

AGRONOMY

ZINC SOURCE AND RATE AFFECT INJURY AND TISSUE CONCENTRATION, BUT NOT YIELD, IN MISSISSIPPI CORN

Bobby Golden, Jason Bond, and John Orlowski

DESPITE THE HIGH LEVEL OF VISUAL INJURY, CITRATE-ZN IS LIKELY THE MOST COST-EFFECTIVE OPTION FOR CORN PRODUCERS CONSIDERING A FOLIAR ZINC APPLICATION.

Cotton in the Mississippi Delta has historically been planted in light textured, high-pH soils that typically have low organic matter levels. These soils are also generally low in certain micronutrients, including zinc. Cotton acreage in Mississippi has dramatically declined and the majority of former cotton acreage is currently being planted to corn. Corn planted on these light-textured, former cotton soils often exhibit zinc deficiency and numerous corn fields in the Mississippi Delta are positively identified as being zinc deficient during the growing season.

Zinc deficiency in corn generally occurs early in the growing season and is characterized by interveinal chlorosis and/or white mid-leaf streaking. Current Mississippi Extension recommendations call for 2-3 pounds of zinc/ac for soils that are deficient in zinc. However, corn producers in the Mississippi Delta are reluctant to use soil-applied zinc due to the cost and uncertainty of economic return. Producers are generally more interested in applying zinc as a foliar spray if zinc deficiency symptoms are observed in the corn crop.

Multiple formulations of zinc are available for foliar application and producers have reported varying

levels of foliar injury from different foliar zinc sources. However, it is unclear whether foliar injury observed from foliar applications of zinc results in yield loss. Furthermore, little information exists regarding the ability of different zinc formulations to increase the level of zinc in the corn plant and on the appropriate application rates for various zinc products used to correct zinc deficiencies in corn. Therefore, the objectives of this study were to (i) determine the level of corn injury caused by multiple foliar zinc sources, (ii) determine if injury caused by foliar zinc application affected corn grain yield, and (iii) determine plant tissue zinc content of corn treated with various foliar zinc sources at multiple rates.

Studies were established at the Mississippi State University Delta Research and Extension Center during the 2012, 2013 and 2014 growing seasons. Since an objective of this study was to determine if injury from foliar zinc application affected yield, study sites were chosen that had sufficient levels of zinc to support a high yielding corn crop (>200 bu/ac) and were unlikely to respond to foliar zinc application.

Treatments consisted of three zinc sources that are



Zinc deficient corn plant

labeled for foliar application on corn. One source was EDTA chelated zinc (EDTA-Zn). Another source was citric acid chelated zinc (Citrate-Zn). The final source was zinc sulfate (ZnSO_4). All three zinc sources were applied at rates of 0.5 lbs Zn/ac, 1.0 lb Zn/ac, and 2.0 lb Zn/ac at the four leaf growth stage (V4). Foliar injury was evaluated 3, 6, and 9 days after zinc application and yield were determined at harvest. Tissue samples were taken after zinc application to assess plant zinc status.

Differences in corn injury were observed among zinc sources and rates. In general Citrate-Zn resulted in the greatest foliar injury while ZnSO_4 resulted in the least foliar injury after application. Despite the differences in injury, corn grain yield was not affected. Although there were no yield differences between

zinc sources, producers may still want to avoid the high levels of visual injury associated with Citrate-Zn. At the 0.5 and 1.0 pound Zn/ac rates ZnSO_4 application resulted in similar levels of tissue zinc concentration as Citrate-Zn with much lower levels of foliar injury, indicating that ZnSO_4 may be the ideal zinc source for growers averse to foliar zinc injury. For growers less concerned with foliar injury, the lack of yield differences suggests that growers should choose a foliar zinc product based on price. At current market prices a Citrate-Zn product similar to the one used in this study would cost 39% less than the EDTA-Zn and ZnSO_4 products. Despite the high level of visual injury, Citrate-Zn is likely the most cost-effective option for corn producers considering a foliar zinc application.