Row Crops Newsletter

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MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Randy Smith H. Randall Smith – Area Agronomy Agent – MSU Extension Service – Covington County

Carolyn Conger Carolyn Conger – County Director – MSU Extension Service – Covington County

Corn Production Notes

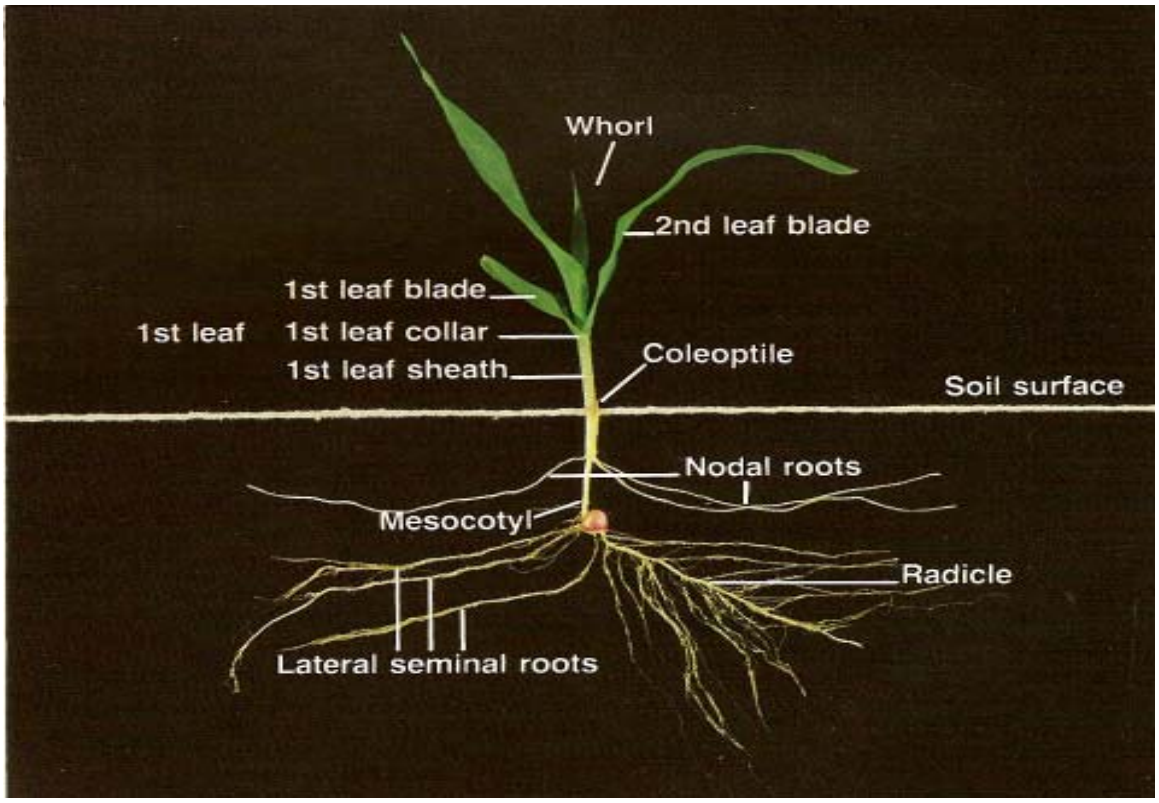
Corn Description: Corn is a monocot possessing only one cotyledon or embryonic leaf. This characteristic allows corn emergence from deeper depths than other crops. The size of a corn seed and the amount of stored energy in the seed offers some advantages to corn success in emerging from deeper depths as opposed to other crops. This greatly reduces the risk of replanting and allows us to reach moisture in drier conditions at planting. Corn should be planted at depths ranging from 1.5 – 2.0 inches deep. Shallower planting depths cause us more problems than good. Because the growing point of corn remains below the soil surface during early development, we do not have to worry about the plant breaking its neck during emergence and we generally do not have to worry about the effects of cold weather. One problem with shallow plantings is rootless corn syndrome where the root system does not develop properly. This reduces the development of an adequate root system increasing lodging. Corn also has defenses against environmental stress that does not exist in other crops. Under drought corn will roll up its leaves to reduce transpiration or water loss to the environment. Granted this is a short-term relief but it does serve as some protection to the plant. Corn is also a better user of photosynthates than other crops due to the type of photosynthetic pathway it possesses. Primarily corn only requires sunlight, temperature, water and nutrients to produce an adequate crop. Of course we need to be cognitive of early season weeds and insects.

Corn Growth Stages: There has been a great amount of discussion pertaining to the growth and development of corn. Corn is divided into vegetative and reproductive stages and are as follows.

Vegetative Stages	Description	Reproductive Stages	Description
VE	Emergence	**R1**	Silking
V1	First Leaf	**R2**	Blister
V2	Second Leaf	**R3**	Milk
V3	Third Leaf	**R4**	Dough
V4	Fourth Leaf	**R5**	Dent
V5	Fifth Leaf	**R6**	Physiological Maturity
V6	Sixth Leaf		
V(n)	Last Leaf before Tasseling		
VT	Tasseling		

V (n) will fluctuate depending upon the hybrid being grown and the environment.

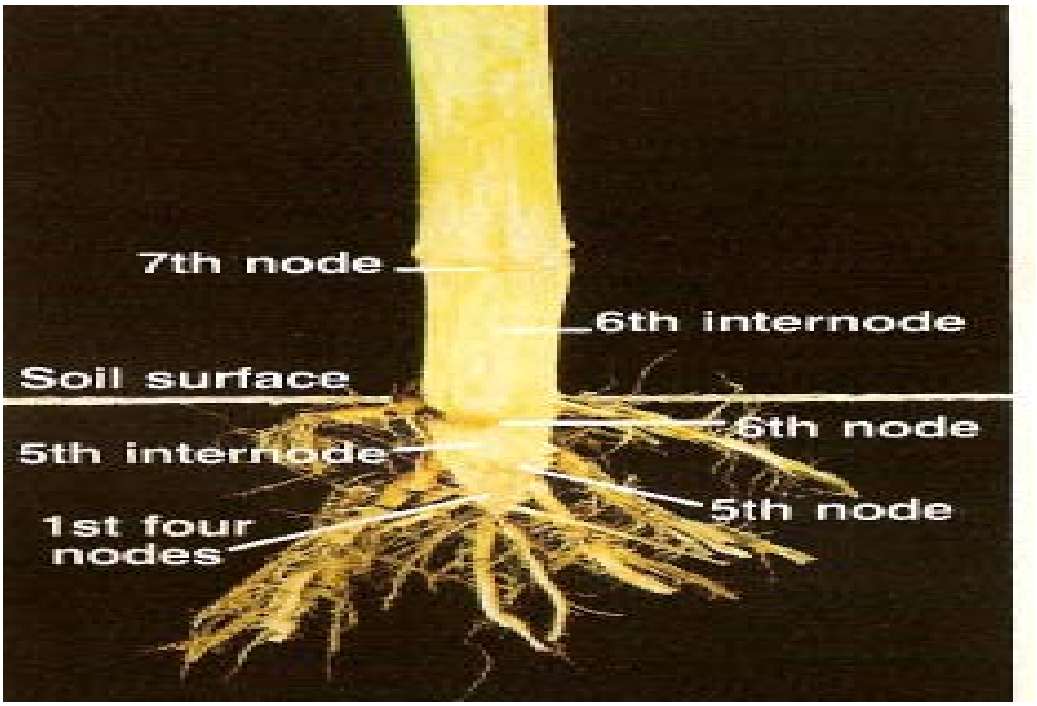
Further Description of Vegetative Processes: At this writing we will not discuss the reproductive processes but focus on vegetative development. Proper vegetative identification becomes important because of growing point movement relative to weather, herbicide restriction pertaining to application timing, irrigation timing and fertilizer timing. Be aware that the first leaf on the corn stalk is not the first true leaf.



Source: How a Corn Plant Develops. Iowa State University

When making a decision relative to stage of growth look for the collar on the leaf. Also be aware that as a corn plant grows it will loose its lower leaves making it difficult to identify the growth stage. Of course a longitudnal section of the corn stalk can be made to identify the crop stage. This allows the determination of nodes inside the plant.

VE (Germination & Emergence Stage): The seed absorbs water to begin the germination process. The radical will be the first plant part to emerge followed closely by the coleoptile that encompasses the embryonic plant. The three to four lateral, seminal roots quickly develop and VE is finally obtained with rapid mesocotyl elongation pushing the growing coleoptile to the soil surface. Under warm, moist conditions emergence will occur in 4-5 days and under cooler conditions, emergence might require two weeks. Once the coleoptile & mesocotyl tip is exposed to the sunlight elongation ceases. At this time the growing point is 1-1.5 inches below the soil surface based on recommended planting depths. Planting depth becomes important since the radical & lateral seminal roots are the first to emerge from the seed and their depth depends solely upon planting depth. Growth of these roots slows shortly following VE and is virtually nonexistent at the V3 stage. These roots continue to function during the life of the corn plant but their primary function is to sustain the plant until the nodal roots become established that begins at VE. The nodal root system becomes the primary water and nutrient supplier to the plant. From V1 to about R3, a set of nodal roots begins at each progressively higher node on the stalk up to nodes 7-10. After R3 there is limited root development. Nodal root begins to turn downward as temperatures increase and soil begins to dry.



Early development of corn nodes as they originate near the root system

Source: How a Corn Plant Develops. Iowa State University

V3 Stage: At V3 the growing point is still below the soil surface and very little stem elongation has occurred. Root hairs begin growing from the nodal roots, seminal root development has ceased, all leaves and ear shoots that will be produced is being formed (this will occur to V5) and the initiation of the tassel begins in the stem apex. All of this is going on below ground. At this stage the growing point is affected by soil temperatures. Cold soil temperatures increases the time between leaf stages, the number of leaves formed, delay tassel formation and reduce nutrient availability. Destructive events to the foliage of corn at this phase will have little effect on the growing point and eventually yield. Cultivation too close to the row at V2 can be harmful to developed nodal roots and weed competition prior V3 is very costly.

V6-V8 Stages: At V6 the growing point and tassel are above the soil surface, the stalk is beginning rapid elongation, the nodal root system has already taken over as the primary root system tillers are forming and the loss of the two lower leaves will occur. Precise fertilizer placement is less critical now because the nodal roots are well developed. Side-dressing of Nitrogen can occur up to V8 if fertilizer is applied in moist soils and if excess root pruning can be avoided. During this time watch out for nutrient deficiencies, insect damage (root worms & corn borers).

V9-V11 Stages: Many ear shoots (potential ears) are formed will develop at every above ground node with the exception of the last 6-8 nodes below the tassel but only one or two ear shoots develop into a harvestable ear (We generally only want one ear/stalk), internode elongation continues rapidly, tassel formation begins, time between the formation of new leaves will be shortened by V10 and at V10 there is an increase in nutrient and dry weight accumulation that continues into the reproductive stages. Soil nutrient and water are at a greater demand during these phases.

V12-V14 Stages: The number of kernels/row on each ear and the ear size is being determined at this stage. The number kernels per row will not be complete until about one week from silking or about V17. During these stages adequate moisture and nutrients are very important since kernel number and ear size is being determined. Earlier maturing varieties move through these stages much faster than later maturing varieties therefore it has been noticed that higher populations are required in early maturing varieties to provide the same yield as the later maturing varieties.

V15-V17 Stages: At V15 the plant is about 10-12 days away from silking. This stage begins the most crucial period of plant development relative to yield determination. During this stage, upper ear shoot development surpasses that of the lower ear shoots, new leaf stages are now occurring every 1-2 days, silks are beginning to grow from upper ears, by V17 the ear shoots have grown enough that their tips are visible and the tip of the tassel may also be visible. Water, nutrients, high temperatures or hail can cause significant yield loss during these stages. Seed reduction will result from negative conditions if it occurs two weeks before or two weeks following silking. Less yield loss occurs the farther away from silking the stress occurs. Therefore this four week period prior to silking is a very important time for irrigation.

V18-V19 Stages: At this stage the silks from the ear form beginning from the base and brace roots are now being formed. The corn plant at this time is about one week away from silking and ear development is continuing. Stress during this phase delays ear and kernel development and to a lesser degree with the tassel. If stress is severe enough, there might be enough delay in ear formation to reduce pollination success.

Nutrient Uptake: Uptake of potassium is completed shortly following silk formation. Much of the Nitrogen and Phosphorous uptake will continue until maturity. Absorbed nitrogen and phosphorous are translocated from the vegetative plant parts to the seed later in the season. A large portion of these nutrients are removed via grain at harvest. Potassium, on the other hand, is returned to the soil through the leaves. Only small amounts of nutrients are used early in the growing season but high concentrations are necessary to provide adequate levels later in the season. Early in the season seminal root development is limited and proper fertilizer placement is imperative. Placing fertilizer too close to the seed could cause injury. At later stages of growth, the plants require larger amounts of nutrients. The maximum amount of nitrogen and phosphorus uptake occurs between R5 & R6 and potassium uptake occurs by R2.

Corn Dry Matter Accumulation: The corn grain reaches maximum weight between R5 & R6, the cob, shank and silk between R3 & R4, the husks and lower ear shoots at R2, stalk and tassel meets maximum accumulation at R1 and shows a slight increase at R4, the leaf sheath reaches maximum dry matter accumulation by V18 and the leaves by between V12 & V18. Further information involving the reproductive phase will be forth coming.

Referenced Information originates from How a Corn Plant Develops; Iowa State University.