EFFICACY OF PHOSPHITE FERTILIZATION FOR WEED SUPPRESSION IN THE *PTXD* COTTON SYSTEM

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Herbicide-resistant weeds have emerged as a serious problem in US cotton. Development and adoption of novel weed management strategies and approaches is of prime importance. Phosphorus (P) is an essential macronutrient required for the normal growth and development of plants. Plants can only metabolize P in the orthophosphate (Pi) form, but unable to utilize the phosphite (Phi) form. A transgenic variety of cotton with the bacterial phosphite dehydrogenase (*ptxD*) gene has the ability to convert Phi into Pi, whereas weeds lack this ability and thus can be negatively impacted by Phi application in a P deficient soil. In 2020, a series of studies were conducted to understand the effects of Phi application on cotton (*ptxD* and non-*ptxD* varieties) and weeds [Palmer amaranth (*Amaranthus palmeri*) and johnsongrass (*Sorghum halepense*)] in four soil types: very low P [10 parts per million (ppm)], low P (15 ppm), moderate P (25 ppm), and normal P (50 ppm). The experiments were conducted in a randomized complete block design with three replications, comparing soil (preemergence) as well as foliar applications (postemergence). Results showed that Phi application negatively impacted weed growth, but the degree of impact greatly varied across residual soil P level and weed species. The impact was particularly greater in low P soil (10 to 15 ppm) and on broadleaf weeds such as Palmer amaranth. Subsequent studies with glufosinate and Phi tank-mix combinations further improved weed control efficacies. Additional investigations are required to standardize the utilization of Phi as a weed suppression tool in cotton.