Title

Evaluation of Brake herbicide for preemergence weed control in furrow irrigated rice

Principle Investigator

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Objective

Determine the spectrum and duration of control and crop safety when utilizing Brake herbicide in furrow irrigated rice production

Justification

Fluridone, the active ingredient in Brake herbicide, was first reported as a possible herbicide for use in cotton production in 1976. This herbicide showed great promise with efficacy on many key weeds and excellent crop safety. However, high costs and rainfall or irrigation for activation requirements in excess of most other soil applied residual herbicides quickly removed this product from consideration. Fluridone found a home in the aquatic herbicide market under the name Sonar. It has been shown to control species such as hydrilla, Eurasian watermilfoil, and duckweed in ponds, lakes, lagoons, and reservoirs and other high moisture environments.

Fluridone has once again shown promise for use in cotton weed control. With a rise in the number of herbicides to which resistance has developed (Glyphosate, PPO, ALS), especially in Palmer amaranth and barnyardgrass, new modes of action effective at controlling this and other species have gained some popularity. Fluridone has been evaluated in soybeans and corn with little advantage over current standards in weed control and poor crop safety. In peanut production it has shown to be effective and safe. However, high moisture requirements for activation can still cause poor results. Earlier investigations into its use in delayed flood rice focused on preplant, at planting, and preemergence application timings. At these timings, crop injury was noted to be variable but often detrimental.

Procedures

The focus of this study was to evaluate weed control and spectrum as well as crop safety with fluridone applied as an overlapping residual after an at planting application of Command + Sharpen in furrow irrigated rice. Rice was planted on May 11 on 38" beds. Fluridone was applied at early-POST and mid-POST timings at a range of rates (8, 12, 16, and 24 fl. oz./ac.) on June 7 and June 28, respectively (Figure 1). Precipitation of nearly 0.5" was received within 4 hours following the June 7 application on previously wet soil, and 1.13" within 5 days for the June 28 application. Crop injury and weed control evaluations began 2 days after initial fluridone applications and continued until four weeks after the final fluridone application. Rice was also harvested for yield.

Results

Very few differences in weed control were observed in this study. Species evaluated were Palmer amaranth, large crabgrass, and hemp sesbania. Bleaching and chlorosis were the main crop response parameters seen. Both of these responses were minor and the crop generally recovered. However, it should be noted that most injury was observed in the furrow and moderated as you moved to the bed shoulder and to the top of the beds. Injury also persisted more so in the furrow and may have even recurred with subsequent irrigations and precipitation.

Crop response in the form of bleaching or whitening of tissue occurred after the EPOST (1-2 leaf rice) application timing on June 7. Response increased as the rate increased. The 24 fl.oz./ac rate displayed significantly higher bleaching than the 8,12, or 16 oz. rates which had more bleaching than the untreated check at 1 week after treatment (WAT) (Figure 2). MPOST timings are omitted from this analysis because those treatments had not been applied at the time of these evaluations. Similar observation occurred during the 2 and 3 WAT evaluations. After the MPOST applications had been made

we were able to compare just the MPOST applications, or all treatments. When only analyzing the MPOST treatments, we saw the same trend as the EPOST applications – rate increase=more crop response, just not significant differences at 1 WAT (Figure 3). In addition to bleaching, we also noted chlorosis significantly higher from all MPOST treatments at 1 WAT compared to the no fluridone check. (Figure 4) This trend continued, sometimes only numerically, for both types of injury through the rest of the assessments.

As touched on previously, weed control differences were minimal in this study. No statistical differences in Palmer amaranth or large crabgrass were noted until the final evaluations on July 25, and none observed in control of barnyardgrass or hemp sesbania. Barnyardgrass control was more variable than control of the other species – but populations of barnyardgrass were also more dense but sporadic than the other species. Control of barnyardgrass was greater than 80% in all treatments at the conclusion of the study, and 95% for hemp sesbania. Control of large crabgrass was 90% or better from all treatments including the no fluridone check (Figure 5).

Crop yield in this study was overall lower than one would consider adequate. No significant differences existed even though treatment averages ranged from 40 bu./ac. for the no fluridone check to 103 bu./ac. for the 8 oz. rate applied at EPOST and 12 oz. rate applied at MPOST. This was due to the high variability in the replications in this study (Figure 6).

Conclusions

From a crop safety perspective, fluridone appears to be a good candidate for use in furrow irrigated rice production. While some bleaching was encountered, these symptoms were minor and usually not long lasting , although recurrence was possible, especially as the application rate increased. This study and a previous study both show that injury is mainly confined to the furrow. In discussions with producers, I have asked and been asked is this a concern. The answer I have received is that it depends on how your furrows were made. Growers who use traditional, preplant beds maintain that this is a small but significant portion of their crop and that injury, maturity delay or death may cause economic losses. Growers who plant on flat ground and come back later and run narrow furrows probably don't have this concern and they are plowing out a couple of drill rows in the furrow making process.

Weed control was excellent in this study. However, the densities of the evaluated species were not what I expected based on the number of seed we broadcast to this study area prior to planting, nor uniform. I am well aware of this chemicals performance in cotton for controlling Palmer amaranth, and am encouraged by the crop safety in this study. Continuation of this study for another year or perhaps two could help us better understand the performance and longevity when weed densities are higher.

Figure 1. Treatment List

Treatment	Fluridone Rate (fl.oz./ac)	Application Timing
1	-	-
2	8	EPOST
3	12	EPOST
4	16	EPOST
5	24	EPOST
6	8	MPOST
7	12	MPOST
8	16	MPOST
9	24	MPOST

Figure 2. Crop response 1 WAT in the form of bleaching from fluridone applied to 1-2 leaf rice (EPOST) on June 7. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

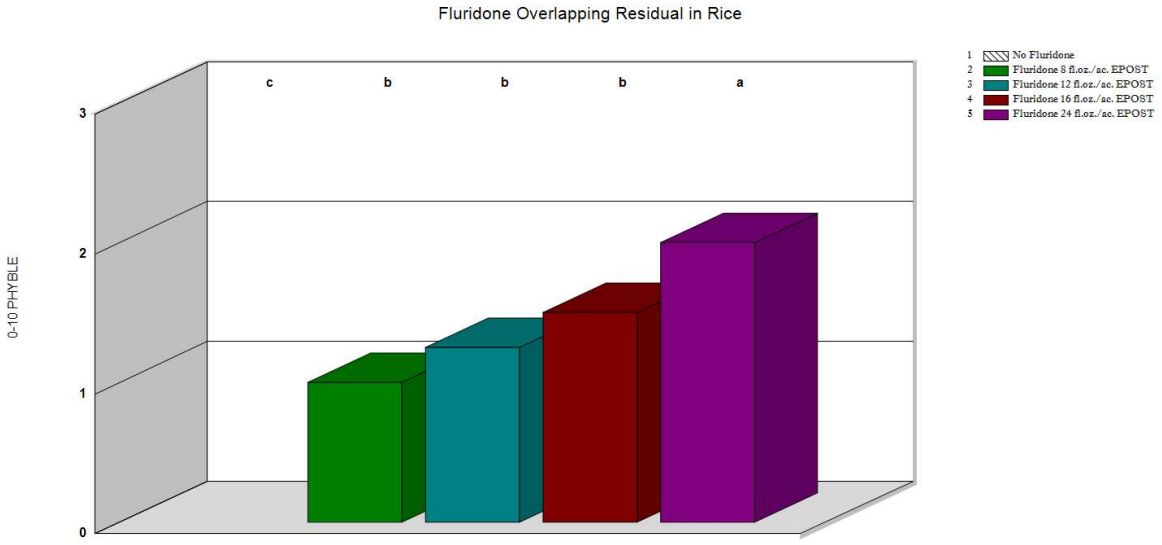

Figure 3. Crop response 1 WAT in the form of bleaching from fluridone applied to 4-5 leaf rice (MPOST) on June 30. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

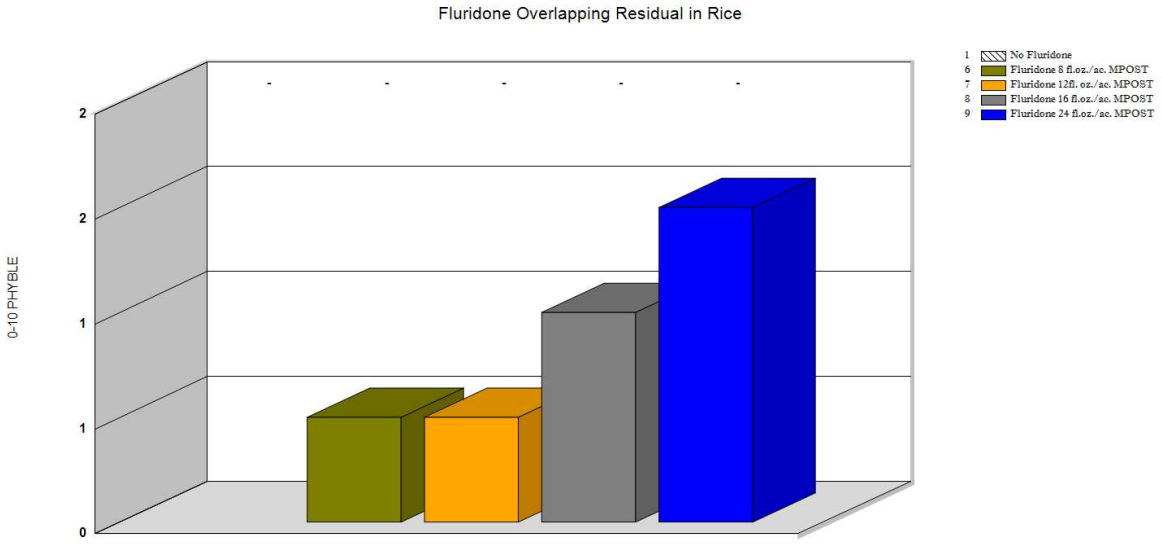

Figure 4. Crop response 1 WAT in the form of chlorosis from fluridone applied to 4-5 leaf rice (MPOST) on June 30. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

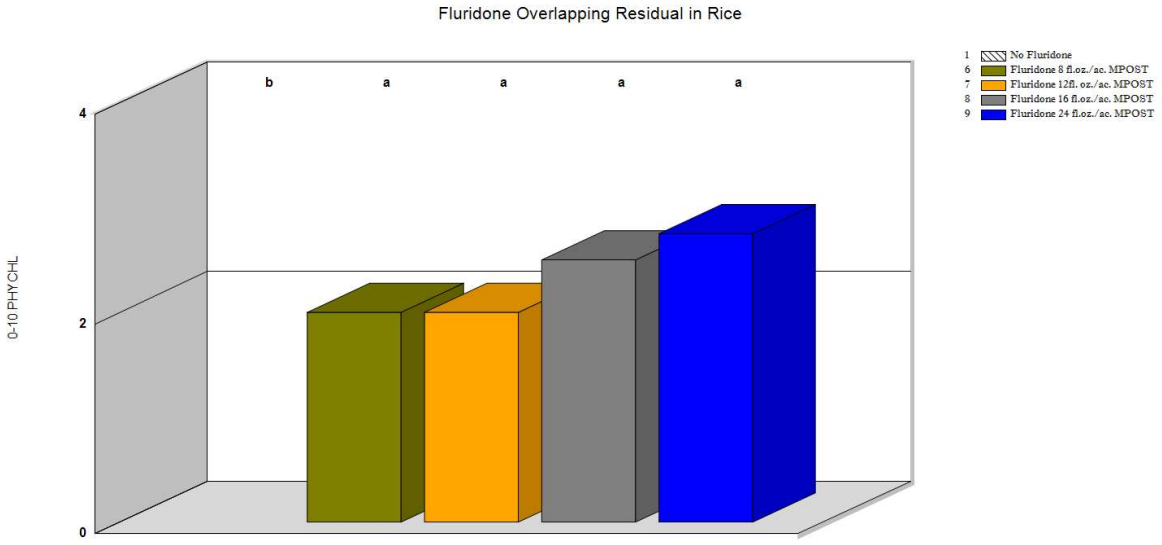

Figure 5. Large crabgrass control following applications of fluridone at 0,8,12,16 or 24 fl.oz./ac applied to 1-2 leaf rice (EPOST) or 4-5 leaf rice (MPOST) on July 25. 100=complete control and 0=no control. Data with the same letters are not statistically different.

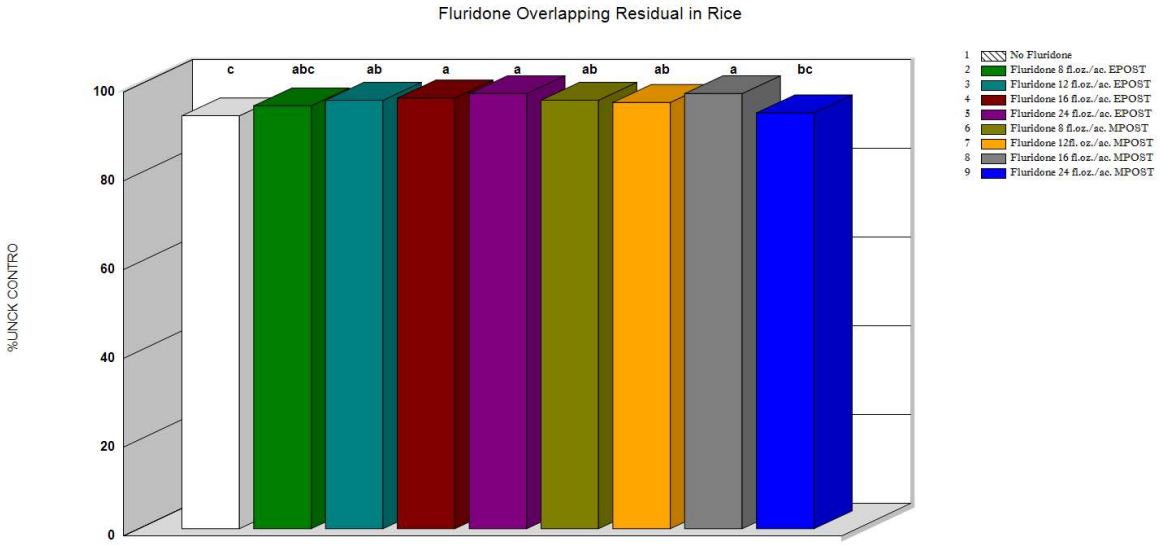

Figure 6. Rice yield (bu./ac.) following applications of fluridone at 0,8,12,16 or 24 fl.oz./ac applied to 1-2 leaf rice (EPOST) or 4-5 leaf rice (MPOST). Large boxes denote high variability in data across replications.