



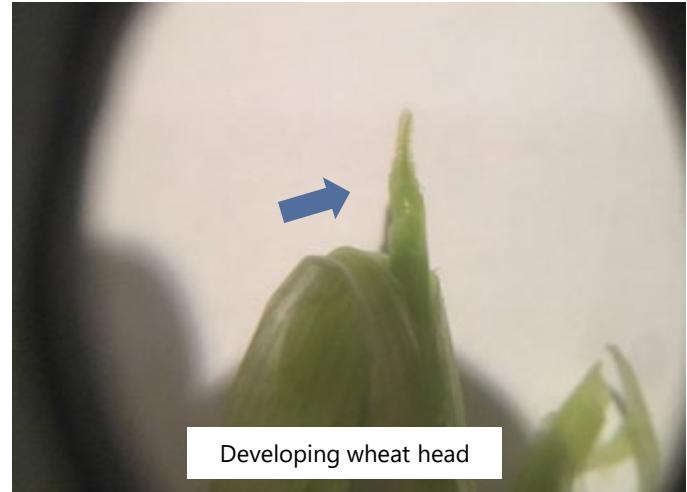
## Assessing Freeze Damage in Wheat

There are three major factors that have the greatest impact on potential freeze damage to a growing wheat crop.

1. **Growth stage** when the freeze occurs. (Susceptibility increases greatly when head and growing point move above soil surface.)
2. **Actual temperature** of susceptible plant parts. (Temperatures will vary within the field and within the crop canopy.)
3. **Duration** of freezing temperatures



- It will take 3-7 days after the weather event for any definitive signs to show up in the plant.
- Each individual wheat plant will have tillers in various stages of development, with the largest tillers being the most advanced. If one or two of the largest tillers are damaged, the smaller tillers can still produce a head with some compensation in size.



- Evaluate the largest tillers by slicing the stem and finding the developing growing point. If the tiller is jointed, the head can be found just above it. In tillers that have not yet fully jointed, the growing point may still be above the soil surface.
- Evaluate for discoloration, developing heads that are not firm or "crisp," slimy tissue inside the stem, or a rotting odor.
- Try to calculate a projected head count per square foot to use as a guide in decision making.
  - At least 50 viable wheat heads per square foot are desired in freeze damaged wheat.

**Table 1.** Temperatures that cause injury to wheat at spring growth stages and symptoms and yield effect of spring freeze injury (Klein, 2006).

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

Klein, R.N. 2006. Freeze injury to Nebraska wheat. Univ. of Nebraska Extension. EC132 <http://extensionpublications.unl.edu/assets/pdf/ec132.pdf>

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