

Nutrient Alternatives for Fresh Market Tomato and Cucumber Production

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Objectives

The objective of this trial was to evaluate alternative nutrient sources for their effects on cucumber and tomato yield and quality. For this trial, two organically approved sources (Microstart 60Plus and Naturesafe 13-0-0) were compared to a more standard nutrient program.

Summary

All three treatments gave similar total yield, yield of No. 1 and cull fruit for slicing cucumber. Nature Safe 13-0-0 produced the lowest number of cull cucumber fruit. For tomato, 4-0-8-2Ca and Microstart 60Plus had similar total yield. However, 4-0-8-2Ca had a higher yield of No. 1 fruit than the other two treatments. Differences may be due to the plants not having access to all the nutrients in the Nature Safe and Microstart products, which were applied as dry products prior to bed shaping and plastic laying. The 4-0-8-2 was applied as a liquid product through the drip system, which would have concentrated the nutrients in the area where the greatest number of roots would have grown.

Methods

Fertilizer

Prior to planting, 200 pounds of 0-0-60, 20 pounds of sulfur, 20 pounds of Solubor, and the following nitrogen sources and amounts were broadcast and incorporated:

Treatment Number	Nitrogen Source	Pounds Nitrogen/acre	Pounds Product/acre
1	Ammonium Nitrate	33	100
2	Microstart 60Plus 7-2-2	140	2,000
3	Nature Safe 13-0-0	140	1,077

To apply preplant nitrogen, reference points outside the trial were established, plots were laid out and the appropriate amount of each product was hand applied on April 10, 2007. To minimize soil and nutrient movement, the trial was rotovated and plot location reestablished. Treatment 1 was supplemented with 4-0-8-2Ca through the drip irrigation system at 1 pound nitrogen per acre per day beginning June 16, 2007 and ending August 20 for a seasonal total of 96 pounds per acre of nitrogen. Microstart 60Plus and Nature Safe 13-0-0 were applied to attain approximately 140 pounds per acre of nitrogen.

Weed Control

Weeds in beds were controlled with black plastic mulch. Between-row weeds were controlled by cultivating and hoeing.

Planting

‘Mountain Spring’ fresh market tomato seed was planted April 11, 2007 to 72 cell trays in a greenhouse and transplanted to the field on June 1 in beds 6 inches high and spaced 5.5 feet on center with an in row spacing of 1.5 feet (5,280 plants/acre). ‘Speedway’ slicing cucumber was direct seeded on June 1, 2007 at a rate of two seeds every 1.5 feet (10,560 plants/acre). The trial was planted and analyzed as a split plot design with nitrogen source as the main plot and crop as the subplot. There were four replications — 10 plants per replication for tomato and 20 plants for cucumber.

Plant Care

Plots were irrigated as needed and disease and insect pests controlled using recommended cultural practices.

Harvest and Data Collection

Harvest was conducted eight times for cucumber from July 19 to August 13, and six times for tomato from August 14 to September 19. Cucumber fruit was graded into No. 1, No. 2, and cull fruit; and tomato was graded into No. 1 large (>2.5” in dia.) and small (2.0 to 2.5” in dia.), No. 2, and cull fruit.

Results

Few significant differences were found between the three nutrient programs in either ‘Speedway’ or ‘Mt. Spring’ (Tables 1 and 2). Total yield, yield of No. 1, and yield of cull fruit between treatments had no significant differences for ‘Speedway.’ The only difference was in the yield of No. 2 ‘Speedway’ fruit, where the 4-0-8-2 treatment had higher yield than Nature Safe 13-0-0.

Differences for ‘Mt. Spring’ were more critical. The 4-0-8-2 treatment had the highest level of total yield and yield of No. 1 large fruit. Microstart 60Plus had similar total yield but 4-0-8-2 stood alone for yield of No. 1 large fruit.

Differences between 4-0-8-2 and the other treatments may be due to how the products were applied. Microstart and Nature Safe were applied dry and spread throughout the shaped bed. Even though soil was moist at bed shaping the weather during June and July was warm and dry, which would cause the beds to dry out except around the drip tape emitters. Plant roots only explore moist areas, and since the 4-0-8-2 product is a liquid applied through the drip, roots would have access to most of the nutrients in that product. A significant portion of the two dry products, however, may have been left unused since it would have been in areas outside the wetting pattern where there was minimal moisture for microbial activity and root growth.

Table 1. Yield in 1-1/9 bushels per acre of 'Speedway' slicing cucumber from three nutrient treatments at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan in 2007.

Treatment	Total Yield	Yield No. 1	Yield No. 2	Yield Cull
Standard 4-0-8-2	1,787	864	578	345
Microstart 60+7-2-2	1,787	865	543	380
Nature Safe 13-0-0	1,575	809	464	302
Lsd = .05	ns	ns	93	ns

Table 2. Yield in 25-pound cartons per acre of 'Mt. Spring' fresh market tomato from three nutrient treatments at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan in 2007. Fruit weight is in grams.

Treatment	Total Yield	Yield No. 1 Large	Weight No. 1 Large	Yield No. 1 Small	Yield No. 2	Yield Cull
Standard 4-0-8-2	4,055	2,154	285	356	841	705
Microstart 60+7-2-2	3,844	1,856	279	400	761	828
Nature Safe 13-0-0	3,648	1,654	291	390	789	815
Lsd = .05	379	266	ns	ns	ns	ns