

# DEMaND

Developing and Educating Managers and New Decision-makers



*The DEMaND series helps individuals grow in their capacity to meet the complex needs and challenges of managing a successful farm business. Whether individuals represent the transition of generations, from an employee to owner, or are new to farming, the DEMaND series offers a fresh look at farm management.*

## How to Read a Seed Guide (Wheat Edition)

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E3505 January 2025

### Intro Section

Raising a profitable crop begins with selecting the right seed product to plant on your farm. Seed product options are found in seed guides, available from seed companies or related seed dealers. Seed guides can be difficult to navigate to find the information you are looking for. There aren't any standards by which all companies comply with to bring consistency between guides. Therefore, it is important to do your homework to fully understand what information is being presented and how to make comparisons between companies so that you can select the best products for your farm.

Discussed in this document are definitions and explanations of the types of information you will likely find mentioned across most wheat seed guides. Each section will also highlight the importance of making sure you read to understand the seed guide information, so that you don't make false assumptions about the data. We'll also review how costs and harvest factors are important considerations in selecting seed options for your farm.

### Wheat 101

Wheat is sold as varieties. A variety is a naturally occurring or selectively bred group within a species that has distinct characteristics that are stable and reproducible from generation to generation. A hybrid is the result of cross-breeding two different parent plants, usually from separate varieties, to produce offspring with specific desired traits. Hybrid plants (often labeled as F1 hybrids) do not produce seeds that reliably replicate the parent plant's traits. For consistent results, the hybrid must be recreated by cross-pollinating the original parent plants

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each generation. While hybrid wheat is being developed, it is still in research and development and not available to farmers in the United States.

Because varieties are stable and reproducible from generation to generation, many people will save seed to plant (called bin-run wheat). Bin-run refers to wheat harvested in the previous year but kept for next year's planting. However, keep in mind that many of the wheat varieties are still protected varieties. You cannot legally sell or convey any bin-run wheat seed to other farmers that is under protection, but you can plant it back on your own farm. For more information on variety protections, visit the Plant Variety Protection Act website:

[www.ams.usda.gov/rules-regulations/pvpa](http://www.ams.usda.gov/rules-regulations/pvpa).

When selecting seed, you'll need to identify characteristics important for a successful wheat crop on your farm. Just as no two farms are exactly alike, neither are the fields in which you'll be planting. You need to understand the field conditions and potential environment you expect a wheat plant to grow in. Then, select varieties that meet those expectations.

One of the main distinguishing features and a starting point for deciding what wheat to grow is determining what class of wheat you want to grow and most importantly what one you can successfully grow and have a market for.

### **Classes of Wheat**

There are six different classes of wheat on the market: hard red winter, hard red spring, soft red winter, soft red winter, soft white, hard white and durum. Each of these classes is grown in specific areas across the United States based upon where it grows with the best quality and what the local processors want.

In Michigan, the two main classes of wheat grown are soft red winter and soft white winter wheat. Soft red winter wheat makes up about 70% of the market in Michigan. Soft white wheat often brings a premium price from flour mills, but it also requires higher level of management – particularly application of fungicides. Both classes of wheat are important to the milling industry. Farmers should factor in local cash prices for red and white wheat when deciding what varieties to plant on their farms.

### **Relative Maturity (RM)**

**Relative maturity** is known as the days needed to reach harvest maturity. Most wheat growers and seed guides will refer to early, mid, or late maturity when discussing RM. Harvest maturity is when grain can be harvested with minimal loss or kernel damage. In many cases, flowering date is used as a proxy for relative maturity. This has the greatest influence on when harvest can begin. Harvest date is not used to compare wheat varieties because weather can have a huge impact on when harvest begins, regardless of when the crop completes its life cycle and is ready for harvest. Temperature, humidity and water availability can delay or speed up the seed dry down process. If long term rain is predicted after the plant is ready for harvest, it can be advisable to take the crop at a higher moisture level and dry it down.

## Identify Desired Characteristics

Seed guides offer information on a number of different plant attributes including growth factors that focus on plant health and survivability, harvest condition and quality of grain, tolerance or safety concerns when using herbicides and even disease resistance or susceptibility. All of these are important when considering the field conditions on your farm.

### **Plant Characteristics**

Plant health is a key consideration when selecting a wheat variety for your farm. From planting to harvest, growth expectations will largely determine if a wheat plant can produce quality, harvestable kernels.

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**Kernel Color** – There are two different kernel colors red or white. Typically, red wheat has less issues with low falling numbers when weather conditions can promote this issue.

**Head Type** – Awned or awnless (smooth) is the equivalent to does it have hairs sticking out of the head or not (if you have heard of bearded wheat it refers to an awned variety). Some farmers prefer awned varieties to deter deer feeding.

**Winter Hardiness** – How well it survives the winter, since winter wheat varieties are planted in the fall because they need a period of vernalization to produce grain. Vernalization is the cool period needed in winter wheat for the wheat to be able to produce grain. For more information on vernalization, visit: <https://www.canr.msu.edu/news/fall-wheat-emergence-and-the-vernalization-process>.

**Lodging Resistance/Standability** – How well it resists falling over in the field when it gets taller.

**Height** – How tall is the plant, typically the taller the plant the more risk there can be of lodging if high winds or heavy rains occur.

**Seed Size vs Est Seed Count** – Wheat kernels are not all the same size. Typically, an indication of seed size is given in a guide if its size its relative to other wheat. If a guide lists a seed count it implies seed size based on how many seeds exist per pound.

**Test weight** – A measurement of the density of kernels. A better rating means a likelihood of denser kernels and better harvest quality under ideal conditions. Denser kernels weigh heavier and can lead to high yields since less kernels are needed to equal a bushel. U.S. grade 1 wheat must have 60 or higher test weight. U.S. grade 2 wheat has test weight between 58 and 60. Low test weights can lead to price deductions.

**Yield** – Bushels per acre of grain produced. Bushels plus quality is what you get paid on. Yields are calculated using a standard test weight of 60 pounds per bushel.

### Disease Ratings

Most seed guides list several diseases and a plant's susceptibility towards them. A better rating indicates the plant is less susceptible to disease development and injury, while a lower rating indicates higher susceptibility and greater potential for yield loss. A lower disease resistance may also require additional pesticide use in the form of fungicides for fungal diseases.

Disease ratings listed in a seed guide may refer to root, leaf (foliar) or head damage. According to the MSU Wheat Disease website (<https://www.canr.msu.edu/wheat/disease/>), wheat is susceptible to more than 30 diseases. Some of the more common diseases in Michigan are Fusarium Head Blight and Stripe Rust. With the existence of disease, yields can be reduced as well as kernel quality (directly or indirectly).

Disease resistance ratings are used to compare the plant response to disease among varieties. Complete resistance does not exist. Fungicides may still be needed if environmental conditions favor disease presence or injury. Disease ratings should be used to help determine the level of risk a farmer is exposed to with each variety. This should be factored into management decisions about disease control. To learn more about wheat diseases and management tips, visit the Crop Protection Network (<https://cropprotectionnetwork.org/>).



Figure 1. Awned versus awnless wheat heads. Photo by Dennis Pennington, Michigan State University.

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Comments in this section provided by Martin Chilvers, Michigan State University.

### Guide and Selecting Some Options

Identifying local conditions, what markets you have available and what you need from a wheat variety is key to successful selection. Understanding the difference in weather patterns, field conditions and potential pest or environmental concerns helps you to select potential options that meet your needs.

Once you have narrowed down what class of wheat you want to plant, review the wheat variety trial information across multiple locations. Variety trials are a great source of information when comparing wheat seed options and can provide an idea of what varieties have performed well in your area. Multi-year and multi-location data should be considered. Each year and location have different weather and disease pressures. For wheat, the top variety selection characteristics to consider are 1. Grain yield and 2. Resistance to fusarium head blight. This information should be found in your seed guide. Trials are conducted by universities, seed dealers and sometimes even local farms. Contact your local seed dealers for the latest in variety trial information. For more information on MSU's wheat variety trials, visit: <https://www.canr.msu.edu/varietytrials/wheat/>.

### Identifying the Cost of Seed Selection

There's still one more step in the seed selection process. Once you've identified the top performers, the final step is to identify the costs of those potential varieties.

#### Cost Per Bag vs. Cost Per Acre

Identifying seed costs begins with knowing the price of an individual variety. Most types of seed are sold in fairly standardized units regardless of packaging (bag, tote or box). For wheat, seed is sold in equivalents of 50 pounds per bag. However, there is an added variable of seed size, often described by how many seeds exist per pound. A 50 pound bag of wheat can vary from as much as 10,000 to 20,000 seeds per pound. The seed size (seeds per pound) is your first comparison point between variety options.

For example, local retailers are offering two varieties of wheat. Variety 1 is available in 50 pound bags with 15,000 seeds per pound. Variety 2 is also available in 50 pound bags but only has 10,000 seeds per pound. Variety 1 will cost \$20 per bag, while variety 2 will cost \$12.50 per bag.

Table 1. Example comparison of wheat varieties and prices.

Wheat Varieties	Seeds Per Pound	Price Per 50 lb. Bag
Variety 1	15,000	\$20.00
Variety 2	10,000	\$12.50

As Table 1 illustrates, variety 1 has a smaller seed size compared to variety 2 (5,000 more seeds per bag) but also costs an additional \$7.50. However, to fully understand the cost comparison per bag, the desired planting population must also be considered.

Planting population, or planting rates of seeds per acre, do not often vary between wheat varieties. Instead, rates vary based on early planting months compared to late planting months. Early planting rates start at 1.2 million, while late planting rates can reach as high as 2.0 million seeds per acre. Therefore, if the two example varieties are planted in the same period, the planting rates would be identical.

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With identical planting rates of 1,400,000 seeds per acre, let's further consider the cost differences between the two varieties of wheat in the previous example.

Table 2. Example comparison of planting rates on wheat variety costs.

Wheat Varieties	Price Per Bag	Seeds Per Pound	Planting Rate (Seeds Per Acre)	Bags Per Acre	Cost Per Acre
Variety 1	\$20	15,000	1,400,000	$(1,400,000 \div 15,000)$ = 1.87	$(\$20 \times 1.87)$ = \$37.40
Variety 2	\$12.50	10,000	1,400,000	$(1,400,000 \div 10,000)$ = 2.80	$(\$12.50 \times 2.8)$ = \$35.00

As Table 2 outlines, with a planting rate of 1,400,000 seeds per acre, 1.87 bags of variety 1 are needed to plant a single acre. At the same planting rate, 2.80 bags of variety 2 are needed to plant a single acre. At a cost of \$20 per bag, the per acre cost of variety 1 is \$37.40. In comparison, at \$12.50 per bag, variety 2 has a cost per acre of \$35.00.

With the addition of planting rates, only a marginal difference of \$2.40 per acre exists between the two varieties. Which variety should you choose?

The answer lies in reviewing your farm's criteria for what it needs out of a wheat variety. Growth factors become an important part of the decision once you begin to look at the final cost per acre between varieties. In the above example, it can be assumed that growth factors are similar between the two varieties. If that were not the case, the choice could easily rest on which variety's attributes best meet your intended use or needs on the farm.

### Harvest Cost Considerations

Harvest time costs can also be helpful when comparing wheat varieties. Commercial grain buyers will grade wheat bushels based on a number of factors. Factors can include test weight, moisture content, kernel damage, heat damage from drying, and even non-grain or foreign material. Grain that is sold without meeting these standards is discounted by fee or reduced bushels. The most common and impactful with regard to seed selection are standard test weight and ideal storage moisture.

When considering test weight and moisture content, be sure to review wheat variety trial information. Trial results will list the test weight and moisture content of each variety. Comparing test weight and moisture levels with potential discounts can give you an indication of harvest time costs. By combining costs with potential revenues, you can then identify varieties that will perform and be profitable for your farm.

For more information on test weight for wheat, review test weight in small grains from Michigan State University ([https://www.canr.msu.edu/news/test\\_weight\\_in\\_small\\_grains](https://www.canr.msu.edu/news/test_weight_in_small_grains)).

Another harvest time cost can be how quickly quality decreases with preharvest sprouting and low falling numbers. Poor quality seed that sprouts or has low falling numbers can lead to additional discounts. In good quality wheat we expect a 300-400 falling number, and the point at which a discount occurs varies by elevator. Although not routinely shown in a seed guide, quality concerns are true for all wheat varieties, but especially white wheat. For more information on falling numbers, visit: [www.canr.msu.edu/news/falling-numbers-in-wheat-what-causes-it-why-am-i-getting-docked](http://www.canr.msu.edu/news/falling-numbers-in-wheat-what-causes-it-why-am-i-getting-docked).

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### Seed Selection Cost Comparison Decision Tool

The *Seed Selection Cost Comparison Decision Tool* considers all costs to seed selection and helps to identify which options maximize production and profitability. Tool comparisons provide a ranking for each seed variety based on yield and economic returns. These rankings illustrate top production and profitability options to consider in making seed purchases.

Another resource to pair with the decision tool is the MSU Variety Trials ([www.canr.msu.edu/varietytrials/](http://www.canr.msu.edu/varietytrials/)). Trial data includes information on test weights, moisture and yields. To download the Seed Selection Cost Comparison Decision Tool, visit: <https://www.canr.msu.edu/resources/seed-selection-cost-comparison-decision-tool>

## Closing Thoughts

Selecting the right seed for your farm starts and stops with profitability. You want to select varieties that are adaptable and will maximize yields across all acres. Selection starts with identifying local conditions and what you need from a wheat variety. Understand the difference in weather patterns, field conditions, intended uses and potential pests or environmental concerns for your farm. Knowing your needs helps you to select potential options.

Often, all the information needed to select wheat varieties is in the seed guide if you take time to read it. MSU Extension recommends that if you have questions as you review a seed guide, reach out to the company or your local agronomist. These individuals can best answer questions about a product they sell or work with.

The final key to profitability is to consider more than just yields. The economic returns related to seed and harvest costs are equally important, which include seed purchases, test weight, moisture shrink loss and drying charges.

## Resources

### MSU Extension Wheat Website

<https://www.canr.msu.edu/wheat/>

MSU Extension focus on wheat production to provide educational opportunities for educators and researchers to gain access to learn more about the crop and find new techniques to help the future of the crop.

### MSU Extension Wheat Agronomy

<https://www.canr.msu.edu/wheat/agronomy/>

Growers can use data from MSU wheat variety trials when selecting wheat varieties to plant on their farms. Additional information on planting, growth, development, scouting, intensive management and other topics are also available.

### Michigan Wheat 101

<https://bigwclients.com/miwheat/michigan-wheat-101/>

A Guide for Soft Winter Wheat Production in Michigan.