

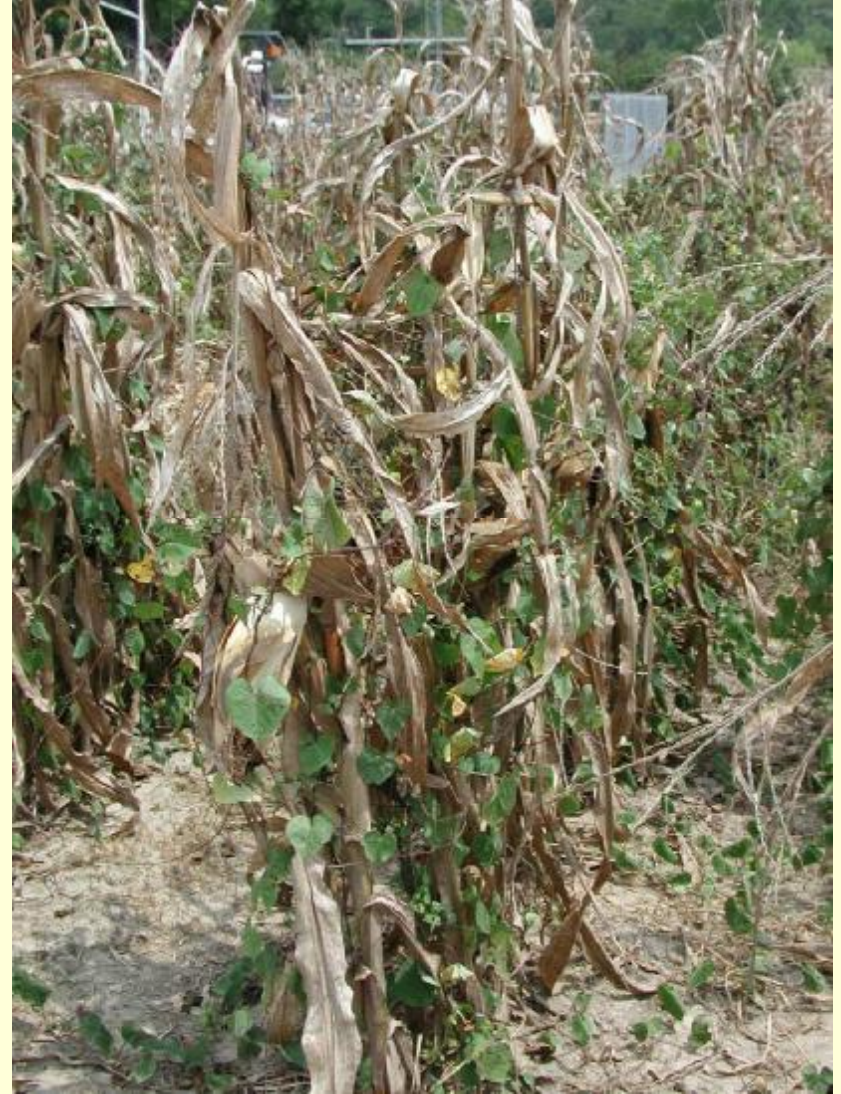


Gramoxone as a Harvest Aid in Soybeans - Application Timing and Economic Value

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Need For Harvest Aids?



Late Season Application to Desiccate Weeds

Another Need For Harvest Aids – Dry Down Green Plants?

- “Green Plant Syndrome” problem in mid-South - the retention of green leaves and presence of green stems and/or pods
- Causes:
 - Use of fungicides
 - Late season stinkbug infestations
 - Environmental stresses
- The green bean problem is more prevalent in indeterminate varieties but has occurred in determinate varieties as well.



Green Stems

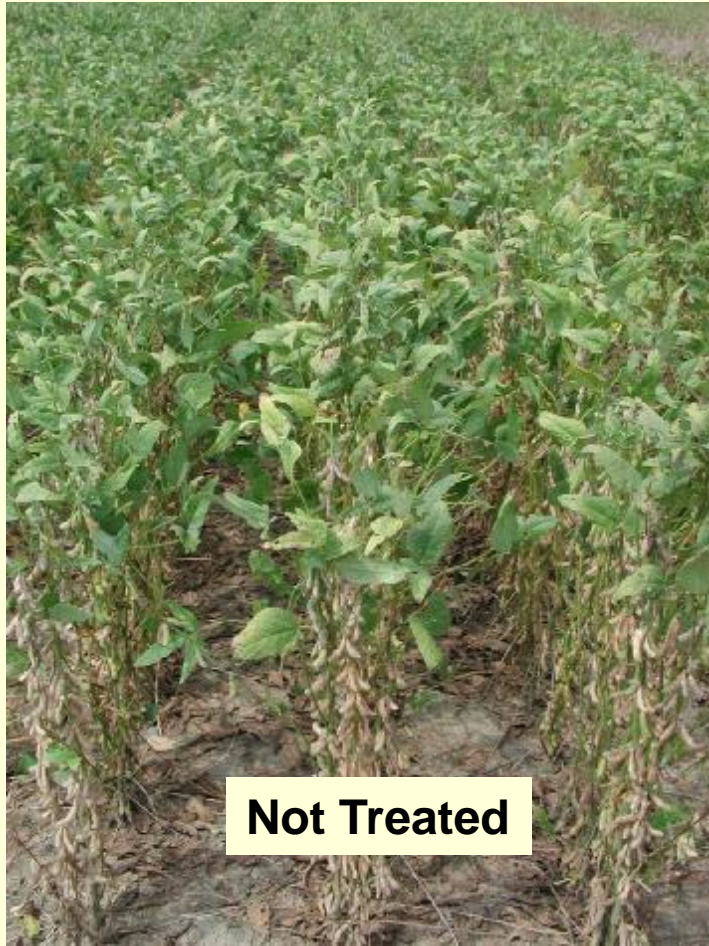


Leaf Retention



Green Pods

Harvest Aid Value – Earlier Crop Harvest?

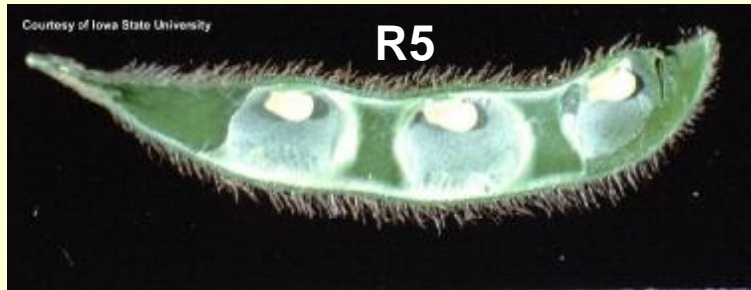


Gramoxone Inteon (Paraquat) Label

- 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, 1/2 of leaves have dropped, and remaining leaves are yellowing.
 - Confusing??
 - Application probably too late?



Soybean Reproductive Growth Stages



R5 Beginning Seed

Seed is 1/8 inch long in a pod **at one of the four uppermost nodes** on main stem.



R6 Full Seed (60% average seed moisture)

A pod containing a green seed that fills the pod cavity located **at one of the four uppermost main stem nodes**.

R6.5 Full Seed (50% average seed moisture)

All normal pods **on four uppermost nodes** have pod cavities filled. Leaf senescence begins. Seed at 50% dry matter accumulated.

R7 Beginning Maturity (40% average seed moisture)

One normal pod on main stem has reached mature color. Seeds at 100% dry matter accumulated. Physiological maturity (around 3 weeks prior to harvest)

Harvest Aid Study

- Research conducted in Group IV indeterminate soybeans and Group V determinate soybeans
- Harvest Aid:
 - Gramoxone Inteon (2L) @ 1 pt/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 approximately weekly intervals

Harvest Aid Study

Asgrow 4403RR Group IV Indeterminate Soybean Variety

<i>Application timing</i> <small>(Avg. seed moisture)</small>	<i>DAP to application</i> ¹	<i>DAA to harvest</i>	<i>Days harvested before nontreated</i>	<i>% Yield reduction vs. nontreated</i>
%	-----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

¹Planted May 12, 2006 and April 16, 2007.

²Yield 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

<i>Application timing</i> <i>(Avg. seed moisture)</i>	<i>DAP to application</i> ¹	<i>DAA to harvest</i>	<i>Days harvested before nontreated</i>	<i>% Yield reduction vs. nontreated</i>
%	-----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

¹Planted May 12, 2006 and May 10, 2007.

²Yield for the nontreated control was 59.4 bu/A.



Harvest Aid Study Results

- Apply Gramoxone to indeterminate Maturity Group IV soybeans when seed moisture from the uppermost 4 nodes of plants averages 50%.
 - Seed in upper canopy least mature
 - Application around 115 days after planting in either mid- April or mid-May
 - Soybeans harvested 7 to 10 d after application and 14 to 15 d before nontreated
- Apply Gramoxone to determinate Maturity Group V and VI soybeans when seed moisture from the uppermost 4 nodes of plants averages 40%.
 - Seed in upper and lower canopy least mature
 - Application around 125 days after planting in mid-May
 - 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)



Recommendations For Timing of Harvest Aid Application in Soybeans



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.

Other ways:

If one normal pod on main stem has reached mature color soybean growth stage is R7.



Next Step ...

Value of Harvest Aid in IPM Programs

Effect on Soybean Yield and Grade?

Economics?

Soybean Variety

Asgrow 4403 RR

Insect Control Treatment (+I or -I)

Orthene @ 16 oz + Baythroid @ 2 oz for red banded stinkbug

Fungicide Treatment (+F or -F)

Headline @ 12 oz + Topsin M @ 1 lb applied at R3

IPM Treatments were: **-I/-F** (nontreated control), **+I/-F**, **-I/+F**, and **+I/+F** (maximum IPM)

Harvest Aid Treatments (superimposed)

Gramoxone Inteon @ 16 oz or no harvest aid

Location/Years

Ben Hur Research Station - Baton Rouge (2007 and 2008)

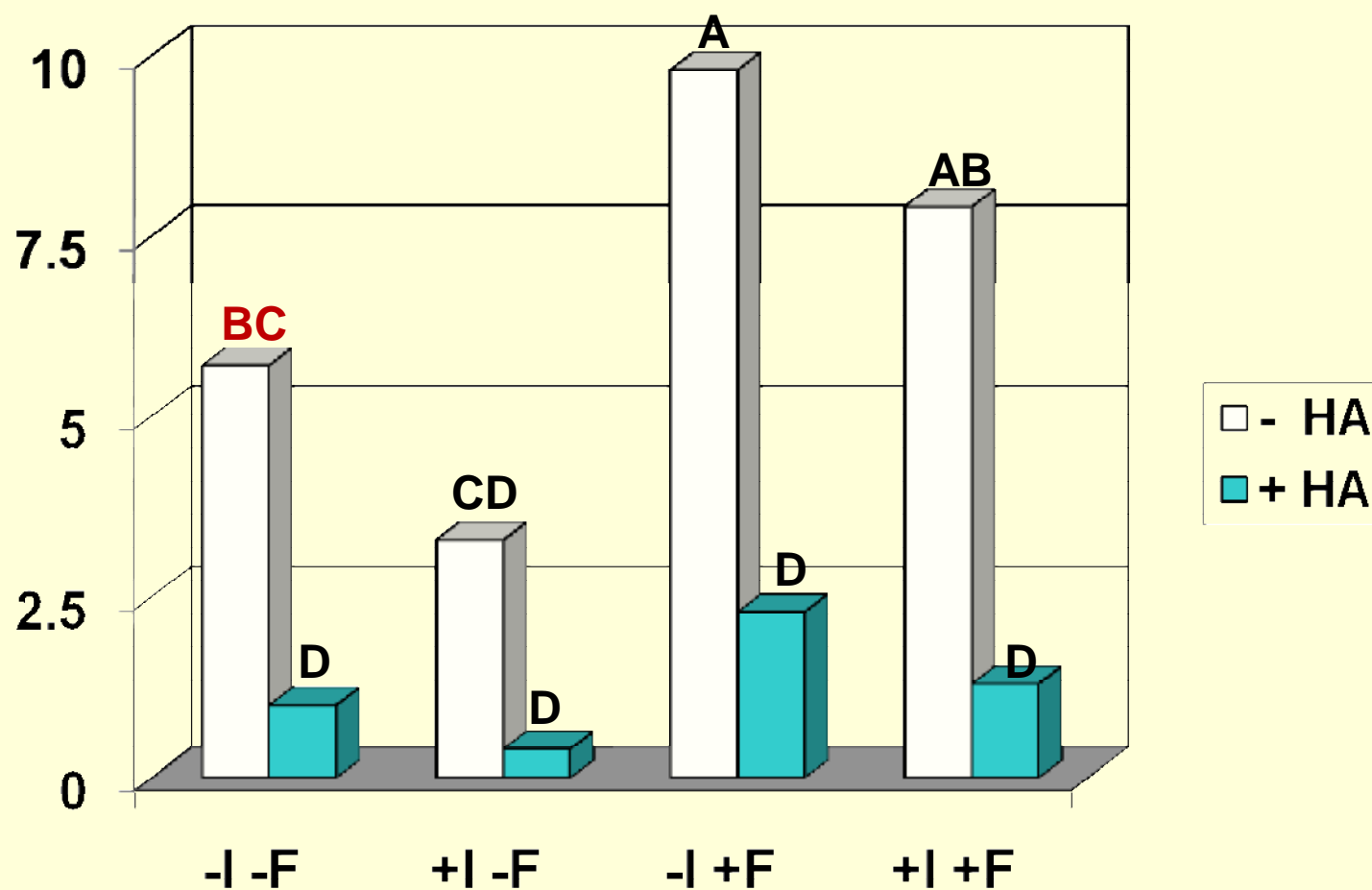


Data Collected for Soybean in the Field



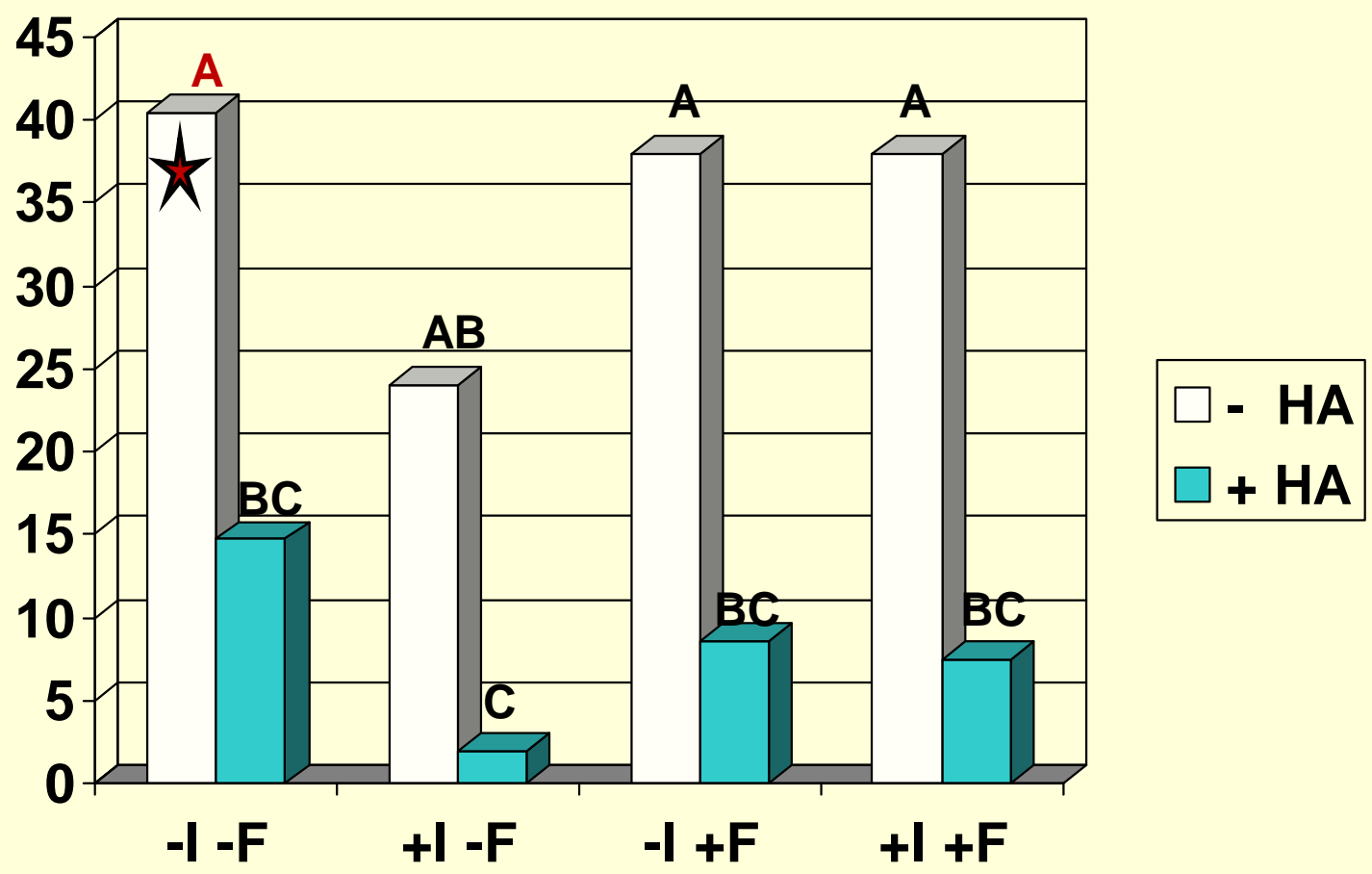
Leaf Retention (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



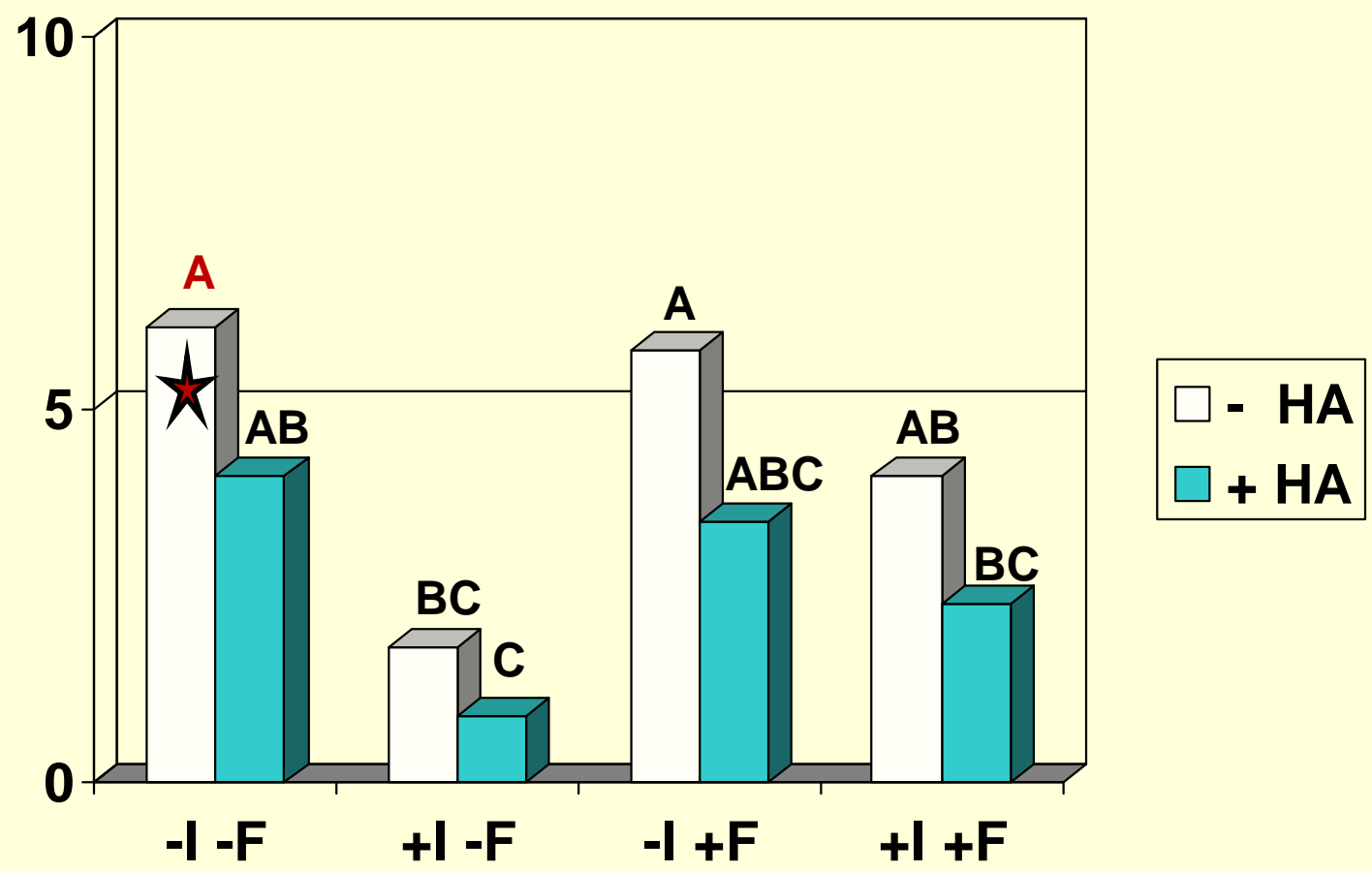
Green Stems (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid

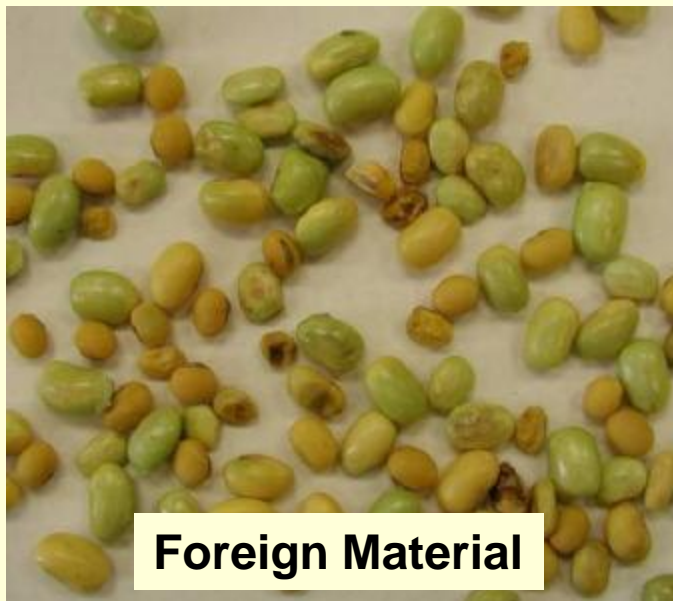


Green Pods (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



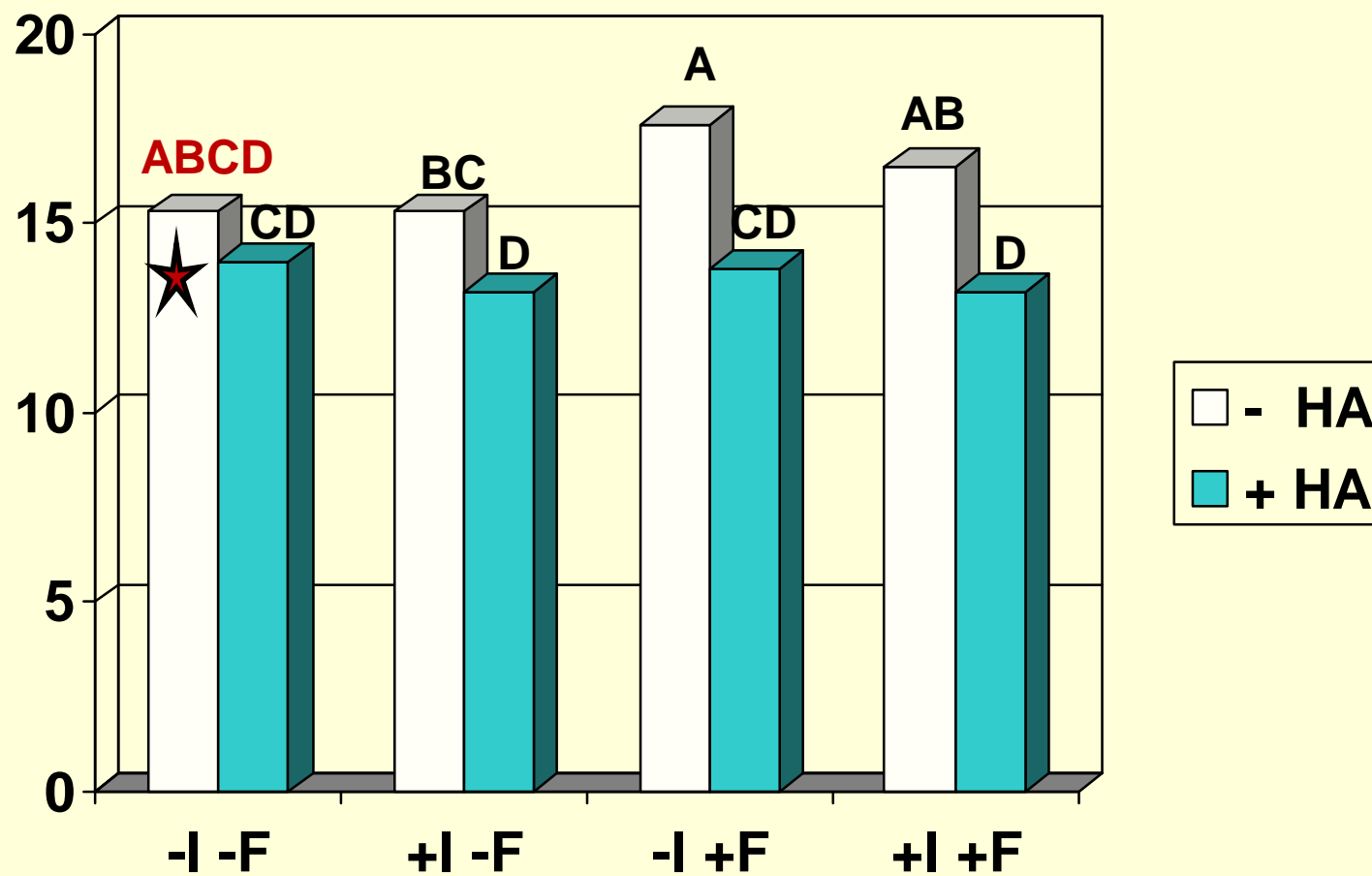
Data Collected for Harvested Soybean



What is the effect on soybean grade and economics?

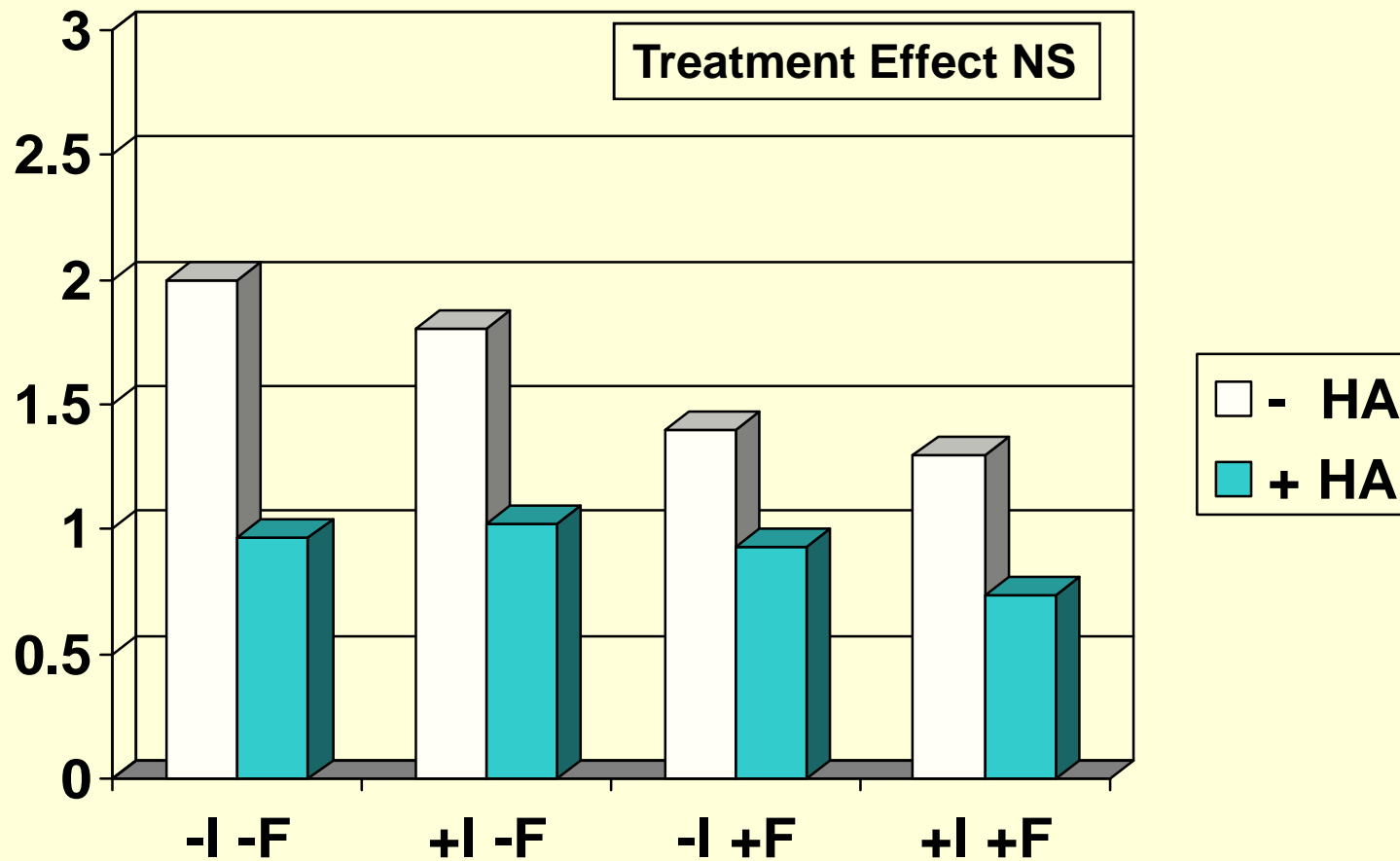
Seed Moisture (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



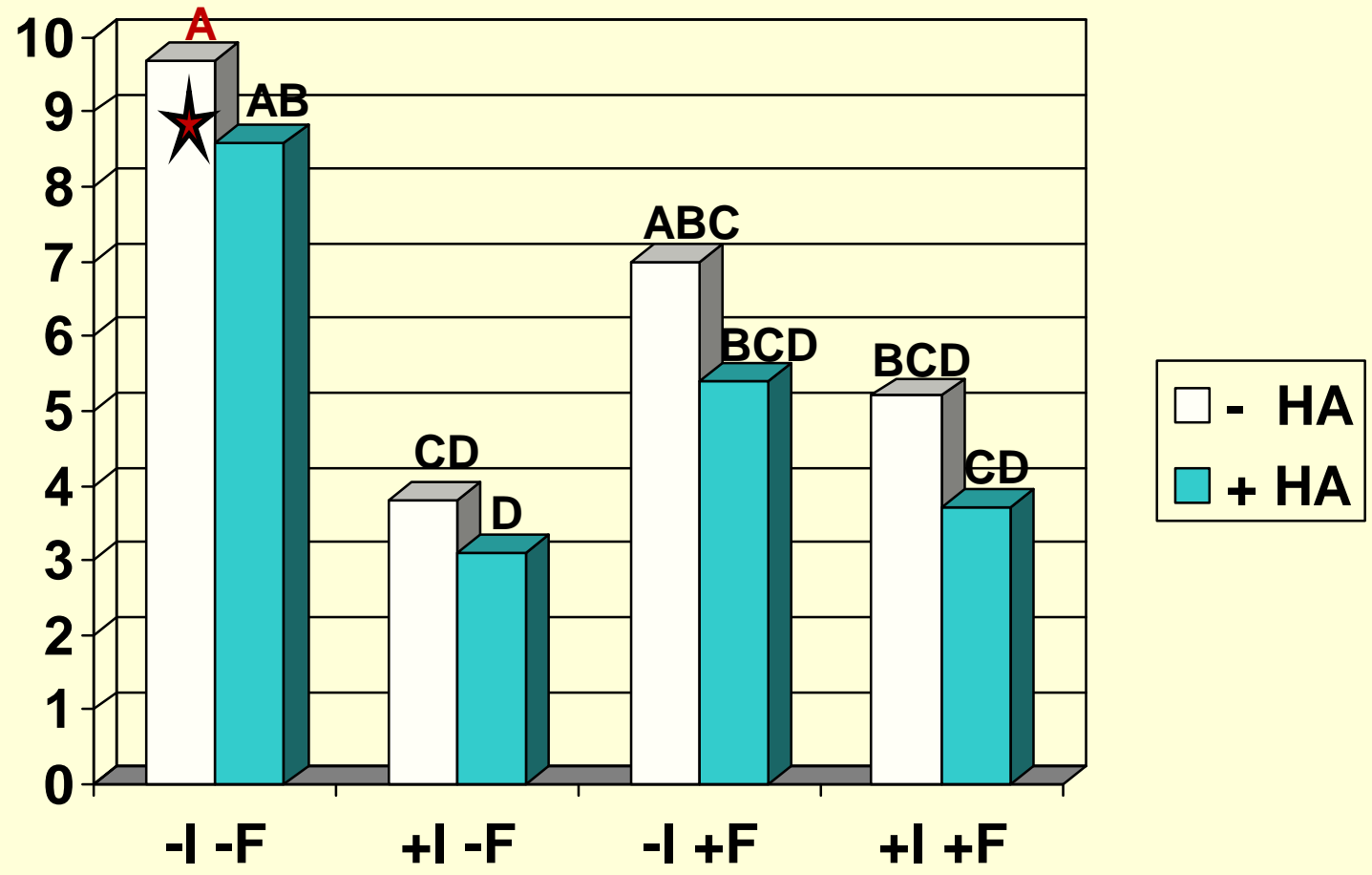
Foreign Material (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



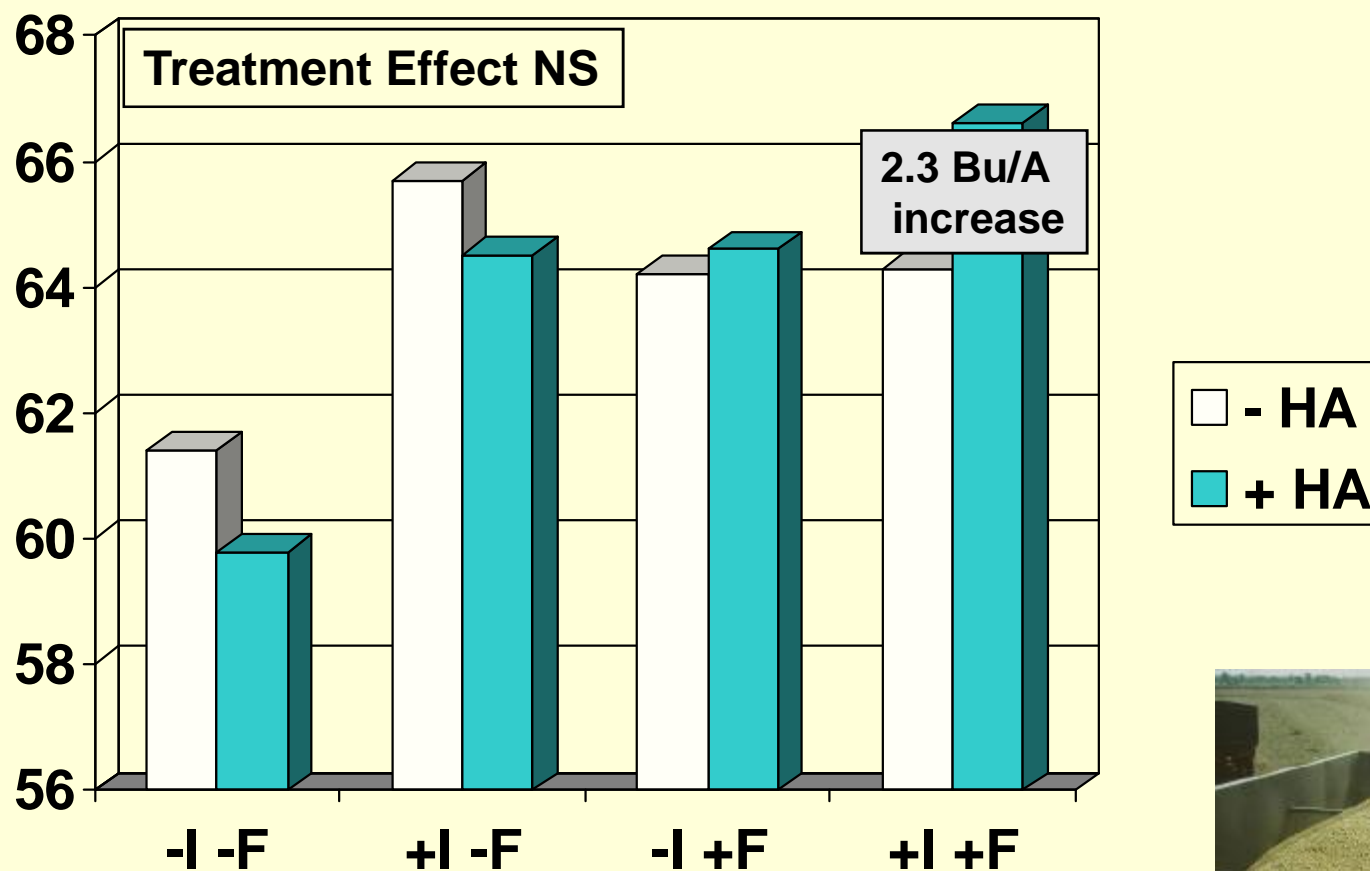
Seed Damage (%)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



Yield (Bu/A)

Insecticide/Fungicide IPM Programs and Gramoxone Harvest Aid



Deductions Due to Foreign Material and Seed Damage and Value of Harvest Aid

IPM Program	Harvest aid	Foreign Material (%)	FM Deduction (\$/A)	Seed Damage (%)	Damage Deduction (\$/A)	Total deduction (\$/A)	Yield (Bu/A)
-I/-F nontreated	-	<u>2.00</u>	\$6.14	<u>9.7</u>	\$17.81	<u>\$23.95</u>	61.4
	+	0.97	\$0.00	8.6	\$14.75	\$14.75	59.0
+I/-F	-	<u>1.86</u>	\$5.65	3.9	\$3.29	\$8.94	65.7
	+	1.02	\$0.12	3.1	\$3.26	\$3.38	64.5
-I/+F	-	1.40	\$2.56	<u>7.0</u>	\$9.63	<u>\$12.19</u>	64.2
	+	0.93	\$0.00	5.4	\$7.11	\$7.11	64.6
+I/+F	-	1.32	\$2.06	5.1	\$7.07	<u>\$9.13</u>	64.3
	+	0.74	\$0.00	3.7	\$3.33	\$3.33	66.6

Foreign material allowed up to 1%. FM greater than 1% is deducted by that percentage from gross weight of the load. Calculations are based on soybean price= \$10.00/Bu.

Seed damage allowed up to 2%. As the percentage increases a discount scale is used.

Economic Return – Gramoxone Application

<i>Harvest Aid</i>	<i>Price</i>	<i>Rate</i>	<i>Total Cost</i>
	--\$/Unit--	--Unit/A--	--\$/A--
Gramoxone	\$34/gal	16 oz	\$4.32
Induce	\$18.95/gal	5 oz	\$0.75
Application	--	--	<u>\$4.50</u>
			\$9.57

- When Gramoxone was not applied, total economic loss due to FM and damage deductions for the IPM programs was \$23.95/A for -I/-F; \$8.94 for +I/-F; \$12.19 for -I/+F; and \$9.13 for +I/+F.
- When Gramoxone was applied, deductions were reduced \$9.20 for -I/-F; \$5.56 for +I/-F; \$5.08 for -I/+F; and \$5.80 for +I/+F.
- The gain due to use of Gramoxone would not cover total cost of the application.
- A yield increase associated with Gramoxone application occurred only when insecticide and fungicide were both applied (2.3 Bu/A increase).
- A yield increase of around 1 Bu/A (at \$10/Bu) would be needed to cover the cost of the Gramoxone application.

Conclusions



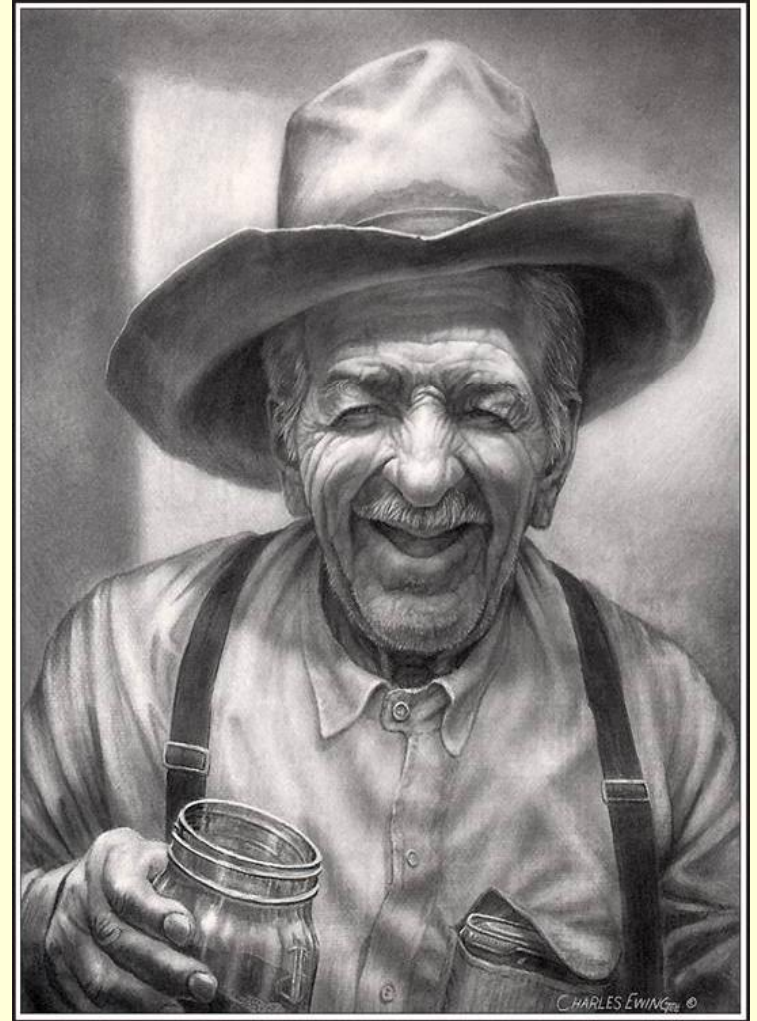
- To maximize soybean seed quality and yield potential an effective IPM program that includes insect control and management of diseases should be implemented.
- Leaf retention, occurrence of green stems and pods, and seed moisture are linked to level of red banded stinkbug control and fungicide application; foreign material (FM) was increased with fungicide application and seed damage was decreased when insecticide was applied.
- Use of Gramoxone Inteon harvest aid can enhance desiccation of soybean and reduce seed moisture.
- Economic gain from reducing FM and seed damage with use of Gramoxone may not cover the total cost of application (\$9.57/A); a slight yield increase would improve economics.
- “Value” of Gramoxone harvest aid in IPM programs should include economic return as well as advantages in earlier harvest and improved harvest efficiency.

St. Peter and the Farmer

A farmer stood at the Pearly Gates,
His face all ruddy and old.
"What have you done," St. Peter said,
"To gain admittance to the fold."

"I've been a farmer, Sir;
I farmed for many a year."
He slowly ran his hand to his face
And brushed away a tear.

The Pearly Gates swung open wide,
St Peter rang the bell.
"Come in, old man, your welcome here,
You've already been through Hell."



Questions?



Questions?















Baton Rouge 2007 & 2008

Application	Green leaves	Green stems	Green pods	Seed Moisture	Foreign Material	Damage	Yield
Fungicide	%						Bu/A
None	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
Insecticide							
None	5.4	27.0	5.7	15.5	1.4	7.3	63.6
Orthene + Baythroid	4.1	19.2	2.7	14.7	1.2	3.8	66.7
Harvest Aid							
None	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