

Best Management Practices for Wheat

With recently higher market prices and improved management techniques, wheat has become a consistent player in many growers' crop rotation as part of a double crop system with soybeans. This crop has proved to be agronomically beneficial by providing cover in the winter months to minimize erosion, improved tilth on low organic matter soils, and a source of cash flow during the summer months prior to fall harvest of corn and soybeans. Although wheat can be particularly sensitive to environmental events, the following best management practices can be used to minimize the effects of these occurrences, to improve the yield potential of your crop, and provide higher return on investment.

Goal: Maintaining the optimum number of harvestable heads provides the potential for highest yields!

The optimum number of harvestable heads is between 60 -70 heads per square foot. This goal can be easily achieved by establishing an adequate stand and promoting the growth of tillers. Each tiller has the potential to grow a harvestable head.

Stand Establishment

1. **Variety Selection:** Carefully select varieties which fit your management style. Each variety has its' own growth characteristics and defensive package against common diseases. Are you looking for quick growing wheat that harvests early with less residue to easily establish a soybean stand or are you interested in promoting more stem growth which leads to higher straw yields? Feel free to contact your local Beck's representative for more specific information on the varieties which we have available to our customers.
2. **Planting Depth:** Plant wheat seeds at a depth of 1 -1.5 inches deep. This keeps good seed to soil contact for improved emergence while minimizing heaving during the winter months.
3. **Seeding Rates:** 1.5 million seeds per acre (around 35 seeds/ft²) is a good target rate for seeding using conventional tillage practices and wheat varieties that promote good tillering. Pushing seeding rates from 1.8 to 2 million seeds per acre tends to show more benefit with varieties that tiller less and rely on the main and secondary stems produce heads. For no-till practices increase seeding rates by 10%. For broadcast seeding increase rates by 30%. Over seeding can lead to late season lodging. Planter calibration and changing seed rates with changes in seed size is critical to obtaining accurate seeding rates. The following chart shows the yield potential for a range of final stands.

Table 3-4. Wheat yield potential based on plants per square foot.

% Stand	Plants/sq ft^a	% Yield potential^b
100	30-35	100
80	24-28	100
60	18-21	90-95
50	15-18	75-80
40	12-14	60-70
20	6-7	40-50

Bitzer, M., J. Herbek, and D. Van Sanford. UK-125.

4. **Planting Date:** There are pro's and con's to planting early versus later. In the past the Hessian Free-Fly Date has been used as the standard on which growers have based their decision on when to plant. Due to wet conditions that have hurt wheat stands in recent years and the need to optimize the use of their labor and machinery efficiently, growers continue to push planting dates earlier. The following is a list of pro's and con's to consider when making the decision to begin planting.

<u>Timing</u>	<u>Pro's</u>	<u>Con's</u>
Early Planting	Improved stand establishment	Increased aphid pressure and chance for Barley Yellow Dwarf infestation
	Improved fall growth and less winter loss	Increased chance of damage from late spring freeze
Later Planting	Less potential for fall insect infestations	Wet fall weather could decrease final stands thus limiting potential number of heads
	Minimizes excessive fall growth, leading to less chance for spring freeze damage	Less fall growth could lead to increased winter loss and heaving
	Fall herbicide application may be avoided	

Past Beck's Southern Practical Farm Research showed a 7 bushel/acre yield advantage planting the third week of October versus the first week of October. This yield difference is primarily due to warm weather late into the fall and early winter over the past two years along with higher incidences of Barley Yellow Dwarf and spring freeze damage in the earlier planting date. More recent Southern PFR data shows that this yield difference can be minimized with the use of seed applied insecticides for fall aphid infestation and improved nitrogen management practices for earlier planting dates. Results from plantings that took place during the second week of October were varied due to heavy rainfall events that took place in falls of 2006 and 2007 which limited stands and thus then number of harvestable heads.

Insect Control

1. Aphids: Aphid infestations, primarily fall infestations, can lead to yield loss from the Barley Yellow Dwarf virus. Aphid pressure is especially high in early planted wheat. Begin scouting for aphids around field margins, especially near sod or next to fields where wheat was grown the previous fall. Aphids are usually found in areas of dense plant growth; near the ground where end rows overlap with other rows. The following chart can be used to determine if aphid populations have reached economic thresholds.

# of Aphids per foot of row required for insecticide treatment	
30 after emergence	3
30 to 60 days after emergence	6
More than 60 days after emergence	10

Johnson, D. and L. Townsend. UK Entfact 121.

- Aphids can be kept below economic threshold levels in the fall with the use of FaStart[®] (Beck's applied insecticide) or by spraying a pyrethroid insecticide such as Mustang Max[®] or Warrior[®]. Beck's Southern Practical Farm Research data shows an average 11.5 bushel/acre advantage using FaStart[®] as a stand alone fall insecticide treatment over the past two years. A 4.5 bushel/acre advantage was noted using only a spring application of a pyrethroid insecticide.
2. True Armyworms: These pests can usually be found in larvae form from late April through mid-May in wheat fields. Armyworms chew on the foliage of the wheat plant. Excessive damage to the flag leaf and head clipping can cause severe yield loss. If 4 or more armyworms can be found in 1 square foot a pyrethroid insecticide application should be used.

Nitrogen Management

Along with stand establishment, nitrogen management is one of the most important factors in achieving high yielding wheat. The timing of nitrogen applications can be a great tool in obtaining high tiller counts which leads to optimum harvestable heads. Use liquid nitrogen streamers or an air-flow boom truck to ensure consistent distribution of nitrogen fertilizer. If a spinner truck is used, double spread to distribute fertilizer more evenly.

1. Fall Application: Wheat typically uses somewhere between 20 – 40 lbs of nitrogen in the fall for stand establishment. 300lbs of 9-23-30 provides 27 units of nitrogen. This is usually adequate if there is any carry-over nitrogen from the previous crop. Although fall applications are primarily for seedling establishment, early planting dates utilize fall nitrogen in early tiller development prior to winter dormancy.
2. Spring Application: Wheat requires approximately 1.2lbs of spring nitrogen per potential bushel of yield. Nitrogen timing is the key to obtaining optimum head counts without increasing the potential for spring freeze damage or lodging. If tiller counts at the Feekes 3 stage (early tiller formation, typically early February) are low, a split application approach can be used to promote tillering with an early application at Feekes 3 and the balance being applied at Feekes 5 (stem

elongation, typically mid-March). If tiller counts are adequate at Feekes 3, delay nitrogen application to Feekes 5. Early planting utilizes more of the fall applied nitrogen for tiller development, thus making a single application at Feekes 5 a better choice in years with warm fall and winter temperatures that promote rapid growth. Use the following chart to aid in your nitrogen management decisions.

# of Tillers	Nitrogen to add	
	Feekes 3	Feekes 5
0 < 2	40 – 50 lbs (50 - 60 lbs no-till)	40 – 50 lbs (50 - 60 lbs no-till)
3 < 4	30 – 40 lbs (40 - 50 lbs no-till)	50 – 60 lbs (60 - 70 lbs no-till)
5 or more	None	80 – 90 lbs (110 - 120 lbs no-till)

A one shot nitrogen application of urea or 28% UAN solution at the Feekes 3 stage is not recommended for several reasons. Depending on late winter and spring weather, nitrogen loss can be very high. Warm weather can encourage early nitrogen uptake which leads to excessive growth and an increased chance of spring freeze damage. Early nitrogen uptake also promotes early infestations of diseases such as powdery mildew. Early, one shot application of urea or 28% UAN solution at Feekes 3 can also lead to increased nitrogen losses through volatilization. Polymer Coated Ureas have proven to be a useful tool in minimizing nitrogen loss in wheat if an early, one shot application is desired. PCU's applied after late-February may not have enough time to release their nitrogen prior to rapid uptake at the Feekes 5 growth stage.

Disease Management

1. **Barley Yellow Dwarf Virus:** The Barley Yellow Dwarf Virus is vectored into the wheat plant by aphids. The disease can be found in stunted, yellow plants with purpling at the tips and along the margins of the upper most leaves of the plant. There are no curative measures that can be used to reduce the virus once it has entered the plant. However, infections can be minimized by controlling aphid populations, especially in the fall. Barley Yellow Dwarf is usually more severe in early planted wheat where aphid populations were high. It can be vectored into the plant in the spring, but recent years have shown damage to be more severe with fall infestations.
2. **Foliar Diseases:** Diseases such as *Septoria*, Powdery Mildew, and leaf rusts are commonly found in wheat fields across Beck's marketing area. *Septoria* and Powdery Mildew are most commonly found during periods of cool to moderate temperatures with high moisture while leaf rust are more common during moderate to warm temperatures and high moisture. Damage from these diseases can be minimized with the use of foliar fungicides such as Headline[®] and Quilt[®]. Scout for these diseases during flag leaf elongation and early heading. Fungicide applications made after during or after flag leaf elongation are most beneficial. Beck's Southern Practical Farm Research showed that fungicides have provided a 5 bushel/acre advantage over untreated entries under moderate disease pressure in springs of 2005 and

2006, but no profitable returns were achieved under heavy *Septoria* pressure in 2008.

3. Head/Kernel Diseases: Head diseases can severely limit both yields and quality. Head Scab most commonly occurs when cool temperatures and moisture are present during flowering. There is no known control for head scab, but some varieties have shown improved tolerance over others. Proline[®] is a foliar fungicide that commonly added to strobilin fungicides for suppression of head scab, but it will not control the disease. Note that applications of strobilin fungicides during flowering can lead to increased toxin levels in heads that are infected with Head Scab. Glume Botch is another head disease which occurs during periods of warm temperatures and moist conditions. Yield loss from Glume Blotch can be minimized with the use of foliar fungicides. Both of these diseases result in small, shriveled grains which lower test weight.

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