Harvest Aid Products and Timing Soybean
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With the 2018 soybean season here in Arkansas starting to wind down, we're starting to get calls about what is the proper timing for harvest aid applications and what products work the best. With the weedy fields I've seen driving across the State due to either preemerge herbicides not being activated early in the season, or the poor control from post-herbicide applications, we could potentially see more harvest aids applied this fall to help with harvesting our soybean crop. A lot of work has been conducted on the use of harvest aids in the mid-South U.S., and below are results from research conducted here in Arkansas.

Timing of Harvest Aids

The most asked question about the use of harvest aids in soybean is at what growth stage (GS) can these products be applied and not see significant yield and seed quality issues. From research conducted by Dr. Tom Barber using Gramoxone SL applied at 0.25 lb ai/ac at five different growth stages, the earliest growth stage where we see no statistical yield loss is R6.5 GS. If applications of these products are made prior to R6.5 GS, soybean grain yields were reduced as much as 68.5% when applied at R5.5 GS and 56.6% when applied at R6.0 GS compared to the untreated check (Table 1). The results from this research are similar to results seen in other mid-South U.S. states. The hardest part of this recommendation is determining when the soybean plants are at R6.5 GS. Under normal growing conditions, soybean plants will reach the R6.5 GS 10-14 days after R6.0 GS. The definition of R6.0 GS is "One 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." At the R6.0 GS, when soybean pods are opened, the pod membrane will still stay attached to the seed (Figure 1). When soybean plants reach the R6.5 GS, seed from a pod from one of the four uppermost nodes should easily separate from the pod membrane. At this point, the seed is not taking in any additional moisture or nutrients. A visual progress of pod development from R6 to R8 is shown in Figure 2. Based on the current data, it would be better to be on the later side of the R6.5 GS than too early.

Harvest Aid Products

Nine different harvest aid products or tank mixes of these products were evaluated at the R6.5 GS and at 70% leaf drop. When compared to the soybean grain yield of the untreated check, yields for all of the products and combinations at the two timings were not significantly different. All treatments with Gramoxone SL alone or in combination and Sodium Chlorate alone had significantly higher percent leaf drop seven days after application compared to the other treatments at the R6.5 GS timing. All treatments had greater than 95% leaf drop at both timings 14 days after applications (data not shown). The only downside to the use of Gramoxone is the pre-harvest interval of 15 days. Always read and follow herbicide labels.

Things to remember about the use of harvest aids:

- Harvest aids such as Gramoxone SL do not remove excessive moisture from seeds. There are some reports that adding sodium chlorate to a desiccant may help remove excessive moisture from green soybean tissue and/or seed.
- If possible, do not apply a harvest aid herbicide prior to a rain. Wetting and drying cycles could cause shattering of pods to occur.

- Be prepared to harvest fields as soon as possible as allowed on the herbicide label, after applying a desiccant. Once harvest aids are applied to a soybean field, nothing good can happen to the crop until it is put through the combine.
- Crop and weed drydown may be slowed during cool, wet weather. Additional time beyond the herbicide product's pre-harvest time interval may be needed to dry down large weeds.

Table 1. Effects of soybean yield from application timings of Gramoxone SL applied at 0.25 lb ai/ac as a harvest aid.

Trt. No.	Treatment	Rate	Appl. Timing	Yield (bu/ac)	% Yield Reduction
1	UTC			45.4 b	0.0%
2	Gramoxone SL	0.25 lb ai/ac	R5.5	14.3 d	68.5%
3	Gramoxone SL	0.25 lb ai/ac	R6.0	19.7 c	56.6%
4	Gramoxone SL	0.25 lb ai/ac	R6.5	42.4 b	6.6%
5	Gramoxone SL	0.25 lb ai/ac	R7.0	53.1 a	-17.0%
6	Gramoxone SL	0.25 lb ai/ac	50% Leaf Drop	53.4 a	-17.6%

Means followed by the same letter do no significantly differ (P = 0.05)

Table 2. Soybean Grain Yield, Percent Leaf Drop, and Percent Desiccation of Different Harvest Aid Products and Timings.

Trt. No.	Treatment	Rate	Appl. Timing	Yield (bu/ac)	% Yield Reduction	% Leaf Drop 7 DAA	% Desiccation 7 DAA
1	UTC			50.2 a	0.0%	0.0 e	0.0 d
2	Gramoxone SL	0.25 lb ai/ac	R6.5	44.2 a	12.0%	90.0 a	6.0 c
	AMS	1.04% v/v					
	NIS	0.25% v/v					
3	Gramoxone SL	0.5 lb ai/ac	R6.5	47.1 a	6.2%	81.3 a	16.6 ab
	COC	1% v/v					
4	Sodium Chlorate	5 lb ai/ac	R6.5	52.2 a	-4.0%	78.8 ab	5.0 c
5	Gramoxone SL	0.25 lb ai/ac	R6.5	44.5 a	11.4%	85.0 a	9.4 bc
	Sodium Chlorate	2.5 lb/ac					
6	Sharpen	0.0445 lb ai/ac	R6.5	49.1 a	2.2%	40.0 d	14.6 ab
	MSO	1 lb ai/ac					
	AMS	1.04% v/v					
7	Sharpen	0.0445 lb ai/ac	R6.5	40.6 a	19.1%	51.3 c	12.3 ab
	COC	1% v/v					
	AMS	1.04% v/v					
8	Sharpen	0.0223 lb ai/ac	R6.5	45.1 a	10.2%	78.8 ab	13.2 ab
	Gramoxone SL	0.25 lb ai/ac					
	AMS	1.04% v/v					
	COC	1% v/v					
9	Roundup PowerMax	0.95 lb ai/ac	R6.5	44.6 a	11.2%	67.5 b	9.1 bc
	Aim	0.0234 lb ai/a					

	COC	1.04% v/v					
10	Roundup PowerMax	0.95 lb ai/ac	R6.5	41.2 a	17.9%	67.5 b	22.9 ab
	Sharpen	0.0445 lb ai/ac					
	MSO	1 lb ai/ac					
11	Gramoxone SL	0.25 lb ai/ac	70% Leaf Drop	49.2 a	2.0%		
	AMS	1.04% v/v					
	NIS	0.25% v/v					
12	Sharpen	0.0445 lb ai/ac	70% Leaf Drop	51.5 a	-2.6%		
	MSO	1 lb ai/ac					
	AMS	1.04% v/v					
13	Sharpen	0.0445 lb ai/ac	70% Leaf Drop	53.7 a	-7.0%		
	COC	1% v/v					
	AMS	1.04% v/v					
14	Sharpen	0.0223 lb ai/ac	70% Leaf Drop	43.9 a	12.5%		
	Gramoxone SL	0.25 lb ai/ac					
	AMS	1.04% v/v					
	COC	1% v/v					

Means followed by the same letter do no significantly differ (P = 0.05)

Figure 1. Growth Stage R6 description and illustration of a R6 soybean pod. Membrane is still attached to the seed when pod is opened.

R6

Reproductive Stage 6

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

* Beans of many sizes can be found on the plant
* Large amounts of nitrogen are still being accumulated from the soil and remobilized to the seed

Adapted from "A Visual Guide to Soybean Growth Stages", University of Wisconsin – Madison.

Figure 2. Progression of soybean pods and seed from R6 to R8.

Adapted from “A Visual Guide to Soybean Growth Stages”, University of Wisconsin – Madison.