ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

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Soybean Growth And Development In Alabama

Soybean development throughout the season varies according to environmental conditions, cultivar, Maturity Group, plant populations and spacing, and planting date. The growth and flowering of indeterminate soybean cultivars grown in the northern United States differs from the southern grown determinate cultivars. For example, high populations and shading generally result in few pods set on the lower branches of determinate cultivars. Indeterminate cultivars flower as they grow taller and more pods are likely to be set on the lower branches. While developmental time intervals can be different, the sequence of events that occurs for soybean growth is the same, regardless of cultivar.

Vegetative development occurs very rapidly after emergence, giving the soybean a competitive edge on most weeds. After emergence, the cotyledons provide energy to the seedling for approximately 1 week. The first nodules on the roots are formed approximately 1 week after emergence and provide the plant's nitrogen requirements within 2 weeks. The first leaves formed are unifoliate and opposite on the first node. Subsequently formed leaves are trifoliate (three leaflets) and are alternate up the mainstem. Approximately 5 days per leaf are required early in the season especially under cool temperatures, with three days per leaf later in the season. Likewise, internode lengths will generally be shorter towards the base of the plant but longer as conditions warm up.

Table 1 describes the vegetative stages of soybeans regardless of cultivar.

Flower initiation is triggered by shorter days (actually longer nights) toward the middle of the summer. Developing a rule of thumb for predicting when a particular Maturity Group cultivar will flower is difficult because of variation among the genotypes, environments, longitude, latitude, and planting date. However, a very general rule of thumb for full season Maturity Group V soybeans planted on May 1 is for flowering to begin around July 4. Add approximately 5 days delay in flowering for each change in Maturity Group. However, the picture is not as clear when planting takes place in mid- to late June and early July due to day-length effects.

Table 1. Vegetative Stages

Vegetative Stage	Description
VE	Emergence
VC	Cotyledons unfolded
V1	One node with unifoliate leaves
V2	Two nodes with a trifoliate leaf
V3...V(n)	Three nodes to nth node

Table 2 describes the reproductive stages of soybeans regardless of cultivar.

Table 2. Reproductive Stages.

Reproductive Stage	Description
R1	Beginning bloom—one open flower
R2	Full bloom—blooms to the top
R3	Beginning pod—3/16 pod at one of the four upper nodes on the mainstem
R4	Full pod—3/4 inch pod at the same point
R5	Beginning seed—1/8 inch seed in a pod at the same point
R6	Full seed—a pod with green seed that fills the seed cavity
R7	Beginning maturity—fully developed pod with mature color located on the mainstem
R8	Full maturity—95% of the pods have turned mature color

In the determinate cultivars planted in the southern United States, flowering begins after the plant has reached its full height. Flowering begins at node 8 to 10 and proceeds upward and downward at a very rapid rate. Flowers are borne in a raceme (elongated cluster) arrangement and will open from the base of the raceme outward to the tip. Because of the day-length effect, Group V soybeans begin to flower earlier than Group VII cultivars. Planting a Group V cultivar late in the season can result in a shorter plant due to the early initiation of flowers. Late planting is more likely to be successful when later maturing cultivars are chosen.

Regardless of the cultivar, only 25 to 50 percent of the flowers produced will fertilize and develop into a pod. In some cases the flower abortion rate can be as high as 80 percent. Since the flowering period occurs over 3 to 4 weeks (or longer), soybeans can compensate for the loss. Final yield is primarily dependent on the number of seeds per pod and seed size. Producers should be able to find small pods approximately 10 to 14 days after the first flowers appear.

Approximately 50 to 80 days are required for a flower to progress to a mature pod. However, this interval is highly variable between cultivars, environments, planting systems, and other considerations. Seed dry weight accumulation begins around 10 days after flowering and continues for 4 weeks. Dry weather during the seed filling stages (R5 and later) can cause small pods to shed and reduce size and number of seeds per pod. After the plants reach the R8 (full maturity) stage, 1 week to 10 days of dry weather are required to dry the seeds to 15 percent moisture or less.

For more information, call your county Extension office listed in your telephone directory.

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