3.0	2.7	2.9	----	2.2	2.2	2.3
RS978	Red	3.7	5.9	146.5	151.2	151.9	----	37.0	40.5	39.0	----	3.3	3.2	3.4	----	1.7	2.0	1.9
RS934	Red	3.0	----	145.9	----	----	----	34.1	----	----	----	2.1	----	----	----	2.6	----	----
Hyland Emmitt	Red	1.5	4.5	149.0	153.5	154.0	153.3	36.4	39.2	37.3	36.6	4.2	3.6	3.7	3.8	2.3	2.6	2.5
AG2738	Red	4.0	5.7	148.3	152.8	----	----	31.2	34.1	----	----	1.6	1.7	----	----	3.1	3.0	----
W123	Red	4.2	----	147.1	----	----	----	33.9	----	----	----	1.5	----	----	----	2.0	----	----
Milton	Red	3.0	----	148.7	----	----	----	36.5	----	----	----	3.4	----	----	----	2.3	----	----
Pioneer Brand 25R39	Red	3.8	5.8	149.5	154.0	----	----	34.8	37.7	----	----	4.6	4.2	----	----	2.5	2.8	----
Pioneer Brand 25R62	Red	1.8	4.9	149.2	153.6	154.2	----	32.7	35.3	34.0	----	2.6	2.2	2.6	----	2.3	2.5	2.9
R075	Red	2.4	3.5	147.3	152.1	152.7	----	33.2	35.9	34.9	----	3.5	3.9	4.2	----	2.6	2.5	2.6
Excel 234	Red	4.4	6.2	146.6	150.7	----	----	34.2	37.7	----	----	1.4	1.4	----	----	2.2	2.6	----
R045	Red	2.7	4.1	147.4	152.1	152.6	151.9	33.3	35.9	34.8	34.2	3.4	3.6	4.0	3.9	2.4	2.8	2.7
Merl	Red	3.2	5.7	146.4	150.7	----	----	32.5	35.4	----	----	1.1	1.0	----	----	3.5	3.1	----
AgriPro/Syngenta W1377	Red	3.0	5.5	147.1	152.0	152.5	----	36.3	38.9	37.6	----	4.8	4.9	5.2	----	2.0	2.5	2.5
Excel 242	Red	4.0	----	148.3	----	----	----	34.4	----	----	----	3.7	----	----	----	2.2	----	----
Roane	Red	3.8	6.1	147.0	152.2	152.8	152.0	33.1	35.6	34.2	33.6	2.9	3.1	2.8	3.4	1.9	2.3	2.5
R065	Red	2.0	3.5	147.4	152.2	152.8	----	33.1	36.2	35.0	----	2.8	3.5	4.1	----	2.0	2.4	2.5
Pioneer Brand 25R56	Red	2.7	----	148.7	----	----	----	32.9	----	----	----	3.0	----	----	----	2.1	----	----
Excel 209	Red	6.7	----	145.8	----	----	----	35.1	----	----	----	3.9	----	----	----	3.8	----	----
Aubrey	White	2.7	4.0	146.8	151.1	151.9	151.4	35.9	38.9	36.5	36.1	0.9	1.1	1.4	1.6	2.1	2.4	2.5
Ambassador	White	2.4	5.5	147.2	152.0	152.8	152.3	36.3	38.4	36.4	35.7	3.0	2.7	2.6	2.7	2.6	2.7	3.2
Envoy	White	1.5	3.8	149.2	153.5	153.9	153.3	36.3	37.4	35.7	34.6	1.0	1.7	1.6	1.9	2.4	2.6	2.8
MSU D8006	White	3.3	5.3	147.3	152.0	152.8	152.2	36.8	38.9	36.8	36.1	2.3	2.1	2.2	2.2	2.6	2.9	2.9
MSU D6234	White	1.9	4.5	149.2	153.5	154.1	153.5	37.6	39.6	37.7	36.8	2.1	2.3	2.2	2.4	2.3	2.4	2.2
Coral	White	2.0	5.3	149.7	153.9	154.4	153.8	37.2	39.6	37.7	37.3	3.4	3.6	3.9	4.0	2.3	3.0	3.2
AgriPro/Syngenta W1062	White	3.2	5.9	148.4	153.2	153.7	153.1	35.5	38.7	37.2	36.2	3.3	3.2	3.3	3.7	2.2	2.6	2.7
Linebacker 180	White	1.8	5.2	149.3	153.6	----	----	37.7	40.0	----	----	4.1	3.9	----	----	2.5	3.1	----
Pioneer Brand 25W36	White	3.0	5.7	148.5	153.6	154.0	----	35.4	37.4	35.9	----	1.8	2.4	2.5	----	3.1	3.4	3.1
Hyland Ava	White	2.4	4.6	150.7	154.7	154.9	----	36.6	40.6	38.6	----	3.0	3.0	3.3	----	2.6	2.9	2.8
AC Mountain	White	2.5	5.3	149.3	153.3	153.8	153.3	38.6	41.7	40.2	39.7	2.7	3.3	3.4	3.4	2.0	2.6	2.4
Pioneer Brand 25W43	White	3.0	5.8	147.2	152.2	153.1	----	33.1	35.8	34.8	----	3.4	4.2	4.1	----	2.2	2.7	2.9
Crystal	White	1.9	4.6	149.2	153.5	154.0	153.4	34.3	37.0	35.3	34.9	2.3	1.9	2.0	2.1	2.5	2.5	2.8
Saftey 10	White	1.5	4.9	148.6	152.8	----	----	36.2	38.1	----	----	3.8	4.1	----	----	1.9	2.6	----
Caledonia	White	1.6	4.6	148.7	153.1	153.6	153.1	35.5	38.0	36.1	35.0	3.2	3.1	3.2	3.4	2.2	2.7	3.0
Abbey	White	0.9	----	150.4	----	----	----	35.6	----	----	----	2.3	----	----	----	1.8	----	----
MEAN (2010 = 76 Entries)		2.7	4.8	148.1	152.8	153.4	152.7	35.1	37.7	36.2	35.3	2.5	2.5	2.7	2.6	2.3	2.6	2.6
LSD (0.05)		1.0	1.9	0.5	0.9	0.7	0.6	1.8	1.9	1.5	1.2	0.6	1.0	0.8	0.7	0.7	0.7	0.7
CV (%)		38.8	20.1	0.3	0.3	0.3	0.3	5.2	2.4	2.5	2.4	19.8	19.4	18.4	18.5	25.0	13.9	16.5

2010 Michigan State University Wheat Performance Trials (Commercial Only)

Table 3 : Multi-Year Performance Summary (Note: Tables sorted by 2010 Yield, red wheats grouped before white)

Multi-year data are the most informative.
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Name	Grain Color	Stripe Rust Score (0-9)		Leaf Rust Score (0-9)			Stem Rust Score (0-9)	In Head Sprouting Score (0-9)			Black Point Percent		
		Multi-Year		Multi-Year Averages				Multi-Year Averages			Multi-Year Averages		
		2010	09-10	2009	08-09	07-09		2009	2008	07-08	06-08	2008	07-08
MCIA Red Devil	Red	0.3	----	----	----	----	----	----	----	----	----	----	----
RS967	Red	1.4	----	----	----	----	----	----	----	----	----	----	----
AgriPro/Syngenta Branson	Red	1.3	0.7	3.0	3.3	3.2	0.0	0.6	2.1	2.2	2.6	5.6	5.9
Pioneer Brand 25R47	Red	1.3	0.9	2.0	2.8	2.5	4.0	3.8	5.3	5.0	9.0	12.9	12.1
RS935	Red	0.7	----	----	----	----	----	----	----	----	----	----	----
Dyna-Gro 9922	Red	0.2	----	----	----	----	----	----	----	----	----	----	----
Red Ruby	Red	3.1	1.9	3.0	4.3	3.7	5.0	1.6	4.2	3.9	12.2	9.2	8.8
Sunburst	Red	0.9	0.5	1.0	1.5	2.5	0.0	0.4	1.4	----	11.6	9.1	----
AgriPro/Syngenta W1104	Red	0.0	----	----	----	----	----	----	----	----	----	----	----
AgriPro/Syngenta W1566	Red	1.7	0.9	3.0	----	----	0.0	----	----	----	----	----	----
Genesis R085	Red	1.5	0.8	2.0	2.8	----	4.0	1.9	----	----	5.6	----	----
Hopewell	Red	0.5	0.3	4.0	5.5	4.7	1.0	0.5	1.7	2.1	1.6	2.6	2.8
Dyna-Gro 9042	Red	0.0	----	----	----	----	----	----	----	----	----	----	----
MCIA Butch	Red	1.2	0.7	4.0	5.0	4.7	0.0	1.5	3.6	----	6.7	6.6	----
Dyna-Gro V9723	Red	2.0	1.2	3.0	3.8	----	2.0	3.3	----	----	2.5	----	----
MCIA Oasis	Red	4.3	2.2	1.0	1.0	1.0	4.0	1.2	2.0	2.0	25.6	34.4	33.8
R055	Red	1.4	1.0	1.0	2.0	2.0	0.0	3.0	5.4	4.6	4.5	10.5	14.5
Malabar	Red	2.4	1.5	4.0	5.8	----	5.0	1.9	----	----	5.8	----	----
RS978	Red	2.0	1.1	3.0	4.3	----	3.0	4.1	----	----	2.4	----	----
RS934	Red	0.6	----	----	----	----	----	----	----	----	----	----	----
Hyland Emmit	Red	3.8	2.3	4.0	4.8	4.0	2.0	1.5	4.3	5.0	23.0	21.8	22.4
AG2738	Red	0.9	0.6	1.0	----	----	3.0	----	----	----	----	----	----
W123	Red	0.7	----	----	----	----	----	----	----	----	----	----	----
Milton	Red	0.7	----	----	----	----	----	----	----	----	----	----	----
Pioneer Brand 25R39	Red	0.8	0.6	2.0	----	----	1.0	----	----	----	----	----	----
Pioneer Brand 25R62	Red	0.0	0.2	3.0	4.0	----	4.0	3.5	----	----	2.6	----	----
R075	Red	5.3	3.7	3.0	3.5	----	1.0	1.0	----	----	27.5	----	----
Excel 234	Red	5.8	3.2	1.0	----	----	0.0	----	----	----	----	----	----
R045	Red	6.8	3.6	3.0	3.8	3.5	1.0	1.0	3.3	4.6	24.2	25.7	22.6
Merl	Red	1.2	0.6	2.0	----	----	2.0	----	----	----	----	----	----
AgriPro/Syngenta W1377	Red	1.0	0.7	3.0	4.0	----	4.0	1.5	----	----	5.8	----	----
Excel 242	Red	4.3	----	----	----	----	----	----	----	----	----	----	----
Roane	Red	1.0	0.7	2.0	3.5	3.0	2.0	0.6	4.1	3.8	2.3	2.7	3.8
R065	Red	6.0	3.5	3.0	3.8	----	1.0	0.7	----	----	31.8	----	----
Pioneer Brand 25R56	Red	0.5	----	----	----	----	----	----	----	----	----	----	----
Excel 209	Red	2.7	----	----	----	----	----	----	----	----	----	----	----
Aubrey	White	0.8	0.5	3.0	4.5	4.2	5.0	7.7	8.1	8.3	9.6	7.2	7.3
Ambassador	White	2.7	1.6	4.0	5.3	4.5	4.0	6.7	7.7	7.9	2.7	5.8	----
Envoy	White	1.0	1.1	3.0	4.3	3.8	4.0	3.0	5.3	5.6	5.6	7.0	----
MSU D8006	White	0.7	0.5	2.0	3.8	3.3	4.0	4.9	6.0	6.3	27.7	20.1	22.1
MSU D6234	White	3.7	2.6	1.0	2.5	2.5	0.0	5.4	7.0	7.6	28.0	29.8	27.1
Coral	White	1.8	1.6	2.0	3.3	3.0	7.0	6.2	7.3	7.8	2.9	5.8	5.9
AgriPro/Syngenta W1062	White	0.1	0.3	2.0	3.0	2.7	4.0	3.7	5.1	----	2.7	8.1	----
Linebacker 180	White	1.7	1.2	4.0	----	----	4.0	----	----	----	----	----	----
Pioneer Brand 25W36	White	1.2	1.0	3.0	4.0	----	4.0	6.9	----	----	1.1	----	----
Hyland Ava	White	1.0	0.5	3.0	4.3	----	4.0	6.1	----	----	10.8	----	----
AC Mountain	White	2.1	1.5	3.0	4.5	4.2	4.0	7.8	8.4	8.3	3.7	8.1	9.7
Pioneer Brand 25W43	White	0.0	0.0	2.0	3.3	----	0.0	4.8	----	----	6.4	----	----
Crystal	White	4.1	2.5	4.0	4.5	3.8	5.0	7.0	7.7	7.8	0.8	0.9	----
Saftey 10	White	1.6	1.2	4.0	----	----	3.0	----	----	----	----	----	----
Caledonia	White	1.7	1.2	4.0	5.0	4.7	5.0	4.7	6.7	7.3	3.9	5.9	5.6
Abbey	White	0.9	----	----	----	----	----	----	----	----	----	----	----
MEAN (2010 = 76 Entries)		1.9	1.3	2.5	3.7	3.5	2.6	3.2	4.7	4.9	8.5	10.3	12.8
LSD (0.05)		1.3	2.2	1.3	1.5	1.3	1.3	1.9	2.2	1.8	13.9	8.7	7.6
CV (%)		48.3	84.8	38.4	19.9	22.3	26.8	29.1	23.2	22.1	82.4	41.9	35.9

2010 Michigan State University Wheat Performance Trials (Commercial Only)

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Table 4 : Multi-Year Performance Summary (Note: Tables sorted by 2010 Yield, red wheats grouped before white)

Name	Grain Color	Fusarium Head Blight (Scab) Data : Field Observation Symptoms												DON (ppm) in grain		
		Incidence (% of spikes)				Severity (% within spikes)				Index (% overall infection)						
		Multi-Year Averages				Multi-Year Averages				Multi-Year Averages				Multi-Year Averages		
		2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	2010	2 YR 09-10	3 YR 08-10	4 YR 07-10	2009	2 YR 08-09	3 YR 07-09
MCIA Red Devil	Red	88.7	-----	-----	-----	53.4	-----	-----	-----	47.1	-----	-----	-----	-----	-----	-----
RS967	Red	89.4	-----	-----	-----	39.9	-----	-----	-----	35.7	-----	-----	-----	-----	-----	-----
AgriPro/Syngenta Branson	Red	90.6	85.0	85.7	66.5	56.6	45.0	41.9	38.3	51.5	38.9	36.2	37.3	5.3	5.6	5.3
Pioneer Brand 25R47	Red	92.8	87.6	84.8	75.6	47.5	40.0	35.5	43.5	43.6	35.4	31.2	42.2	4.4	5.5	5.6
RS935	Red	94.7	-----	-----	-----	41.1	-----	-----	-----	38.5	-----	-----	-----	-----	-----	-----
Dyna-Gro 9922	Red	91.1	-----	-----	-----	49.2	-----	-----	-----	44.6	-----	-----	-----	-----	-----	-----
Red Ruby	Red	94.6	95.8	95.0	81.7	60.5	48.3	47.8	51.5	57.5	45.5	45.3	51.4	7.4	9.2	8.4
Sunburst	Red	89.0	86.1	88.7	73.3	40.1	31.4	31.3	34.6	36.0	27.8	28.3	37.1	3.0	4.7	4.5
AgriPro/Syngenta W1104	Red	88.3	-----	-----	-----	47.6	-----	-----	-----	42.2	-----	-----	-----	-----	-----	-----
AgriPro/Syngenta W1566	Red	92.7	84.7	-----	-----	66.4	57.7	-----	-----	61.4	49.7	-----	-----	13.3	-----	-----
Genesis R085	Red	86.9	80.0	82.1	-----	53.7	44.8	42.5	-----	46.9	36.8	35.7	-----	5.3	5.5	-----
Hopewell	Red	86.4	86.0	86.3	71.5	59.5	48.2	44.5	47.1	51.4	42.0	39.1	42.9	8.4	8.0	7.6
Dyna-Gro 9042	Red	88.9	-----	-----	-----	41.3	-----	-----	-----	37.0	-----	-----	-----	-----	-----	-----
MCIA Butch	Red	94.3	92.9	93.1	80.9	64.9	60.1	56.4	59.0	61.3	56.8	53.2	56.7	13.0	12.3	12.5
Dyna-Gro V9723	Red	82.5	73.6	73.7	-----	50.8	45.5	45.5	-----	41.8	34.8	34.8	-----	3.9	5.0	-----
MCIA Oasis	Red	93.1	83.6	86.4	70.2	62.1	49.9	46.9	45.4	58.0	43.0	41.5	45.8	3.6	5.5	5.1
R055	Red	93.3	88.1	86.5	71.8	44.3	38.2	34.7	37.8	40.9	34.3	30.9	39.5	3.6	4.4	4.3
Malabar	Red	79.2	78.0	78.7	-----	36.5	29.7	24.7	-----	29.0	22.5	18.7	-----	3.5	4.3	-----
RS978	Red	86.8	76.1	76.8	-----	51.6	45.1	44.6	-----	44.3	34.9	34.7	-----	3.4	4.5	-----
RS934	Red	85.9	-----	-----	-----	32.7	-----	-----	-----	27.8	-----	-----	-----	-----	-----	-----
Hyland Emmit	Red	81.1	79.0	75.6	60.9	57.3	46.9	41.0	38.6	46.5	37.4	31.6	34.9	3.5	4.5	4.5
AG2738	Red	90.5	86.7	-----	-----	54.3	41.6	-----	-----	49.5	37.3	-----	-----	3.9	-----	-----
W123	Red	78.1	-----	-----	-----	48.4	-----	-----	-----	37.8	-----	-----	-----	-----	-----	-----
Milton	Red	94.2	-----	-----	-----	48.7	-----	-----	-----	46.1	-----	-----	-----	-----	-----	-----
Pioneer Brand 25R39	Red	89.0	77.2	-----	-----	58.4	51.9	-----	-----	52.2	41.2	-----	-----	5.1	-----	-----
Pioneer Brand 25R62	Red	85.1	83.6	85.6	-----	41.6	32.5	30.7	-----	35.7	27.0	26.2	-----	4.6	8.0	-----
R075	Red	87.4	79.0	77.1	-----	49.3	44.7	40.4	-----	43.2	36.4	32.5	-----	4.6	5.0	-----
Excel 234	Red	69.3	61.0	-----	-----	36.0	28.6	-----	-----	24.9	19.2	-----	-----	2.3	-----	-----
R045	Red	86.5	74.0	78.5	65.6	52.9	45.3	39.7	41.6	45.6	35.0	31.9	36.6	5.2	6.5	6.2
Merl	Red	90.3	85.9	-----	-----	51.2	47.8	-----	-----	46.4	41.1	-----	-----	8.8	-----	-----
AgriPro/Syngenta W1377	Red	91.3	75.5	80.3	-----	40.5	30.3	27.8	-----	36.5	25.4	24.0	-----	2.6	3.7	-----
Excel 242	Red	78.4	-----	-----	-----	39.6	-----	-----	-----	30.9	-----	-----	-----	-----	-----	-----
Roane	Red	94.3	78.3	76.1	62.7	38.4	28.9	25.3	29.6	35.6	24.4	21.1	30.4	1.6	2.6	3.0
R065	Red	90.9	80.9	79.0	-----	58.3	45.0	41.6	-----	53.1	38.2	34.5	-----	4.9	5.7	-----
Pioneer Brand 25R56	Red	89.8	-----	-----	-----	54.0	-----	-----	-----	48.1	-----	-----	-----	-----	-----	-----
Excel 209	Red	81.5	-----	-----	-----	37.7	-----	-----	-----	30.5	-----	-----	-----	-----	-----	-----
Aubrey	White	81.6	71.1	75.6	60.9	49.1	44.3	39.2	38.7	40.1	33.1	30.6	34.6	4.3	5.1	4.5
Ambassador	White	86.3	85.1	86.3	71.4	71.2	62.4	61.9	57.9	61.3	52.5	53.7	54.7	11.2	12.3	12.0
Envoy	White	93.2	92.6	87.1	75.7	52.8	44.9	39.4	46.0	49.3	41.6	35.7	44.3	8.9	8.8	9.0
MSU D8006	White	89.5	84.2	88.1	73.0	60.2	48.3	49.9	49.5	53.8	40.8	44.4	47.5	6.6	7.8	8.4
MSU D6234	White	92.9	79.4	83.4	69.7	53.3	44.0	40.3	44.8	49.7	36.4	34.5	38.1	3.9	7.4	6.2
Coral	White	86.6	79.3	81.9	64.7	53.8	49.7	47.5	44.8	46.9	39.4	38.6	38.3	4.1	6.7	5.5
AgriPro/Syngenta W1062	White	88.5	89.5	90.1	70.7	56.4	47.4	49.9	44.1	50.1	41.9	44.6	43.1	6.9	8.9	7.4
Linebacker 180	White	81.8	81.3	-----	-----	55.7	48.9	-----	-----	46.1	40.1	-----	-----	4.3	-----	-----
Pioneer Brand 25W36	White	91.5	85.1	87.6	-----	69.3	57.0	55.4	-----	63.9	49.2	49.3	-----	6.5	8.3	-----
Hyland Ava	White	68.4	65.0	70.3	-----	50.5	43.8	35.8	-----	33.8	27.7	23.6	-----	2.4	3.6	-----
AC Mountain	White	78.2	76.2	77.0	63.4	67.5	57.9	52.4	55.4	52.2	43.7	39.8	39.2	7.0	7.5	6.2
Pioneer Brand 25W43	White	86.2	75.6	76.2	-----	47.7	35.0	31.0	-----	41.1	29.1	26.3	-----	4.1	5.3	-----
Crystal	White	93.8	92.4	93.7	78.8	64.8	56.2	53.2	54.4	61.0	51.9	49.6	50.2	9.0	11.1	12.1
Saftey 10	White	93.7	88.3	-----	-----	60.7	51.8	-----	-----	57.1	46.3	-----	-----	7.3	-----	-----
Caledonia	White	88.8	83.1	85.8	71.7	64.8	57.2	55.5	55.7	57.7	49.1	48.8	49.5	9.9	12.2	10.4
Abbey	White	82.3	-----	-----	-----	50.1	-----	-----	-----	41.2	-----	-----	-----	-----	-----	-----
MEAN (2010 = 76 Entries)		87.2	82.7	83.1	70.5	50.7	45.1	41.8	45.6	44.4	38.1	35.6	42.6	5.6	6.7	7.1
LSD (0.05)		8.0	13.3	10.8	10.3	9.4	8.2	7.7	11.5	8.8	8.4	7.9	11.7	2.7	2.8	2.7
CV (%)		9.5	8.0	8.0	10.3	22.9	9.0	11.3	17.9	22.5	11.0	13.5	19.4	-----	20.8	22.7

2010 Michigan State University Wheat Performance Trials (Commercial Only)

Multi-year data are the most informative.
MSU makes no endorsement of any variety or brand.

Table 5 : Multi-Year Performance Summary (Note: Tables sorted by 2010 Yield, red wheats grouped before white)

Name	Grain Color	Milling and Baking Properties (2009 Crop and Earlier)														
		Percent Flour Yield			Percent Protein In Flour			Lactic Acid Retention			Softness Equivalent Percent			Quality Lab Test Weight		
		Multi-Year Averages			Multi-Year Averages			Multi-Year Averages			Multi-Year Averages			Multi-Year Averages		
		2009	08-09	07-09	2009	08-09	07-09	2009	08-09	07-09	2009	08-09	07-09	2009	08-09	07-09
MCIA Red Devil	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
RS967	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	
AgriPro/Syngenta Branson	Red	71.1	70.9	70.6	7.0	7.4	7.9	95.0	103.3	110.2	61.0	60.4	61.5	63.0	63.2	62.7
Pioneer Brand 25R47	Red	71.6	71.8	72.0	6.6	6.8	7.1	93.6	100.2	103.6	63.9	61.5	62.3	60.6	62.1	61.7
RS935	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Dyna-Gro 9922	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Red Ruby	Red	70.1	70.4	70.5	6.6	6.7	7.3	103.0	107.8	112.4	61.5	60.5	61.1	62.7	63.5	63.5
Sunburst	Red	65.6	65.5	66.0	7.0	7.3	7.7	89.7	99.9	106.1	49.0	47.7	49.7	65.3	65.9	65.5
AgriPro/Syngenta W1104	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
AgriPro/Syngenta W1566	Red	70.9	----	----	7.2	----	----	83.7	----	----	60.5	----	----	62.0	----	----
Genesis R085	Red	69.3	69.6	----	6.7	7.2	----	88.0	97.3	----	62.4	60.7	----	62.6	63.9	----
Hopewell	Red	68.7	68.9	69.3	6.8	7.2	7.6	103.3	109.0	114.6	61.0	59.4	60.1	62.3	63.1	62.7
Dyna-Gro 9042	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MCIA Butch	Red	67.8	68.4	68.7	7.1	7.2	7.5	100.0	103.4	108.3	55.3	56.8	58.0	62.3	62.3	61.9
Dyna-Gro V9723	Red	71.7	71.7	----	6.4	6.9	----	85.8	100.6	----	61.5	60.1	----	61.8	62.4	----
MCIA Oasis	Red	71.0	70.6	71.3	7.1	7.2	7.6	90.6	99.8	107.2	58.4	56.1	57.5	61.7	62.9	62.4
R055	Red	71.8	71.9	71.9	7.0	7.4	7.7	91.7	102.9	106.4	57.5	55.8	56.1	62.5	63.7	63.4
Malabar	Red	70.0	70.3	----	6.5	6.5	----	103.5	106.7	----	57.9	57.2	----	62.7	63.1	----
RS978	Red	71.3	71.3	----	6.8	6.9	----	84.0	97.6	----	60.6	59.6	----	62.0	62.8	----
RS934	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hyland Emmit	Red	72.3	72.2	72.3	6.8	6.7	7.3	78.6	86.4	89.1	56.0	56.6	56.6	62.4	63.1	62.9
AG2738	Red	68.9	----	----	6.0	----	----	110.8	----	----	64.7	----	----	60.2	----	----
W123	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Milton	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pioneer Brand 25R39	Red	69.6	----	----	6.5	----	----	88.1	----	----	57.6	----	----	63.1	----	----
Pioneer Brand 25R62	Red	71.1	70.9	----	6.4	6.7	----	91.4	96.1	----	61.8	58.4	----	60.2	61.4	----
R075	Red	71.6	71.7	----	6.0	6.5	----	89.5	91.4	----	62.0	60.4	----	63.2	64.4	----
Excel 234	Red	70.0	----	----	6.8	----	----	91.5	----	----	55.7	----	----	64.1	----	----
R045	Red	71.6	71.5	71.7	6.4	6.7	7.2	86.8	90.5	92.2	61.7	60.2	60.7	63.4	64.5	64.2
Merl	Red	71.0	----	----	7.0	----	----	93.6	----	----	58.4	----	----	64.0	----	----
AgriPro/Syngenta W1377	Red	67.9	68.2	----	7.2	7.4	----	97.4	104.9	----	54.4	52.4	----	64.6	65.2	----
Excel 242	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Roane	Red	66.9	67.7	67.9	7.2	7.3	7.7	99.3	105.5	110.4	58.4	57.0	57.8	64.7	65.5	65.1
R065	Red	71.5	71.5	----	6.6	6.8	----	85.7	89.6	----	61.7	60.0	----	63.0	64.3	----
Pioneer Brand 25R56	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Excel 209	Red	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Aubrey	White	71.3	71.3	71.0	7.6	7.5	7.8	95.4	94.9	103.2	61.1	59.6	60.4	63.6	63.6	63.4
Ambassador	White	72.6	72.3	72.8	6.7	6.9	7.3	85.8	90.4	94.6	58.8	57.1	58.3	60.7	61.3	61.3
Envoy	White	71.0	71.0	71.2	7.4	7.7	8.0	93.1	100.4	106.1	54.3	50.7	52.8	63.0	64.1	63.7
MSU D8006	White	72.7	72.8	73.0	7.1	7.0	7.5	104.3	108.1	112.3	61.3	60.0	61.0	62.1	62.8	62.6
MSU D6234	White	69.1	69.3	69.5	6.8	7.0	7.6	80.6	84.5	85.9	59.3	55.6	55.8	62.1	63.5	63.3
Coral	White	70.8	71.2	71.4	6.2	6.5	7.1	96.1	101.0	105.5	63.3	59.3	59.6	61.2	62.8	62.9
AgriPro/Syngenta W1062	White	72.4	72.4	72.6	6.3	6.5	7.1	104.9	109.8	113.0	65.1	60.9	61.8	61.4	63.4	63.0
Linebacker 180	White	70.3	----	----	6.3	----	----	94.8	----	----	63.1	----	----	59.3	----	----
Pioneer Brand 25W36	White	69.6	70.0	----	6.5	6.9	----	86.8	93.8	----	60.7	58.2	----	62.7	63.5	----
Hyland Ava	White	70.3	70.1	----	6.1	6.4	----	84.7	89.2	----	62.8	60.6	----	61.4	62.7	----
AC Mountain	White	71.5	71.1	71.0	6.2	6.5	7.2	87.4	91.0	95.1	62.6	59.5	58.9	60.1	61.0	61.0
Pioneer Brand 25W43	White	69.7	70.1	----	6.8	7.2	----	97.3	105.8	----	59.3	57.3	----	61.8	62.8	----
Crystal	White	70.9	71.1	71.9	6.7	6.9	7.3	91.4	95.7	98.3	57.8	55.6	57.1	61.5	62.4	62.1
Saftey 10	White	69.8	----	----	6.5	----	----	96.9	----	----	64.0	----	----	61.4	----	----
Caledonia	White	71.0	71.0	71.3	6.6	6.9	7.5	96.2	100.9	106.1	61.1	57.2	58.1	61.0	62.7	62.5
Abbey	White	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MEAN (2010 = 76 Entries)		70.3	70.5	70.9	6.7	6.9	7.5	92.9	98.7	103.8	59.6	57.5	58.3	62.2	63.3	62.9
LSD (0.05)		----	0.8	0.9	----	0.5	0.4	----	9.3	6.7	----	4.0	3.0	----	1.4	1.0
CV (%)		----	0.6	0.8	----	3.2	3.5	----	4.6	3.9	----	3.5	3.1	----	1.1	0.9

2010 Michigan State University Wheat Performance Trials (Commercial Only)

Multi-year data are the most informative.
MSU makes no endorsement of any variety or brand.

Table 6 : Single Site: Yield, Test Weight and Moisture Performance Summary (Note: Tables sorted alphabetically by organization)

Name	Grain Color	Commercially Available	HURON			INGHAM			LENAWEE			SANILAC			TUSCOLA			Organization
			Yield bu/acre	Test Weight	Moist.	Yield bu/acre	Test Weight	Moist.	Yield bu/acre	Test Weight	Moist.	Yield bu/acre	Test Weight	Moist.	Yield bu/acre	Test Weight	Moist.	
AgriPro/Syngenta Branson	Red	Yes	103.3	60.4	13.4	66.9	52.8	15.4	87.2	58.5	12.0	101.5	60.1	13.7	100.7	56.6	13.9	AgriPro Wheat / Syngenta Seeds
AgriPro/Syngenta W1062	White	Yes	96.3	59.2	17.2	58.6	50.7	14.9	77.2	57.2	12.2	97.2	58.5	18.3	91.3	57.6	15.1	AgriPro Wheat / Syngenta Seeds
AgriPro/Syngenta W1104	Red	Yes	98.6	60.2	14.1	66.6	50.7	14.2	85.2	58.3	11.8	97.9	59.3	14.1	100.0	55.1	13.7	AgriPro Wheat / Syngenta Seeds
AgriPro/Syngenta W1377	Red	Yes	91.7	63.7	14.1	51.2	55.8	16.2	80.8	61.8	12.7	91.1	62.4	14.1	86.9	60.0	14.5	AgriPro Wheat / Syngenta Seeds
AgriPro/Syngenta W1566	Red	Yes	98.4	60.9	14.0	68.9	51.4	15.2	86.9	59.0	12.1	100.9	59.8	14.9	93.6	56.0	14.0	AgriPro Wheat / Syngenta Seeds
Linebacker 180	White	Yes	87.7	55.8	21.0	65.9	52.5	17.5	81.9	57.6	12.2	89.4	56.6	19.2	94.7	56.2	16.4	D.F. Seeds, Inc.
R045	Red	Yes	95.7	61.8	14.9	47.5	49.6	14.3	83.2	58.9	12.0	92.7	61.5	14.8	83.9	57.4	13.7	D.F. Seeds, Inc.
R055	Red	Yes	96.4	60.4	13.6	71.8	54.6	15.2	81.2	59.4	12.5	94.6	59.1	14.8	93.9	56.5	13.9	D.F. Seeds, Inc.
R065	Red	Yes	94.4	61.9	14.6	53.6	50.9	14.5	80.5	59.2	12.0	88.8	61.2	14.8	83.6	56.9	13.4	D.F. Seeds, Inc.
R075	Red	Yes	95.3	61.9	14.4	53.0	49.4	14.1	81.9	58.9	12.0	91.8	60.7	14.8	87.5	57.4	13.9	D.F. Seeds, Inc.
Saftey 10	White	Yes	92.7	59.4	15.2	54.6	51.4	15.5	73.2	56.8	11.7	90.5	58.6	15.8	93.1	58.7	14.5	D.F. Seeds, Inc.
Ambassador	White	Yes	99.1	59.6	13.1	75.0	52.5	14.6	88.2	57.4	11.9	96.4	58.4	13.6	89.2	56.2	13.6	D.F. Seeds, Inc. / Cooperative Elevator Co.
Envoy	White	Yes	99.2	60.7	14.5	73.4	54.3	14.3	84.9	59.5	12.1	96.9	60.1	14.7	93.7	58.0	13.8	D.F. Seeds, Inc. / Cooperative Elevator Co.
Aubrey	White	Yes	98.7	60.7	13.9	76.6	56.3	16.6	84.4	59.1	12.2	95.0	60.5	14.0	97.4	58.9	14.6	D.F. Seeds/Co-op Elevator Co./Farmers Co-op Grain Co.
Dyna-Gro 9042	Red	Yes	97.6	61.2	13.7	64.3	52.9	15.2	84.3	58.6	12.1	98.0	59.8	14.5	95.6	57.4	14.1	Dyna-Gro Seed
Dyna-Gro 9922	Red	Yes	102.1	62.1	14.4	64.2	52.3	14.9	89.6	59.7	12.3	101.6	60.2	15.7	99.9	58.0	14.0	Dyna-Gro Seed
Dyna-Gro V9723	Red	Yes	101.6	60.4	13.6	65.2	51.9	14.3	80.5	56.8	11.9	93.6	59.9	13.9	98.3	56.2	13.4	Dyna-Gro Seed
Excel 209	Red	Yes	83.0	61.9	13.5	47.3	53.8	14.2	68.0	59.5	12.0	83.2	62.2	13.7	83.2	58.5	13.7	Excel Brand Seed
Excel 234	Red	Yes	99.3	62.6	14.0	60.4	56.0	17.5	73.0	59.3	12.5	91.5	61.4	14.5	82.0	58.5	14.4	Excel Brand Seed
Excel 242	Red	Yes	92.0	60.8	14.1	40.6	48.7	14.8	81.3	59.4	12.2	94.5	60.7	14.2	92.9	57.5	14.4	Excel Brand Seed
Abbey	White	Yes	89.7	55.7	22.0	60.8	54.3	18.1	69.1	57.5	12.8	84.3	55.2	22.5	92.4	58.0	17.0	Harrington Seeds, Inc.
Caledonia	White	Yes	91.4	59.2	14.7	57.5	50.9	14.7	74.5	56.3	11.8	90.4	58.6	15.4	88.5	56.4	14.2	Harrington Seeds, Inc.
Hyland Ava	White	Yes	94.7	57.7	17.3	60.3	53.2	16.9	72.4	55.1	12.6	90.6	55.9	19.9	97.9	57.9	14.5	Hyland Seeds
Hyland Emmit	Red	Yes	96.0	60.1	14.6	62.5	52.5	16.4	82.8	58.1	12.1	92.4	59.2	15.6	97.1	57.9	14.7	Hyland Seeds
AC Mountain	White	Yes	95.2	60.0	13.3	63.3	53.0	14.9	76.7	57.7	11.9	89.1	59.3	14.0	90.5	57.3	13.6	Michigan Crop Improvement Association
AG2738	Red	Yes	98.6	59.4	13.7	57.3	49.7	13.9	80.1	55.5	11.3	97.8	58.0	14.3	95.0	55.1	13.4	Michigan Crop Improvement Association
Coral	White	Yes	92.5	59.8	15.3	59.1	52.4	17.2	80.7	57.7	12.1	93.6	57.4	17.7	95.2	57.0	14.4	Michigan Crop Improvement Association
Crystal	White	Yes	93.5	60.4	12.9	63.2	50.9	13.1	71.5	56.7	11.5	95.5	59.3	14.0	83.8	56.1	13.1	Michigan Crop Improvement Association
Hopewell	Red	Yes	96.5	60.1	14.3	74.1	52.5	15.7	80.4	58.1	12.2	95.5	60.4	14.2	100.0	57.6	13.8	Michigan Crop Improvement Association
MCIA Butch	Red	Yes	101.3	59.3	13.3	61.5	48.9	13.7	79.0	55.8	11.5	97.5	58.5	13.8	100.0	55.1	13.4	Michigan Crop Improvement Association
MCIA Oasis	Red	Yes	100.1	59.9	14.6	59.7	51.0	15.0	81.5	57.9	12.0	99.5	59.3	15.0	97.7	57.3	14.0	Michigan Crop Improvement Association
MCIA Red Devil	Red	Yes	104.3	62.0	13.7	70.0	53.5	14.9	89.8	59.8	12.1	105.3	60.2	15.1	105.5	58.2	14.3	Michigan Crop Improvement Association
Milton	Red	Yes	91.8	62.6	14.2	64.6	55.1	15.1	82.8	60.7	12.3	91.5	62.0	15.1	93.5	58.5	14.0	Michigan Crop Improvement Association
MSU D6234	White	Yes	92.0	60.5	14.4	70.1	52.4	14.8	85.0	58.8	12.3	90.3	59.4	15.4	88.8	57.7	14.3	Michigan Crop Improvement Association
MSU D8006	White	Yes	95.0	60.4	13.5	68.9	53.3	14.5	79.4	58.4	11.8	98.7	59.8	14.0	91.4	56.9	13.8	Michigan Crop Improvement Association
Red Ruby	Red	Yes	100.2	60.8	15.2	77.0	53.9	14.6	86.1	59.1	12.2	95.3	60.4	15.7	91.1	57.7	13.7	Michigan Crop Improvement Association
Roane	Red	Yes	89.2	62.9	14.3	51.5	54.9	15.2	79.0	60.4	12.4	90.4	61.8	14.8	90.9	59.4	14.5	Michigan Crop Improvement Association
Malabar	Red	Yes	97.0	61.1	13.8	63.1	53.5	15.5	89.5	59.0	12.2	92.6	60.8	13.9	94.5	57.4	13.9	Ohio Seed Improvement Association
Pioneer Brand 25R39	Red	Yes	93.7	60.7	14.0	53.4	49.6	15.1	80.1	58.3	12.4	93.7	58.6	15.1	92.7	56.4	14.2	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25R47	Red	Yes	106.3	60.0	14.4	66.2	52.7	15.3	87.0	57.2	12.1	101.7	59.0	15.2	96.6	56.5	14.0	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25R56	Red	Yes	94.0	60.2	13.2	42.8	48.0	13.3	75.7	56.5	11.6	90.8	59.4	13.8	94.3	54.9	13.2	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25R62	Red	Yes	99.8	59.3	13.4	47.2	49.0	13.3	76.5	56.5	11.6	93.2	58.9	13.9	96.2	55.0	13.0	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25W36	White	Yes	95.0	61.3	13.3	63.7	52.3	14.6	77.2	58.5	12.0	91.6	60.4	13.9	90.3	57.1	13.7	Pioneer Hi-Bred International, Inc.
Pioneer Brand 25W43	White	Yes	95.2	60.2	14.1	55.0	51.4	14.2	76.0	57.4	11.9	94.3	58.5	14.0	91.4	56.9	13.8	Pioneer Hi-Bred International, Inc.
Genesis R085	Red	Yes	97.9	61.0	15.4	75.3	55.5	17.6	84.7	60.5	12.4	93.7	60.1	15.6	95.7	59.1	15.6	Platinum Genetics LLC
RS934	Red	Yes	95.6	62.1	13.9	72.1	55.5	15.5	77.4	61.3	12.3	93.7	61.0	14.4	95.8	59.0	14.3	Rupp Seeds, Inc.
RS935	Red	Yes	106.4	60.0	13.3	63.5	51.4	13.5	89.7	59.2	11.7	100.7	59.0	14.1	97.7	55.4	13.0	Rupp Seeds, Inc.
RS967	Red	Yes	103.6	61.7	13.3	78.2	54.8	15.1	83.9	59.9	12.2	101.8	61.3	14.0	99.0	57.9	13.9	Rupp Seeds, Inc.
RS978	Red	Yes	96.8	60.1	13.4	64.1	52.9	14.3	81.4	57.3	11.9	98.6	60.1	13.7	95.8	56.2	13.4	Rupp Seeds, Inc.
Merl	Red	Yes	94.8	62.4	14.6	56.1	52.9	15.3	73.9	60.1	12.2	91.1	61.5	15.8	86.9	57.7	14.2	Virginia Tech / VCIA
Sunburst	Red	Yes	101.8	62.5	16.4	69.8	55.7	16.4	81.3	62.3	12.4	97.8	61.7	16.5	97.8	60.3	14.6	Wellman Seeds, Inc.
W123	Red	Yes	96.4	60.4	13.5	64.0	52.0	14.1	78.3	57.5	11.8	93.5	59.8	13.9	94.0	56.1	13.6	Wellman Seeds, Inc.
MEAN (2010 = 76 Entries)			95.5	60.5	14.4	62.3	52.4	15.0	80.1	58.4	12.1	93.4	59.7	15.0	92.7	57.2	14.0	
LSD (0.05)			3.8	0.8	0.7	5.6	1.2	0.6	3.7	0.9	0.3	4.9	0.9	0.8	5.5	0.9	0.3	
CV (%)			2.8	0.9	3.7	6.4	1.6	3.1	3.4	1.1	1.6	3.8	1.0	4.1	4.3	1.1	1.8	