

Soybean Growth and Development

Palle Pedersen

Soybean Extension Agronomist

Department of Agronomy

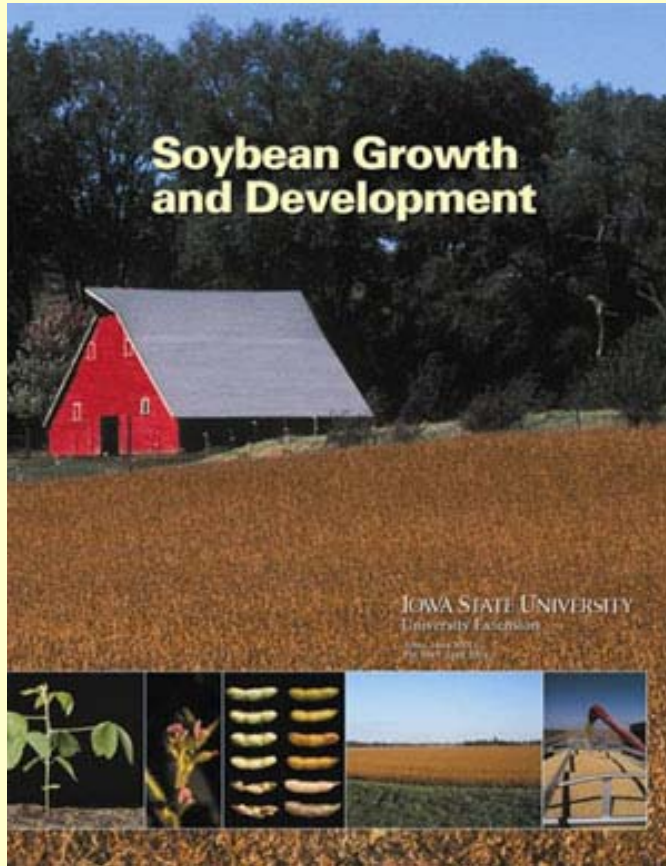
Iowa State University

University Extension

515-294-9905

www.soybeanmanagement.info

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



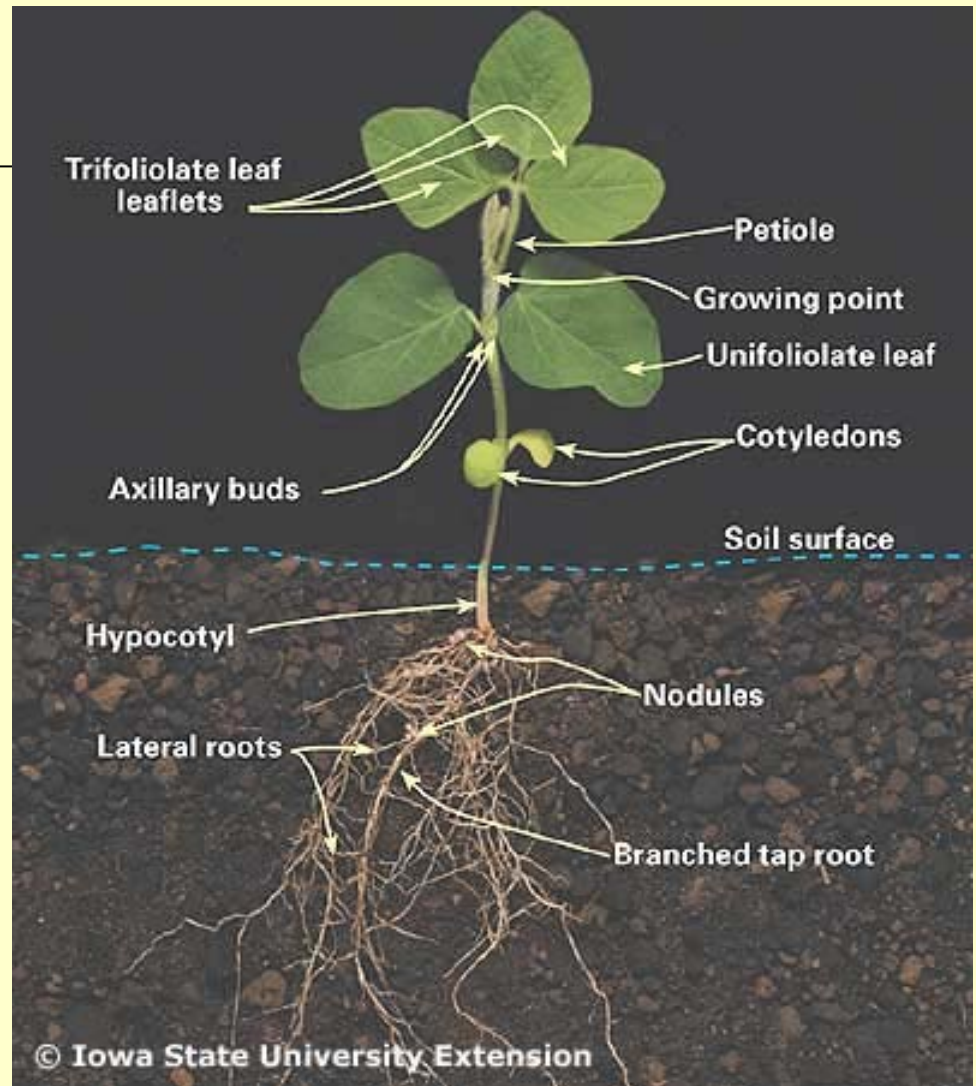
Reproductive Stages

- R-Stages
- R1, R2, R3, ... R8
- Starts at flowering

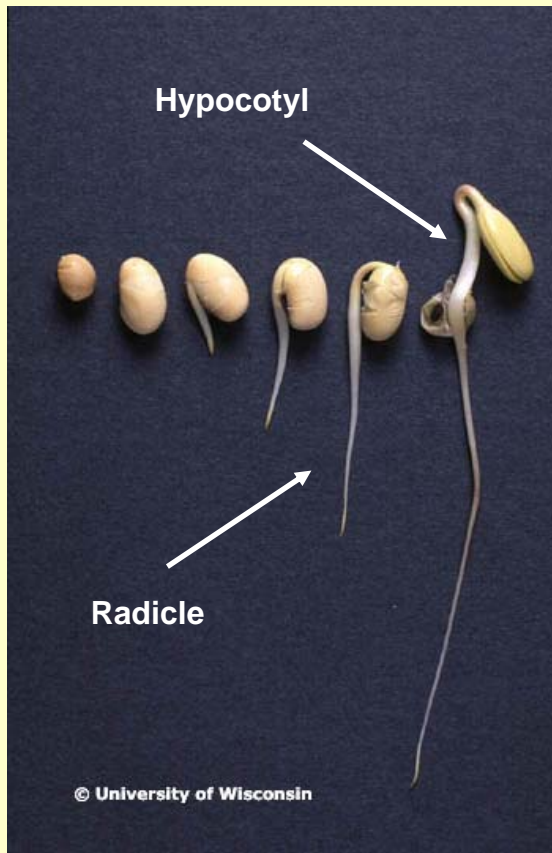


Soybean Morphology

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



Soybean Germination



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



© Iowa State University Extension

Nitrogen Fixation

- **Approximately 50% of the N comes from the nodules N fixation (*Bradyrhizobium japonicum*)**
- **Soil NO₃ will inhibit N₂ 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

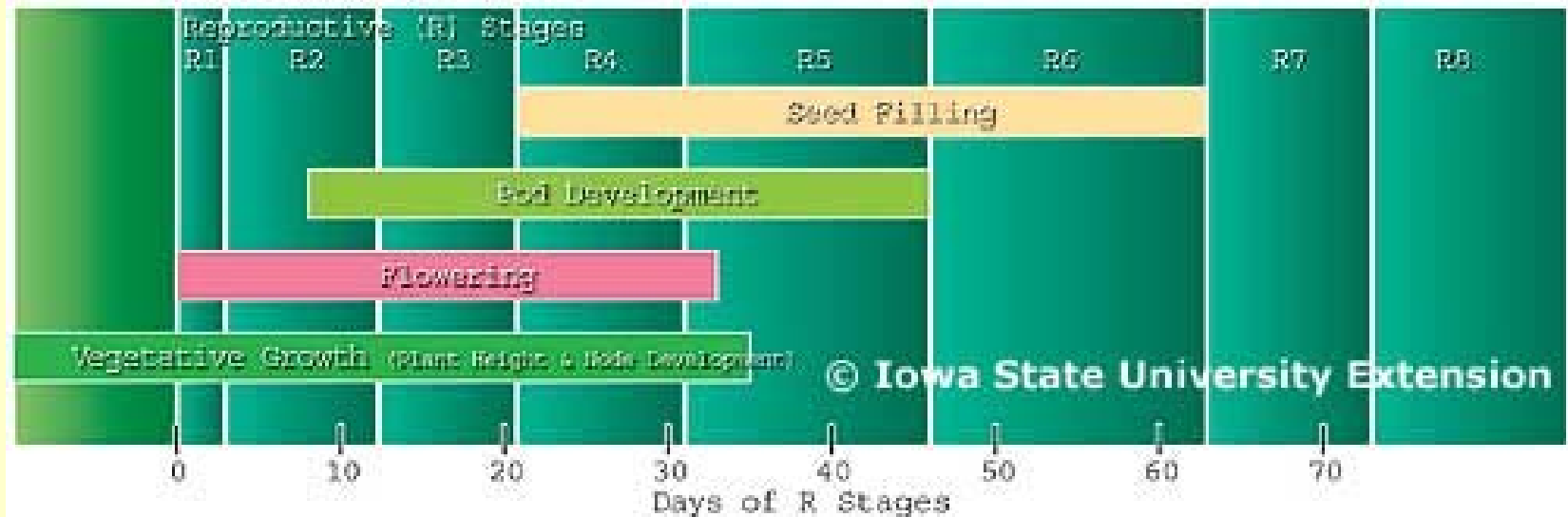
R5: Beginning seed

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 $\frac{3}{4}$ " 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

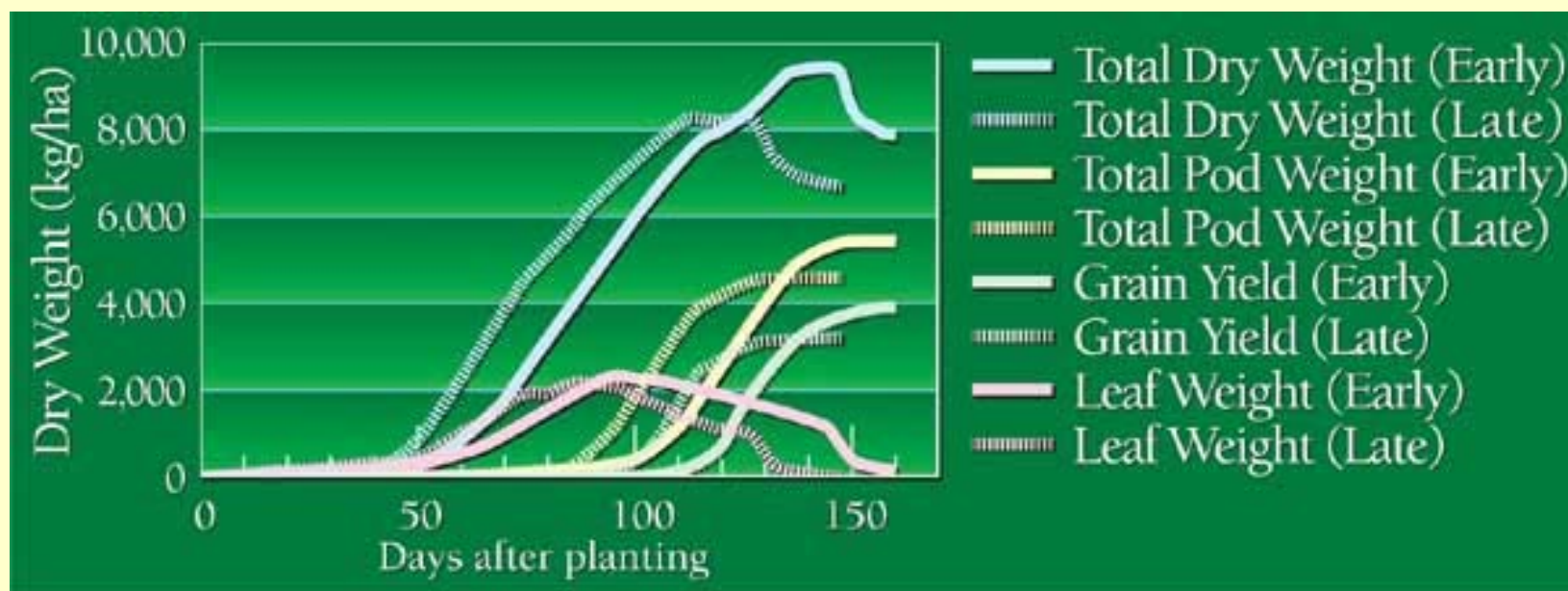
- **95% of the pods have reached their mature color**
- **Harvestable 7-10 days after R8**
- **Final plant population should be assessed**



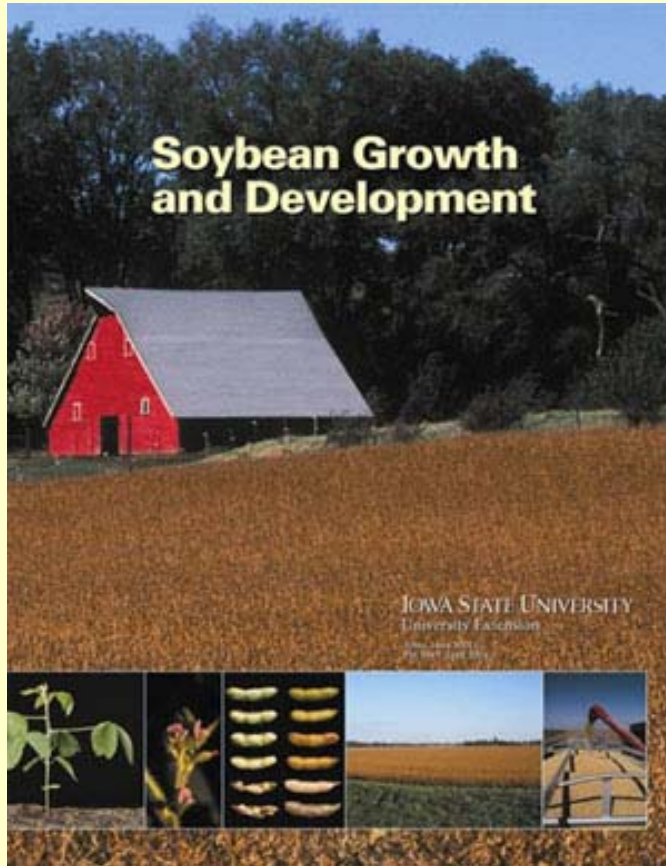
Pod and Seed Development



Dry Weight Accumulation for an Early Planting (1 May) vs. Late Planting (21 May) in Iowa



For More Information



Palle Pedersen

515-294-9905

palle@iastate.edu

www.soybeanmanagement.info