EFFECTS OF SIMULATED DICAMBA AND 2,4-D DRIFT ON COTTON

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Abstract

Recent developments in herbicide-resistant traits have provided producers with cost-effective and efficacious weed control. Adoption of herbicide-resistant cotton varieties has been rapid, with acreage exceeding 95% in Mississippi. Future industry developments include traits which have potential resistance to dicamba and 2,4-D. Traditional cotton varieties are extremely susceptible to these herbicides and rapid adoption of the technology could lead to additional concerns relative to off-target deposition. Field experiments were conducted in order to determine the effects of simulated drift, e.g. reduced herbicide rates, on cotton injury and yield. Experiments were conducted in 2009 at the Blackbelt Branch Experiment Station in Brooksville, MS. Deltapine® 0924 B2RF cotton seed were planted at a population of 52,000 seeds per acre. Plot size measured 25 feet wide by 40 feet in length. Each plot was surrounded by a 12.6 ft buffer in order to prevent cross contamination of treatments. An experiment for each herbicide was designed as a factorial experiment having the main factor as application timing and the sub-factor being herbicide rates with 4 replications of each treatment. All applications were made at an application volume of 15 gallons per acre. Application timings included treatments which were applied to 10 and 16 node cotton. Treatments for the dicamba drift experiment included the following: Clarity 4L at 32 fl oz product/A (1 X), 8 fl oz/A (1/4 X), 2 fl oz/A (1/16 X), 0.5 fl oz/A (1/64 X), and 0.125 fl oz/A (1/256 X). The 2,4-D drift experiment had a similar rate reduction structure however the 1X rate of 2,4-D 4L was reduced to 16 fl oz/A, thus application rates were changed to 4 fl oz/A (1/4 X), 1 fl oz/A (1/16 X), 0.25 fl oz/A (1/64 X), and 0.0625 fl oz/A (1/256 X). Results from these experiments indicate that initial injury from simulated drift of 2,4-D is more evident when applied to 10 node cotton when compared to the injury observed with applications to 16 node cotton. One week after application (WAA), 25% crop injury was observed for the 1 X rate of 2,4-D when applied to 16 node cotton. Less than 10% injury was observed both 1 and 2 WAA for the remaining 2,4-D treatments when applied to 16 node cotton. Minimal crop re-growth was observed for all treatments of simulated 2,4-D drift to cotton. When simulated dicamba drift was applied to 10 node cotton, an increase in crop injury over time was observed for all rates except the 1/256 X rate. Crop injury 1 WAA from simulated dicamba drift was more pronounced on 16 node cotton when compared to injury sustained from the simulated 2,4-D drift, however, visual injury decreased with time. Greater yield reductions were found from earlier applications and higher rates for both dicamba and 2,4-D simulated drift. Visual crop injury from 2,4-D applications to 10 node cotton were similar to the injury observed from dicamba applications, however, greater yield reductions were observed for the 2,4-D applications. Complete yield loss was observed for the 1/64 X rate of 2,4-D when applied to 10 node cotton while less than 10% yield loss was observed for the 16 node application timing. Yield reductions ranged from 33 to 100% for all dicamba drift simulation rates at the 10 node application timing. At the 16 node application timing, yield reductions were less than 9% for both the 1/64 X and 1/256 X dicamba rates. For both 2,4-D and dicamba simulated drift, significant yield loss was observed for treatments where minimal crop injury was noted.