Tomato Nitrogen Rate Study

Thomas Horgan, Casey Barickman, David Nagel, and Eugene Blythe
North Mississippi Research & Extension Center P.O. Box 1690 Verona MS 38879. 662-566-2201.
E-mail: teh5@ra.msstate.edu

Introduction: The standard recommendation for tomatoes from the Mississippi State University Soil Testing Lab is 120 lbs of actual Nitrogen per acre (N/ac). A number of Mississippi growers and extension agents have questioned if this was adequate. In the 2014 Vegetable Crop Handbook for Southeastern United States 200.5 lbs of N/ac is the recommended rate. This study was conducted to determine yield differences from the Nitrogen rates of 0, 50, 100, 150, and 200 lbs N/ac applied in split applications to 3 tomato varieties, field grown in north Mississippi.

Materials and Methods: Rocky Top, Cherokee Purple, and Big Beef tomato varieties were grown in the summer/fall of 2013 and 2014 in northern Mississippi (Table 1). The experimental design was a randomized complete block with four replications. Each replication consisted of 6 plants with the middle 4 harvested for data. Raised beds were formed, 6 in high and 30 in across the top, with a press-pan-type bed shaper that installs drip-tape as the bed is formed. Plants were irrigated to apply approximately 1 acre inch (27,000 gal/ac) of water/week minus rainfall. Plants were spaced 2 ft. apart in the row and rows were on 8 ft. centers. Plants were greenhouse seeded the 1st week of July and transplanted to the raised beds the last week of July. A rebar/tomato stake was driven between every two plants for support and the Florida weave trellising technique was used. Ammonia nitrate was the nitrogen source. All plots received one-half the assigned Nitrogen rate 7 days after transplant (DAT), 1/4 rate was applied 27 DAT, and the final 1/4 rate was applied 48 DAT. No lime or P was required but all the K, 180 lbs/ac of 0-0-60, was applied pre-plant according to Mississippi State Soil Testing Laboratory recommendations. A motorized back pack mist sprayer was used for insect and disease control. The insecticides Asana, Warrior, Insecticidal Soap, and Bt (Bacillus thuringensis), were mixed with the fungicides Bravo WS, Quadris, or Kocide and sprayed every 7-10 days. Harvest began early October and every 3-5 days until the last harvest after the first killing frost in early to mid November.

Figure 1. Rocky Top 0-200 lbs N/ac with all the tomatoes from a 4 plant rep., harvested 14 Oct.

Figure 2. Cherokee Purple 0-200 lbs N/ac with all the tomatoes from a 4 plant rep., harvested 14 Oct.

Figure 3. Big Beef 0-200 lbs N/ac with all the tomatoes from a 4 plant rep., harvested 14 Oct.

Table 1. Cultivar name, seed source, and descriptions of the 3 tomatoes grown during the summer/fall of 2013 in northern Mississippi.

Entry	Seed Source [x]	Description
RockyTop	Rogers	Hybrid, beef steak, extra-large fruit, determinate
Big Beef	Siegers	Hybrid, beefsteak, indeterminate, AAS winner
Cherokee Purple	Johnny's	Heirloom, flattened fruit, indeterminate, consistent taste test winner

[x] Seed of these cultivars is available from more than one seed company. The company listed was the source of seed for our trial.

Table 2. The total marketable, jumbo, and extra large per plant tomato yield of the 5 Nitrogen rates in 2013 & 2014.[y]

Treatment lbs N/ac	Total Weight (lbs)		Total Number (#)		Jumbo Weight (lbs)		Jumbo Number (#)		Ex-Large Weight (lbs)		Ex-Large Number (#)	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
200	13.9 a	15.0 a	24.1 a	28.2 a	6.7 a	6.3 a	8.9 a	7.8 a	6.1 a	6.0 a	12.3 a	12.0 a
150	13.7 a	14.7 a	22.0 ab	28.2 a	6.5 a	5.7 a	8.6 a	7.1 a	5.6 ab	6.1 a	11.1 ab	12.3 a
100	12.9 ab	14.8 a	24.3 a	25.2 a	6.4 a	6.0 a	8.6 a	7.7 a	6.5 a	6.2 a	12.8 a	12.1 a
50	12.2 bc	14.5 a	20.6 b	27.2 a	6.7 a	5.3 a	8.9 a	6.5 a	4.8 b	6.3 a	9.5 b	11.6 a
0	11.0 c	13.2 a	18.9 b	24.9 a	5.7 a	4.7 a	7.5 a	5.8 a	4.7 b	6.2 a	9.4 b	12.0 a

[y] Means sharing the same letter, within a column, were not significantly different. LSD at *P*=0.10

Table 3. The total per-plant per-variety yield of jumbo and extra-large tomato fruit.[z]

Variety	Jumbo Weight (lbs)		Jumbo Number (#)		Ex- Large Weight (lbs)		Ex- Large Number (#)	
	2013	2014	2013	2014	2013	2014	2013	2014
Rocky Top	8.0 a	5.7 a	10.4 a	7.5 a	5.3 b	7.2 a	10.4 b	15.2 a
Cherokee Purple	6.6 b	5.6 a	8.5 b	6.5 a	4.3 c	3.7 b	8.6 c	7.0 b
Big Beef	4.7 c	5.5 a	6.5 c	6.9 a	7.0 a	7.7 a	14.1 a	13.8 a

[z] Means sharing the same letter, within a column, were not significantly different. LSD at *P*=0.10

Results: In 2013 total per plant yields of the 200 and 150 lbs N/ac rates were significantly greater than the 50 and 0 lbs N/ac but not greater than 100 lbs N/ac which had the highest total number (24.3) of tomatoes (Table 2). The total number of the 200 and 100 lbs N/ac rates were significantly greater than the 0 and 50 lbs N/ac but not the 150 lbs N/ac. The 5 nitrogen rates had no significant yield effect on the weight or number of the Jumbo grade however in the Extra Large grade 200 and 100 lbs N/ac out produced 50 and 0 lbs N/ac. Rocky Top yielded the most Jumbo, Big Beef yielded the most Extra Large with Cherokee Purple being intermediate (Table 3). Cherokee Purple, a heirloom variety, produced many severely cracked and misshaped culls. Over 95% of the marketable yields were the jumbo and extra large grades therefore the large and medium grade data was not included here. This data shows that the recommended rate of 120 lbs N/ac is more than adequate to maximize yields. In 2013 & 2014 the N treatments had no effect on cull numbers or weights, however Rocky Top had the fewest culls.

Current commercial tomato production information for Mississippi – insect, disease, and weed management as well as recommended fertigation and spray schedules – is available in the Southeastern U. S. Vegetable Crop Handbook.
Copies are available from your extension office or online at: http://www.thegrower.com/south-east-vegetable-guide/pdf/