**Triticum aestivum, wheat**

### Taxonomy


### Brief facts

- Wheat is a cereal grass that is cultivated worldwide and is one of the most important food grain along with maize and rice.

- In comparison with other domesticated cereal species wheat genetics is quite complicated because some wheat species occur as stable polyploids (having more than two sets of diploid chromosomes), which makes genome mapping and QTL (quantitative trait loci) tracking quite difficult. Each wheat genome is an order of magnitude larger than the genomes of other model plants such as *Arabidopsis thaliana* and rice. Indirect evidence suggests that in the wheat genomes there may be gene-rich islands (gene insulae) separated by gene-poor or gene-empty regions.

- *T. aestivum* (bread wheat) is a hexaploid species that is most widely cultivated. It is very good model to study polyploidy, a driving force for plant genome evolution.
Vegetative stages of *Poaceae* (grass family)

- **Germination**
  - radicle
  - seminal root
  - coleoptile

- **Seedling**
  - first leaf
  - adventitious root
  - second leaf

- **Tillering**
  - first tiller
  - node
  - first leaf
  - coleoptile
  - primary seminal root
Developmental stages (life cycle)

Life Cycle Stages

The development and growth of cereal grains have been translated into several numeric scales to quantify development for scientific and management purposes. The most commonly used scales are the Feekes, Zadoks and Haun. The most widely used scale in the United States is the Feekes scale. Completion of development from germination to maturity takes 280-359 days for winter wheat and 120-145 days for spring wheat.
• Seeds **MeSH**

  - **dormant seed**
    - dry seed
  - **germination** **MeSH**
    - Zadok stages 00-09; this stage includes imbibition, emergence of radicle and emergence of coleoptile

• vegetative

  - **seedling** **MeSH**
    - Zadok stages 10-19; Feekes stage 1; first five leaves are unfolding on the main shoot
  - **tillering**
    - growth of shoots (tillers) that sprout from the base of a grass; Zadok stages 20-29; Feekes stage 2-3
  - **stem elongation**
    - also called *jointing*; most tillers have been formed by this stage, and the secondary root system is developing; winter wheats, which may have a prostrate growth habit during the development of vegetative parts, begin to grow erect; stem elongation stage continues from start of pseudo stem erection until flag leaf becomes fully visible; Zadok stages 30-39; Feekes stages 4-9
- **reproductive**
  - **booting**
    - at this stage, the head is fully developed and can be easily seen in the swollen section of the leaf sheath below the flag leaf; Zadok stages 40-49; Feekes stage 10.0-10.1
  - **heading**
    - emergence of inflorescence; Zadok stages 50-59; Feekes stages 10.2-10.5
  - **flowering**
    - also called *anthesis*; Zadok stages 60-69; Feekes stages 10.5.1-10.5.3

- **ripening**
  - Zadok stages 90-99; Feekes stages 11.1-11.3
  - **watery ripe**
    - Feekes sage 10.5.4
  - **mealy ripe**
    - Feekes stage 11.1
  - **kernel hard**
    - Feekes stage 11.3

- **ripe**
  - plant reached physiological maturity and is harvest ready; Feekes stage 11.4
Wheat inflorescence anatomy

Plant Components

- **spike**
  a type of monocot inflorescence that does not have branches and pedicels; the spikelets, are attached directly to the central axis, or rachis of the stem; examples of crops that have this type of inflorescence would be wheat, barley, ryegrass, and wheatgrass

- **rachis**
  the central axis of the inflorescence to which spikelets are attached

- **spikelet**
  the individual flowering units in the spike; grass inflorescence flower cluster; it consists of two glumes and one or more individual florets

- **glume**
  the glumes are a pair of empty scale-like bracts that are located at the base of the grass spikelet

- **flore** [MeSH]
  a small flower; there are one or more florets contained in the spikelet

- **lemma and palea**
  two bracts enclosing the floret

- **lemma**
the outer bract that usually encloses or partially encloses a flower in the spikelet of the grasses

- **awn**
  - an extension of the vein or mid-rib of the lemma

- **palea**
  - the inner and usually smaller of two scaly bracts immediately subtending the grass flower in a spikelet

- **pistil**
  - the entire female reproductive system

- **ovary**
  - reproductive structure that contains one or more ovules that upon fertilization will develop into the seed or seeds

- **style**
  - the stalk-like portion of the pistil that connects the stigma and the ovary

- **stigma**
- **lodicle**: Lodicles are two small structures located at the base of the pistil that function to open the floret during the time of pollination and fertilization.

- **stamen**: The male reproductive system.

- **anther**: The enlarged terminal portion of the stamen; the structure that contains the pollen.

- **pollen**: The organ in which the pollen adheres and germinates.

- **filament**: The stalk-like portion of the stamen, which bears the anther at its tip.

- **rachilla**: An axis of a spikelet that bears the florets.
References

Websites

- Wheat: the big picture
- Growth and Development Guide for Spring Wheat