Gramoxone Inteon / Paraquat Use as a Soybean Harvest Aid: Application Timing

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Need For Harvest Aids?

Late Season Application to Desiccate Weeds

Harvest Aid Value – Earlier Crop Harvest?

Gramoxone Inteon (Paraquat) Label

- Spray volume:
  - 20 GPA for ground and 5 GPA for air
- Timing:
  - *Indeterminate varieties*: Apply when at least 65% of the seed pods have reached a mature brown color or when seed moisture is 30% or less
  - *Determinate varieties*: Apply when plants are mature, i.e., beans are fully developed, ½ of leaves have dropped, and remaining leaves are yellowing.
  - Confusing??
  - Application probably too late?

Seed Development in Pods

R5 Stage (beginning seed)
Seed 1/8 inch long in a pod of one of the *four uppermost node*s on the main stem with a fully developed leaf.

R5 to R6 duration 11 to 20 days: average 15 days

R6 Stage (full seed)
Pod containing a green seed that fills the pod cavity at one of the *four uppermost nodes* on the main stem with a fully developed leaf.

R6 to R7 duration 9 to 30 days: average 18 days

Seed Moisture
R6 – around 60%
R6.5 – around 50% (physiological maturity)
R7 – around 40%

Harvest Aid Study

- Soybean Varieties:
  - Group IV indeterminate and Group V determinate
- Harvest Aid:
  - Gramoxone Inteon (2L) @ 1pt/A + 0.25% NIS
- Application Timing:
  - Based on moisture of soybean seed collected from uppermost 4 nodes of plants
  - Seed moisture of 60 (R6), 50 (R6.5), 40 (R7), 30, and 20% (seed weighed, dried, and re-weighed); represented average seed moisture
  - Applications at 7 to 10 day intervals

Harvest Aid Study
Asgrow 4403RR Group IV Indeterminate Soybean Variety

Application timing *(Avg. seed moisture)*	*DAP to application*[1]	*DAA to harvest*	*Days harvested before nontreated*	*% Yield reduction vs. nontreated*
%	----------2006/2007----------			2-year average
60	111/101	15/18	14/15	5.4 b
50	116/112	10/7	14/15	3.0 a
40	123/121	8/5	9/8	1.2 a
30	130/126	7/5	3/3	2.9 a
20	133/130	7/4	0/0	-1.1 a
Nontreated[2]	-	-	0	0.0 a

[1]Planted May 12, 2006 and April 16, 2007.
[2]Yield for the nontreated control was 61.8 bu/A.

Gramoxone Application Too Early Reduces Seed Weight and Yield

Harvest Aid Study
Asgrow 5903RR Group V Determinate Soybean Variety

Application timing *(Avg. seed moisture)*	*DAP to application*[1]	*DAA to harvest*	*Days harvested before nontreated*	*% Yield reduction vs. nontreated*
%	----------2006/2007----------			2-year average
60	112/105	14/21	18/21	21.9 c
50	114/116	15/12	13/21	15.7 b
40	123/127	14/12	7/8	1.5 a
30	130/136	7/7	7/4	-2.2 a
20	137/141	7/6	0/0	-2.4 a
Nontreated[2]	-	-	0	0.0 a

[1]Planted May 12, 2006 and May 10, 2007.
[2]Yield for the nontreated control was 59.4 bu/A.

Harvest Aid Study Results

- **Harvest aid can be safely applied to indeterminate Maturity Group IV soybeans when seed moisture from the uppermost 4 nodes of plants averages 50%.**
  - **Soybeans harvested 7 to 10 d after application and 14 to 15 d before nontreated**
- **Harvest aid can be safely applied to determinate Maturity Group V soybeans when seed moisture from the uppermost 4 nodes of plants averages 40%.**
  - **Soybeans harvested 12 to 14 d after application and 7 to 8 d before nontreated**
- **Gramoxone label is unclear as to application timing and is probably too conservative (current label 30% seed moisture and ½ leaves dropped).**
- **Other label issues**
  - **16 oz/A maximum rate**
  - **15 day harvest interval (needed for desiccation of vines)**

Why is application timing earlier for indeterminate than for determinate varieties?

- **Indeterminate soybean:**
  - **Flowering initiated at the bottom of the plant and proceeds upward**
  - **Seeds in the upper canopy are the least mature**
- **Determinate soybean:**
  - **Flowering initiated in middle of the plant and proceeds upward and downward**
  - **Seeds in both the upper and lower canopy are the least mature**
- **Application too early is more detrimental to determinate varieties than indeterminate varieties**

  Why? Greater percentage of immature seed

When Should Harvest Aid be Applied?

Apply when **65%** of the seed pods are mature brown color or when seed moisture is **30%** or less (indeterminate soybean - Gramoxone label)

Apply when plants are mature, i.e., beans are fully developed, ½ of leaves have dropped, and remaining leaves are yellowing (determinate soybean - Gramoxone label)

Apply when **70%** of the leaves have fallen from the plant or when **65%** of pods have reached mature brown color (Mississippi State)

When **1/2** of soybean leaves have dropped and the other **1/2** are yellow. For indeterminate soybeans, apply when **65%** of pods are brown and remaining pods are turning yellow. (University of Arkansas)

The Issue: *The longer application is delayed – the later the harvest* ….

Leaf drop should not be used to determine timing; leaf retention can vary by variety and growing conditions

Pod color may not be the best timing tool

Concentrate on seed in the pods

Seed Development in Pods

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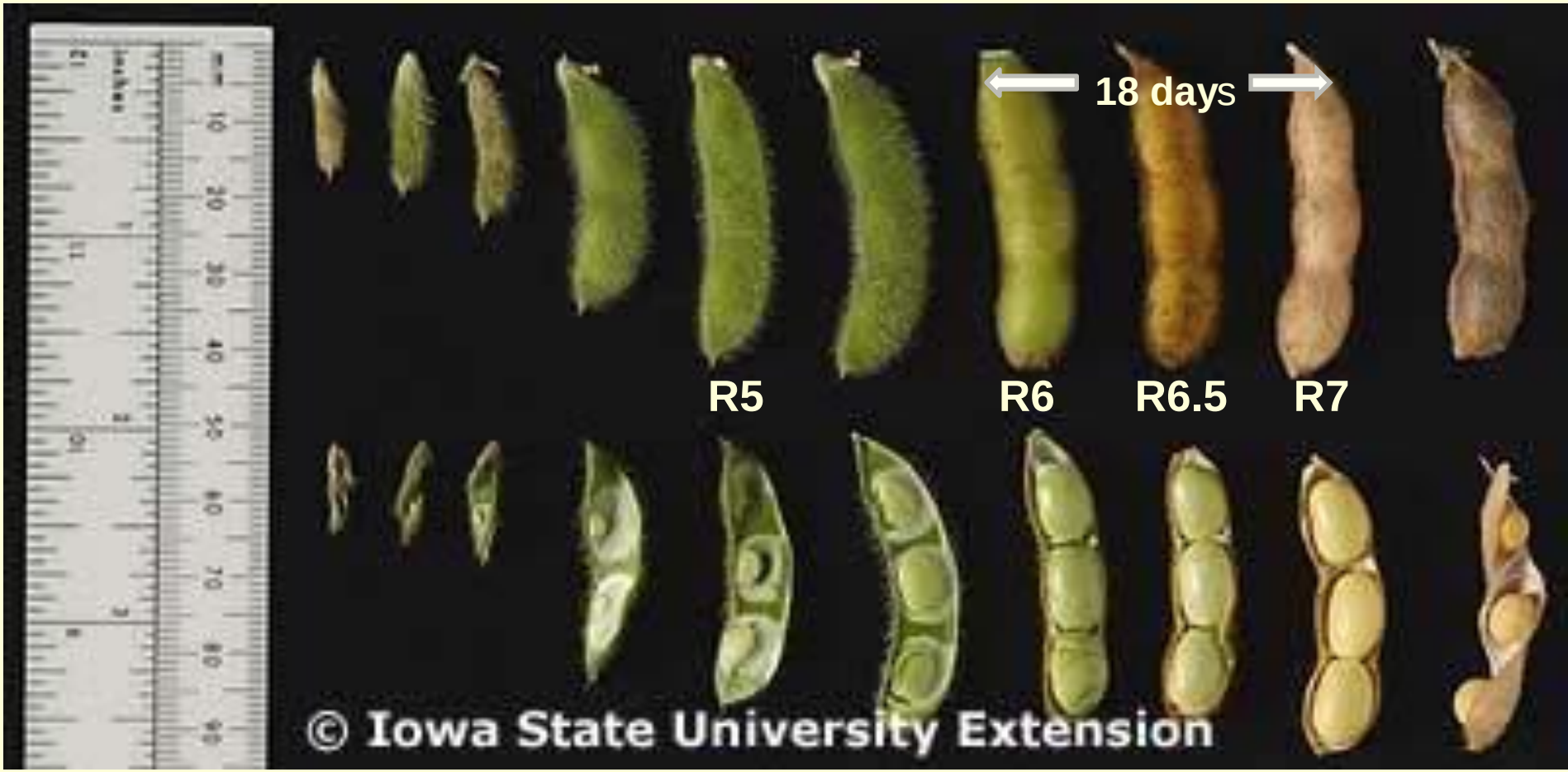
Seed 1/8 inch long in a pod of one of the four uppermost nodes on the main stem with a fully developed leaf.

R5 to R6 duration 11 to 20 days: *average 15 days*

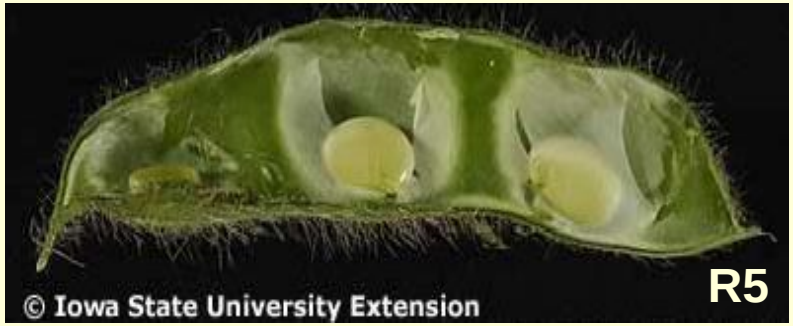
<u>R6 Stage (full seed)</u>
Pod containing a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem with a fully developed leaf.

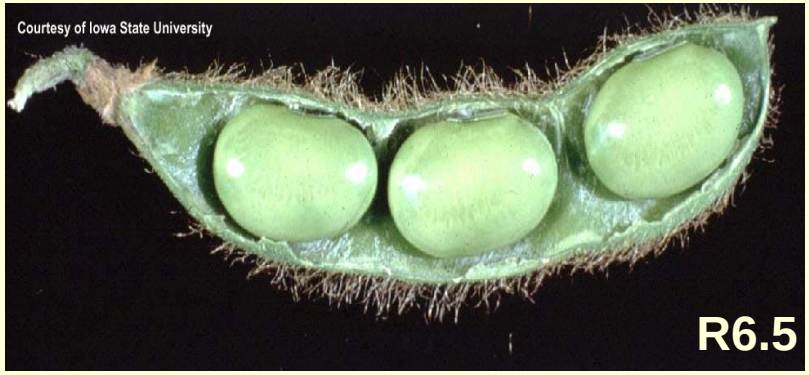
R6 to R7 duration 9 to 30 days: *average 18 days*

Pod Development R3-R8



How to Determine When to Apply Harvest Aid?





Start looking closely at plants when yellowing of leaves is first observed.

Collect pods from the top four nodes of plants at random across the field.

Open pods and look for separation of beans from the white membrane inside the pod.

If separation has occurred for <u>all</u> pods collected , seed are at physiological maturity (around 50% moisture) and have reached maximum dry weight.

It is safe to remove leaves without affecting seed weight.


Questions?