

EFFECT OF SIMULATED 2,4-D DRIFT ON COTTON GROWTH, DEVELOPMENT, AND YIELD**Darrin M. Dodds****Mississippi State University****Mississippi State, MS****Guy D. Collins****A. Stanley Culpepper****Seth Byrd****University of Georgia****Tifton, GA****Peter A. Dotray****Misha Manuchehri****Texas Tech University****Lubbock, TX****Abstract**

Given the proliferation of glyphosate-resistant Palmer amaranth throughout much of the Southeast and Mid-South regions of the United States, efficacious and cost effective means of control are needed. The Enlist™ weed control system is under development by Dow AgroSciences and will allow for postemergence application of glyphosate, glufosinate, and 2,4-D to cotton containing Enlist™ technology. Several previous studies have demonstrated that 2,4-D is efficacious on a number of weed species including Russian thistle, Palmer amaranth, smallflower morningglory, and carpetweed. Although weed control efficacy has been demonstrated, concerns exist regarding off-target movement of 2,4-D. To address this concern, Dow AgroSciences has developed 2,4-D choline™ which boasts reduced volatility and potentially reduced drift. However, cotton containing Enlist™ technology grown in close proximity to cotton without Enlist™ technology as well as potential issues with 2,4-D tank contamination have created a need to determine the extent of damage that can be expected from off-target movement of 2,4-D. Therefore, this research was conducted to determine the effect of 2,4-D on cotton growth development, and yield.

Studies were conducted in 2013 in Moultrie and Tifton, GA; Starkville, MS; and Lubbock, TX. PHY 499 WRF was planted at all locations. In addition, small plot research techniques were utilized at all locations which included two or four row plots which were 30 to 40 feet in length and replicated four times. 2,4-D amine was applied at 0.0018 and 0.036 lb ai/ac at each location at the following cotton growth stages: 4-leaf; 9-leaf; 1st bloom; 1st bloom + 2 weeks; 1st bloom + 4 weeks; and 1st bloom + 6 weeks. Experiments were conducted using a randomized complete block design and means were separated using Fishers Protected LSD at $p = 0.05$.

Cotton height at first bloom ranged from 21-25 inches and was unaffected by 2,4-D application rate or timing (4- and 9-leaf applications had been made). However, nodes above white flower (NAWF) were reduced by 2,4-D application at 0.036 lb ai/ac to 9-leaf cotton as well as by 2,4-D application at 0.0018 and 0.036 lb ai/ac application to 4-leaf cotton. NAWF reductions from 4-leaf 2,4-D applications were worse when 0.036 lb ai/ac was applied compared to 0.0018 lb ai/ac. End of season cotton heights were unaffected by 2,4-D application rate or timing; however, cotton plants with aborted terminals were observed at the higher application rate at various growth stages. Seed cotton yield was negatively impacted by 2,4-D applied at 0.0018 lb ai/ac at the following growth stages: 4-leaf; 1st bloom, and 1st bloom + 2 weeks. Furthermore, seed cotton yields were negatively impacted by 2,4-D applied at 0.036 lb ai/ac at the following growth stages: 4-leaf; 9-leaf; 1st bloom; 1st bloom + 2 weeks; and 1st bloom + 4 weeks. 2,4-D applied 0.036 lb ai/ac at all growth stages with the exception of 1st bloom + 6 weeks significantly reduced seed cotton compared to 2,4-D applied at 0.0018 lb ai/ac applied at similar growth stages. The percentage of cotton bolls that opened was significantly reduced by 2,4-D applied at 0.036 lb ai/ac to 4-leaf, 9-leaf, and 1st bloom stage cotton. In addition, 2,4-D applied at 0.0018 lb ai/ac applied to 9-leaf cotton significantly reduced the amount of open bolls at harvest.

In conclusion, 2,4-D can adversely affect growth development, and yield of cotton. Even at extremely low rates, yield reductions were observed due to 2,4-D application. The most sensitive stages appear to be between the 4-leaf stage and two weeks after 1st bloom. Further research is needed to determine the minimum amount of 2,4-D required to cause growth deformities and yield losses.