Soybean Growth and Development

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Extension Publication

- More detailed information can be found in:
  - Publication PM1945
  - Iowa State University Extension Distribution Center
  - 515-294-5247
  - www.extension.iastate.edu/pubs/
Soybean Maturity Groups
# Soybean Growth and Development

## Vegetative Stages
- V-Stages
- VE, VC, V1, V2, V3, Vn

## Reproductive Stages
- R-Stages
- R1, R2, R3, … R8
- Starts at flowering
Soybean Morphology

- Growing point above ground
- Nodes are counted when the leaflets are fully developed (unrolled)
Soybean Germination

Hypocotyl

Radicle

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VE - Emergence

- 5 to 21 days after planting
- Temperature and moisture dependent
- Planting depth should be 1 to 1.5 inch
VC - Stage

- Unifoliolate leaves have unrolled
- Leaves are opposite
- First node
V1- Stage

- One unrolled trifoliolate leaf
- Two nodes
- Trifoliolate leaf nodes are produced singularly and alternately
V2 - Stage

- Two unrolled trifoliolates
- Three nodes
- Nodules have been established
- Check for proper nodulation
Soybean Nodulation
Nitrogen Fixation

- Approximately 50% of the N comes from the nodules N fixation (*Bradyrhizobium japonicum*)

- Soil NO$_3$ will inhibit N$_2$ fixation

- A small amount of N may increase yields in certain low N, high yielding environments
V3 – Stage

- Three unrolled trifoliolates
- Four nodes
- Axillary buds allow plants to recover from damage
V6 - Stage

- New V stage every 3-5 days
  - VC-V5: every 5-7 days
  - V5-R5: every 3-5 days

- Roots stretch across 30-inch rows
Reproductive Stages

R1: Beginning flowering
R2: Full flowering
R3: Beginning pod
R4: Full pod
R5: Beginning seed
R6: Full seed
R7: Beginning maturity
R8: Full maturity
Reproductive Development for a mid Maturity Group 2 in Iowa

- Critical periods:
  - The early reproductive period (R1 to R5.5) is sensitive to altered source strength and crop growth rate
  - R4-R5.5 is particular sensitive to moisture stress
R1 - Beginning Flowering

- One open flower at any node
- Rapid root growth
R2 - Full Flowering

• Open flower at one of the two uppermost nodes
R3 - Beginning Pod

- Pod 3/16” long at one of the four uppermost nodes
- 60-75% of flowers abort and never contribute to yield
R4 - Full Pod

- Pod is ¾” long at one of the four uppermost nodes
- Pod number determined
- Start of critical yield determination period
R5 - Beginning Seed

- Seed is 1/8” long in pod at one of the four uppermost nodes
- Large demand for water and nutrients
- Dry matter accumulation will stop halfway between R5 and R6
R6 - Full Seed

- Pod containing a green seed that fills the pod cavity at one of the four uppermost nodes.
R7 - Beginning Maturity

- One pod anywhere with its mature color
R8 - Full Maturity

- 95% of the pods have reached their mature color
- Harvestable 7-10 days after R8
- Final plant population should be assessed
Pod and Seed Development
Dry Weight Accumulation for an Early Planting (1 May) vs. Late Planting (21 May) in Iowa
For More Information

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