Wheat Variety Selection and Placement for the North

- In addition to yield, farmers consider several performance characteristics including grain protein, straw strength, height, maturity, and disease tolerance when selecting a wheat product.
- Wheat products should be selected to perform in the landscape and climate of each Northern Plains region.
- Having multiple products with different strengths helps spread harvest times, and therefore risk, from potentially damaging weather.

Variety Selection for Risk Management

Northern Plains wheat classes include hard red winter and hard red spring wheat, with hard white spring wheat making up a very small annual acreage. Each class has characteristics that make it successful in different parts of the Northern Plains geography. After determining the appropriate class to grow, farmers should select multiple products within that class with a range of characteristics to match the agronomic plan of the farm (Tables 1-4).

Geographies

Red River Valley – This area extends along the entire Minnesota/North Dakota border, approximately 25 to 40 miles east and west of the Red River of the North into Minnesota and North Dakota, respectively. The Red River Valley is not a typical valley formed by a river, rather a valley with origins as the floor of enormous Glacial Lake Agassiz, where rich glacial till and lake sediment were deposited. Soils in this region are characterized by high clay content (approximately 30 to 60%) and high silt content, very little sand content, high organic matter, and a generally black appearance in the thick A horizon. Total precipitation in this region averages between 16 and 23 inches per year, with most of that coming as rainfall, though some portion can be attributed to snowfall due to the continental climate. Winter wheat planting is from September 1st to 30th, planting earlier as you move north in this region. Spring wheat in this region is typically between April 15th and May 15th, or as early as the soil is trafficable after snowmelt. The most important wheat diseases in this region are fusarium head blight (scab), yellow (stripe) rust, leaf rust, and bacterial leaf streak. Hard Red Spring Wheat is the dominant wheat class in the Red River Valley.

Drift Prairie – The drift prairie is a large region in the Northern Plains encompassing land in both North Dakota and South Dakota. The eastern boundary of the Drift Prairie is the beach ridge of Glacial Lake Agassiz, or the western edge of the Red River Valley in North Dakota. The eastern boundary continues south the entire South Dakota border. The western boundary is approximately the continental divide as it separates drainage east/west in North Dakota and South Dakota. The Drift Prairie was formed by repeated glaciation resulting in glacial deposits, or drift. This drift is characterized as very rocky. The

Table 1. Northern Plains Spring Wheat-Growing Regions.

<table>
<thead>
<tr>
<th>Region</th>
<th>Location</th>
<th>Products</th>
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<tbody>
<tr>
<td>Red River Valley</td>
<td>East/West of Red River in Minnesota and North Dakota</td>
<td>WB9479, WB9590, WB9719, WB-Mayville</td>
</tr>
<tr>
<td>Drift Prairie</td>
<td>Central ND (East of continental divide) and Eastern SD</td>
<td>WB9479, WB9590, WB9653</td>
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<tr>
<td>Missouri Coteau</td>
<td>Central ND (West of continental divide) and North Central SD</td>
<td>WB9590, WB9653, WB9719</td>
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<tr>
<td>West River/Great Plains</td>
<td>Southwest ND and Western SD</td>
<td>WB9590, WB9653, WB9719</td>
</tr>
<tr>
<td>Eastern Minnesota</td>
<td>Northeast Minnesota</td>
<td>WB9479, WB9590, WB9653</td>
</tr>
<tr>
<td>North Central Glaciated Plains</td>
<td>Southwest and South-central Minnesota</td>
<td>WB9479, WB9590, WB9653</td>
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Figure 1. Map of Northern Plains Geography.

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region had many continental glaciations, and is thus characterized as hilly and poorly drained. Elevation rises significantly in the Missouri Coteau. The region has an average of 12 to 18 inches of precipitation, mostly as rainfall. Within the Missouri Coteau lies the general line (albeit variable year to year) where cool and moist conditions to the north and east change to warmer and drier conditions to the south and west. The soils of this region are sandy-loams to loamy with soil organic matter averaging between 1 to 3%. Spring wheat is the primary crop in the region for North Dakota, though consistent winter wheat production is found on smaller acreage. This region is predominantly planted into no-till or reduced tillage production of wheat, and producers maintain diverse crop rotations throughout the region.

West River/Great Plains – West of the Missouri River in both North Dakota and South Dakota, terrain becomes more arid and rugged. Hilly topography within the region makes way to the tallest points in North and South Dakota, White Butte and Black Elk Peak, respectively. Soils in these regions are much older than those found in eastern ND and SD, as glacial events never impacted these soils. Rainfall is much less under the rain shadow of the Rocky Mountains, ranging between 8 and 14 inches per year, with the stark possibility of significantly lower annual precipitation. Within this region, land usage shifts to more grazing and rangeland. This region also contains the badlands geographic formations of both North and South Dakota. Crop production moves more to a continuous wheat rotation under strict no-tillage production practices to

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conserves soil moisture. Spring wheat is predominant in the North Dakota West River region, although considerable interest in winter wheat is present some years. This region in South Dakota is referred to as West River or Great Plains, and extends to the western edge of the Missouri River, and meets the Drift Prairie in the southern half of the state. In South Dakota, this region is primarily and consistently winter wheat production, with spring wheat being a more minor crop. Planting for winter wheat is from September 15th to October 15th, depending on the crop rotation. Disease prevalence in the West River region shifts towards no-till and southern diseases, where tan spot, septoria leaf blotch, and wheat streak mosaic virus predominate. Leaf rust is found occasionally, and wheat stem sawfly is a greater concern here than the rest of the Northern Plains.

**Eastern Minnesota** — The largest and most geographically diverse region within the Northern Plains, this region lies east of the clay predominated soils of the Red River Valley in Minnesota, and the North Central Glaciated Plains. It contains a gradient from the western to the eastern portions of this region, as well as the north to the south, and is several eco-regions grouped into one.

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<td>Wheat Variety</td>
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| Keldin | Very high end yield potential  
Very good test weight |
| WB-Grainfield | Very high yield potential and broad adaptation  
Later maturing, holds dormancy very well  
Good for dual purpose graze and grain |
| WB4418 | Very high end yield potential  
Excellent disease package  
Very good standability |
| WB4462 | Excellent winter hardiness  
Broadly adapted variety, moves west well  
Very good disease package |
| WB4623CLP | Two-gene Clearfield® tolerance  
Very good yield potential  
Excellent stripe rust resistance |
| WB-Matlock | Elite winter hardiness  
Very good standability |

Productive agricultural soils intermix with non-producing acres of poorly drained, rocky, and wooded ground varying from broadleaf to conifer forest. Soils in this region range from nearly 100% sand in the top soil, to clay soils, and are generally described as diverse. The northern reaches of this region are a mix of the coolest temperatures and highest precipitation in the Northern Plains, which combine to make it a highly productive wheat producing region.

Due to the cooler temperatures in the northern parts of this region throughout the growing season compared to the rest of the Northern Plains, spring wheat flourishes with extensive tillers, high biomass accumulation, and high yields. Average temperatures become warmer moving south in this region, while moisture remains similar, and wheat acreage drops off significantly. Rainfall in this region is typically the highest in the Northern Plains, ranging from about 15 to 25 inches, with an average at 20 to 22 inches per year. The diseases in this region are first and foremost fusarium head blight (scab) in the north, with bacterial leaf streak, crown/foot rots, and tan spot reducing yields on a smaller scale across most of this region.

**North Central Glaciated Plains** — This region is located to the east and south of the Red River Valley in Minnesota and east of the Drift Prairie in South Dakota. It is both south and west of the broad Eastern Minnesota region. Soils are diverse throughout, but tend towards rolling to level, ranging from clay-loam to sandy-loam classification. The crop rotation in this region has moved towards a soybean and corn rotation, although spring wheat has a consistent place in the region on smaller acres than the row crops. This region plants quite early for spring wheat, as early as the first of April or even into March some years. The earlier plantings help to offset the heat that comes with the southern latitude in this region, which tends to limit yield potential. Rainfall is plentiful in the North Central Glaciated Plains, ranging from 16 to 26 inches. Diseases tend to favor the more southern wheat diseases, where yellow (stripe) rust is found most years, with fusarium head blight (scab), leaf rust, tan spot, and other more minor diseases for this region being found sporadically.

**Northern Plains General Comments** — The Northern Plains as a whole, supports a rich agricultural environment, and has historically been very important and productive for wheat. North Dakota makes up the majority of spring wheat acres, with Minnesota and South Dakota consistently producing at or just above 1 million acres of planted spring wheat. South Dakota makes up most of the Northern Plains’ consistent winter wheat production. The Northern Plains has very diverse agronomic practices for producing successful spring or winter wheat, with very different stresses impacting yield in each region.

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development & Agronomy by Monsanto. Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. WestBred and Design® and WestBred® are registered trademarks of Monsanto Technology LLC. ©2017 Monsanto Company All Rights Reserved 170911232104 103117SEK.