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Cooperative Extension Service

Farm Update

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AGRICULTURE & NATURAL RESOURCES EDUCATION
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Early Corn Development

A lot of corn will be grown this year. Understanding a corn plant and its key development stages helps everyone manage corn better.

For corn to grow and produce kernels, it must conduct photosynthesis and respiration. Photosynthesis uses sunlight to convert water and carbon dioxide into glucose sugar. Respiration uses sugar to build structures such as stalks, leaves, cob, kernels, etc. Corn is a member of the C4 class of warm-season plants, meaning that corn is among the most efficient for photosynthesis. Corn is more efficient at converting sunlight to sugar than soybean, wheat, barley, or rye. Respiration helps maintain the plant. In simplistic terms, photosynthesis produces sugar and respiration uses that sugar to build and maintain the plant. Photosynthesis occurs during the day, and most respiration occurs at night. Over the entire growing season, a typical field of corn in our area will produce about 80 pounds of glucose for every bushel of grain produced.

Corn hybrids typically grown in Kentucky require approximately 110 to 120 growing degree days to go from emergence to physiological maturity (blacklayer), depending on temperature and light. The seed fill period occurs for 30 to 40 days, depending on heat unit accumulation. Corn maturity is dictated primarily by heat unit accumulation. Because

temperatures differ each season, that same corn hybrid may require a different number of days to reach maturity in two different seasons. Corn growing degree days (GDD) were developed to better track corn development over a season. The corn seed companies report a hybrid maturity in days, but this calculation is based on the expected number of GDDs to complete growth and development. The estimate of GDD accumulation can vary widely based on planting date and seasonal temperatures.

Corn growing degree days calculate each day as: GDD = (Tmax + Tmin)/2 – Tbase

Where Tmax is the maximum daily temperature, but limited to 86°F, Tmin is the daily minimum temperature and is limited to 50°F. The Tbase is the base temperature of 50°F. For example, a day has a high of 75 and a low of 55. For this day, GDD = [(75+55)/2]-50 = 15 GDDs. Another day has a high of 97 and a low of 66. In this case, Tmax is capped at 86. So, the GDD = [(86+66)/]-50 = 26 GDDs. This process is repeated for each day.

Crop scientists have determined that corn requires an approximate number of GDDs to reach various stages of growth. By tracking the GDDs during the growing season, a farmer can estimate when the corn is expected to reach certain stages. For example, a farmer wants to estimate when the corn will reach V6 growth stage. The farmer can calculate how many GDDs have been accumulated since planting, then estimate how many accumulated GDDs will be sufficient to reach V6. The UK Ag Weather Center has done the work for you. The website https://weather.uky.edu/ lists both the GDD and accumulated GDDs from April 1.

The leaf collar method is most commonly used to define corn growth stages. In this, corn growth stages are divided into vegetative stages, signified with a “V” and reproductive stages, signified with an “R.” The V stages begin at emergence (VE). V1 identifies the first leaf with a

collar. V2, the second collared leaf, and so on until a tassel emerges. The R stages begin with silk emergence (R1) and end at physiological maturity (R6).

Emergence, VE (about 100 GDDs), occurs when the coleoptile shoot pushes through the soil surface. The radicle is the first organ to emerge from a germinating seed and quickly develops a seminal root system. Three visible leaf collars, V3 (about 275 GDDs), is the stage in which roots have emerged from the first couple of nodes (nodal roots) above the seed but below the soil surface. These nodal roots are active. The growing point is below the soil surface.

Six visible leaf collars, V6, (about 475 GDDs) is the stage in which the growing point is above the soil surface. Tassel and dominant ear development have started. While this stage is vegetative, some reproductive organs are beginning to develop. More nodal roots are developing, and the plant is relying on these nodal roots for anchoring and nutrient uptake. Most post-emergence herbicides require application by V6 stage to reduce risk of injury to the developing ear.