

Value of Harvest Aids: An Agronomic and Economic Approach

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Harvest Aid Uses

- **Traditionally used for late season desiccation of weeds**
- **Weeds present at harvest can reduce harvest efficiency and crop quality**



Need For Harvest Aids?

- **“Green Plant Syndrome”** problem in Louisiana - the retention of green leaves and presence of green stems and or pods
- **Causes:**
 - Diseases and use of fungicides
 - Late season stinkbug infestation
 - Environmental stress
 - Variety and or Maturity Group



Green Stems



Leaf Retention



Green Pods

Benefits of Harvest Aids

- **Effective control of late season weeds/vines**
- **Improved harvest efficiency and earlier harvest of crop**
- **Earlier harvest can reduce exposure of soybeans to adverse weather conditions which can reduce both yield and seed quality**
- **Earlier harvest results in earlier land preparation for the planting of sugarcane or wheat**

Gramoxone Label for Harvest Aid Application ...Confusing?

■ Spray volumes

- 20 GPA Ground application
- 5 GPA Aerial application

■ Application 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.

Soybean Harvest Aid Treatments

Maturity Groups IV, V, and VI

Experimental Factors

■ Harvest Aid

- **Gramoxone Inteon 1pt/A + 0.25% NIS**
- **Gramoxone Inteon 1 pt/A + Aim 1.4 oz/A + 0.25% NIS**
- **Sodium chlorate 4 qt/A**

■ Application Timing

- **60, 50, 40, 30, and 20% average seed moisture; 50% seed moisture represents R6.5 (physiological maturity)**
- **Seeds/pods collected from the top 4 nodes of the plant; seeds weighed, dried, and re-weighed to calculate moisture**
- **Timings were approximately 7-14 days apart**

Results



Seed Moisture %	% Yield Reductions		
	MG IV	MG V	MGVI
60	15.4	21.9	18.0
50	safe	15.7	3.9
40	safe	safe	safe
30	safe	safe	safe
20	safe	safe	safe
20	safe	safe	safe

Observations

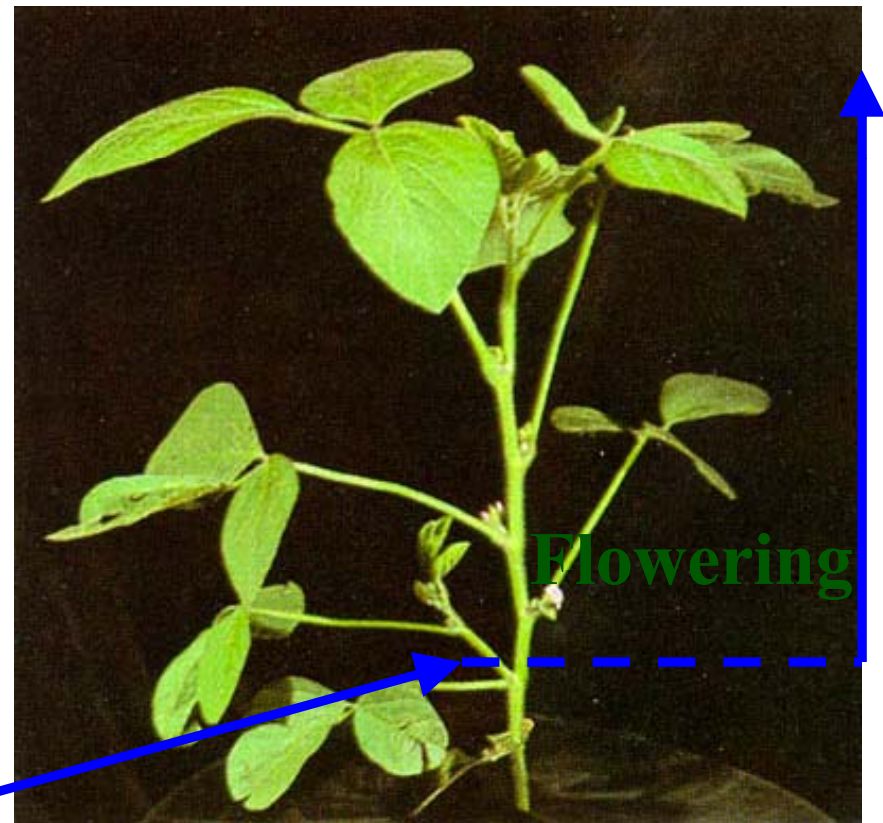
- **Harvest aid application timing was more flexible for the indeterminate (Group IV) variety than for the determinate (Group V and VI) varieties.**
- **Determinate varieties were more sensitive to early harvest aid application (before physiological maturity) than indeterminate varieties.**
- **Differences in response to timing of defoliation for indeterminate and determinate varieties were related to differences in growth habit and the effect on flowering and seed development.**

Differences in Floral Initiation

Indeterminate Varieties

- Flowering begins at the lower nodes of the plant and progresses toward the top of the plant.
- Pod growth and seed fill follow in a similar pattern.
- The most immature seeds are in the top of the plant.

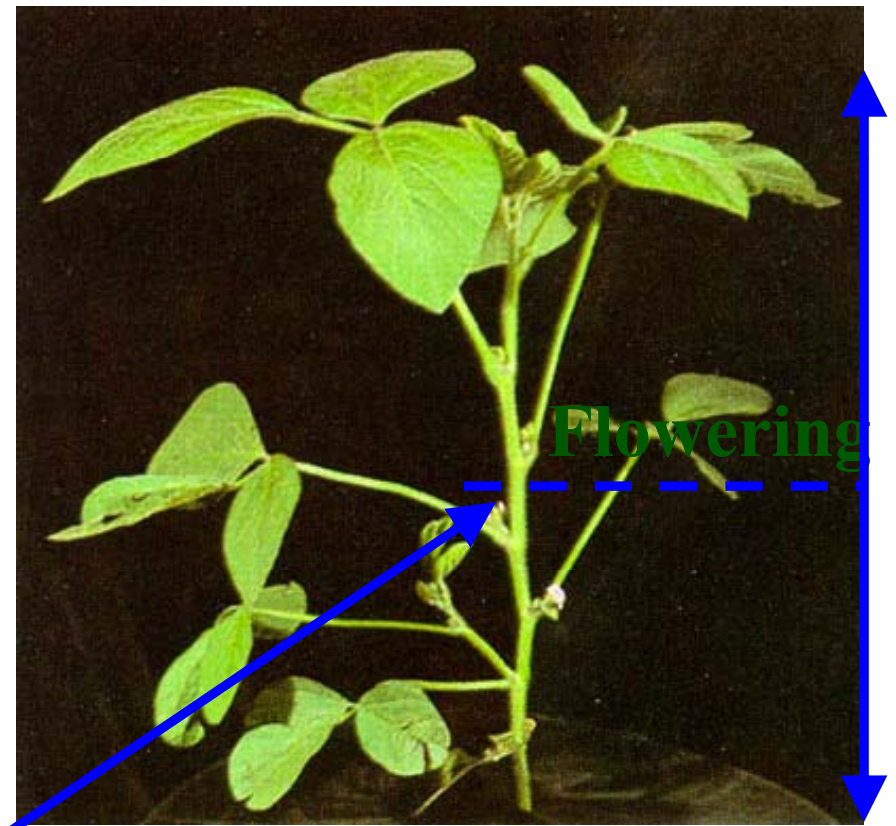
**Floral
Initiation**



Differences in Floral Initiation

Determinate Varieties

- Flowering begins at the middle 3 to 6 nodes of the plant and progresses toward the top and bottom of the plant.
- Pod growth and seed fill follow in a similar pattern.
- The most immature seed are in the top and bottom of the plant.



**Floral
Initiation**

Harvest Aid Study Results



- Soybean seed moisture decreased 0.7 percentage points per day as moisture changed from 60% to 20%.
- Harvest aid can be safely applied to indeterminate Maturity Group IV soybeans when seed moisture from the uppermost 4 nodes of plants averages 50%.
 - Application corresponded to around 115 days after planting in either mid-April or mid-May
 - Soybeans were harvested 7 to 10 days after application and 14 days earlier than the 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%.
 - Application corresponded to around 125 days after planting in mid-May
 - Soybeans were harvested 12 to 14 days after application and 7 to 8 days earlier than the nontreated.
- Gramoxone label is unclear as to application timing and is probably too conservative (current label 30% seed moisture and ½ leaves dropped).

Harvest Aid Timing Recommendation

- Harvest aid can be safely applied to indeterminate and determinate soybean varieties when seed moisture in the top third of plants averages 40 to 50%.
- **How to Determine:** Collect pods from the top third of plants at random across the field. Open pods and look for separation of beans from the white membrane inside the pod. If this is observed for all pods collected then seed are at physiological maturity (around 50% moisture) and have reached maximum dry weight. It is safe then to remove leaves without affecting seed weight.

Another way: If one normal pod on main stem has reached mature color soybean growth stage is R7. Harvest should occur in about three weeks.



R6.5 (Physiological Maturity)



Fungicide Insecticide & Harvest Aid Interaction Study 2007 & 2008

- **Locations**
 - **Ben Hur Research Station Baton Rouge, LA**
 - **Macon Ridge Research Station Winnsboro, LA**
- **Fungicide Treatments**
 - **0, 1, and 3 applications of Headline + Topsin M**
- **Insecticide Treatments**
 - **None, Karate, or Baythroid + Orthene as needed**
- **Harvest Aid Treatments**
 - **+ or – an application of Gramoxone Inteon**

Baton Rouge 2007 & 2008

Applications	Green leaves	Green stems	Green pods	Seed Moisture	Foreign Material	Damage	Yield
<u>Fungicide</u>	%						Bu/A
0	2.5	19.0	3.0	14.3	1.4	5.8	63.4
1	4.7	20.5	3.6	15.2	1.1	5.2	64.9
3	6.3	26.3	5.6	15.6	1.2	4.7	67.7
<u>Insecticide</u>							
None	5.4	27.0	5.7	15.5	1.4	7.3	63.6
Karate	3.9	19.5	3.8	14.9	1.2	4.6	65.7
Orthene + Baythroid	4.1	19.2	2.7	14.7	1.2	3.8	66.7
<u>Harvest Aid</u>							
0	7.6	33.5	5.0	16.5	1.5	6.0	64.8
1	1.4	10.4	3.2	13.6	1.0	4.5	65.8

Winnsboro 2007 & 2008

Applications	Green leaves	Green stems	Green pods	Seed Moisture	Foreign Material	Damage	Yield
<u>Fungicide</u>	————— % —————						Bu/A
0	40.0	57.5	10.4	11.8	2.4	11.7	28.2
1	40.1	59.2	9.0	11.9	3.4	13.4	27.4
3	43.9	59.5	11.7	12.1	2.1	12.4	29.0
<u>Insecticide</u>							
None	56.8	78.7	17.2	13.2	4.0	22.5	24.0
Karate	36.7	46.8	7.8	11.4	2.0	7.8	29.6
Orthene + Baythroid	30.5	50.7	6.1	11.2	2.0	7.3	31.1
<u>Harvest Aid</u>							
0	67.6	75.0	12.0	12.4	2.7	13.1	27.8
1	15.1	42.5	8.8	11.5	2.6	11.9	28.7

Medium Control



No Insect Control



High Control



Harvest Aid



No Harvest Aid



Deductions For Foreign Material (Baton Rouge 2007 & 2008)

Treatment	FM %	Yield Bu/A	Deductions/Acre			
			Soybean Price/Bushel			
<u>Fungicide</u>			\$8.50	\$9.50	\$10.50	\$11.50
None	1.5	62.6	\$2.55	\$2.85	\$3.15	\$3.45
Headline + Topsin M	1.1	65.2	\$0.85	\$0.95	\$1.05	\$1.15
<u>Insecticide</u>						
None	1.3	62.3	\$1.70	\$1.90	\$2.10	\$2.30
Orthene + Baythroid	1.2	65.5	\$0.85	\$0.95	\$1.05	\$1.15
<u>Harvest Aid</u>						
None	1.6	63.8	\$3.40	\$3.80	\$4.20	\$4.60
Gramoxone Inteon	1.0	63.9	\$0.00	\$0.00	\$0.00	\$0.00

A grower is allowed up to 1% foreign material with no discount. Anything above 1% FM is deducted by that percent from the gross weight of the load.

Deductions for Damage (Baton Rouge 2007 and 2008)

Treatment	Damage	Yield	Deductions	Deductions
	%	Bu/A	\$/Bushel	\$/Acre
<u>Fungicide</u>				
None	6.3	62.6	\$0.15	\$9.39
Headline + Topsin M	5.3	65.2	\$0.11	\$7.17
<u>Insecticide</u>				
None	7.7	62.3	\$0.19	\$11.84
Orthene + Baythroid	4.0	65.5	\$0.05	\$3.23
<u>Harvest Aid</u>				
None	6.1	63.8	\$0.15	\$9.57
Gramoxone Inteon	4.5	63.9	\$0.08	\$5.11

A grower is allowed up to 2% damage with no discount. As the percentage increases a discount scale is used.

Net Returns (Baton Rouge)

	Price	Rate	Total Cost	Soybean Price per Bushel			
	\$/Unit	Unit/A	\$/A	\$8.50	\$9.50	\$10.50	\$11.50
<u>Fungicide</u>				Net Returns/Acre			
Headline	\$327/gal	12 oz	\$30.60				
Topsin M	\$18.25/lb	1 lb	\$18.25				
Application			\$4.50				
			\$53.35	\$26.02	\$28.62	\$31.22	\$33.82
<u>Insecticide</u>							
Orthene	\$7.50/lb	1 lb (x2)	\$15.00				
Baythroid	\$340/gal	2 oz (x2)	\$10.64				
Application			\$4.50				
			\$34.64	\$36.61	\$39.81	\$43.01	\$46.21
Harvest Aid							
Gramoxone	\$34/gal	16 oz	\$4.32				
Induce	\$18.95/gal	5 oz	\$0.75				
Application			\$4.50				
			\$9.57	\$8.71	\$8.81	\$8.91	\$9.01

Conclusions

- **Applying a fungicide significantly increases the number of green stems, pods, and retained leaves at harvest.**
- **Stink bug feeding can reduce yield and increase foreign material and seed damage. They can also increase the incidence of green plant syndrome.**

Conclusions Continued

- **Paraquat application allowed for soybean harvest 1 to 2 weeks earlier. Earlier harvest may allow growers to take advantage of higher price for early delivery and to escape late season adverse weather conditions that reduce seed quality and yield.**
- **Our research did not measure the economic benefit of earlier harvest and improved harvest efficiency**
- **Harvest aids are especially important when growers utilize an aggressive fungicide program.**



Questions ?