Dealer Programs To Move Soybean Yields Higher

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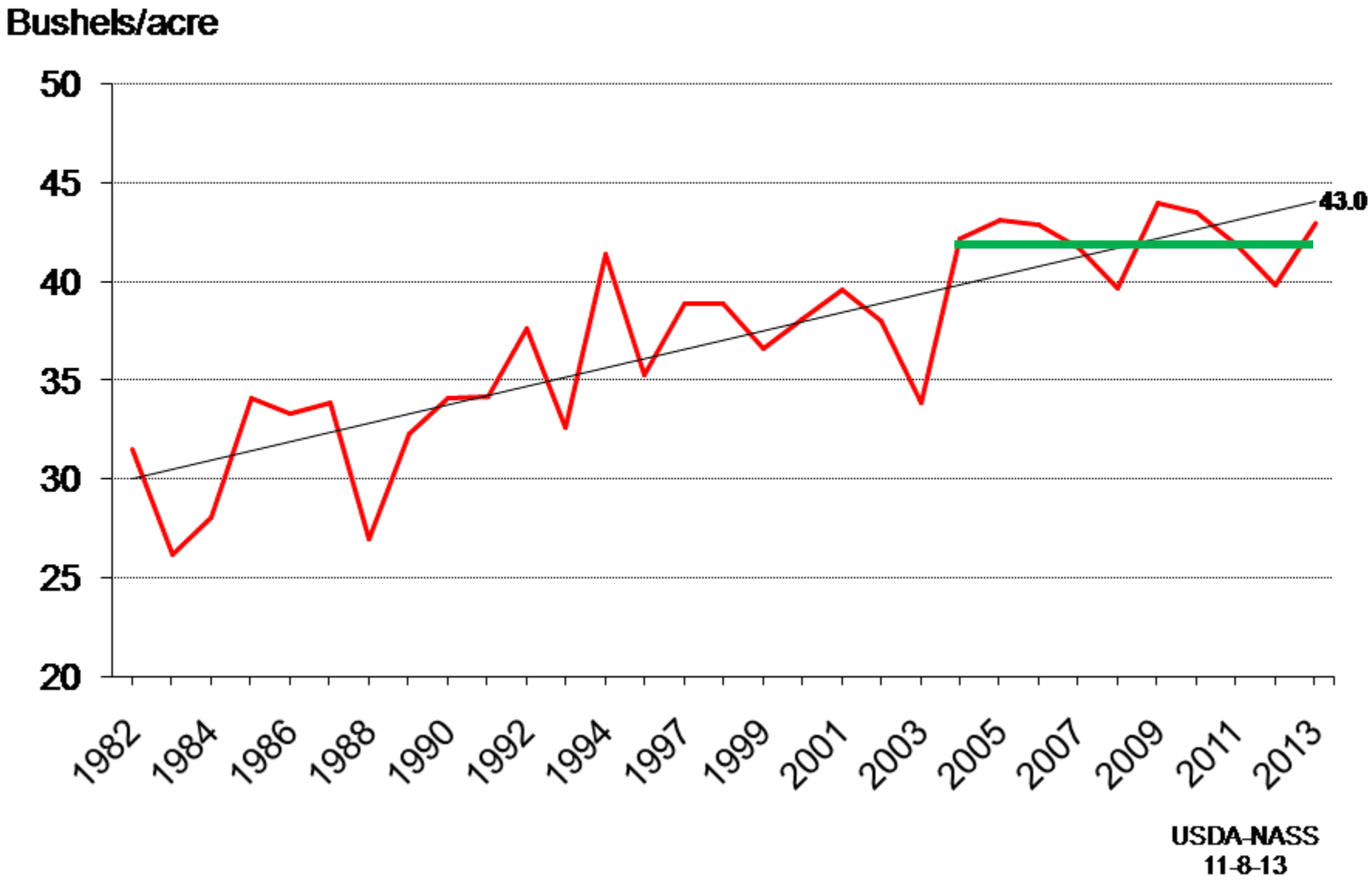
B&M Crop Consulting, Inc.


High-Yielding Soybeans
Understand the Yield Components of Soybeans

U.S. Soybean Yield



Soybean Yields

- Have we gotten “lazy” with soybean management?
- Plant…..spray…..harvest.
- How much time do you spend with your customers in soybean fields?
- Are your customers frustrated with soybean yields?
- Do you understand the factors that drive soybean yield?
- What have you tried to improve with their soybean management system?

Where do we begin?

- Understanding how the plant works
- Growth & Development
  - Germination/Emergence
  - Growing Point
  - Vegetative Stages
  - Reproductive Stages
  - Yield Components

Growth and Development

- Like corn, soybeans have a built-in yield potential and once planted start adjusting to the environment
- **Beans set their yield later in the development process than corn**. A tough start for beans doesn't carry the yield penalty it does in corn

Growth and Development

- The staging system for beans is split into Vegetative Stages and Reproductive Stages
- Vegetative Stages are designated by V (V1, V2, etc.)
- Reproductive stages are designated by R (R1-R8)

Growth and Development

- Nitrogen nodules show up at VE but don't start supplying nitrogen to the plant until **V3**
- Nodules that are making nitrogen will be **pink** inside
- Nodules will produce whatever nitrogen the soil can't supply to meet bean needs

Soybean Seed Treatment

Inoculant

Treated

More Nodules

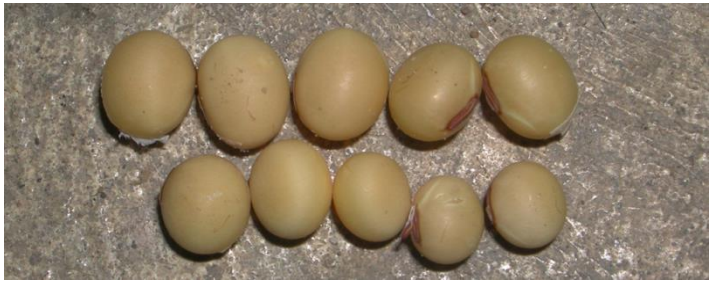
Untreated

Less Nodules

Gibsonburg, OH. Photos taken on 6/8/06, V2 Soybeans

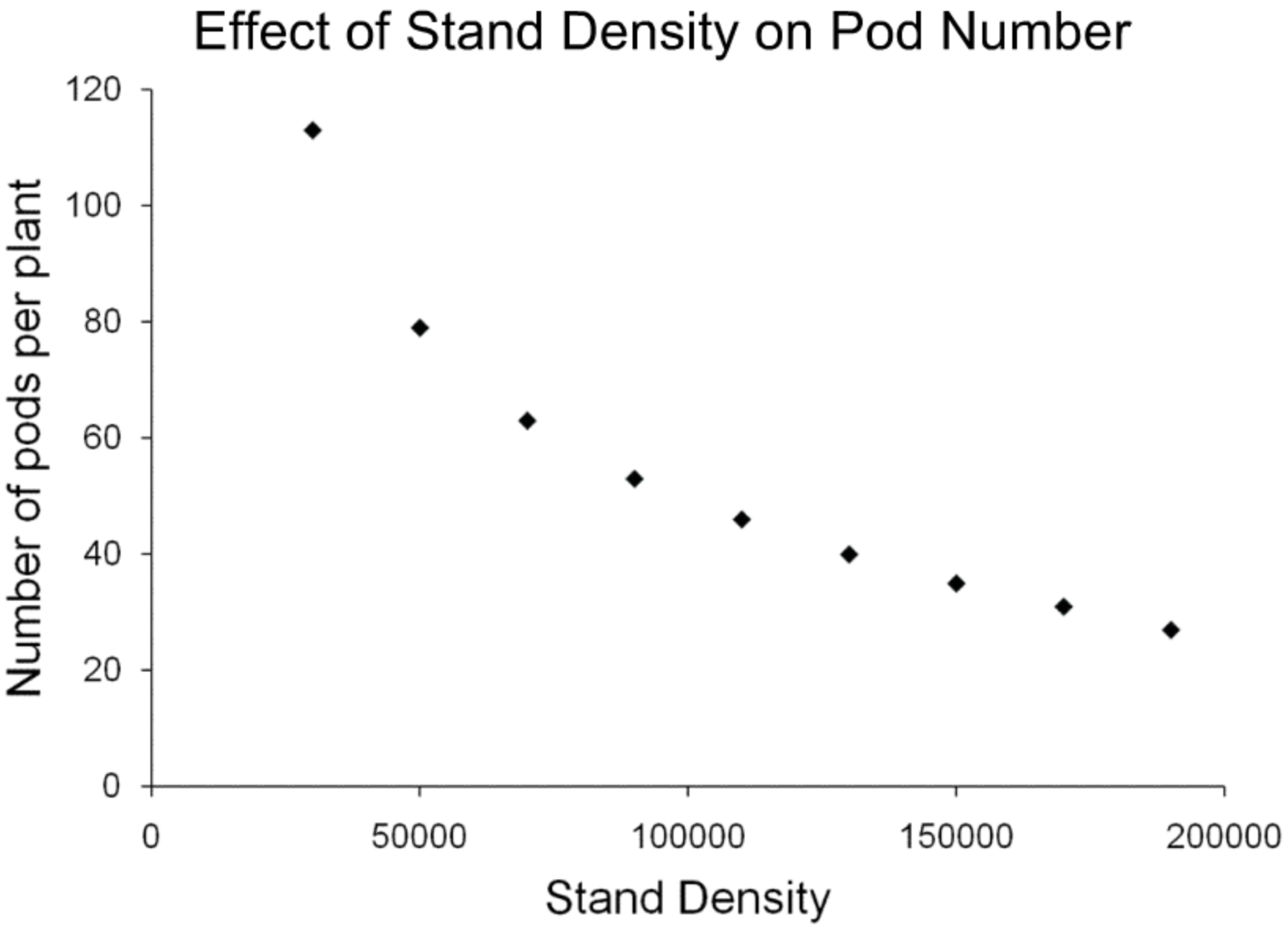
Growth and Development

- Yield is divided into three components
  - Total number of pods
  - Number of beans per pod
  - Weight per bean (seed size)



Growth and Development

- Branch is a function of environment and genetics
  - The main growing point on top controls the auxiliary buds on the stem below
  - If the main growing point has a lot of control over the plant, you will have a straight line bean
  - If it has weak control, you will have a bushy bean



William J. Weibold, Ph.D.
Professor, Plant Science Division, University of Missouri

56,000 **210,000**

Source: William J. Weibold, Ph.D., Professor, Plant Science Division, University of Missouri

Plant Growth Regulators (PGRs)

- **PGRs are plant hormones that use chemical signal molecules to regulate cellular processes within the plant**
- **PGRs:**
  - **Shape the plant**
  - **Affect seed growth**
  - **Determine time of flowering**
  - **Determine the sex of flowers**
  - **Affect leaf death**
  - **Affect fruit characteristics**
  - **Affect which tissues grow where**
  - **Affect plant longevity**

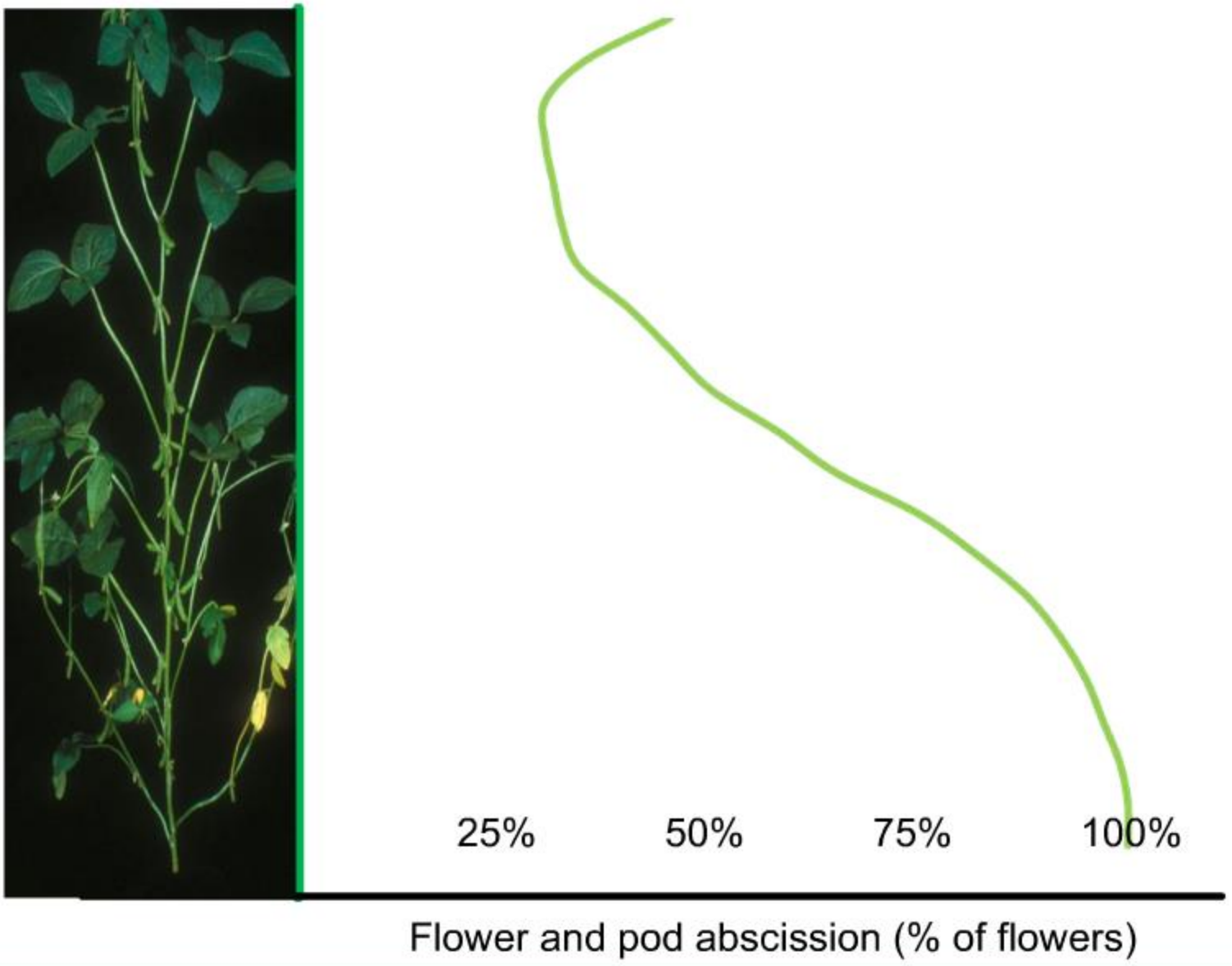
Flowering

- **60 to 75%** of all soybean flowers produced typically abort and never contribute to yield
- The over-production of flowers allows the soybean to compensate for stressful conditions during the early R-stages

Growth and Development

- Yield is divided into three components
  - Total number of pods
  - Number of beans per pod
  - Weight per bean (seed size)
- **Large yield increases are the result of increased pods per plant**
  - Upper limit on beans per pod and seed size are genetically set
    - Together they can make a sizable difference

Flower and Pod Abscission within a Soybean Canopy



Source: William J. Weibold, Ph.D., Professor, Plant Science Division, University of Missouri

Planting Date

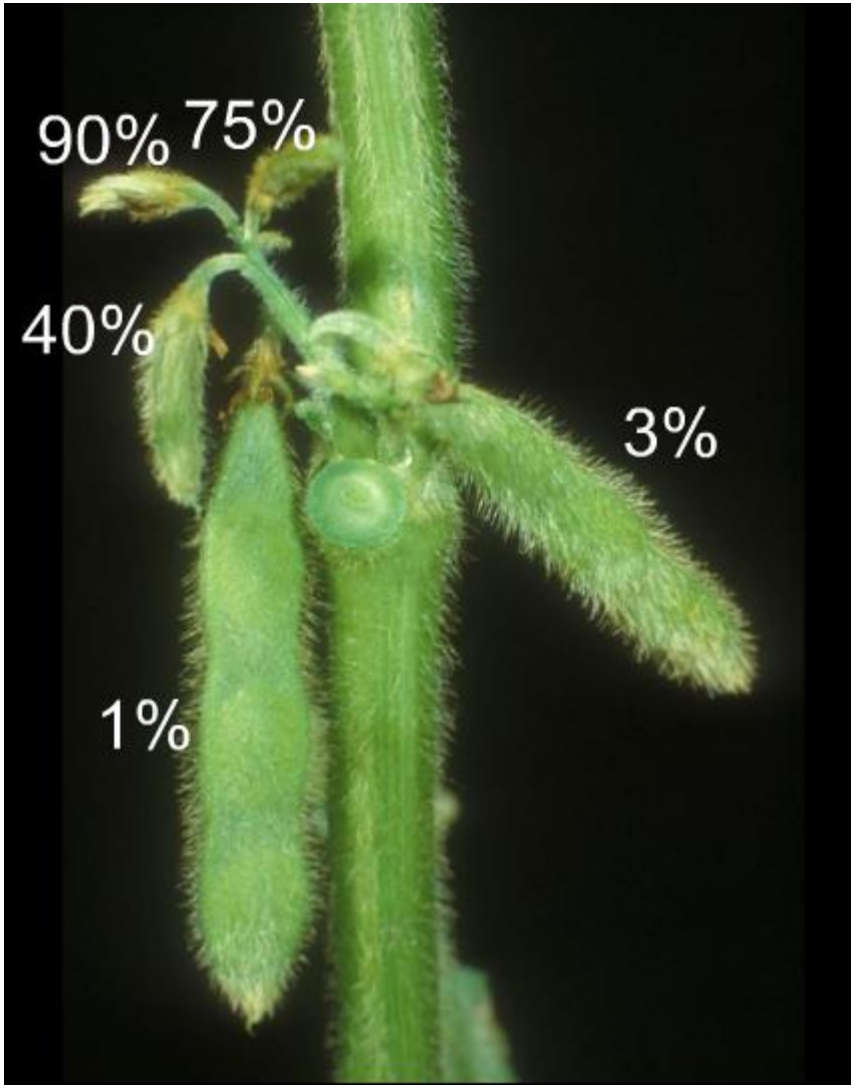
- Average yield loss of <u>0.4 Bu/ac/day</u>
- When planting has been delayed past the first week of May
- Univ. Wisconsin

Growth and Development

- **Stress** in the form of moisture, heat, etc. during R1 through R5.5 will affect the components of yield differently
  - Stress at R1 through R4 could **reduce the number of pods**
  - Stress at R3 through R4 could **reduce the size of pods** (1, 2 or 3 bean pods)
  - Stress at R4 to R6 may cause **beans to abort in the pod**
  - Stress at R5.5 to R6.5 will cause the **bean size to be affected**

Stress increases amount of abscission.

“Older” pods produce hormones or steal food/nutrients from “younger” pods



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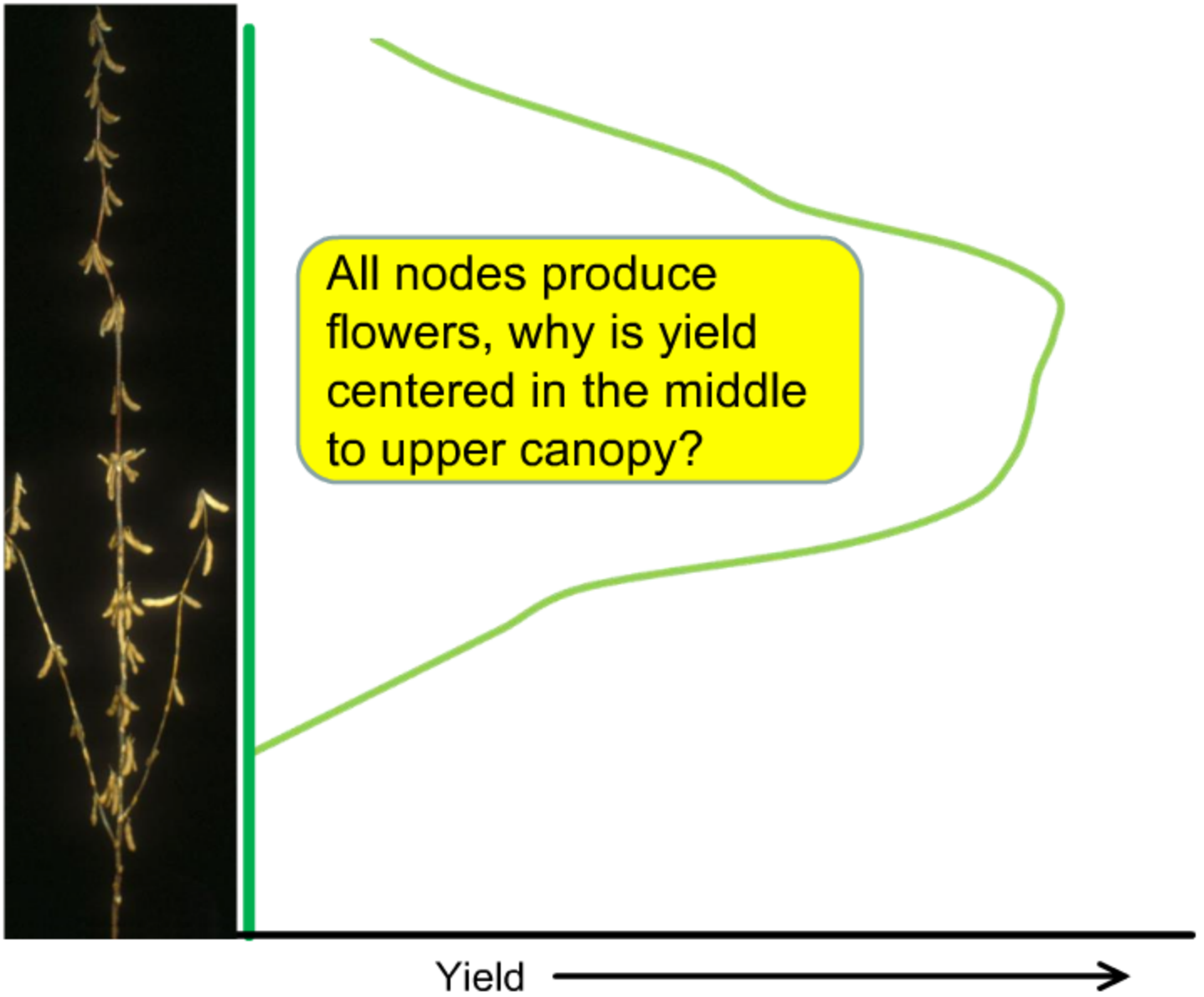
Distribution of Yield within a Soybean Canopy



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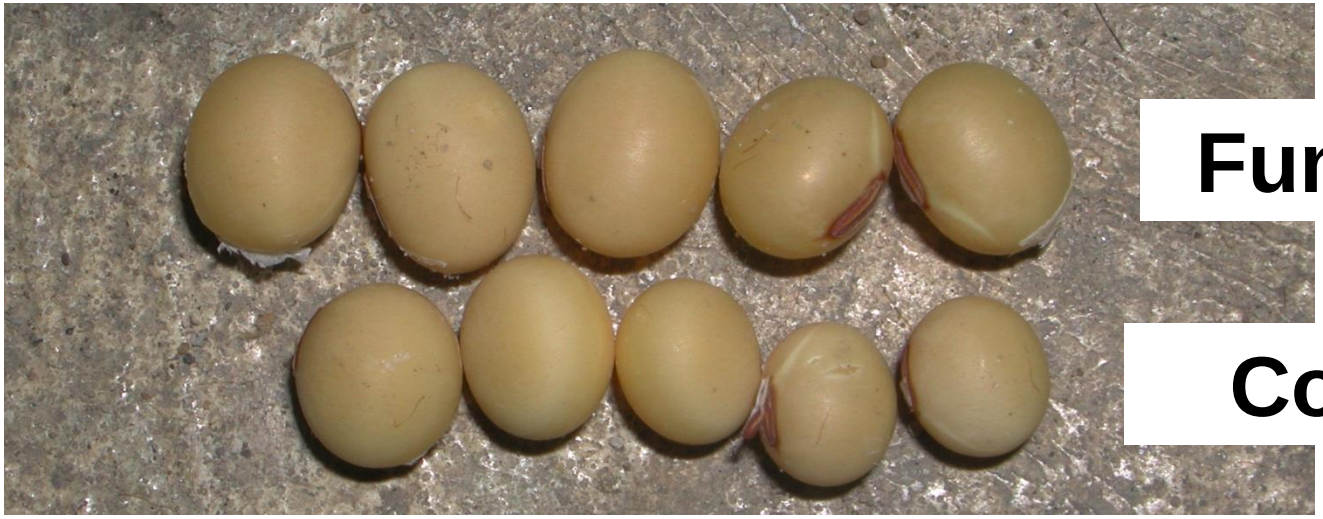
R5 Stage (Beginning Seed)

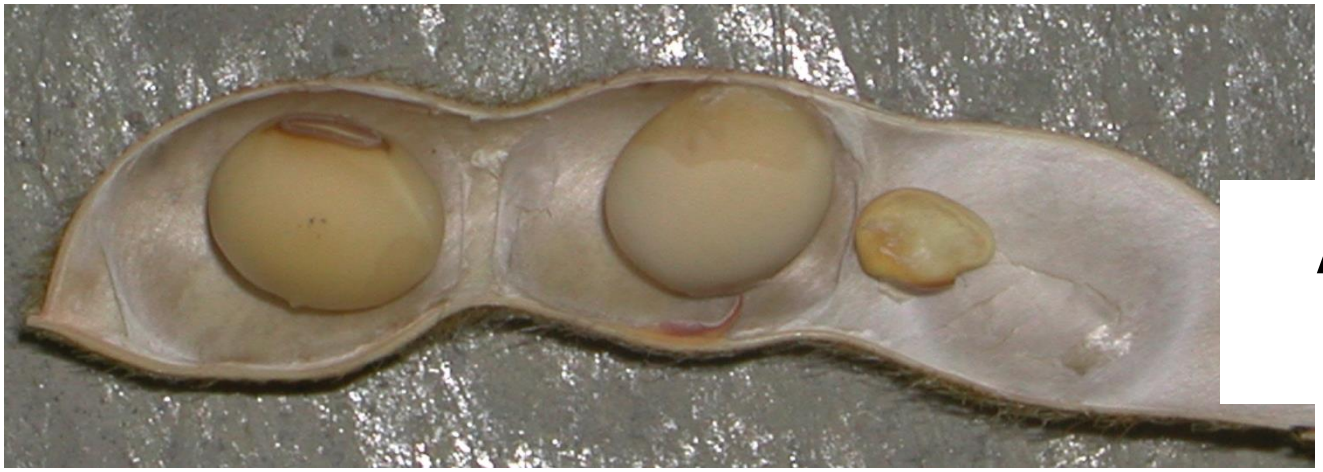
Pod and Seed Development during R5

Seed Size



Fungicide

Control



Aborted Seeds

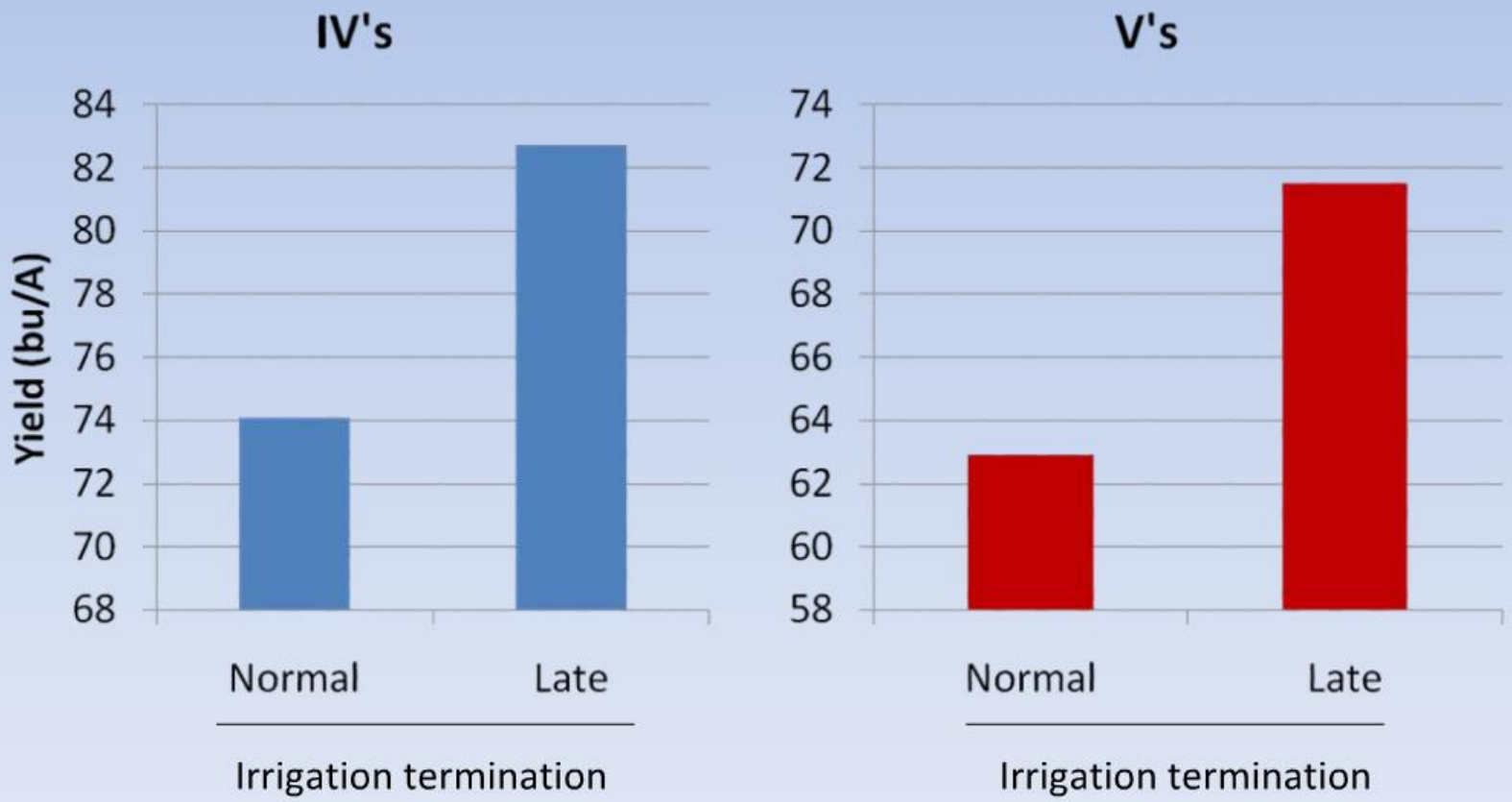
Irrigation Termination

Normal (R6)

Late (R7)

Trey Koger, Ph.D.
Soybean Extension Specialist, Mississippi State University Extension

Effect of late irrigation



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The timing of stress has a major impact on yield.

Reduces
flowers

Reduces
nodes
&
pods
per node

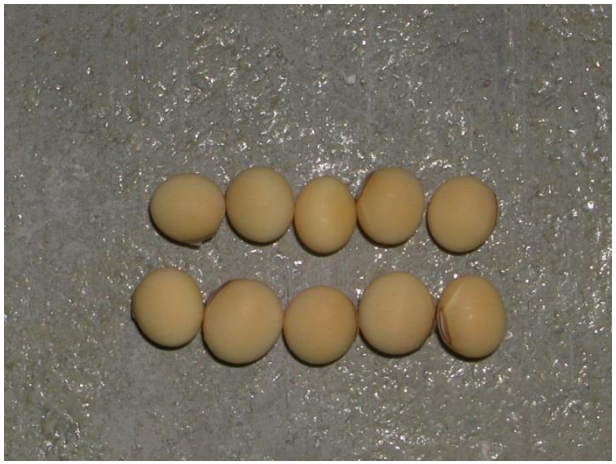
Reduces
beans
per pod
and
bean size

Changes bean
quality =
more protein,
less oil

Source: DiFonzo, Michigan State University, 2003

Yield Components

Year	Pods	Seeds	Potential Seeds	Seeds/lb.	Yield
2007	28	60	68	2588	55
2008	15	37	42	3738	25
2009	30	58	74	3214	39



Population	Seeds/Plant	Seeds/lb.	Yield
150,000	60	2500	60
150,000	60	3200	47

Summary

- **Understanding growth and development is a key to fine tuning a "system"**
- **Understanding the effects of stress based on the growth stage of a plant is important in optimizing yields**
- **"Back to the Basics!"**
  - **Do you know how to identify the growth stages of soybeans?**

Questions?

Thank you

The Andersons

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