Study Background

A 15 question survey was sent to all Michigan wheat growers in March 2011. The response generated 1,460 usable surveys; the distribution of respondents was representative of the industry. Results were tabulated with breakouts for farms producing red vs. white varieties and further breakouts out by size of the wheat enterprise. Breakouts by category are reported when there were statistically discernable differences in results by category. Breakouts were also done for subsurface drainage tile and for National Agricultural Statistics Service/USDA (NASS) crop reporting district (CRD) for some measures. The survey provides a baseline for future comparisons of key performance indicators.

The foci of the survey were:

- Growers average wheat yield over the previous five years
- Wheat varieties planted
- Average spring-time nitrogen application rates (actual N) and method(s) of application
- Approaches to control of Fusarium head scab
- Previous crop and tillage method
- Research priorities, particularly considerations for enhancing yield vs. reducing quality risk

Background Information

Figure 1 depicts the percentage of respondents who grew soft red winter (SRW) vs. soft white winter (SWW) varieties. The breakout was 61% and 39%, respectively.
Figure 2 depicts the distribution of Lower Peninsula responses by NASS CRD and whether a farm grew predominantly SRW or SWW. SWW was the dominate wheat enterprise in Huron and Tuscola counties with at least 90% of the respondents growing SWW varieties.

At least 40% of the respondents in Midland, Bay, Saginaw, Isabella, Montcalm and Ionia grew SWW and while ¼ of Shiawassee and Genesee respondents grew SWW varieties.

Nearly 50% of the respondents in Ottawa grew white varieties. In other counties, the percentage of respondents growing SWW varieties ranged from zero to 33%.

SRW varieties dominated in Southeast Michigan (CRD 90) from Lapeer and St. Clair to the Ohio border and South Central Michigan (CRD 80) with the exception of Ionia.

Figure 2 also depicts the percentage of the state’s respondents by NASS CRD. The dominant wheat growing areas are East Central (CRD 60), Southeast (CRD 90) and South Central (CRD 80).

The size distribution of wheat enterprises is skewed toward smaller enterprises. The percentage of the respondents in the smaller enterprise category (less than 100 acres, average 55 acres), medium (between 100 and 250 acres, average 150 acres), and larger (more than 250 acres, average 350 acres) were 62%, 26%, and 12%, respectively. The total production in each category was approximately the same.
Subsurface Drainage

The amount of subsurface drainage tile tends to be based upon soil type. The percentage of farms raising wheat on land with no tiling in East Central Michigan was 8% compared to 20% in Southeast Michigan. In South Central Michigan, 37% of the respondents were growing wheat on non-tiled land.

Fifty percent of the farms in East Central Michigan were raising 100% of their wheat on tiled fields compared to 15% to 17% in Southeast and South Central and less than 10% in North Central. Wheat yields in counties where tiling has shown a large benefit are significantly higher on farms with tiled land.

Across all farms, 37% of the farms were growing wheat on 100% tiled land and 24% on land that was not tiled. Relative to tiled drainage, Figure 3 depicts the percentages by enterprise size and wheat class. SWW is primarily grown on soils where crop response to tiling is particularly significant. The patterns within class of wheat are similar. Farms with smaller enterprises are more likely to grow wheat on soils that are not tiled.

Wheat Yields

Figure 4 depicts the frequency distribution of average yields. The most common yield was 60-70 bu/acre. Twenty one percent of farms report less than 60 bu while 8% report over 90 bu.
The frequency distribution of yields is different for farms growing SRW compared to SWW as depicted in Figures 5 and 6. The frequency distribution also differs by enterprise size.

The average yields across all farms growing SWW were larger than those growing red SRW. We did not attempt to adjust for soil and microclimate characteristics. Also, average yields increase as wheat enterprise size increases.

The percentage of farms growing SWW with yields of 90 bu or more was 26% for the farms in the larger enterprise. That compares to 6% for farms in the smaller size enterprise category. Farms in medium size enterprise category are intermediate.

The 80-90 bu was most frequent for the medium and larger enterprise categories compared to 70-80 bu in the small size category.

**Wheat Varieties Planted in Michigan**

Growers were asked to list the varieties, along with acreages planted, during the fall of 2010. Growers were not asked to specify whether their seed source was certified or “bin-run”.
Growers listed 30 separate SRW varieties. Those SRW varieties comprising at least 1 percent of the total SRW acreage are provided in Table 1. Hopewell, a 15 year old variety, is still grown on over a third of Michigan’s SRW acres. When the Hopewell acres are combined with the second leading variety (Pioneer 25R47), nearly half of the SRW crop is represented.

![Table 1: Varieties and acreages of Soft Red Winter (SRW) Wheat, Michigan, 2011](image)

<table>
<thead>
<tr>
<th>SRW Varieties</th>
<th>SRW acres</th>
<th>SRW acres %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hopewell</td>
<td>137,000</td>
<td>32.2%</td>
</tr>
<tr>
<td>Pioneer 25R47</td>
<td>74,200</td>
<td>17.5%</td>
</tr>
<tr>
<td>Red Ruby</td>
<td>47,300</td>
<td>11.1%</td>
</tr>
<tr>
<td>Pioneer 25R56</td>
<td>24,000</td>
<td>5.6%</td>
</tr>
<tr>
<td>Pioneer 25R62</td>
<td>13,700</td>
<td>3.2%</td>
</tr>
<tr>
<td>DF-R045</td>
<td>12,800</td>
<td>3.0%</td>
</tr>
<tr>
<td>Pioneer 25R39</td>
<td>10,000</td>
<td>2.4%</td>
</tr>
<tr>
<td>Pioneer 25R78</td>
<td>8,900</td>
<td>2.0%</td>
</tr>
<tr>
<td>Sunburst</td>
<td>8,430</td>
<td>1.4%</td>
</tr>
<tr>
<td>Butch</td>
<td>6,070</td>
<td>1.2%</td>
</tr>
<tr>
<td>DF-R075</td>
<td>5,240</td>
<td>1.2%</td>
</tr>
<tr>
<td>Roane</td>
<td>5,120</td>
<td>1.1%</td>
</tr>
<tr>
<td>Branson</td>
<td>4,630</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Only includes those varieties with more than 1 percent of acreage

Growers of SWW listed 18 different varieties. As shown in Table 2, the 2011 SWW acreage was dominated by Pioneer 25W43, Ambassador, AC Mountain, Pioneer 25W36 and Caledonia. While Pioneer 25W43, Ambassador and Pioneer 25W36 were made available within the past five years, Caledonia and AC Mountain have been grown for over 10 years.

![Table 2: Varieties and acreages of Soft White Winter (SWW) Wheat, Michigan, 2011](image)

<table>
<thead>
<tr>
<th>SWW Varieties</th>
<th>SRW acres</th>
<th>SRW acres %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pioneer 25W43</td>
<td>41,000</td>
<td>15.1%</td>
</tr>
<tr>
<td>Ambassador</td>
<td>35,700</td>
<td>13.1%</td>
</tr>
<tr>
<td>AC Mountain</td>
<td>30,300</td>
<td>11.1%</td>
</tr>
<tr>
<td>Pioneer 25W36</td>
<td>26,500</td>
<td>9.7%</td>
</tr>
<tr>
<td>Caledonia</td>
<td>23,700</td>
<td>8.7%</td>
</tr>
<tr>
<td>Aubrey</td>
<td>21,100</td>
<td>7.8%</td>
</tr>
<tr>
<td>MSU D8006</td>
<td>13,700</td>
<td>5.0%</td>
</tr>
<tr>
<td>Crystal</td>
<td>12,400</td>
<td>4.6%</td>
</tr>
<tr>
<td>Syngenta W1062</td>
<td>11,300</td>
<td>4.2%</td>
</tr>
<tr>
<td>Coral</td>
<td>11,300</td>
<td>4.2%</td>
</tr>
<tr>
<td>Hyland Ava</td>
<td>9,930</td>
<td>3.7%</td>
</tr>
<tr>
<td>MSU D6234</td>
<td>4,210</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
This data will be of interest to all segments of the wheat industry. From Extension and research perspectives, the data are helpful in profiling the state’s crop relative to disease vulnerability, popularity of agronomic traits, and the rate of adoption of new varieties.

Figure 7 depicts the percent of farms incorporating MSU yield variety trials information in the selection decision. Use is greater by SWW growers and by medium and larger sized farms.

Over 75% and 60% of farms with medium and larger sized enterprises growing SWW and SRW, respectively, incorporate trial information into their decision. By region, the percentage is greatest in East Central and lowest in South Central and Southwest. The percentage is in-between in West Central and Southeast.

**Nitrogen Application Rates and Methods of Application**

The frequency distribution of the nitrogen rate/acre was relatively independent of enterprise size as can be seen in Figure 8. The most frequent of application rate was 81 to 100 lb/acre. There was a trend for higher application rates for farms with larger enterprises.

The rates of application rates are broken out by wheat class...
in Figures 9 and 10. The rate of application increases as yield increases and SWW growers, on average, apply higher rates than SRW growers.

Figure 9. Frequency of Nitrogen Application Rates for SRW Farms

Of the SRW growers with yields less than 60 bu/acre, 22% used less than 60 lb N, 31% used 61-80 lb, 32% used 81-100 lb, and 17% used more than 100 lb.

Of the SRW growers with yield greater than 90 bu, 3% used less than 60 lb N, 9% used 61-80 lb, 49% used 81-100 lb, and 39% used more than 100 lb.

Figure 10. Frequency of Nitrogen Application Rates for SWW Farms

Of the SWW growers who with yields less than 60 bu/acre, 27% used less than 60 lb N, 32% used 61-80 lb, 24% used 81-100 lb and 17% used more than 100 lb.

Of the SWW growers with yields more than 90 bu, 3% used less than 60 lb N, 8% used 61-80 lb, 50% used 81-100 lb and 39% used more than 100 lb.
Management Practices to Suppress Fusarium Head Scab

The disease that poses the greatest threat to profitable wheat production and milling is Fusarium head blight. The disease is associated with a mycotoxin that, when present at significant levels, renders the grain unacceptable for most markets. Three questions were designed to gain a better understanding of grower’s use of fungicides and other measures to address the disease.

Growers were asked to describe practices they employ to reduce the risks of serious Fusarium head scab infections. This question was adapted from a survey conducted with North Dakota wheat farmers by Gregory McKee of North Dakota State University. The results are described in Figures 12 – 16.

SWW growers are much more likely to apply a fungicide than SRW growers. Also, the number of growers likely to use fungicides increased with increasing wheat enterprise size.

Fungicides have proven to be helpful in combating Fusarium head blight. Growers were asked how many times in the last five years they applied a fungicide to prevent scab. The purpose of the query was to obtain a sound estimate of the amount of fungicides currently used by MI wheat growers. It will serve as a baseline that can be referenced when a similar survey is conducted in the future.

As shown in Figure 12 SWW growers with medium to larger enterprises were more likely to use fungicides than comparable SRW growers during 2005 - 2009. Nearly 50% of SWW growers with larger enterprises had applied a fungicide in each of the previous five years. In contrast,
farms with smaller enterprises were much less likely to apply fungicides to prevent scab, particularly SRW growers.

Figure 12. Years Applying Fungicide to Prevent Scab in the Last 5 Years

Growers were asked to select the practice that best describes their approach to using a fungicide against Fusarium. The results are shown in Figures 13 and 14. For SRW growers, Figure 13, the most common response was to rely on a consultant. Spraying every year and consideration of

Figure 13. Decision Factors Used by SRW Growers on Whether to Apply Fungicide
weather conditions were both inversely related to enterprise size. Farms with medium sized enterprises more frequently apply fungicide every year and to use weather conditions to decide than smaller enterprises. Similarly, the frequency was greater for farms with larger enterprises than farms with medium enterprises.

**Figure 14. Decision Factors Used by SWW Growers on Whether to Apply Fungicide**

As shown in Figure 14, larger SWW growers most commonly treated every year as contrasted to basing the decision on more situation specific considerations. Growers with small and medium size enterprises were most apt to rely on a consultant.

A majority of the respondents for both SRW and SWW indicated that they were more likely to observe the weather for unfavorable conditions than use the national scab forecasting model. Growers indicated that they are most likely to use resistant varieties and fungicides and to avoid following Fusarium susceptible crops relative to adopting practices for minimizing Fusarium head blight. Neither SWW nor SRW growers tended to use staggered planting or varieties with differing days-to- maturity ratings as a strategy.

Figures 15 and 16 depict the association between the yields and the number of spray applications in the last five years. There is an inverse relationship between number of applications in the past five years and yield.
The percentage of farms growing SRW with yield less than 60 bu with no sprays in the past five years was much higher than those spraying at least once. Further, the percentage not spraying was inversely related to yield. This could be this result of confounding with other factors but the observed relationship is bears consideration.

Two additional yield groupings are used for SWW compared to SRW: (1) 81-90 bu and (2) > 90 bu. The pattern of application is the same as with SRW but much more striking. More than 50% of the farms producing more than 90 bu applied fungicide in all five years. Only 5% applied fungicide less the three out of five years.
Crop Preceding Wheat in the Cropping System

Knowing which crops wheat follows has implication for tillage, fertilization, weed control and, most importantly, disease management.

Wheat most often follows soybeans in Michigan. Over 80% of farms planting SRW responded they plant wheat after soybeans. The percentage for SWW was between 60% and 75%. There are small differences associated with enterprise size.

The frequency of farms reporting planting SRW after dry beans was negligible as shown in Figure 19. Farms reporting planning SWW following dry beans is more common on farms with medium and larger enterprises, approaching 40%. These results fit the role of dry beans in cropping systems in counties where SWW is grown.
Planting wheat following sugar beets is not common but does occur as shown in Figure 19.

Fewer than 20% of farms reported planting SRW following corn as shown in Figure 21. The percentages are less for farms growing white varieties. The percentage was lower on farms growing SWW.

Planting wheat following a corn harvested in late summer as corn silage is sometimes done.
Small grains (primarily wheat, barley and oats) are not often grown ahead of wheat. This is particularly true of barley and wheat, as various plant diseases often reduce the crop’s performance and quality. This practice is discouraged unless multiple measures are used to minimize the elevated risk of Fusarium head scab.

Figure 21. No-Till Planting

Figure 21 describes no-till planting practices by class of wheat and enterprise size. Minimum tillage is the dominant approach (70% to 80%) on farms growing SRW, particularly farms on medium and larger sized enterprises.

No-till is less widely used for farms growing SWW but still comprises around 50% of the farms with medium and larger sized enterprises.

Research Priorities

Growers were asked to prioritize the importance of increasing yield compared to reducing the risk of quality discounts. The results are shown in Figure 22. The preferences are much different for farms raising SRW vs. SWW as would be expected because of the relative risks of growing the SWW. Farms producing
red varieties, which typically face fewer quality problems, want to increase yield. Farms producing white wheat varieties, where quality risk is a much more significant issue, place about equal weight on increasing yield and reducing quality problems which lead to discounts. The SWW growers with medium and larger enterprises were also more concerned about quality risk than growers with a smaller wheat enterprise.

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The authors received support from the Michigan Wheat Commission, Michigan State University AgBioResearch and Extension, and the National Agricultural Statistics Service/U.S. Department of Agriculture for the conduct of this study.