THE EFFECT OF AUXIN GROWTH REGULATOR HERBICIDES ON THE UPTAKE AND MOVEMENT OF GLYPHOSATE IN GRASS SPECIES

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Abstract

Dicamba controls numerous dicotyledonous weed species, including those that may be resistant to other herbicides like glyphosate. The development of dicamba-resistant cropping systems has the potential to provide many additional options in weed control. Plans are to incorporate dicamba, glufosinate, and glyphosate-resistant technology into the same plant. Prior research has indicated that a tank mixture of dicamba and glyphosate can lead to antagonism of glyphosate activity on grasses. Recently conducted field studies, indicate possible antagonism of glyphosate by dicamba when applied to barnyardgrass (*Echinochloa crus-galli*). The same studies also indicated that grass control was not significantly different between dicamba formulations; however, rate of dicamba did affect glyphosate visual control.

A study was designed to determine absorption and uptake of glyphosate in response to the presence of dicamba, as well as determine the ability to overcome possible antagonism with increasing rates of glyphosate. Rates of 0.25, 0.50, and 0.75 lb ae/A of glyphosate as well as, a set of identical glyphosate rates that included the addition of 0.50 lb ae/A diglycolamine dicamba were evaluated. A radio labeled ^{14}C glyphosate was utilized in and added to a small portion of the prepared spray solution. Plants were treated with the radio labeled spray solution on the 2nd leaf from the top, halfway between the leaf tip and collar on the adaxial leaf surface.

At 24 hours after treatment, the treated area was washed and the plant was partitioned into sections. The treated area was washed with water and then chloroform to remove any glyphosate on and in the epicuticular leaf wax, respectively. The majority of the labeled glyphosate was contained in the water wash of the treated area. Total glyphosate uptake after 24 hours ranged from 10 to 28% of the total applied amount. The portion of the plant below the treated leaf had a stair-step pattern of increased glyphosate concentration as glyphosate rates were increased; however, this pattern did not occur when dicamba was added. The presence of dicamba reduced the amount of glyphosate absorption at the 0.50 and the 0.75 lb ae/A rates. Uptake of glyphosate at the 0.50 lb ae/A rate was not different to that of the 0.75 lb ae/A glyphosate plus 0.50 lb ae/A dicamba, indicating that a 50% rate increase was needed to achieve similar levels within the plant. Overall, the addition of dicamba to glyphosate did result in decreased uptake at the 0.50 and the 0.75 lb ae/A rates of glyphosate; however, decreased uptake does not necessarily equal decreased efficacy as all may have reached a lethal concentration in the 24 hours uptake period.