

How soybeans build yield

VE stage: Emergence

Germination happens when the seed absorbs half its weight in water. The radical (primary root) emerges first. The hypocotyl (stem) follows soon, growing upward and pulling the cotyledons ("seed leaves") with it. Emergence occurs 5 to 10 days after planting. Lateral roots begin to grow and absorb water and nutrients.

VC stage: Cotyledon stage

Begins when the unifoliate leaves unroll (leaves no longer have edges touching). The cotyledons supply nutrients to the plant for 7 to 10 days. If both leaves are lost, yields can suffer by 8 to 9 per cent.

V1 stage: First trifoliate

After one set of single leaves emerges, all new emerging leaves are trifoliates V1 stage occurs with the full opening of the first trifoliate (leaf has unrolled and edges no longer touch). Every three to five days, new leaves appear through the V5 stage. V stages are defined by the number of trifoliate leaves that have developed on the main stem, not the branches. At V2 (usually 6 to 8 inches tall), active nitrogen fixation starts. Most root nodules are within 10 inches of the surface. Each nodule contains millions of bacteria. Pink or red insides show active fixation. White, brown or green nodes aren't fixing enough nitrogen.

V5 stage: Fifth trifoliate

Plants reach 10 to 12 inches. In the top stem, axillary buds develop; they'll grow into flower clusters (racemes). The total number of nodes the plant can produce is set. If something damages the growing point, the axillary buds will branch off and grow profusely. If the plant breaks off below the cotyledon node, the plant will die. It is about a week until flowering begins.

R1 stage: Beginning bloom

At least one flower appears on the plant on any node on the main stem. Plant is at the V7 to V10 stage and typically is 15 to 18 inches tall. Flowering always begins on the third to sixth node. Flowering progresses up the plant and the branches. At the R2 stage, the plant is beginning full bloom. The appearance of flowers begins to slow. Nitrogen (N) fixation increases rapidly.

R3 stage: Beginning pod development

When one pod on one of the four upper nodes reaches three-sixteenth inch long, the plant is at R3. Usually occurs between V11 and V17. Plants are 23 to 32 inches tall. Typically, 60 to 75 percent of flowers abort, but stress can increase the loss. Temperature or moisture stress can limit pod numbers, beans per pod or bean size. At R4, the plant reaches the full pod stage, pod growth is rapid and seed development begins. This is the most crucial stage for seed yield.

R5 stage: Full seed

The plant redistributes nutrients to provide about half the nitrogen, potassium and phosphorus needs. The rest comes from N fixation and root uptake. At R5, the plant is less able to compensate for stresses. The seed is at least one-eighth inch long in one of the pods on the upper four nodes. Halfway through this stage, the plant reaches its maximum height, number of nodes and leaf area. N fixation peaks. Seeds accumulate dry weight. By R6, the "green bean" stage, total pod weight peaks. Seed growth is rapid.

R7-R8 stages: Beginning maturity to full maturity

R7 begins when one normal pod on the main stem is mature in colour (brown or tan). Green is disappearing, and both seeds and pods appear yellow. The seeds are 60 percent moisture at physical maturity. Stress has little effect unless pods are shattered or fall to the ground. At R8 (full maturity), 95 percent of the pods are mature in colour. From this stage, it takes only 5 to 20 days of good drying weather to get soybeans below 15 percent moisture, ideal for harvest.



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