

AGRONOMY

NITROGEN FERTILIZER PROGRAMS FOLLOWING RICE EXPOSURE TO GRAMOXONE SL

Benjamin Lawrence, Jason Bond, Bobby Golden, Tyler Hydrick, and Matthew Edwards

"OUR STUDIES INDICATE SEVERE RICE GROWTH AND DEVELOPMENT ISSUES CAN OCCUR FROM OFF-TARGET MOVEMENT OF GRAMOXONE SL. RICE WAS UNABLE TO OVERCOME EARLY-SEASON EXPOSURE TO GRAMOXONE SL IN EITHER FERTILIZER STUDY."

Jason Krutz

In Mississippi, rice is produced within the Mississippi and Yazoo River Delta. Rice accounts for about 5% of the total row crop acreage in Mississippi; therefore, it is commonly grown adjacent to corn, cotton, and/or soybean. Row-crop producers in Mississippi have primarily chosen to continue the use of Roundup Ready cropping systems in the presence of glyphosate-resistant weeds. In these production systems, Gramoxone SL is often applied prior to planting at three pints per acre for glyphosate-resistant weed control.

Nitrogen (N) fertilizer is applied to rice in the greatest quantity and frequency of any nutrient, and a single pre-flood N application prior to rice tillering is the most efficient N delivery method for rice in Mississippi.

However, split applications are also recommended under challenging rice management scenarios. Starter N fertilizers applied to two-leaf rice and during stressful environmental conditions have been shown to increase yields as much as 10 bushels per acre. Due to Mississippi's diverse cropping landscape, incidents of off-target movement of Gramoxone SL to rice from adjacent fields have increased in recent years. Nitrogen fertilizer is a cornerstone input for rice production; therefore, altering fertilizer management strategies or adding starter fertilizer may improve rice performance following exposure to a sub-lethal rate of Gramoxone SL.

Two studies were conducted at Delta Research and Extension Center to determine the impact of starter N



Different urea N management strategies applied before and after rice exposure to Gramoxone SL.

Urea Application Splits	Urea Application Timing	
	Urea (N) Units lb/A	Timing
None	150	LPOST
Two	100:50	LPOST:PD
Three	75:37.5:37.5	LPOST:14DPF:PD
Four (1)	37.5:37.5:37.5:37.5	MPOST:LPOST:14DPF:PD
Four (2)	37.5:37.5:37.5:37.5	LPOST:14DPF:PD: 5% Head
*EPOST (2- to 3-leaf); MPOST (3- to 4-leaf); LPOST (4-leaf to 1-tiller); PD (panicle differentiation); 14 DPF (14 d postflood); 5% HD (panicle emergence)		

Table 1. Urea (46-0-0) application timings and rate following rice exposure to Gramoxone SL applied at 10% the recommended use rate in Mississippi.

fertilizer (AMS 21-0-0) and altering urea (46-0-0) applications to rice exposed to sub-lethal rates of Gramoxone SL. Gramoxone SL was applied at the two- to three-leaf (EPOST) rice growth stage in both studies at 10% of the suggested use rate of three pints/ac to simulate a worst-case scenario drift event. Starter N fertilizer treatments were applied at 21 units seven days before, the same day as, or seven days after Gramoxone SL applications. In the study evaluating N fertilizer management strategies, urea treatments are shown in Table 1.

Gramoxone SL injured rice by $\geq 48\%$, reduced rice height by 56%, delayed rice maturity by eight days, and reduced rice yield 56%, regardless of starter N fertilizer treatment. Results from the starter N fertilizer study

indicated that AMS did not aide in rice recovery following exposure to sub-lethal rates of Gramoxone SL. Regardless of urea application timing, Gramoxone SL injured rice by $\geq 50\%$, reduced rice height by 16%, and delayed rice maturity 5 days. Differences in rice yield were observed due to urea applied at different application timings, but yield loss due to Gramoxone SL was at least by 58% regardless of urea management.

Both studies indicate severe rice growth and development issues can occur from off-target movement of Gramoxone SL. In either fertilizer study, rice was unable to overcome early-season exposure to Gramoxone SL. Extreme caution should be exercised if Gramoxone SL is applied adjacent to rice.



Ammonium sulfate (AMS) applied as a starter fertilizer before and after rice exposure to Gramoxone SL.