EARLY SOYBEAN GROWTH AND DEVELOPMENT

A soybean seed has two distinct parts: the cotyledons and the embryo. The two cotyledons are the main food storage structure, which supply food during emergence and for the seven to ten days after emergence through the V1 growth stage.

The embryo itself is comprised of three parts.

1. The radicle is the first root and it’s the first part of the embryo to penetrate the seed coat. Lateral roots form from the radicle, and tiny root hairs then develop on the lateral roots. Root hairs are the main absorbing surface of the entire root system. A soybean’s root system branches and rebranches within the first four to five weeks after planting, with the bulk of root mass persisting in the top six inches of soil.

2. The hypocotyl is the stem below the cotyledon. It begins to elongate after the radicle and forms an arch, which is pushed upward. As the arch breaks the soil surface, it pulls the cotyledons and epicotyl up. The uppermost cells of the hypocotyl stop growing as cells on the underside continue to straighten the arch. This process lifts the cotyledons into an upright position.

3. The epicotyl is comprised of the small leaves, stem and the apical growing point. The epicotyl is protected between the cotyledons until after emergence. The loss of a cotyledon is not lethal to the seedling, but damage to the epicotyl is.

The hypocotyl arch is a large structure that is relative to seed size, utilizing considerable seed energy to push through the soil. Therefore, compaction or crusting is a serious threat to soybean emergence.

Soon after exposure to sunlight, the cotyledons and other plant parts develop chlorophyll and turn green. The cotyledons drop after the seedling can support itself, approximately seven to ten days after the VE growth stage. After reaching the V1 growth stage (first trifoliate leaf), photosynthesis by the developing leaves is adequate for the plant to sustain itself.

Hypocotyl arch  A damaged hypocotyl  Soybeans at the VC (Cotyledon) stage
The first two leaves are unifoliates, positioned opposite each other at the same node. All subsequent leaves are trifoliates and are positioned on alternate sides of the stem, one at each node. A plant achieves a new V stage (new trifoliate) every 5 to 7 days through V5, and every 3 to 5 days between V5 and R5.

Nitrogen-fixing nodules begin to form at the V2 growth stage, and most are concentrated at the planting depth. Nodules are sensitive to moisture, pH and temperature, among other factors. Planting too deep or too shallow may expose the nodules to suboptimal conditions.

The following practices can help you ensure you’re reaching your top-yield potential:

• Optimal supply of soil moisture during germination, emergence, and early vegetative growth periods. Soybean seed must reach a moisture content of 50% before germination begins.

• Soil temperatures of at least 55°F or greater are desired at planting. Cold soils delay germination and increase the risk of seedling disease.

• Plant soybeans deep enough so they can access moisture, but not too deep that it complicates emergence.

• Early planting dates maximize the vegetative growth period while allowing for a longer reproductive period.

• A sound, vibrant soybean fertility program helps produce top-yielding, high-profit soybeans.