FERTILIZATION OF FRESH MARKET TOMATOES PRODUCED UNDER HIGH TUNNELS

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OBJECTIVES:

1. To determine nitrogen and potassium levels necessary to maximize fresh market tomato produced under tunnels.
2. To determine the influence of nitrogen and potassium levels on the incidence of gray wall and green core in tomatoes grown under high tunnels.

SUMMARY:
Little significance was noted in yield or quality in 'Mt. Spring' fresh market tomato when subjected to nitrogen and potassium ratios of 1:1, 1:2, 1:3 or 1:4. No differences were found in total yield or gray wall and green core. Lack of differences may have resulted from lack of extreme nutrient levels, consistent moisture and lack of cool, wet, cloudy conditions during the growing season, all of which are reported to contribute to symptom expression. Few differences were also found when analyzing leaf nutrient levels.

METHODS:
Fertilizer: Prior to planting 33-0-0, 0-0-60, Cal-fortified (calcium plus micronutrients), sulfur and Solubor were broadcast and incorporated at 125, 250, 100, 25 and 10 pounds/acre, respectively. The following drip irrigation treatments were investigated:

0.5#/acre nitrogen plus:	1.0#/acre nitrogen plus:
0.5#/acre potassium	1.0#/acre potassium
1.0#/acre potassium	2.0#/acre potassium
1.5#/acre potassium	3.0#/acre potassium
2.0#/acre potassium	4.0#/acre potassium
1.5#/acre potassium plus foliar CaNO3	3.0#/acre potassium plus foliar CaNO3

All treatments were applied on a per acre per day basis through the drip system beginning 20 June and continued through 12 September 2005. Nitrogen and potassium were added using 3-0-20 and 28-0-0 (providing an actual nitrogen rate of 0.6-pounds/acre/day for the 2-pound/acre/day potassium treatment at the lower nitrogen rate). Foliar CaNO3 was applied on 28 July and 4, 11 and 18 August at the rate of 10 pounds/acre.
Fumigation/weed control: Beds were fumigated with 350 pounds/acre 67/33% Methyl Bromide/Chloropicrin at shaping and plastic laying. Between-row weeds were controlled by cultivating and hoeing.
Planting: 'Mountain Spring' fresh market tomato seed was planted 7 April to 72 cell trays in a greenhouse. Seedlings were transplanted to the field 2 June. Beds were 6" high and spaced 5.5' on center. In row spacing was 1.5' (5280 plants/acre). The trial was planted and analyzed as a randomized block design with four replications and eight plants/replication. Two guard plants bordered each plot. The trial was set up to compare treatments within each nitrogen level and not between nitrogen levels. Plumbing logistics of setting up such a trial was determined to be too difficult. This trial

is similar to a trial conducted outside the tunnel. Again, statistical comparisons cannot be made between tunneled and non-tunneled plantings because of the logistics of proper replication to evaluate tunneled and non-tunneled production.

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

Harvest and data collection: Harvest was conducted seven times between 9 August and 26 September and fruit graded into number one large (>2.5" in dia.) and small (2.0 to 2.5" in dia.), number two and cull fruit. Incidence of gray wall and green core in tomato was evaluated by randomly selecting eight fruit from six of the harvests and slicing them horizontally slightly toward the stem end and counting the number of fruit exhibiting symptoms. Leaf nutrient analysis was conducted at both nitrogen levels.

RESULTS:

Neither total yield nor yield of number one large fruit were affected by any treatment evaluated (Table 1 and 2). Differences in average fruit weight and incidence of green core and gray wall were found at the 0.5-pound nitrogen level (Table 1), all other traits were found non-significant.

Leaf nutrient analysis of both the 0.5 and 1.0-pound/acre treatments found no statistical differences in the major nutrients of nitrogen, phosphorous, potassium, calcium or magnesium. Differences at the 0.5-pound nitrogen level were noted for sodium, sulfur, manganese and zinc while the 1.0-pound nitrogen level had differences for sulfur, boron, copper and zinc.

This was a frustrating trial from the standpoint of such little differences were detected in the traits measured. Much effort went into this trial for what useful information was obtained. Visual differences were noted between the growth of plants in the 0.5 and 1.0 nitrogen levels, however growth at both levels still seemed excessive. It may be that even the 0.5 pounds/acre/day is luxuriant given the growing conditions of the tunnel. It is also possible varieties other than 'Mt Spring' may be better adapted to tunnel production.

Table 1. Yield in 25# cartons of 'Mt. Spring' fresh market tomato as influenced by five nitrogen to potassium ratios at the Southwest Michigan Research and Extension Center in 2005.

Treatment (#/acre/day)	Total Yield	Yield No.1 Large	% Total	Fruit Weight	Yield No. 2	% Total	Yield No.1 Small	% Total	Yield Cull	% Total	Green Core	Gray Wall
0.5N:0.5K	3221	1773	55	301	466	14	398	12	585	18	4	5.4
0.5N:1K	3050	1652	55	294	485	16	512	17	400	13	5.5	5
0.5N:1.5K	3096	1651	53	301	422	14	559	18	463	15	4.1	4.2
0.5N:2K	3030	1573	52	323	531	18	424	14	502	17	4.1	4.6
0.5N:1.5K+foliar	3008	1566	52	300	426	14	447	15	569	19	4.5	4
lsd .05	ns	ns	ns	28	ns	ns	ns	ns	ns	ns	1.1	1.1

Table 2. Yield in 25# cartons of 'Mt. Spring' fresh market tomato as influenced by five nitrogen to potassium ratios at the Southwest Michigan Research and Extension Center in 2005.

Treatment (#/acre/day)	Total Yield	Yield No.1 Large	% Total	Fruit Weight	Yield No. 2	% Total	Yield No.1 Small	% Total	Yield Cull	% Total	Green Core	Gray Wall
1N:1K	3306	1831	56	303	579	17	397	12	499	15	3.7	4.6
1N:2K	3253	1757	54	310	573	18	462	14	461	14	3.9	5.2
1N:3K	3019	1719	57	315	434	14	405	13	461	15	3.4	4.2
1N:4K	3244	1775	55	308	485	15	513	16	471	15	3.5	4.2
1N:3K+foliar	3325	1657	50	297	679	20	435	13	553	17	3.3	4.9
lsd .05	ns	ns	6	ns	195	5	ns	ns	ns	ns	ns	ns