NITROGEN, PHOSPHOROUS, POTASSIUM, AND ZINC EFFECTS ON YIELD OF SWEETPOTATO

J. L. Main, M. W. Shankle, and T. F. Garrett

Pontotoc Ridge-Flatwoods Experiment Station; North Mississippi Research and Extension Center; Mississippi State University; Pontotoc, MS 38863

ABSTRACT: A zinc (Zn) nutrient trial was conducted at a producer location (Danny Clark Farm) on a Faulkner silt loam soil in Northwest Chickasaw County, Miss. The trial was developed to compare recommended N-P-K to no N-P-K and zinc at three rates on sweetpotato development. There were no differences in yield or root set due to the main plot treatments of recommended or no N-P-K. US No. 1 yield was 343 bu/ac and 329 bu/ac for the no N-P-K and recommended N-P-K treatments, respectively. There was an overall trend for higher yield for the no N-P-K treatment with the exception of the cull and jumbo grades. US No.1 yield and root set was higher for the check rate of zinc than the three Zn treatments.

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KEYWORDS: micronutrient, zinc, sweetpotato

MATERIALS AND METHODS: A zinc (Zn) nutrient trial was conducted at a producer location (Danny Clark Farm) on a Faulkner silt loam soil in Northwest Chickasaw County, Miss, in 2002. Soil nutrient content in the trial area was determined by previous grid sample soil tests in 2001. An area of the field that was deemed low in Zn was sampled again in the spring of 2002 to confirm a deficiency. Standard production practices were employed in the field with the exception of fertilizer and insecticide. Field preparation included disk, chisel plow, disk, and hip. The trial was a split plot randomized complete block design with three replications. The main plot factors consisted of soil test recommended 50-80-140 lb/ac N-P-K and no N-P-K. Subplot factors consisted of three zinc rates 1.2 lb ai/ac (low), 2.4 lb ai/ac (recommended), and 3.6 lb ai/ac (high). An additional check treatment of no zinc was included for comparison.

Planting occurred on June 6 and all treatments were applied on June 17, eleven days after transplanting (DAT). Soil samples were taken prior to treatment application from each main plot (data not shown). Main plot treatments were applied by hand to the assigned plot areas. Subplot treatments were applied over-the-top using a three-row backpack CO_2 sprayer. All treatments were incorporated using a Liliston rolling cultivator. At each of the three leaf sampling periods 40, 61, and 88 DAT, thirty leaves from fifth leaf below the last unfolded leaf were taken from each subplot for analysis (data not shown). At each date, hyper-spectral data was taken from the 350 to 1000 nm wavelengths to determine reflectance among the treatments using a hand held spectroradiometer (statistical analysis on going). Yield data was collected from 4 m of a single row in each subplot using a small chain type sweetpotato digger 105 DAT. Harvested roots were

graded according to the National Sweetpotato Collaborators group standards. Graded roots were weighed, counted, and converted to bu/ac and number/ac format.

RESULTS AND DISCUSSION: There were no interactions between the main and subplot factors at the 95 percent confidence interval. There were no differences in yield or root set due to the main plot treatments of recommended or no N-P-K (Table 1). US No. 1 yield was 343 bu/ac and 329 bu/ac for the no N-P-K and recommended N-P-K treatments, respectively. There was an overall trend for higher yield for the no N-P-K treatment with the exception of the cull and jumbo grades. US No.1 yield and root set was higher for the check rate of zinc than the three Zn treatments (Table 2). US No 1 yield ranged from 445 bu/ac for the check to 278 bu/ac for the 3.6 lb Zn ai /ac rate. Total marketable yield reflected the US No.1 yield differences with the check again producing a greater yield and root set, 610 bu/ac and 51333 roots/ac, than the zinc application treatments.

COOPERATORS: Dr. Michael Kenty, Helena Chemical company.

Table 1. Sweetpotato mean yield and root set of N-P-K from 3 replications, across zinc treatments in 2002.

	US No. 1		Canner		Cull		Jumbo		Total Marketable	
Treatments	Bu/ac[Z]	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac
50-100-140 N-P-K	329 a[Y]	16353 a	123 a	16720 a	144 a	8873 a	21 a	440a	473 a	42387 a
0-0-0 N-P-K	343 a	17967 a	123 a	14740 a	139 a	10413 a	19 a	366 a	486 a	43487 a

[Z] Bu/ac= # of 50 lb bushels per acre.

[Y] Means within a column followed by the same letter are not significantly different by Fishers' protected least significant difference (LSD) ($P \leq 0.05$).

Table 2. Sweetpotato mean yield and root set among zinc treatments from 3 replications, across N-P-K treatments in 2002.

	US No. 1		Canner		Cull		Jumbo		Total Marketable	
Treatment	Bu/ac[Z]	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac	Bu/ac	Roots/ac
0 lbai/ac	445 a[Y]	23027 a	151 a	20093 a	102 a	7920 a	13 a	293 a	610 a	51333 a
0.5 lb ai/ac	324 b	16280 b	119 a	14520 a	160 a	11000 a	22 a	440 a	466 b	42240 ab
1.0 lb ai/ac	296 b	15107 b	100 a	12760 a	159 a	9240 a	17 a	293 a	414 b	37400 b
2.0 lb ai/ac	278 b	14227 b	121 a	15547 a	145 a	10413 a	28 a	586 a	429 b	40773 b

[Z] Bu/ac= # of 50 lb bushels per acre.

[Y] Means within a column followed by the same letter are not significantly different by Fishers' protected least significant difference (LSD) ($P \leq 0.05$).