

Know Your Wheat Growth Stage to Predict Wheat Freeze Injury

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With the cold temperatures predicted over the next few evenings there is significant concern over this year's wheat crop. 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 Indiana your wheat is anywhere from tillering stage to starting to joint (pre-joint) to jointing. If your wheat is in the tillering stage (the wheat is still relatively short and has prostrate growth) that crop can withstand temperatures down to ~12 °F (please see table 2 below). If the wheat is standing upright (pseudostem erection) and just prior to joint (no detectable node) than the temperature that injury occurs is ~20°F. If you are able to detect a node than the temperature where injury occurs is 24°F. Cold injury at jointing can cause moderate to significant yield.

The true extent of injury will not be fully evident until temperature warm up and growth resumes. If you have any further questions please email me at conleysp@purdue.edu

Figure 1. Wheat Resistance to Freeze Injury (From [Spring Freeze Injury to Kansas Wheat](#))

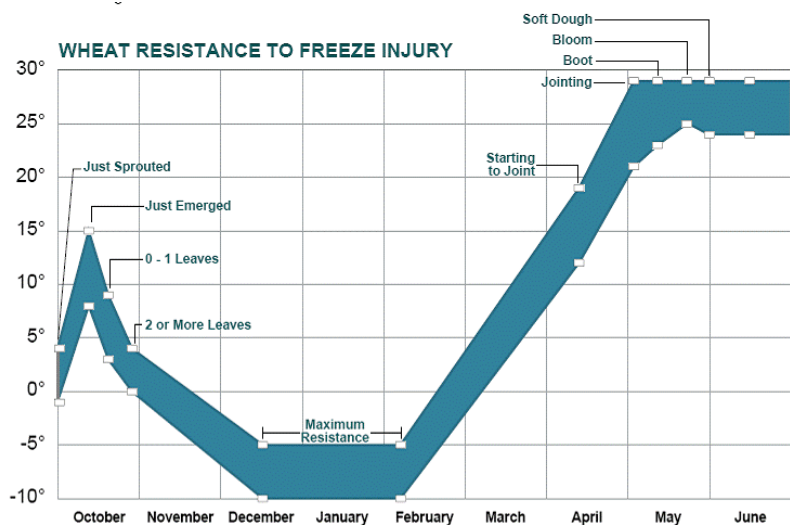


Figure 1. Temperatures that cause freeze injury to winter wheat at different growth stages. Winter wheat rapidly loses hardiness during spring growth and is easily injured by late freezes (graph adapted from A. W. Pauli).

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