Know Your Wheat Growth Stage to Predict Cold Injury

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With the cold temperatures predicted this evening there are some questions regarding the potential impact on this year's wheat crop. Based on the predicted temperatures that I have seen reported across the state widespread crop injury is unlikely, however frosty wheat tomorrow morning may garner a few questions. Below I have attached a link to a publication entitled Spring Freeze Injury to Kansas Wheat. I have removed a table from that publication to stress the importance of growth stage on damage.

Publication link: http://wheat.colostate.edu/freeze.pdf

Depending upon where you are in the state of WI your wheat crop is anywhere from Feekes 6 (1st detectable node; Image 1) to Feekes 9 (Flag leaf ligule and collar visible; Image 2). If your wheat is at Feekes 6 the crop can withstand temperatures down to ~24 °F (please see Figure 1 below). If the flag leaf is completely emerged than the temperature that injury occurs is ~28°F. Cold injury during these growth stages can cause moderate to severe yield loss.

Figure 1. Wheat Resistance to Freeze Injury (From: Spring Freeze Injury to Kansas Wheat)

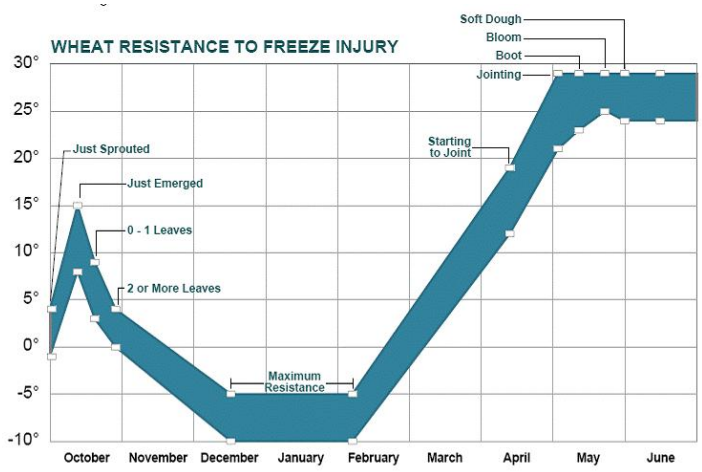

Figure 1. Temperatures that cause freeze injury to winter wheat at different growth stages. Winter wheat rapidly loses hardiness during spring growth and is easily injured by late freezes (graph adapted from A.W. Pauli).

Table 1. Temperatures that cause freeze injury to wheat at spring growth stages and symptoms and yield effect of spring freeze injury.

Growth stage	Approximate injurious temperature (two hours)	Primary symptoms	Yield effect
Tillering	12 F (-11 C)	Leaf chlorosis; burning of leaf tips; silage odor; blue cast to fields	Slight to moderate
Jointing	24 F (-4 C)	Death of growing point; leaf yellowing or burning; lesions, splitting, or bending of lower stem; odor	Moderate to severe
Boot	28 F (-2 C)	Floret sterility; spike trapped in boot; damage to lower stem; leaf discoloration; odor	Moderate to severe
Heading	30 F (-1 C)	Floret sterility; white awns or white spikes; damage to lower stem; leaf discoloration	Severe
Flowering	30 F (-1 C)	Floret sterility; white awns or white spikes; damage to lower stem; leaf discoloration	Severe
Milk	28 F (-2 C)	White awns or white spikes; damage to lower stems; leaf discoloration; shrunken, roughened, or discolored kernels	Moderate to severe
Dough	28 F (-2 C)	Shriveled, discolored kernels; poor germination	Slight to moderate

Image 1: Feekes 6: 1st detectable node.

Image 2: Feekes 9: Flag leaf ligule and collar visible.