

WEED SCIENCE

EFFECT OF SIMULATED HERBICIDE DRIFT ON RICE GROWTH AND YIELD

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GLYPHOSATE-RESISTANT WEEDS, PRIMARILY GLYPHOSATE-RESISTANT PALMER AMARANTH, ARE THE PRINCIPAL WEED CONTROL ISSUE FACING GROWERS IN MISSISSIPPI. RICE IS NOT DIRECTLY AFFECTED BY GLYPHOSATE RESISTANCE, BUT IT IS IMPACTED INDIRECTLY THROUGH OFF-TARGET MOVEMENT OF HERBICIDES TARGETING GLYPHOSATE-RESISTANT WEEDS IN ADJACENT FIELDS.

Mississippi State University Extension Service recommendations are to apply the non-selective herbicide paraquat (Gramoxone SL, Parazone, Firestorm, etc.) mixed with a residual herbicide to control glyphosate-resistant weeds prior to planting corn, cotton, or soybean. Unfortunately, cases of paraquat drift to rice have increased in Mississippi in recent years, but little research has been conducted to evaluate the effect of paraquat on rice growth and yield. Previous research at the Mississippi State University Delta Research and Extension Center showed that rice yield was reduced with Reflex and metribuzin applied prior to flooding at 25% of the use rate. Gramoxone SL reduced rice yield when applied prior to flooding at 12.5 and 25% of the use rate.

A follow up study evaluated the effect on rice of low rates of Gramoxone SL and Reflex applied at different application timings. Simulated drift applications were made at 25% of the use rates of Gramoxone SL (3 pt/ac) and Reflex (1 pt/ac). These treatments were applied very early-postemergence (VEPOST) to rice in the one-leaf stage, early-postemergence (EPOST) to rice in the two- to three-leaf stage, mid-postemergence (MPOST) to rice in the three- to four-leaf stage, late-postemergence (LPOST) to rice in the four-leaf to one-tiller stage, or 21 days

after flooding (21 d PTFLD).

At 14 DAT, rice injury with Gramoxone SL was greatest from EPOST applications and least from applications 21 d PTFLD. Rice injury following EPOST applications of Gramoxone SL was still 74% at 28 DAT. Gramoxone SL applications VEPOST, EPOST, MPOST, and LPOST delayed rice maturity 2 to 10 days. Rice treated with Gramoxone SL 21 d PTFLD never fully matured. All applications of Gramoxone SL reduced rice yield $\geq 13\%$ with similar reductions following EPOST, MPOST, and LPOST applications. Gramoxone SL applications after flooding reduced rice yield 84%.

Rice injury 14 DAT with Reflex was $<15\%$ regardless of application timing. Reflex applications only influenced rice heading when applied 21 d PTFLD, and the delay following this application was only 1 day. Rice yield was not reduced following applications of Reflex VEPOST, EPOST, or MPOST; however, Reflex applied LPOST and 21 d PTFLD reduced rice yield 12 and 36%, respectively.

Based on visual estimates of rice injury 14 DAT and rice maturity, Gramoxone SL applications were more damaging to rice than Reflex. Effects on rice maturity and yield varied between the herbicides based on application timing. Rice recovered from

Rice response to sub-lethal rates of Gramoxone SL at different application timings



Nontreated



VEPOST



EPOST



MPOST



LPOST



14 d PTFLD

early-season injury following simulated drift of Reflex with no reductions in rice yield following applications VEPOST, EPOST, or MPOST. Although the magnitude varied, yield reductions were greatest with either herbicide following applications 21 d PTFLD. Yield reductions following 21 d PTFLD applications of Gramoxone SL and Reflex were 84 and 36%, respec-

tively. Problematically, the greatest visual injury 14 DAT from these applications was 28% with Gramoxone SL. Therefore, the full extent of the consequences of drift of these herbicides occurring at midseason may not be apparent until harvest. Previous research has shown this to also be the case with drift of glyphosate and Liberty 280.