

NITROGEN, PHOSPHOROUS, POTASSIUM, AND LIME INCREASE YIELD OF SWEETPOTATO

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ABSTRACT: A lime 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 lime at three rates on sweetpotato development. US No. 1 yield and root set, were significantly higher for the recommended N-P-K treatment 415 bu/ac and 20386 roots/ac than the no N-P-K treatment, 271 bu/ac and 14446 roots/ac, respectively. While no difference was found in the yield of US No. 1 among lime treatments, the number of US No. 1 roots was higher for the 1000 lb/ac rate than the 334 lb/ac rate. The late application of lime may have required a higher amount per acre than if the lime had been applied in the fall as recommended. The highest rate of lime tended to produce a higher root set of US No.1 roots as well as jumbo roots. Lime appears to be increasing the sizing rate of the sweetpotato roots producing the more valuable small US No. 1 sized roots.

CITATION: Main, J. L., M. W. Shankle and T. F. Garrett. 2003. Nitrogen, phosphorous, potassium, and lime increase yield of sweetpotato. Annual Report 2002 of the North Mississippi Research & Extension Center. Mississippi Agriculture & Forestry Experiment Station Information Bulletin 398:243-245.

KEYWORDS: nutrient, lime, sweetpotato

MATERIALS AND METHODS: A lime trial was conducted at a producer location (Danny Clark Farm) on a Faulkner silt loam soil in Northwest Chickasaw County, Miss. 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 lime 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. Subplots consisted of three lime rates at 334 lb ai/ac (low), 664 lb ai/ac (recommended fall application rate), and 1000 lb ai/ac (high). An additional check treatment of no lime 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 by hand over-the-top of the crop. 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 using a small chain type sweetpotato digger 105 DAT. Roots were graded according to the National Sweetpotato Collaborators group standards. Roots were then weighed, counted, and converted to bu/ac and number/ac format.

RESULTS AND DISCUSSION: Interactions between main and subplot factors were not found at the 95 percent confidence interval in this trial. US No. 1 yield and root set were significantly higher for the recommended N-P-K treatment, 415 bu/ac and 20386 roots/ac, than the no N-P-K treatment, 271 bu/ac and 14446 roots/ac, respectively (Table 1). Total marketable yield was also increased by the recommend N-P-K application by 137 percent across the lime treatments. While no difference was found in the yield of US No. 1 among lime treatments the number of US No. 1 roots was higher for the 1000 lb/ac rate than the 334 lb/ac rate (Table 2). Canner yield was greater for the check and the 1000 lb/ac rate than the 334 lb/ac rate, 148,125, and 93 bu/ac, respectively. The number of canner roots ranged from 20,827 for the check to the lowest of 13,787 roots/ac for the 334 lb/ac rate. Cull yield was lower for the 1000 lb/ac rate than the 334 lb/ac rate, 175 and 273 bu/ac, respectively. Total marketable yield was higher for the 1000 lb/ac rate, 575 bu/ac than the 334 lb/ac rate yield of 427 bu/ac. The number of total marketable roots was higher for the check and the 1000 lb/ac rate then the 334 lb rate.

The late application of lime may have required a higher amount per acre then if the lime had been applied in the fall as recommended. The highest rate of lime tended to produce a higher root set of US No.1 roots as well as jumbo roots. Lime appears to be increasing the sizing rate of the sweetpotato roots producing the more valuable small US No. 1 sized roots.

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

| Treatments | US No. 1 | | Canner | | Cull | | Jumbo | | Total Marketable | |
|------------------|--------------------|----------|--------|----------|-------|----------|-------|----------|------------------|----------|
| | 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 | 415 a ^Y | 20386 a | 115 a | 17307 a | 248 a | 14667 a | 34 a | 586 a | 565 a | 52947 a |
| 0-0-0 N-P-K | 271 b | 14446 b | 130 a | 18773 a | 195 a | 14813 a | 9 a | 220 a | 410 b | 48253 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 lime treatments from 3 replications, across N-P-K treatments in 2002.

| Treatment | US No. 1 | | Canner | | Cull | | Jumbo | | Total Marketable | |
|---------------|--------------------|----------|--------|----------|--------|----------|-------|----------|------------------|----------|
| | Bu/ac ^Z | Roots/ac | Bu/ac | Roots/ac | Bu/ac | Roots/ac | Bu/ac | Roots/ac | Bu/ac | Roots/ac |
| 0 lb ai/ac | 320 a ^Y | 17307 ab | 148 a | 20827 a | 212 ab | 15400 a | 14 a | 293 a | 483 ab | 53827 a |
| 334 lb ai/ac | 304 a | 14373 b | 93 b | 13787 b | 273 a | 16427 a | 28 a | 440 a | 427 b | 45027 b |
| 664 lb ai/ac | 347 a | 16720 ab | 122 ab | 18480 a | 227 ab | 14080 a | 12 a | 293 a | 483 ab | 49573 ab |
| 1000 lb ai/ac | 401 a | 21267 a | 125 a | 19067 a | 175 b | 13053 a | 30 a | 586 a | 557 a | 53973 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) ($P \leq 0.05$).