



Vegetative


Reproductive




Stage 0
Emergence: The plant breaks through the soil surface; early growth usually is slow. The time between planting and emergence depends on soil temperature, residue cover and distribution, soil moisture, planting depth, and seed vigor. Adjust planting time so emergence occurs in favorable conditions.




Stage 1
Three-leaf stage: Three leaves are fully expanded with a visible collar (leaf tissue at the junction of the leaf blade and sheath). The growing point is under the soil surface. This stage occurs 10 to 20 days after emergence, depending on soil temperature and moisture.




Stage 2
Five-leaf stage: Five leaves are fully expanded with a visible collar. The growing point is below the soil surface. The plant begins a rapid growth and nutrient accumulation phase. The root system is expanding rapidly. Minimize weed competition from planting through this growth stage. This stage occurs 20 to 25 days after emergence.




Stage 3
Growing point differentiation: Potential leaf number is defined 30 to 40 days after emergence. Maximum plant growth and nutrient uptake rates are achieved. The growing point is above the surface and changes from producing leaves to forming heads.




Stage 4
Flag leaf visible: Rapid stem elongation and increases in leaf area occur at this stage. The final leaf, the "flag leaf," is visible in the whorl. Potassium uptake is >40%, nitrogen >30%, phosphorus >20%, and total growth is about 20% complete relative to final nutrient content.




Stage 5
Boot stage: Maximum leaf area has been achieved. Maximum potential head size and seed number has been set. The upper stalk, known as the "peduncle," begins to elongate. Final size of the peduncle varies with the genotype. This stage occurs 50 to 60 days after emergence.




Stage 6
Half-bloom: Full exertion of the head occurs at this stage and 50% of the plants in the field are in some stage of bloom. For an individual plant, this stage is when the flowering reaches 50% of the head. Total growth is 50% complete. Compared to final nutrient content, nutrient accumulation is 60% for phosphorus, 70% for nitrogen, and >80% for potassium.



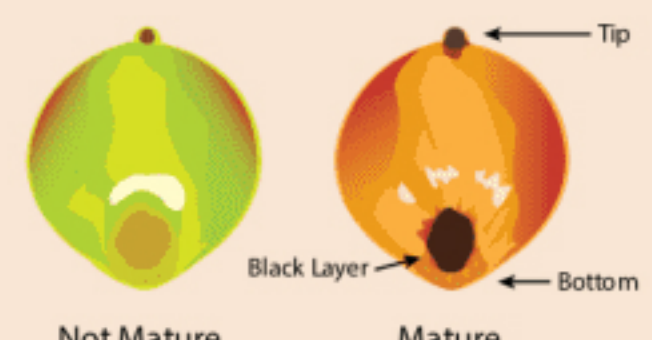
Stage 7
Soft-dough: Grain formation begins immediately after flowering and the grain fills rapidly (50% of dry weight). The stem loses weight due to a remobilization process (from stem to grain). Grains are the main priority for the plant; thus, without a good balance between leaves (source) and grain (sink), the duration of grain filling can be shortened. A severe stress at this growth stage can produce lighter and chaffy grains.



Stage 8
Hard-dough: Grain reaches 75% of its final dry weight and nutrient uptake is almost complete. Lower leaves lose functionality due to remobilization of nutrients to grains or senescence. A severe stress at this growth stage can still reduce grain weight, but not at the extent possible in the soft-dough stage.

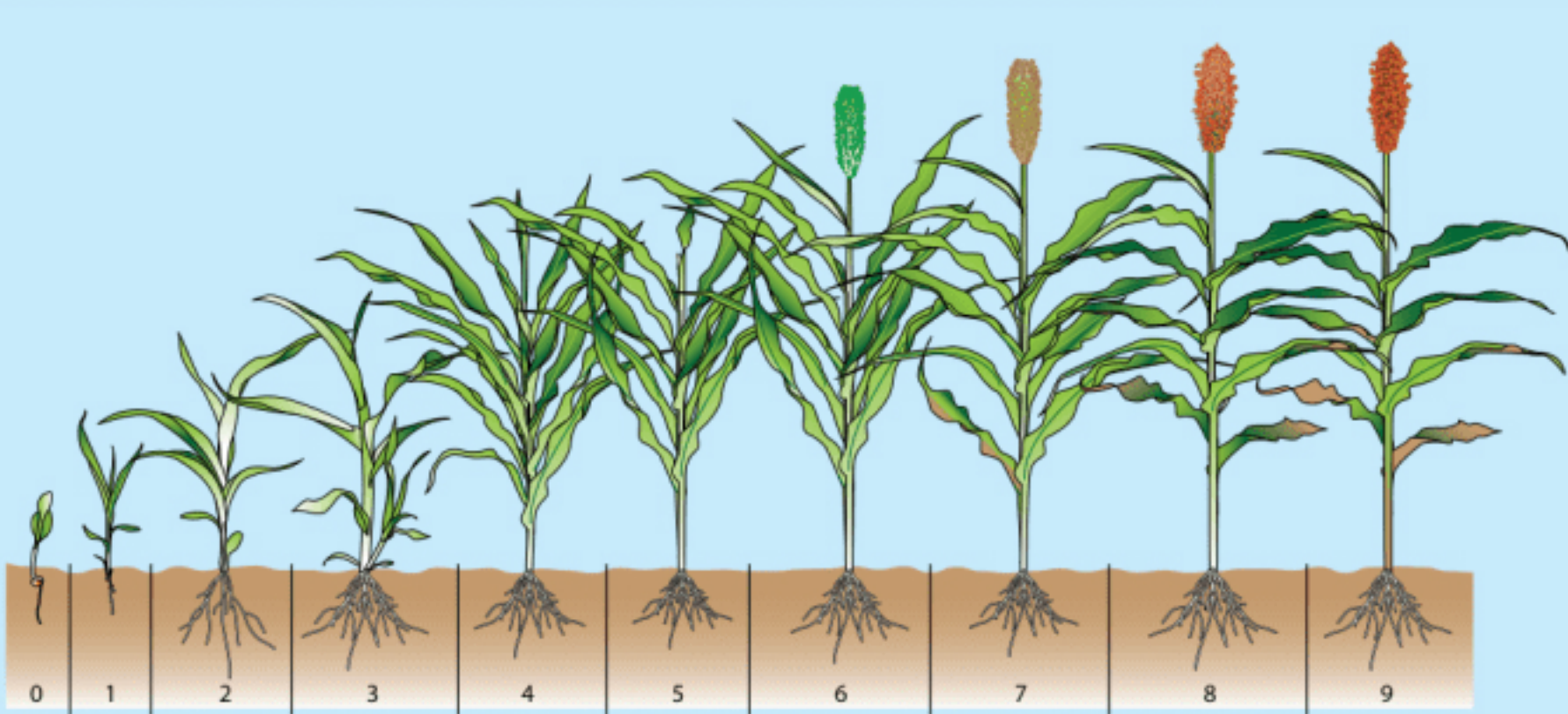


Stage 9
Physiological maturity: Grain achieves its maximum dry weight. Mature grain is identified by looking for the dark spot, the black layer, on the bottom of the kernel. Grain moisture ranges from 25 to 35%. The time to harvest depends on the environmental conditions. Artificial drying can be promoted by the use of desiccants without affecting yield when applied after maturity.



Not Mature Mature

Sorghum Growth Stages and Identifying Characteristics	
Growth stage	Identifying characteristic
0	Emergence. Coleoptile visible at soil surface.
1	Three-leaf stage. Collar of third leaf visible.
2	Five-leaf stage. Collar of fifth leaf visible.
3	Growing point differentiation. About eight-leaf stage with a visible collar.
4	Flag leaf visible. Final leaf visible in whorl.
5	Boot stage. Head extended into flag leaf sheath.
6	Half-bloom. Half of the plants at some stage of bloom.
7	Soft-dough. Grains are soft with little or no liquid present when squeezed.
8	Hard-dough. Grains are hard when squeezed.
9	Physiological maturity. Black layer on the bottom of kernel.



Sorghum Development Stages



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Crop Production Team
KSUCROPS
KSU, ARS, and University of Nebraska



**KANSAS
GRAIN
SORGHUM**
Growers Working Together

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