



Germination occurs as seed absorbs water and activates to grow the new plant. Germination happens below the soil.

Photo Courtesy of Brandon Gerrish, Texas A&M AgriLife.

Germination - Coleoptile



The coleoptile protects the emerging shoot as it comes through the soil.

Photo Courtesy of Brandon Gerrish, Texas A&M AgriLife.



The wheat plant emerges from the soil
roughly 7 to 10 days after planting.

(Photo Courtesy of Kristie Keys, Texas A&M AgriLife.)



Additional stems known as tillers grow from the main stem of the wheat plant. Tillers help the crop survive winter dormancy and increase yield potential.



The wheat plant goes dormant as temperatures drop around 32°F. Growth stops above ground, but roots continue to develop. On average, winter wheat needs 3-6 weeks of temperatures between 32-45 °F to properly vernalize.



Active growth resumes as temperatures rise. Tillering begins again, the stem elongates and leaves expand. This stage is sometimes called Spring “Green Up.”



The wheat head fully emerges and the kernels begin to fill and harden.



The kernels harden and then dry out.

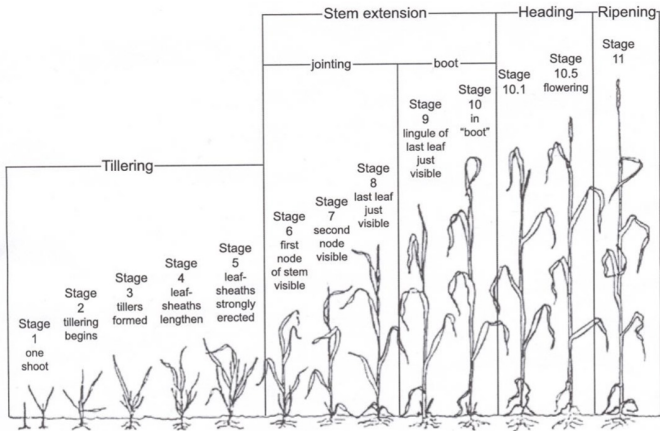


Photo Courtesy of Texas A&M AgriLife.

The Feekes scale has 11 stages to describe the plant's development from emergence to maturity.

Farmers and scientists use the Feekes scale to understand crop development and know when to apply inputs to maximize yield.

Tillering - Stage 1



The wheat plant emerges from the soil.

Photo Courtesy of Brandon Gerrish, Texas A&M AgriLife.



Tillers begin to grow from the main stem.

Photo Courtesy of Brandon Gerrish, Texas A&M AgriLife.



Tillers are fully formed and may twist spirally.

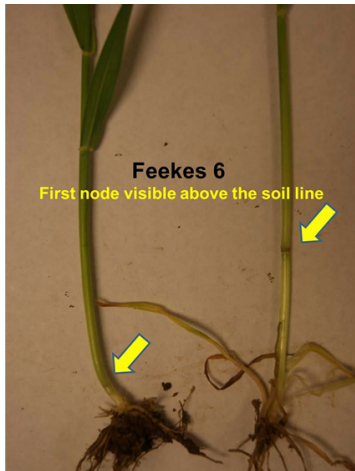
Tillering - Stages 4 & 5



Stage 4 - The secondary root system forms while leaves grow larger.

Stage 5 - The plant begins to stand up straighter and heads begin to develop.

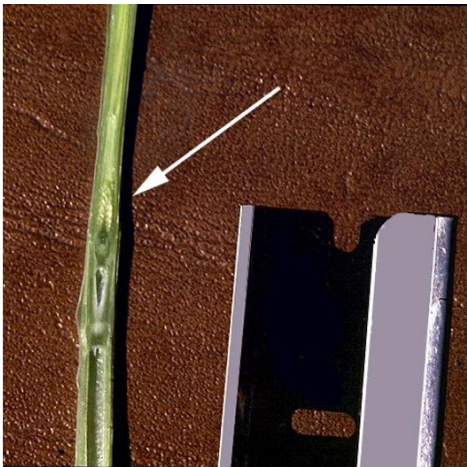
Stem Extension (Jointing) - Stage 6



A bump or joint in the stem, known as the node, can be seen above the soil. At this point, no more tillers will grow.

Photo Courtesy of Paul Pierce, The Ohio State University.

Stem Extension (Jointing) - Stage 7



The next node is visible higher up on the stem.

Photo Courtesy of Calvin Trostle, Texas A&M AgriLife.

Stem Extension (Jointing) - Stage 8



The last leaf, known as the flag leaf, unfolds.
The flag leaf is typically larger than other leaves and grows near the top of the plant.

Photo Courtesy of Jourdan Bell, Texas A&M AgriLife.

Stem Extension (Boot) - Stages 9 & 10



Stage 9 - The flag leaf fully unfolds.

Stage 10 - The head swells inside the flag leaf sheath, also known as the “boot.”

Photo Courtesy of Jourdan Bell, Texas A&M AgriLife.

Heading - Stage 10.5



The head fully emerges.



If pressed, the kernels feel soft like dough.



The kernels are dry and the plant turns golden brown.