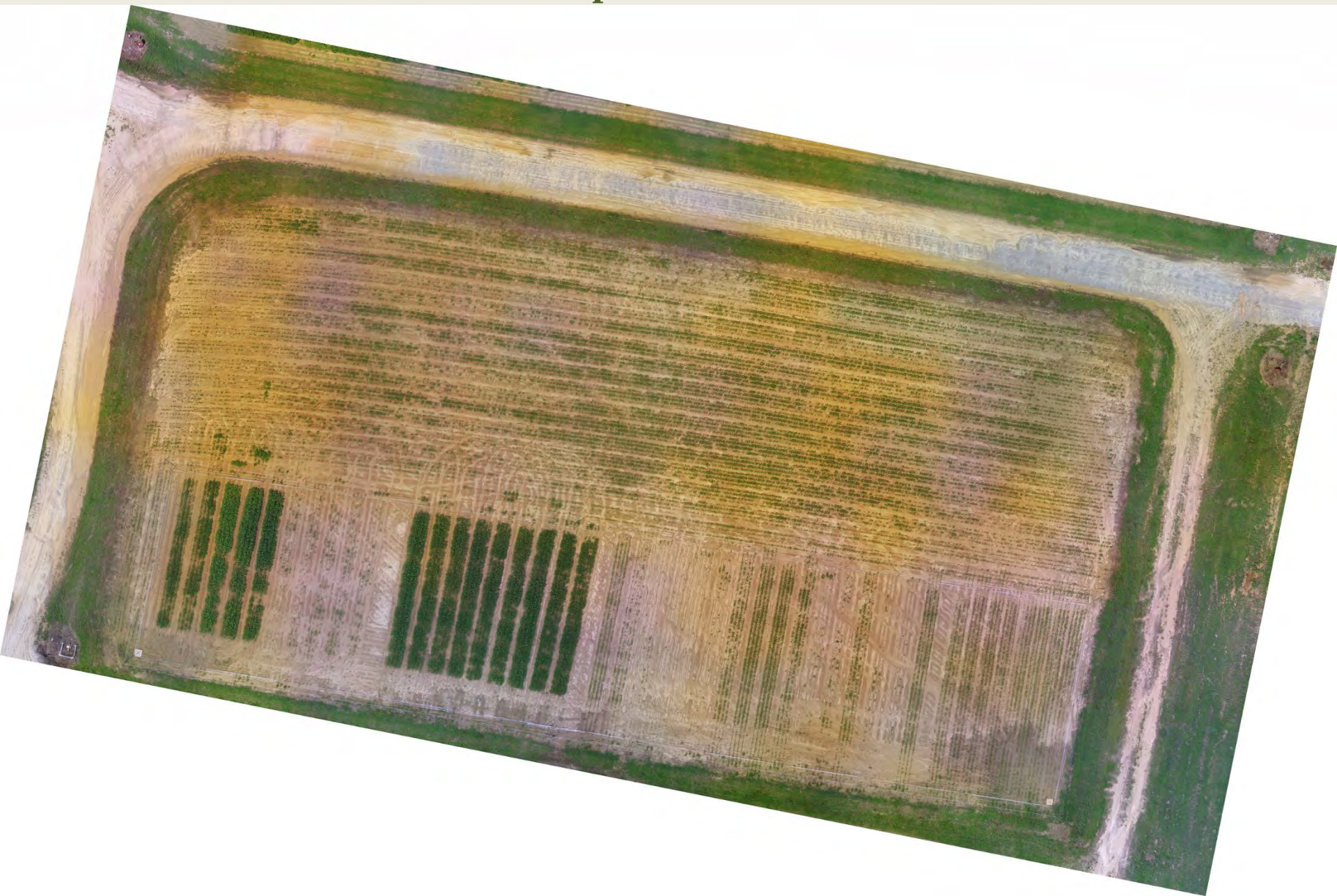
# 2018 Soybean Agent Training

## Central Crops Research Station



# Introduce Yourself
# Name
# County

# 2018 Soybean Agent Training

**Hosted at Central Crops Research Station**
**13223 US Business 70 West Clayton, NC 27520-2128**

## Monday August 13th (Basic/ID Training) 10 AM - 4 PM

10 AM - 11 AM Welcome/Soybeans 101 - Rachel Vann (inside)
11 AM - 12 PM Weed ID/Herbicide Symptomology - Wes Everman (inside)
12 PM - 1 PM Lunch sponsored by Nutrien Ag Solutions (Rick Strecker)
1 PM - 2 PM Insect ID - Dominic Reisig/Anders Huseth (outside)
2 PM - 3 PM Disease ID- Lindsey Thiessen (outside)
3 PM - 4 PM Soybean Fertility Management/Deficiency Symptoms - Carl Crozier (inside)

5 PM- 6:30 PM Soy Social Hour hosted by the North Carolina Soybean Producers Association at:
The Holiday Inn Express 3741 Thistledown Drive
Raleigh, NC 27606

## Tuesday August 14th (Advanced/Management Training) 9 AM - 3 PM

9:00 AM - 9:30 AM Variety Selection - Ryan Heiniger (inside)
9:30 AM - 10:00 AM Variety Selection Tool/Other Updates- Katherine Stowe (inside)
10:00 AM - 10:45 AM General Agronomic Management - Rachel Vann (outside)
10:45 AM - 11:15 AM Soybean Protein- Anna Locke (outside)
11:15 AM - 11:45 AM Public VS Private Soybean Breeding OR is it Public AND Private Soybean Breeding- Tommy Carter (outside/inside)
11:45 AM - 12:30 PM Lunch sponsored by the North Carolina Soybean Producers Association
12:30 PM - 1:15 PM Soybean Disease Scouting/Management - Lindsey Thiessen (inside)
1:15 PM - 1:45 PM Insect Scouting/Management - Dominic Reisig/Anders Huseth (inside)
1:45 PM - 2:30 PM Weed Management/Auxin Technology Update - Wes Everman (inside)
2:30 PM - 3:00 PM Soybean Jeopardy/Concluding Remarks- Rachel Vann (inside)

# Thank you to our Sponsors!!

NC SOYBEAN PRODUCERS ASSOCIATION

NC COOPERATIVE EXTENSION

N.C. A&T STATE UNIVERSITY

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Nutrien Ag Solutions™

RESEARCH STATIONS DIVISION

Working Together for One Cause

NC DEPARTMENT OF AGRICULTURE

NC STATE UNIVERSITY

# Soybeans 101

Rachel Vann, Soybean Extension Specialist

NC COOPERATIVE EXTENSION

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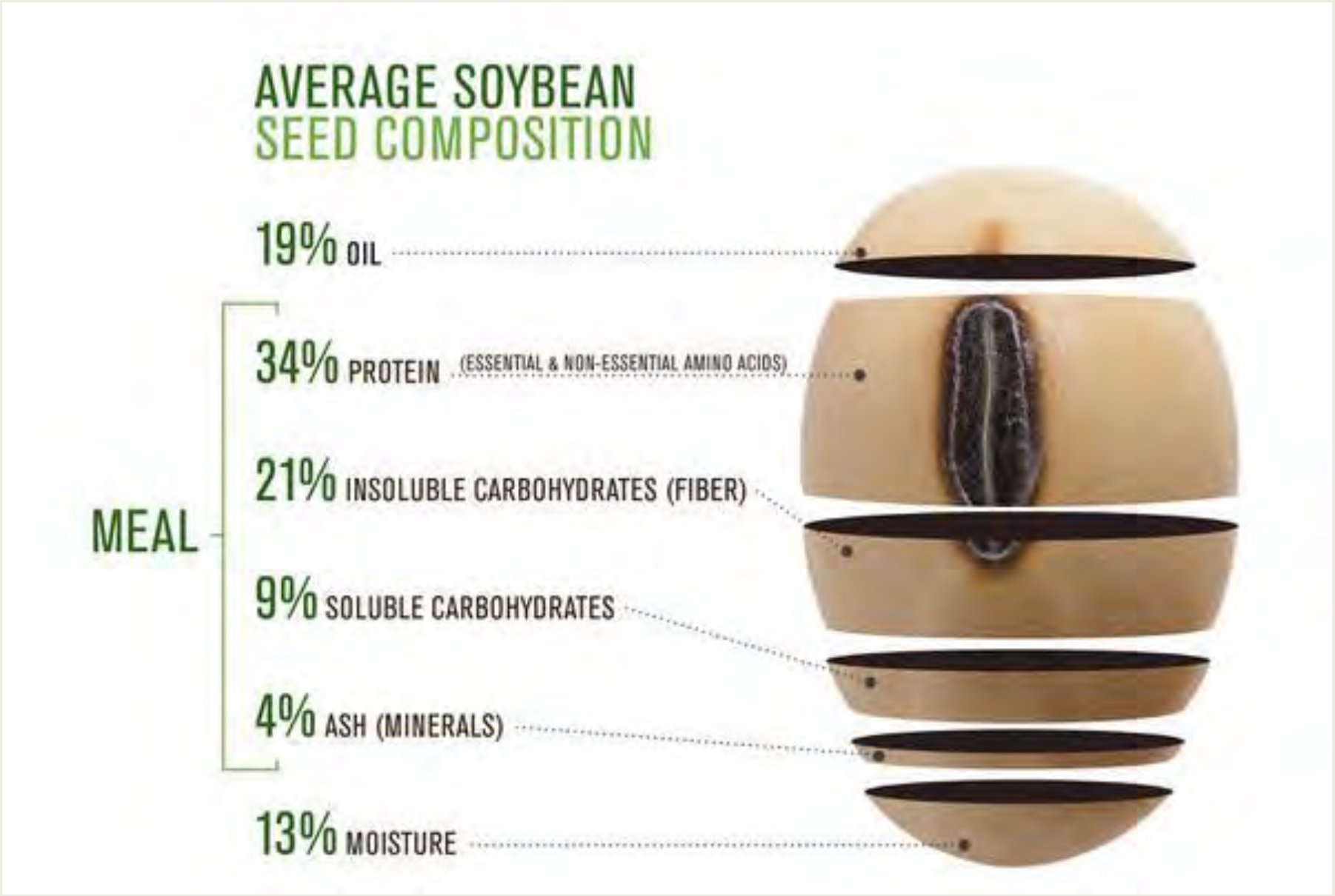
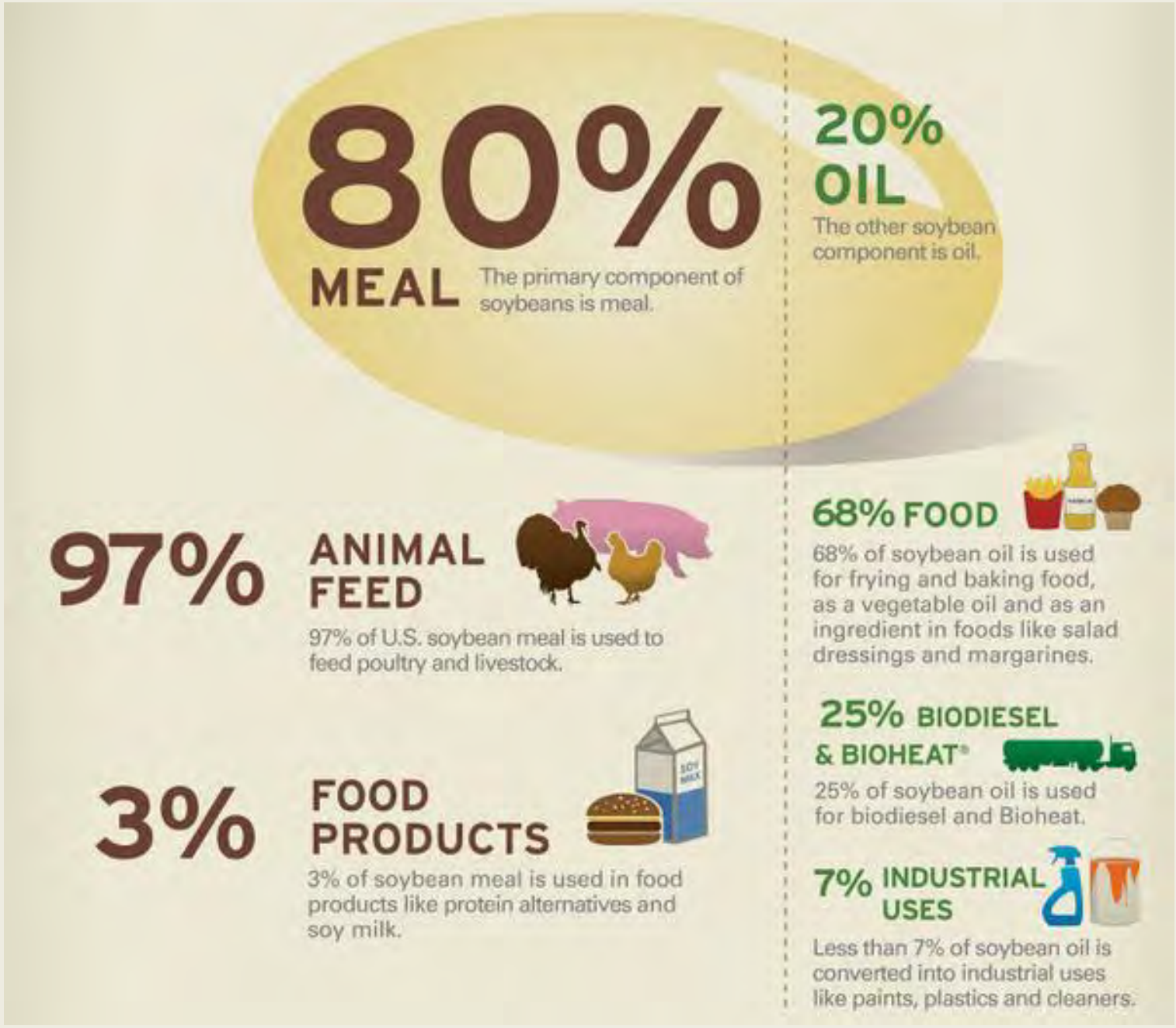
# Soybean 101

- Scientific name: *Glycine max*
- Family: Leguminosae (Legume)
- Heat during flowering is a limitation for many legumes
- Each soybean plant generally produces 60-80 pods, with generally 3 seeds/pod (ASA)




Source: United Soybean Board



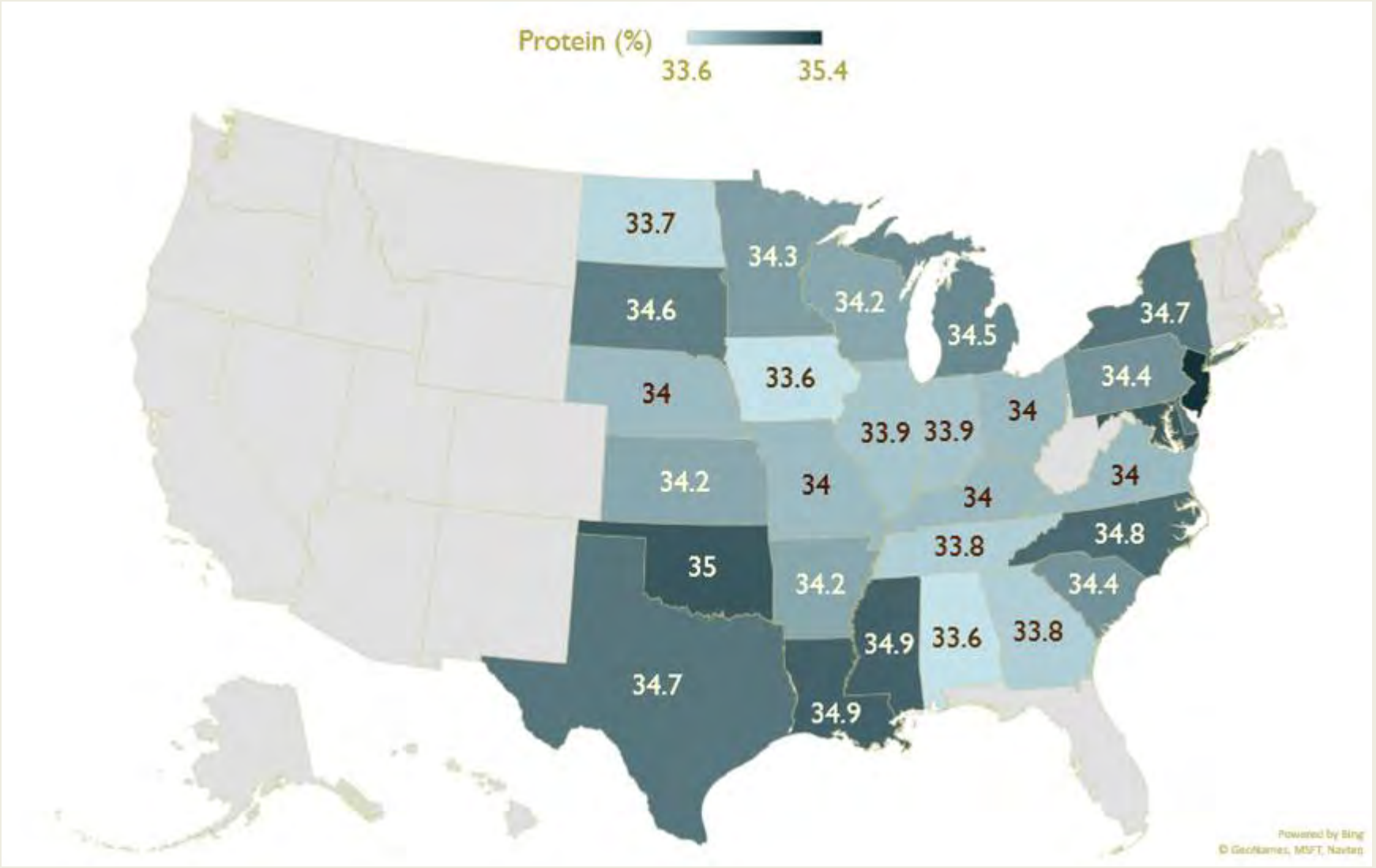

Source: United Soybean Board

One bushel of soybeans produces about

**1.5 gallons of soybean oil**

and

**48 pounds of protein-rich soybean meal**



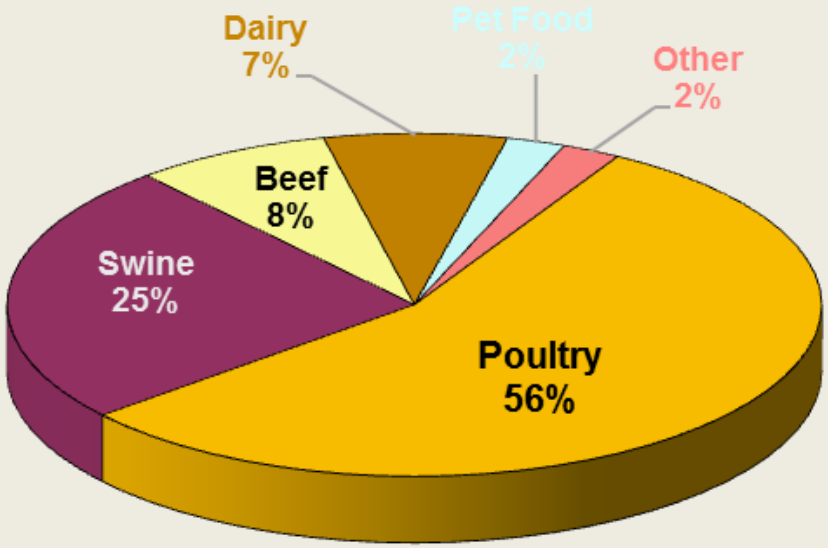

Source: K. Stowe, NC Soybean Producers Association

# Total Market Value of Agricultural Products Sold in NC in 2017: $12,588,142,000

**Livestock, Poultry, and their Products**
**$8,285,265,000**

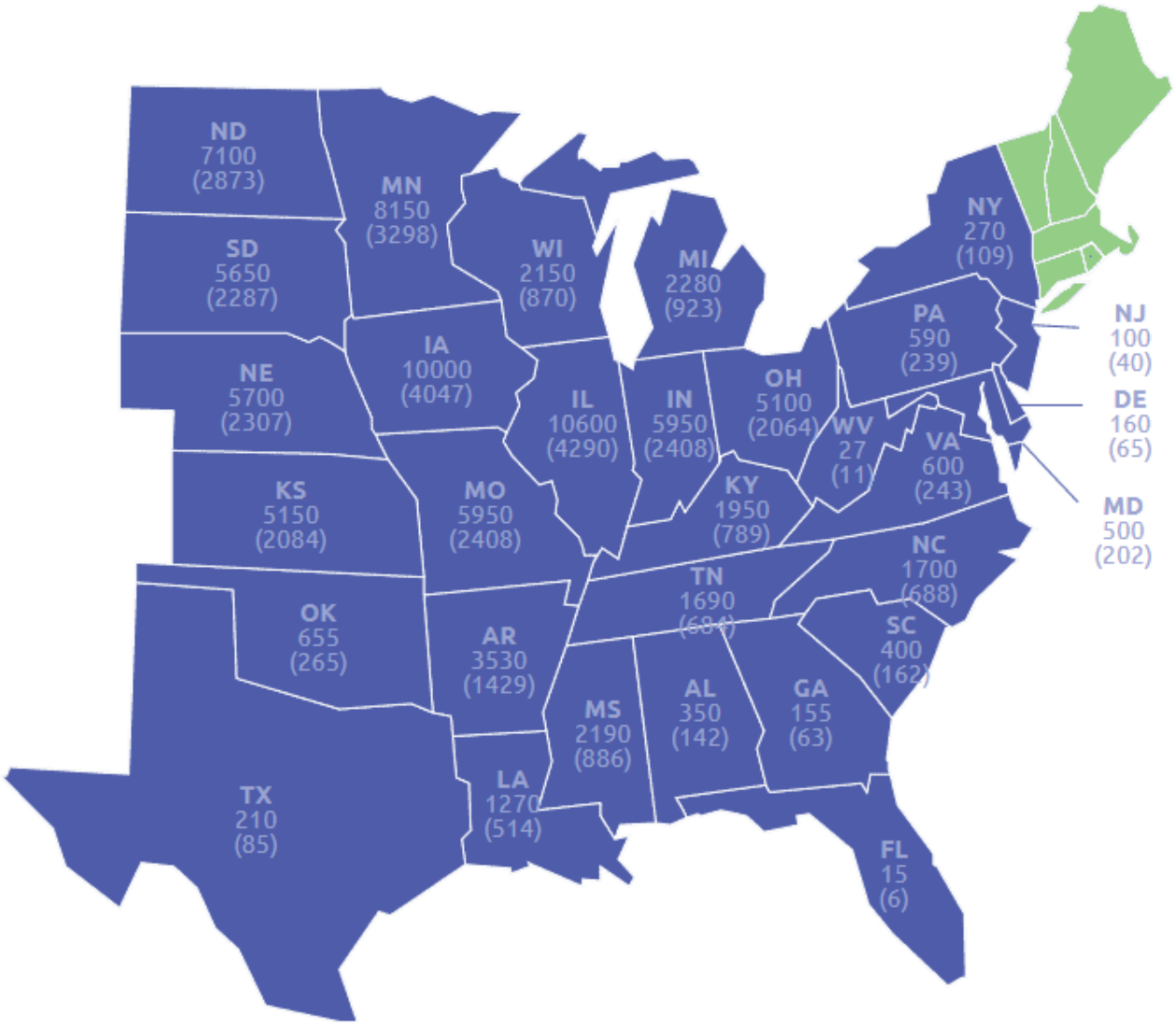
**Crops**
**$4,302,877,000**

U.S. Protein Meal Consumers, 2016



# How many acres of soybeans did NC produce in 2017?

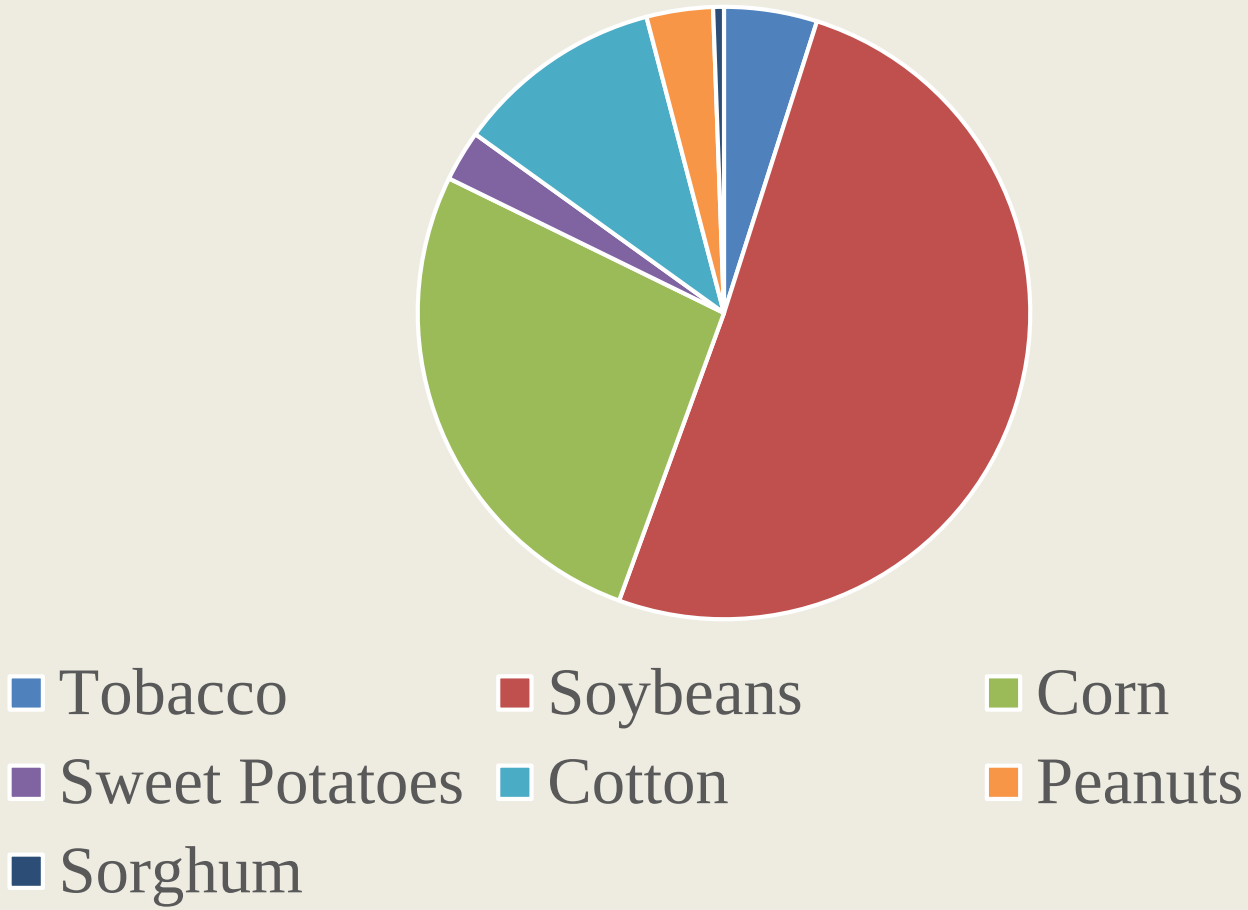
Source: USDA, NASS



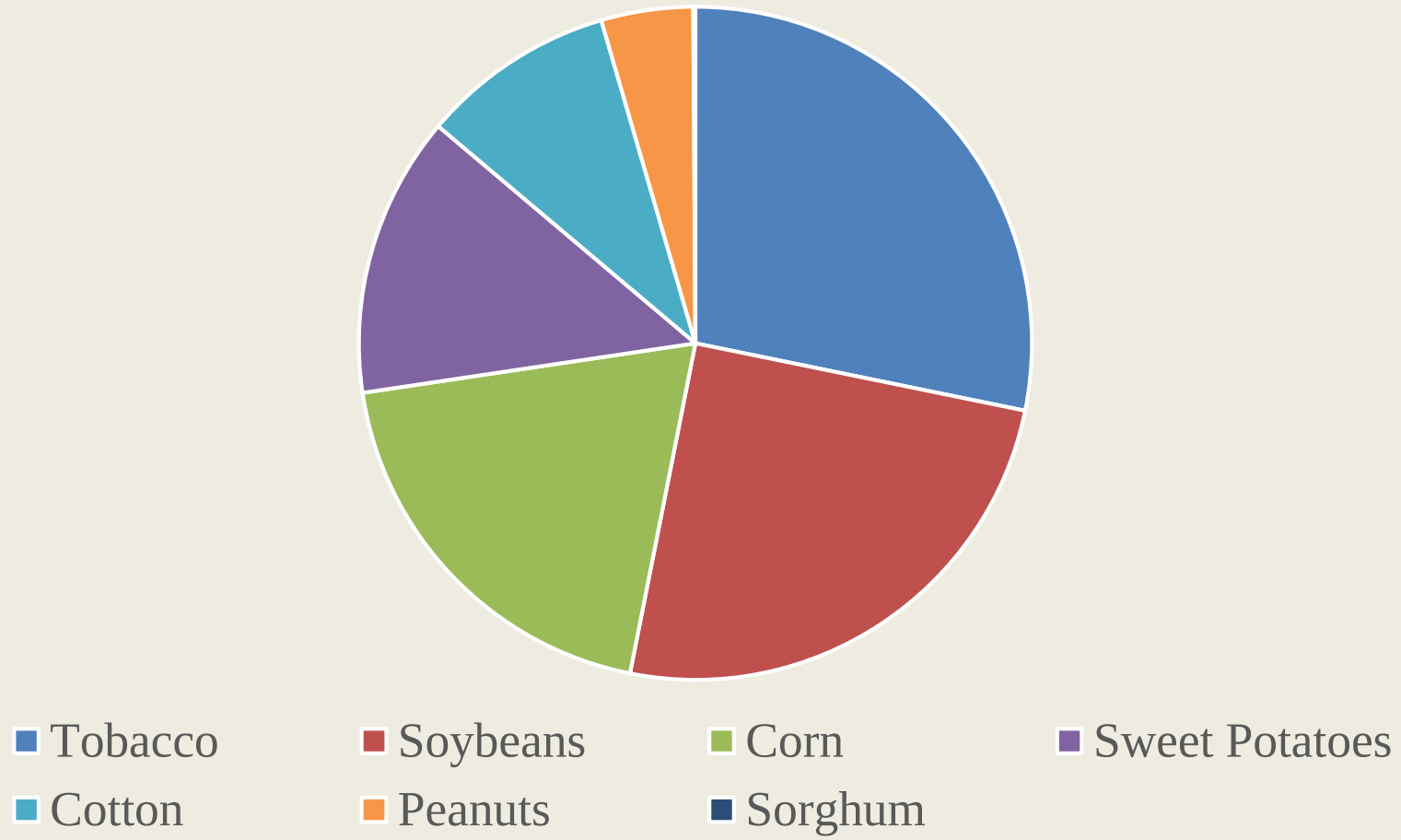

U.S. Soybean **Area Planted by State** 2017

Thousand Acres ( Thousand Hectares )

# NC Major Summer Row Crop Acres Harvested (%) in 2017



# NC Major Summer Row Crop Value of Production (%) in 2017

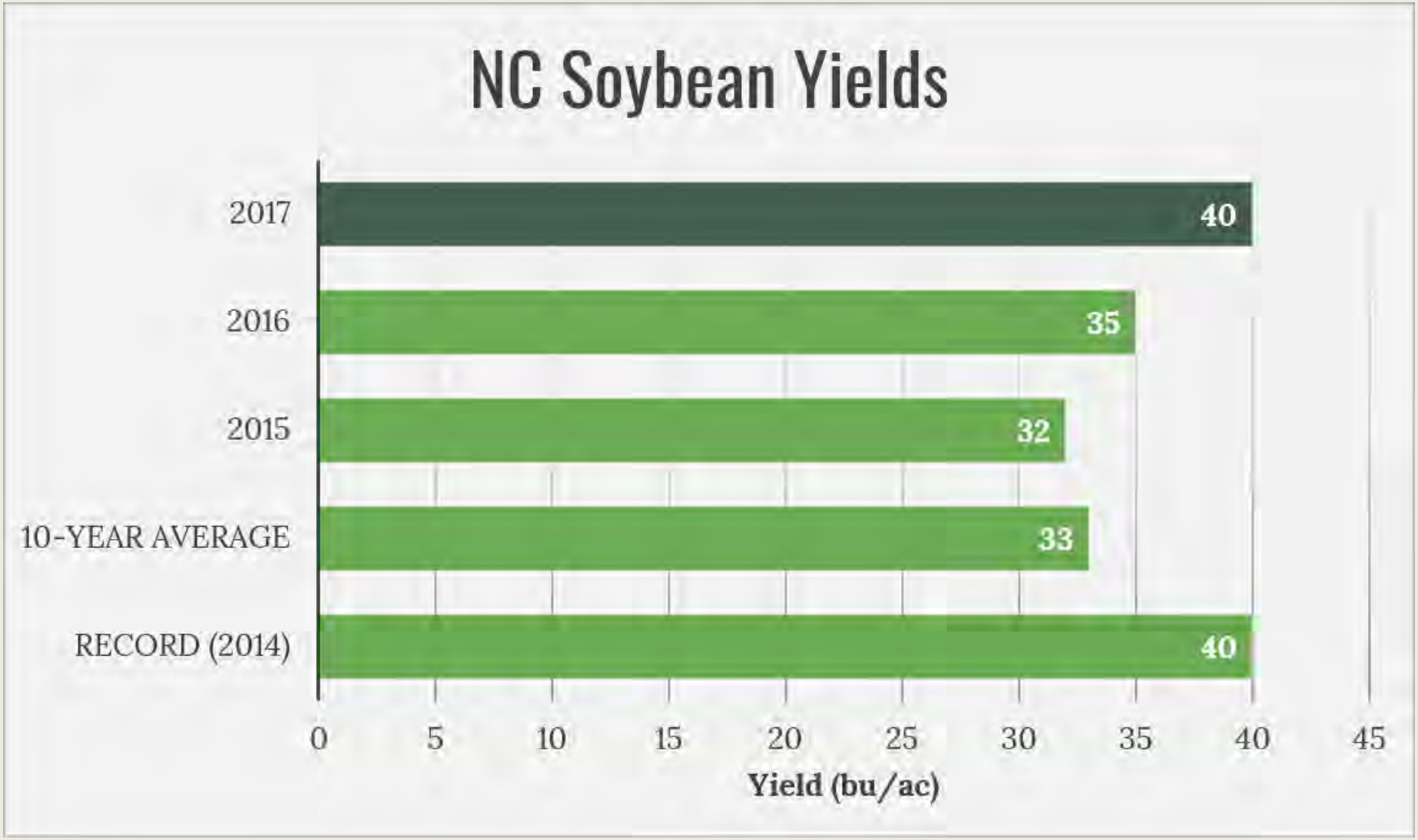


# What percentage of our acreage in North Carolina is generally double cropped?

| Year | % Acreage Double Cropped |
|---|---|
| 2014 | 45 |
| 2015 | 41 |
| 2016 | 26 |
| 2017 | 30 |
| 2018 | 35 |
| Source: USDA NASS | |

# What was the average soybean yield in NC in 2017?

# Average NC Soybean Yield

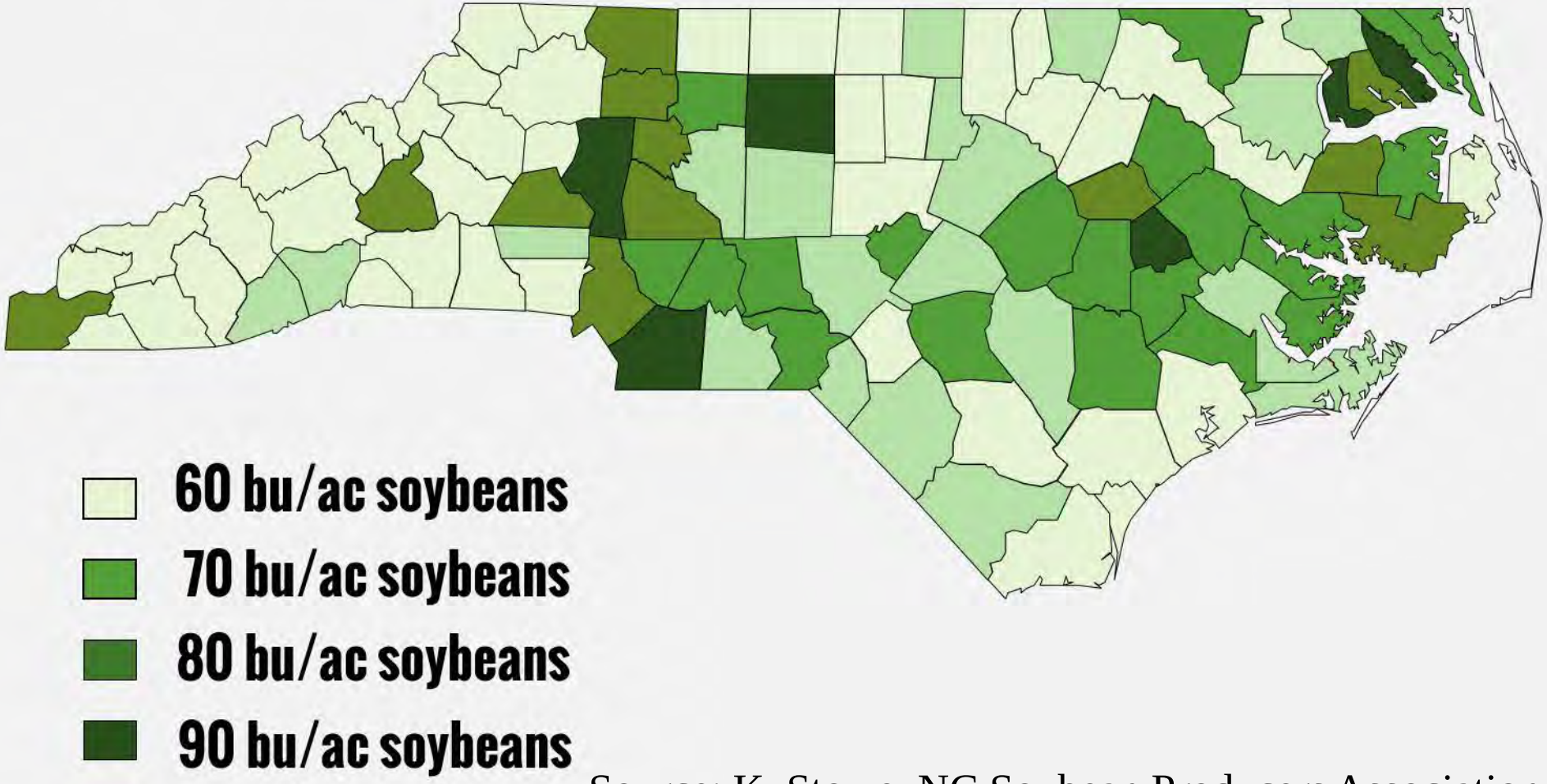



Source: K. Stowe, NCSPA

Highest US Soybean Yield >170 bu/acre, Highest NC Soybean Yield >100 bu/acre

# Counties with Highest Contest Yields

(data through 2016)




Source: K. Stowe, NC Soybean Producers Association

# Soybean Growth and Development

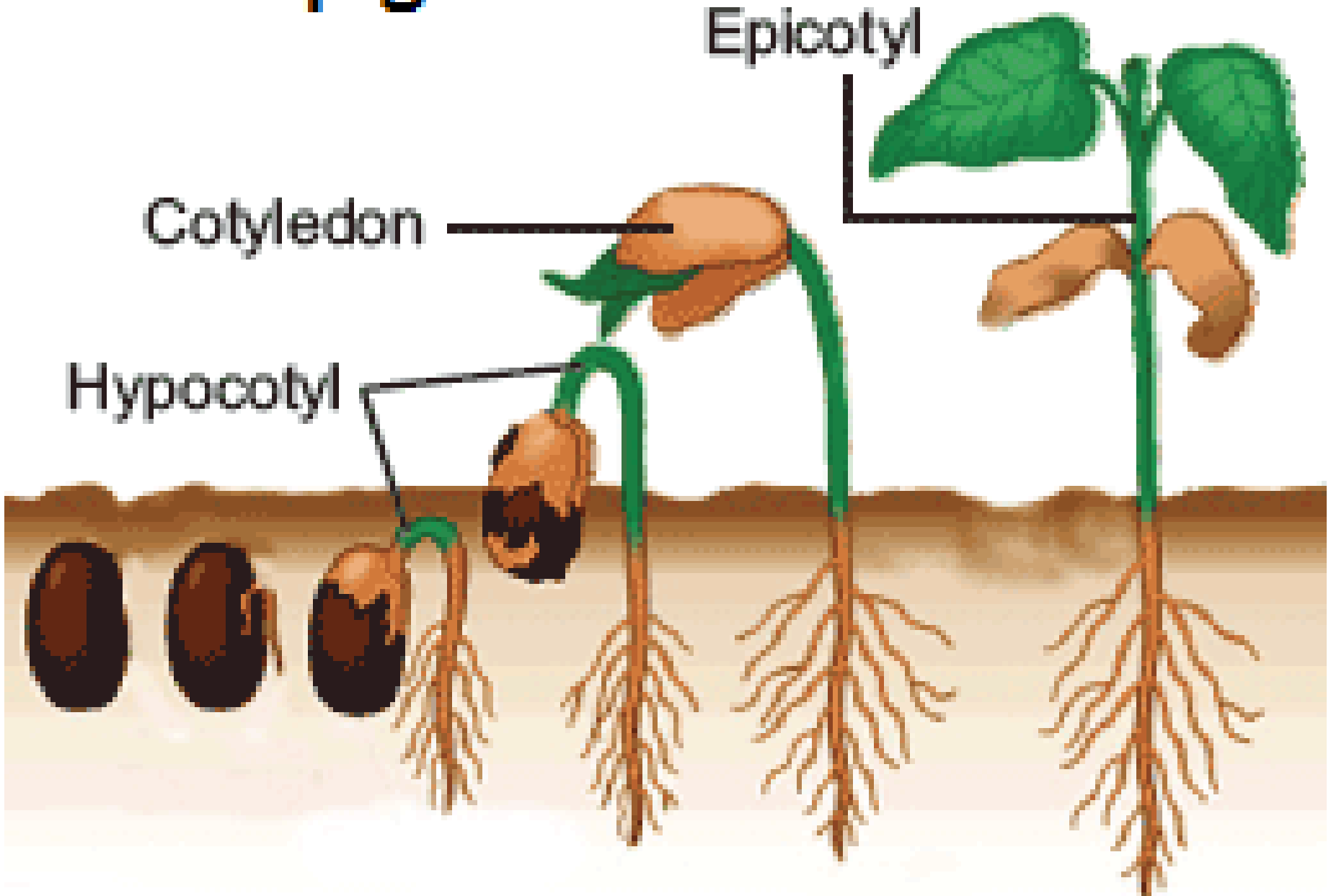
# Soybean Growth Stages

## Germination

- Germination begins with the soybean seed absorbing 50% of its weight in water.
- The radical (or primary root) grows from the swollen seed
- The radical elongates downward
- The hypocotyl begins elongation upward toward the soil surface, pulling the cotyledons along


Source: Cool Bean, University of Madison-Wisconsin

# Epigeal



**If a deer eats below the soybean cotyledon, can the plant recover without effecting yield?**

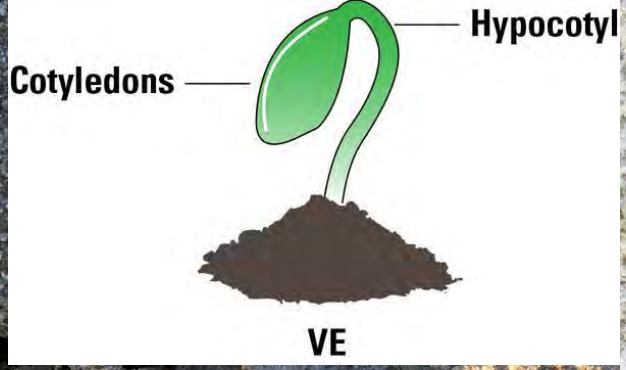
# Soybean Growth Stages

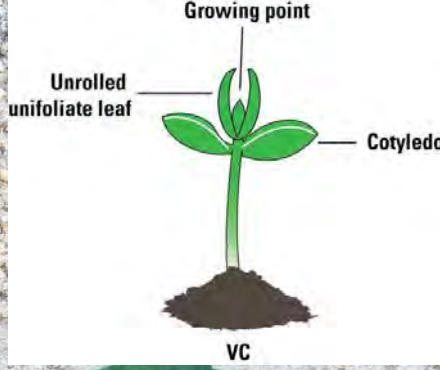
Why is it important to know soybean growth stages?

Fehr and Caviness (1977)

All soybean vegetative and reproductive stages consider the main stem only

Each growth stage begins when 50% of the soybean plants in the field reach that growth stage




Hypocotyl Arch

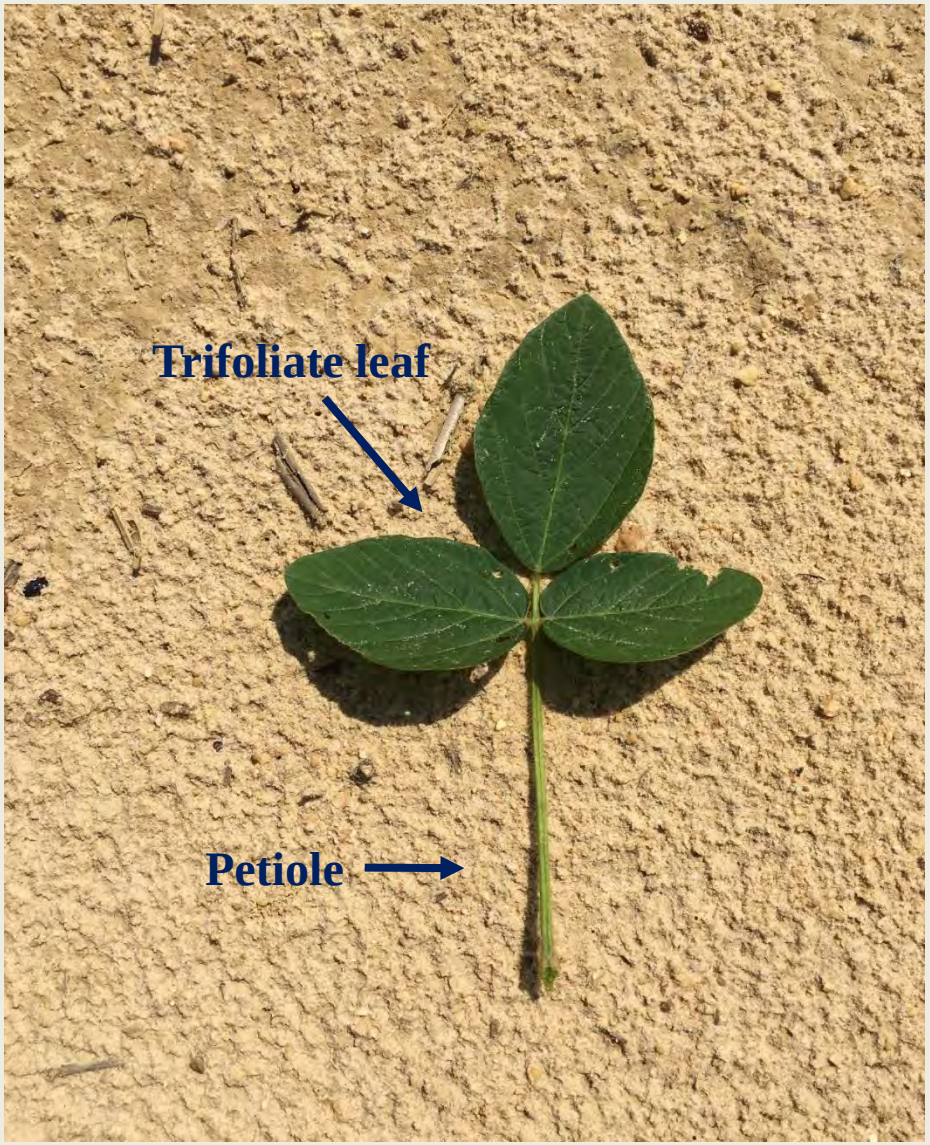
Growing Point

VE

VC

At VC, the first unifoliate leaves are present

# Trifoliate leaf





Comparison of when trifoliate leaflets are considered touching (above) and not touching (below)


Source: Cool Bean, University of Madison-Wisconsin


Leaf edges not touching
Fully developed unifoliolate leaf
Node 1
Node 0
V1


Terminal bud
Trifoli leaf
Leaf edges not touching
Petiole
Uppermos counted,
Lowest node counted, nod
Unifoliolate buds
Cotyledonary nodes
Axillary buds
V2

V1

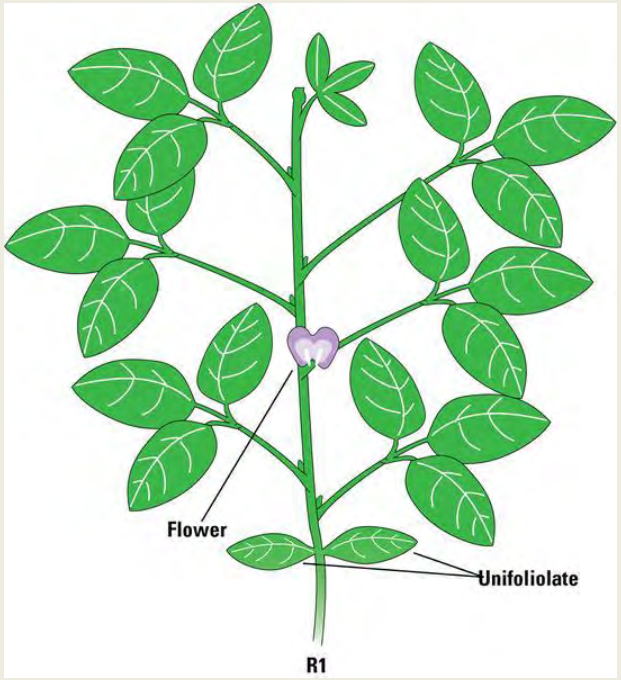
V2


VX

# Determinate vs Indeterminate

- Terminate most vegetative growth when they start flowering
- Generally MGVI or greater
- Most soybean varieties in the South

- Start flowering several weeks before they quit growing vegetatively
- Generally MGIV or less
- Most soybean varieties in the Midwest



# Soybean Growth Stages

## Determinate

Determinate – ceases new vegetative growth soon after flowering begins:

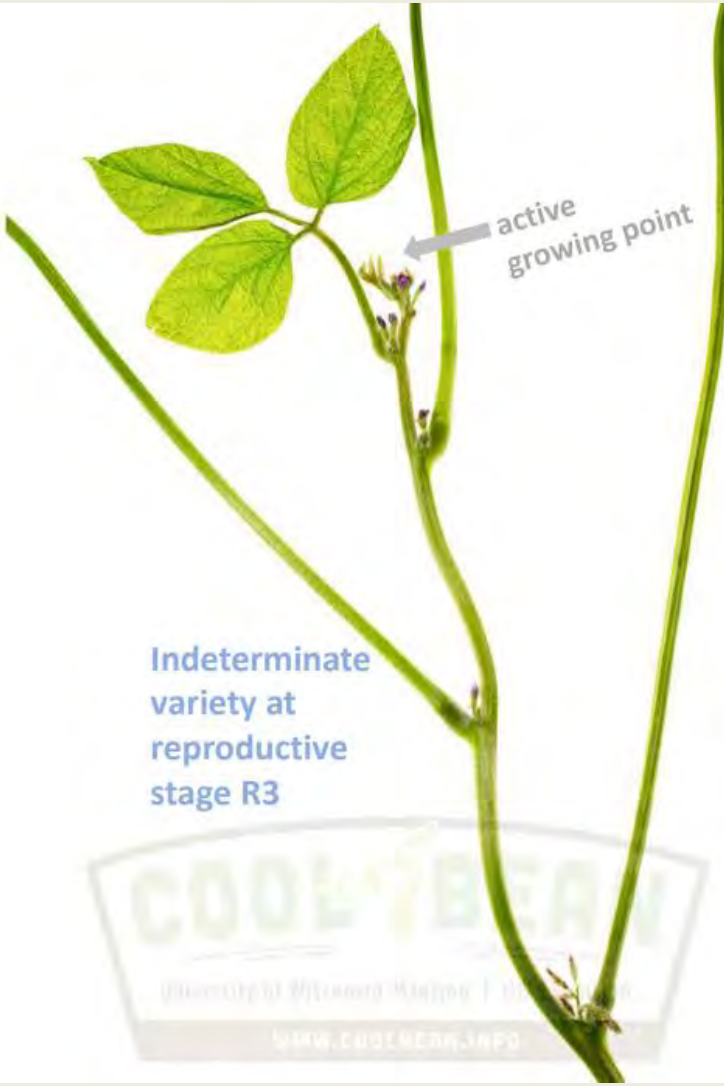
- Determinate plants have a terminal node on the main stem, indicating the end of vegetative growth from the apical meristem
- Determinate varieties are typically grown in the Southern U.S. (maturity groups IV to V and later) and in South America

# Soybean Growth Stages

## Indeterminate

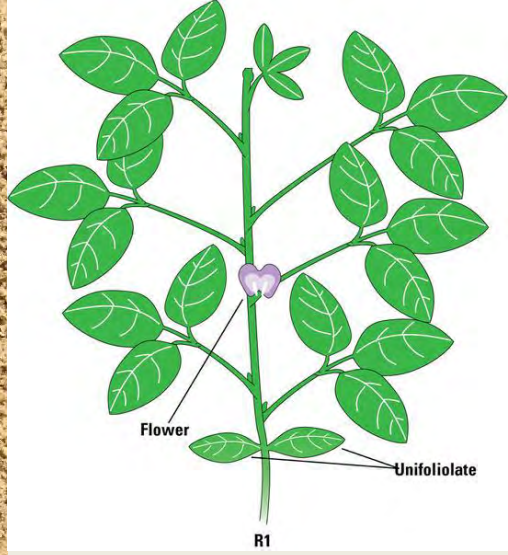
Indeterminate – continues new vegetative growth even after flowering begins:

- Indeterminate plants continue vegetative growth through the early to mid reproductive phases
- Indeterminate varieties are typically grown in the Central and Northern U.S. (maturity groups 000-IV)

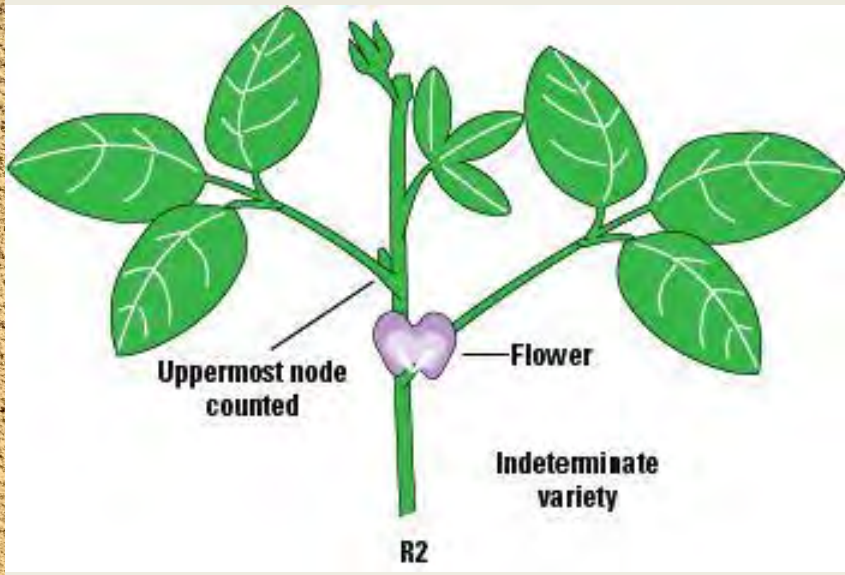


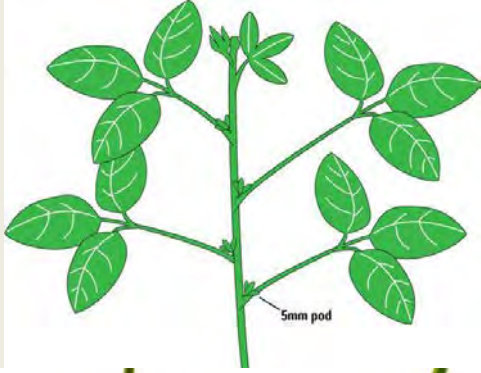

Indeterminate variety at reproductive stage R3


R1


Flower
Unifoliolate
R1

R2



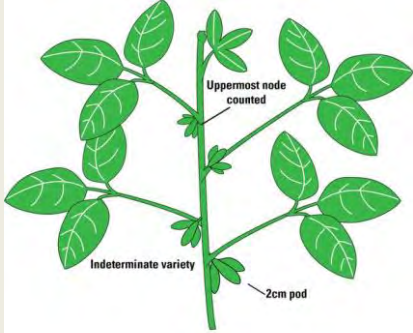



# Soybean Growth Stages

## R3

**Reproductive Stage**
Pod is 3/16 inch long at one of the four uppermost nodes on the main stem

- A plant can have all of the following – developing pods, withering flowers, new open flowers and flower buds

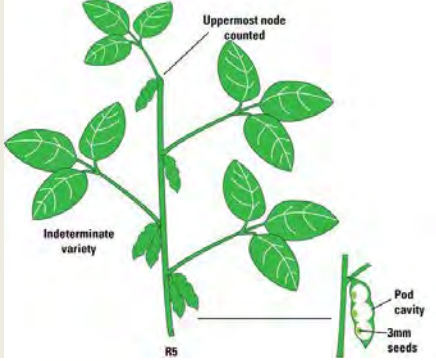




# Soybean Growth Stages

## R4

**Reproductive Stage**
Pod is 3/4 inch long at one of the four uppermost nodes on the main stem

- At this stage, rapid pod growth is occurring and seeds are starting to develop
- Flowering is still present on the upper branch nodes

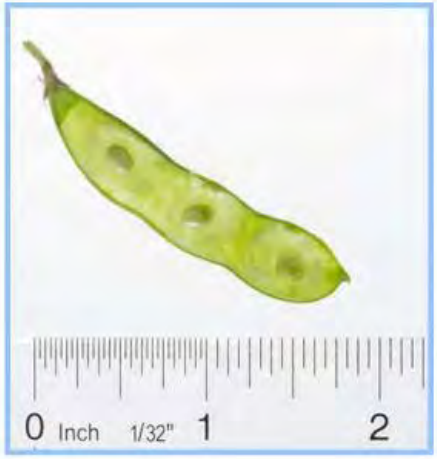


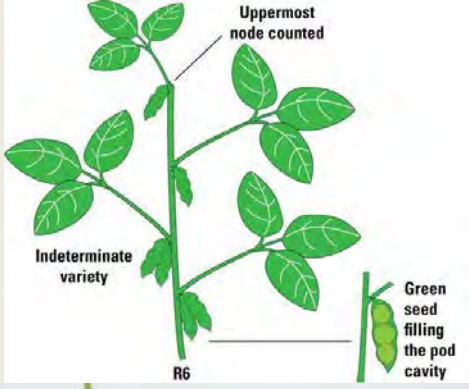

# Soybean Growth Stages

## R5

**Reproductive Stage**
Seed is 1/8 inches long in the pod at one of the four uppermost nodes on the main stem

- Rapid seed filling begins
- Dry weight and nutrients begin redistributing through the plant to the developing seed
- Root growth is slowing




# Soybean Growth Stages

## R6

**Reproductive Stage**
Pod containing a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem

- Beans of many sizes can be found on the plant
- Large amounts of N are still being accumulated from the soil, directly to the seed

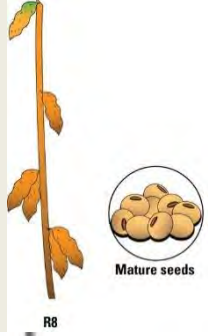
# Soybean Growth Stages

# R7

[No Title]

**Reproductive Stage**
One pod on the main stem has reached a mature pod color of brown or tan

- Yellow pods are moving toward maturity
- Tan or brown pods signal physiological maturity
- Seeds at the R7 growth stage pods are at approximately 60% moisture


# Soybean Growth Stages

## R8

Reproductive Stage

**95% of pods have reached mature pod color**

- Mature pod color does not necessarily indicate that beans are ready to harvest
- 5-10 days of drying weather are typically required after R8 for soybean moisture to be <15%

## Soybean Growth Stages

# Early pod development

## Soybean Growth Stages

# Seed development

Green (R6) pod


Developing seeds in pods

# Soybean Growth Stages

## Pod development

Green (R6) pod
Bean fills pod cavity

Yellow pod
Not physiological mature

Pod reaches mature color - brown, tan or tawny
Physiological maturity

Harvestable

# SOYBEAN GROWTH STAGING GUIDE

## V-E *Emergence*

Cotyledons have been pulled through the soil

## V-C *Unifoliate*

Unrolled unifoliate leaves

## V-1 *Trifoliate*

First unrolled trifoliate leaf

## V-2 to V-12

Second unrolled trifoliate leaf, third unrolled trifoliate leaf, fourth, etc.

## R-1 *Beginning bloom*

Plants have at least one open flower at any node (can be purple or white)

## R-2 *Full bloom*

Plants have an open flower at one of the two uppermost nodes on the main stem

## R-3 *Beginning pod*

Pods are 1/4-inch long at one of the four uppermost nodes on the main stem

## R-4 *Full pod*

Pods are 3/4-inch long at one of the four uppermost nodes on the main stem

## R-5 *Beginning seed*

Seeds are 1/8-inch long in the pod at one of the four uppermost nodes on the main stem

## R-6 *Full seed*

Pods contain green seeds that fill the pod to capacity at one of the four uppermost nodes on the main stem


## R-7 *Beginning maturity*

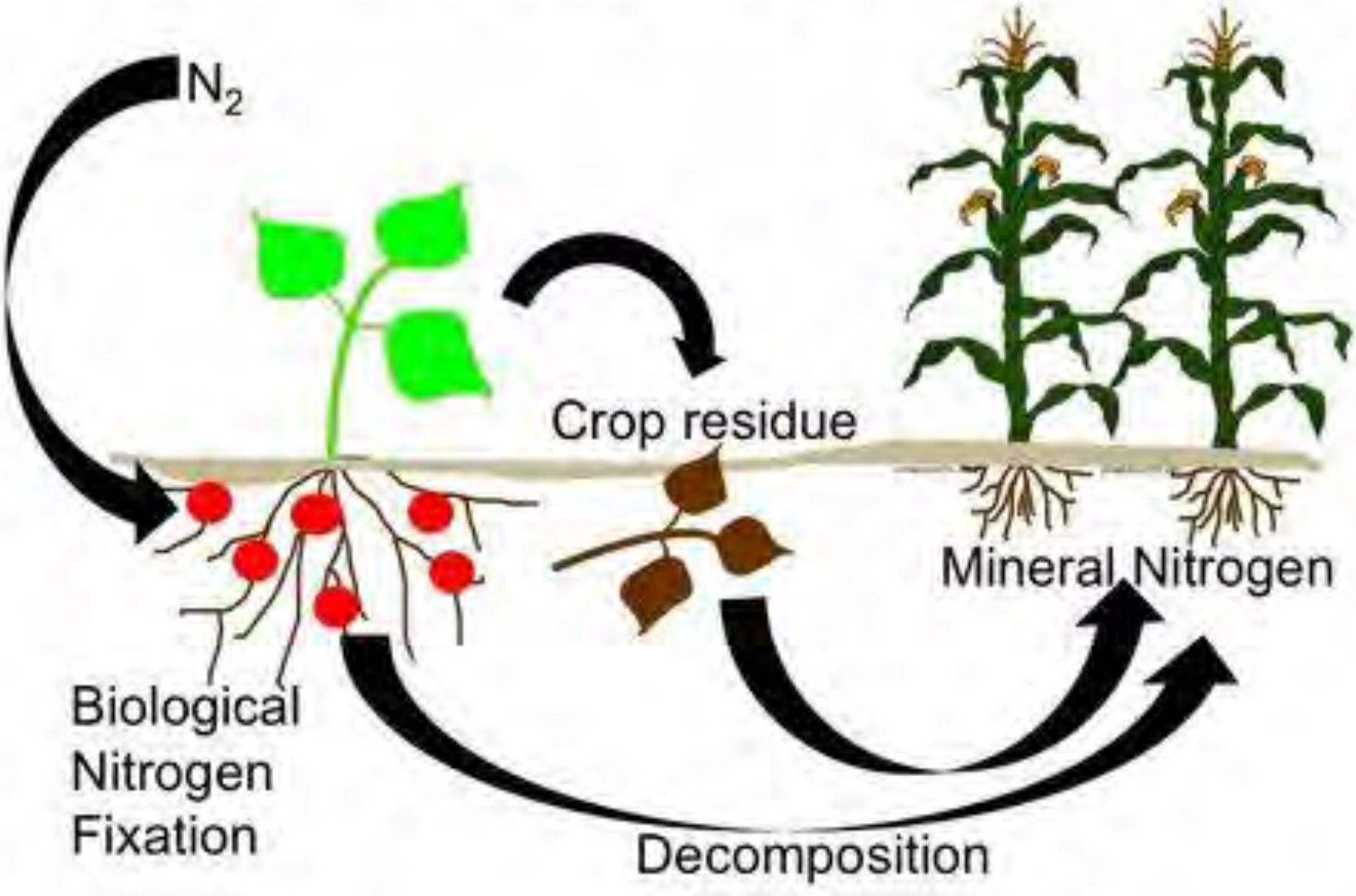
Majority of pods are yellow and at least one pod on the main stem has reached its mature colour (tan/brown)


## R-8 *Full maturity*

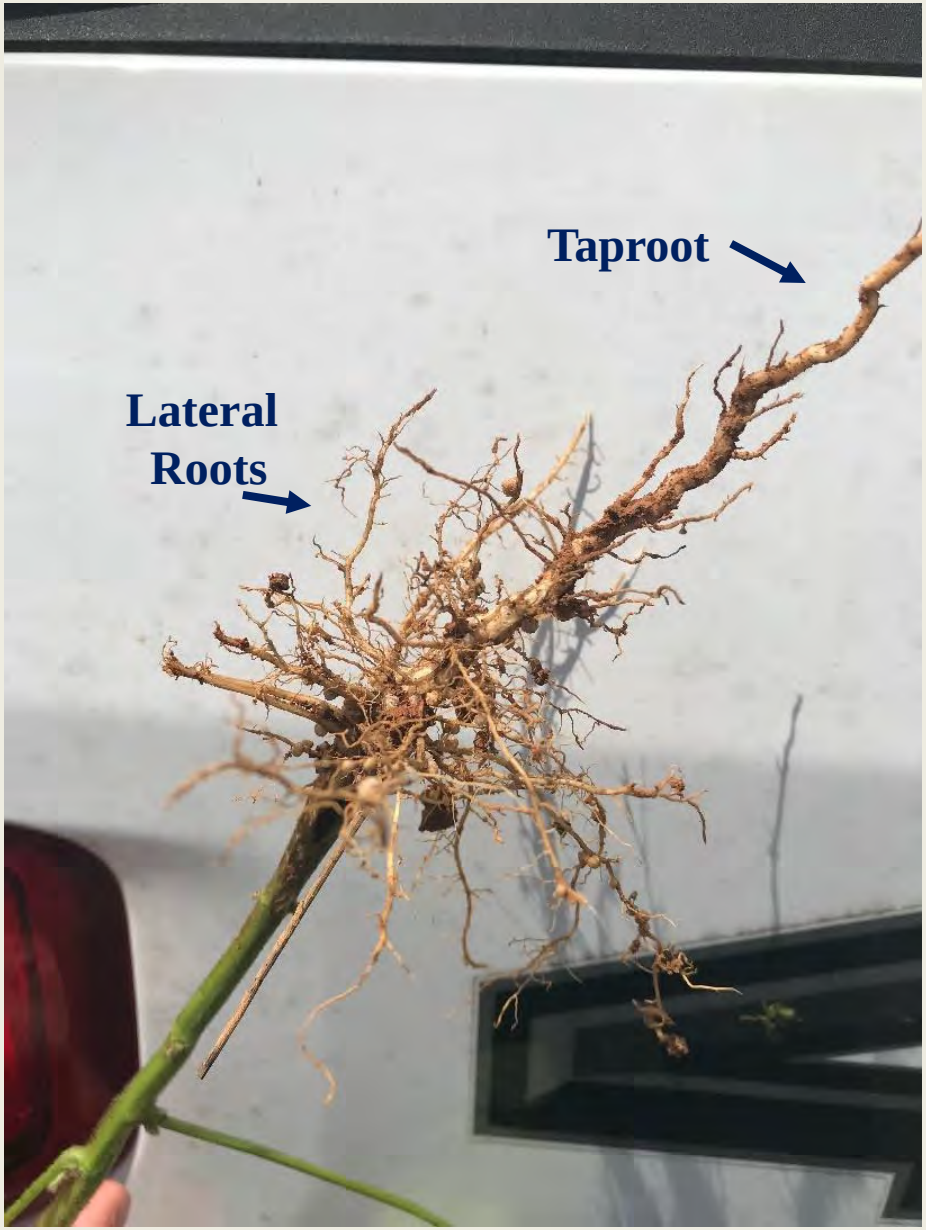
95% of the pods have reached their mature colour

Manitoba Pulse & Soybean Growers • www.manitobapulse.ca

# Legume based cropping system



# Soybean N fixation




- Bradyrhizobium japonicum (bacteria)
- Bacteria form symbiotic relationship with plant
- Fix atmospheric $N_2$ mediated by nitrogenase
- What impacts nodulation?
  - Oxygen-limited environments
  - Soil pH
  - Dry soils
  - Excess mineral nitrogen

**If a nodule is functioning properly, what will be the inside color?**

# What controls flowering in soybeans?

- Photoperiod sensitive plant
- Day length is primary driver
- Temperature is also an important driver
- Maturity group and growth stage will influence flowering

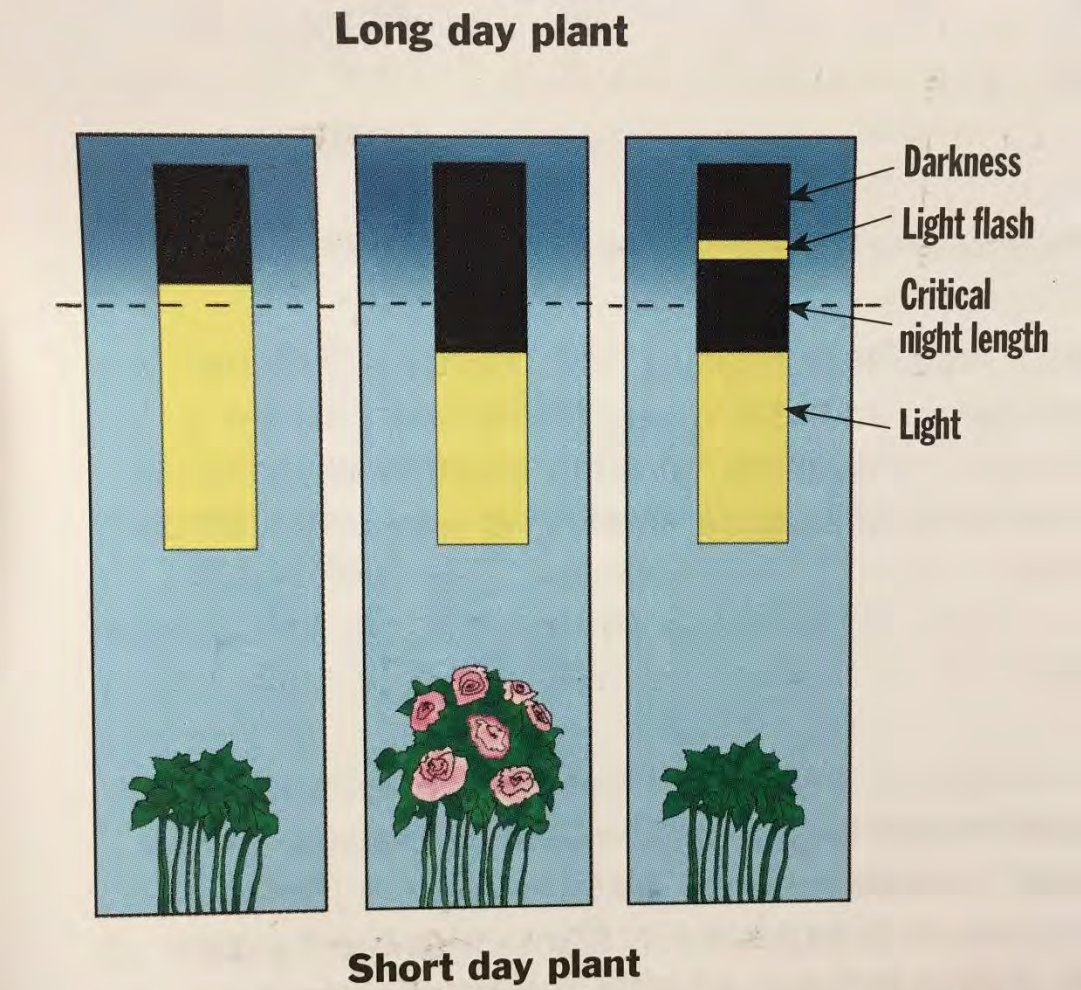
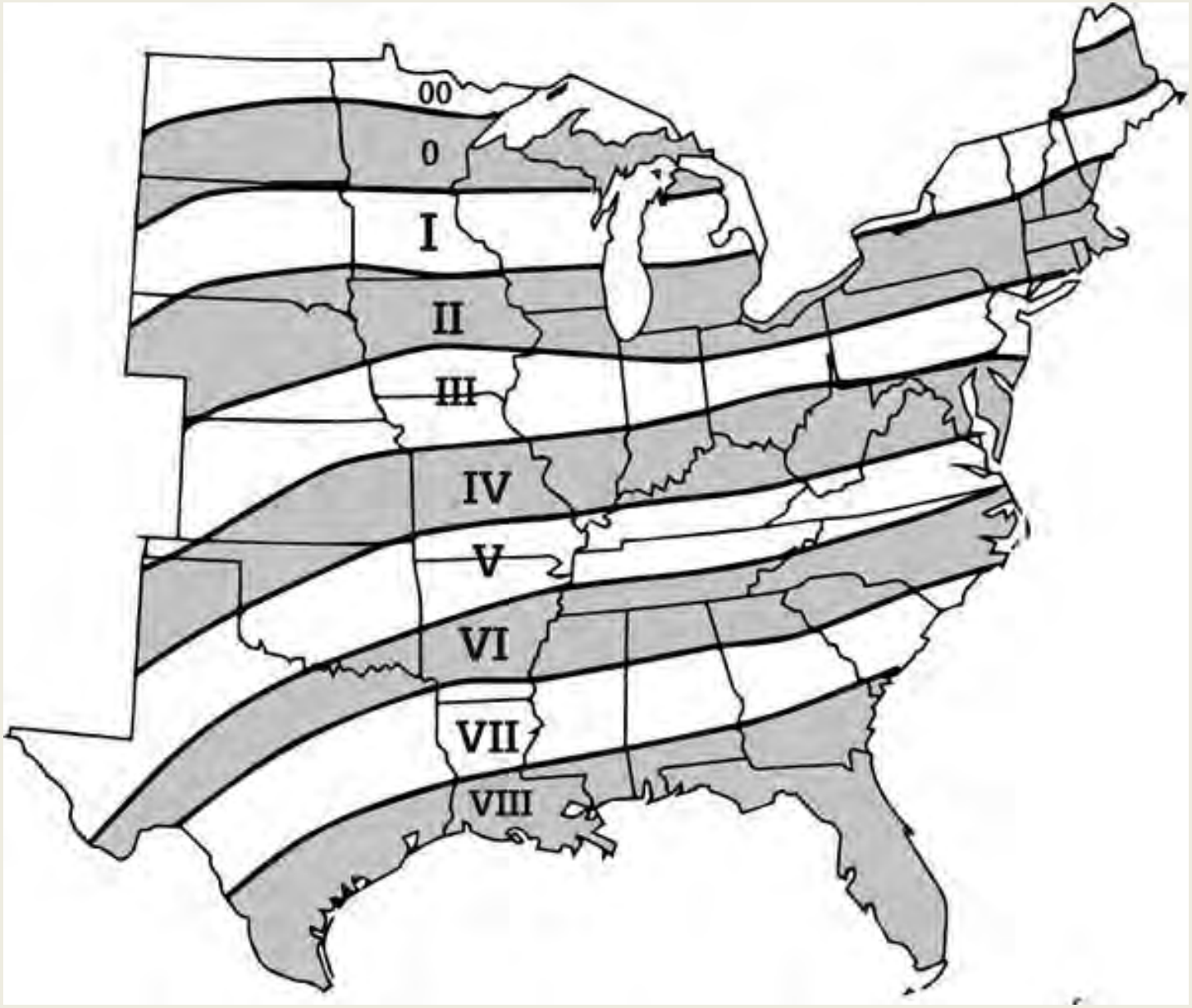



**Figure 6.4.** Flowering responses of long and short day plants.

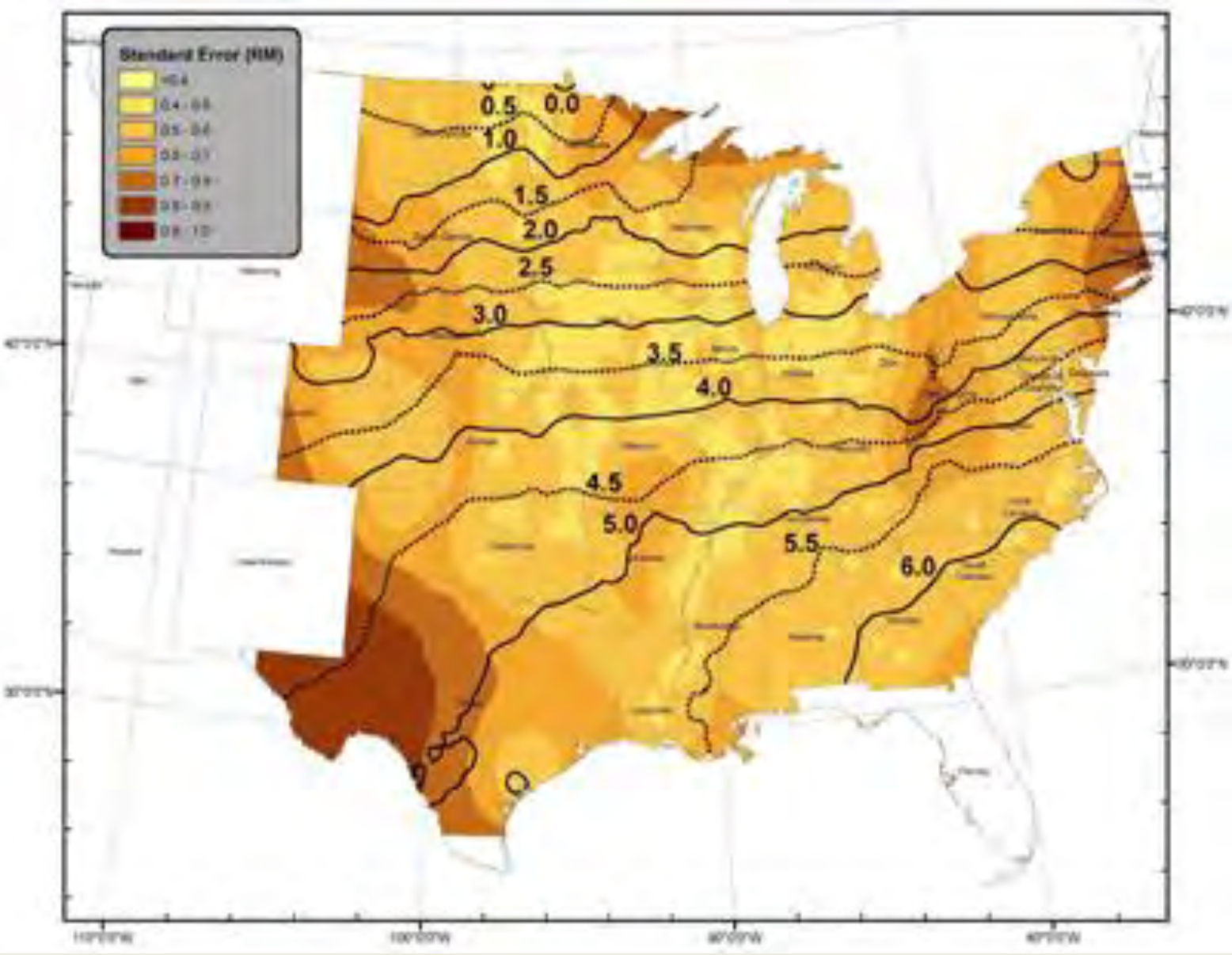
# What is a soybean maturity group?

- Maturity group zones were developed to define where a soybean variety is best adapted
- A variety is classified into maturity group according to the length of period from planting to maturity. This is controlled by photoperiod and temperature.
- 13 major groups ranging from MG000 to MGX
- Graduations in each maturity group by adding a decimal to the maturity group number (i.e. 3.8, 5.6, etc.)

# Soybean Maturity Groups: Traditional Model

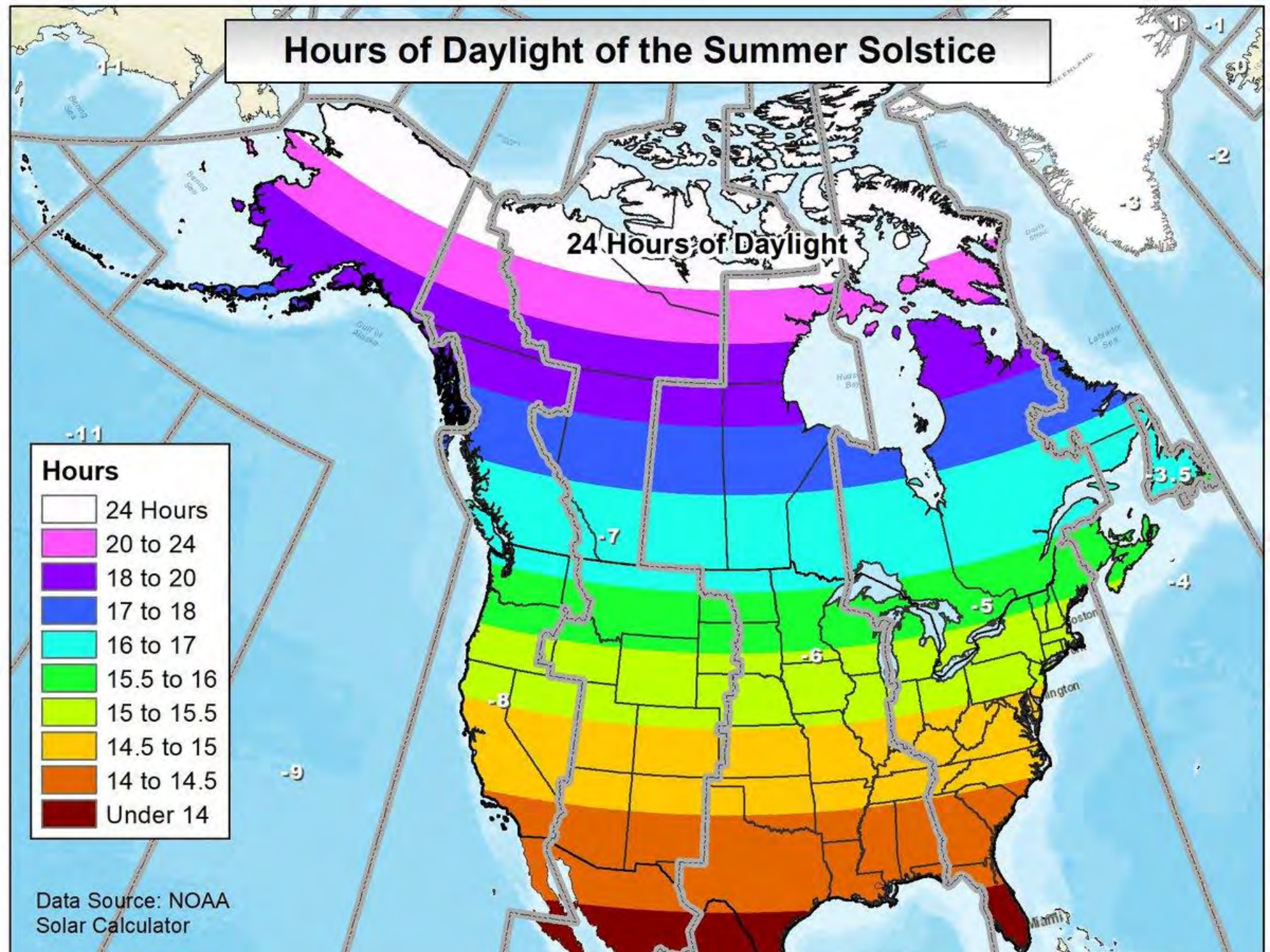


# Soybean Maturity Groups: New Model?

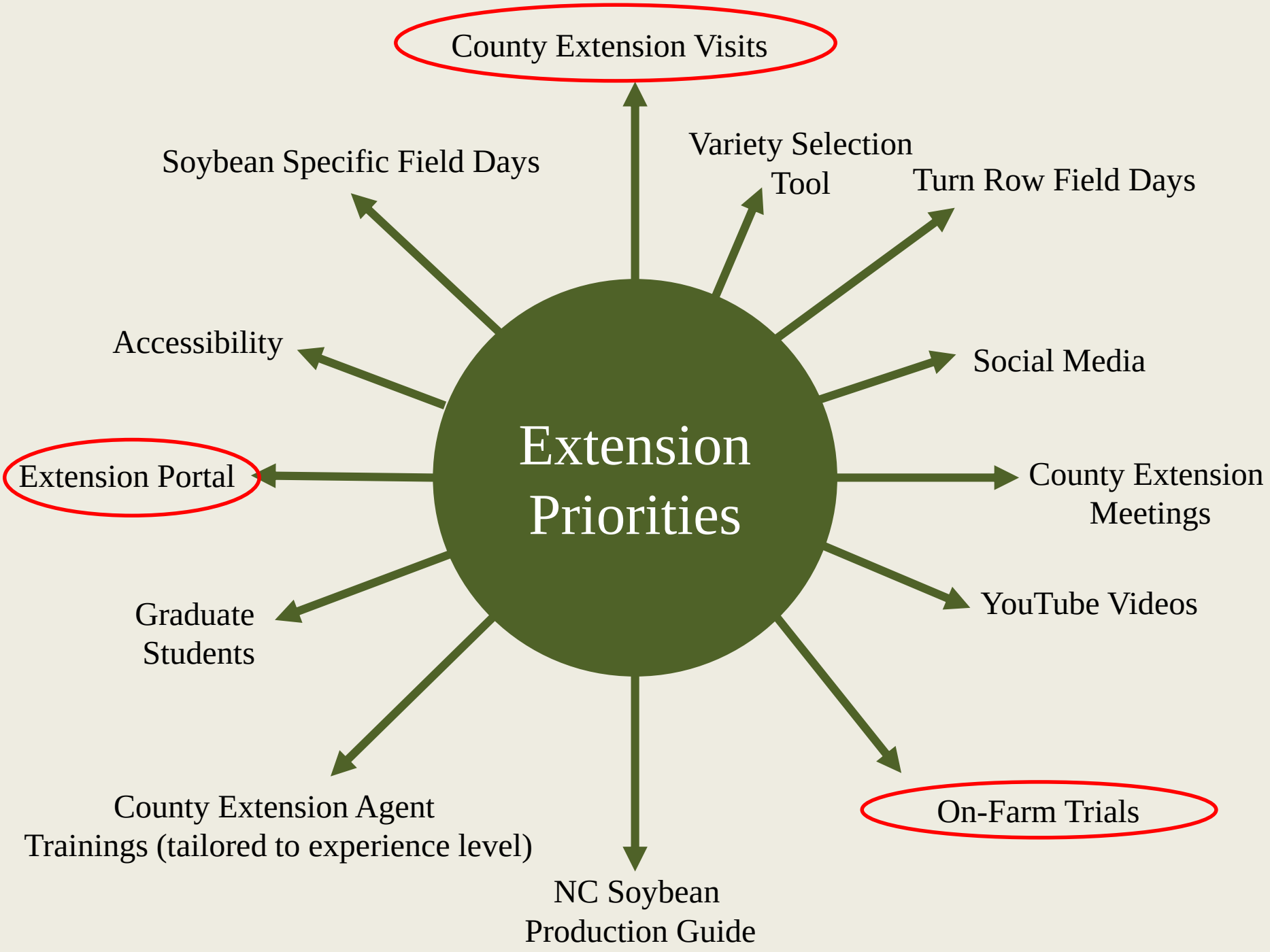


**As you move up in maturity group the soybean plant has more time for vegetative growth to feed seed production. This should help increase yield. Why don't growers in the Midwest plant higher maturity groups?**

# Hours of Daylight of the Summer Solstice



**As soybean MG increases, a LONGER night is needed to induce flowering**


County Extension Visits
Soybean Specific Field Days
Variety Selection Tool
Turn Row Field Days
Accessibility
Social Media
Extension Priorities
Extension Portal
County Extension Meetings
Graduate Students
YouTube Videos
County Extension Agent Trainings (tailored to experience level)
NC Soybean Production Guide
On-Farm Trials

NC STATE EXTENSION soybeans.ces.ncsu.edu COUNTY CENTERS TOPICS GIVE NOW

# Soybeans

Search

- Meet Our Staff
- Events
- Soybean Production Guide
- NC Soybean Variety Information
- NC Soybean Yield Contest
- **Additional Production Information**
  Reduce Soybean Harvest Loss, Soybean Crop Profile in NC
- **Disease Management**
  Disease and Nematode Management (From Soybean Production Guide), Soybean Cyst Nematode, Soybean Stem Canker
- **Insect Management**
  Insect Management (From Soybean Production Guide), Pest Avoidance, Scouting for Insects ...
- **Weed Management**
  Weed Management (From Soybean Production Guide), Annual Broadleaf Weed Control, Annual Grass Control ...
- Organic Soybeans
- Soybean Economics
- Departments

## Events

ALL EVENTS

| | | | |
|---|---|---|---|
| AUG 13 MON | Soybean Agent Training | AUG 18 SAT | Lincoln/Gaston County Corn & Soybean Field Day |
| Mon Aug 13 - Tue Aug 14 | | Sat Aug 18 | |
| 12 hours away | | 6 days away | |

| | | | |
|---|---|---|---|
| AUG 23 THU | Forsyth, Stokes, Surry, Yadkin Soybean Field Day | AUG 28 TUE | Johns Soybe |
| Thu Aug 23 | | Tue 8/2 | |
| 2 weeks away | | 2 weeks | |

## News and Updates

### Section 18 Approved for Sivanto Prime on Sweet Sorghum for Sugarcane Aphid

As in 2016 and 2017, Sivanto Prime for control of sugarcane aphid on sweet sorghum has been approved for ...

# Stakeholder Feedback on Applied Research Priorities

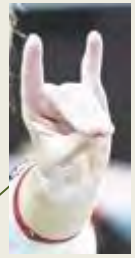
**Foliar Micronutrients**

**Early Maturing Varieties (MG III and IV's)**

**Revisiting Fertility Recommendations**

Rotations

Cover Crops



Planting Dates

Seeding Rate

On-farm strip trials

Fungicides (products and application timing)

Row Spacing

Maximizing Yield

# Questions?