SOYBEAN RESPONSE TO SIMULATED DRIFT AND SPRAY TANK CONTAMINATION OF PLANT GROWTH REGULATOR HERBICIDES. Kevin B. Kelley, Loyd M. Wax, Aaron G. Hager, and Dean E. Riechers, Graduate Research Assistant, Professor, and Assistant Professors, Department of Crop Sciences, University of Illinois and USDA-ARS, Urbana, IL 61801.

Plant growth regulator (PGR) herbicides are very effective for weed control and are commonly used in corn and wheat production throughout the Midwest. However, soybeans are often grown in close proximity to corn and wheat fields and are very sensitive to PGR herbicides. Soybean demonstrating injury symptoms similar to those caused by PGR herbicides are commonly observed, and the increased use of postemergence herbicides has coincided with an increase in the frequency of these injury reports. Soybeans can be injured when a PGR herbicide moves off target either through spray drift or volatilization, or by residues dislodged from application equipment that was used for previous applications to a corn or wheat crop. This study evaluated the effects on soybeans of the commonly used PGR herbicides dicamba, dicamba + diflufenzopyr, 2,4-D and clopyralid. In 2001 and 2002, all four herbicides were applied at two ultra-low rates at two soybean vegetative growth stages and one early reproductive stage to simulate exposure by drift. In 2002, the commonly used soybean herbicides glyphosate, imazethapyr, imazamox and fomesafen were applied with and without 1% of a field use rate of dicamba at two vegetative growth stages to simulate tank contaminations.
Simulated drift of all four PGR herbicides caused significant soybean injury and plant height reductions. Soybeans were often able to compensate for the injury and reduced height through branching and yielded normally, though the level of injury and the probability of a yield response increased with higher rates. The severity of the response at different growth stages varied among herbicides. When comparing relative fractions of field use rates of these herbicides, increasing soybean injury followed the order dicamba > dicamba + diflufenzopyr > clopyralid > 2,4-D. Treatments including 1% of a field use rate of dicamba often resulted in a yield loss. However, when dicamba was combined with the commonly used soybean herbicides imazamox, imazethapyr and fomesafen at a late vegetative application, even greater soybean injury and yield loss occurred compared with dicamba applied alone. There was also a negative interaction at an early postemergence application between dicamba and fomesafen. Glyphosate did not have a negative interaction with dicamba at either application timing. These results indicate that soybeans can usually compensate for PGR herbicide injury and yield normally if they are not excessively stressed by an additional factor. When soybeans are additionally stressed by either a soybean herbicide or possibly an environmental stress, they are less able to compensate for the injury caused by a PGR herbicide than they would without the additional stress.

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