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## SULFUR FERTILIZATION EFFECTS ON ONION YIELD AND PUNGENCY

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SUMMARY

The application of sulfur (S) as a fertilizer resulted in an increase in the yield of onion bulbs and an increase in the pungency (volatile sulfide content) of onion tissue as well as the percent S of dried onion leaves. Sulfur hastened maturity of onions and increased the size of onion bulbs.

INTRODUCTION

In the plant, sulfur (S) is a constituent of the amino acids cystine and methionine, the compound glutathione, and the vitamins thiamine and biotin. Sulfur is also constituent of mustard oil and the allyl and vinyl sulfides of onions and garlic. Yellowing of plants resulting from S deficiency is similar to that of N.

The S requirements of plants are generally believed to be satisfied by atmospheric deposition, irrigation, insecticides, or fertilizer carriers. However, S deficiencies have been observed with 'Granex' onions on the Gulf Coast of Texas and with high yielding forages such as 'Coastal' bermudagrass produced under a high fertilizer regime on sandy soils of East Texas. The objective of this study was to investigate the effects of S fertilization on the yield, volatile sulfide content (pungency), and chemical composition of onion plants at high rates of nitrogen (N), phosphorus (P) and potassium (K) on a fine sandy loam (fsl) soil.

MATERIALS AND METHODS

Sulfur from 21 percent calcium sulfate was banded approximately 4 inches (10.2 centimeters) below 'Yellow Granex' onion plants in late January at rates indicated in Tables 1 and 2. All experimental plots were treated with dolomitic limestone at 1000 lbs/A and received a uniform application of 60 lbs N, 26 lbs P, and 50 lbs K per acre (67 N, 29 P, and 56 K kilograms per hectare) with the S fertilizer. A soil test indicated the Dothan fsl was low in N, P, and S. In May, leaves from 10 onion plants were harvested, dried, and prepared for

chemical analysis. Shortly before 50 percent of the onion tops fell over, the volatile sulfide content (pungency) of bulb tissue was measured by use of a gas chromatograph. The maturity (number of tops down) and yield of onion bulbs was determined in mid-June.

#### RESULTS AND DISCUSSION

The application of 15 pounds per acre of S resulted in an increase in the yield of onion bulbs (Table 1). Sulfur application also increased the volatile S content (pungency) of onion bulb tissue as well as the maturity, percent S of leaf tissue, and size of onion bulbs (Table 2).

Consumers prefer low pungency "Yellow Sweet Spanish" type onions. Maximum yields of such onions bulbs can be achieved by the use of correct amounts of S fertilizer materials on the low S fine sandy loam type soils of East Texas.

Table 1. Effect of S on yield of 'Yellow Granex' onions, Overton, Texas, 1976

| <u>Sulfur rate</u> |              | <u>Yield</u>                |
|--------------------|--------------|-----------------------------|
| <u>Lbs/A</u>       | <u>kg/ha</u> | <u>23 kg (50# sacks)/ha</u> |
| 0                  | 0            | 725 b*                      |
| 5                  | 6            | 798 ab                      |
| 10                 | 11           | 798 ab                      |
| 15                 | 17           | 888 a                       |

\* Numbers in columns followed by the same letter are not different at the 5% level according to Duncan's new multiple range test.

Table 2. Effect of S on volatile sulfide content, mineral composition, bulb size, maturity and yield of 'Yellow Granex' onions at Overton, Texas, 1978

| Sulfur rate<br>Lbs/A | kg/ha | Propyl*<br>Disulfide | % S<br>(dry wt) | Bulb size<br>(gms) | Maturity<br>No. tops down | Yield<br>23 kg<br>(50# sack)/ha) |
|----------------------|-------|----------------------|-----------------|--------------------|---------------------------|----------------------------------|
| 0                    | 0     | 837 b <sup>Z</sup>   | 0.14 d          | 97 b               | 69                        | 665                              |
| 10                   | 11    | 917 ab               | 0.20 c          | 112 a              | 87                        | 785                              |
| 20                   | 22    | 1022 a               | 0.23 b          | 110 a              | 73                        | 719                              |
| 30                   | 34    | 936 ab               | 0.26 a          | 109 a              | 83                        | 719                              |

\* Gas chromatograph integrator counts representing amount of propyl disulfide in fresh onion tissue.

<sup>Z</sup> Mean separation in columns by Duncan's multiple range test.

Based on TAES PR-3551 by D. R. Paterson