

Late-Season Wheat Irrigation for the Texas South Plains

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Wheat is at a wide range of development across the South Plains (23 April 2007). Most wheat south of Lubbock has headed in the past two weeks, and early heading is in progress to the north. There is also a lot of acreage that is still in early to mid boot due to late planting. What irrigation guidelines might we use on the irrigated wheat crop?

Due the ample rain and snow over the winter unirrigated wheat looks pretty good although due to the heavy vegetative growth and higher evaporative demand, this wheat may dry out quickly without further rain. If wheat can be irrigated how much should growers consider? Of course, if we knew it was going to be hot and dry with no rainfall, then only larger amounts of water would see the crop through to a decent harvest, but that wouldn't necessarily make any money.

Wheat and Water Evapotranspiration: The Texas High Plains Evapotranspiration Network, <http://txhighplainset.tamu.edu/statemap.jsp>, provides climatic and water use information for several crops including wheat. Click on a town on this website to access a nearby weather station's menu for daily climate and soil temperature data and especially the 'Daily Fax,' which provides a summary of predicted evaporative moisture demand for wheat and other crops. Recent data suggest, that most wheat fields in the Texas High Plains have water use of 0.25" or more per day.

Here are some grower guidelines for decisions on further irrigation:

1) How much nitrogen did you put down? (Aside: even if wheat is pre-boot, it's essentially too late for N, as the latest time for N we would recommend would be not after than when the first node is visible; fields with minimal N application could receive small amounts of N through boot, but it won't affect seed number). As a general rule of thumb, for wheat going to grain, Extension suggests 1.2 to 1.5 lbs. N/A (use the lower amount if the soil wasn't tested). So if 60 lbs. of N was applied, it should have the N fertility to go in the 50 bu./A range. If a farmer did not apply N (unless he has good residual soil fertility), then irrigating a lot would not make sense because the yield potential might not be there.

2) What does it cost you to pump 1" of irrigation water per acre? Many producers aren't sure... The rule of thumb for wheat is about 3-4 bu./A for each inch water though individual applications, especially boot stage, can give better response. I generally use 3.5 bu./A/inch for calculations (it might be higher as you move north into the Panhandle). Timing, however, can greatly influence the response to irrigation. Travis Miller, former statewide small grains specialist, has seen timely irrigation at boot stage result in yield increases up to 10 bu/A.

3.5 bu/A X \$4.70/bu = \$16.45 (23 April 2007). Irrigation costs per acre inch are highly variable based on fuel and pumping efficiency (have those pumps tested!), about \$8-12 per acre-inch.

Hopefully a grower will know this accurately for his pumps, fuel, and pricing structure.

3) What is my current yield potential? This is harder to estimate until you see how big the head will be after flowering. You may consult guidelines in "Estimating Wheat Yield Potential," available through local Extension offices or read/download at <http://lubbock.tamu.edu/othercrops/pdf/wheat/estwheatyield.pdf>

Bottom line--What to advise? Wheat has looked good but much of our crop is drying fast due to daily water use that exceeds 0.25" per day in late April. Make sure the flag leaf is healthy, as it provides up to 75% of the leaf area that provides photosynthate contributing to yield potential. This is according to "Growth Stages of Wheat: Identification and Understanding Improve Crop Management," available at <http://lubbock.tamu.edu/othercrops/pdf/wheat/wheatgrowthstages.pdf>

For modest irrigation of wheat in late-season I suggest that growers consider the following:

Wheat still in the pre-boot to late-boot stage:

1A) Water in two applications ~1.5" (*see note at bottom) in mid- to late-boot stage. {The end of boot stage is when heads just start to emerge.} This is an optimum time to irrigate wheat where yield response is expected to be higher. You are just in front of flowering, and good moisture prior to flowering (wheat is mostly self-pollinated, thus by the time you see the anthers, it has actually already fertilized) will increase yield potential in the number of seeds per spikelet. Actual pollination should occur about 5-7 days after heading, and visual bloom (extruded anthers) should occur in a couple more days. Most tillers should bloom shortly after the main head even though they developed later.

1B) Irrigate again another ~1.5" about 14 days later in split applications (unless you receive a good rain). This will provide moisture to carry into grain fill and should enhance seed size, the final component of grain yield.

These are timely but limited irrigations where we believe crop response would be higher.

Wheat that is already headed:

2A) What stage is the crop in terms of heading? Pre-bloom or post-bloom? If the crop is past flowering then the window for beneficial additional watering is not that long as grain fill can occur as quickly as 30 days in a high stress environment. Benefit from irrigation is questionable when kernels are past watery ripe, especially if there is still some decent soil moisture. When kernels are milky ripe, then chances that economic yield responses may be achieved due to irrigation are greatly reduced (even if soil is about dried out). Once kernels are mealy ripe then the crop is starting to dry down, and irrigation would have little effect.

2B) Get your best estimate of the wheat yield potential (see resource above). If the yield potential is less than 25 bu./A at current wheat prices then I might suggest you consider not irrigating. The potential return may be minimal especially at current irrigation prices.

2C) If you decide that the crop has decent yield potential--a) pre-bloom heading, irrigate immediately with ~1.5"/A, then evaluate again whether one additional irrigation might be applied in another 10-14 days up to the watery ripe kernel stage; b) post-bloom, but prior to or at

watery ripe kernels, consider ~1.5" A irrigation. Yield response afterwards is not assured.

What if the crop is already drying down and showing moisture stress? This is a harder call. The water it would take to pull the crop back may not be justified if the crop is already stressed, especially for limited yield potential. You could irrigate ~1.5" but the crop will likely dry again in another 10 days. If growers have an otherwise good looking crop that is suffering moisture stress only, they might have a better indication of the yield potential of the field. If it appears to be low, then irrigation is less justified; otherwise refer to the suggestions in either 1A-1B or 2A-2C above.

Summary–Limited but timely irrigation: The discussion here targets limited but timely irrigation provided crop potential still exists. Although I noted above 3.5 bu/A for 1" of water in the calculation, I think that much of the wheat crop could surpass the response 3.5 bu/A in this timely but limited irrigation scenario.

*The use of ~1.5" of irrigation as a target in the above examples is arbitrary, but I believe it is a realistic goal that could be achieved by many growers in a two-irrigation scenario.