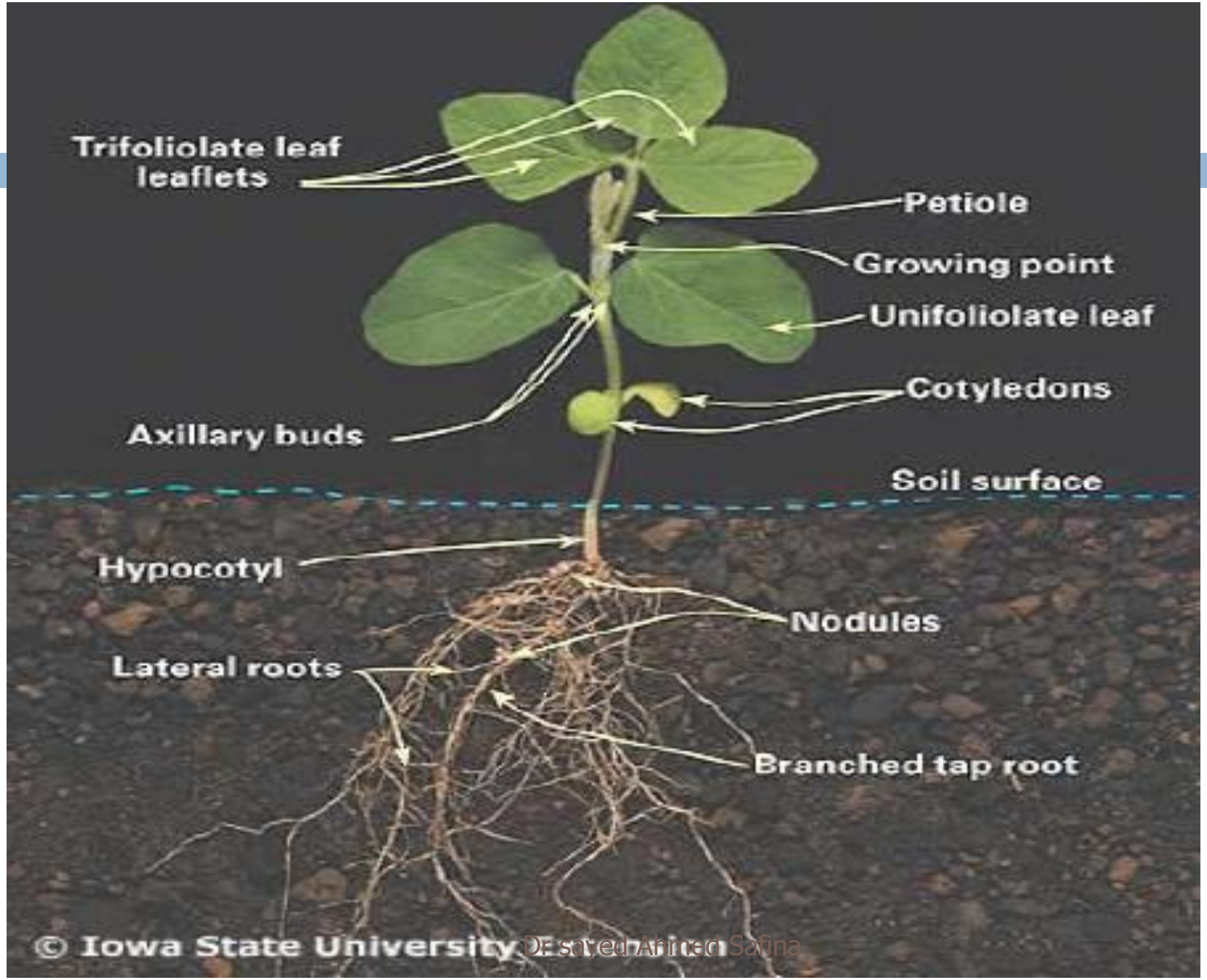
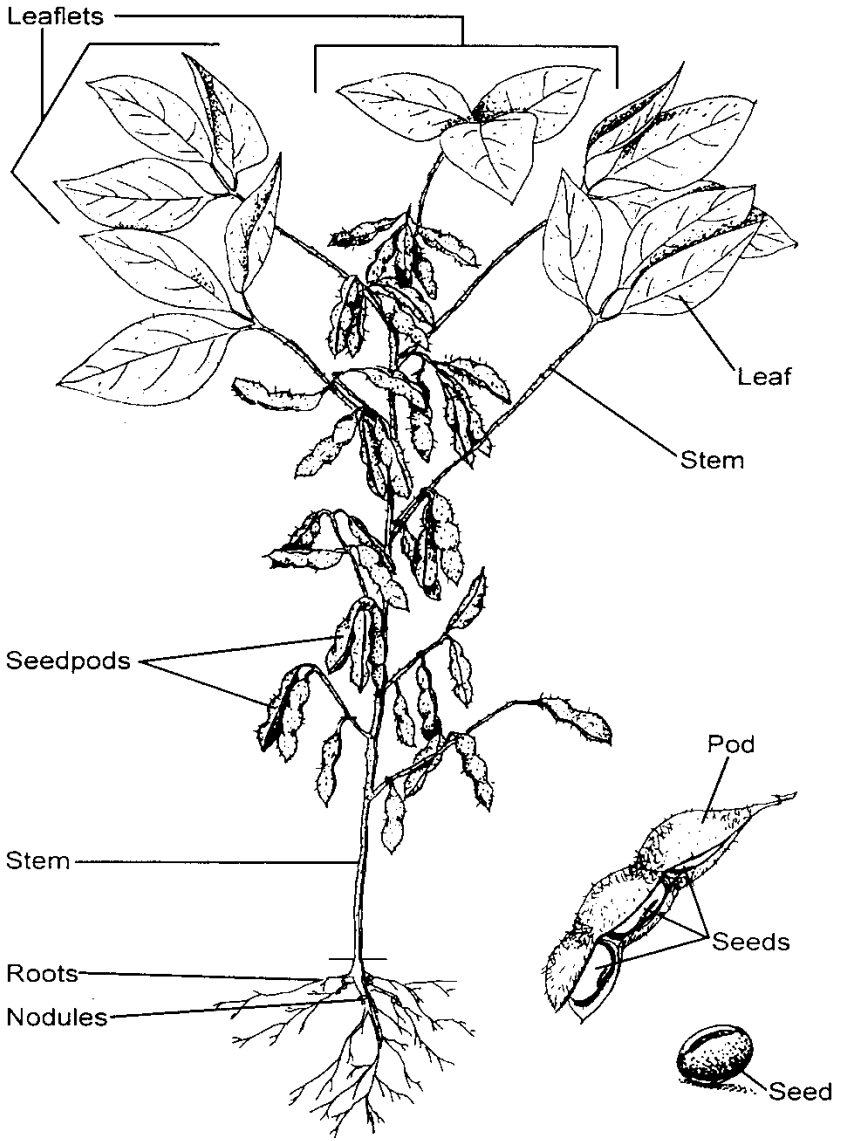
SOYBEAN

GLYCIN MAX L. (MERR)

Soybean Growth and Development



Soybean plant

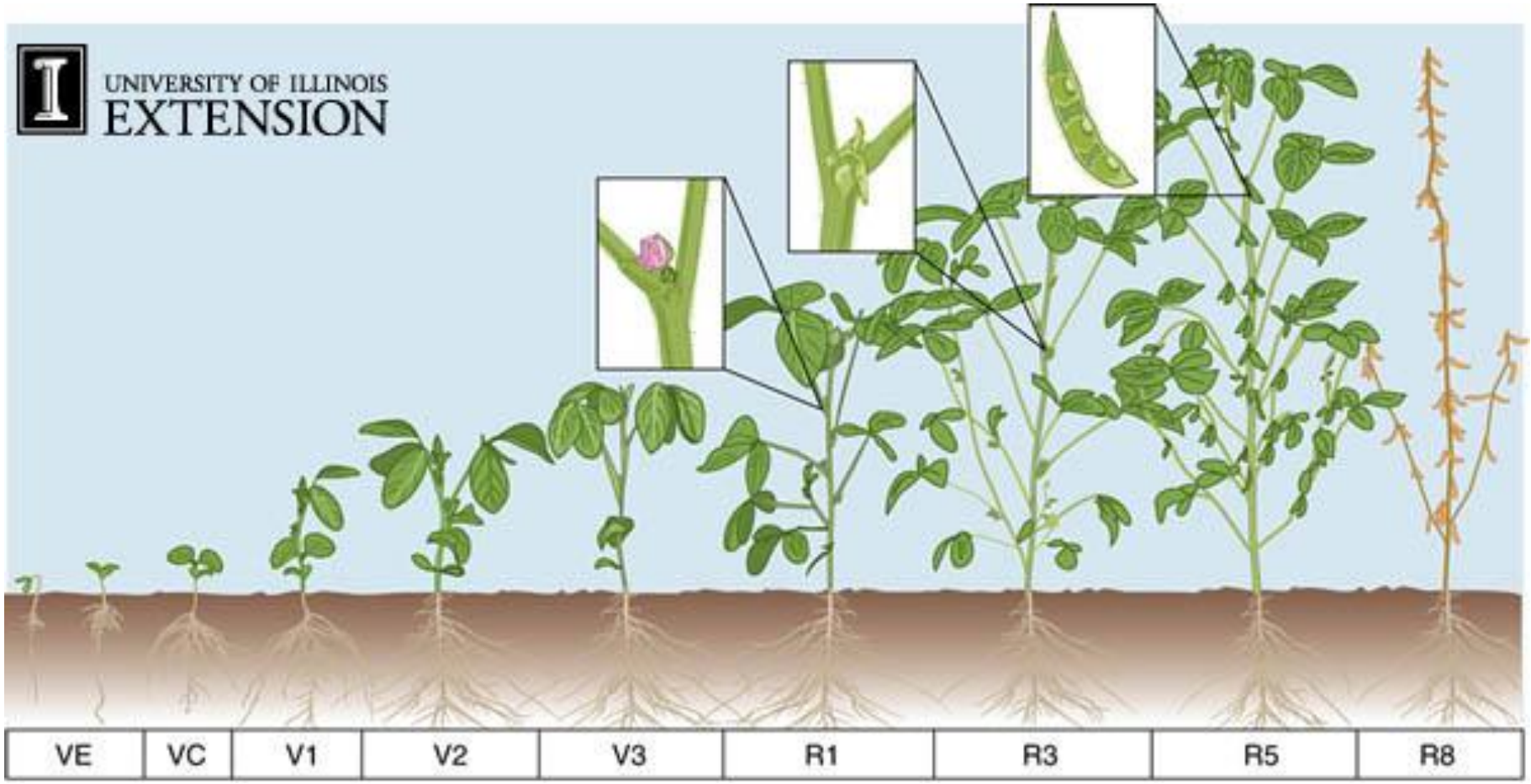


Leaves

SOYBEAN GROWTH STAGES

Determination of vegetative and reproductive stages requires node identification. A node is the part of the stem where the leaf develops.

Soybean Growth and Development



. Growth stages of a soybean plant

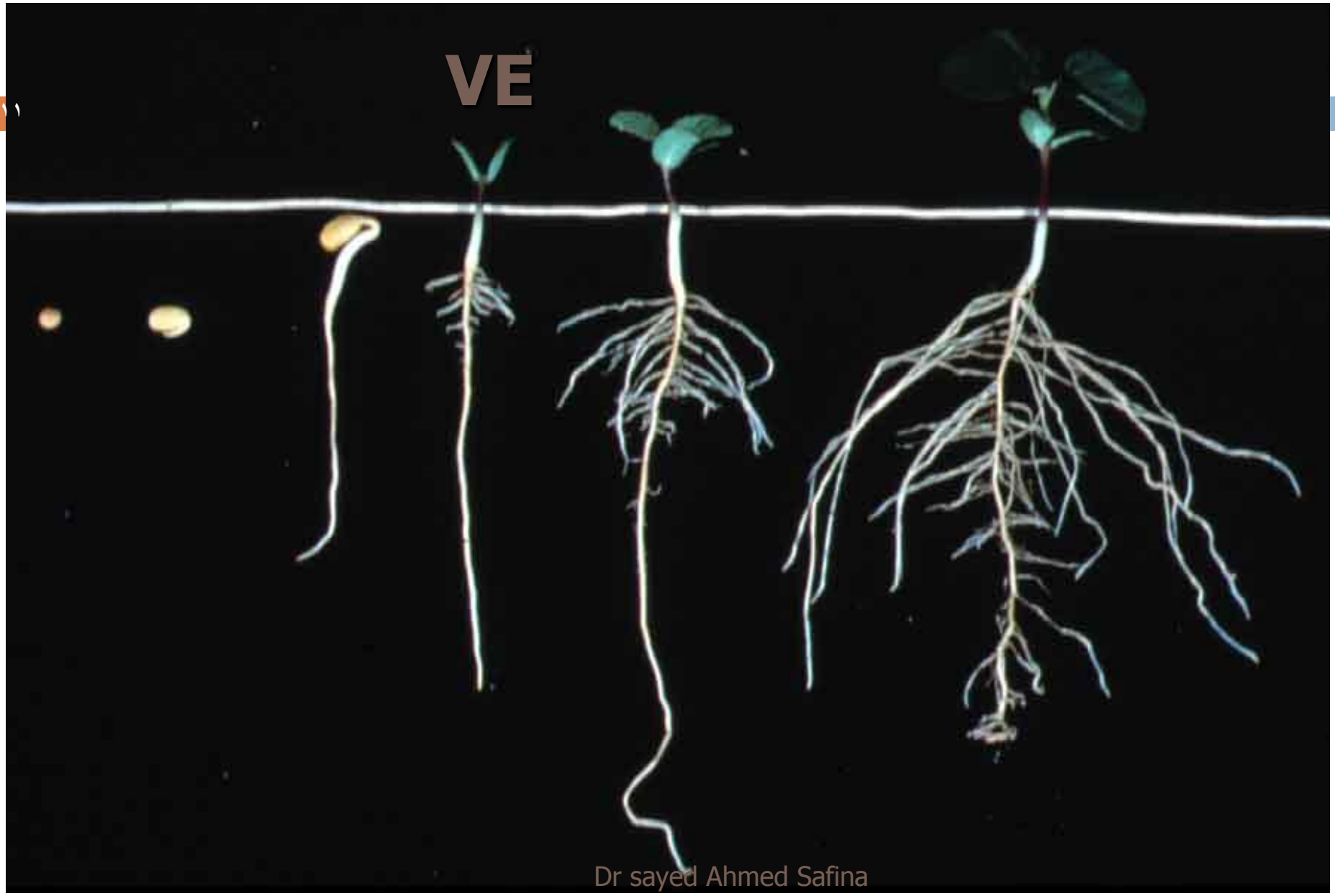
Growth Stages	
VE	Emergence
VC	Cotyledon
V1	First-node
V2	Second-node
V3	Third-node
V(n)	nth-node
R1	Beginning bloom
R2	Full bloom
R3	Beginning pod
R4	Full pod
R5	Beginning seed
R6	Full seed
R7	Beginning maturity
R8	Full maturity

Vegetative Stages

- **Vegetative stages are described from the time the plant emerges from the soil. After the cotyledon (VC) stage, nodes are counted beginning with the unifoliolate nodes.**

- **Begin at emergence**
- **Include VE and VC stages**
- **End when the first flower is noted**
- **Include stages V1 through V(n) where n = last node on the main stem at the time of first flower**

VC



- **VE - Emergence**
- **Depending on soil moisture, soil temperature, and planting depth, VE or emergence occurs one to two weeks after planting. At this stage, cotyledons are above the soil surface. Loss of the cotyledons prior to the V1 growth stage may cause a yield reduction of 8 to 9 percent. Nodule formation typically begins at this growth stage.**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VC - Cotyledon

- At this growth stage the cotyledons have fully expanded and the unifoliate leaves have unfolded. The unifoliate leaves are located at the first true node on the plant.

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V1 - First Trifoliolate (Second Node)

Although it is the second true node, this stage marks the first node at which the first trifoliolate is produced.

The trifoliate is considered to be fully developed when the leaflets at the third true node are unfolded (leaflet edges are no longer touching).

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V2 - Second Trifoliolate (Third Node)

Soybean plants at the V2 stage have two fully developed trifoliolates. Nodules formed at the VI growth stage begin actively fixing nitrogen for the plant. Lateral roots are growing rapidly

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V3 - Third Trifoliolate (Fourth Node)

- **Three trifoliolates are now fully developed above the unifoliate leaves.**

Other Stages

- **V4 - Fourth Trifoliolate (fifth node). Four trifoliolates above the unifoliate.**
- **V5 - Fifth Trifoliolate (sixth node). Five fully developed trifoliolates above the unifoliate leaves. The axillary buds in the top stem axils appear bushy and are beginning to develop into flower clusters.**

- **V6-Sixth Trifoliolate (seventh node). Six trifoliolates above the unifoliate leaves. However, by this growth stage the cotyledons and the unifoliate leaves have dropped off leaving scar tissue at the nodes.**

Reproductive Stages

- **Reproductive stages are based on flowering, pod development, seed development, and plant maturation.**

- Begin at the time of first bloom
- End at maturity
- Include
- Flowering (R1 and R2)
- Pod development (R3 and R4)
- Seed growth (R5 and R6)
- Seed/plant maturation (R7 and R8)

R1 - Beginning Bloom

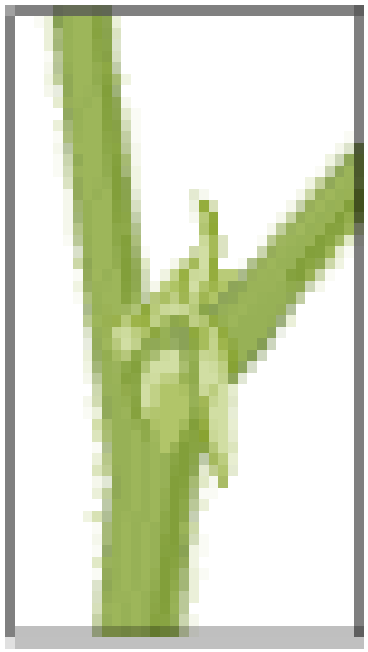
- **A plant is at the R1 growth stage when one open flower is at any node on the main stem. Typically, plants at the R1 stage are 15 to 18 inches tall and are in the V7 to V10 growth stage.**

R2 - Full Bloom

- A plant is at the R2 stage of reproduction when there is an open flower at one of the two uppermost nodes on the main stem with a fully developed leaf.
- At this stage the plant is rapidly accumulating dry matter and nutrients initially in the vegetative tissues, but nutrient accumulation will shift to the pods as seeds begin to develop.
- Nitrogen fixation in the nodules increases rapidly. Roots continue to grow deeper into the soil profile and lateral roots have grown across the interrow space at this stage.
- Yield will be reduced by approximately 6% if plants are defoliated by 50%.

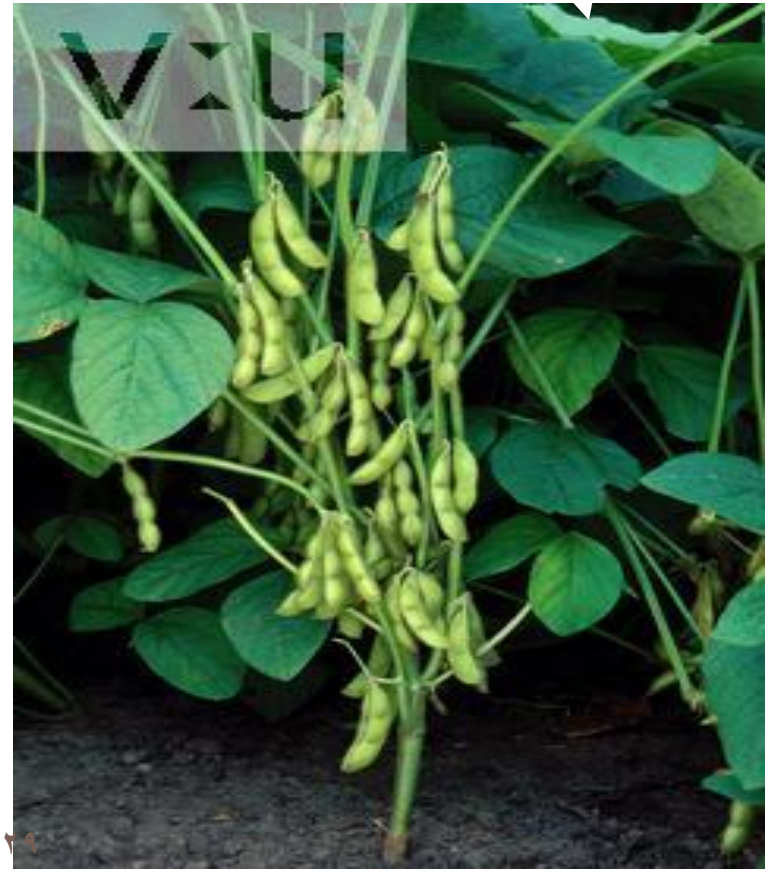
R3 - Beginning Pod

- When pods are 5 mm (3/16 inch) long at one of the four uppermost nodes on the main stem with fully developed leaf the plant is at the R3 stage.



R4 - Full Pod

- At this stage the seed pod is 2 cm (3/4 inch) long at one of the four uppermost nodes on the main stem with a fully developed leaf.
- Rapid pod growth and initiation of seed development are characteristics of this period of development.
- Dry weight accumulation by the pods is rapid from R4 to R5.5, with some pods on the lower nodes of the main stem close or at full size. Pods normally reach their full length and width before seeds begin to develop rapidly.

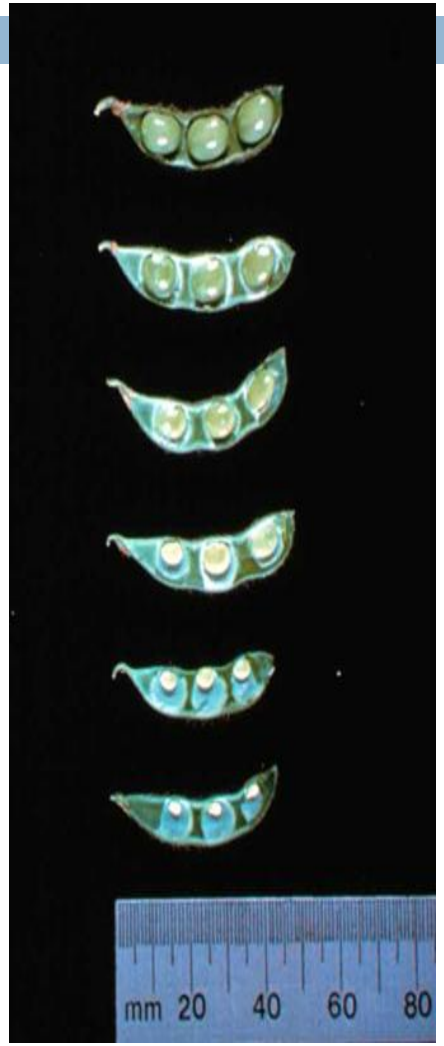


The period between R4.5 and R5.5 is especially critical because flowering becomes complete and cannot compensate, and because young pods and seeds are more likely to abort under stress than those formed earlier.

Yield reductions at this time are mainly from reductions in total pod numbers per plant, with less loss in beans per pod and seed size. If better conditions prevail after R5.5, seed size may be compensated with genetic limitations.

R5 - Beginning Seed

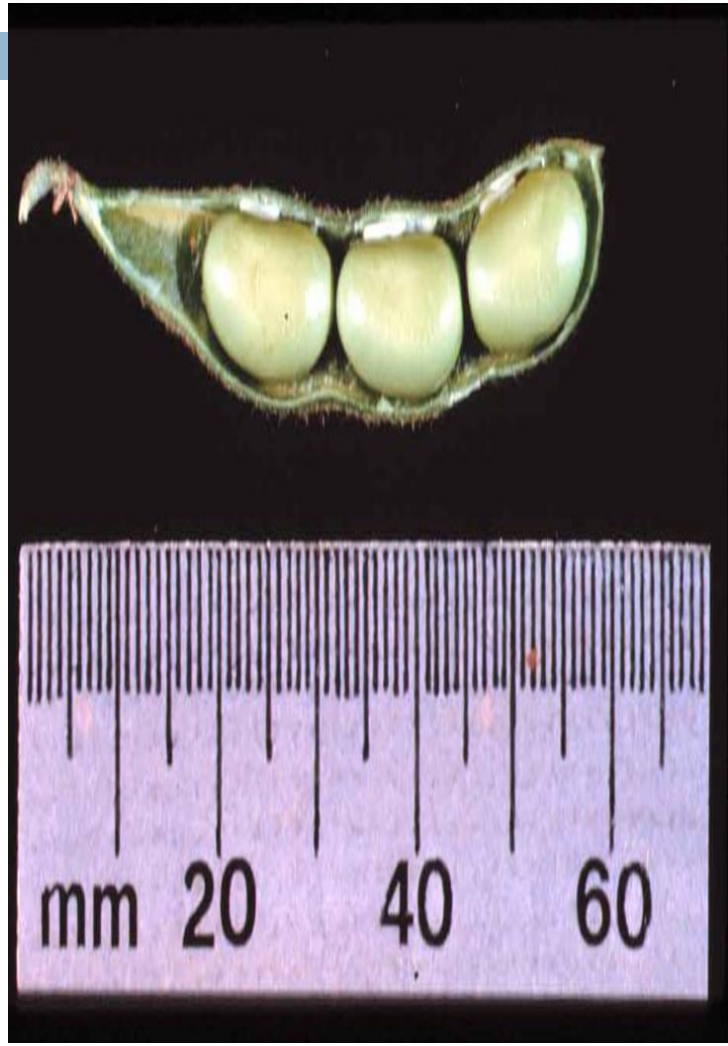
- The seed in the pod at one of the four uppermost nodes with fully developed leaves on the main stem is 3 mm (1/8 inch) long at this stage.
- This stage is characterized by rapid seed growth, with nutrient accumulation and dry matter distribution shifting from vegetative development toward the growing seed.
- Nitrogen fixation in the nodules has peaked at this stage and will decline rapidly.
- Seeds have begun to rapidly accumulate dry matter and nutrients.



- **Rapid seed dry weight accumulation continues until approximately R6.5, with 80% of the total seed dry weight acquired.**
- **Demand for water and nutrients is large at this time of seed development. A 75% yield reduction may occur is plant are completely defoliated between the R5 to R5.5. Yield reductions between R5.5 ad R6 are usually due to aborted pods and seeds per pod.**

R6 - Full Seed

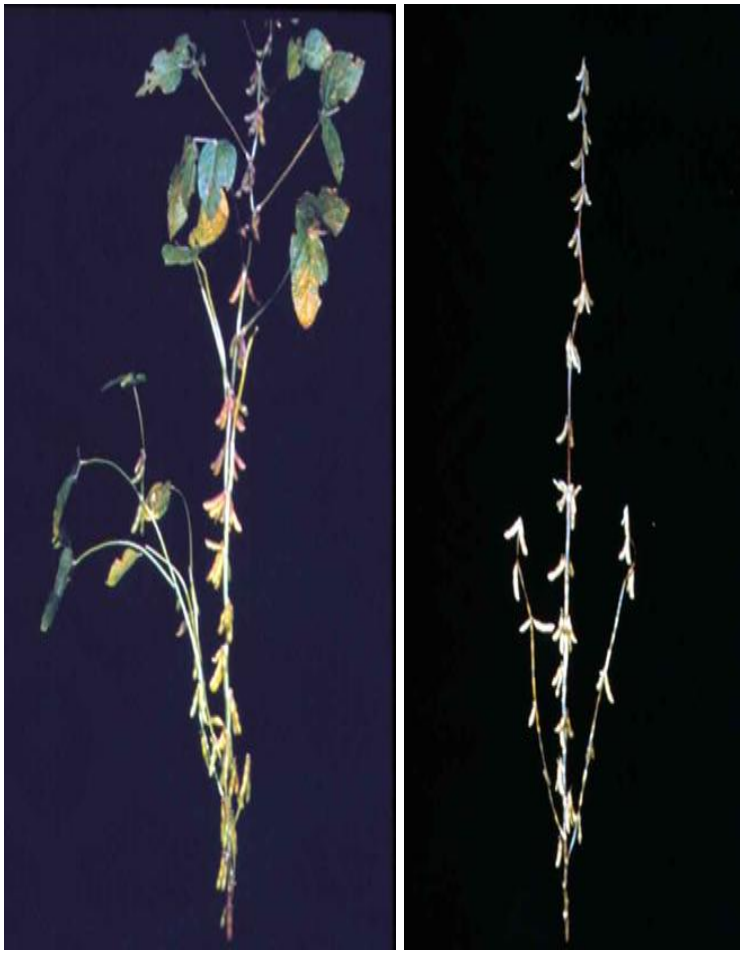
- **A plant is at the R6 stage when a pod containing a green seed that fills the pod cavity is present at one of the four uppermost nodes on the main stem with a fully developed leaf.**
- **Rapid leaf yellowing begins shortly after R6 and continues to about R8. Leaf senescence begins on the older (lower) nodes first, with the possibility of 3 to 6 trifoliate leaves falling off before leaf yellowing begins.**



R7 - Beginning Maturity

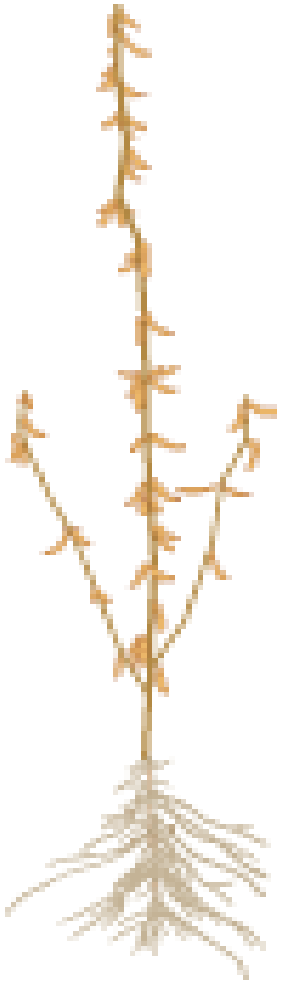
One normal pod on the main stem has reached its mature pod color. Physiological maturity of a soybean seed occurs when dry weight accumulation has stopped, and occurs when the seed as well as the pod turn yellow.

At this stage the plant is basically at physiological maturity because very little additional dry weight will be accumulated.

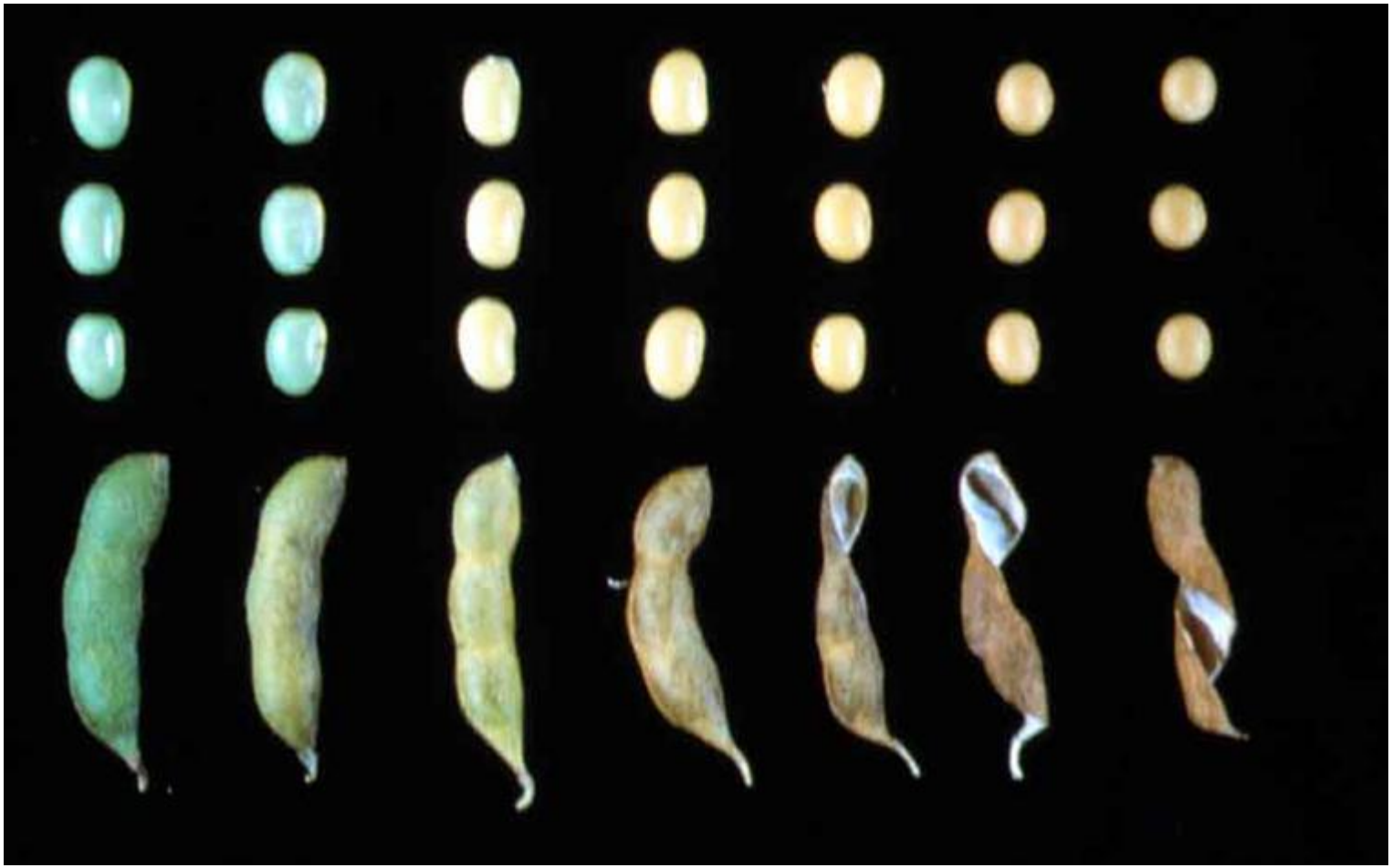


R8 - Full Maturity

- At this stage 95% of the pods have reached maturity, but 5 to 10 days of drying weather are needed after R8 before soybeans have less than 15% moisture. Ideal moisture for harvest and storage is 13%, with moisture below 13% causing increased pre-harvest shatter loss, increased number of split beans, and loss of weight to sell.



R6 → R8

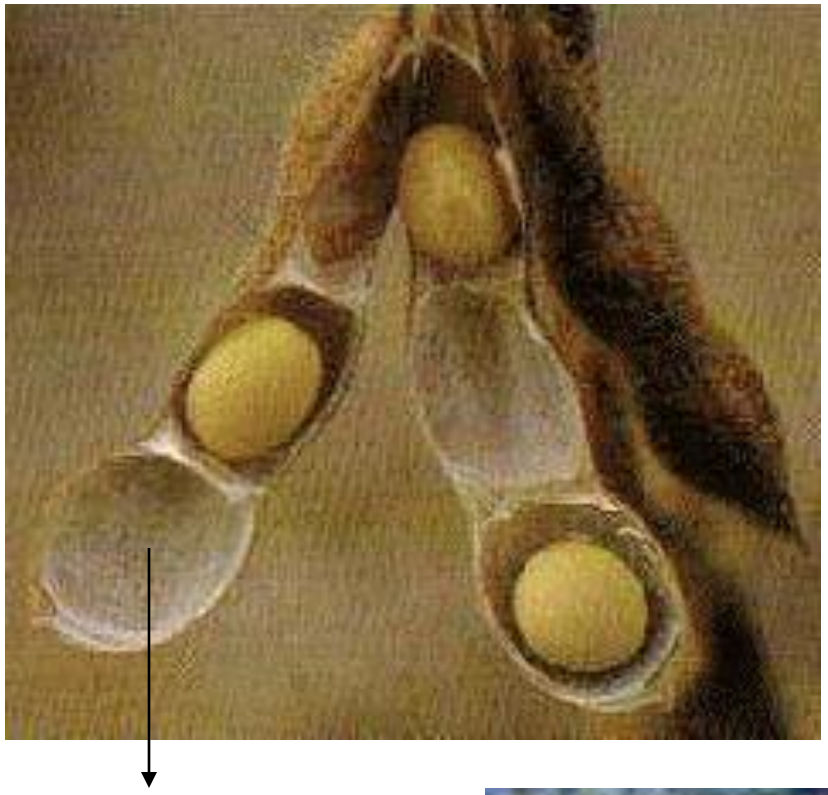


DETERMINATE VARIETIES

- Grow very little in height after flowering begins.
- Flowering occurs about the same time in top and bottom of plant.
- Pod and seed development about the same throughout the plant.
- Terminal leaf about the same size
- Terminal node on main stem usually bears a long flowering stalk.
- Terminal node has several pods.

INDETERMINATE VARIETIES

- Are at less than one-half their final growth height when flowering begins.
- Grow taller and produce branches while flowering, pod and seed development are taking place's Pods and seed development on lower part of plant are more advanced than at top.
- Top of plant generally has similar leaves than those lower on the plant.
- Only few pods at terminal node.
- Very little branching when grown in optimum stands.



(hilum (colors include black, brown, buff, gray and yellow

Seeds

Thank you