MISSISSIPPI SOYBEAN PROMOTION BOARD
PROJECT NO. 57-2016 (YEAR 1)
2016 Annual Report

Title: Evaluation of Multiple Agronomic Considerations with Harvest Aid Use in Mississippi Soybean Production

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BACKGROUND

Harvest aid use in soybean production in Mississippi is fast becoming a standard production practice for a number of growers. However, there are a number of considerations with the use of soybean harvest aids that need to be investigated. The commonly used compounds for use as harvest aids in soybeans are paraquat (Gramoxone), saflufenacil (Sharpen) and sodium chlorate. Each chemical recommends or requires the use of different adjuvants (Crop oil concentrate, methylated seed oil, non-ionic surfactant). Research is needed to investigate the effects of different adjuvants not only on individual harvest aids, but also on common mixtures of harvest aids.

Similarly, harvest aid labels also require or recommend certain application volumes for best performance. Harvest aid spray volumes vary by application equipment (airplane vs. groundrig) and can affect performance of harvest aids. Research needs to be conducted to evaluate the performance of harvest aids at various application volumes.

The label of harvest aids also specifies a pre-harvest interval (PHI), which is the minimum amount of time that must elapse between chemical application and soybean harvest. Different harvest aids have different PHI requirements affecting the amount of time a soybean crop is in the field after harvest aid application.

Similarly, wet fall conditions can prevent equipment from getting into the field to harvest the soybean crop. Research needs to be conducted to evaluate how various harvest aids and harvest aid combinations affect soybean moisture content and shattering at various harvest timings after harvest aid application.

One of the most popular harvest aids is paraquat (Gramoxone). Aside from being used as a harvest aid, paraquat is used extensively as a burndown herbicide in Mississippi soybean production. Given that soybean planting (April- June) and harvest (August-November) can be spread out over a number of months, multiple opportunities exist for misapplication of paraquat when used both as a burndown and harvest aid. Paraquat has the potential to drift onto a young soybean crop or accidentally be applied to a soybean crop via tank contamination when paraquat is being sprayed as a burndown. Similarly, paraquat can drift onto a soybean crop during reproductive growth when harvest aids are being applied to an adjacent field or through tank contamination. Research is needed to determine the effect of multiple rates of paraquat on soybean at different growth stages.

OBJECTIVES

Objective 1: Investigate the effects of different adjuvants on harvest aid performance.

Objective 2: Investigate the effects of spray volume on the efficacy of multiple soybean harvest aids.

Objective 3: Investigate the effects of harvest interval after harvest aid use on soybean yield, moisture and shattering.

Objective 4: Determine the effect of various rates of paraquat on soybean at multiple growth stages to simulate issues with spray tank contamination and drift.

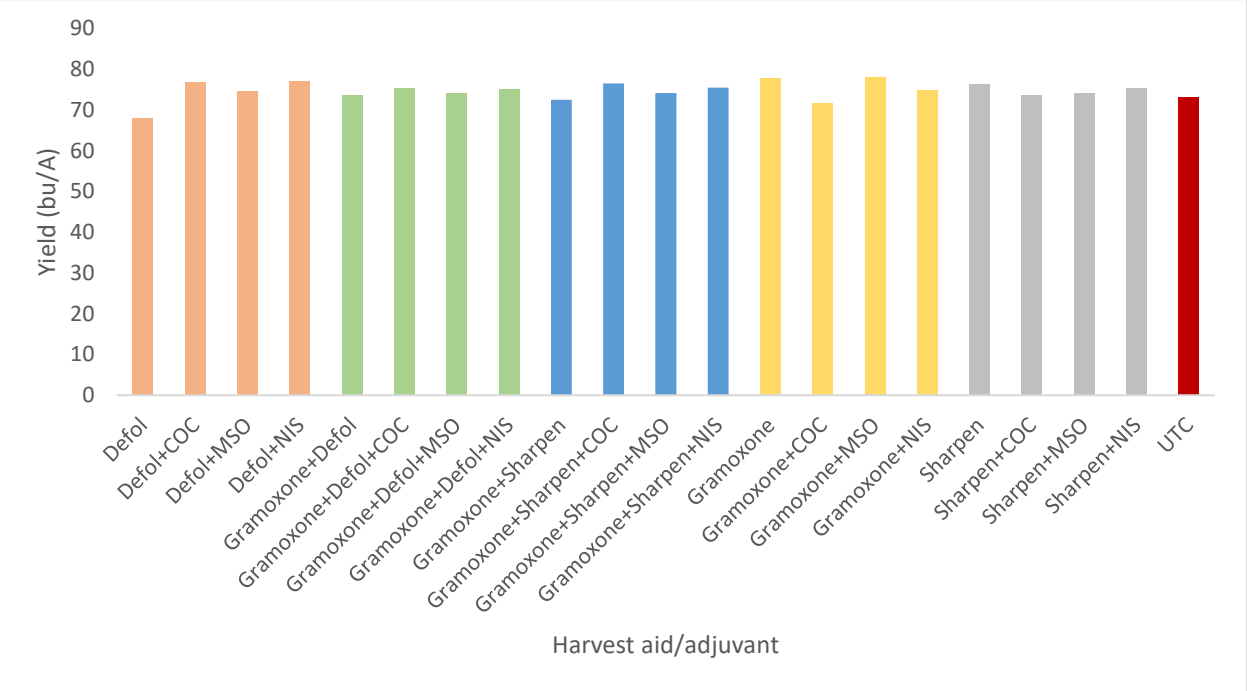
PROGRESS/ACTIVITY

Weather conditions prevented the spray volume study from being completed; however, all other studies were successfully completed.

Adjuvant Study

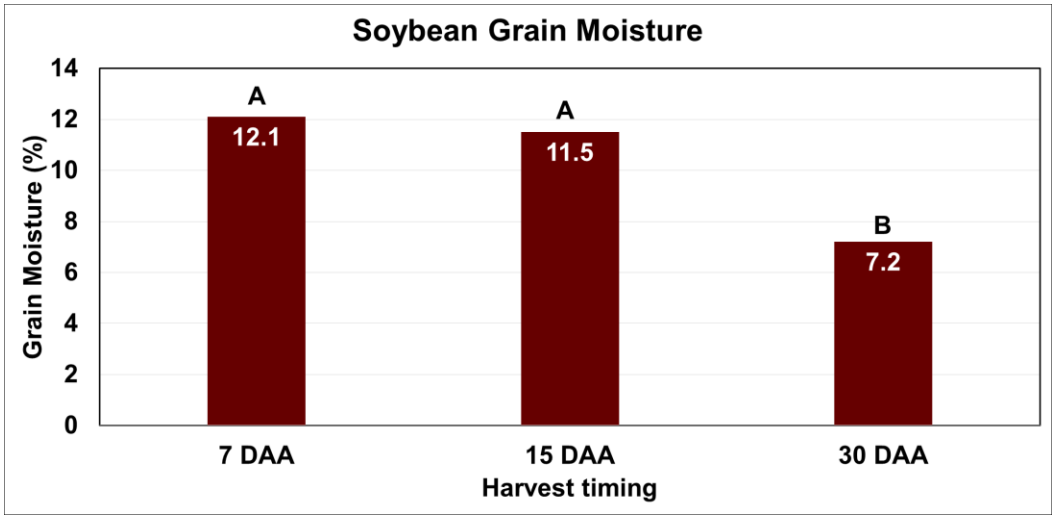
For the adjuvant study, most harvest aid products and combinations performed similarly with the different adjuvants. Sodium chlorate (Defol) performance was decreased when adjuvants were not used compared to when either MSO, COC, or NIS was included in the mix. It appears that when sodium chlorate is being applied alone (no tank mix partner) for a harvest aid, an adjuvant should be used.

Also, the Sharpen label states that MSO must be used as an adjuvant when applied as a harvest aid. We did not observe any differences in performance between MSO and COC when used as an adjuvant with Sharpen.

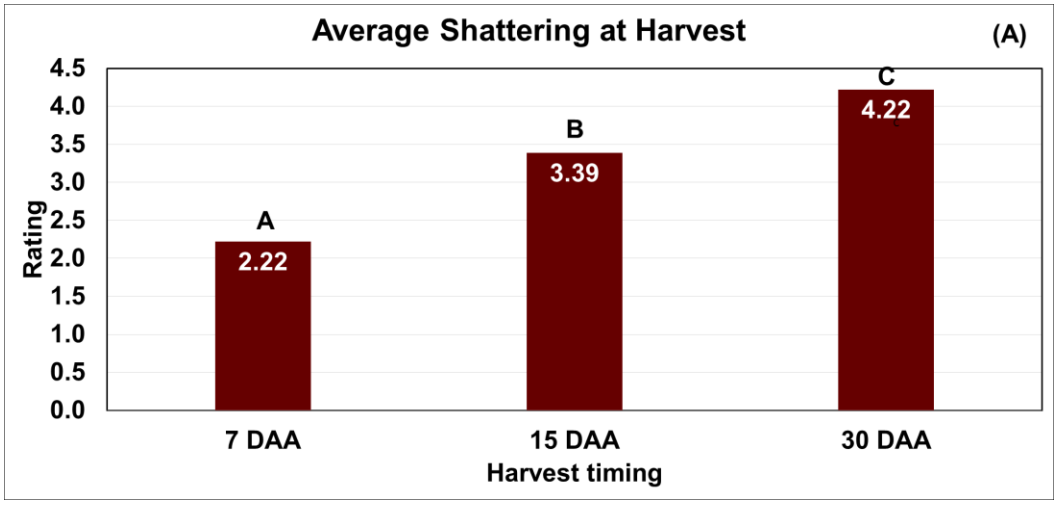


Shattering study

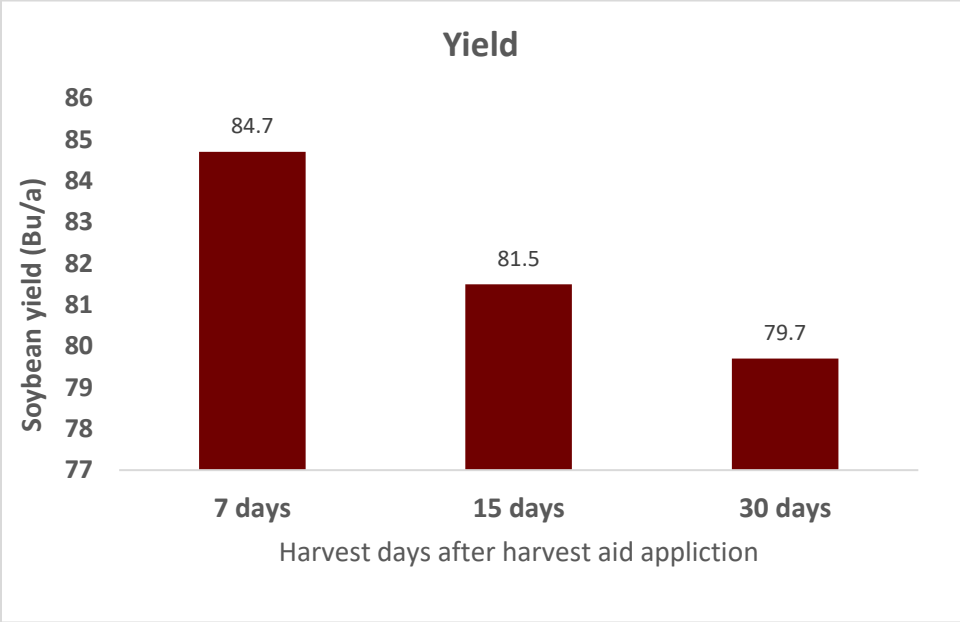
The type of harvest aid product (paraquat, saflufenacil, sodium chlorate) or combination of products did not affect moisture, shattering or yield. However, harvest date after harvest aid application did affect moisture, shattering, and yield. No differences in seed moisture were observed between 7 and 15 days after application (DAA). When harvest was delayed until 30 DAA, seed moisture was significantly decreased.



Shattering ratings were determined prior to harvest at 7, 15 and 30 DAA. Not surprisingly, the least amount of seed shattering was observed when soybean was harvested at 7 DAA. Shattering increased as harvest was delayed to both 15 DAA and 30 DAA. The increase in shattering for the later harvest dates can be expected as the soybean pods dry and split open. Interestingly, the harvest aid product did not affect the amount of shattering.

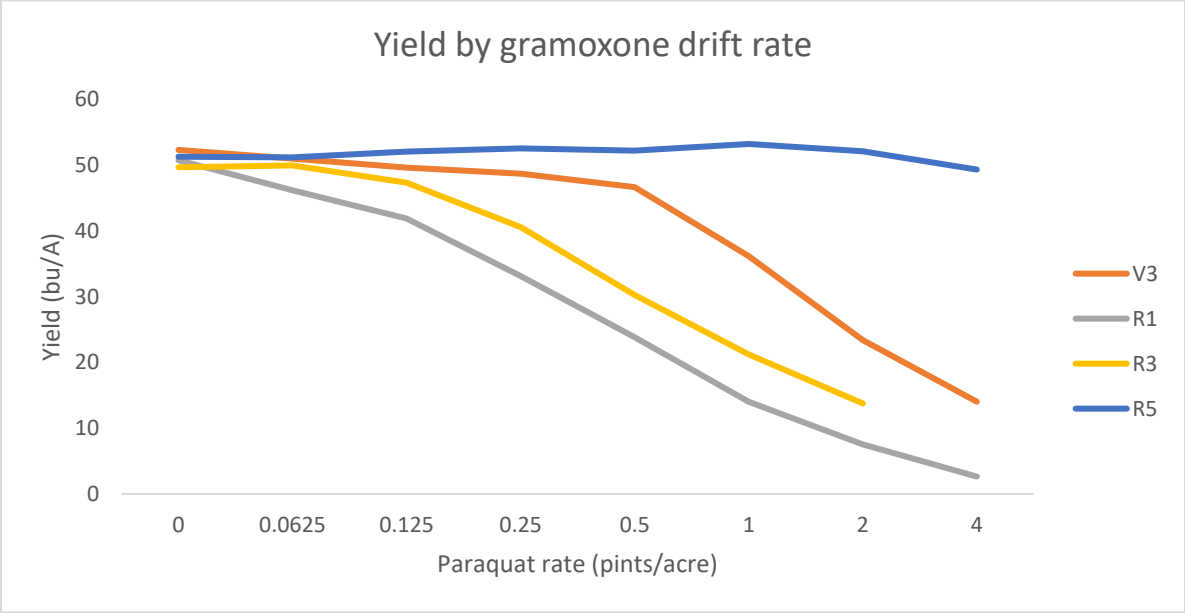


Yields were the greatest when soybean was harvested 7 DAA. Yields were decreased when harvest was delayed until 15 and 30 DAA. This is due to a combination of increased shattering and moisture loss for the later harvest dates. The loss of yield for later harvest dates should be taken into account when determining which harvest aid product to use.



Drift Study

The drift study was successfully conducted in 2016. We had planned for applications at more growth stages; however, we feel that we had a good spread of growth stages to identify trends in the effect of paraquat drift on soybeans



As expected, early vegetative soybean are rather tolerant to paraquat. This is likely due to their ability to branch and compensate when the main growing point is destroyed or damaged from a drift event. Paraquat rates up to 0.5 pints per acre did not significantly affect soybean yield when applied at V3. This indicates that paraquat drift events that occur during early vegetative growth will likely not require a replant since affected plants will have

enough time to recover.

Soybeans were extremely sensitive to paraquat when applied at the R1growth stage (beginning of flowering). We know from previous studies that R1 is a critical stage to yield determination, and other stresses that occur during this period (drought, pests) can significantly affect yield. Yield decrease was observed even at the 1/16 X rate (0.0625) and yield dramatically declined with increasing paraquat rate. A soybean crop experiencing a drift event during flowering may be a candidate for replanting.

Sensitivity to paraquat decreased as soybean progressed through reproductive stages. At R3 (beginning of pod development), soybeans were slightly less sensitive to paraquat than at R1, but still suffered significant yield loss at low paraquat rates. Interestingly, no yield loss was observed for any paraquat rate at R5. When the R5 application occurred, soybean plants were nearing the end of R5 and probably approaching R6. Previous studies have shown that R6 soybean do not experience yield loss when desiccant rates of paraquat were applied.