

## **Late-Season Texas Wheat: Irrigation Timing & Termination**

Calvin Trostle, Ph.D., Professor & Extension Agronomist, TAMU Dept. of Soil & Crop Sciences,  
Lubbock, (806) 746-6101, [ctrostle@ag.tamu.edu](mailto:ctrostle@ag.tamu.edu)  
May 3, 2023

At any given time from early spring to early summer in Texas wheat is at a wide range of growth stages across Texas. Final irrigation decisions for winter wheat range from March to May from the Lower Rio Grande Valley to the High Plains.

**Wheat and Water Evapotranspiration:** Research data suggests that most wheat fields in Texas have water use of 0.25" or more per day in later growth stages and when temperature and wind conditions are favorable.

Here are some grower guidelines for decisions on late-season irrigation:

1) How much nitrogen did you put down? Even if wheat is still pre-boot, it is essentially too late for N to have any meaningful impact on wheat yield. For further information on wheat N requirements and topdressing see the 12 common questions of "Nitrogen and Texas Wheat Grain Production—Topdress Timing is Critical" at

<https://lubbock.tamu.edu/files/2023/02/TopDress-N-Tips-for-Wheat-2023-Trostle-Mowrer-Final.pdf>

Typically, the latest time for N we would recommend is no later than when the first node is visible. Fields with deficient N application could receive small amounts of N to boot, but this N will have little effect on seed number. As a rule of thumb, for wheat going to grain, Extension suggests 1.2 to 1.5 lbs. N/A (the former if the grower doesn't soil test). So, if a grower put down 50 lbs. of N, along with some likely available soil N, the crop should have the N fertility yield in the 50-60 bu./A range. If a farmer did not put down 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 though individual applications, especially boot stage, can give a greater response. I generally use 3.5 bu/A/inch for calculations (it might be slightly higher in the Texas Panhandle). Timing, however, can greatly influence the response to irrigation. Dr. Travis Miller, former statewide small grains specialist, has seen timely irrigation at boot stage result in yield increases up to 10 bu/A.

Using the KCBOT hard red winter wheat July futures of \$7.85/bu (May 2023) ,3.5 bu/A X \$7.85/bu = \$27.48. Irrigation costs per acre inch are highly variable based on fuel and pumping efficiency (have those pumps tested!), about \$5 to \$10 per acre-inch. Hopefully a grower will know this accurately for his or her 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 <https://varietytesting.tamu.edu/wp-content/uploads/sites/17/legacy-files/wheat/docs/mime-6.pdf>

**Bottom line--What to advise?** Wheat that looks good, often despite drought conditions in much of Texas, will dry fast due to daily water use that exceeds 0.25" per day. 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 <https://varietytesting.tamu.edu/wp-content/uploads/sites/17/legacy-files/wheat/docs/mime-5.pdf>

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

Wheat in the mid to late boot stage:

1A) Water a total of 2" (\*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. Wheat is mostly self-pollinated, thus by the time you see the male anthers poking out of the head, it has already fertilized. This irrigation will increase yield potential in the number of seeds per spikelet. {The maximum number of seeds you can have per spikelet and the maximum number of spikelets per head was determined back near jointing at growing point differentiation.} 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) Water again another total 2" in the range of 14 days later during early grain fill after you started irrigating above (unless you receive a good rain). This will provide moisture to complete grain fill and should enhance seed size, the final component of grain yield.

These are timely but modest irrigations where we believe crop response would be higher. For early to late-boot stage, 4 to 6" of additional irrigation is a reasonable expectation. Rain may help you save some irrigation expense.

Wheat that is already headed:

2A) What stage of heading is the crop? Pre-bloom or post-bloom? If wheat or other small grain is past flowering the window for beneficial added irrigation is shortened. Grain fill can occur as quickly as 30 days from flowering in a warm or high stress environment. Benefit from additional irrigation is questionable when kernels are entering milk stage, especially if there is still good soil moisture. Once kernels complete the milk stage chances for economic yield response due to irrigation are reduced (even if soil is drying out). Once kernels are mealy ripe (what I call the 'gel' stage, you can still squeeze material out of the seed prior to soft dough) then approaching soft dough then the crop is starting to dry down, and irrigation will likely have little benefit.

2B) Get your best estimate of the wheat yield potential (see resource above). If the yield potential is less than 25 bu./A at modest wheat prices I suggest you may consider not irrigating. The potential return may be minimal pending current irrigation prices. And the irrigation you have available, especially if you are operating under annual pumping limits, is more valuable on a subsequent summer crop like corn, cotton, peanuts, or alfalfa.

Modest irrigation of headed wheat, depending on soil moisture, is likely in the 2 to 4" range if irrigation is available.

**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.

For irrigation termination:

- Milk stage and adequate soil moisture—further irrigation has limited potential benefit.
- Milk stage and poor soil moisture—continue with limited irrigation.
- Soft dough stage, regardless of soil moisture status—further irrigation has minimal potential benefit. The economic return for added irrigation is minimal and the water can be saved for the next crop.

\*The use of ~2" of irrigation as a target in the above examples is arbitrary, but I believe a realistic goal that could be achieved by many growers.