

COMPARING INFIELD DISTRIBUTION OF ZINC AND PHOSPHORUS IN SOIL AND PLANT RESULTING FROM APPLICATIONS OF MIXED AND COMPOSITE FERTILIZERS

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Abstract

Due to the relatively low application rates (5.6-11.2 kg/ha-1 actual Zinc) uniform distribution of Zinc fertilizers may be a problem in some commercial cotton fields. As Zn moves slowly by diffusion in soil, corn roots must grow into new soil areas to obtain the necessary Zn. This process is inhibited by cool wet conditions often found early in the growing season, resulting in Zn deficiency. Fertilizers containing Phosphorus, Zinc and Sulfur composited in one granule are commercially available. In this study a composite fertilizer, MESZ (12-40-0-10S-1Zn, Mosaic Fertilizer, LLC, Riverview, FL) was compared to a mixture of diammonium phosphate (18-46-0) and zinc sulfate (0-0-0-20S-40Zn) for the ability to produce uniform distributions of P and Zn in soil and plant tissue. In a small plot evaluation multiple soil and plant tissue samples were systematically collected from each plot and analyzed for P and Zn content. The average and standard deviation for each plot was determined and statistically compared. Plots treated with the composite fertilizer were found to have lower standard deviation than those treated with the mixed fertilizers.

Table 1. Fertilizer treatments and soil test data, 2010

Treatment	Applied P in lb/a	Applied Zn in lb/a	Average soil test P (lb/a)	St Dev soil test P (lb/a)	Average soil test Zn (ppm)	St Dev soil test Zn(ppm)
Check	0	0	102b	4.1a	0.41b	0.15b
DAP + ZnSO ₄	46	5	111a	4.1a	0.86a	0.34a
MESZ	46	1	113a	4.1a	0.83a	0.18b

Values followed by the same letter are statistically equivalent at the alpha=0.05 level

Table 2. Plant tissue data for fertilizer treatments, 2010.

Treatment	Average plant P (%)	St Dev plant P (%)	Average plant Zn (ppm)	St Dev plant Zn (ppm)	Dry matter accumulation (gr/plant)	P uptake (mg/plant)	Zn uptake (mg/plant)
Check	0.15a	0.02a	28.5b	3.1a	2.2b	3.3b	0.0061c
DAP + ZnSO ₄	0.18a	0.02a	28.8b	2.5ab	3.0a	5.4a	0.0088b
MESZ	0.20a	0.02a	31.7a	1.8b	3.5a	6.8a	0.0191a

Values followed by the same letter are statistically equivalent at the alpha=0.05 level

Table 3. Average cotton lint yields for treatments, 2010.

Treatment	Cotton lint yield (lb/a)
Check	934b
DAP + ZnSO ₄	1024a
MESZ	1048a

Values followed by the same letter are statistically equivalent at the alpha=0.05 level