
Response of Tomato to Fertilization with Meister Controlled-Release Fertilizers 98-02

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Tomato fertilization studies with Meister controlled-release fertilizers were carried out on an Arredondo fine sand soil at the University of Florida Horticultural Research Unit in Gainesville, Florida in the fall of 1997. Soil for the experiment was plowed and disked and pre-beds were formed on 4 ft centers. Soil samples were taken from the upper 6 inches of soil before bedding.

Fertilizer treatments are described in Table 1, consisting of rates of a Meister 19N-5 P₂O₅-14K₂O polymer-coated controlled-release fertilizer, soluble (ammonium nitrate plus potassium chloride) treatments, zero-N and zero-K checks, and two treatments evaluating effect of a foliar-applied controlled-release N fertilizer. Two methods of fertilizer placements were compared for the Meister fertilizer. The Meister and Coron (foliar) fertilizers were products marketed by Helena Chem. Co., Memphis, TN. Meister is a product of Chisso-Asahi Fertilizer Co., LTD., Tokyo, Japan and Coron is a product of Coron Corp., Souderton, PA.

On 18 August 1997, fertilizers were applied to the soil. For the broadcast placement treatments, fertilizer was spread by hand over the top of the pre-beds and incorporated by rototilling. Following rototilling, the beds were shaped and pressed. Beds were spaced 4-ft apart, center-to-center, were 6 inches in height, and 24 inches across the top surface. For the band placement treatments, fertilizer was placed off-center in a 6-inch-wide band on the bed surface and pressed lightly into the soil.

Following fertilizer application, the beds were fumigated (2 knives) with 98 methyl bromide -2 chloropicrin mixture at 350 lbs per acre (broadcast rate) and covered with white-on-black polyethylene mulch film (Sonoco Film Products, Hartsville, SC). During mulching, drip irrigation tubing was laid on the surface in the center of the bed. Drip irrigation tubing was 10 mil. thick with emitters on 12-inch spacing with 0.5 gal per minute per 100 ft flow rate (Chapin Watermatics, Watertown, NY).

Two treatments were used to test effects of foliar N in addition to reduced rate of N from controlled-release N. At early flowering of peppers and again 14 days later, foliar N was applied with a CO₂-powered back pack sprayer delivering 30 gal/acre solution. Foliar N was Coron controlled-release N applied in each spray at 2 gal/acre.

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Irrigation water was applied as needed to maintain the soil moisture at -10 cb on a tensiometer at 6 inches deep in the soil. Pests and diseases were controlled by timely application of labeled pesticides.

Tomato plants cv Agriset 761 (Agrisales Seeds Co., Ft. Myers, FL) were planted on 25 August 1997 in single rows on each bed. Plant spacing was 18 inches between plants in a row. Plots were 20 ft in length.

Tomatoes were harvested once, 7 November 1997, graded into extra large, large, medium, and cull fruits, and weighed.

Treatments were replicated four times in a randomized complete-block design. Data were analyzed by analysis of variance and treatment means compared with least significant difference.

Results and Discussion

Yields of extra large, large, medium, and total marketable tomato fruits were affected by fertilization treatment (Table 2). Greatest yields of extra large fruits were with Meister broadcast at 175 lb/acre N. Most other fertilizer treatments resulted in intermediate yields of extra large fruits, with lowest yields of extra large fruits resulting with the zero N or K treatments. Large fruit yields were greatest with either rate of Meister broadcast or with broadcast soluble fertilizer. Large fruit yields were significantly lower with any other fertilizer treatment. Yields of medium fruits were generally better with the Meister fertilizer treatment. Results of the tomato yields showed that treatments with Meister fertilizer led to improved yields of the more valuable extra-large fruits and probably enhanced fruit set since yields were better across all tomato size categories with controlled-release fertilizer. Cull fruit yield was not influenced by fertilizer treatment.

Total marketable fruit yield was greatest with the intermediate and highest rates of broadcast Meister fertilizer (Table 2). Total marketable yields were poorest with the zero N or K treatments. Results showed that tomato yields and values were greatest with 175 lb/acre N supplied by Meister broadcast.

Analysis of the main effects of placement and rate of Meister fertilizer also clearly demonstrated the advantage of broadcasting Meister in this fall tomato crop (Table 3). These results are different from those in a Spring crop (Hochmuth, 1997). When placing all of the fertilizer in the bed, even with controlled-release fertilizer, consideration should be given to the season and weather conditions. Broadcasting may favor yields in warm wet growing seasons.

Tomato yields, especially extra large and total marketable fruit yields, were increased with increasing rate of Meister (Table 3). There were no statistically significant difference between yields with 125 or 175 lb/acre N supplied from Meister, indicating that reductions in N use with Meister controlled-release fertilizer might be possible. Foliar controlled-release N did not influence tomato yields.

Summary

1. Extra large and total marketable tomato fruit yield was greatest with Meister controlled-release fertilizer.
2. Tomato yields were greater with broadcast fertilization compared to banding in this fall crop.
3. Total N rate could be reduced slightly from the recommended rate when using controlled-release fertilizer in this fall tomato crop.
4. Foliar controlled-release N application did not affect fruit yields of tomato.

Literature Cited

Hochmuth, G. 1997. *Response of Mulched Tomato to Meister Controlled-Release Fertilizer*. Florida Agricultural Experiment Station, North Florida REC - Suwannee Valley Report 97-8.

Table 1. Fertilization treatments for evaluation of Meister fertilizer for tomato, Fall 1997, Gainesville, FL.

<u>Treatment</u>	<u>Fertilizer</u>	<u>Placement</u> ^y	<u>N Rate (lb/acre)</u> ^z
1	Meister (19-5-14)	Band	75 (112)
2			125 (188)
3			175 (263)
4	Meister	Broadcast	75
5			125
6			175
7	AN/KCl ^x	Band	175
8		Broadcast	175
9	Check (ON) ^w		0
10	Check (OK) ^w		175
11	Meister ^v	Band	100 (Coron)
12	Meister ^v	Band	100

^z N rate expressed on basis of 6-ft centers; rate on 4-ft bed center basis in parenthesis.

^y Band was 6-inch wide band of fertilizer on surface center of bed; broadcast involved spreading fertilizer on surface of bed and incorporating with rotiller.

^x Mixture of ammonium nitrate and potassium chloride.

^w Checks were zero N with 175 lb/acre K₂O or 175 lb/acre N with zero K.

^v Treatments 11 and 12 were same except treatment 11 included two foliar sprays of Coron on controlled-release N foliar spray at 2 gal/acre each at early bloom and 14 days later.

Table 2. Response of tomato to fertilization with controlled-release N, first harvest, Fall 1997, Gainesville, FL.

Treatment	Yield (25-lb carton/acre) ^z				
	Extra Large	Large	Medium	Total Marketable	Cull
1	236	498	203	937	19
2	308	674	266	1247	62
3	333	626	240	1198	61
4	277	780	229	1287	78
5	374	833	322	1529	96
6	528	1008	297	1833	94
7	341	656	223	1220	47
8	317	819	163	1300	77
9	93	227	101	421	10
10	130	237	138	506	25
11	236	482	201	919	46
12	319	492	186	997	14
Prob. >F	0.0001	0.0001	0.0023	0.0001	0.1864
LSD (0.05) ^x	128	275	95	386	NS

^z Yield in 25-lb cartons per acre (4-ft bed centers).

^y Treatment descriptions in Table 1.

^x Probability of greater F value with least significant difference with P>F was less than 0.05 or not significant (NS).

Table 3. Response of pepper to fertilization with controlled-release N, second harvest, Fall 1997, Gainesville, FL.

<u>Meister Placement</u>	<u>Meister Rate (lb/acre N)^y</u>	<u>Yield (25-lb carton/acre)^z</u>				
		<u>Extra Large</u>	<u>Large</u>	<u>Medium</u>	<u>Total Marketable</u>	<u>Cull</u>
Band		293	599	236	1128	48
Broadcast		393	874	283	1550	89
Prob. >F ^x		0.0532	0.0024	0.1378	0.0020	0.0784
Significance F-test ^x		NS	**	NS	**	NS
	75	257	639	216	1112	48
	125	341	753	294	1388	79
	175	431	817	268	1516	77
	Prob. >F	0.0315	0.1823	0.1277	0.0302	0.4767
	LSD (0.05)	117	NS	NS	275	NS

^z Yields in 25-lb cartons per acre (4-ft bed centers).

^y Meister rate in terms of lb/acre N based on 6-ft beds, typical pepper bed spacing.

^x Probability of greater F value and significance of F-test at 5% (*) or 1% (**) probability levels, or not significant (NS).