Soybean Flowering through Maturity

Key Points
- Vegetative growth stages indicate how many fully-developed trifoliate leaves are present on a soybean plant.
- Soybean reproductive growth stages begin at flowering (R1-R2).
- Soybean pod development stages include R3-R4.
- Seed development stages include R5-R6.
- Plant maturation occurs from R7-R8.
- Growth stages can overlap.
- The growth stage of soybean is determined when 50% of the plants are in or beyond that growth stage.

Beginning Bloom (R1) (V7-V10)
This is a time of rapid growth, with at least one flower on the plant. Soybean flowering begins on the third to sixth node of the main stem. Flowering continues up and down the main stem and eventually moves to branches. Since groups of flowers develop from the base to the tip, pods at the base of the plant are usually more mature than those at the tips. Vertical roots and secondary roots and root hairs are rapidly growing during R1, and continue until R4-R5. Plants are 15 to 18 inches tall and in the vegetative stage V7 to V10. Stresses, such as defoliation or root damage, that occur from R1 to R5 can affect growth rate and yield potential.

Full Flower (R2) (V8-V12)
An open flower at one of the top two nodes on the main stem establishes full flower or full bloom (R2). One or more of the upper nodes has a fully developed leaf and approximately 50% of the total number of nodes has developed. Plants are in the V8 to V12 vegetative stage and are around 17 to 22 inches tall. Roots can reach across 40-inch rows. Major lateral roots have turned down into the soil and nitrogen fixation by root nodules is increasing. Plants will accumulate 25% of total dry weight and nutrients and about 50% of mature height during this stage. Fifty percent defoliation at this stage can reduce yield by 6%.

Beginning Pod (R3) (V11-V17)
One of the four uppermost nodes is 3/16 inch long and small pods, flowers, and flower buds are visible. Plants are 23 to 32 inches tall and in the V11 to V17 vegetative growth stage. Stress during this growth stage may decrease total pod number, beans per pod, or seed size. Because of the long flowering period, soybean plants can typically compensate, at least partially, for temporary stress; however, the plant loses this ability as it matures from R1 to R5.5. During R3, 60 to 75% of the flowers and as many as 50% of the formed pods can abort. Stress during this stage may increase abortion rates and decrease yield potential. Favorable growing conditions may increase pod number per plant and increase yield potential.

Full Pod (R4) (V13-V20)
This stage marks the beginning of the critical period for determining soybean yield potential. One of the four upper-most nodes will have a 3/4 inch long pod. Rapid pod growth and seed development are followed by finalization of pod number. Pod dry weight increases from R4 to R5. Stress during this period can cause more reduction in yield potential than at any other growth stage. Irrigation during this time may help reduce potential yield loss.
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**Beginning Seed (R5) (V15-V23)**

A seed in a pod at one of the four uppermost nodes is now 1/8 inch long. Seed-fill during this growth stage demands large amounts of water and nutrients. Nitrogen (N) accumulation in the leaves and N fixation both peak and then start to drop as the seeds use nutrients. The soybean plant redistributes stored nutrients with half of the needed N, P, and K coming from the plant’s vegetation and half coming from N fixation and nutrient uptake by the roots. Dry matter accumulation continues and will stop halfway between R5 and R6. Plants achieve maximum height, node number, and leaf area approximately half way through R5. Seed accumulation continues until about R6.5, when about 80% of total seed dry weight should have been reached. Plants are less able to compensate for stress and vegetative damage during this stage.

**Full Seed (R6) “Green Bean” Stage (V16-V25)**

This stage starts with a pod containing green seeds that fill the pod cavity at one of the four uppermost nodes on the main stem. Bean growth rate is rapid and peaks at R7. Total pod weight peaks during R6. Three to six trifoliate leaves may fall from the lowest nodes just before leaf yellowing begins. Halfway through R6, root growth is complete. This stage marks the start of the period when stresses have very little effect on yield potential (R7).

**Beginning Maturity (R7)**

One pod on the main stem is a brown or tan mature color. Eventually, the seed and pods appear yellow and all green color is lost, indicating the peak of dry matter accumulation in individual seeds. Seeds contain about 60% moisture at physiological maturity. Stress during the beginning and full maturity growth stages does not affect yield potential unless: pods drop to the ground, seeds are shattered from pods, plants lodge, or losses occur during harvest. Plants that have reached R7 are safe from a killing frost.

**Full Maturity (R8)**

When 95% of the pods have achieved their mature color, the crop is fully mature (R8). Fully mature soybeans should reach harvest moisture of less than 15% within five to 10 days of reaching R8. Warm, dry weather will lower the soybean moisture faster, and wet weather will slow moisture loss. For long-term storage, soybean moisture should be reduced to 13% or less.

**Sources:**


**Photo Credit:**

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