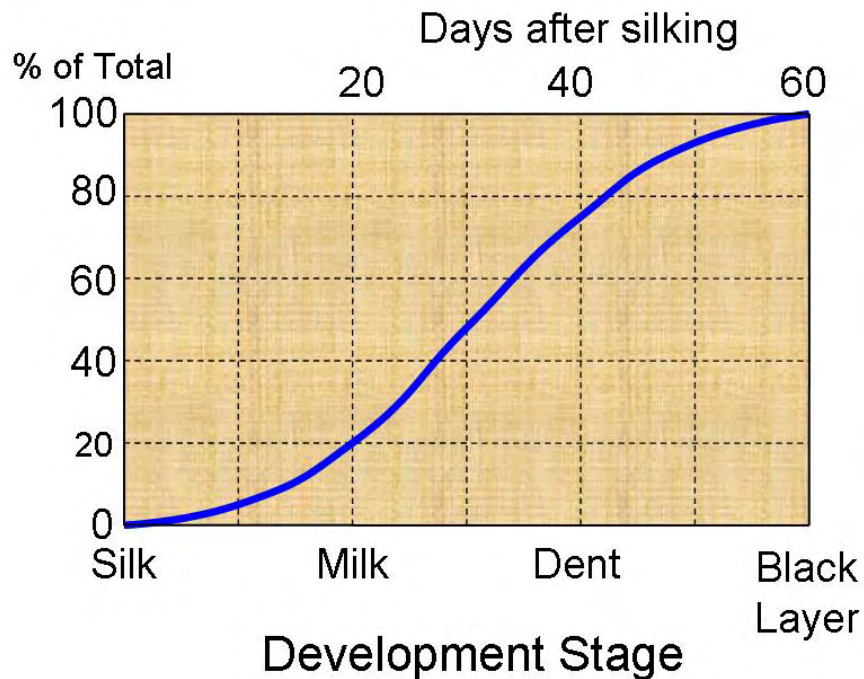


MSU Grain Crops Update
June 27, 2007
Dr. Erick Larson

Corn Irrigation Termination – A common irrigation error is terminating irrigation before corn physiological maturity (black layer) occurs. Most Mississippi-grown corn will not likely reach physiological maturity until mid-July or later, depending upon the latitude and planting date. Premature irrigation termination will accelerate maturity, prohibiting kernels from reaching their full potential size and weight. Although kernels appear somewhat mature and corn water use begins declining at the dent stage, this is far too early to terminate irrigation. Potential kernel weight is only about 75% complete at the dent stage (Figure 1). Thus, termination of irrigation at the dent stage can reduce grain yields as much as 15-20% when hot, dry conditions persist. Early irrigation termination will also likely reduce stalk strength and promote lodging, because plants will cannibalize energy from vegetative organs to fill kernels when they are stressed.

Figure 1. Corn grain weight accumulation during reproductive growth stages.



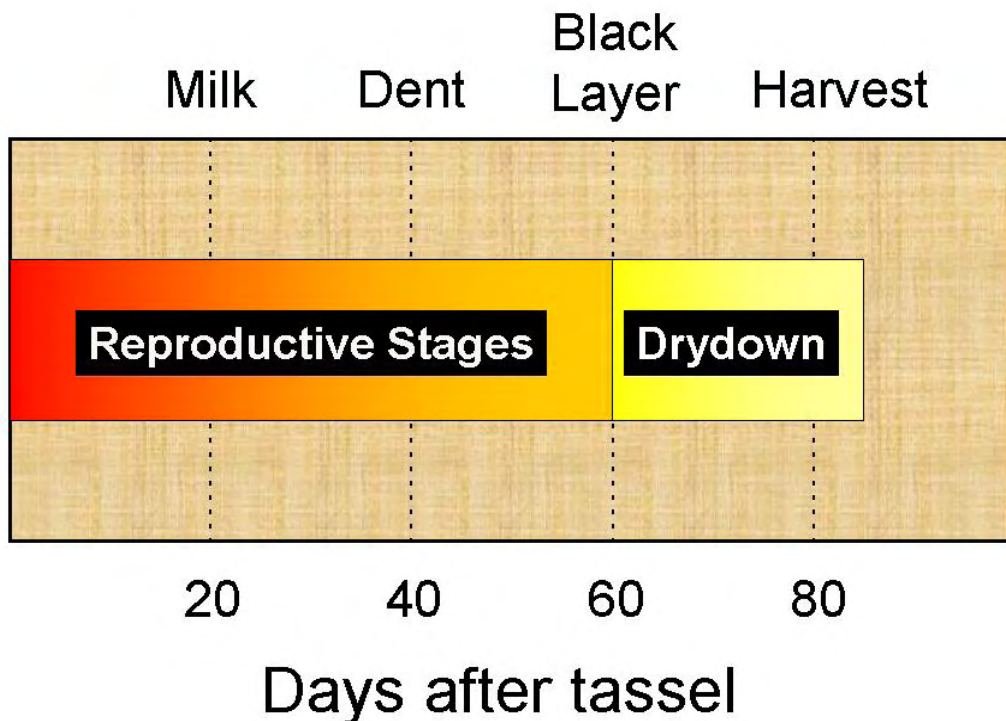
Check the Milk-line - The most reliable method for corn producers to monitor kernel maturity for irrigation scheduling purposes is to observe progression of the milk-line between dent stage and black-layer. The milk-line is more relevant than the black-layer, because it indicates when physiological maturity will occur, before the black layer forms. The milk-line is the borderline between the bright, clear yellow color of the hard seed coat outside the hard starch layer, compared to the milky, dull yellow color of the soft seed coat adjacent the dough layer (Figure 2). To observe the milk line, break a corn ear in half and observe the cross-section of the top half of the ear (the flat side of kernels opposite the embryo).

Figure 2. Photo showing a cross-section of an ear of corn with the milk-line advanced half-way down the kernels.



Corn Kernel Maturation - Hard starch develops initially at the outside tip of the kernel and this transition and shrinkage associated with moisture loss causes the dent to form. This hard starch development gradually progresses towards the kernel base as kernels mature. It generally takes about 20 days for the milk-line to progress from the kernel tip, down to the base, where the black-layer forms (Figure 3). Growers can use this guideline to estimate the approximate maturity date. For instance, if the milk-line is half-way down the kernels, it will take about another 10 days to reach physiological maturity. Thus, the field needs supplemental irrigation water to supply moisture for 10 more days.

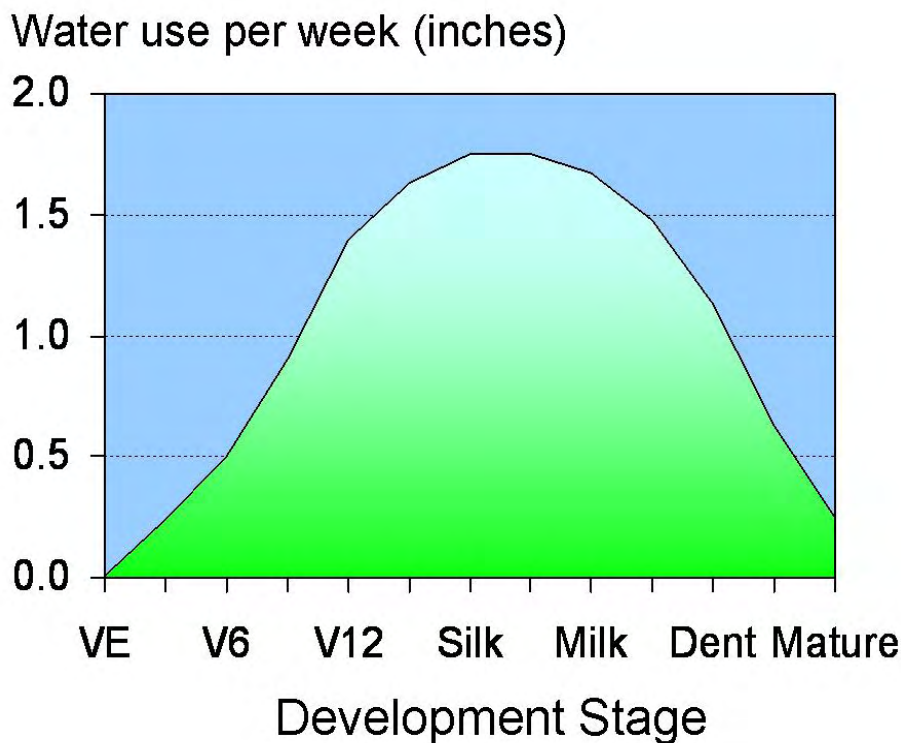
Figure 3. Normal sequence of corn reproductive development stages and moisture dry-down after grain reaches physiological maturity.



Will Rainfall Help Now? – Dryland corn which did successfully pollinate and still has green leaves will definitely benefit from substantial late June rainfall or more rain in early July. Rainfall obviously will also generally be a tremendous benefit for irrigators because most irrigated corn will not reach physiological maturity (black layer) until mid-July or later. Kernel number is generally determined by the milk stage (roasting ear) about 20 days after pollination. Severe drought stress has already limited this vital yield component in many areas or pollination may have failed to some extent. However, corn will continue to fill seed weight normally well into July to August, depending upon crop maturity. Moisture will also substantially help maintain plant health, including stalk strength, and grain quality. If substantial rainfall does not come, extreme drought will accelerate maturity of stricken fields, as plants sacrifice energy reserves in vegetative parts in desperate attempt to fill grain. Thus, many fields will likely senesce or die prematurely.

Reduced Water Demand – Corn moisture requirement will steadily drop from a peak of 1.5-1.75 inches per week at the dough stage (four weeks post tassel) to an inch or less per week after dent. However, high evaporation rates during late July generally often counterbalance the reduced water use by corn plants to some degree. Thus, insufficient irrigation water and/or slight delays can quickly reduce yield potential and evaporate profitability. Most importantly, growers should continue supplying irrigation water until the kernels reach physiological maturity.

Figure 4. Corn water use during the growing season.



Wheat Stubble Management – Wheat acreage is expected to increase considerably this fall if markets hold or continue to rise, leaving many growers in an unfamiliar cropping sequence, that is continuous wheat. Many have questioned how to manage wheat stubble remaining after harvest. Many perceive this wheat residue is a hindrance which must be eliminated or it will impede planting. However, considering that many areas in Mississippi are currently enduring the worst drought in history and our soils are natively low in organic matter, I would strongly suggest we utilize this residue to our advantage, instead of literally burning it off. Producers in the Wheat belt, particularly the driest regions of areas natively dry, rarely burn wheat stubble. Wheat straw is an extremely effective moisture conservation tool during the hot summer. Wheat straw has high solar reflectance, particularly compared to bare soil. Therefore, it absorbs much less solar radiation than bare soil, meaning the soil surface will remain much cooler when wheat residue or stubble is present, reducing evaporation rates and retaining soil moisture. Thus, I would recommend leaving the stubble stand or lightly discing the stubble now to establish a dust/straw mulch through the remainder of the summer. Chemical weed control can be employed, when necessary, with either method to maintain the advantages of the mulch through the summer. Tillage can be utilized in the fall for seedbed preparation, if desired.



To add your address to the Corn and/or Wheat email list, please send a request to: elarson@pss.msstate.edu.



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